Newcastle Coal
INFRASTRUCTURE GROUP

OPERATION DUST & AIR QUALITY MANAGEMENT PLAN

DOCUMENT NO: HSEC.MP.12.02

NEXT REVIEW DATE: 16/07/23

REVIEW FREQUENCY: 2 YEARS

AUTHOR: Phil Reid

Position: Environmental Advisor

AUTHORISED BY: Nathan Juchau

Position: Manager – HSEC

TABLE OF CONTENTS

KEY ELEMENTS

The Key Elements provide an overview of this Procedure. If you are required to complete work in relation to this procedure, it is essential that you familiarise yourself with the contents of the whole procedure.

- 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
- This management plan outlines the ways in which NCIG plans, implements and monitors its activities to mitigate impacts on local air quality
- The major development approval for the NCIG Coal Export Terminal is the Project Approval provided by DPIE (PA 06_0009), including subsequent modifications (MOD1, MOD2 and MOD3). This approval contains a number of conditions related to air quality and dust management which are explained in more detail in Section 3.6.2
- An Environmental Protection Licence (EPL) 12693 was obtained prior to construction of the project pursuant to the Protection of the Environment Operations Act 1997. The EPL includes a number of dust and air quality conditions that are required to be met which are explained in more detail in Section 3.6.2
- 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 79 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 79 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 79 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.

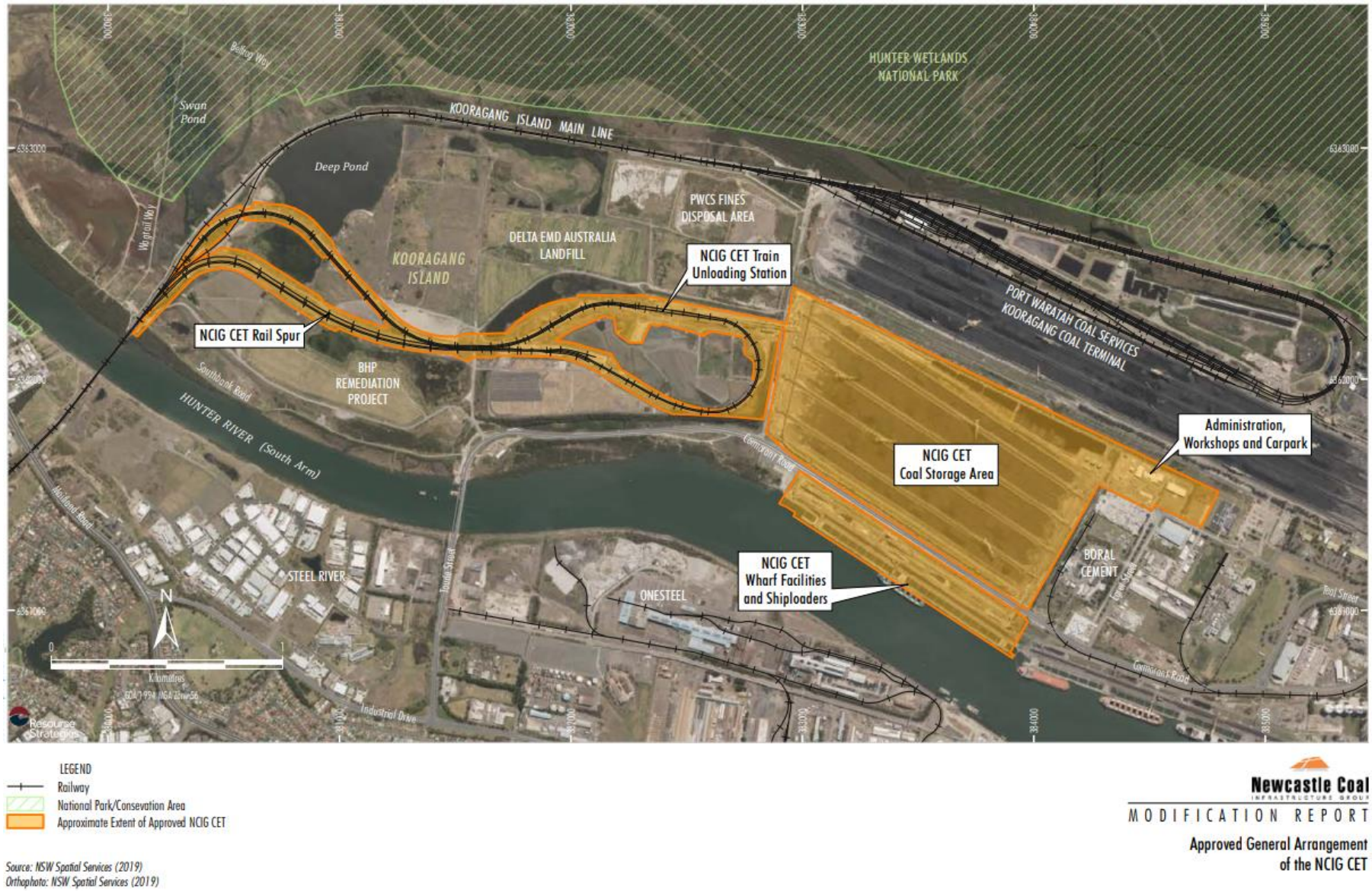

Figure 1. NCIG Project General Arrangement

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. 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 ISO 14001:2015, 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

> Provide adequate resources for the implementation of this plan

> 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) (now Department of Planning, Industry and Environment (DPIE)) approved Environmental Representative for the NCIG Project, 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 (NPI) and National Greenhouse and Energy Reporting (NGER)
- 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, 2020). 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 a 44 to 155-year period for various meteorological parameters.

