Santos | HUNTER GAS PIPELINE

CHAPTER 10 - AIR QUALITY

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10. Air quality

This chapter provides a summary of the air quality assessment for the project. It describes the existing air quality environment, identifies potential construction, operation and decommissioning impacts, and provides measures to mitigate and manage the impacts identified.

The assessment, undertaken with reference to the *Guidance on the assessment of dust from demolition and construction* (Institute of Air Quality Management (IAQM), 2024), concluded that the main potential impact on local air quality would be the generation of dust during construction. The assessment identified that the project poses a low risk of dust impacts, based on the potential dust emission magnitude, proximity of receivers, and the sensitivity of the surrounding area.

Although the assessment shows a low risk of potential dust impacts, suitable mitigation and management measures will be implemented during construction to ensure the risk of impacts remains low.

Further information is provided in Technical Report 6 (Air quality and odour).

10.1 Approach

10.1.1 Overview

The main potential air quality impacts of the project would be dust during construction associated mainly with works within the construction right of way, but also including use of construction ancillary facilities, road and track works, and the use of unsealed access roads and tracks.

The *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (NSW EPA, 2022) (the Approved Methods) has been used to define sensitive receivers and the air quality criteria adopted for the assessment.

The Approved Methods details the methods for modelling and assessing emissions from stationary sources. Given construction of the project is a linear progression of activities, and the relatively short periods of construction at any given point along the construction right of way, a quantitative air dispersion modelling assessment in accordance with the Approved Methods was not deemed necessary to show compliance with air quality criteria during construction.

A qualitative, risk-based approach based on the UK Institute of Air Quality Management (IAQM) *Guidance on the assessment of dust from demolition and construction* (IAQM, 2024) (the IAQM Guidance) has been undertaken to assess potential dust impacts during construction. The IAQM Guidance has been used for air quality assessments for many infrastructure projects in NSW where the main potential air quality impacts are dust during construction.

The IAQM Guidance assessment approach involves an evaluation of the risk of dust impacts during construction that considers the potential magnitude of dust emissions based on activity type (e.g. earthworks) and the sensitivity of the surrounding environment. This results in a risk rating for types of construction activities (without mitigation, rated as negligible to high). This risk rating is then used to determine the extent of mitigation and management required.

An overview of the approach to the assessment is provided below. Further information is provided in section 2 of Technical Report 6 (Air quality).

10.1.2 Methodology

Study area

The study area for the air quality assessment consists of:

- a two-kilometre radius around the project site excluding proposed new/upgraded access tracks, roads and intersections

- a one-kilometre radius around proposed new/upgraded access tracks, roads and intersections
- a 250-metre radius around unsealed access tracks and roads that would be used by construction vehicles.

The study area is shown in Figure 2.1 of Technical Report 6 (Air quality).

Key tasks

The air quality assessment involved:

- identifying sensitive receivers in the study area with the potential to be affected by air quality impacts
- reviewing existing regional ambient air quality and meteorology, including data obtained by the Bureau of Meteorology (BoM) weather station and the NSW DCCEEW air quality monitoring station, both located at Narrabri Airport
- establishing assessment criteria in accordance with the Approved Methods and the National Environment Protection Council (NEPC) National Environment Protection (Ambient Air Quality) Measure Variation Instrument 2021 (the Air NEPM) (provided below)
- identifying and assessing the potential risk of construction dust impacts using the IAQM Guidance approach and mitigation required
- validation of the assessment results against the results from other similar projects involving emission modelling
- reviewing other emission and potential odour sources
- qualitatively assessing the potential for operational, cumulative and decommissioning air quality impacts
- identifying mitigation and management measures.

Air quality criteria

Assessment criteria for the project were taken from the Approved Methods and are consistent with those in the Air NEPM. The objective of the criteria is ambient air quality that minimises the risk of adverse health impacts from exposure to air pollution. Achieving compliance with the criteria helps demonstrate the project would operate in a manner that protects human and environmental health and amenity.

Relevant assessment criteria for the primary pollutants associated with construction are presented in Table 10.1. These cover total suspended particles, particulate matter less than 10 and 2.5 microns in diameter (PM_{10} and $PM_{2.5}$), and deposited dust. The criteria apply to the total impact (increment plus background) and must be reported as 100th percentile (maximum).

