Operation Dust and Air Quality Management Plan

DOCUMENT NO: HSEC.MP.12.02

NEXT REVIEW DATE: 30/11/20

REVIEW FREQUENCY: 2 YEARS

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TOP 5 DUST MANAGEMENT RULES

- Adequate planning of stockpiles to reduce risk of dust emissions from site
- Monitor stacking and reclaiming activities for visible dust and take action as necessary
- Monitor stockpiles and general site under High and Extreme risk conditions and take action as necessary
- Complete Environmental Risk Event Checklists for required events for continuous improvement
- Avoid driving on unsealed surfaces to prevent dust generation
1. CONTEXT

Newcastle Coal Infrastructure Group (NCIG) is the operator of a Coal Export Terminal (CET) located in the industrial area of Kooragang Island in the Port of Newcastle. NCIG has approval to construct and operate a 66 Million Tonnes per Annum (Mtpa) CET, including associated rail and coal handling infrastructure and wharf/ship loading facilities.

NCIG’s activities have the potential to impact local air quality. This can be from a number of activities, including coal handling activities, unsealed surfaces, vehicle emission or odours, particularly from spontaneous combustion events.

This management plan outlines the ways in which NCIG plans, implements and monitors its activities to mitigate impacts on local air quality. The plan is specifically developed to meet the needs and expectations of NCIG’s stakeholders, as provided for in the overarching NCIG Operation Environmental Management Plan (HSEC.MP.12.01).

1.1 Purpose

The Operation Dust and Air Quality Management Plan (ODAQMP) has been developed in order to document the way in which NCIG manages activities that have the potential to impact on local air quality. It outlines the system that identifies and assesses air quality risks including statutory and approval requirements, the controls and procedures that manage these risks, and measures to review the system including, its effectiveness. Critical to this approach is business leadership and involvement, particularly at the planning and review stage to ensure that clear objectives and targets are established, and adequate resources are provided in order to achieve these.

The system outlined in this document is consistent with the framework established by the business, and contained within the NCIG Sustainable Development Management Plan (HSEC.MP.01). This framework (Plan-Do-Check-Act) is shown in more detail in the overarching NCIG Operation Environmental Management Plan (HSEC.MP.12.01).

1.2 Scope

This ODAQMP applies to the operation of the NCIG CET up to the maximum 66 Mtpa capacity (in accordance with Condition 1.1 of the CET Project Approval (06_0009)). It applies specifically to activities undertaken to operate the CET, including general operations, maintenance and administration activities. It does not apply to construction activities, as they are outlined within the NCIG Environmental Assessment and Project Approval (06_0009) and subsequent modification, or construction and maintenance activities undertaken within the NCIG Compensatory Habitat areas. These activities fall within a different set of management plans, which cover specific environmental risks. Despite this, management measures and controls are consistent between all areas under
NCIG’s operational control wherever practicable.

The NCIG CET operation is located on the south arm of the Hunter River. The following three major activities are undertaken during operations:

- **Train Unloading** – trains enter the NCIG site from the Kooragang mainline, travel along the rail spur and empty their coal wagons into one of two dump stations. Empty trains travel around the rail loop then rejoin the mainline.
- **Coal Handling and Stockpiling** – coal is transferred from the dump station, via a series of conveyors, to the stockyard for stockpiling. One of four stacker/reclaimers is used to stack coal onto the stockpile and reclaim coal via a bucket-wheel. Coal is reclaimed from the stockpile and sent to the wharf via an outbound series of conveyors.
- **Ship Loading** – Two ship loaders are available to transfer coal onto ships at berth, drawing from the buffer bins. There are three berths at the NCIG wharf, taking three ships at any one time.

The CET Operational site is shown on Figure 1 based on the maximum allowable coal throughput of 66 Mtpa.

Other key features of the NCIG CET include the water management system (including containment and reuse of water onsite), Administration, Store and Workshop Buildings, access roads and internal roads, utilities including electricity, water and sewer infrastructure, and site security features.

1.3 **Structure**

This ODAQMP is structured as follows:

**Section 2 – Leadership and Commitment.**

**Section 3 – Planning and System Support,** including existing environment and environmental assessment, risk management, legislative requirements and compliance obligations, and air quality standards.

**Section 4 – Operation and Implementation,** including key operational controls and impact management.

**Section 5 – Performance Evaluation and Improvement,** including air quality monitoring and reporting.

NCIG was granted Project Approval (06_0009) on 13 April 2007. This ODAQMP has been prepared in accordance with all conditions relating to dust and air quality in the Project Approval (06_0009).
Figure 1. NCIG Project General Arrangement
2. LEADERSHIP AND COMMITMENT

2.1 NCIG Sustainable Development Management Approach

NCIG’s leadership commitment is provided in more detail in the NCIG Operation Environmental Management Plan (HSEC.MP.12.01). Beyond this, NCIG management provides support for the effective management of environmental issues by:

- providing adequate resources for the management of air quality aspects;
- ensuring integration of air quality management requirements throughout business processes, eg. risk assessment, procurement and acquisition;
- communication of air quality performance and conformance with environmental requirements, eg. Quarterly HSEC Board Reports, CEO presentations at Business-wide Communication Days; and
- ensuring that air quality management is reflected across business and departmental objectives, through the development of objectives and targets during the annual business planning process – see Section 3.3.

NCIG strives to achieve best practice for environmental management, including dust and air quality management. For this reason, the NCIG SDMP, which includes this ODAQMP, aims to comply with the provisions of ISO14001:2015, which is supported and actively assisted by the Executive Leadership Team.

2.2 Roles, Responsibilities and Functions

Management of air quality issues is regarded as the responsibility of all NCIG employees and contractors. As well as this, key environmental accountabilities fall with senior and environmental-specific roles within the organisation. Key accountabilities are outlined in the following sections.

2.2.1 Chief Executive Officer (CEO)

- Actively promote and support the effective implementation of this plan
- Ensure adequate resources are provided to manage air quality aspects and impacts of the business

2.2.2 Manager – HSEC

- Ensure the adequacy of this plan to meet relevant approval and licence conditions, legislative requirements and other compliance obligations
- Ensure that the Sustainable Development Management Plan, which includes this management plan, complies with ISO14001.
- Ensure the plan is aligned with relevant NCIG policy and kept up to date with industry
best practice

- Ensure air quality risks are covered in Broad Brush Risk Assessments (BBRAs)
- Develop the plan in consultation with other NCIG Departments and, where relevant, other stakeholders, eg. government regulators
- Monitor the effective implementation of this plan
- Ensure adequate levels of dust and air quality management training for all levels of personnel
- Accountable for the timely and effective response of community enquiries, including complaints related to air quality, in accordance with Condition 6.2, Schedule 2 of the Project Approval (06_0009)
- Principal point of contact for environmental regulators
- Ensure environmental performance is reported regularly to the ELT and Board of Directors through appropriate means, eg. Quarterly HSEC Report.
- Fulfil the role of Department of Planning and Environment (DoPE)-approved Environmental Representative for the NCIG Project (see Appendix B), including taking reasonable steps to avoid or minimise unintended or adverse air quality impacts, and failing the effectiveness of such steps, to direct that relevant actions be ceased immediately should an adverse impact on local air quality be likely to occur.

