STRATFORD MINING COMPLEX
Air Quality Management Plan

STRATFORD MINING COMPLEX
(STRATFORD EXTENSION PROJECT)

AIR QUALITY MANAGEMENT PLAN

Revision Status Register

Section/Page/ Annexure	Revision Number	Amendment/Addition	Distribution	DP&E Approval Date
All	AQMP-R01-A	Original	EPA, DP&E	22 March 2018

MARCH 2018
Project No. YAN-17-10
Document No. AQMP-R01-A

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1 INTRODUCTION

1.1 STRATFORD MINING COMPLEX

Stratford Coal Pty Ltd (SCPL), a wholly owned subsidiary of Yancoal Australia Limited (Yancoal), owns the Stratford Coal Mine (SCM), which is located approximately 100 kilometres (km) north of Newcastle, New South Wales (NSW) (Figure 1). SCPL also owns the Bowens Road North Open Cut (BRNOC), located to the immediate north of the SCM. The SCM and BRNOC are collectively referred to as the Stratford Mining Complex (SMC).

Yancoal also owns the Duralie Coal Mine (DCM), which is located approximately 20 km south of the SMC (Figure 1). Run-of-mine (ROM) coal from the DCM is transported by rail to the SMC for processing and export.

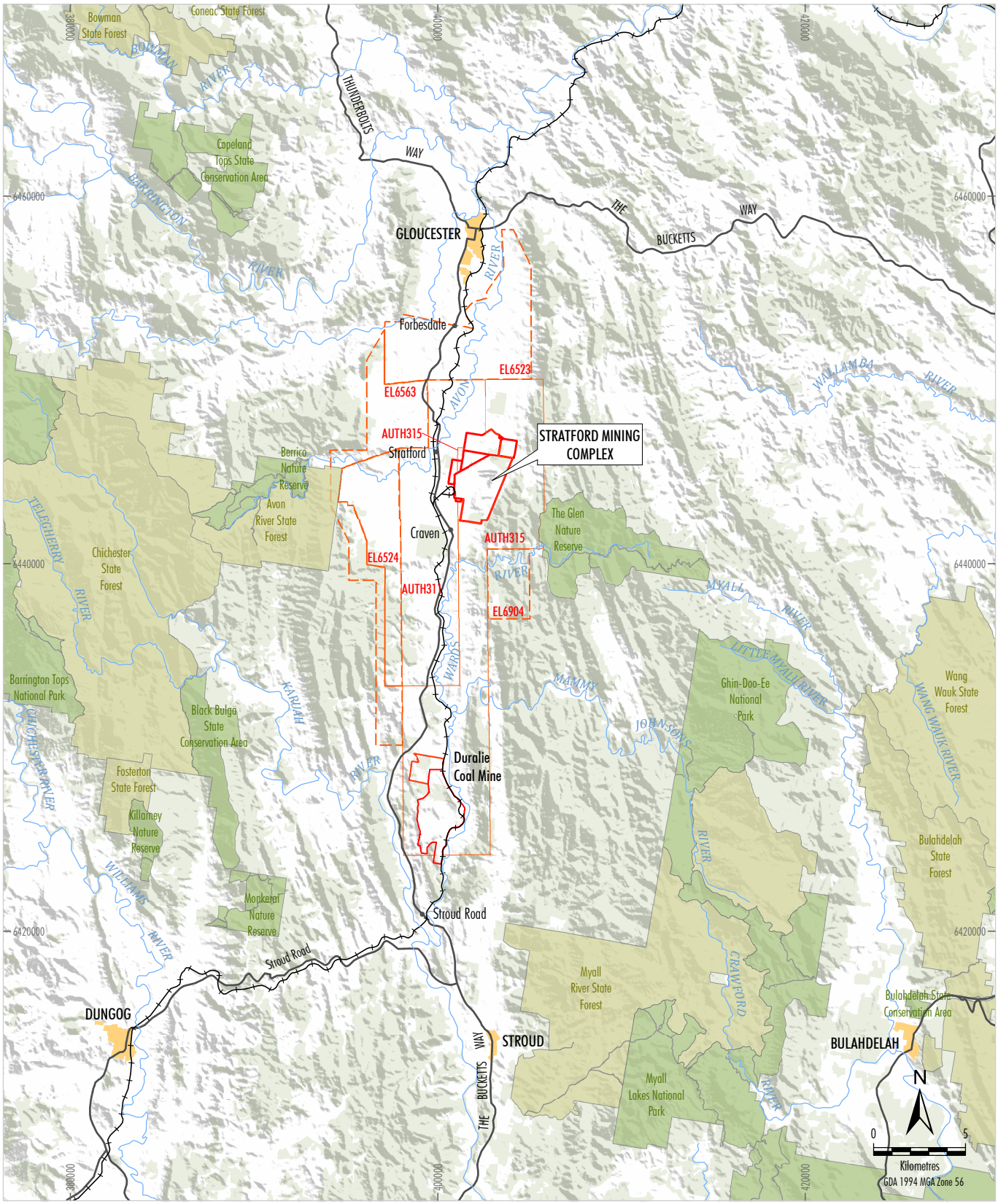
Mining activities approved under the SCM Development Consent and the BRNOC Development Consent were suspended in mid-2014, however, processing of ROM coal from the DCM and the export of product coals has continued under the SCM Development Consent.

Development Consent SSD-4966 for the Stratford Extension Project (SEP) was granted on 29 May 2015 and involves the extension and continuation of mine operations at the SMC[1], including (among other things) (Figure 2):

- mining of up to 2.6 million tonnes of ROM coal per annum;
- continuation of mining in the BRNOC; and the extension of mining into three new open cut mining areas:
  - Roseville West Pit Extension;
  - Avon North Open Cut; and
  - Stratford East Open Cut.
- progressive backfilling of mine voids with waste rock behind the advancing open cut mining operations;
- continued and expanded placement of waste rock in the Stratford Waste Emplacement and Northern Waste Emplacement;
- coal processing at the existing coal handling and preparation plant (CHPP);
- stockpiling and loading of product coal to trains for transport on the North Coast Railway to Newcastle;
- disposal of CHPP rejects via pipeline to the existing co-disposal area in the Stratford Main Pit and, later in the mine life, the Avon North Open Cut void;
- continued use of existing water storages/dams and progressive development of additional sediment dams, pumps, pipelines, irrigation infrastructure and other water management equipment and structures;
- other associated minor infrastructure, plant, equipment and activities and minor modifications to existing structure, plant and equipment and activities; and
- rehabilitation of the site.

The general arrangement of the approved SMC is provided in Figure 2. The approximate extent of the initial activities is shown on Figure 3.

[1] A copy of Development Consent SSD-4966 (and other statutory State and Federal licenses and approvals) is available on the Stratford Coal website (www.stratfordcoal.com.au).



