



Bulloo Interlink Pipeline

Environmental Authority

Greenhouse Gas Assessment

APA Bulloo Interlink Pipeline Pty Ltd

June 2026



Contents

Executive summary	iii
Acronyms and abbreviations	v
Glossary	vi
1. Introduction	1
1.1 Project overview	1
1.2 Purpose and scope of this document	3
1.3 Report structure and content	3
1.4 Limitations	3
2. Legislative and policy context	4
2.1 Queensland framework	4
2.2 Australian framework	5
2.3 International framework	6
3. Methodology	9
3.1 Overview	9
3.2 Land Sector Emissions and Vegetation Disturbance	9
3.3 Proportionality and interpretation of results	9
3.4 Assessment approach	10
4. Construction impacts	14
4.1 Potential emissions sources	14
4.2 Greenhouse gas estimate	14
5. Operational impacts	15
5.1 Potential emissions sources	15
5.2 Greenhouse gas estimate	15
6. Decommissioning impacts	16
6.1 Potential emissions sources	16
6.2 Greenhouse gas estimate	16
7. Risk assessment	17
7.1 State and federal emissions context	17
8. Mitigation and management	19
8.1 Approach to mitigation and management	19
8.2 List of mitigation measures	19
9. References	21

Table index

Table 1.1	Structure and content	3
Table 2.1	Guideline application requirements for low versus medium to high emitters	4
Table 2.2	Greenhouse gas legislation summary	6
Table 3.1	Select greenhouse gases and their 100-year global warming potential	11
Table 3.2	Greenhouse gas assessment assumptions	11
Table 4.1	Construction greenhouse gas emission sources	14
Table 4.2	Summary of construction phase emissions	14
Table 5.1	Operational greenhouse gas emission sources	15
Table 5.2	Summary of operational phase annual emissions	15
Table 6.1	Decommissioning greenhouse gas emission sources	16
Table 6.2	Summary of decommissioning phase emissions	16
Table 7.1	Percentage of state and national emissions	17
Table 8.1	Greenhouse gas mitigation measures	19

Figure index

Figure 1.1	Project location and key features	2
Figure 2.1	Overview of Greenhouse Gas Protocol scopes and emissions across the value chain (WRI and WBCSD, 2004)	7
Figure 3.1	Greenhouse gas assessment and management plan approach	10

Executive summary

The project

APA Bulloo Interlink Pipeline Pty Ltd (APA), which is part of the APA group of companies (the APA Group) is planning to develop the Bulloo Interlink Pipeline, an underground high-pressure gas pipeline linking the South West Queensland Pipeline in Queensland with the Moomba to Wilton Pipeline in New South Wales (NSW). The Queensland section of the Bulloo Interlink Pipeline (referred to as 'the project' for the purposes of this document) is approximately 236 kilometres (km) long. Overall, the pipeline has a total length of approximately 339 km and will provide a more direct route for natural gas to travel from Australia's northern production areas to southern gas markets.

This report

This report has been prepared by GHD Pty Ltd (GHD) as part of the Environmental Authority (EA) application for the project. The EA supports an application for approval of the project in accordance with the *Environmental Protection Act 1994* (Qld).

This report considers the potential for greenhouse gas emissions due to the project in accordance with the Queensland Government's *Guideline – Greenhouse Gas Emissions* (DETSI, 2026) and based on the accounting and reporting principles published in the *Greenhouse Gas Protocol* (WRI & WBCSD, 2004). Greenhouse gas emissions have been estimated for the construction, operations and decommissioning phases of the project and are expressed in terms of equivalent carbon dioxide (CO₂-e).

Impacts from the project

Emissions for the project are summarised in Table ES.1. Construction emissions have been annualised based on year of construction, and total project life is 40 years.

Table ES.1 *Bulloo Interlink Pipeline – QLD component greenhouse gas emissions summary*

Project phase	Duration	Emissions (t CO ₂ -e)			
		Scope 1	Scope 2	Total, annualised	Total (over project lifetime)
Construction phase	13 months	151,580	-	139,920	151,580
Operational phase	Annual	2,745	-	2,745	109,800
Decommissioning phase	12 months	5,950	-	5,950	5,950
Total					267,330

The majority of the project's estimated greenhouse gas emissions occur during construction and are driven by a conservatively assessed temporary loss of carbon sink from vegetation clearing (123,340 t CO₂-e).

This assessment meets the requirements of the Queensland Guideline – greenhouse gas emissions for low-emitting activities. Annualised construction emissions exceed the 25,000 t CO₂-e Scope 1 and Scope 2 threshold. Operational emissions, however, are substantially lower than the threshold throughout the operational life of the project.

Annual emissions for the project are minor compared to annual emissions in Queensland and Australia, at 124.1 Mt CO₂-e/y¹, and 437.5 Mt CO₂-e/y² respectively.

¹ Total annual greenhouse emissions, Queensland Government State of the Environment Report 2024

² Quarterly Update of Australia's National Greenhouse Gas Inventory: June 2025, Australia's National Greenhouse Accounts

Recommended mitigation measures

A number of opportunities have been implemented in project planning to reduce the emissions footprint, such as minimising the amount of cleared vegetation. Additional opportunities have been identified in this assessment to reduce the project's emissions, including planning methods for efficient transportation of materials and workers to and from the site, formal leak detection and cathodic protection surveys conducted annually, and establishing an approach to residual gas management considerate of greenhouse gas emissions impacts.

Acronyms and abbreviations

Abbreviation/term	Definition
AR	Assessment Report
CO ₂	Carbon dioxide
COP21	21st Conference of the Parties
CRoW	Construction right of way
Cth	Commonwealth
DETSI	Department of Environment, Tourism, Science and Innovation (Queensland)
DCCEEW	Department of Climate Change, Energy, the Environment and Water
EA	Environmental Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW)</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i>
EP Act	<i>Environmental Protection Act 1994 (Qld)</i>
GHG	Greenhouse Gas
IPCC	Intergovernmental Panel on Climate Change
kL	Kilolitre
km	Kilometres
LPG	Liquified Petroleum Gas
CH ₄	Methane
MWh	Megawatt hour
NDC	Nationally Determined Contribution
NGA	National Greenhouse Accounts
NGER	National Greenhouse and Energy Reporting
NGER Act	<i>National Greenhouse and Energy Reporting Act 2007</i>
N ₂ O	Nitrous oxide
t CO ₂ -e	Tonnes of carbon dioxide (gas) equivalent
UNFCCC	United Nations Framework Convention on Climate Change