### 2.2.3 Executive Leadership Team (ELT)

- Ensure this management plan is implemented in their area of accountability
- All direct reports adhere to the requirements of this plan
- All direct reports have sufficient resources to adequately comply with and continuously improve this plan
- All air quality matters are brought to the attention of the Manager – HSEC

### 2.2.4 HSEC Department

- Ensure that this plan is developed to meet or exceed the requirements of relevant approval and licence conditions, legislative requirements and other compliance obligations
- Ensure that this plan is developed to address potentially significant air quality impacts resulting from NCIG’s operational activities
- Assist other departments in the implementation of controls outlined in this management
plan, including provision of dust and air quality management training

- Organise air quality monitoring as it is identified in this plan and maintain air quality records including dust and air quality monitoring data, air quality complaints and dust and air quality incident reports
- Prepare relevant statutory air quality reports, eg. National Pollutant Inventory and National Greenhouse and Energy Reporting
- Monitor and review compliance of this plan, including auditing and compliance tracking required in Project Approval (06_0009)
- Any non-conformance of the plan is appropriately addressed through corrective actions, eg. incident or hazard reporting, review of action.

2.2.5 Superintendents / Team Leaders

- Ensure all direct reports are trained and adhere to the applicable requirements of this management plan

2.2.6 All Workers

- Actively apply and participate in the application of this procedure.

It is noted that, where relevant, these accountabilities have been formalised by NCIG management in the various Position Descriptions for NCIG personnel.

3. PLANNING AND SYSTEM SUPPORT

3.1 Existing Environment

3.1.1 Local Climate

Long-term climatic data from the Bureau of Meteorology (BoM) weather station at Newcastle Nobbys Signal Automatic Weather Station (AWS) (Site No. 061055) were analysed to characterise the local climate in the proximity of the NCIG CET (Todoroski, 2015). The Newcastle Nobbys Signal AWS is located approximately 6km southeast of the NCIG CET. Table 1 and Figure 2 present a summary of data from the weather station over an approximate 53-year period.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
</table>

Table 1. Monthly Climate Statistics Summary – Newcastle Nobbys Signal AWS
The data indicate that January is the hottest month, while July is the coldest month. Rainfall peaks in the first half of the year and declines thereafter. Humidity levels exhibit variability over the day and seasonal fluctuations. Wind speeds during the warmer months have a greater spread between the 9am and 3pm conditions compared to the colder months. The mean 9am wind speeds range from 20.8 km/h in February (5.8 m/s) and March to 26.4 km/h in June (7.3 m/s). The mean 3pm wind speeds vary from 26.1 km/h in May (7.3 m/s) to 35.3 km/h in November (9.8 m/s). It should be noted that wind speeds at Nobbys are considered a conservative representation of wind speeds at the NCIG site, i.e. Nobbys is more susceptible to greater wind speeds due to the open coastal setting.
Figure 2. Monthly Climate Statistics Summary – Newcastle Nobbys Signal AWS
3.1.2 Local Meteorological Conditions

Seasonal windroses based on the NCIG Weather Station data collected from July 2017 to June 2018 are presented in Figure 3.

Figure 3. Seasonal Windroses – NCIG Weather Station (2017/2018)
On an annual basis winds from the north-northwest and northwest are most frequent. During summer, winds from the east-southeast and southeast dominate the distribution. The autumn, winter and spring wind distribution patterns are similar to the annual distribution and are typically dominated by winds from the north-northwest and northwest. The winter distribution pattern differs from the autumn and spring distribution with only a little wind originating from the southeast and east-southeast.

3.2 Local Air Quality

The main sources of particulate matter in the wider area around the NCIG CET include emissions from the neighbouring industry and emissions from local anthropogenic activities such as motor vehicle exhaust and domestic wood heaters, urban activity and other various commercial and industrial activities (Lower Hunter Particle Characterisation Study, 2016).

The Newcastle Local Air Quality Monitoring Network has been in operation since November 2014. This network is funded through local industry and operated by the Office of Environment and Heritage. A review of the most recent published Newcastle LAQMN Report and the Lower Hunter Particle Characterisation Study is provided below. This review will be updated as more recent data becomes available.

Figures 4 and 5 below show the daily PM10 and PM2.5 averages for the Carrington, Stockton and Mayfield locations for a typical 12-month period (November 2014 to October 2015). The data set shows that the annual average PM10 concentrations were below the annual average criterion of 30 µg/m³, with the exception of Stockton (Carrington – 23.1 µg/m³; Stockton – 35.6 µg/m³; Mayfield – 21.8 µg/m³). Similarly, Figure 4 shows that the majority of daily average concentrations were below the daily average criterion of 50 µg/m³. However, a number of readings at the Stockton location were above the criterion. Further analysis indicates that these readings were consistently over a seasonal period of approximately October to March, which was repeated twice in the above data set. An analysis of wind direction during that period (using the NCIG weather station data) indicates that the predominant wind direction during that period was from the east-southeast and southeast. This is representative of coastal predominant winds, which typically carries salt and sand particulates.
Figure 4. Daily Average PM10 Concentrations – Newcastle LAQMN (November 2014 to October 2015)

Figure 5. Daily Average PM2.5 Concentrations – Newcastle LAQMN (November 2014 to October 2015)
The data set shows that the annual average PM2.5 concentrations for Carrington and Stockton were above the annual average advisory reporting standard of 8 µg/m³, while the annual average at Mayfield was below (Carrington – 8.4 µg/m³; Stockton – 9.7 µg/m³; Mayfield – 7.6 µg/m³). Figure 5 shows that the majority of daily average concentrations were below the daily average advisory reporting criterion of 25 µg/m³. Only six daily readings were above this criterion.

Figures 6, 7, 8 and 9 show PM10 and PM2.5 pollution roses for a typical 12-month period (December 2014 to February 2015), in particular the Stockton and Mayfield sites. These locations correspond to the Newcastle LAQMN sites. The graphics show that the elevated concentrations for both size ranges are associated with winds from the easterly sector (“samples are likely to contain a significant proportion of sea salt”, CSIRO, Lower Hunter Particle Characterisation Study, 4th Progress Report (Summer), April 2015). This period corresponds to the season in Figure 4, when the greatest number of daily PM10 exceedances was recorded.

Figure 6. PM10 Pollution Roses, December 2014 to February 2015 – Stockton (CSIRO, 2015)
Figure 7. PM10 Pollution Roses, December 2014 to February 2015 – Mayfield (CSIRO, 2015)

Figure 8. PM2.5 Pollution Roses, December 2014 to February 2015 – Stockton (CSIRO, 2015)
Figure 9. PM2.5 Pollution Roses, December 2014 to February 2015 – Mayfield (CSIRO, 2015)

Key findings from the Lower Hunter Particle Characterisation and the Lower Hunter Dust Deposition studies include:

**PM2.5**
- PM2.5 (annual average) was within the standard of 8 ug/m$^3$ at each location with the exception of Stockton (9.1 ug/m$^3$)
- Sea salt was the dominant source of PM2.5 (40-50%)
- Numerous other sources (secondary ammonium sulfate, soil including coal, wood smoke, vehicles, mixed shipping/industry, mixed industry/vehicles and nitrate) with no dominant human-derived source
- Nitrate component was significantly higher at Stockton than other locations. Primary signature of nitrate (as opposed to secondary) and wind direction analysis strongly suggests that the source is Orica’s Ammonium Nitrate plant.