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LEGEND

- Mining Lease Boundary
- Exploration Licence Boundary
- NSW State Forest
- National Park, Nature Reserve or State Conservation Area

Source: Geoscience Australia (2006); NSW Department of Planning & Environment (2017)

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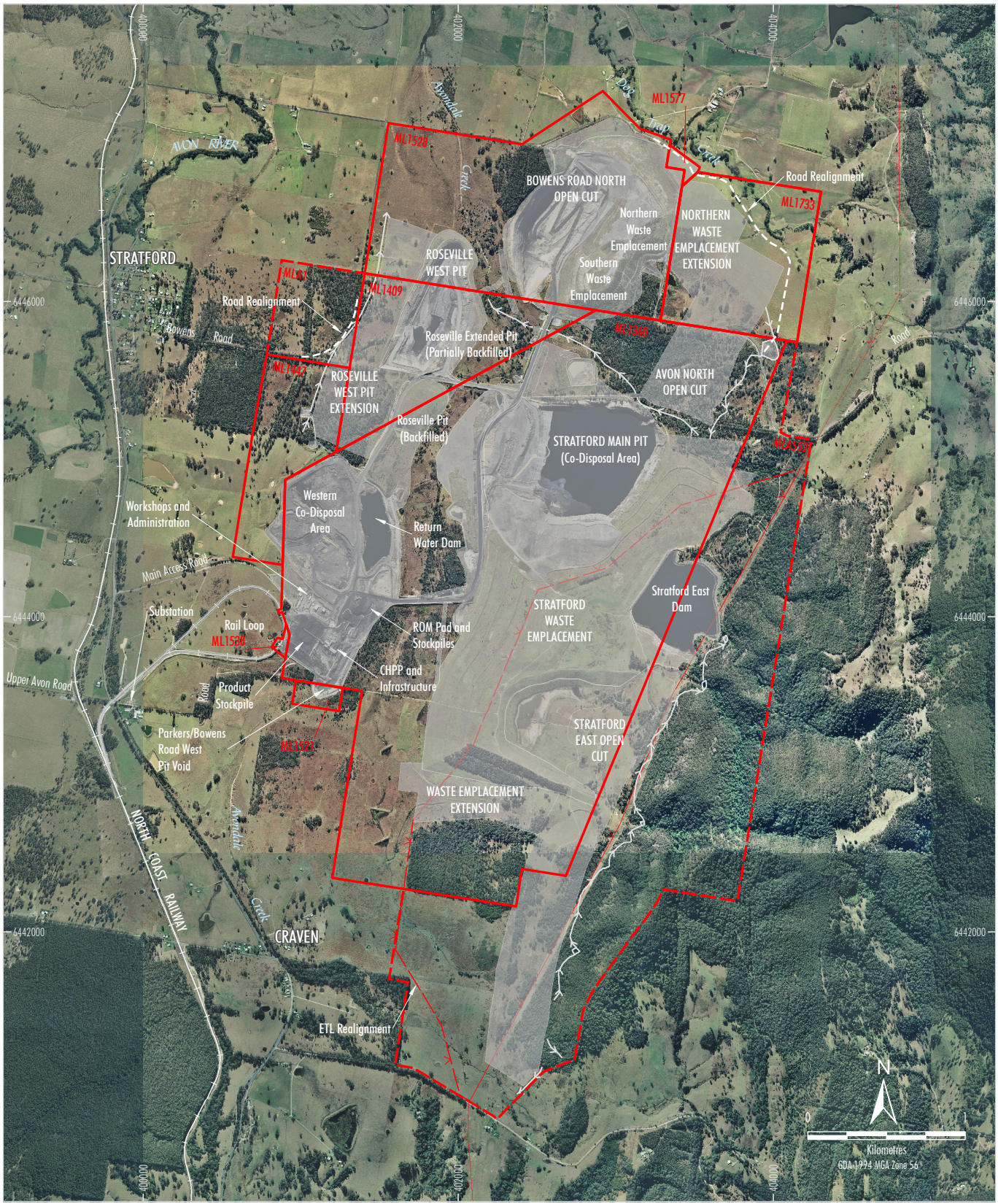
STRATFORD EXTENSION PROJECT

Regional Location

Figure 1



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LEGEND

- Mining Lease Boundary
- Mining Lease Application Boundary
- Electricity Transmission Line
- Approximate Extent of Existing/Approved Surface Development
- Conceptual Up-Catchment Diversion

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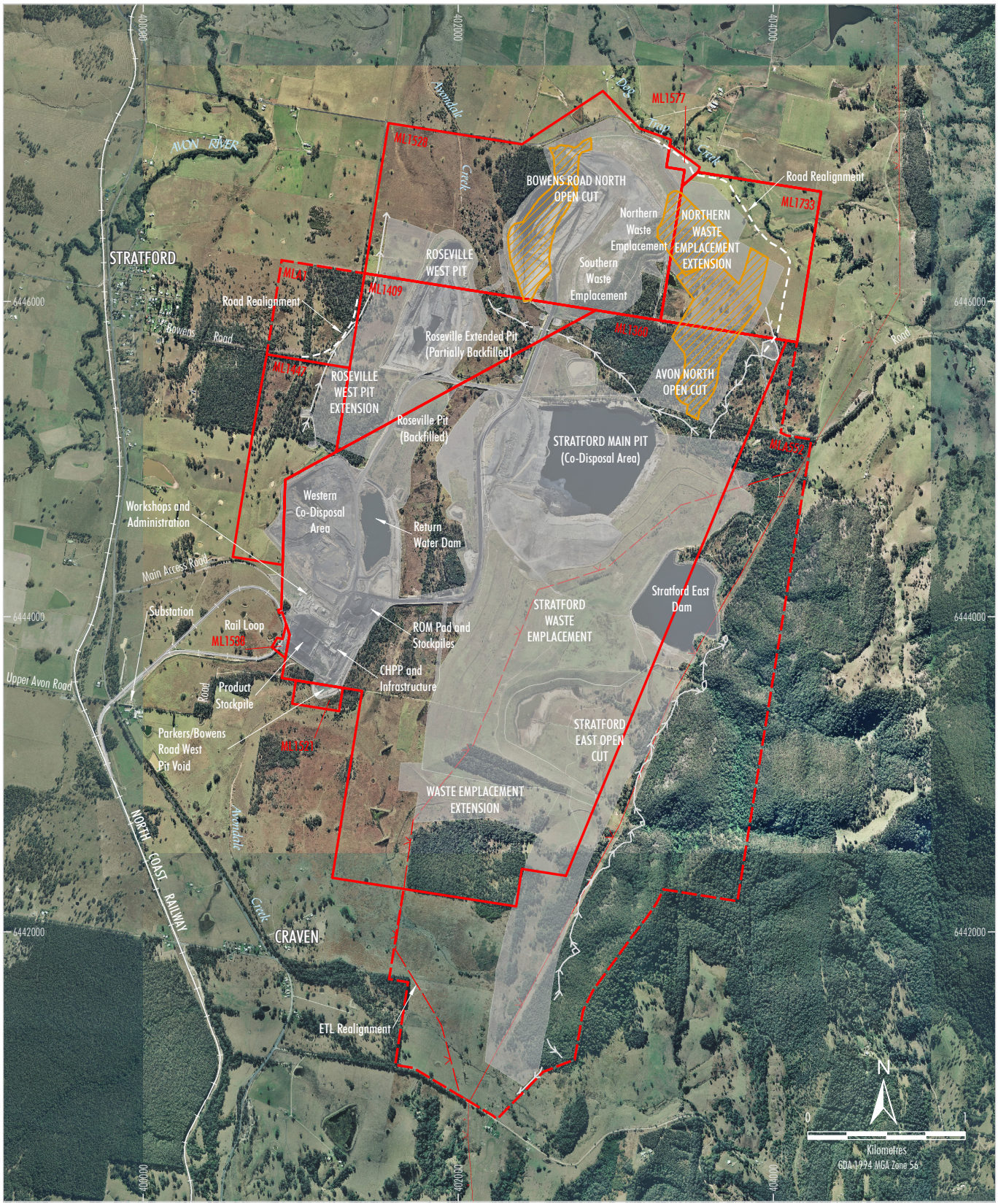
Approved General Arrangement

Source: Orthophoto - Yancoal (July 2014); LPI (2016); NSW Department of Planning & Environment (2017)

Figure 2



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LEGEND

- Mining Lease Boundary
- Mining Lease Application Boundary
- Electricity Transmission Line
- Approximate Extent of Existing/Approved Surface Development
- Conceptual Up-Catchment Diversion
- Stratford Extension Project Start-up Components

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Initial Stage

Source: Orthophoto - Yancoal (July 2014); LPI (2016); NSW Department of Planning & Environment (2017)

Figure 3

1.2 PURPOSE AND SCOPE

This Air Quality Management Plan (AQMP) has been prepared by SCPL to address the requirements of Condition 23, Schedule 3 of Development Consent SSD-4966 and relevant conditions of Environment Protection Licence EPL 5161 (as varied[2]).
This AQMP outlines the procedures and strategies for air quality management at the SMC to ensure compliance with air quality criteria.