Glossary

Term	Definition
Construction right of way (CRoW)	The area that will be directly disturbed to construct the pipeline within the study area (includes the trench, temporary storage areas and construction manoeuvring areas). The nominal corridor width is up to 40 m.
Pipeline alignment	The pipeline centreline.
Pipeline easement (the easement)	The permanent operational easement for the project that would be established to facilitate ongoing access and maintenance. Allows the pipeline operator a legal right to enter land to construct, operate and maintain the pipeline. It is registered on the underlying land title and remains on title. The nominal easement width for the project is 30 m.
Project	The project includes constructing, operating (including maintaining) and decommissioning approximately 236 km of underground natural gas transmission pipeline located in Queensland, and associated above ground infrastructure to connect to the South West Queensland Pipeline.
Project site	The term 'project site' is used to refer to the land required to construct, operate (including maintain) and decommission the project, and defines the extent of land subject to project approval. The project site comprises the 40 metre wide construction right of way, within which the 30 m permanent easement and surface operational facilities would be located. It also includes additional land required outside the construction right of way for temporary and ancillary facilities, including construction compounds, temporary workspaces, temporary accommodation facilities, access track works, and land required to support the project's water servicing strategy.
Study area	The full extent of land with the potential to be directly or indirectly affected by the project (e.g. by noise and vibration, visual or traffic impacts), assessed for environmental values, including the project site, survey area, and surrounding context.

1. Introduction

1.1 Project overview

APA Bulloo Interlink Pipeline Pty Ltd (APA), which is part of the APA group of companies (the APA Group) is planning to develop the Bulloo Interlink Pipeline, an underground high-pressure gas pipeline that will link the South West Queensland Pipeline in Queensland with the Moomba to Wilton Pipeline in New South Wales (NSW).

The Bulloo Interlink Pipeline includes an approximately 236-kilometre (km) long section in Queensland, which will provide a more direct route for natural gas to travel from Australia's northern production areas to southern gas markets. The pipeline has a total length of approximately 339 km, comprising about 103 km in NSW.

The section of the Bulloo Interlink Pipeline located in Queensland (referred to as 'the project' for the purposes of this document), and assessed in this report, will require an environmental authority (EA) under the *Environmental Protection Act 1994* (Qld) (EP Act). Approval for the NSW section of the Bulloo Interlink Pipeline will be sought under a separate approval process in accordance with NSW legislation and approval requirements.

1.1.1 Location

The project is located within the Bulloo Shire local government area in the vicinity of the Noccundra township within the traditional Country of the Wangkumarra People and Kullilli People. The project site extends south from the tie-in point with the South West Queensland Pipeline for about 186 km, then traverses south-west for about 30 km, and south about 20 km to the Queensland–NSW border. The project location and key project features are shown in Figure 1.1.

1.1.2 Key project features

The project will be designed, constructed and operated in accordance with the *AS 2885 Pipelines – Gas and Liquid Petroleum* series of standards (AS 2885) and the Australian Pipelines and Gas Association (APGA) *Code of Environmental Practice – Onshore Pipelines* (APGA Code of Environmental Practice) (APGA, 2022).

The key operational features of the project include:

- an underground high pressure, steel gas transmission pipeline with a length of about 236 km
- a permanent easement of up to 30 metres (m)
- supporting surface infrastructure, including:
 - beginning of line facility, including a connection to the South West Queensland Pipeline
 - temperature control station, including main line valve
 - cathodic protection units
 - main line valve
 - pipeline marker signs
 - permanent access tracks.

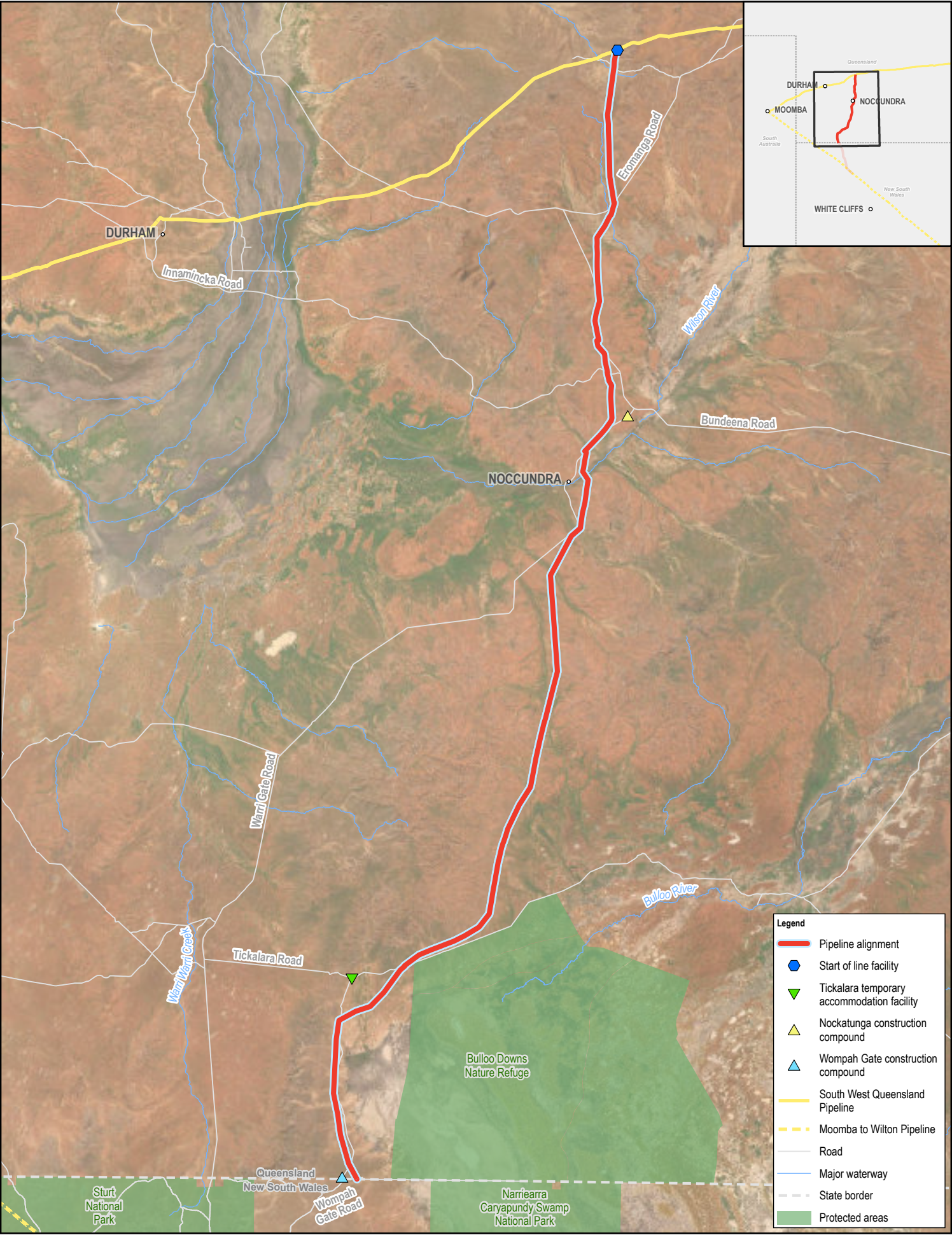
An approximately 40 m wide construction right-of-way (CRoW) will be established to facilitate construction and access.