**PM2.5-10**
- PM2.5-10 (annual average) was within the standard of 30 ug/m$^3$, although Stockton (21.5 ug/m$^3$) was more than double Mayfield (8.3 ug/m$^3$)
- The major difference between Stockton and Mayfield was fresh sea salt (13.6 ug/m$^3$ vs 3.3 ug/m$^3$)
- Light absorbing carbon component, which includes coal, was 2.2 ug/m$^3$ at Stockton and 0.8 ug/m$^3$ at Mayfield and was higher during winter months when winds were from NW direction.
Deposited Dust

- All locations were within the standard of 4 g/m²/month, the highest being 1.1 g at Islington
- Coal accounted for 10% of deposited dust on average, but was a maximum of 25% in one petri dish sample (Stockton South, 17-20/8/15)
- This study had strong community involvement, was based in residential areas close to coal infrastructure (rail and terminals) and aimed to answer numerous questions, including “what is in the black dust”
- Samples included dust gauges, but also targeted petri dish and brush samples
- Individual examples of a brush samples taken at a house were presented, which appeared black to the naked eye, but under microscope, showed a range of colours and therefore sources.

3.3 NCIG Air Quality

A summary of the available data collected from the internal BAMs during July 2017 and June 2018 is presented in Table 2. The monitoring data indicate that the annual average TSP concentrations for each of the monitoring stations on the site were below the relevant criterion of 90µg/m³.

It is noted that the TH06 monitor recorded a higher annual average level relative to the other monitors. Based on the prevailing meteorological conditions, the results at TH06 appear to be influenced by the monitor’s close proximity to a conveyor transfer point and stockpiles.

<table>
<thead>
<tr>
<th>Period</th>
<th>WP01 (North)</th>
<th>TH06 (East)</th>
<th>TH12 (South)</th>
<th>TH02 (West)</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 2016 – June 2017</td>
<td>24.4</td>
<td>43.9</td>
<td>27.9</td>
<td>33.9</td>
</tr>
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</table>

3.4 Dispersion Modelling

The wind direction and speed shown in the wind roses in Figure 3 indicate the direction and speed in which contaminants such as dust will be transported. Predominant wind directions show that the potential effects of wind direction and dust will be minimal on identified residential or other sensitive receivers (i.e. Fern Bay West, Fern Bay East, Warabrook/Mayfield West, Mayfield, and Carrington) as the identified predominant wind conditions are directed towards the residential areas of Stockton West and Stockton East.

To use the wind data to assess dispersion, it is necessary to also have available data on atmospheric
stability. This was conducted by Holmes Air Sciences in 2006 (NCIG EA, 2006) and again by Sinclair Knight Merz in 2011 and 2013 for the NCIG Model Validation and Compliance Assessment (SKM, 2011 and 2013). In each case, an atmospheric stability class for each hour of the relevant meteorological station (Steel River and NCIG) was calculated using sigma-theta. The most common stability occurrences in all cases were calculated to be D class stabilities (between around 46 and 57%) which suggest that allowed dust emissions will disperse rapidly for a significant proportion of the time.

### 3.5 Potential Emissions

Potential air emissions have been calculated by analysing the various types of dust generating activities taking place during each stage of the NCIG CET and applying suitable emission factors to represent each component activity. The estimated dust emissions from the key activities are summarised in Table 3. The results presented include the application of the dust control measures.

<table>
<thead>
<tr>
<th>Activity</th>
<th>NCIG CET Operations</th>
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<tbody>
<tr>
<td>Trains unloading to unloading station</td>
<td>9,647</td>
</tr>
<tr>
<td>Conveyor</td>
<td>178</td>
</tr>
<tr>
<td>1st transfer between unloading station and stockpiles</td>
<td>5,788</td>
</tr>
<tr>
<td>Conveyor</td>
<td>66</td>
</tr>
<tr>
<td>2nd transfer between unloading station and stockpiles</td>
<td>5,788</td>
</tr>
<tr>
<td>Conveyor</td>
<td>739</td>
</tr>
<tr>
<td>Stacking to coal stockpiles</td>
<td>9,647</td>
</tr>
<tr>
<td>Reclaiming coal from stockpiles</td>
<td>8,180</td>
</tr>
<tr>
<td>Conveyor</td>
<td>739</td>
</tr>
<tr>
<td>Transfer between stockpile and shiploader</td>
<td>4,908</td>
</tr>
<tr>
<td>Conveyor</td>
<td>113</td>
</tr>
<tr>
<td>Transfer to buffer bins</td>
<td>4,908</td>
</tr>
<tr>
<td>Conveyor</td>
<td>199</td>
</tr>
<tr>
<td>1st transfer between buffer bin and shiploader</td>
<td>4,908</td>
</tr>
<tr>
<td>Conveyor</td>
<td>18</td>
</tr>
<tr>
<td>2nd transfer between buffer bin and shiploader</td>
<td>4,908</td>
</tr>
</tbody>
</table>
It is recognised that NCIG’s demand for electricity results in release of greenhouse gas emissions at the energy generation source (i.e. Scope 2 Emissions). The volume of emissions is not calculated as part of this management plan but is calculated yearly for National Greenhouse and Energy Reporting (NGER) – see section 5.9 of the NCIG Operation Environment Management Plan (HSEC.MP.12.01).

3.6 Legislation, Approvals and Licensing Requirements

There are a number of legislative and regulatory documents which apply to the way in which NCIG manages dust and air quality. These are primarily broken down into legislation and policies, and approvals and licences. The majority of these are administered by state government departments, including the Department of Planning and Environment (DPE) and the NSW Environment Protection Authority (EPA).

3.6.1 Legislation and Policies

Environmental Planning and Assessment Act 1979

The major development approval for the NCIG Coal Export Terminal is the Project Approval provided by DPE (PA 06_0009), including subsequent modifications (MOD1 and MOD2). This approval was provided under the now repealed Part 3A (Major Projects) of the Environmental Planning and Assessment Act 1979. The approval contains a number of conditions related to air quality and dust management which are explained in more detail in Section 3.1.2.


The Protection of the Environment Operations (POEO) Act 1997 is the primary piece of state legislation regulating pollution, including air pollution. Part 5.4 of the Act specifically regulates air pollution, including operation of plant, maintenance of plant and dealing with materials in a proper
and efficient manner. The Act also provides for the issuing of Environment Protection Licences (EPLs), which is covered in more detail in Section 3.1.2. The NSW EPA is the applicable regulatory authority, which regulates NCIG under this Act.