Table 1. Monthly Climate Statistics Summary – Newcastle Nobbys Signal AWS

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature												
Mean max. temperature (°C)	25.6	25.4	24.8	22.8	20.0	17.5	16.8	18.1	20.2	22.1	23.5	24.9
Mean min. temperature (°C)	19.3	19.4	18.3	15.4	12.0	9.8	8.5	9.3	11.5	14.1	16.2	18.0
Rainfall												
Rainfall (mm)	89.0	106.9	119.2	116.7	114.5	118.9	91.9	72.5	71.9	72.7	70.9	80.3
Mean No. of rain days (≥1mm)	8.1	8.2	9.2	9.2	8.9	9.2	8.1	7.4	7.2	7.8	7.8	7.6
9am conditions												
Mean temperature (°C)	21.9	21.9	20.9	18.1	14.6	12.1	10.9	12.2	15.1	17.9	19.5	21.1
Mean relative humidity (%)	77.0	80.0	79.0	78.0	79.0	79.0	77.0	72.0	69.0	68.0	72.0	74.0
Mean wind speed (km/h)	20.9	20.8	20.8	21.5	23.6	26.4	26.3	25.8	25.1	23.7	23.2	21.7
3pm conditions												
Mean temperature (°C)	23.3	23.5	22.9	21.3	18.8	16.5	15.9	16.9	18.5	19.8	21.0	22.4
Mean relative humidity (%)	72.0	74.0	72.0	66.0	64.0	63.0	59.0	56.0	59.0	64.0	68.0	71.0
Mean wind speed (km/h)	33.2	32.6	30.6	28.0	26.1	28.2	28.9	30.5	33.9	34.4	35.3	35.2

The data indicates that January is the hottest month with a mean maximum temperature of 25.6 degrees Celsius (ºC) and July as the coldest month with a mean minimum temperature of 8.5ºC. Rainfall peaks in the first half of the year and declines thereafter. March is the wettest month with an average rainfall of 119.2 millimetres (mm) over 9.2 days and November is the driest month with an average rainfall of 70.9 mm over 7.8 days. Average annual rainfall for the station is 1,121.0 mm occurring over an average of 98.7 days. Humidity levels exhibit variability over the day and seasonal flux across the year. Mean 9am humidity levels range from 68% in October to 80% in February. Mean 3pm humidity levels range from 56% in August to 74% in February. Wind speeds during the warmer months tend to have a greater spread between the 9am and 3pm conditions compared to the colder months. Mean 9am wind speeds range from 20.8 kilometres per hour (km/h) in February and March

to 26.4 km/h in June. Mean 3pm wind speeds range from 26.1 km/h in May to 35.3 km/h in November.