Key ancillary facilities and infrastructure outside the CRoW would include:

- a temporary accommodation facility located at the intersection of Wompah Gate Road and Tickalara Road
- a construction compound facility to stockpile line pipe located on Wompah Gate Road near the southern end of the project site.

Smaller temporary workspaces are also proposed at regular intervals along the CRoW to support construction activities.

Further information on the project's features and indicative construction methodology is provided in Chapter 4 (Project description) of the Environmental Authority Supporting Information Report.



Paper Size ISO A4
0 4.5 9 13.5 18
Kilometres
Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54



APA



APA Group
Bulloo Interlink Pipeline

Project No. 12661648
Revision No. 0
Date 15/06/2026

Project location and key features

Figure 1.1

1.2 Purpose and scope of this document

This report assesses the potential greenhouse gas impacts of the project in accordance with the environmental assessment requirements of the *Application requirements for petroleum activities guidelines* (DESI, 2024) and in line with the Queensland Government's *Guideline – Greenhouse Gas Emissions* (DETSI, 2026). This report:

- assesses the impacts of constructing, operating and decommissioning the project in relation to greenhouse gas (GHG) emissions
- recommends measures to mitigate and manage the impacts identified.

This report has been written to inform the planning and approvals process for the project and is not a formal lifecycle assessment. Information in this report draws on best available estimates at the time of analysis and should be revised as new data becomes available. However, the estimation of GHG emissions from the proposed construction and operation of the project helps in understanding the impacts and encourages consideration of opportunities to reduce emissions.

1.3 Report structure and content

The structure and content of this report are outlined in Table 1.1.

Table 1.1 *Structure and content*

Section	Description
Section 1 – Introduction	Outlines the key elements of the project and the purpose of this report (this section).
Section 2 – Legislative and policy context	Summarises the key legislative requirements and guidelines relevant to greenhouse gas emissions.
Section 3 – Approach	Describes the study area and methodology for the assessment.
Section 4 – Construction impacts	Examines the greenhouse gas impacts during construction.
Section 5 – Operational impacts	Examines the greenhouse gas impacts during operations.
Section 6 – Decommissioning impacts	Examines the greenhouse gas impacts during decommissioning.
Section 7 – Risk Assessment	Provides the project's emissions in the context of state and federal emissions.
Section 8 – Mitigation and management measures	Recommends measures to mitigate and manage the potential impacts identified.

1.4 Limitations

This report has been prepared by GHD for APA Bulloo Interlink Pipeline Pty Ltd and may only be used and relied on by APA Bulloo Interlink Pipeline Pty Ltd for the purpose agreed between GHD and APA Bulloo Interlink Pipeline Pty Ltd as set out in section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than APA Bulloo Interlink Pipeline Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations and assumptions set out in this report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

2. Legislative and policy context

2.1 Queensland framework

Within the *Clean Economy Jobs Act 2024* the Queensland government has made a commitment to reach net-zero by 2050. To achieve this, all sectors will need to contribute to meeting a net-zero emissions target, recognising the level of emissions they release to the atmosphere and their varying opportunities and capacities to avoid and mitigate their emissions.

The *Guideline – Greenhouse Gas Emissions* (DETSI, 2026) (the Guideline) clarifies the Queensland Government's minimum expectations for emissions management under the EP Act and how such requirements to manage emissions will be mandated through environmental authorities (EAs).

This assessment is also underpinned by the EP Act and the Environmental Protection Regulations 2019 of Queensland. The EP Act aims to protect the environment while allowing for sustainable development. It establishes an environmental management program, policies for specific environmental aspects, and a licensing system for regulated activities. The Environmental Protection Regulations 2019 and other policies provide detailed processes and guidelines to achieve the EP Act's objectives. This framework ensures that development is balanced with environmental protection.

2.1.1 The Guideline – greenhouse gas emissions

This assessment has been prepared in accordance with the Guideline, which sets out the minimum expectations for GHG emissions information to be provided with applications for new EAs.

The Guideline provides detail on identifying and estimating greenhouse gas emissions, defines requirements for management, mitigation, and abatement planning, and informs assessment of risk of project impacts on environmental values. The Guideline does not differentiate between construction emissions (where typically emissions are short term and high) and operational emissions, where the Commonwealth regulatory requirements target performance and management.

Projects with expected GHG emissions (Scope 1 and Scope 2) of less than 25,000 t CO₂-e per year (construction or operational) are considered low emitters while those with emissions of 25,000 t CO₂-e or more per year (at any time during the life of the project) are considered medium to high emitters.

Application requirements differ for low emitters and medium to high emitters as summarised in Table 2.1.

Table 2.1 Guideline application requirements for low versus medium to high emitters

GHG emission category	Application requirements
Low emitters	– GHG emissions inventory (Scope 1 and Scope 2 only) – GHG emission mitigation and management practices – A risk assessment that outlines the scale of expected GHG emissions from the activity and how they are expected to contribute to climate change impacts on Queensland's environmental values
Medium to high emitters	– GHG emissions inventory (Scope 1, Scope 2 and Scope 3) – GHG emission mitigation and management practices (including Scope 3 where possible) – GHG abatement plan – A risk assessment that outlines the scale of expected GHG emissions from the activity and how they are expected to contribute to climate change impacts on Queensland's environmental values

2.2 Australian framework

The Commonwealth legislation applicable to this greenhouse gas assessment is described below.

2.2.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is Australia's primary national environmental legislation, enacted to safeguard the environment, including its biodiversity and significant natural and cultural sites. Administered by the Department of Climate Change, Energy, the Environment and Water (DCCEEW), the EPBC Act provides a legal framework for protecting and managing nationally and internationally important flora, fauna, ecological communities, and heritage places. It outlines processes for environmental impact assessments, approvals for activities that may affect protected matters, and promotes ecologically sustainable development.

2.2.2 Climate Change Act 2022

The *Climate Change Act 2022* sets legally binding targets for reducing GHG emissions, with the goal of achieving net-zero emissions by 2050. The *Climate Change Act 2022* mandates the development of national climate change strategies and action plans, ensuring a coordinated and comprehensive approach to mitigation and adaptation efforts. It also establishes mechanisms for monitoring and reporting progress, enhancing transparency and accountability in climate governance.

2.2.3 National Greenhouse and Energy Reporting Act 2007

The Australian Government enacted the *National Greenhouse and Energy Reporting Act 2007* (NGER Act) in July 2008. The NGER Act establishes a national framework for Australian corporations to report Scope 1 and Scope 2 GHG emissions, and energy consumption and production.