**Protection of the Environment (Clean Air) Regulation 2010**

The Clean Air Regulation provides regulatory measures for control of emissions from a number of specific activities. These measures in large part do not apply to NCIG activities, with the exception of motor vehicles and motor vehicle fuels. This Part of the regulation deals specifically with emissions of air impurities, and the fitting and maintenance of anti-pollution devices.

**National Greenhouse and Energy Reporting Act 2007**

The Commonwealth Government has legislated for the provision of data and accounting of greenhouse gas emissions and energy consumption and production, in order to inform policy making on emissions reduction and meet Australia’s international reporting obligations, particularly under the Kyoto Protocol. NCIG is a liable entity under the legislation, and therefore must report on energy and fuel consumption annually. This is explained in more detail in Section 5.9 of the NCIG *Operation Environment Management Plan* (HSEC.MP.12.01).

**National Environment Protection Council Act 1994 (National Pollutant Inventory NEPM)**

Similar to NGER Reporting, the Commonwealth Government, in the form of National Environment Protection Council, has legislated for the mandatory reporting of pollution across Australia, so that the community has access to the information about the emission and transfer of toxic substances which may affect them locally. The primary objectives are to maintain and improve air and water quality, minimise environmental impacts and improve sustainable use of resources. NCIG is required to report under the National Pollutant Inventory NEPM annually, including emissions to air. This is explained in more detail in Section 5.

**Minimising Particulate Pollution from Coal Mines (NSW EPA)**

The NSW Government and EPA have responded to growing community concern regarding particle emissions from coal mining. While NCIG is not part of the coal mining industry, there are a number of activities that are common to coal mining operations. These activities and features include emissions of particulate matter, unsealed surfaces, coal stockpiling, and coal loading and unloading.

The NSW OEH conducted a benchmarking study of the coal mining industry for best practice measures to prevent and/or minimise emissions of particulate matter (http://www.epa.nsw.gov.au/resources/air/KE1006953volumel.pdf). NCIG has reviewed this document in order to benchmark the coal terminal activities against other similar activities in the mining industry. This comparison found that NCIG is currently practising all best-practice measures where they apply. These are explained in more detail in Section 4.
3.6.2 Approvals and Licences

Project Approval 06_0009, including subsequent Modifications

There are a number of conditions within the Project Approval pertaining to the management of odour or dust emissions from the terminal site. Specifically, these are:

- Condition 2.1 – emission of offensive odour.
- Condition 2.2 – Design, construction, commissioning, operation and maintenance of the site to minimise or prevent emissions of dust.
- Condition 2.3 – Covering of dust-generating loads from vehicles.
- Condition 2.4 – Prevention of visible emissions of dust from the site boundary.
- Condition 2.5 – Control of dust emissions on all internal roads and trafficable areas.
- Condition 2.6 – Design, construction, operation and maintenance of the site to minimise potential fugitive emissions from plant and equipment, e.g. minimise coal transfer points, minimise drop height from stacking, full or partial enclosure of conveyors, installation of wind shields and belt cleaning systems on conveyors, dust control equipment on mobile plant.
- Condition 2.7 – covering, sealing, grassing or otherwise of site to minimise the potential generation of wind-blown dust.
- Condition 2.8 – Installation, operation and maintenance of a meteorological monitoring station on site.
- Condition 3.1 – Continuous monitoring of meteorological parameters (using the onsite meteorological station).
- Condition 3.2 – Ambient dust monitoring, approved by the Director General and OEH, including total suspended particulate, PM10 and deposited dust and investigation of the use of TEOMs. Also includes provision for auditing and updating of the monitoring program from time to time.
- Conditions 3.3, 3.4 and 3.5 – Air Quality Modelling Validation Study, after 12 months operation of Stage 1, and again after export rate exceeds 33 million tonnes per annum.
- Conditions 4.1 a) and c) – sharing of dust monitoring data with the operator of Kooragang Coal Terminal, and coordination and cooperation in monitoring of ambient environmental impacts.
- Condition 4.3 – participation in any cumulative dust study that may be commissioned by DPE in consultation with OEH.
Condition 7.6 a) – Preparation and implementation of an Operation Dust Management Plan, including measures to minimise and manage impacts on local air quality. The plan is to include:

- identification of all major sources of dust emissions;
- description of the procedures to manage dust emissions;
- dust monitoring locations;
- dust monitoring procedures in accordance with the project approval and EPL;
- protocols for regular maintenance of plant and equipment; and
- procedures for non-compliances.

Environment Protection Licence 12693

An Environmental Protection Licence (EPL) 12693 was obtained prior to construction of the project pursuant to the Protection of the Environment Operations Act 1997. Subsequent amendments to this licence have been made to reflect changes in site boundaries and activities. The key dust and air quality conditions in the EPL are:

- Condition P1.1 – Meteorological Monitoring Station located on the premises, in accordance with locations shown in the Operation Dust Management Plan, March 2010, Version 1.

- Condition L4 – Licensee must not cause or permit the emission of any offensive odour from the premises (Section 129, POEO Act).

- Condition O3 – Several conditions regarding dust and dust management, including maintaining the site in a condition that minimises or prevents dust, conducting operations to minimise dust, covering truck loads that have the potential to generate dust and operation of sprays to prevent and minimise dust from coal from the premises. The operation of the sprays must give consideration to a number of matters including the types of coal handled, forecast meteorological conditions, current weather conditions from the real-time meteorological station and ambient air quality from the real time monitoring network located at NCIG.

- Condition O7.1 – NCIG must carry out all activities in an environmentally satisfactory manner so as to minimise pollution of air. This includes ensuring that vehicles and containers leaving the site are clean and sealed so that materials or wastes are not tracked, thrown, blown etc from vehicles or containers onto public roads. It also requires implementing procedures for this purpose.

- Condition M1 – refers to the recording and retention of monitoring data, including
details of the time, date, location and person who samples.

- Condition M3 – Monitoring for the concentration of pollutants to be done in accordance with the Approved Methods Publication.
- Condition M4 – Weather monitoring to be measured and electronically logged, including siting, temperature at 2m and 10m, wind speed at 10m, wind direction at 10m, sigma theta at 10m and solar radiation (AS2922-1987 or “Approved Methods for the Sampling and Analysis of Air Pollutants in NSW”).
- Condition M5 – A record of all complaints made in relation to pollution must be kept, including details of the date and time, the method by which the complaint was made, personal details of the complainant, the nature of the complaint, the action taken by NCIG including any follow up contact and if no action was taken, the reasons why.

3.7 Air Quality Standards

Air quality criteria are benchmarks set to protect the general health and amenity of the community in relation to air quality. The sections below identify the potential air emissions generated by the NCIG site and the applicable air quality criteria.

The air quality goals that are relevant to this study are sourced from the NSW EPA document "Approved Methods for the Modelling and Assessment of Air Pollutants in NSW" (NSW Department of the Environment and Conservation [DEC], 2005).