1.3 STRUCTURE OF THIS AQMP

The remainder of this AQMP is structured as follows:

Section 2: Outlines the statutory requirements applicable to this AQMP.

Section 3: Describes key sources of emissions.

Section 4: Details the criteria and performance indicators that will be used to assess air quality impacts at the SMC.

Section 5: Provides detailed baseline data.

Section 6: Describes the air quality management system.

Section 7: Describes the air quality monitoring program.

Section 8: Provides a contingency plan to manage any unpredicted impacts and their consequences.

Section 9: Describes the annual review and improvement of environmental performance process.

Section 10: Describes the management and reporting of incidents, complaints and non-compliances.

Section 11: Lists the references cited.

1.4 CONSULTATION

This AQMP has been provided to the NSW Environmental Protection Authority (EPA) for their review and comment. The EPA confirmed, via a letter dated 8 March 2018, that it had no comments on the AQMP.

[2] In December 2017 SCPL applied to vary EPL 5161 for the SCM to encompass the entirety of the SMC including the SEP.

2 STATUTORY REQUIREMENTS

SCPL's statutory obligations are contained in:

(i) the conditions of Development Consent SSD-4966;

(ii) the conditions of Commonwealth Approval EPBC 2011/6176;

(iii) the conditions of EPL 5161;

(iv) other relevant licences and permits, including conditions attached to mining leases; and

(v) other relevant legislation.

Obligations relevant to this AQMP are described below.

2.1 EP&A ACT DEVELOPMENT CONSENT

Air Quality Management Plan

Condition 23, Schedule 3 of Development Consent SSD-4966 requires the preparation of an AQMP for the SMC. Table 1 presents these requirements and indicates where they are addressed within this AQMP.

Air quality criteria and operating conditions prescribed by Development Consent SSD-4966 are described in Section 4.

Table 1
Development Consent SSD-4966 Requirements Relevant to this AQMP

Development Consent SSD-4966 Condition	AQMP Section
Condition 23, Schedule 3	
23. The Applicant shall prepare and implement an Air Quality Management Plan for the development to the satisfaction of the Secretary. This plan must:	
(a) be prepared in consultation with the EPA, and submitted to the Secretary for approval prior to 31 December 2015, unless otherwise agreed by the Secretary;	Section 1.4
(b) describe the measures that would be implemented to ensure compliance with the relevant air quality criteria and operating conditions of this consent;	Sections 6 and 7
(c) describe the proposed air quality management system; and	Section 6
(d) include an air quality monitoring program that:	
• *uses a combination of real-time monitors and supplementary monitors to evaluate the performance of the development against the air quality criteria in this consent;*	Section 7.3
• *adequately supports the proactive and reactive air quality management system;*	Sections 6.1.1 and 6.1.2
• *evaluates and reports on:*	
- *the effectiveness of the air quality management system; and*	Section 9
- *compliance with the air quality operating conditions; and*	Section 9
• *defines what constitutes an air quality incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any air quality incidents.*	Section 10

Management Plan Requirements

Condition 3, Schedule 5 of Development Consent SSD-4966 outlines the management plan requirements that are applicable to the preparation of this AQMP. Table 2 presents these requirements and indicates where they are addressed within this AQMP.

Table 2
Management Plan Requirements

Development Consent SSD-4966 Condition	AQMP Section
Condition 3, Schedule 5	
3. The Applicant shall ensure that the management plans required under this consent are prepared in accordance with any relevant guidelines, and include:	
a) detailed baseline data;	Section 5
b) a description of:	
• *the relevant statutory requirements (including any relevant approval, licence or lease conditions);*	Section 2
• *any relevant limits or performance measures/criteria;*	Section 4
• *the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;*	Section 4
c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	Sections 6
d) a program to monitor and report on the:	
• *impacts and environmental performance of the development;*	Sections 7.1 to 7.3
• *effectiveness of any management measures (see c above);*	Section 9
e) a contingency plan to manage any unpredicted impacts and their consequences;	Section 8
f) a program to investigate and implement ways to improve the environmental performance of the development over time;	Section 9
g) a protocol for managing and reporting any;	Section 10
• *incidents;*	
• *complaints;*	
• *non-compliances with statutory requirements; and*	
• *exceedances of the impact assessment criteria and/or performance criteria; and*	
h) a protocol for periodic review of the plan.	Section 9

2.2 LICENCES, PERMITS AND LEASES

In addition to Development Consent SSD-4966 and Commonwealth Approval EPBC 2011/6176, all activities at or in association with the SMC will be conducted in accordance with a number of licences, permits and leases which have been issued or are pending issue.

Key licences, permits and leases pertaining to the SMC include:

- The conditions of EPL 5161 administered by the EPA under the NSW *Protection of the Environment Operations Act, 1997* (PoEO Act). The conditions in EPL 5161 relevant to air quality are provided in Section 4.2.
- The conditions of the Mining Leases (MLs) 1360, 1409, 1447, 1538, 1521, 1577, 1528 and 1733 issued by the NSW Minister for Mineral Resources under the NSW *Mining Act, 1992*.
- Water licenses and approvals issued under the NSW *Water Management Act, 2000*.

2.3 GREENHOUSE GAS AND ENERGY LEGISLATION

Yancoal is registered on the National Greenhouse and Energy Register (established under section 16 of the Commonwealth *National Greenhouse and Energy Reporting Act, 2007* [NGER Act]), which is publicly available on the Commonwealth Clean Energy Regulator website (www.cleanenergyregulator.gov.au). Yancoal will continue to assess and report the following for the SMC in accordance with NGER reporting requirements:

- Annual scope 1 greenhouse gas (GHG) emissions, which are the direct result of activities at a facility under the operational control of Yancoal and its subsidiaries (i.e. SCPL), such as onsite diesel combustion.

- Annual scope 2 GHG emissions, which are the emissions associated with the generation of electricity that is purchased by Yancoal. These emissions are not under the operational control of Yancoal.
- Annual energy consumption, such as diesel and electricity consumption.
- Annual energy production, such as the energy in the extracted coal.

Assessment and reporting of the above will be conducted in accordance with the following legislation subordinate to the NGER Act:

- *National Greenhouse and Energy Reporting Regulations, 2008; and*
- *National Greenhouse and Energy Reporting (Measurement) Determination, 2008.*

2.4 NATIONAL POLLUTANT INVENTORY

SCPL also provides annual National Pollutant Inventory (NPI) reports to the EPA (established under the *National Environment Protection (National Pollutant Inventory) Measure 1998*). Emissions data for the SMC is publicly available on the Commonwealth NPI website (www.npi.gov.au) and is also reported in the Annual Reviews (Section 9.1).

2.5 OTHER LEGISLATION

Other NSW legislation that may be applicable to air quality management at the SMC include, but are not limited, the:

- *Contaminated Land Management Act, 1997*;
- *Crown Lands Act, 1989*;
- *Electricity Supply Act, 1995;*
- *Native Vegetation Act, 2003*;
- *Noxious Weeds Act, 1993*;
- *Biodiversity Conservation Act, 2016*; and
- *Work Health and Safety (Mines) Act, 2013*.

3 SOURCES OF EMISSIONS

3.1 PARTICULATE MATTER

Development Consent SSD-4966 provides criteria for the particulate matter emissions which have the potential to affect the general health and amenity of the local community and surrounding environment. The particulate matter emissions requiring specific management are:

- total suspended particulate matter (TSP);
- particulate matter less than 10 micrometers (µm) (PM_{10}); and
- deposited dust (DD).