The NGER Act together with its subordinate legislative instruments identified below, underpins the National Greenhouse and Energy Reporting (NGER) Scheme:

- The *National Greenhouse and Energy Reporting Regulations 2008* (and its amendments) which provide the necessary details that allow compliance with, and administration of, the NGER Act
- The *National Greenhouse and Energy Reporting (Measurement) Determination 2008* (and its amendments) which provides methods and criteria for calculating GHG emissions and energy data under the NGER Act
- The *National Greenhouse and Energy Reporting (Audit) Determination 2009* which sets out the requirements for preparing, conducting and reporting on greenhouse and energy audits.

2.2.4 National Greenhouse Account Factors

The National Greenhouse Accounts (NGA) Factors provide methods that help companies and individuals estimate GHG emissions. The NGA Factors are updated and published each year by the Department of Climate Change, Energy, the Environment and Water (DCCEEW). They include broadly applicable calculation methods aligned with national and international guidance. It includes information on the sources of GHG emissions, including direct (Scope 1) and indirect (Scope 2 and 3) emissions. It includes information on the use of emission factors to convert a unit of activity into its emissions equivalent.

A summary of what is covered by the legislation is presented in Table 2.2. These frameworks have been relied upon to produce this GHG assessment.

Table 2.2 Greenhouse gas legislation summary

Act/ Scheme	Description
EPBC Act	Controls and assesses actions that are likely to have a significant impact on nationally important environmental matters, including where GHG emissions contribute to climate change impacts on MNES. Following EPBC reforms in November 2025, controlled actions must provide GHG emissions estimates and measures to manage emissions.
<i>Climate Change Act 2022</i>	Mandates the development of national climate strategies and action plans, and establishes mechanisms for monitoring, reporting, and verifying progress for reducing GHG emissions.
NGER Act and Regulations	Details reporting GHG emissions, energy production, and energy consumption by corporations in Australia. It aims to provide robust data to inform government policy and international reporting obligations. It also details specific information companies must report and the methods for calculating emissions and energy data. This confirms consistency and accuracy in the data collected.
National Greenhouse and Energy Reporting (Measurement) Determination 2008	Provides methods, criteria and emission factors for calculating GHG emissions and energy data under the NGER Act and Regulations.
National Greenhouse Accounts	Provides methods for companies and individuals to estimate their GHG emissions.

2.3 International framework

Several international organisations have policies for governments to use as guidance on GHG mitigation and management. Some of these are listed in the sections below with an explanation and description of their relevance to this assessment.

2.3.1 Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard

The *Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard* (WRI & WBCSD, 2004) (GHG Protocol) provides the internationally accepted framework for accounting and reporting standards for organisations to report GHG emissions. The main principles as presented for carbon accounting are:

- **Relevance:** The GHG emissions assessment is to present information that users need for making decisions.
- **Completeness:** Appropriate emission sources within the assessment boundary must be accounted for so that users will find the assessment comprehensive and meaningful.
- **Consistency:** Accounting approaches, assessment boundary and calculation methodology must be consistent, so that GHG emissions can be compared over time.
- **Transparency:** Information and appropriate assumptions are to be documented clearly in the assessment so that users can attest to its credibility; and that all parameters, values (and units) are accessible and presented within the assessment.
- **Accuracy:** Data presented should be credible to effect precise emissions quantification, so as to permit users to make decisions.
- **Conservativeness:** Using conservative assumptions and values where uncertainty (e.g. source data, or bill of quantities information) is high. Applying this principle will lead to a more likely overestimate of GHG emissions and underestimate of GHG removals (WRI & WBCSD, 2005).

The GHG Protocol further defines GHG emissions through the concept of emission scopes that are as follows:

- ‘Scope 1’ means direct GHG emissions from sources within the boundary of the project and as a result of the project’s activities (including emissions from land/vegetation clearing)
- ‘Scope 2’ means GHG emissions associated with the consumption of electricity, heat, or steam that are physically produced by another facility

- ‘Scope 3’ means indirect GHG emissions of greenhouse gases generated in the wider community other than Scope 2 emissions, occurring as a consequence of the activities of a facility project but arise from sources not owned or controlled by that facility’s business (WRI & WBCSD, 2004).

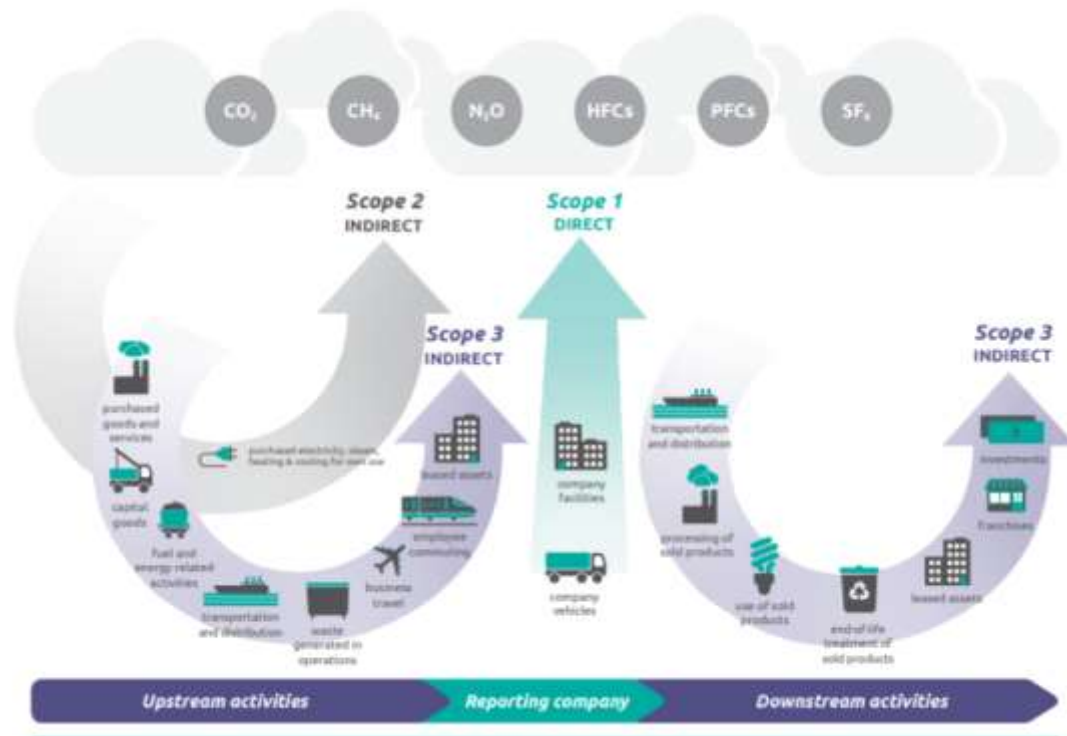


Figure 2.1 Overview of Greenhouse Gas Protocol scopes and emissions across the value chain (WRI and WBCSD, 2004)

2.3.2 Paris Agreement under the United Nations Framework Convention on Climate Change

The United Nations Framework Convention on Climate Change (UNFCCC) establishes the overall framework for intergovernmental organisations to address climate change issues. Under the UNFCCC, governments:

- commit to reducing greenhouse gas emissions through national policies and international agreements, such as the Paris Agreement
- receive support for climate adaptation and mitigation efforts, including financial aid, technology transfer, and capacity-building initiatives
- report and monitor their progress in addressing climate change, ensuring transparency and accountability through regular submissions of national communications and greenhouse gas inventories.