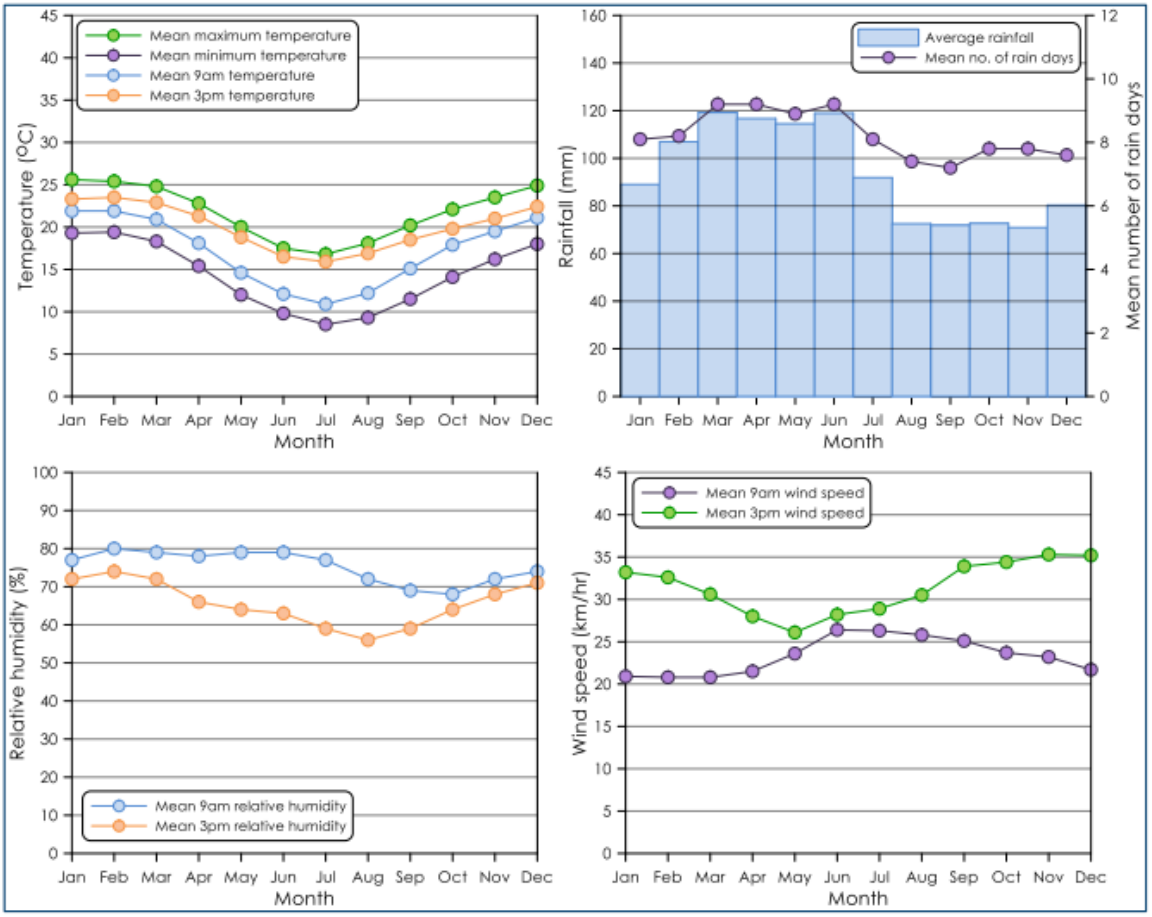

Figure 2. Monthly Climate Statistics Summary – Newcastle Nobbys Signal AWS

3.1.2 Local Meteorological Conditions

Seasonal windroses based on the NCIG Weather Station data collected from July 2019 to June 2020 are presented in Figure 3.

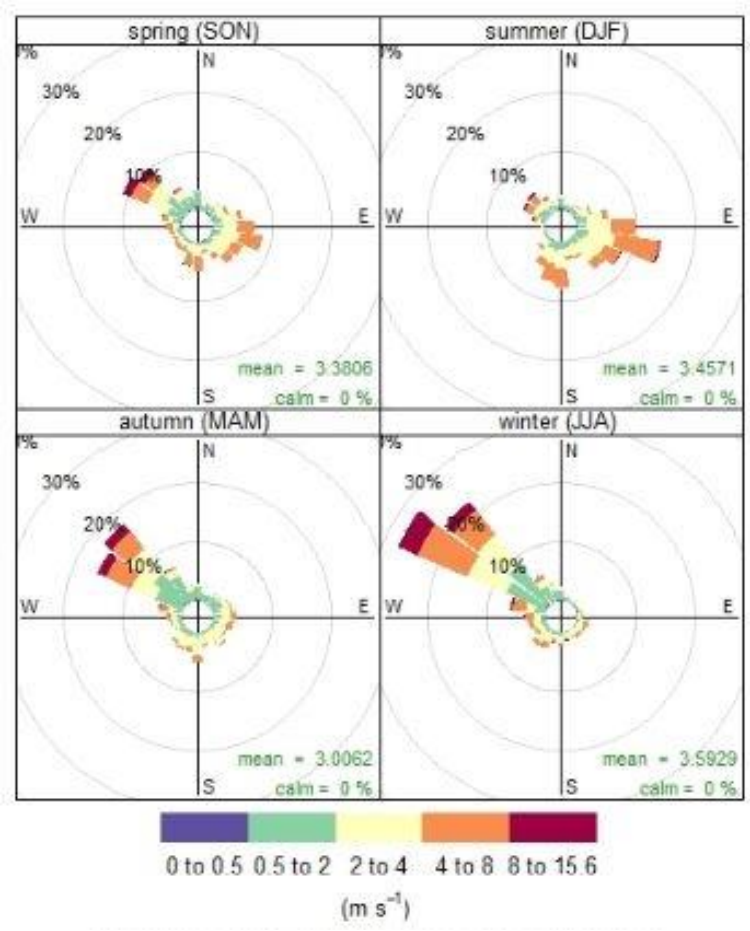

Figure 3. Seasonal Windroses – NCIG Weather Station (2019/2020)

On an annual basis wind 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 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, CSIRO, 2016).

The Newcastle Local Air Quality Monitoring Network (NLAQMN) has been in operation since November 2014. The network consists of three air quality monitoring stations in the Port of Newcastle at Mayfield, Stockton and Carrington. The network was established to provide government, industry and the community with up-to-date information about air quality within the Port of Newcastle. This network is funded through local industry, administered by the EPA and operated by DPIE. In 2019 the first review of the Newcastle Local Air Quality Monitoring Network was undertaken by (the then) OEH on behalf of the EPA (OEH, 2019).

