

# **Australia Pacific LNG Project**

## **Volume 3: Gas Pipeline**

### **Chapter 13: Air Quality**

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## 13. Air quality

### 13.1 Introduction

#### 13.1.1 Purpose

The purpose of this chapter is to describe the potential effect of construction and operation of the Australia Pacific LNG main gas transmission pipeline (gas pipeline) on ambient air quality, and identify suitable mitigation and management measures to address potential impacts. The assessment of the potential impact of air emissions from activities associated with development of the gas pipeline has been conducted in accordance with the environmental impact statement (EIS) terms of reference for the Australia Pacific LNG Project (the Project).

Construction and decommissioning of the gas pipeline will result in the generation of fugitive, wheel generated and general construction dust and exhaust emissions. Air emissions generated during the operational phase of the Project are expected to be minimal.

Australia Pacific LNG's sustainability principles will be applied to the planning, design and construction of the gas pipeline to ensure that air emissions do not adversely impact identified sensitive dwellings.

Of Australia Pacific LNG's 12 sustainability principles, the key principles in relation to air quality for the gas pipeline include:

- Minimising adverse environmental impacts and enhancing environmental benefits associated with Australia Pacific LNG's activities, products or services; conserving, protecting, and enhancing where the opportunity exists, the biodiversity values and water resources in its operational areas
- Identifying, assessing, managing, monitoring and reviewing risks to Australia Pacific LNG's workforce, its property, the environment and the communities affected by its activities.

The quality of the air over the proposed gas pipeline is relatively good, given that most of the region is predominantly rural in nature. The sustainability principles as applied to air quality mean that Australia Pacific LNG will seek to control emissions from project activities to ensure ambient air quality is not degraded such that there is no potential for adverse health effects or environmental harm.

Australia Pacific LNG will manage air emissions and dust generation associated with all construction and operational activities through compliance with construction environmental management plans and by limiting gas venting during maintenance activities. This will include implementation of procedures to meet the air quality objectives set down in the Queensland Environmental Protection (Air) Policy 2008.

#### 13.1.2 Scope of work

The assessment of potential air emission impacts associated with the development of the gas pipeline included:

- Sources, nature and quantity of air emissions
- Ambient air quality of the gas pipeline area that might be affected by the Project
- Qualitative air impact assessment
- Mitigation measures to reduce the impacts.

Greenhouse gas emissions associated with the gas pipeline are discussed in Volume 3 Chapter 14.

### 13.1.3 Legislative framework

The *Environmental Protection Act 1994* provides the framework for the management of the air environment in Queensland. The Environmental Protection (Air) Policy 1997 was made under the Act and gazetted in 1997. This policy was subsequently reviewed and the Environmental Protection (Air) Policy 2008 (EPP Air) came into force on 1 January 2009.

The objective of the EPP Air is:

*“...to identify the environmental values of the air environment to be enhanced or protected and to achieve the object of the Environmental Protection Act 1994, i.e., ecologically sustainable development.” (EPP Air Explanatory Notes)*

The environmental values to be enhanced or protected under the EPP Air are the qualities of the environment that are conducive to:

- Protecting the health and biodiversity of ecosystems
- Human health and wellbeing
- Protecting the aesthetics of the environment, including the appearance of buildings structures and other property
- Protecting agricultural use of the environment.

The administering authority must consider the requirements of the EPP Air when it decides an application for an environmental authority, amendment of a licence or approval of a draft environmental management plan. Schedule 1 of the EPP Air specifies air quality objectives for various averaging periods. Those relevant to the Project's gas pipeline are shown in Table 13.1.

**Table 13.1 Ambient air quality objectives**

Indicator	Environmental value	Averaging period	Air quality objective ( $\mu\text{g}/\text{m}^3$ ) <sup>1</sup>	Number of days of exceedance allowed per year
Particles as PM <sub>10</sub> <sup>2</sup>	Health and wellbeing	24-hour	50	5
Particles as PM <sub>2.5</sub> <sup>3</sup>	Health and wellbeing	24-hour	25	N/A <sup>4</sup>
		1-year	8	N/A
Total suspended particulates	Health and wellbeing	1-year	90	N/A

<sup>1</sup>  $\mu\text{g}/\text{m}^3$  - micrograms per cubic metre

<sup>2</sup> PM<sub>10</sub> - particulate matter with aerodynamic diameter less than 10 microns

<sup>3</sup> PM<sub>2.5</sub> - particulate matter with aerodynamic diameter less than 2.5 microns

<sup>4</sup> N/A – not applicable

Dust nuisance can occur due to the deposition of dust particles, nominally less than 10 microns in size, in residential areas and areas hosting identified sensitive dwellings. Elevated dust deposition rates can cause reduced public amenity through, such as soiling of clothes, building surfaces and other surfaces or productivity of crop and livestock capabilities.