3.7.1 Particulate Matter

Particulate matter refers to particles of varying size and composition. The air quality standards of three classes of particulate matter are relevant to NCIG’s operations. The first class is referred to as Total Suspended Particulate matter (TSP) which measures the total mass of all particles suspended in air. The upper size range for TSP is nominally taken to be 30 micrometres (µm) as in practice, particles larger than 30 to 50µm settle out of the atmosphere too quickly to be regarded as air pollutants. The second and third class are sub-classes of TSP, namely PM10, particulate matter with aerodynamic diameters of 10µm or less, and PM2.5, particulate matter with aerodynamic diameters of 2.5µm or less.

Table 4 summarises the air quality standards that are relevant to NCIG as outlined in the NSW Environment Protection Authority (EPA) document "Approved Methods for the Modelling and Assessment of Air Pollutants in NSW" (NSW DEC, 2005). Consideration of background dust levels needs to be made when using these goals to assess potential impacts.
Table 4. NSW EPA air quality impact assessment criteria

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging Period</th>
<th>Impact</th>
<th>Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSP</td>
<td>Annual</td>
<td>Total</td>
<td>90µg/m³</td>
</tr>
<tr>
<td>PM₁₀</td>
<td>Annual</td>
<td>Total</td>
<td>30µg/m³</td>
</tr>
<tr>
<td></td>
<td>24 hour</td>
<td>Total</td>
<td>50µg/m³</td>
</tr>
<tr>
<td>Deposited dust</td>
<td>Annual</td>
<td>Incremental</td>
<td>2g/m²/month</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>4g/m²/month</td>
</tr>
</tbody>
</table>

Source: NSW DEC, 2005
µg/m³ – micrograms per cubic metre
g/m²/month – grams per square metre per month

The criterion for 24-hour average PM₁₀ originates from the National Environment Protection Measure (NEPM) goals (NEPC, 1988). These goals apply to the population as a whole, and are not recommended to be applied to “hot spots” such as locations near industry, busy roads or mining. However, in the absence of alternative measures, the criteria are applied to assess the potential for impacts to arise at such locations.

The NEPM permits five days annually above the 24-hour average PM₁₀ criterion to allow for bush fires and similar events. Similarly, it is normally the case that days where ambient dust levels are affected by such events are excluded from assessment as per the NSW EPA criterion.

The NSW EPA currently does not have impact assessment criteria for PM₂.₅ concentrations; however, the National Environment Protection Council (NEPC) has released a variation to the NEPM (NEPC, 2003) to include advisory reporting standards for PM₂.₅ (see Table 5).

The advisory reporting standards for PM₂.₅ are a maximum 24-hour average of 25µg/m³ and an annual average of 8µg/m³, and as with the NEPM goals, apply to the average, or general exposure of a population, rather than to “hot spot” locations.

Table 5. Advisory reporting standard for PM2.5 concentrations

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging Period</th>
<th>Advisory Reporting Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM₂.₅</td>
<td>24 hours</td>
<td>25µg/m³</td>
</tr>
<tr>
<td></td>
<td>Annual</td>
<td>8µg/m³</td>
</tr>
</tbody>
</table>

4. OPERATION AND IMPLEMENTATION

NCIG manages air quality impacts from its operations with the regard to both coal handling and additional areas of the site. This focusses primarily on management of ambient particulate emitted
to the environment, but also includes management of greenhouse gases and odour.

4.1 Coal Handling

4.1.1 Infrastructure

As the result of bulk movement of coal through an extensive system of conveyors and transport points, small amounts of coal have the potential to spill from transport and produce dust. Design of the NCIG coal handling system has produced an effective method of dust suppression which is achieved by material restraint. Material restraint minimises spillage and fugitive material by mechanical containment on conveyors and transport points. This is achieved via belt supports, containment skirts, wear plates, load sealing boxes, slit rubber dust control curtains and covers, which are all subject to regular inspections. Monitoring of all conveyor, hopper, transfer and storage infrastructure is carried out on a regular basis to identify potential spill points and maintenance requirements.

4.1.2 Logistics Planning

Dust risk from coal handling activities is considered at the planning stage of NCIG’s operations. Where practical, coal types with high or extreme dust risk are positioned in locations in the yard where they are unlikely to result in significant dust emissions from site. Train unloading tasks are also planned with lower stockpile heights where possible, if dust risk is high or extreme due to coal type of weather conditions.

4.1.3 Integrated Dust Management System

NCIG has developed an Integrated Dust Management System (IDMS) to manage dust from coal handling activities. The system is broken down primarily into three areas as described below; inbound, stockyard and outbound.

4.1.3.1 Inbound

The inbound system consists of a series of water sprays positioned at the chute of each transfer point from the dump station to the stockyard. There are also water sprays positioned at the hopper in the dump station and additional sprays at the stack point of the Stacker Reclaimer. The sprays are activated based on dust risk, either of the coal product being received, or the environmental conditions experienced at the time.

Depending on the current risk level, sprays will be activated according to the matrix shown below. An initial dust risk is assigned to each product that NCIG receives. The HSEC Department, with the assistance of Dump Station Operators, conducts a dustiness assessment of each of these products every 12-18 months based on observations in the dump station and at the stack point. Dust risk of
each product is updated based on this assessment.

The inbound system also has an inline moisture meter which provides feedback to the SCADA System on the real-time moisture of the coal product being delivered to the stockyard. This moisture level is compared to the nominated Dust Extinction Moisture (DEM) value assigned to that product. If the moisture content is below the DEM, additional sprays will be activated at pre-set graduations. If the moisture content is above the DEM, sprays will be deactivated at pre-set graduations. The dump station operator and/or inbound support technician is expected to monitor dust from stacking for the duration of the task, and manually intervene to activate additional sprays where the automated system fails to control this.

Table 6. NCIG operation environmental monitoring program

<table>
<thead>
<tr>
<th>Inbound Dust Risk</th>
<th>Number of sprays activated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>0</td>
</tr>
<tr>
<td>Moderate</td>
<td>4</td>
</tr>
<tr>
<td>High</td>
<td>7</td>
</tr>
<tr>
<td>Extreme</td>
<td>10</td>
</tr>
</tbody>
</table>

Additional dust management features of the inbound system include minimum stack height, such that the drop height of coal from the Stacker Reclaimer is not greater than 4m, and 12m pile stacking to reduce the elevation at which coal is stacked, and thereby reducing exposure to strong winds which generate dust. Trials using a Stacker Reclaimer-mounted fogging cannon have been conducted to test the effectiveness of managing dust from stacking (and reclaiming) processes, although with only limited success.

4.1.3.2 Stockyard

Coal stockpiles are managed predominantly through the operation of water sprays aligning the sides of each stockpile in the stockyard. This is to prevent wind-generated dust from the surface of coal stockpiles. Development and testing of spray guns was undertaken when first installed, confirming that the devices were able to provide a suitable wetting pattern over the NCIG stockpiles, subsequently minimising the potential for dust generation. This system is illustrated in Figure 10 and 11.
Figure 10. NCIG spray gun wetting pattern for narrow coal stockpiles.