The Paris Agreement is a landmark international treaty adopted in 2015 during the 21st Conference of the Parties (COP21) to the UNFCCC. Its chief objective is to constrain the rise in global temperatures to well below 2 degrees Celsius (°C) above pre-industrial levels, with a concerted effort to limit the increase to 1.5 °C. The agreement mandates comprehensive and ambitious climate actions from nearly all nations, fostering both mitigation and adaptation strategies, with a particular emphasis on supporting developing countries. Additionally, it establishes a robust framework for transparency, requiring regular monitoring, reporting, and enhancement of national climate commitments over time.

As Australia is party to the Paris Agreement, efforts must be made to halt the increase of global average temperatures, and the Australian Government has made a commitment to a 28 per cent (%) reduction of GHG emissions below 2005 levels by 2030, and to achieve a reduction of 62-70% on 2005 levels, by the year 2035.

2.3.3 Intergovernmental Panel on Climate Change

The Intergovernmental Panel on Climate Change (IPCC) is a body of scientific experts established in 1988 by the World Meteorological Organisation and the United Nations Environment Programme to provide independent climate change advice. The IPCC produces detailed reports on various aspects of climate change and its impacts, using the latest climate science to develop practical response strategies. Despite the establishment of the UNFCCC in 1992, the IPCC remains the primary source of scientific and technical data on climate change and GHG emissions.

The IPCC Sixth Assessment Report (AR6) is based on more recent literature since the publication of the AR5 in 2014. It summarises the state of understanding of climate change risk and impacts, mitigation and adaptation.

However, for the purposes of applying the global warming potential of specific GHG emissions, these remain sourced from AR5, which Australia's legislative instrument - the *National Greenhouse and Energy Reporting Act 2007* as amended, continues to adopt.

3. Methodology

3.1 Overview

This greenhouse gas assessment has been prepared in accordance with methods and criteria defined in:

- The Queensland Government's *Guideline – Greenhouse Gas Emissions* (DETSI, 2026) (the Guideline)
- National Greenhouse and Energy Reporting (Measurement) Determination 2008 (Cth)
- National Greenhouse Energy Report Technical Guidelines
- The Greenhouse Gas Protocol (World Resources Institute and the World Business Council for Sustainable Development, 2013)

The data considered in the GHG assessment was sourced from project documents available at the time of writing. The Scope 1 and 2 emission factors used for this assessment were sourced primarily from the NGER Regulations 2008, updated from July 2025. Other sources that were deemed relevant at the time of writing include:

- National Greenhouse Accounts Factors (2025)
- IPCC Fifth Assessment Report, Climate Change 2013.

3.2 Land Sector Emissions and Vegetation Disturbance

To estimate emissions associated with vegetation clearing and the temporary loss of carbon sink during construction, FullCAM information derived from the Transport Authorities Greenhouse Group (TAGG) report (TAGG, 2013), relevant to the project locality, was applied.

The TAGG methodology was selected as a conservative and regulator-recognised proxy for estimating land-sector emissions associated with linear infrastructure construction, noting that no pipeline-specific land-sector greenhouse gas methodology is currently available.

Application of this approach required:

- classification of vegetation communities within the construction footprint
- estimation of the area subject to vegetation disturbance during construction.

This approach ensures consistency with recognised guidance and avoids under-estimation of emissions

Methodology limitations and conservatism

Land-sector emissions estimated using this methodology represent a conservative estimate of construction-phase impacts and do not reflect ongoing or sustained operational emissions. Also, there is no allowance for post-construction rehabilitation, regrowth, or recovery of vegetation and carbon stocks

3.3 Proportionality and interpretation of results

Consistent with the Guideline, greenhouse gas assessments should be proportionate to the likely magnitude, duration, reversibility and risk profile of impacts on environmental values.

In this context:

- the majority of reported emissions arise from conservatively modelled land-sector impacts during the construction phase
- these emissions are associated with temporary disturbance rather than ongoing operational activities
- operational greenhouse gas emissions from the project are comparatively minor.

Further detail on assumptions, inclusions and exclusions is provided in section 3.4.

Emissions have been calculated for the QLD portion of the pipeline only, to avoid double counting of emissions between QLD and NSW. For some emissions sources, such as vegetation clearing, emissions calculations can be easily split between QLD and NSW based on the area of land cleared within each state. For other emissions sources, such as the fuel consumption of construction plant during construction, the total emissions for that activity

has been divided between the QLD and NSW portions of the project by the percentage of the length of the pipeline within each state.

3.4 Assessment approach

3.4.1 Key tasks

The following key tasks were undertaken as part of this assessment in line with the requirements of the Guideline.

- **Step 1:** Identify the GHG emissions likely to be generated throughout the life of the project following the tasks shown in Figure 3.1.
- **Step 2:** Determine if the application meets the medium to high GHG emission category, using the Scope 1 and Scope 2 threshold of 25,000 t CO₂-e at any time during the life of the project.
- **Step 3:** Identify the management practices proposed to be implemented to prevent or minimise adverse impacts.
- **Step 4:** Identify if a GHG abatement plan will be required to accompany the application.
- **Step 5:** Describe the impacts of climate change on environmental values and the risk and likely magnitude of such impacts based on the relative scale of the project's net GHG emissions.