The main sources of particulate matter emissions generated as a direct result of SMC operations include:

- hauling of waste rock and ROM coal in trucks on unpaved roads;
- dozer and excavator operations;
- wind erosion of exposed areas; and
- handling and loading/unloading of ROM and product coal from the DCM and the SMC.

Particulate matter emissions will also be generated by other activities at the SMC, including:

- topsoil stripping and handling;
- drilling and blasting;
- coal processing activities within the CHPP; and
- short term construction activities such as public road realignments.

In 2012, SCPL commissioned an independent investigation of dust emissions from the transportation of coal between the SMC and the Port of Newcastle. This study concluded that dust lift-off from product coal during transportation by rail is likely to be minimal (i.e. as the moisture levels of the coal remains above or equal to the dust extinction moisture level) (PAEHolmes, 2012b).

3.2 GREENHOUSE GASES

SCPL reports the following greenhouse gases in accordance with the requirements of the *National Greenhouse and Energy Reporting (Measurement) Determination, 2008*:

- carbon dioxide (CO_2);
- methane (CH_4); and
- nitrous oxide (N_2O).

These are determined and reported as follows:

- fuel consumption (diesel) during mining operations – scope 1 emissions;
- emissions associated with the loss of carbon through vegetation clearing – scope 1 emissions;
- release of fugitive CH_4 during mining – scope 1 emissions; and
- indirect emissions associated with on-site electricity use – scope 2 emissions.

3.3 ODOUR AND FUME

Spontaneous combustion events have the potential to give rise to odour emissions (SCPL, 2015)The Glenview Seam may be a feature of the proposed Avon North Open Cut and, therefore, there is some potential for spontaneous combustion events if the seam is exposed in the final highwall or end wall (SCPL, 2012).

Measures to prevent spontaneous combustion are described in the Spontaneous Combustion Management Plan (SCPL, 2015).

Blasting has the potential to generate nitrogen oxide (NOx) fumes and result in fugitive fume emissions (e.g. when the explosive product is incorrectly formulated [Australian Explosives Industry and Safety Group Inc., 2011]). The management of blast fume is described in the SMC Blast Management Plan (the Blast Management Plan) (SCPL, 2017) and associated SMC Blast Fume Management Procedure (SCPL, 2016).

4 AIR QUALITY CRITERIA AND PERFORMANCE INDICATORS

4.1 NSW DEVELOPMENT CONSENT CONDITIONS

4.1.1 Air Quality Criteria and Air Quality Acquisition Criteria

Air quality criteria and air quality acquisition criteria are provided in Conditions 18 and 21, Schedule 3 of Development Consent SSD-4966. These conditions are reproduced below.

Air Quality Criteria

18. The Applicant shall ensure that all reasonable and feasible avoidance and mitigation measures are implemented so that particulate matter emissions generated by the development do not cause exceedances of the criteria in Tables 6 at any residence on privately-owned land.

Table 6: Air quality criteria

Pollutant	***Averaging Period***	***Criterion***	
Particulate matter <10 µm (PM_{10})	*Annual*	*[a,d] 30 µg/m³*	
Particulate matter <10 µm (PM_{10})	*24 hour*	*[b] 50 µg/m³*	
Total suspended particulates (TSP)	*Annual*	*[a,d] 90 µg/m³*	
[c] Deposited dust	*Annual*	*[b] 2 g/m²/month*	*[a,d] 4 g/m²/month*

Notes to Table 6:

[a] Cumulative impact (ie increase in concentrations due to the development plus background concentrations due to all other sources).

[b] Incremental impact (ie increase in concentrations due to the development alone, with zero allowable exceedances of the criteria over the life of the development).

[c] Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.

[d] Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by the Secretary.

[e] "Reasonable and feasible avoidance measures" includes, but is not limited to, the operational requirements in conditions 23 and 24 to develop and implement a real-time air quality management system that ensures operational responses to the risks of exceedance of the criteria.

Air Quality Acquisition Criteria

21. If particulate matter emissions generated by the development exceed the criteria, or contribute to an exceedance of the cumulative criteria, in Table 7 at any residence on privately-owned land, or on more than 25% of any privately-owned land where there is an existing dwelling or where a dwelling could be built under existing planning controls, then upon receiving a written request for acquisition from the landowner the Applicant shall acquire the land in accordance with the procedures in conditions 5-6 of Schedule 4.

Table 7: Air quality land acquisition criteria

Pollutant	***Averaging Period***	***Criterion***	
Particulate matter <10 µm (PM_{10})	*Annual*	*[a,d] 30 µg/m³*	
Particulate matter <10 µm (PM_{10})	*24 hour*	*[b] 50 µg/m³*	
Total suspended particulates (TSP)	*Annual*	*[a,d] 90 µg/m³*	
[c] Deposited dust	*Annual*	*[b] 2 g/m²/month*	*[a,d] 4 g/m²/month*

Notes to Table 7:

[a] Cumulative impact (ie increase in concentrations due to the development plus background concentrations due to all other sources).

[b] Incremental impact (ie increase in concentrations due to the development alone, with up to 5 allowable exceedances of the criteria over the life of the development.

[c] Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.

[d] *Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents or any other activity agreed by the Secretary.*

4.1.2 Yancoal-owned Land

Condition 20, Schedule 3 of Development Consent SSD-4966 states the requirements for SCPL to ensure that all reasonable and feasible avoidance and mitigation measures are implemented so that particulate matter emissions generated by the SMC do not cause exceedances of the air quality criteria in Condition 18, Schedule 3 at any occupied residence on Yancoal-owned land *viz*.:

> *20. The Applicant shall ensure that all reasonable and feasible avoidance and mitigation measures are implemented so that particulate matter emissions generated by the development do not cause exceedances of the criteria in Table 6 at any occupied residence on mine-owned land unless:*
>
> *(a) the tenant and landowner (if the residence is owned by another mining or petroleum company) has been notified of any health risks associated with such exceedances in accordance with the notification requirements under Schedule 4 of this consent;*
>
> *(b) the tenant of any land owned by the Applicant can terminate their tenancy agreement without penalty at any time, subject to giving reasonable notice;*
>
> *(c) air mitigation measures such as those listed in condition 20 are installed at the residence, if requested by the tenant or landowner (if the residence is owned by another mining or petroleum company);*
>
> *(d) air quality monitoring is regularly undertaken to inform the tenant or landowner (where owned by another mining or petroleum company) of the actual particulate emissions at the residence; and*
>
> *(e) data from this monitoring is presented to the tenant in an appropriate format for a medical practitioner to assist the tenant and/or landowner (where owned by another mining or petroleum company) in making informed decisions on health risks associated with occupying the property,*
>
> *to the satisfaction of the Secretary.*

4.1.3 Greenhouse Gas Emissions

Condition 22(b), Schedule 3 of Development Consent SSD-4966 states the requirements for SCPL to minimise the release of greenhouse gas emissions from the SMC, as follows:

> *The Applicant shall … implement all reasonable and feasible measure to minimise the release of greenhouse gas emissions from the site;*

4.1.4 Odour

Condition 17, Schedule 3 of Development Consent SSD-4966 states the requirements for SCPL to prevent the release of offensive odours from the SMC, as follows:

> ***Odour***
>
> *17. The Applicant shall ensure that no offensive odours, as defined under the POEO Act, are emitted from the site.*

4.1.5 Blast Fume

Condition 16, Schedule 3 of Development Consent SSD-4966 requires a blast fume management protocol to minimise the risk of blast fume emissions. This is addressed in the Blast Management Plan.