Figure 11. NCIG spray gun wetting pattern for wide coal stockpiles.
Stockpile sprays are activated according to an evapotranspiration algorithm that calculates the evaporation of moisture from the coal surface using real-time data from the NCIG onsite weather station. Once the coal stockpile surface moisture equals zero, a cycle of stockpile sprays is initiated. Sprays sequence from west to east and south to north, with up to five sprays operating at any one time. A sequence of sprays will take approximately 30-50 minutes, depending on coal present in the stockyard. Operators are also able to turn sprays on manually, and are expected to do so if inspections of the stockyard suggest this is necessary.

In addition to the evapotranspiration algorithm, there are a number of overriding or inhibiting modes:

**High or Extreme Dust Risk**

As well as using real-time weather inputs for the evapotranspiration algorithm, real-time wind speed, wind direction and rainfall data is used to calculate Dust Risk. Dust risk is calculated using a dust risk matrix which categorises conditions into Low, Moderate, High or Extreme. If real-time conditions exceed High, a cycle of stockpile sprays is initiated. This will occur even if coal stockpile surface moisture is greater than zero. The Extreme stockpile spray cycle is shortened such that the complete cycle rotates through the stockyard in half the normal time, i.e. approx. 20-25 minutes.

Forecast data is also used to calculate a Forecast Dust Risk. This feature uses forecast data 2 hours in advance. If forecast conditions exceed High, a cycle of stockpile sprays is initiated on the hour. This will occur even if coal stockpile surface moisture is greater than zero.

**Wind Directionality**

Depending on the direction and speed of wind, certain stockyard sprays may be interlocked where they would otherwise be ineffective in reaching the stockpile. For example, if wind speed is from the western quadrant and greater than 5 m/s, then the far eastern spray at each stockpad will be interlocked. In addition, the above scenario would activate stockyard sprays further upwind from the known location of a stockpile, eg. stockpile sprays to the immediate west of the spray in front of a pile will activate. The resultant effect is that spray will be blown down onto the pile.

**Stacker Reclaimer Location**

Sprays are interlocked in the immediate vicinity surrounding the Stacker Reclaimer. This is to avoid potential injury to people or damage to equipment.

**Rainfall**

If an observable amount of rain is detected on the Meteorological Monitoring Station, then stockyard sprays will be interlocked for a pre-set period to avoid excessive moisture application. In addition, the amount of rain detected will be added to the evapotranspiration algorithm, thereby
extending the period before coal stockpile surface moisture equals zero.

4.1.3.3 Outbound

Water sprays at the Stacker Reclaimer bucket wheel (used during reclaim activities) are the primary outbound dust suppression control. The default mode for all other water sprays on the outbound system is off. This is to avoid excess moisture in outgoing coal product, which can create issues while loading onto the ship. In the event that coal loading activities create fugitive dust emissions, the Ship Loader Operator is required to activate outbound sprays to control the visible dust.

It should also be mentioned that where low (12m) stockpiles are built to avoid dust generation during stacking activities, this has the benefit of reducing dust during reclaim activities. This is due to lower elevation, and hence lower wind speeds.

4.1.3.4 Operator Notifications

There are a number of operator notifications to assist in managing dust from activities. These are listed below.

**Inbound Dust Risk Notification**

If a train with high or extreme dust risk is commencing unloading, a notification prompt on SCADA is activated, requiring acknowledgment from the dump station operator. This will ensure that particular attention is given to the unloading activities through to the stack point, and further action is taken where appropriate. The same notification is given during unloading in high or extreme weather conditions.

**Forecast or Live High/Extreme Dust Risk Alerts**

Email alerts and SCADA Critical System Alerts are activated when forecast or live dust risk is high or extreme. This will ensure that the operations team is aware of the potential for dust generation, provide an opportunity to conduct an inspection of site and take subsequent action where appropriate.

**Real-time Dust Monitor Alerts**

NCIG has four (4) real-time dust monitors located at the boundaries of the NCIG site – see Section 5.1 for more information. The primary intent of these monitors is to provide feedback to the operations team of excessive dust levels onsite, where further action can be taken to control this. An email alert and SCADA Critical System Alert will be activated when elevated dust levels are experienced at these monitors.

**Outbound Dust Risk Notification**

If a stockpile product with high or extreme dust risk is commencing reclaiming, a notification
prompt on SCADA is activated. This informs the Ship Loader operator and provides them the opportunity to take further action where necessary.

**Environmental Risk Event Checklist**

The NCIG Control System alerts operators of the plant when a particular environmental risk event is occurring (Environmental System Alert). This may be initiated by high dust levels or high/extreme dust risk conditions. If an alert is activated, an Environmental Risk Event Checklist is required to be completed, including actions taken to control or mitigate the situation.

### 4.1.4 Additional Coal Handling Practices

As mentioned in Section 4.1.2, creation of low stockpiles assists in the management of coal dust. This is through lower elevation of piles and lower stacking elevations, which are both exposed to lower wind speeds.

The potential for coal remaining inside and on the outer surfaces of empty coal wagons, can contribute to coal accumulation within the rail network after leaving the NCIG facility. This then has the potential to be a dust nuisance, with deposited material re-suspended by passing trains. For this reason, unloading practices:

- target the complete discharge of coal to ensure all possible coal is unloaded from wagons; and
- avoid ‘ploughing’ of coal, i.e. pushing of coal by the underside of coal wagons, which is caused by high train speed and slow discharge of coal through the dump station hopper.

It is important that all stockyard sprays are able to operate as frequently as they are required. For this reason, NCIG Operators are to ensure that Stacker Reclaimers are parked in adequate positions when not in use (i.e. stacking or reclaiming), so that stockyard sprays are not interlocked due to Stacker Reclaimer position.

### 4.2 Ancillary Areas

All areas ancillary to the stockpad and plant on the NCIG site are managed to control erosion and wind-generated dust and improve landscape amenity. These include:

- Sealed Roads
- Surface water management features, eg. sumps and settling ponds, including the removal of sediment from the site which may contribute to dust generation.
- Vegetated areas, including grassed areas and trees for wind breaks
- Surface binder on unsealed surfaces

Surface binder is required to be reapplied approximately every 12-18 months as weathering and environmental conditions breakdown the binder over time. Site users are instructed to stay off
these areas as vehicle traffic will also cause the binder to be damaged. Road bollards have been erected to assist with this.

4.3 Maintenance Activities

Maintenance activities are conducted to reduce the amount of material that can contribute to wind-borne dust. This includes:

- Water carts to be used around unsealed areas during high wind events
- cleaning of sumps and water management features
- road sweeping
- cleaning up of coal spillage

Maintenance activities are also managed to reduce the potential impact on local air quality. Considerations are given to the types of activities that may cause dust and appropriate controls are put in place, eg. covers around abrasive blasting, wetting down surfaces prior to road sweeping.

In particular, vehicles carrying coal spillage material across public roads from one NCIG area to another, are cleaned prior to leaving site so that coal fines and other material are not tracked onto public roads.