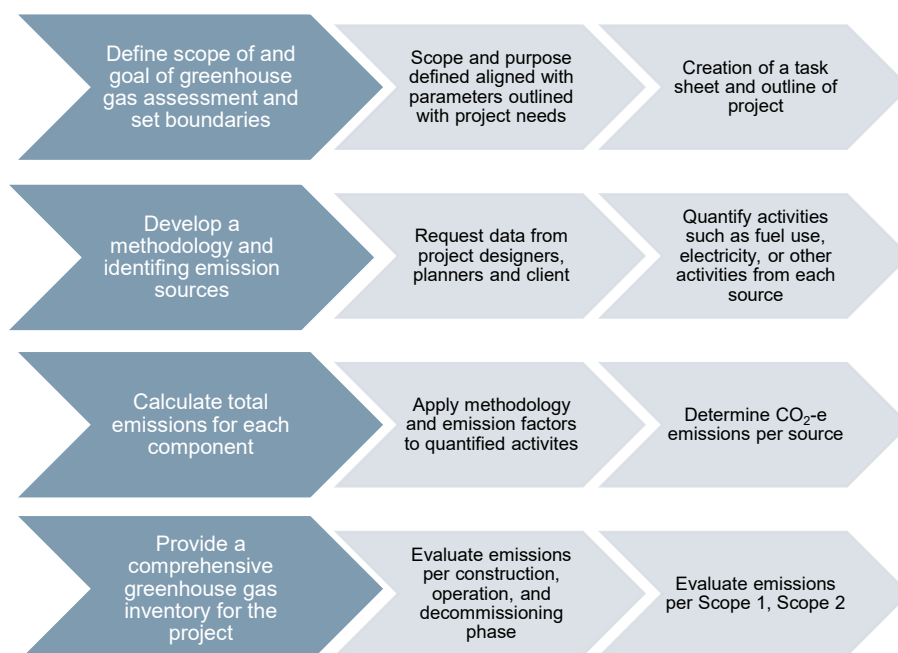


Figure 3.1 Greenhouse gas assessment and management plan approach

3.4.2 Application of the Guideline – greenhouse gas emissions

The Guideline defines medium to high emitters as projects with combined Scope 1 and Scope 2 greenhouse gas emissions of 25,000 t CO₂-e per year or more at any time during the life of the project.

Annualised construction emissions exceed the 25,000 t CO₂-e Scope 1 and Scope 2 threshold. Operational emissions, however, are substantially lower than the threshold throughout the operational life of the project.

3.4.3 Quantifying greenhouse gas emissions

Categories used to calculate emissions

In accordance with the Greenhouse Gas Protocol, and as noted in section 2.3.1, potential emissions are calculated across three categories (known as ‘scopes’) to help differentiate between direct emissions from sources that are owned or controlled by a project, and indirect emissions that are a consequence of project activities, but which occur at sources owned or controlled by another entity.

This assessment has calculated Scope 1 and Scope 2 emissions sources.

Greenhouse gases and global warming potential

The GHGs considered in this assessment and the corresponding global warming potential for each gas are listed in Table 3.1. Global warming potential is a metric used to quantify and communicate the relative contributions of different substances to climate change over a given time horizon.

Global warming potential accounts for the radiative efficiencies of various gases and their lifetimes in the atmosphere, allowing for the impacts of individual gases on global climate change to be compared relative to those for the reference gas carbon dioxide. In this assessment, the global warming potentials from the NGER Regulations 2008, updated from July 2025, were used. These are reflective of radiative forcing over a 100-year time horizon.

Table 3.1 Select greenhouse gases and their 100-year global warming potential

Greenhouse Gas	Global Warming Potential
Carbon dioxide (CO ₂)	1
Methane (CH ₄)	28
Nitrous oxide (N ₂ O)	265

Basis of calculations

Estimated GHG emissions are only as accurate as the information available. The estimations provided should not be relied upon more than the data from which it was calculated. High level inputs and assumptions for the assessment are described in Table 3.2.

More broadly the following assumptions create a basis for the assessment:

- Wherever possible, project design information was used to calculate GHG emissions, where there is limited availability of information, the assumptions below have been detailed to confirm consistency and data source.
- As the project progresses through the reference design, detailed design, construction and operational phases, this assessment should be updated (for currency) with more relevant information as it becomes available.
- The assessment was based on emission factors available at the time of the assessment and future changes in emission factors or global warming potential were not considered.

Table 3.2 Greenhouse gas assessment assumptions

Parameter	Assumptions
Construction Phase – Scope 1	
Temporary accommodation facility power consumption	The construction temporary accommodation facility is powered by two active 500 kVA generators, consuming approximately 80 L/h of diesel each.
Construction diesel	Fuel consumption for the construction phase of the project is based on fuel consumption estimates provided by APA for construction activities.
Transport of pipes	The pipe sections will be transported from the two stockpile sites to the project CRoW via truck. APA provided information regarding pipeline transport logistics (e.g. number of pipe segments, number of trips) from the import location (Port of Adelaide) to the stockpiles. It was assumed that the subsequent transport of pipe segments from the stockpiles to the CRoW followed the same process – 1,591 trips for Stockpile 1 and 1,298 trips for Stockpile 2. It was assumed an average distance of 30 km will be travelled per trip to move the pipe between a stockpile and the pipeline corridor, estimated using the length of the pipeline and the location of the temporary accommodation facility.
Staff, local ground travel	The total number of trips was 6,328 for the temporary accommodation facility at Nockatunga, and 7,196 for the second temporary accommodation facility at the intersection of Wompah Gate Road and Tickalara Road (as per data provided by APA). The assumed distance from both temporary accommodation facilities to CRoW was 30 km, estimated using the length of the pipeline and the location of the temporary accommodation facility.

Parameter	Assumptions
Vegetation removal – lost carbon sink	Vegetation clearing emissions have been estimated using the project's disturbance footprint area (total clearance footprint is 1,130 ha) intersected with Queensland Regional Ecosystems data (based on survey data supplemented by DNRM v13 data where the alignment has not been surveyed). Emissions factors for different vegetation classes have been sourced from the VicRoads TAGG calculator, adjusted for the potential maximum biomass class at the project location. It is assumed that cleared vegetation will be left to decompose naturally, so additional emissions are considered negligible.
Operational Phase – Scope 1	
Fuel consumption for operations / maintenance	It was assumed field staff will undertake 12 maintenance trips every year, driving length of the pipeline during each maintenance trip. Field staff will be based in Cobar, NSW. An average light commercial vehicle fuel consumption was assumed 12.8 L/100 km.
Fugitive emissions from natural gas transmission	This was based on the NGER MD, div 3.3.7 Method 1 – natural gas transmission (other than flaring) for the length of the pipeline within QLD
Operational Phase – Scope 2	
Electricity consumption	Above-ground infrastructure exists in QLD, including a scraper station, a beginning of line facility, and main line valve. The assumed electricity consumption of the scraper station is 12 kWh/day. It is assumed electricity is to be supplied by solar panels as part of the end of line facility. Detail of electricity consumption of other operating equipment is unknown.
Decommission Phase – Scope 1	
Diesel used in deconstruction works	The decommissioning process was undefined at the time of writing this report, with the details of the deconstruction equipment and/or fuel consumption unknown. Diesel usage was estimated as 4.4% of construction fuel use, based on the estimated scale of the deconstruction works compared to construction works.
Flaring	It was assumed that 90% of the residual gas in the pipeline will be flared. Emissions from flaring natural gas was calculated using the NGER Measurement Determination Section 3.86.
Venting	It was assumed that 10% of the residual gas will be vented (directly releasing the gas into the atmosphere), reflecting instances where flaring may not be feasible. Emissions from venting was calculated using the GWP of methane for 97% of the volume of natural gas released.