The review found that since the establishment of the Network in 2014 to the end of 2017, PM10 and PM2.5 particle levels at all three sites were below the daily benchmarks for 83.5% and 99.4% of days, respectively. Figure 4 shows that all Newcastle Local and Lower Hunter sites recorded elevated particle levels during 2015 to 2017; however, the number of days with particle levels over the daily benchmarks varied across the sites. Stockton consistently recorded the highest number of days over the PM10 daily benchmark compared to other sites in the region. The Lower Hunter Particle Characterisation Study (LHPCS) (CSIRO, 2016) found sea salt to be a major contributor to particles at Stockton, particularly during the warmer months. Most exceedance days were affected by bushfires and dust storms. Days over the PM2.5 benchmark were due to bushfires and hazard reduction burns, except for three days at Stockton under north-west winds in winter 2015 (OEH, 2019). The LHPCS found that Stockton PM2.5 levels in winter were mainly influenced by primary ammonium nitrate particles.

Figure 5 shows that annual average PM10 concentrations remained below the benchmark at all sites except Stockton, due mainly to the contribution of sea salt. Annual PM2.5 concentrations exceeded the benchmark each year at Carrington and Stockton (OEH, 2019). The LHPCS found that compared to Newcastle, Mayfield and Beresfield, higher annual average PM2.5 concentrations at Stockton were due to sea salt and primary ammonium nitrate particles.

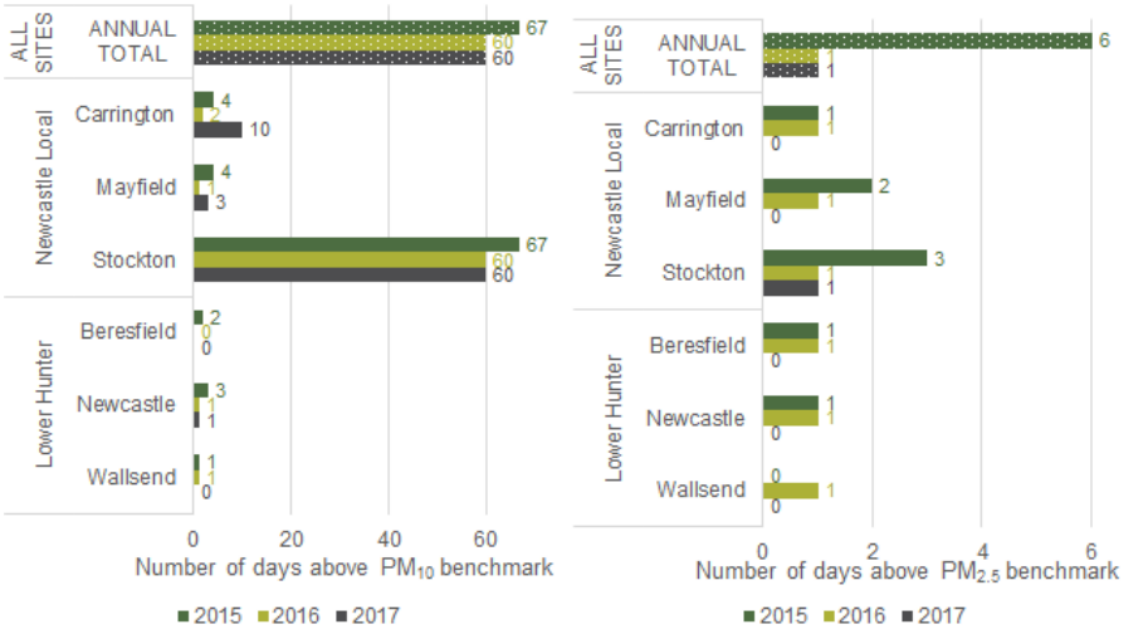

Figure 4. Number of days above the daily PM10 and PM2.5 benchmarks in the Newcastle region from 2015 to 2017 (OEH, 2019)

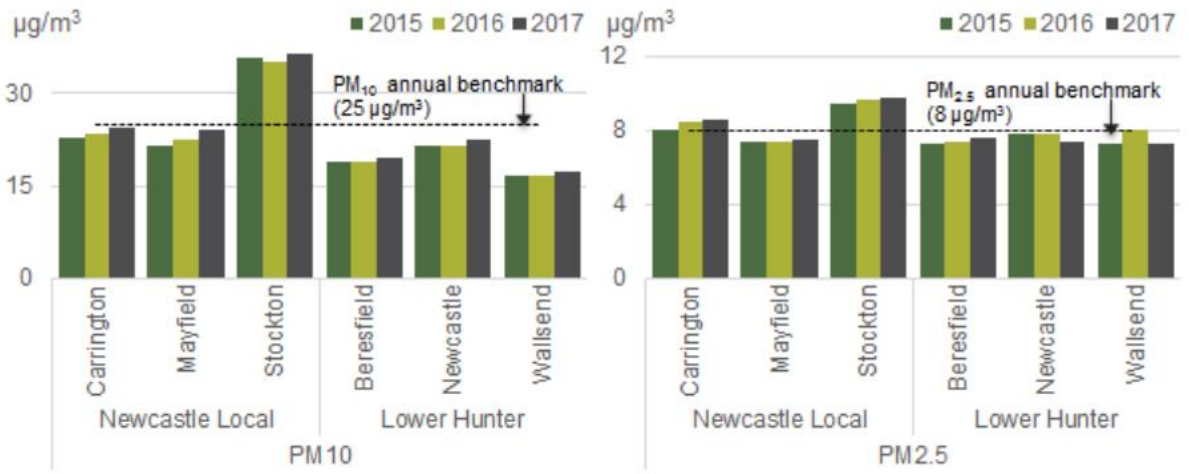

Figure 5. PM10 and PM2.5 annual averages in the Newcastle region from 2015 to 2017 (OEH, 2019)