4.4 Vehicles

All vehicles onsite are managed to control impacts on air quality. These measures include:

- Regular maintenance of vehicles to ensure potential emissions are managed
- Regular washdown to avoid dust generation from dirty vehicles
- Vehicle driver behaviour to observe speed limits and remain on designated roads to avoid wheel-generated dust
- Ensuring that all vehicles entering and exiting the site which contain materials that may produce dust are covered, except whilst loading/unloading
- Ensuring that all vehicles and containers which have the potential to track or lose material onto public roads, are cleaned prior to leaving the site.

4.5 Odour Management

There is the potential for odour to be generated from the NCIG site by spontaneous combustion of coal. This is considered a low risk to the local environment. However, a specific Operation Spontaneous Combustion Management Protocol has been developed to meet the requirement of Condition 7.6 d (see HSEC.MP.12.05 Operation Spontaneous Combustion Management Protocol).
4.6 Greenhouse Gas Management

NCIG emits relatively little greenhouse gases to the environment directly from its operations. Emissions are in the form of fuel consumption, predominantly diesel from site vehicles, this is managed as effectively as possible through regular servicing of vehicles and equipment. However, NCIG recognises its greenhouse emissions extend beyond the terminal site boundary, including emissions for energy production, as a result of NCIG’s energy demands (i.e. Scope 2 Emissions). As the NCIG terminal matures, further operational improvements are continuously made to increase the efficiency of the plant, for example through reducing run times of conveyors and machines before and after stacking or reclaim tasks. These improvements are predominantly made through SCADA logic changes in the operational system and are made on an ongoing basis.

5. PERFORMANCE EVALUATION AND IMPROVEMENT

5.1 Ambient Air Quality Monitoring Program

Air quality and dust monitoring is undertaken at four (4) internal locations and nine (9) external locations including Fern Bay, Stockton, Mayfield, Steel River, Kooragang, Sandgate, Newcastle, Beresfield and Wallsend (Figure 12). Details of the monitoring program are provided below.
Figure 12. Ambient Air Quality Monitoring Locations.
Monitoring records include TSP, particulate matter <10 μm (PM$_{10}$), particulate matter <2.5 μm (PM$_{2.5}$) and deposited dust as per Table 7. From time to time, additional air quality monitoring will be conducted on an as needs basis. In addition, meteorological data is monitored and logged at the NCIG CET, which is also detailed in Table 7. These monitoring results are shared and discussed with Port Waratah Coal Services as part of the Coordinated Environmental Management and Monitoring Protocol (CEMMP).

It should be noted that on the 25th August 2017, an amendment was made to the NCIG Environmental Protection Licence (EPL12693) which removed the requirement for ambient air quality monitoring at Points 7-10 and 14-15. However, NCIG will continue to monitor and publish ambient air quality data for these locations previously listed in EPL12693 for the interest of the public.

### Table 7. NCIG Operation Ambient Air Quality Monitoring Program

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>UNITS</th>
<th>FREQUENCY</th>
<th>LOCATION</th>
<th>METHODOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Meteorological Monitoring</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature at 2m and 10m</td>
<td>°C</td>
<td>Continuous</td>
<td>NCIG site (adjacent Clearwater Pond)</td>
<td>AS 2922</td>
</tr>
<tr>
<td>Wind Speed at 10m</td>
<td>ms$^{-1}$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wind Direction at 10m</td>
<td>Degrees</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sigma-theta at 10m</td>
<td>Degrees</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solar radiation at 10m</td>
<td>Wm$^{-1}$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Depositional Dust Monitoring</strong></td>
<td>g/m$^2$/month</td>
<td>Monthly</td>
<td>• Stockton – DG2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Kooragang – DG3 (MP 7)</td>
<td>AS/NZS 3580$^2$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Mayfield – DG4 (MP 8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Steel River – DG5 (MP 9)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Sandgate – DG6 (MP 10)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Fern Bay – DDG-K8 (DG1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Stockton Prawners Club – DDG-C1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Stockton Hospital – DDG-K1</td>
<td></td>
</tr>
<tr>
<td><strong>High Volume Air Sampling</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>PARAMETER</td>
<td>UNITS</td>
<td>FREQUENCY</td>
<td>LOCATION</td>
<td>METHODOLOGY</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>-------------</td>
<td>------------</td>
<td>------------------------------------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Total Suspended Particulates (TSP)</td>
<td>µg/m³</td>
<td>6-daily</td>
<td>• Steel River – HVAS1 (MP 14)</td>
<td>DEC Approved Methods¹</td>
</tr>
<tr>
<td>Particulate Matter &lt;10µm (PM10)</td>
<td></td>
<td></td>
<td>• Mayfield – HVAS2 (MP 15)</td>
<td></td>
</tr>
<tr>
<td>Total Suspended Particulates (TSP) (Integrated AQMN with PWCS)</td>
<td></td>
<td></td>
<td>• Stockton Prawners Club – HVAS-C1</td>
<td></td>
</tr>
<tr>
<td>Particulate Matter &lt;10µm (PM10) (Integrated AQMN with PWCS)</td>
<td></td>
<td></td>
<td>• Fern Bay – HVAS-K2 (TSP), HVAS-K3 (PM10), HVAS-K4 (Directional TSP)</td>
<td></td>
</tr>
<tr>
<td>Newcastle Local Air Quality Monitoring Network (operated by OEH, funded by industry)</td>
<td></td>
<td></td>
<td>• Stockton</td>
<td>DEC Approved Methods³</td>
</tr>
<tr>
<td>Particulate Matter &lt;10µm (PM10)</td>
<td>µg/m³</td>
<td>Hourly (average daily values reported)</td>
<td>* Stockton</td>
<td></td>
</tr>
<tr>
<td>Particulate Matter &lt;2.5µm (PM2.5)</td>
<td></td>
<td></td>
<td>* Carrington</td>
<td></td>
</tr>
<tr>
<td>Wind Speed</td>
<td>ms⁻¹</td>
<td></td>
<td>* Mayfield</td>
<td></td>
</tr>
<tr>
<td>Wind Direction</td>
<td>Degrees</td>
<td></td>
<td>* Newcastle</td>
<td></td>
</tr>
<tr>
<td>Onsite Beta Attenuation Monitoring (BAM)</td>
<td></td>
<td></td>
<td>* Wallsend</td>
<td></td>
</tr>
<tr>
<td>Total Suspended Particulates (TSP)</td>
<td>µg/m³</td>
<td>Continuous</td>
<td>• BAM N</td>
<td>DEC Approved Methods¹</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• BAM E</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>• BAM S</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• BAM W</td>
<td></td>
</tr>
</tbody>
</table>

¹ The location of monitoring sites is shown on Figure 12.
² Dust deposition will be analysed in accordance with Australian standard AS/NZS 3580.10.1-2003 Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method (Standards Association of Australia 2003).
³ PM₁₀ will be monitored in accordance with the Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (Department of Environment and Conservation NSW 2006).
⁴ AS 2922-1987 Ambient Air – Guide for the siting of sampling units.
5.1.1 Environmental Monitoring Database

Data obtained from the operation ambient air quality monitoring programs is handled as follows:

- Results are entered into the database by the HSEC Department;
- Data is compared with relevant criteria; and
- A non-conformance will be completed in the event of a recorded exceedance.