4.1.6 Operating Conditions

The operating conditions relating to air quality required under Development Consent SSD-4966 are detailed in Condition 22, Schedule 3:

Operating Conditions

22. The Applicant shall:

(a) implement best practice management to minimise the off-site odour, fume and dust emissions of the development;

(b) implement all reasonable and feasible measure to minimise the release of greenhouse gas emissions from the site;

(c) minimise the surface disturbance of the site;

(d) minimise any visible off-site air pollution generated by the development;

(e) operate a comprehensive air quality management system that uses a combination of predictive meteorological forecasting, predictive and real-time air dispersion modelling and real-time air quality monitoring data to guide the day-to-day planning of mining operations and implementation of both proactive and reactive air quality mitigation measures (such as relocate, modify and/or suspend) to ensure compliance with the relevant conditions of this consent; and

(f) minimise the air quality impacts of the development during adverse meteorological conditions and extraordinary events (see note d to Tables 6 and 7 above),

to the satisfaction of the Secretary.

4.2 LICENCE CONDITIONS

In relation to air quality, EPL 5161 for the SMC states the following:

Condition O3.1:

All operations and activities occurring at the premises must be carried out in a manner that will minimise the emission of dust from the premises.

Condition L4.1:

The licensee must not cause or permit the emission of offensive odour beyond the boundary of the premises.

5 BASELINE DATA

5.1 DUST MONITORING DATA

SCPL currently has an air quality monitoring network consisting of:

- Seven static dust fallout gauges, measuring DD rates over the period of a month (in accordance with procedures established by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales* [DEC, 2006]). Deposited dust is assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: *Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method*.
- Four high volume air samplers (HVASs), measuring suspended PM_{10} concentrations. Sampling is undertaken over a 24-hours per day, six days per week cycle, in accordance with the procedure AM-18 in *Approved Methods for the Sampling and Analysis of Air Pollution in New South Wales* (DEC, 2006). HVAS measurements are used to calculate TSP concentrations, based on a correlation between TSP and PM_{10} concentrations developed from site-specific TSP and PM_{10} monitoring (SCPL, 2010).
- A tapered element oscillating microbalance (TEOM).
- A meteorological monitoring station (i.e. weather station).

A detailed description of baseline air quality data is provided in the *Stratford Extension Project - Air Quality and Greenhouse Gas Assessment* (PAEHolmes, 2012a), with a summary of more recent data presented below. While

Development Consent SSD-4966 criteria were not applicable at the time of baseline monitoring, baseline data has been compared to the criteria to provide context to the monitoring results.

5.1.1 Dust Deposition

Review of air quality monitoring data collected from DD gauges between April 2012 and August 2017 identified eight occasions when the measured DD levels were higher than the Development Consent SSD-4966 criterion of 4 g/m^2/month. Notes accompanying the recorded data indicate significant contamination was likely at the relevant monitoring sites during these measurements (e.g. the samples were contaminated with insects, vegetation, bird droppings, etc.). The average across all sites between April 2012 and August 2017 was 0.8 g/m^2/month.

5.1.2 Particulate Matter Concentrations

PM_{10}

Review of PM_{10} data collected between April 2012 and August 2017 shows there have been no exceedances of the Development Consent SSD-4966 annual average criterion of 30 µg/m^3. The average across all sites for the monitoring period is 9.8 µg/m^3.

Monitoring data collected at the SMC HVASs indicate that there was one elevated recording above the Development Consent SSD-4996 24-hour average criterion of 50 µg/m^3 across all sites over the period April 2012 to August 2017 and this was related to bushfires.

A TEOM was included in the SMC air quality monitoring programme in June 2013 for measuring PM_{10} on a real-time continuous basis. The TEOM results are generally consistent with those measured by the HVAS units.

TSP

A site-specific correlation between TSP and PM_{10} concentrations was developed by SCPL, based on co-located HVASs measuring PM_{10} and TSP for five 6-day cycles during 2002. From this monitoring, approximately 45% of TSP was PM_{10}, which compares well with the relationship developed by the NSW Minerals Council for the Hunter Valley (NSW Minerals Council, 2000), which found that approximately 40% of TSP is PM_{10}.

Based on the site-specific correlation between TSP and PM_{10} concentrations and the results of PM_{10} monitoring, calculated annual average TSP concentrations between April 2012 and August 2017 have been on average 22 µg/m^3 which is below the relevant criteria of 90 µg/m^3.

5.2 METEOROLOGICAL MONITORING

Meteorological monitoring continues to be undertaken at the SMC in accordance with the requirements of Development Consent SSD-4966 (and prior consents). The on-site weather station monitors a number of meteorological parameters, including daily rainfall and temperature, solar radiation, wind speed and wind direction.

A summary of monthly meteorological conditions is provided in the SMC Annual Reviews each year (http://www.stratfordcoal.com.au/page/environment/annual-reviews/).

6 MANAGEMENT MEASURES

6.1 AIR QUALITY

Air quality management at the SMC will continue to involve a combination of proactive and reactive management strategies, as well as at-source control measures. These measures will continue to be supported by a network of dust monitoring stations (refer to Section 7).

6.1.1 Proactive Measures and Dust Controls

Proactive dust management measures and dust emissions controls will continue to be implemented to minimise dust emissions from the following key dust-generating activities:

- wind blown dust from exposed areas; and
- dust generated from mining activities.

Current air quality mitigation and management measures employed at the SMC are summarised in Table 4.

Table 4
Management Measures and Controls

Source	Activity	Management Measure
Wind Blown Dust Sources	Areas disturbed by mining	• Only the minimum area necessary for mining will be disturbed. • Exposed areas will be reshaped, topsoiled and revegetated as soon as practicable.
	Waste rock emplacement areas	• Exposed waste emplacement surfaces that are hauled on will be watered to suppress dust. • Progressive rehabilitation (i.e. reshaping, topsoil placement and revegetation) of waste emplacement areas will continue throughout the life of the SMC, as far as practicably possible.
	Coal handling areas	• Water carts will be used in coal handling areas to minimise wind blown and traffic generated dust. • Water sprays are installed on the Stamler feeder/breaker and raw coal conveyors.
	Coal stockpiles	• Automatic sprinklers are installed in the existing SMC product coal stockpile area and are activated when wind speeds exceed 5 metres per second (m/s), except during rain events.
Mining Generated Dust Sources	Haul road dust	• All roads and trafficked areas will be regularly maintained and watered using water carts to minimise the generation of dust. • Obsolete roads will be rehabilitated. • Hauling distances will be optimised through the use of satellite ROM pads.
	Minor roads	• Development of minor roads will be limited and the locations of these will be clearly defined. • Regularly used minor roads will be watered. • Obsolete roads will be rehabilitated.
	Topsoil stripping	• Access tracks used for topsoil stripping during the loading and unloading cycle will be watered.
	Topsoil stockpiling	• Long term topsoil stockpiles will be revegetated with a cover crop.
	Material handling	• Truck overloading and spillage onto haul roads will be minimised.
	Drilling	• Dust aprons will be lowered during drilling. • Water injection or dust suppression sprays will be used when high levels of dust are being generated.

Table 4 (Continued)
Management Measures and Controls

Source	Activity	Management Measure
Mining Generated Dust Sources (Cont.)	Blasting	• Fine material collected during drilling will not be used for blast stemming, but may be used to backfill uncharged drill holes. • Adequate stemming will be used at all times. • Blasting will only occur following an assessment of weather conditions by the Environment and Community Superintendent to ensure that wind speed and direction will not result in excess dust emissions from the site towards adjacent residences (refer to the Blast Management Plan for further information). No blasting will occur in the SMC open cut when wind speeds exceed 5 m/s in a direction that would be likely to carry dust to a nearby receptor.

The following additional best practice management measures will be implemented at the SMC (SCPL, 2012):

- vehicle speed restriction to 60 kilometres per hour.
- watering of wind erosion areas prone to dust lift off during adverse meteorological conditions;
- real-time monitoring with alarm triggers set to enable implementation of reactive dust control management measures; and
- a predictive meteorological forecasting system to enable implementation of proactive dust control management measures.