The LHPCS (CSIRO, 2016) estimated the contribution of fresh sea salt particles from that of the recorded annual averages at the Newcastle, Stockton, Mayfield and Beresfield OEH monitors. The contribution of fresh sea salt particles of PM2.5 concentrations is estimated to be 23% at Stockton and 20% at Mayfield (Figure 6). Contributions of fresh sea salt particles of PM2.5-10 concentrations were estimated to be 63% at Stockton and 40% at Mayfield (Figure 7). Fresh sea salt aerosol arises from the wave-breaking in the ocean and is a natural source of particles.

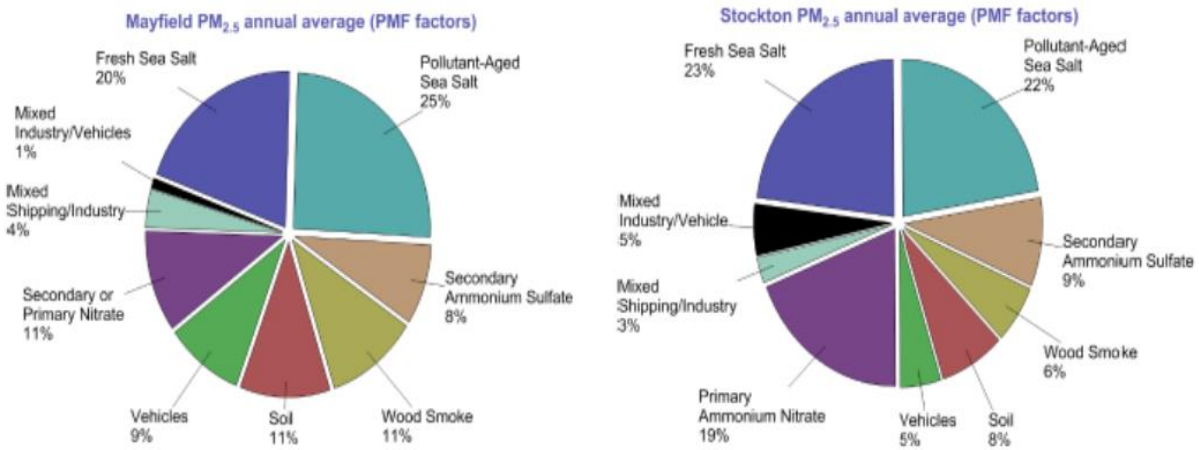

Figure 6. Percentage annual average contributions to total PM2.5 mass at Mayfield and Stockton from March 2014 to February 2015 (CSIRO, 2016)

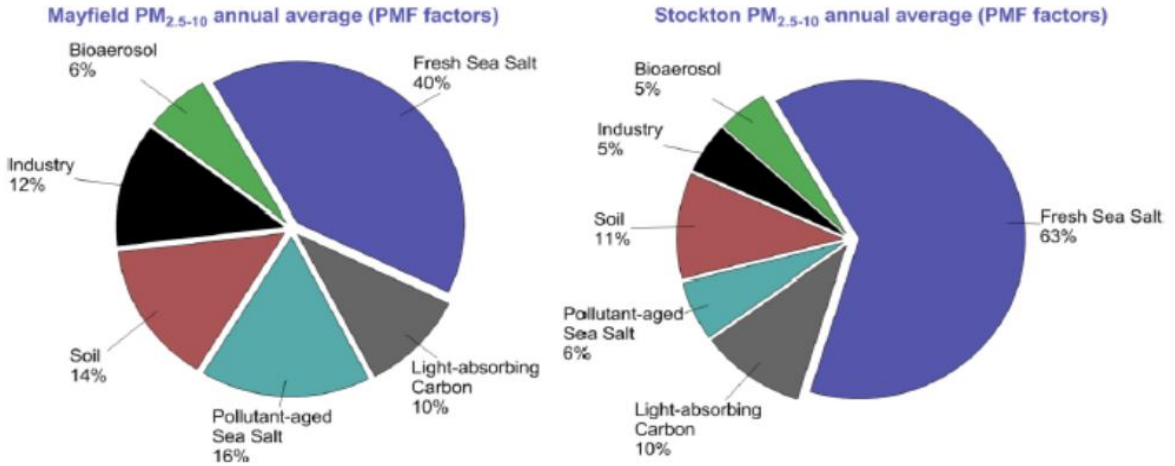

Figure 7. Percentage annual average contributions to total PM2.5-10 mass at Mayfield and Stockton from March 2014 to February 2015 (CSIRO, 2016)