Table 10.1 Air quality criteria

Pollutant	Averaging period	Criterion (µg/m^3)	
		Approved Methods	Air NEPM
Total suspended particles	Annual	90	-
PM_{10}	24 hour	50	50
	Annual	25	25
$PM_{2.5}$	24 hour	25	20
	Annual	8	7
Deposited dust	Annual (maximum increase)	2 g/m^2/month	-
	Annual (maximum total)	4 g/m^2/month	-

10.2 Existing environment

10.2.1 Background air quality

Air quality within the study area is mainly influenced by surrounding rural and agricultural activities and vehicle emissions.

The National Pollutant Inventory lists nine sites that are sources of emissions within about 40 kilometres of the project site. The most significant pollutants reported were carbon monoxide, oxides of nitrogen, particulate matter (PM_{10} and $PM_{2.5}$) and volatile organic compounds.

There are no significant sources of existing odour in the study area.

Ambient air quality data recorded at the NSW DCCEEW Narrabri Airport air quality monitoring station was examined and compared to the assessment criteria in Table 10.1. The review noted that:

- 24 hour average PM_{10} and $PM_{2.5}$ concentrations exceeded the ambient air quality criterion of 50 µg/m^3 and 20 µg/m^3 respectively during 2018 to 2023. High particulate matter concentrations are mainly attributed to bushfires.
- Annual average PM_{10} concentrations were below the ambient air quality criterion of 25 µg/m^3 throughout 2018-2023.
- Annual average $PM_{2.5}$ concentrations were below the ambient air quality criterion of 7 µg/m^3 throughout 2018 to 2023, except for in 2019.

10.2.2 Local meteorology

Climate data indicates the study area has a warm temperate climate, with significant temperature variations between summer and winter.

Wind condition data, recorded at the Narrabri Airport automatic weather station, shows:

- the predominant annual average wind direction is from the south-east
- the average wind speed measured was 3.8 metres per second
- calm conditions occurred four per cent of the time
- high wind speeds (winds greater than five metres per second or 18 kilometres per hour), which are often attributed to dust lift off, mostly occur from the north.

High wind speed conditions can lead to nuisance dust during construction and can lead to pollutants being readily dispersed after emission. Spring and summer have slightly higher average wind speeds than autumn and winter, and summer has the smallest proportion of calm conditions.

10.2.3 Sensitive receivers and ecological receptors

Air quality sensitive receivers are defined as locations where people live and work that could be sensitive to changes in air quality for reasons of human health or amenity. Some environmental features, such as ecologically sensitive areas, may also be considered sensitive to changes in air quality, particularly dust.

Forestry and rural/agricultural uses are the main land uses within and surrounding the project site (see section 11.2 for further information).

A total of 76 sensitive receivers (human receptors) were identified in the study area for the air quality assessment. Most are residential receivers, with a small number of non-residential receivers in the town of Baan Baa. Of these:

- three receivers are located within 250 metres of the project site
- 24 receivers are located within 250 metres of unsealed access tracks and roads proposed to be used by construction vehicles, with most of these (20) located more than 100 metres from the track/road.

The closest sensitive receiver is located about 60 metres from the nearest unsealed access track, and about 130 metres from the project site.

Further information about sensitive receivers is provided in section 3.1 of Technical Report 6 (Air quality).

Areas of native vegetation (ecological receptors) are located within and adjacent to the project site, mainly within the State forests.

10.3 Construction impacts

10.3.1 Dust generation

Airborne particulate matter (dust) has the potential to cause adverse health, nuisance or ecological impacts if not appropriately managed.

Key construction activities that have the potential for dust generation, which formed the basis for the assessment, are described in Table 10.2.

The risk of dust arising in sufficient quantities to cause impacts was assessed for these activity types by considering potential dust emission magnitudes and the sensitivity of the area. Potential dust emission magnitudes for the project were estimated using the definitions in the IAQM Guidance based on the indicative construction work methodology provided in section 3.4. Potential dust generating activities, and the estimated emission magnitude, are provided in Table 10.2. Further information about how these calculations were defined is provided in section 4.2.1 of Technical Report 6.