The ODAQMP is designed to facilitate review of relevant monitoring and operational activity data, identification and implementation of appropriate management measures and subsequent review.

5.1.2 Environmental Monitoring Assessment

In the event of an exceedance of the relevant air quality monitoring criteria, an assessment will be conducted by the HSEC Department to determine if the exceedance is due to NCIG operation activities (i.e. conduct a review of other non-NCIG activities in the area and if relevant, historical monitoring data). If the exceedance is determined to potentially be the result of NCIG operation activities, the HSEC Department will implement a management strategy or appropriate controls.

5.2 Coal Spillage Monitoring

As may be required either by EPL conditions or environmental monitoring requirements, NCIG will monitor the level of coal spillage that may occur into the rail network from time to time. This has the potential to lead to dust and air quality issues over time with repeated deposition of coal spillage and subsequent re-suspension of particulates caused by wind and passing trains. This may also include monitoring of coal wagons as they enter the NCIG Dump Station, for coal build-up on the external surfaces that can lead to coal spillage.

5.3 Maintenance and Calibration of Air Quality Monitoring Equipment

Maintenance and calibration of air quality monitoring equipment is carried out by delegated contract environmental personnel on a regular basis. For onsite and offsite monitors, this is done monthly. The onsite weather station is serviced and calibrated every 12-18 months. Records of maintenance and calibration are provided to the Environmental Representative for each site visit.

5.4 Internal Auditing

The HSEC Department will undertake regular auditing of dust and air quality management within the SDMP, including this Operation Dust and Air Quality Management Plan. This auditing is conducted in accordance with the NCIG Audit and Inspection Procedure (HSEC.PRO.15.01) and the annual HSEC Audit and Inspection Schedule. Non-conformances will be recorded, and appropriate
actions taken to remedy.

5.5 Coordination

The monitoring and management of air quality at the NCIG site will be undertaken in a coordinated approach with the adjacent coal terminal operated by PWCS. The manner in which the coordination will be conducted is outlined by the Coordinated Environmental Monitoring and Management Procedure.

5.6 Incident Review

Environmental incidents relating to dust and air quality management of the NCIG site are to be managed in accordance with NCIG Hazard and Incident Management Procedure (HSEC.PRO.13.01), including the Trigger Action Response Procedure. This includes recording the incident on the NCIG HSEC System, which is then forwarded to the Manager – HSEC and Environmental Advisor for action.

5.7 Corrective Action

If corrective actions are identified as a result of air quality monitoring assessment, ODAQMP audit and inspection results, compliance tracking or community complaints about dust (see Operation Environmental Management Plan), the HSEC Department or Manager – HSEC will determine appropriate management strategies and implementation of contingency measures in consultation with other departments. This same process is applied as an outcome of management review of environmental management measures, as discussed in Section 5.8. These will be in addition to those implemented as part of normal operational activities.

Corrective actions are also identified for environmental incidents. This process will be implemented in accordance with the NCIG Hazard and Incident Management Procedure (HSEC.PRO.13.01) including the Trigger Action Response Procedure.

5.8 Reporting

Operator Notifications for dust events, as detailed in Section 4.1.3.4, require management action. These actions are required to be recorded in an NCIG Environmental Risk Event Checklist. This assists NCIG Operators in understanding all necessary considerations during a dust event, while also providing a detailed record of the event.

For all other reporting commitments, refer to Section 5.9 of the NCIG Operation Environmental Management Plan (HSEC.MP.12.01).
5.9 General Review

Ongoing review and attainment of feedback in regard to environmental measures is undertaken to ensure that the SDMP is meeting its targets and objectives. Any improvements deemed necessary will be identified and SDMP documentation will be updated to reflect this.

5.9.1 Management Review

The ELT reviews progress and health of environmental management measures on a quarterly basis in line with the Quarterly HSEC Report prepared for the NCIG Board. In addition, Key Result Areas (KRAs) and objectives are set during the business planning process (see Section 3.3), to ensure that statements within the Sustainable Development Policy are being achieved. Information used to develop KRAs and objectives include:

- Legislative requirements;
- Performance against environmental objectives and targets in the HSEC Plan;
- Compliance assessment;
- Environmental monitoring results;
- Results of environmental auditing and trends of non-conformance;
- Monitoring of environmental statistics;
- Environmental incidents
- Corrective actions;
- Community complaints;
- Other current environmental issues and concerns;

The above is consistent with the NCIG Management Planning, Monitoring and Review Procedure (HSEC.15.02). As with general review of environmental management measures, improvements deemed necessary by management will be identified and SDMP documentation will updated to reflect this.

<table>
<thead>
<tr>
<th>Revision No</th>
<th>Date</th>
<th>General Description of Change</th>
<th>Persons Involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Draft</td>
<td>1/04/10</td>
<td>Review of draft Document</td>
<td>Brendan Logan</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Nathan Juchau</td>
</tr>
<tr>
<td>Date</td>
<td>Action</td>
<td>Person(s)</td>
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<tr>
<td>1/06/10</td>
<td>Final document for approval</td>
<td>Brendan Logan</td>
<td></td>
</tr>
<tr>
<td>1/05/12</td>
<td>General revision</td>
<td>Phil Reid</td>
<td></td>
</tr>
<tr>
<td>1/05/13</td>
<td>General revision</td>
<td>Phil Reid</td>
<td></td>
</tr>
<tr>
<td>8/2/16</td>
<td>Update ODAQMP to be consistent with revised SDMP framework, including environmental management component. Include findings from recent EPA/OEH studies and monitoring results from LHAQMN. Include recommendations from previous Independent Environmental Audits.</td>
<td>Phil Reid</td>
<td></td>
</tr>
<tr>
<td>15/12/17</td>
<td>Change to background monitoring (BAM averages) and inclusion of new coal dust operating condition</td>
<td>Phil Reid</td>
<td></td>
</tr>
<tr>
<td>28/11/18</td>
<td>General revision, update to EPL Conditions and deletion of redundant data.</td>
<td>Hayley Ardagh</td>
<td></td>
</tr>
</tbody>
</table>

6. REFERENCES

- Department of Environment and Conservation NSW 2006, Approved methods for the sampling and analysis of air pollutants in New South Wales, Environment Protection Authority (NSW), Sydney.

- Department of Infrastructure, Planning and Natural Resources 2004, Guideline for the preparation of environmental management plans, Department of Infrastructure, Planning and Natural Resources, Sydney.


- Standards Association of Australia 2003, Methods for sampling and analysis of ambient air – determination of particulate matter – deposited matter – gravimetric method (AS/NZS
3580.10.1:2003), Standards Australia, Sydney.


- Standards Association of Australia 2003, Methods for sampling and analysis of ambient air – determination of suspended particulate matter – PM10 high volume air sampler with size selective inlet-Gravimetric method (AS/NZS 3580.9.6:2003), Standards Australia, Sydney.