Key findings from the LHPCS (CSIRO, 2016) and the Lower Hunter Dust Deposition (AECOM, 2016) 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 at all sites (20-24%)
- The higher levels of PM2.5 at Stockton were attributed to higher levels of sea salt and primary ammonium nitrate particles (19%)
- Other sources at the sites included secondary ammonium sulfate, soil including coal, wood smoke, vehicles, mixed shipping/industry, mixed industry/vehicles and nitrate

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/m^2/month, the highest being 1.1g at Islington
- Coal accounted for 10% of deposited dust on average, but ranged from 0% to 25%
- Coal contributed 0.05 to 0.11g/ m^2/month to annual average dust composition
- 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 NCIG's internal Real Time Air Quality Monitors (AQM's) during 2020 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 AQM's are located at NCIG and in close proximity (within 80m) of active coal stockpiling areas.

Table 2. BAMs TSP monitoring data (µg/m^3)

Period	WP01 (North)	TH06 (East)	TH12 (South)	TH02 (West)
2020 (Jan – Dec)	14.61	33.95	20.99	25.40

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 most 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 (based on the approved capacity of 79 Mtpa) are summarised in Table 3. The results presented include the application of the dust control measures.

Table 3. Estimated TSP emissions (kg/year)

ACTIVITY	NCIG CET OPERATIONS
Trains unloading to unloading station	11,886
Conveyor	178
1st transfer between unloading station and stockpiles	7,132
Conveyor	66
2nd transfer between unloading station and stockpiles	7,132
Conveyor	739
Stacking to coal stockpiles	11,886
Reclaiming coal from stockpiles	10,079
Conveyor	739
Transfer between stockpile and shiploader	6,047
Conveyor	113
Transfer to buffer bins	6,047
Conveyor	199
1st transfer between buffer bin and shiploader	6,047
Conveyor	18
2nd transfer between buffer bin and shiploader	6,047
Conveyor	409
3rd transfer between buffer bin and shiploader	6,047
Loading coal to ships	6,047
Wind erosion from coal stockpiles	59,826
Dozer working on coal stockpiles	1,963
Total	**148,649**

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 DPIE and the NSW 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 DPIE (PA 06_0009), including subsequent modifications (MOD1, MOD2 and MOD3). 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 3.6.2.

Protection of the Environment Operations Act 1997

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 (2011) 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/KE1006953volumeI.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, eg. 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 Planning Secretary and EPA, to outline how ambient dust impacts of the project will be monitored.
- 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 the existing 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 DPIE in consultation with EPA.
- 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.
- 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 Criteria

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 EPA, 2017).

3.7.1 Particulate Matter

Particulate matter refers to particles of varying size and composition. The air quality goals relevant to NCIG operations refer to three classes of particulate matter based on the sizes of the particles. 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 50 µm settle out of the atmosphere too quickly to be regarded as air pollutants. The second and third class are sub-classes of TSP, namely, particulate matter with aerodynamic diameters of 10 µm or less (PM10), and particulate matter with aerodynamic diameters of 2.5 µm or less (PM2.5).

Table 4 summarises the air quality goals that are relevant to NCIG operations as outlined in the NSW EPA document *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (NSW EPA, 2017). 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

Pollutant	Averaging Period	Impact	Criterion
TSP	Annual	Total	90 µg/m³
PM_{10}	Annual	Total	25 µg/m³
	24 hour	Total	50 µg/m³
$PM_{2.5}$	Annual	Total	8 µg/m³
	24 hour	Total	25 µg/m³
Deposited dust	Annual	Incremental	2g/m²/month
		Total	4g/m²/month

Source: **NSW EPA, 2017**
µg/m³ – micrograms per cubic metre
g/m²/month – grams per square metre per month

The criterion for 24-hour average PM_{10} 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.

Before 2016, the NEPM had an allowance of 5 exceedance per year for the PM standards. This was replaced in 2016 by an exceptional event rule to allow for events such as bush fires and regional dust events. It is normally the case that days where ambient dust levels are affected by these exceptional events, such events are excluded from assessment as per the NSW EPA criterion.

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 Planning

Dust risk from coal handling activities is considered at the planning stage of NCIG's operations. Coal received is classified in terms of dust risk. 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.

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.

An initial dust risk category is assigned to each product that NCIG receives. Depending on the assigned risk level (Low, Moderate, High, Extreme) sprays will be activated at pre-set graduations. 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 a 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 Technician Coordinator/Inbound Support Technician is expected to monitor dust from stacking for the duration of the task, and manually intervene to activate additional sprays where required.

Additional dust management features of the inbound system include minimum stack height, such that stockpiles are initially stacked to a lower height by default (12m for wide pile stacking and 13m for narrow piles) to reduce the elevation at which coal is stacked, and thereby reducing exposure to strong winds which generate dust.

Real-time dust monitors have been installed in the Dump Station to assist with identifying and managing dust emissions.

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 8 and 9.