The Queensland Department of Environment and Resource Management uses a dust deposition guideline of 120 milligrams per square metre per day as a benchmark for avoiding amenity impacts

and impacts to sensitive dwellings due to dust. The dust deposition guideline is not defined in the EPP Air and therefore is not a statutory requirement.

The EPP Air does not specify objectives for protecting the health and biodiversity of ecosystems or agricultural uses for the indicators that are identified in Table 13.1. The available literature indicates the accumulation of dust on foliage and fodder impacts on flora, fauna and agricultural activities. The literature suggests the thresholds for adverse impacts are significantly higher than those detailed above for protecting human health and amenity (Andrews et al. 1992; Kannegieter 2006; Doley 2003).

## 13.2 Methodology

### 13.2.1 Construction

A qualitative air impact assessment has been undertaken to identify potential sources of air emissions from the construction phase of the Project and to investigate mitigation measures to ensure adverse air quality impacts do not occur as a result of pipeline construction activities. The qualitative study considered the following:

- Air quality objectives as described in the EPP Air
- Existing environment within the pipeline study area
- Identification of important sources of air pollutant emissions
- Air pollutant minimisation through site selection, design of construction process and management.

Australia Pacific LNG does not currently propose any fixed plant for the gas pipeline operations, such as mid-line compression stations, which would be a source of air emissions. Consequently, a detailed dispersion modelling study would not provide useful information as the pipeline construction works proceed quickly and the entire pipeline will be constructed within 18 months.

### 13.2.2 Operations

Emissions during pipeline operations will be limited to occasional maintenance and emergency releases of coal seam gas through the mainline valve vents; and dust and vehicular emissions generated from maintenance vehicles.

## 13.3 Existing environment

### 13.3.1 Climatic conditions

The climatic conditions over the gas pipeline route, which are relevant to the natural occurrences of dust and the dispersion of dust associated with project activities, are described in Volume 3 Chapter 4.

The climate across the gas pipeline route can be summarised as follows:

- Tropical/sub-tropical/semi-arid with relatively wetter summers and drier winters
- Average daily maximum temperatures range between 21.8 and 33.3°C
- Average daily minimum temperatures range between 5.9 and 20.2°C
- Average annual rainfall ranges between 661 and 671mm

- The wind direction is generally variable with slight increase in south westerly winds compared to the overall distribution
- Light wind speeds less than two metres per second dominate.

### 13.3.2 Ambient air quality

The gas pipeline study area is extensive and the ambient air quality is likely to vary significantly depending on the proximity to potential sources of air pollutants.

The majority of the gas pipeline study area is located away from major population centres in inner central Queensland. The main identified air pollutants in these areas are fine particulate material which maybe exacerbated by winds to form dust storms or from bushfires. Identified activities occurring in the area with the potential to influence the ambient air quality include mining, agriculture and industrial activities. These will generate air pollutants mainly from traffic, land clearing, stockpiling of materials, livestock movement and heavy machinery.

In Gladstone, at the northern end of the gas pipeline corridor, ambient air quality will be influenced by industrial activities, other human activities as well as dust. Industries in the Gladstone regional airshed include a major coal-fired power station, alumina refineries, cement manufacturer, and port facilities. Coal stockpiles and load-out infrastructure are an example of a port facility.

#### *Air quality measurements*

The Queensland Department of Environment and Resource Management monitors ambient air quality in major population centres to assess compliance against the National Environment Protection (Ambient Air Quality) Measure and the EPP Air. There are a number of departmental monitoring stations at the northern end of the pipeline study area at Gladstone including one at Targinie.

Elevated levels of PM<sub>10</sub> have been recorded between 2002 and 2009 at the Targinie monitoring station north of Gladstone. These elevated concentrations of PM<sub>10</sub> have been attributed to bushfires and dust storms. In general, ambient concentrations of PM<sub>10</sub> in Gladstone are low, with monitoring results indicating a relatively minor influence from industrial emissions under most circumstances.