3.4.3.1 Exclusions

The following items were excluded from the assessment as their contribution is anticipated to be minor or not relevant, or detail is unknown:

- Emissions that are likely to be immaterial including:
 - emissions associated with combustion of fuels used in minor quantities such as LPG, gasoline, solvents, oils, and greases
 - emissions associated with minor quantities of acetylene welding gases
 - emissions from sulphur hexafluoride or perfluorocarbons – these substances are not proposed to be used or stored as part of the project
 - emissions from pipe release events during operations/maintenance
 - acetylene gases released during deconstruction work
 - it is assumed that cleared vegetation will be left to decompose naturally, so additional emissions are considered negligible.

- Emissions that have not been calculated where detail is unknown including:
 - electricity consumption of some operational equipment.
- The carbon impact of natural revegetation of ground layer / understory vegetation has been excluded as negligible.
- Compression of gas at compressor stations upstream of the pipeline are not in the scope of this project.

4. Construction impacts

4.1 Potential emissions sources

The sources of construction related emissions considered in this assessment are presented in Table 4.1. There are no Scope 2 emissions expected during construction.

Table 4.1 Construction greenhouse gas emission sources

Scope	Emissions Source	Description
Scope 1	Diesel use – stationary	Direct emissions from combustion of diesel for stationary equipment (e.g. diesel generators) and construction vehicles (e.g. graders, excavators) on the project site.
Scope 1	Diesel use – transport	Direct emissions from combustion of diesel for transport purposes (e.g. transporting pipes from stockpiles to pipe corridor and staff travel to and from site).
Scope 1	Vegetation clearing – lost carbon sink	Emissions associated with land clearing resulting in cleared vegetation and lost carbon sink.

4.2 Greenhouse gas estimate

Estimated greenhouse gas emissions associated with construction of the project are presented in Table 4.2. Total construction-phase emissions are estimated to be 151,580 t CO₂-e over a 13-month construction period.

Construction-phase emissions are dominated by emissions associated with vegetation disturbance, which account for approximately 81% of total construction emissions.

Emissions from diesel combustion for construction plant and transport represent the remaining 19% of construction-phase emissions and reflect direct fuel use during works.

Table 4.2 Summary of construction phase emissions

Activity	Activity data	Unit	Emissions (t CO ₂ -e)		
			Scope 1	Scope 2	Total
Diesel use – stationary	2,102	kL	5,700	0	5,700
Diesel use – transport	8,295	kL	22,540	0	22,540
Vegetation clearing – lost carbon sink	1,130	ha	123,340	0	123,340
Total			151,580	0	151,580

5. Operational impacts

5.1 Potential emissions sources

The sources of operational emissions considered in this assessment are presented in Table 5.1. There are no Scope 2 emissions expected during operations as all electricity is expected to be generated on site using solar PV panels.

Table 5.1 Operational greenhouse gas emission sources

Scope	Emissions Source	Description
Scope 1	Diesel use – transport	Direct emissions from combustion of diesel for transport purposes (e.g. staff travel for routine maintenance)
Scope 1	Fugitive emissions	Fugitive emissions associated with transmission of natural gas in a pipeline, associated with equipment leaks, evaporation losses, and other non-combustion sources

5.2 Greenhouse gas estimate

Table 5.2 provides an estimation of annual emissions occurring as a result of operations and maintenance. The largest contributors to operational emissions are from activity fugitive emissions accounting for >99%. The proposed project life is 40 years.

Table 5.2 Summary of operational phase annual emissions

Activity	Quantity	Units	Greenhouse gas emissions (t CO ₂ -e)			
			Scope 1	Scope 2	Total (annual)	Total over project life
Fugitive emissions	236	km of pipeline	2,740	0	2,740	109,600
Diesel use – transport	2	kL	5	0	5	200
Total			2,745	0	2,745	109,800

6. Decommissioning impacts

6.1 Potential emissions sources

The sources of decommissioning related emissions considered in this assessment are presented in Table 6.1. There are no Scope 2 emissions expected during decommissioning.

Table 6.1 *Decommissioning greenhouse gas emission sources*

Scope	Emissions Source	Description
Scope 1	Diesel use – stationary	Direct emissions from combustion of diesel for stationary equipment and construction vehicles for removal of above ground infrastructure.
Scope 1	Diesel use – transport	Direct emissions from combustion of diesel for transport purposes (e.g. transporting pipes from stockpiles to pipe corridor and staff travel to and from site)
Scope 1	Natural gas flaring	Direct emissions from the controlled combustion of natural gas from the pipeline as part of residual gas management planning at the end of project life.
Scope 1	Natural gas venting	Direct emissions from the controlled release of natural gas from the pipeline as part of residual gas management planning at the end of project life.

6.2 Greenhouse gas estimate

Table 6.2 provides an estimation of emissions occurring due to decommissioning. The largest contributor to decommissioning emissions is the flaring of residual gas from the pipeline, accounting for 41%. The actual emissions from decommissioning will vary depending on the final approach to residual gas management, including the extent of gas draw down, residual gas volumes, and ability to flare residual gas.

Table 6.2 *Summary of decommissioning phase emissions*

Activity	Activity data	Unit	Emissions (t CO ₂ -e)		
			Scope 1	Scope 2	Total
Diesel consumption - stationary	93	kL	250	0	250
Diesel consumption - transport	365	kL	990	0	990
Flaring of natural gas	44	TJ	2,450	0	2,450
Venting of natural gas	5	TJ	2,260	0	2,260
Total			5,950	0	5,950

7. Risk assessment

In line with the requirements of the Guideline, this section provides an assessment of the likely impact of the pipeline on environmental values.

7.1 State and federal emissions context

Table 12 presents the project's estimated emissions in the context of Queensland's and Australia's net annual GHG emissions. Queensland's annual emissions in 2022 were 124.1 Mt CO₂-e/y³. Australia's annual emissions for the financial year to June 2025 were 437.5 Mt CO₂-e/y⁴.

Table 7.1 Percentage of state and national emissions

Project Stage (Scope 1 and Scope 2)	Estimated Emissions (t CO ₂ -e)	% of QLD emissions	% of National emissions
Construction	151,580	0.12%	0.03%
Operations (annual)	2,745	0.002%	0.001%

7.1.1 Impacts of climate change on environmental values

Per the *Climate Change in Queensland* report (Queensland Government, 2019), the key risk to the environmental values of Queensland stem from:

- higher temperatures
- hotter and more frequent hot days
- harsher fire weather
- fewer frosts
- reduced rainfall in the south-east
- more intense downpours
- less frequent but more intense tropical cyclones in the north
- rising sea level
- more frequent sea level extremes
- warmer and more acidic seas.

These climate variables risk impacting the below environmental aspects:

- human health and wellbeing
- the health and biodiversity of ecosystems
- agricultural use of the environment.