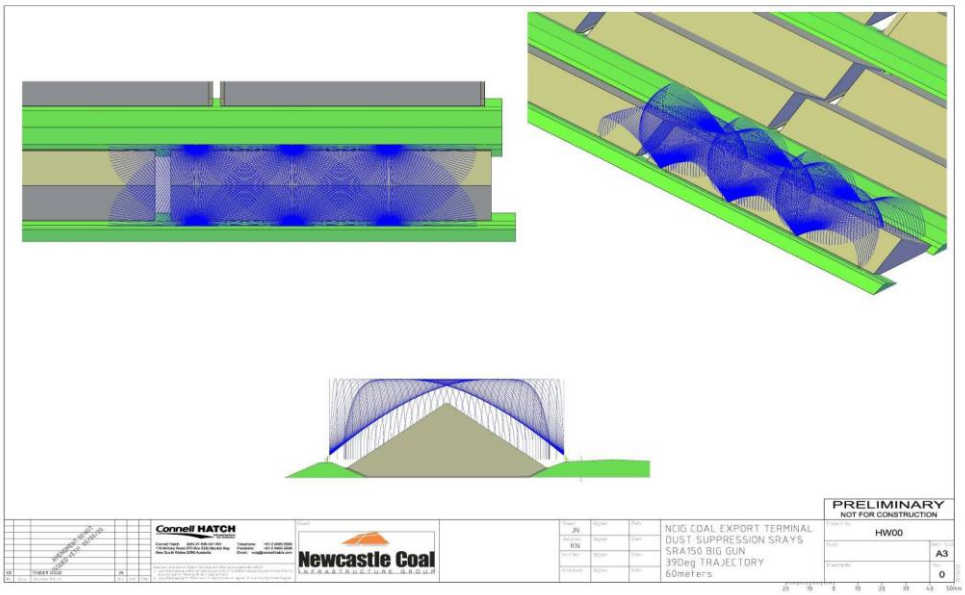

Figure 8. NCIG spray gun wetting pattern for narrow coal stockpiles.

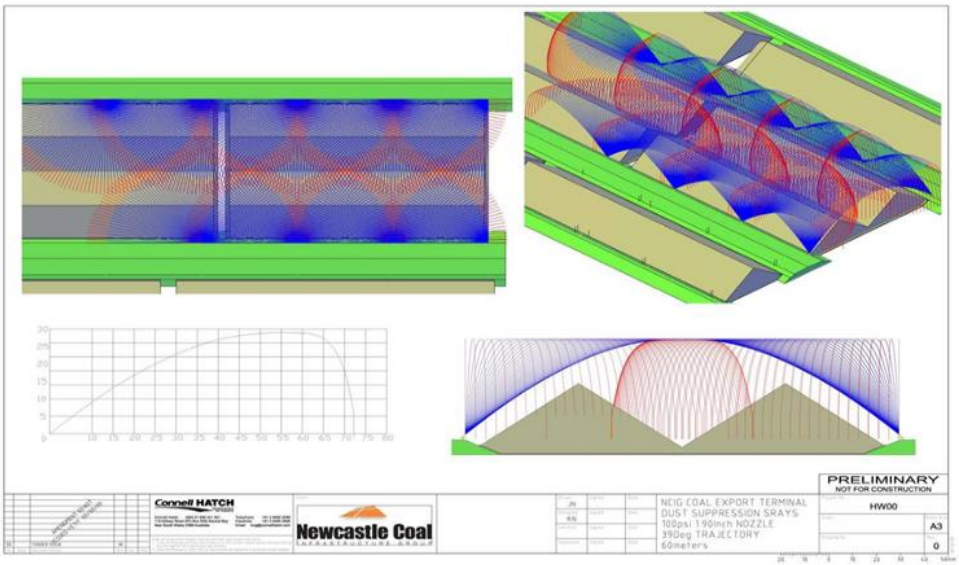

Figure 9. NCIG spray gun wetting pattern for wide coal stockpiles.

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 30-50min, 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 continuously through the stockyard in half the normal time, i.e. approx. 20-25min.

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 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

Inbound stacking tasks are risk-ranked based on product type (i.e potential dustiness), stockyard location and live weather conditions to produce a risk ranking of Low, Moderate, High or Extreme on the SCADA system. If a train with Extreme dust risk is commencing unloading, a notification prompt on SCADA is activated, requiring acknowledgment from the dump station operator before it is able to proceed. This will ensure that particular attention is given to the unloading activities through to the stack point, and further action is taken where appropriate.

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.

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. Lidar technology has recently been implemented in the dump station to identify coal 'hang-ups' in the wagon. Additionally, '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, is also avoided.

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 applied to unsealed surfaces such as the end of stockpads. 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 Extreme wind events or where required
- 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 10). Details of the monitoring program are provided below.

Figure 10. 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 5. 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 5. 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 (EPL 12693) 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 EPL 12693 for the interest of the public.