A summary of the equipment used for at-source dust control is provided in Table 5. These controls are generally consistent with best practice dust controls identified by PAEHolmes (2012b).

Table 5
At-source Control Equipment

Equipment Type	Typical Control Area
Water trucks	• Haul roads • Other trafficked surfaces (including minor roads) • Waste rock emplacements • Coal handling areas • During temporary road realignment construction activities
Water sprays	• ROM coal bin • Primary crusher • Stamler feeder/breaker
Dust collection system	• Drill rigs
Automated sprinklers	• Product coal stockpiles

The above mitigation/management measures are generally in accordance with *the NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining* (Katestone, 2010). Katestone (2010) also lists other potential mitigation measures (e.g. the use of chemical agents to assist with dust suppression watering), however this is not considered to be necessary at the SMC given the strong historical record of compliance with criteria. The findings of Katestone (2010) will be considered in future revisions of this AQMP and in consideration of monitoring data.

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6.1.2 Reactive Measures

The implementation of the measures listed in Section 6.1.1 will minimise dust generation and the need for responsive management measures. In instances where proactive management measures and dust controls, as described in Tables 4 and 5 respectively, fail to prevent significant dust generation (as identified by dust monitoring [Section 7] or by visual observation), the following steps will be taken:

1. The Operations Manager and/or Environment and Community Superintendent (or delegate) will determine if excessive dust is being generated, or is likely to be generated if operations continue (i.e. dust levels are approaching the criteria).
2. The Operations Manager and/or Environment and Community Superintendent (or delegate) will issue an instruction for the particular mining activity causing the excessive generation of dust to reduce the intensity of the activity (e.g. less vehicle movements, reduced vehicle speed and/or utilising a travel surface less prone to produce dust) or if necessary cease the activity immediately.
3. The Environment and Community Superintendent (or delegate) will assess what additional mitigation measures can be applied, including watering of the exposed or active surfaces, installation of mechanical measures (e.g. dust extractors on drill rigs) or continue the activity at a reduced intensity. This assessment will include consideration of wind speed and direction in relation to receptors.
4. If the Environment and Community Superintendent (or delegate) is not satisfied that the additional measures will reduce dust emissions to an acceptable level (due to the prevailing weather conditions) the activity will not recommence until the additional measures have been implemented and/or more favourable weather conditions occur.
5. The Environment and Community Superintendent (or delegate) will be responsible for monitoring the activity once it recommences to measure the effectiveness of control measures and to ensure dust emissions are acceptable.

Details as to how activities at the SMC may be further modified to reduce dust emissions, in addition to those presented above, will be issue-specific, and where necessary developed in consultation with an air quality expert. The development of dust control measures is expected to be an iterative process based on observations and empirical data.

6.2 GREENHOUSE GAS EMISSIONS

SCPL has implemented a number of measures to minimise GHG emissions from the SMC. These measures are described below:

- Maximising energy efficiency as a key consideration in the development of the mine plan. For example, significant savings of GHG emissions (through increased energy efficiency) are achieved by mine planning decisions which minimise haul distances for ROM coal and waste rock transport, and therefore fuel use.
- SCPL (2006) has prepared and implemented an Energy Savings Action Plan (ESAP) in accordance with the NSW *Energy Administration Amendment (Water and Energy Savings) Act, 2005*. SCPL has conducted a comprehensive analysis of energy usage and management strategies at the SMC, and has identified cost-effective energy saving opportunities, including (SCPL, 2006):
  - installation of power factor correction equipment to reduce the maximum electricity demand at the SMC by an estimated 10%;
  - replacement of existing pumps in the CHPP with more efficient models;
  - potential replacement of an existing compressor in the CHPP with a more efficient model;
  - potential replacement of the CHPP rejects pipeline to increase pumping efficiency; and
  - potential adjustment of the number and location of lights in mining and infrastructure areas.

In addition, the following measures will be implemented:

- Regular maintenance of plant and equipment to minimise fuel consumption.
- Consideration of energy efficiency during selection of plant and equipment.

The effectiveness of these measures to reduce SCPL's GHG emissions (and energy consumption) will be monitored, as SCPL will annually estimate GHG emissions and energy consumption in accordance with NGER requirements (refer to Section 2.3).

The results of NGER reporting will also be used internally to identify the major sources of GHG emissions and energy consumption, and to inform future management measures.

The revegetation of previously cleared areas at the SMC as part of the biodiversity offset areas and biodiversity enhancement areas will also assist with reducing net greenhouse gas emissions from the SMC. The revegetation in the biodiversity offset areas and biodiversity enhancement areas will be in addition to the extensive on-site revegetation of the mine development areas as part of the rehabilitation strategy. Specific revegetation measures and proposed timing will be described in the Mining Operations Plan to be prepared for the SMC.

6.3 OTHER MANAGEMENT MEASURES

SCPL's Blast Management Plan describes the measures for the prevention of fumes from mine blasts.

SCPL's Spontaneous Combustion Management Plan describes the monitoring and mitigation measures to reduce the potential for spontaneous combustion events at the SMC (SCPL, 2015).

7 AIR QUALITY MONITORING PROGRAM

The following monitoring program has been developed to ensure that potential air quality impacts are quantified to assist with the continued improvement of control measures.

The air quality monitoring program will continue to consist of networks of dust deposition gauges, HVASs and TEOMs. The results from these monitoring networks will be used to assess compliance with the criteria in Section 4.1.1 for dust deposition and concentrations of particulate matter.

Concentrations of TSP will be calculated, based on the results of the PM_{10} monitoring and the site-specific correlation between PM_{10} and TSP described in Section 5.1.2. The calculated rolling annual average TSP concentrations will be used to assess compliance with the annual TSP criteria detailed in Section 4.1.1.

An additional TEOM measuring PM_{10} and $PM_{2.5}$ levels will be installed between the SMC and the village of Craven during the first year of SEP operations (Figure 4). (Note $PM_{2.5}$ levels will be monitored for guidance and baseline purposes only, i.e. not for compliance).

7.1 DUST DEPOSITION

Dust deposition will continue to be monitored on monthly basis using the network of static dust gauges. The dust gauges are located in all directions around the SMC, as shown in Figure 4.

Dust deposition monitoring will continue to be conducted in accordance with the methods detailed in the *Approved Methods for the Sampling and Analysis of Air Pollution in New South Wales* (DEC, 2006).