Table 10.2 Potential dust emission magnitudes for project construction activities

Construction activity[1]	Overview of activity with potential to generate dust	Potential dust emission magnitude[1]
Earthworks	• Includes vegetation removal, topsoil removal, grading and stockpiling. After pipeline construction (considered below) subsequent earthworks include backfill and site reinstatement. • Also includes works associated with road, track and intersection upgrades and establishment of new access tracks.	Large
Construction	• Includes on-site activities associated with pipe delivery, stringing, bending, welding, coating and installation of the pipeline. • Also includes construction of surface facilities (such as scraper stations and cathodic protection systems), and use of construction ancillary facilities.	Medium
Trackout	• Construction would generate light and heavy vehicle movements (see chapter 13 (Traffic and transport)), which could suspend dust along unsealed access tracks and roads, and transport dust and dirt from the project site onto the public road network.	Large

Note: 1. As per the definitions in section 7 of the IAQM Guidance, summarised in section 2.4.2.2 of Technical Report 6 (Air quality).

Sensitive receivers (human receptors) within the study area are considered a high sensitivity receiver according to the definitions in the IAQM Guidance. Ecological receptors in the vicinity of the project site are considered low sensitivity in accordance with the IAQM Guidance.

The sensitivity of the surrounding area is determined by the number of high, medium and low risk sensitive receivers within a defined proximity of the project site during the above activities. Sensitivity is assessed for three areas of concern, which are the sensitivities of:

- people to the effects of dust soiling and the build-up of deposited dust on surfaces
- people to the health effects of PM_{10}
- ecological receptors to impacts from dust emissions.

Based on the definitions in the IAQM Guidance, the assessment identified the surrounding area would generally have a low sensitivity to dust generation, mainly as a result of the distance of the majority of receivers from project-related dust sources.

The dust emission magnitude in Table 10.2 was combined with the sensitivity of the area to determine the risk of impacts with no mitigation applied. The assessment identified there would be a:

- low risk of dust soiling on receivers from all construction activities
- low risk of impacts on human health from all construction activities
- low risk of impacts on ecological receptors from all construction activities.

Despite the outcomes of the assessment, suitable mitigation and management measures will be implemented during construction (see section 10.6) to ensure the risk of impacts remains low.

10.3.2 Exhaust emissions

The main source of exhaust emissions would be the combustion of diesel fuel and petrol from heavy vehicles, mobile excavation machinery, and/or stationary combustion equipment. Exhaust emissions would involve periodically localised emissions of carbon monoxide, particulate matter (PM_{10} and $PM_{2.5}$), oxides of nitrogen, sulfur dioxide, volatile organic compounds, and polycyclic aromatic hydrocarbons.

Fuel combustion emissions from vehicles, plant and equipment would be intermittent and transient. These are not expected to materially influence local air quality, given the short duration of works at any given location, the likely numbers of emission sources, and scheduling of activities (i.e. not all machinery would be operating in the same location simultaneously).

10.3.3 Odours

The key potential source of odour would be excavation of any odorous soils or materials such as contaminated soils or acid sulphate soils. As described in chapter 7 (Soils), it is not anticipated that construction would encounter quantities of contaminated material, acid sulfate soils or other potentially odorous materials such that odour would be generated at levels that would affect sensitive receivers. Gas within the pipeline would not be odourised, and no emissions of odour are anticipated during commissioning. Therefore, no odour emissions or impacts are expected.

10.4 Operation impacts

The proposed surface infrastructure is not expected to generate material air quality emissions during general operation. Releases of small quantities of gas at the scraper station would result from internal pipeline cleaning, conducted as part of routine maintenance. This would involve the release of about two cubic metres of gas into the atmosphere. These events would be infrequent and only occur about once per year on average and would generate minimal emissions. The volume of gas released is negligible when considered in the context of overall regional or national greenhouse gas inventories and reporting frameworks. Comparison of operational emissions quantities against the total emissions of NSW and Australia is presented in section 18.4.

Vehicle access for pipeline maintenance would result in minor combustion emissions; however, due to the low frequency of these activities these would not affect the local air quality.

As such, no air quality impacts are expected during normal operation.