Table 5. NCIG Operation Air Quality Monitoring Program

PARAMETER	UNITS	FREQUENCY	LOCATION	METHODOLOGY
Meteorological Monitoring				
Temperature at 2m and 10m	°C	Continuous	NCIG site (adjacent Clearwater Pond)	AS 2922
Wind Speed at 10m	ms^{-1}			
Wind Direction at 10m	Degrees			
Sigma-theta at 10m	Degrees			
Solar radiation at 10m	Wm^{-1}			
Depositional Dust Monitoring				
Depositional Dust	g/m^2/month	Monthly	• Kooragang – DG3 • Mayfield – DG4 • Steel River – DG5 • Sandgate – DG6	AS/NZS 3580
Depositional Dust (Integrated AQMN with PWCS)			• Fern Bay – DDG-K8 (DG1) • Stockton Prawners Club – DDG-C1 • Stockton Hospital – DDG-K1	
High Volume Air Sampling				
Total Suspended Particulates (TSP)	µg/m^3	6-daily	• Steel River – HVAS1 • Mayfield – HVAS2	AS/NZS 3580
Particulate Matter <10µm (PM10) (				
Total Suspended Particulates (TSP) (Integrated AQMN with PWCS)			• Stockton Prawners Club – HVAS-C1 • Fern Bay – HVAS-K2 (TSP), HVAS-K3 (PM10), HVAS-K4 (Directional TSP)	
Particulate Matter <10µm (PM10) (Integrated AQMN with PWCS)				

Newcastle Local Air Quality Monitoring Network (administered by EPA, operated by DPIE, funded by industry)				
Particulate Matter <10µm (PM10)	µg/m^3	Hourly average	• Stockton • Carrington • Mayfield • Newcastle • Wallsend • Beresfield	
Particulate Matter <2.5µm (PM2.5)				
Wind Speed	ms^{-1}			
Wind Direction	Degrees			
Onsite Air Quality Monitors (AQM)				
Total Suspended Particulates (TSP)	µg/m^3	Continuous	• North (BAM N) • East (BAM E) • South (BAM S) • West (BAM W)	

5.1.1 Environmental Monitoring Database

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

> Data is analysed and compiled by NCIG Environmental Contractor

> Data is compared with relevant criteria; and

> Data is reviewed by the NCIG HSEC Department. In the event of a recorded exceedance, NCIG will investigate any potential contribution.

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 in response to the exceedance.

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 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.

Additionally, the ODAQMP and matters relating to dust and air quality management will be subject to external audits including NCIG's three-yearly Independent Environmental Audit and annual Environmental Management System audits (ISO 14001:2015).

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 Environment and Sustainability Lead 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 effectiveness of environmental management measures on a quarterly basis in line with the HSEC Reports 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.

Revision No	Date	General Description of Change	Persons Involved
Draft	1/04/10	Review of draft Document	**Brendan Logan** **Nathan Juchau**
Final	1/06/10	Final document for approval	**Brendan Logan**
Final	1/05/12	General revision	**Phil Reid**
Final	1/05/13	General revision	**Phil Reid**
Final	8/2/16	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.	**Phil Reid**

Final	15/12/17	Change to background monitoring (BAM averages) and inclusion of new coal dust operating condition	**Phil Reid**
Final	28/11/18	General revision, update to EPL Conditions and deletion of redundant data.	**Hayley Ardagh** **Phil Reid**
Final	13/07/20	Update to include new controls in FY20 including additional operator notifications and changes in inbound task risk-ranking.	**Hayley Ardagh**
Final	16/07/21	General revision. Merge to new template. Update background air quality and meteorological data and graphs. Update to site monitoring data. Update to recent published air quality references.	**Hayley Ardagh** **Wade Covey**
Final	16/06/22	Update of Section 5.4 (Auditing) to include provision for independent review and auditing of the ODAQMP.	**Hayley Ardagh**

6. REFERENCES

- AECOM 2016, Lower Hunter Dust Deposition Study, report prepared for the NSW Environment Protection Authority, AECOM Australia, Warabrook NSW.
- CSIRO 2016, Lower Hunter Particle Characterisation Study, Final Report, Prepared by CSIRO, ANSTO and the NSW Office of Environment and Heritage on behalf of the NSW Environment Protection Authority.
- Department of Infrastructure, Planning and Natural Resources 2004, Guideline for the preparation of environmental management plans, Department of Infrastructure, Planning and Natural Resources, Sydney.
- NSW Environment Protection Authority 2017, Approved methods for the sampling and analysis of air pollutants in New South Wales, Sydney.
- NSW Office of Environment and Heritage, Delivering dependable air quality science to Newcastle communities, Four-year review of the Newcastle Local Air Quality Monitoring Network, Office of Environment and Heritage, Sydney.
- Resource Strategies 2006, Newcastle Coal Infrastructure Group Coal Export Terminal – Environmental Assessment.
- 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 Total Suspended Particulates (TSP) – High volume air sampler gravimetric method (AS/NZS 3580.9.3:2003), 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.
- Standards Association of Australia 2003, Methods for sampling and analysis of ambient air – determination of suspended particulate matter – PM10 beta attenuation monitors (AS/NZS 3580.9.11:2008/Amdt 1:2009), Standards Australia, Sydney.
- Todoroski Air Sciences 2020, Air Quality and Greenhouse Gas Assessment – NCIG CET Optimisation.