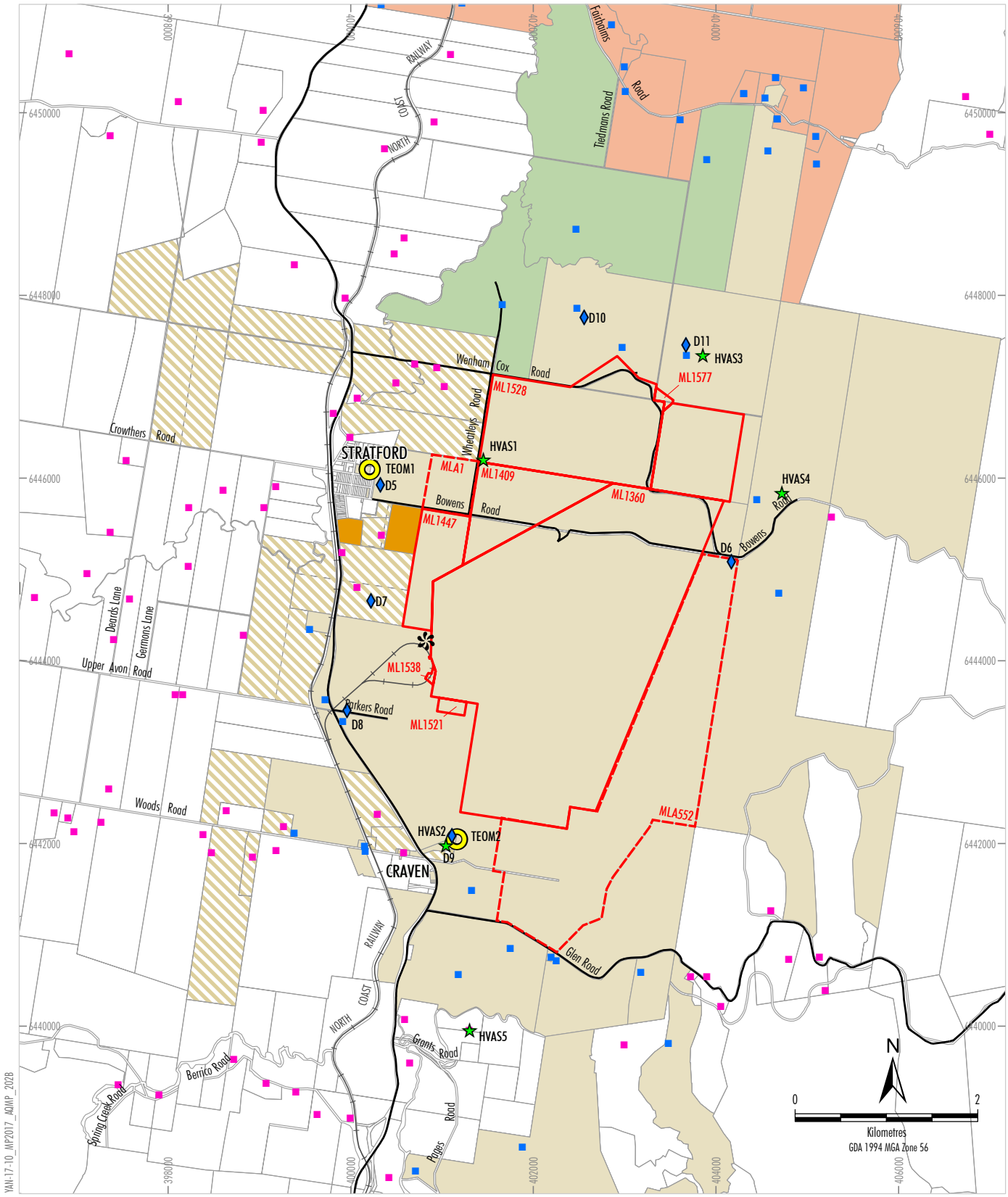
The dust collected in the DD gauges will be analysed monthly for ash content, combustible matter and insoluble solids. The results will be compared with the DD criteria in Section 4.1.1.

7.2 HVAS

PM_{10}

A network of four HVASs will continue to measure PM_{10} concentrations as shown in Figure 4.

INSERT FIGURE 4



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LEGEND

- Mining Lease Boundary
- Mining Lease Application Boundary
- Yancoal Owned Land
- GRL Owned Land or Under Option
- AGL Owned Land
- Private Landholders - Yancoal Agreement
- Crown Land
- Privately Owned Dwelling
- Resource Company Owned Dwelling
- Meteorological Station
- Static Dust Gauge
- High Volume Air Sampler
- TEOM

STRATFORDCOAL
Part of the Yancoal Australia Group

STRATFORD EXTENSION PROJECT

Meteorological and
Air Quality Monitoring Sites

Source: Orthophoto - Yancoal (July 2014); LPI (2016); NSW Department of Planning & Environment (2017)

Figure 4

Sampling will continue to be undertaken over a 24-hours per day, six days per week cycle, in accordance with the procedure AM-18 in *Approved Methods for the Sampling and Analysis of Air Pollution in New South Wales* (DEC, 2006).

HVAS results will be used to determine compliance with the 24-hour PM_{10} concentration criteria in Section 4.1.1. The rolling annual average will also be determined and recorded, to determine compliance with annual PM_{10} criteria.

In addition, a fifth HVAS site is located approximately 1.2 km south of Glen Road. HVAS5 has in the past been operational collecting background air quality data which will be used for comparison with data collected during operation of the Stratford East Open Cut. As such, HVAS5 will be re-activated prior to the commencement of mining operations at the Stratford East Open Cut area.

7.3 REAL-TIME MONITORING

TEOMs located in Stratford Village and in close proximity to Craven will monitor real-time PM_{10} and $PM_{2.5}$ concentrations. The TEOMs will monitor PM_{10} concentrations in accordance with AS 3580.9.8-2008 *Determination of suspended particulate matter – PM_{10} continuous direct mass method using a tapered element oscillating microbalance analyser*. $PM_{2.5}$ concentrations will be monitored in accordance with AS 3580.9.13-2013 *Determination of suspended particulate matter – $PM_{2.5}$ continuous direct mass method using a tapered element oscillating microbalance monitor*.

The TEOMs record five minute instantaneous (i.e. real-time) PM_{10} and $PM_{2.5}$ concentrations and rolling 24-hour average PM_{10} and $PM_{2.5}$ concentrations.

7.3.1 Real-time Triggers

Real-time air quality monitoring data is used to identify when ambient PM_{10} levels in the surrounding environment are elevated and require contingency action. Real-time response triggers (Table 6) have been established and are designed to provide a system to warn operation personnel (via SMS) when dust levels are approaching a relevant criterion and to provide management/control actions.

The triggers have been developed based on predictive dispersion modelling as well as measured particulate matter concentrations (Todoroski Air Sciences, 2013). The alarm triggers and positions of real-time air quality monitoring locations will be reviewed annually (i.e. as mining progresses) or as part of a contingency response, if required.

Triggers are reported to the area supervisor and actions included in shift reports.

7.4 METEOROLOGICAL MONITORING

SCPL operate an automated meteorological monitoring station at the SMC (Figure 4) capable of monitoring:

- air temperature;
- wind direction and speed;
- rainfall;
- relative humidity; and
- solar radiation and evaporation.

Wind speed and wind direction data will be used in conjunction with all dust monitoring data, as described above, to further minimise the potential for dust emissions, and to provide useful information for review of the effectiveness of dust management practices.

7.4.1 Meteorological Forecasting System

A meteorological forecasting system will be used at the SMC to predict meteorological conditions for the coming day to determine, one day in advance, where the risk of dust-enhancing meteorological conditions may occur (e.g. based on wind speed, direction, rainfall and atmospheric stability).

The predictive meteorological forecasting system will work in conjunction with the real-time monitoring system, providing an alert for the appropriate personnel to review the real-time data and manage the intensity of activities for that day, increase controls (e.g. haul truck watering) or limit activity to various areas of the site.

Table 6
Real-time Response Triggers

No.	Trigger	Management/Control Actions	Responsibility
1	**Stratford TEOM** • Winds from NE to SSE (45 to 157.5 degrees); and • Rolling 24 hour PM_{10} level >25 µg/m³ and 5 minute average PM_{10} level is >100 µg/m³ for one reading. **Craven TEOM** • Winds from NNW to E (337.5 to 90 degrees); and • Rolling 24 hour PM_{10} level >25 µg/m³ and 5 minute average PM_{10} level is >100 µg/m³ for one reading.	• Review weather data and trends (e.g. wind direction and speed). • Review weather predictions. • Review current operations and locations of dust generating activities. • Review current dust management controls. • Check that standard mitigation measures are in place. • Continue to monitor PM_{10} until decreasing trend observed.	Environment and Community Superintendent (or delegate)
2	**Stratford TEOM** • Winds from NE to SSE (45 to 157.5 degrees); and • Rolling 24 hour PM_{10} level >25 µg/m³ and 5 minute average PM_{10} level is >100 µg/m³ for three or more consecutive readings; or • 5 minute average PM_{10} level is >200 µg/m³ for one reading. **Craven TEOM** • Winds from NNW to E (337.5 to 90 degrees); and • Rolling 24 hour PM_{10} level >25 µg/m³ and 5 minute average PM_{10} level is >100 µg/m³ for three or more consecutive readings; or • 5 minute average PM_{10} level is >200 µg/m³ for one reading.	• Actions as per Trigger 1. • Mine Production Environmental Assistant to inspect and monitor downwind areas for dust and report to supervisor. • Ensure relevant dust control measures (refer Table 4) are in place and performing effectively. • Make temporary operational changes as appropriate (e.g. relocate overburden dumping to wind protected areas; increase haul road watering rate; ensure operators use best endeavours to minimise dust liftoff during loading; or selectively shutting down mobile fleet or diggers). • Temporarily pause and modify any activity generating excessive visible dust plumes.	Environment and Community Superintendent (or delegate)
3	**Stratford TEOM** • Winds from NE to SSE (45 to 157.5 degrees); and • Rolling 24 hour PM_{10} level >45 µg/m³ for three or more consecutive hours. **Craven TEOM** • Winds from NNW to E (337.5 to 90 degrees); and • Rolling 24 hour PM_{10} level >45 µg/m³ for three or more consecutive hours.	• Actions as per Trigger 1. • Actions as per Trigger 2. • Make operational changes (including temporarily shutting down mobile fleet and diggers where appropriate) until decreasing PM_{10} trend observed.	Environment and Community Superintendent (or delegate)