There is no departmental monitoring station in the central or southern part of the gas pipeline study area. However, the Wandoan Joint Venture commenced monitoring of fine particulate matter (PM<sub>10</sub>) in March 2008 to measure the existing levels of PM<sub>10</sub> at the township of Wandoan and on the site of the proposed Wandoan coal mine.

The monitoring results at Wandoan and the proposed Wandoan coal mine indicate that the PM<sub>10</sub> levels are relatively consistent with the monitoring data from Gladstone. Elevated PM<sub>10</sub> concentrations were due to dust storms that occurred during the monitoring period.

## 13.4 Potential impacts

### 13.4.1 Construction

In general, dust emissions can occur at any point where soil, fill, rock and vegetation are handled, traversed, crushed, conveyed or open to erosion by the wind.

Key construction activities that may emit dust include:

- Access to the pipeline corridor by motor vehicles, particularly trucks and machinery
- Clearing and grading the gas pipeline right of way<sup>1</sup>
- Vehicle movements associated with stringing the pipeline, welding, non-destructive testing and joint coating
- Trenching
- Rock blasting
- Sourcing and placement of bedding and padding
- Pipe trench backfilling
- Clean up and rehabilitation.

The rate of emission of dust from each of these activities varies with activity, soil type, production rate, any recent rain and prevailing wind and humidity, and therefore quantification of emission rates is not feasible.

### 13.4.2 Operations

The potential impacts to the existing air environment from routine pipeline inspections, periodic maintenance activities and emergency release of coal seam gas are expected to be negligible due to the limited quantities of emissions and/or the infrequent nature of these activities.

Greenhouse gas emissions associated with the gas pipeline element of the Project are discussed in Volume 3 Chapter 14.

## 13.5 Mitigation and management

The following mitigation measures will reduce the emissions from those construction activities associated with significant air emissions in consideration of the air quality objectives.

### 13.5.1 General requirements

At locations where dust nuisance is created from construction activities, including vehicle movements on unpaved surfaces, clearing and grading the right of way, trench, bedding and padding, and clean up and restoration, dust will be managed by use of water to suppress emissions,

The following general measures will be applied to the construction works:

- Vegetation or other waste materials will not be burnt onsite
- Dust generating activities will be minimised in windy conditions, if practicable
- Silt and other materials will be removed from erosion control structures as soon as is practicable following a rain event
- An environmental management plan will be implemented to ensure that all works are conducted to achieve an ongoing minimisation of dust emissions

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<sup>1</sup> The right of way is the proposed pipeline construction area, which will be a maximum of 40m wide.

- A complaints management system will be implemented to ensure that any complaints are dealt with through investigation and implementation of corrective treatments.

### 13.5.2 Vehicle movements

Dust and exhaust emissions from trucks and other vehicles will be controlled as follows:

- All vehicles and machinery used for the construction of the pipeline will be maintained in accordance with the manufacturer's specifications to minimise exhaust emissions
- Truck queuing, unnecessary idling of trucks and unnecessary trips will be reduced through logistical planning of materials delivery and work practices
- All vehicles travelling within the worksites will be limited to a speed appropriate for the conditions and safety
- Any soiling of sealed public roads will be cleaned as soon as practicable
- Minimise generation of bull-dust on new access roads through route selection to avoid vulnerable soil types, where possible and dust suppression measures including watering and temporary sheeting
- Trucks carrying dusty, erodible materials will be covered.

### 13.5.3 Land disturbance activities

Dust emissions from clearing and grading activities will be minimised as follows:

- Cleared areas will be minimised as far as practicable by utilising existing easements
- Root stock will be retained in the ground where practicable to reduce erosion and to facilitate rapid rehabilitation e.g. trees will be trimmed and retained rather than removed where practicable
- Clearing of the right of way will be conducted having regard to soil type, terrain, and construction requirements.

Controlled blasting will be conducted only where conventional excavation, rock hammering or trenching equipment is ineffective and is likely to be in rocky areas well away from sensitive receptors, As such, it is unlikely that dust emissions from any rock blasting will result in dust nuisance at sensitive receptors. The design of any blasting will be controlled under the requirements of the *Environmental Protection Act 1994*, see Volume 3 Chapter 15.