10.5 Decommissioning impacts

At project closure, the pipeline would be decommissioned as described in section 3.8, including compliance with the Pipelines Act and Regulation, AS 2885 and relevant guidelines and requirements.

Activities with the potential to affect air quality impacts (if inadequately managed) include:

- operation of diesel-powered machinery and equipment, which may emit carbon monoxide, particulate matter (PM_{10} and $PM_{2.5}$), oxides of nitrogen, sulfur dioxide, volatile organic compounds and polycyclic aromatic hydrocarbons associated with the combustion of diesel fuel and petrol
- minor earthworks associated with the removal of surface facilities and excavation of bell holes, which may generate dust and fine particulate matter

- residual gas management, which may (depending on the outcomes of the safety management study and abandonment plan) involve controlled release or combustion using portable equipment, with the potential to emit gas, volatile organic compounds and combustion by-products
- general site works, including limited ground disturbance, which may contribute to localised dust generation and minor emissions from equipment.

It is noted that the final decommissioning activities would be determined through the safety management study and segment analysis, and may differ from those noted above depending on site-specific conditions and risk assessments. The abandonment plan would define appropriate measures to minimise impacts of residual gas management, including timing, location, equipment selection and monitoring, in accordance with relevant criteria, standards and technologies in place at the time.

Decommissioning activities are expected to have minimal potential to affect air quality due to the comprehensive and structured process that governs decommissioning in accordance with AS 2885. This process ensures that potential risks and impacts are systematically identified, assessed and managed.

Measures to manage emissions during decommissioning will be detailed in the decommissioning environmental management plan. This plan will be adapted from the CEMP to ensure continuity in environmental protection measures and compliance with regulatory requirements. As an outcome of the safety management study, the decommissioning management plan (together with the abandonment plan) would ensure effective management of potential environmental impacts. Emissions are expected to remain within relevant air quality criteria and no impacts on sensitive receivers are expected.

Further information about the approach to environmental management during decommissioning is provided in section 20.4.

10.6 Mitigation and management

10.6.1 Approach to mitigation and management

The primary risk to local air quality would be the generation of dust during construction. The assessment identified there would be a low risk of impact given the distance of most sensitive receivers from the project site and unsealed access tracks and roads. Air quality management measures provided in the CEMP will be implemented during construction to ensure that the risk of impact remains low (see Table 10.3). The CEMP will also include measures to further reduce the potential for impacts at sensitive receivers located close to unsealed access tracks and roads (see Table 10.3).

Undertaking rehabilitation of disturbed areas as soon as practicable after the pipeline is installed would also minimise the potential for dust generation.

Further information on the CEMP is provided in chapter 20 (Approach to environment management and mitigation).

10.6.2 List of mitigation measures

Air quality mitigation measures are listed in Table 10.3.

Table 10.3 Air quality mitigation measures

Impact/issue	Ref	Mitigation measures	Timing
Construction air quality	AQ1	Air quality management measures will be included in the CEMP and implemented during construction. The CEMP will detail processes, responsibilities and measures to manage air quality and minimise the potential for impacts during construction. The CEMP will include, but not be limited to: • a map identifying locations of sensitive receivers • potential sources of emissions to air • air quality management objectives consistent with relevant published NSW EPA guidelines • management measures to be implemented, including preferred methods for dust suppression and triggers for implementation • a process for monitoring dust on site and weather conditions.	Pre-construction, construction
Construction vehicle movements	AQ2	Measures to minimise dust emissions and potential amenity impacts will be defined in the CEMP and implemented where dust from project-related traffic movements is impacting or has the potential to impact sensitive receivers (including those within 250 metres of unsealed access tracks and roads). These measures will include increased frequency of dust suppression as required.	Construction
Rehabilitation of disturbed surfaces	AQ3	Disturbed surfaces not required for surface infrastructure will be rehabilitated as soon as practicable after completion of construction in accordance with the rehabilitation strategy (mitigation measure LU9).	Construction
Decommissioning air quality	AQ4	Air quality management measures will be included in the decommissioning environmental management plan and implemented during decommissioning. The decommissioning environmental management plan will include, but not be limited to: • management of residual gas to ensure compliance with relevant air quality criteria • dust suppression measures during earthworks and equipment operation.	Decommissioning