7.5 ASSESSMENT OF DATA VALIDITY

Where monitoring indicates a potential exceedance of Development Consent SSD-4966 criteria it is necessary to assess the potential for the influence of the following factors:

- Extreme events, such as:
  - bushfires;
  - prescribed burning;
  - dust storms and other extraordinary regional meteorological events;
  - fire incidents;
  - illegal activities; and
  - other activities agreed by the Secretary.
- Irregular activities near monitoring sites such as:
  - exposed areas of soil around the monitoring site;
  - agricultural activities in the immediate and wider area, include lime and fertiliser spreading and ploughing;
  - adjacent land use activities; and
  - contamination from bird droppings, insects, etc.
- Reasonableness of data (e.g. is the equipment operating properly and providing expected data).

7.6 PROTOCOL FOR DETERMINING EXCEEDANCES

Monitoring results will be used to assess dust emissions from the SMC against the criteria detailed in Section 4.1.1.

If data analysis indicates that a criterion has been exceeded, an assessment will be made of the data validity (refer to Section 7.5). Monitoring results above the criteria levels are not exceedances until the data has been assessed and verified. A verified exceedance will be considered to be an air quality incident and a breach of the of criteria detailed in Section 4.1.1 (Section 10).

Dust deposition gauge and HVAS data will be assessed monthly. TEOM data will be reviewed within 24 hours of an exceedance of the criteria.

7.7 REVIEW OF MONITORING RESULTS

The results of dust and meteorological monitoring will be recorded in a database. This data will be available to determine potential relationships between short-term variations in dust levels and the number and distribution of any dust-related complaints, where required. A review of dust emission level monitoring results against the air quality criteria detailed in Section 4.1.1 and dust-related complaints will be used to inform future revisions of the air quality monitoring program and this AQMP where required.

Monitoring results will be reported annually in the Annual Review.

8 CONTINGENCY PLAN

In the event that air quality criteria described in Section 4.1.1 are considered to have been exceeded, as per the protocol described in Section 7.6, SCPL will implement the following Contingency Plan:

- The breach of the air quality criteria will be reported to the Operations Manager and Environment and Community Superintendent (or delegate) within 24 hours of assessment completion.
- SCPL will report the breach as a non-compliance of the air quality criteria to the EPA and the DP&E as soon as practicable (i.e. once confirmed as an air quality exceedance and within 7 days of assessment completion).
- SCPL will identify an appropriate course of action with respect to the identified impact(s), in consultation with the DP&E, as necessary. For example contingency measures, such as, but not limited to, those described in Section 8.1 of this AQMP.
- SCPL will, on request, submit the proposed course of action to the DP&E for approval.
- SCPL will implement the approved course of action to the satisfaction of the DP&E.

8.1 POTENTIAL CONTINGENCY MEASURES

Potential contingency measures will be reviewed during revisions of this AQMP. Key potential contingency measures to be implemented following a verified exceedance of the air quality criteria identified in Section 4.1.1 (and described above) may include the following:

- SCPL will notify the affected landholder or tenant (for privately-owned property) of the validated exceedance and provide them with regular air quality monitoring results, until the results show the SMC is compliant with the relevant criteria, and provide a copy of the NSW Health fact sheet entitled “Mine Dust and You”.
- SCPL will implement additional at-source controls including re-running the dispersion model to confirm the effectiveness of controls.

9 REVIEW AND IMPROVEMENT OF AIR QUALITY MANAGEMENT PLAN

9.1 ANNUAL REVIEW

In accordance with Condition 4, Schedule 5 of Development Consent SSD-4966, SCPL will conduct an Annual Review of the environmental performance of the SMC by the end of March each year, or other timing as may be agreed by the Secretary.

The Annual Review will specifically address the following aspects of Condition 4, Schedule 5, which are directly relevant to air quality management:

- include a comprehensive review of the monitoring results and complaints records for the SMC over the previous calendar year, including a comparison of these results against the:
  - relevant statutory requirements, limits or performance measures/criteria;
  - monitoring results of previous years; and
  - relevant predictions in the SEP EIS;
- identify any non-compliance over the past year, and describe what actions were (or are being) taken to ensure compliance;
- identify any trends in the monitoring data over the life of the SMC;
- identify any discrepancies between the predicted and actual impacts of the SMC, and analyse the potential cause of any significant discrepancies; and
- describe what measures will be implemented over the next year to improve the environmental performance of the SMC.

The Annual Review will be made publicly available on the Stratford Coal website, in accordance with Condition 11, Schedule 5 of Development Consent SSD-4966.

9.2 AQMP REVIEW AND UPDATE

In accordance with Condition 5, Schedule 5 of Development Consent SSD-4966, this AQMP will be reviewed to the satisfaction of the Secretary within three months of the submission of:

(a) an Annual Review under Condition 4, Schedule 5 of Development Consent SSD-4966;

(b) an incident report under Condition 7, Schedule 5 of Development Consent SSD-4966;

(c) an audit under Condition 9, Schedule 5 of Development Consent SSD-4966; or

(d) any modification to the conditions of Development Consent SSD-4966.

Where this review leads to revisions of this AQMP, then within 4 weeks of the review, the revised AQMP will be submitted for the approval of the Secretary. The revision status of this AQMP is indicated on the title page of each copy.

This AQMP will be made publicly available on the Stratford Coal website in accordance with Condition 11, Schedule 5 of Development Consent SSD-4966. A hard copy of the AQMP will also be kept at the SMC.

The AQMP will be revised at the earliest possible time of a modification application for the Stratford Extension Project Development Consent SSD-4966. Matters to consider include the removal of deposited dust monitoring, updating the PM10 annual criterion to 25 ug/m^3, and requiring the reporting of environmental incidents within 24 hours, rather than 7 days.

10 REPORTING AND MANAGEMENT PROTOCOLS

In accordance with Condition 3, Schedule 5 of Development Consent SSD-4966, SCPL has developed protocols for managing and reporting the following:

- incidents;
- complaints;
- non-compliances with statutory requirements; and
- exceedances of the impact assessment criteria and/or performance criteria.

These protocols are described in detail in the SMC Environmental Management Strategy. The management of exceedances of performance criteria is detailed in Sections 7 and 8 of this AQMP.

11 REFERENCES

Australian Explosives Industry and Safety Group Inc (2011) *Code of Practice: Prevention and Management of Blast Generated NOx Gases in Surface Blasting*.

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Stratford Coal Pty Ltd (2017) *Stratford Mining Complex Blast Management Plan*.

Todoroski Air Sciences (2013) *Real-time air quality trigger investigation – Stratford Coal Mine*.