Dust emissions from clean up and restoration will proceed as soon as is practicable after works are completed to minimise duration of exposure of disturbed areas

## 13.6 Conclusions

### 13.6.1 Assessment outcomes

A summary of the environmental values, sustainability principles, potential impacts and mitigation measures in relation to air quality associated with the gas pipeline is presented below in Table 13.2.

A risk assessment has been undertaken to identify potential risks, causes and consequences from air emissions associated with the construction, operation and decommissioning of the pipeline. The risk assessment process is described in Volume 1 Chapter 4. Mitigation measures to reduce the risk have



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been nominated and the residual risk has been calculated. The residual risk level for air quality impacts is identified in Table 13.2.

Implementation of the proposed mitigation and management measures will ensure the air emissions associated with the construction phase of the gas pipeline will not result in a degradation of the ambient air quality at sensitive receptors, such that there is any risk of potential adverse health effects or impacts on terrestrial flora and fauna. Similarly, air emissions associated with periodic maintenance of the pipeline or gas release during any emergency situations will not adversely impact air quality in the area.

Whilst the ambient air quality over the pipeline area outside the Gladstone air-shed is generally good due the predominantly rural nature of the area, there are periodic natural and human induced events such as dust storms and bushfires that result in lower air quality,

By applying appropriate control measures to manage dust generation and air emissions, Australia Pacific LNG is able to undertake its activities in accord with its sustainability principles.

**Table 13.2 Summary of environmental values, sustainability principles, potential impacts and mitigation measures**

Environmental values	Sustainability principles	Potential impacts	Possible causes	Mitigation and management measures	Residual risk level
<p>The qualities of the air environment that are conducive to:</p> <ul style="list-style-type: none"> <li>Protecting the health and biodiversity of ecosystems</li> <li>Human health and wellbeing</li> <li>Protecting the aesthetics of the environment</li> <li>Protecting agricultural use of the environment.</li> </ul>	<p>Minimising adverse environmental impacts and enhancing environmental benefits associated with Australia Pacific LNG's activities, products or services; conserving, protecting, and enhancing where the opportunity exists, the biodiversity values and water resources in its operational areas</p> <p>Identifying, assessing, managing, monitoring and reviewing risks to Australia Pacific LNG's workforce, its property, the environment and the communities affected by its activities.</p>	<p>Community dust nuisance</p> <p>Health impacts</p> <p>Impacts on agricultural production</p> <p>Terrestrial flora and fauna impacts</p>	<p>Dust from construction activities (for example clear and grade, trenching, rock blasting, bedding and padding, pipe lowering and backfilling, clean up and restoration)</p> <p>Traffic and machinery on unsealed roads</p> <p>Wind-borne dust from stockpiles and cleared areas</p>	<p>Avoid land disturbance wherever practicable</p> <p>Minimise area and duration of disturbance</p> <p>No vegetation will be burnt on site</p> <p>Implementation of dust suppression measures including the use of water and covers</p> <p>Manage vehicle movement to minimise dust generation and exhaust emissions</p> <p>Reduce speed limits on unpaved roads and tracks adjacent to dwellings to reduce dust</p> <p>Conduct any blasting activities according to regulations and with appropriate dust control measures</p> <p>Rehabilitate areas as soon as practicable to minimise exposed areas</p> <p>Implement construction procedures to ensure that all works are conducted to achieve an ongoing minimisation of dust emissions</p>	Low

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### 13.6.2 Commitments

To manage the potential impacts of air emissions associated with the construction of the gas pipeline and to meet air quality objectives, Australia Pacific LNG will minimise dust emissions through the following measures:

- Minimise the area and duration of land disturbance activities as far as practicable
- Schedule land disturbance activities with recognition of potentially adverse weather conditions
- Reduce speed limits on unpaved roads and tracks adjacent to dwellings to reduce dust
- Suppress dust formation where required with water or other suitable means
- Rehabilitate disturbed areas as soon as practicable.

## References

Andrews, A and Skriskandarajah, N 1992, *Coal Mine Dust & Dairy Farming – The Answers*, School of Agriculture, University of Western Sydney, Richmond, NSW.

Doley, D 2003, *Effects of mineral dusts on vegetation a review of literature and model calculations*, report to Sinclair Knight Merz on the Curragh North Coal project for Wesfarmers Curragh Pty Ltd.

Kannegieter, NJ 2006, *Report Examining the Impact of Increased Dust deposition on Grazing Animals*, Department of Veterinary Clinical Sciences, University of Sydney, NSW.