7.1.2 Pipeline emissions intensity comparison

The majority of emissions associated with the operation of the pipeline are from fugitive emissions. This has been calculated using the default calculation and factor in the NGER Measurement determination, which is a benchmark of natural gas transmission.

Other project operational emissions are relatively small – there is fuel consumption for field staff to inspect and maintain the pipeline, and electricity consumption for end of line operational equipment. These are both typical emissions sources for operation of a gas transmission pipeline.

The construction phase of the project will result in very high greenhouse gas emissions, mostly due to the proposed clearing of vegetation. The emissions factors use for this calculation are standardised industry-based factors adjusted for the project location.

³ Total annual greenhouse emissions, Queensland Government State of the Environment Report 2024

⁴ Quarterly Update of Australia's National Greenhouse Gas Inventory: June 2025, Australia's National Greenhouse Accounts

7.1.3 Impact of the project

The major impact of the greenhouse gas emissions associated with the project relate to its potential for amplifying climate change and ultimately the potential impact of climate change on environmental values associated with ecosystem health.

As noted above, most of the assessed GHG emissions are largely one off and likely to occur in the construction phase.

This impact is also presented in Section 7.2 of the Environmental Authority Application Supporting Information Report.

8. Mitigation and management

8.1 Approach to mitigation and management

GHG emission mitigations have been identified using the following approach in accordance with the Guideline, supported by nationally and internationally recognised accounting frameworks including NGER, DCCEE national guidance and the GHG Protocol:

1. Robust identification and quantification of emissions across all relevant project phases provides an appropriate baseline for assessing emissions magnitude, risk, and management priority.
2. Emissions abatement options follow the mitigation hierarchy:
 - a. Avoidance - Design and planning measures are prioritised to avoid emissions where practicable, such as optimising layouts, reducing energy demand, and selecting inherently lower-emissions technologies.
 - b. Minimisation: Where emissions cannot be avoided, feasible measures are implemented to reduce emissions intensity, including energy efficiency, fuel switching, electrification, and operational optimisation.
 - c. Management of residual emissions: Remaining emissions are transparently disclosed, with their likely significance assessed relative to environmental values and relevant policy objectives.
3. Medium to high emitters under the Guideline are to prepare a GHG Abatement plan, reflective of the scale and risk of emissions. This Abatement Plan would include emissions projections, reduction targets, implementation planning, and details of emissions monitoring, auditing, and reporting.

8.2 List of mitigation measures

To reduce greenhouse gas emissions the project should implement a combination of the mitigation measures provided in Table 8.1.

Table 8.1 Greenhouse gas mitigation measures

Impact/issue	Mitigation measure	Timing
Energy use and greenhouse gases	Opportunities to reduce greenhouse gas emissions will be investigated and implemented as far as practicable, including but not limited to: – refining the design and construction methodology to further avoid or minimise impacts on native vegetation and fauna habitat as far as practicable – planning methods for efficient transportation of materials and workers to and from the site – investigating the potential for solar energy to supply a portion of electricity demand during construction, including at the temporary worker accommodations. – selecting heavy equipment with higher fuel conversion efficiency and lower greenhouse gas emissions – switching off plant, equipment and vehicle engines when not in use – optimising construction schedules to reduce idle times and unnecessary fuel consumption – educating equipment operators on efficient driving and equipment handling techniques to minimise fuel use – efficiently scheduling and planning material handling to minimise fuel consumption – maintaining plant and equipment in good condition to minimise fuel consumption and emissions – use of B10, renewable or biodiesel fuels for trucks and vehicles where practicable – selecting vehicles with higher fuel efficiency and lower greenhouse gas emissions, including exploring the use of electric or hybrid vehicles – establishing a robust monitoring system to track greenhouse gas emissions throughout the project lifecycle	Construction, operations, and decommissioning

Impact/issue	Mitigation measure	Timing
	– establishing an approach to management of residual gas considerate of greenhouse gas emissions impacts – maximising the draw down of the pipe to reduce the amount of residual gas left in the pipeline – flare as much residual gas as possible, to reduce the volume of gas released to the atmosphere – formal leak detection and cathodic protection surveys conducted annually in accordance with <i>AS/NZS 2885.3:2022 Pipelines – Gas and liquid petroleum, Part 3: Operation and maintenance</i>.	

9. References

- Clean Energy Regulator. (2024). Safeguard facility search. Retrieved from <https://cer.gov.au/markets/reports-and-data/safeguard-facility-reported-emissions-data>
- Climate Change in Queensland* report (Queensland Government, 2019)
- Commonwealth of Australia. (2022). *Climate Change Act 2022* (Compilation No. 1).
- Commonwealth of Australia. (2024a). *Environmental Protection and Biodiversity Conservation Act 1999* (Compilation No. 18).
- Commonwealth of Australia. (2024b). *National Greenhouse and Energy Reporting Act 2007* (Compilation No. 26).
- Commonwealth of Australia. (2024c). *National Greenhouse and Energy Reporting (Measurement) Determination 2008* (Compilation No. 63).
- Commonwealth of Australia. (2024d). *National Greenhouse and Energy Reporting Regulations 2008* (Compilation No. 29).
- Department of Climate Change, Energy, the Environment and Water (DCCEEW). (2022). State and Territory greenhouse gas inventories: 2022 emissions, available from: dcceew.gov.au/climate-change/publications/national-greenhouse-accounts-2022/state-and-territory-greenhouse-gas-inventories-2022-emissions
- Department of Climate Change, Energy, the Environment and Water. (2023). Australian National Greenhouse Accounts Factors. Retrieved from dcceew.gov.au/sites/default/files/documents/national-greenhouse-accounts-factors-2022.pdf
- Department of Energy and Climate. (2024). Queensland's 2035 Clean Economy Pathway: 75% by 2035. Retrieved from https://www.epw.qld.gov.au/__data/assets/pdf_file/0028/48493/queensland-2035-clean-economy-pathway.pdf
- DETSI (Department of the Environment, Tourism Science and Innovation). (2026). *Guideline – Greenhouse Gas Emissions*. Retrieved from detsi.qld.gov.au/policies?a=272936:policy_registry/era-gl-greenhouse-gas-emissions.pdf
- Intergovernmental Panel on Climate Change. (2023). Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (H. Lee & J. Romero, Eds.). IPCC.
- Quarterly Update of Australia's National Greenhouse Gas Inventory: June 2025, Australia's National Greenhouse Accounts
- Queensland Government State of the Environment Report. (2024). Total annual greenhouse emissions
- Transport Authorities Greenhouse Group (TAGG) (2013) Greenhouse Gas Assessment Workbook for Road Projects, available from mainroads.wa.gov.au/49c14c/globalassets/technical-commercial/technical-library/road-and-traffic-engineering/climate-change/carbon-gauge-workbook-2013.pdf

