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MITSUI E&P Australia

Waitsia Gas Project Stage 2 - Greenhouse Gas Management Plan

Disclaimer:

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RELATED DOCUMENTS

This document should be read in conjunction with following documents:

Document Number	Document Title
MS 1164	Ministerial Statement 1164: Waitsia Gas Project Stage 2

TERMS, ABBREVIATIONS AND DEFINITIONS

Term or Abbreviation	Definition
ARI	Assessment on Referral Information
Authorised offsets	Units representing **GHG Emissions** issued under one of the following schemes and cancelled or retired in accordance with any rules applicable at the relevant time governing the cancellation or retiring of units of that kind: a) Australian Carbon Credit Units issued under the Carbon Credits *(Carbon Farming Initiative) Act 2011* (Cth); b) Verified Emission Reductions issued under the Gold Standard program; c) Verified Carbon Units issued under the Verified Carbon Standard program; or d) other offset units that the Minister has notified MEPAU in writing meet integrity principles and are based on clear, enforceable and accountable methods.
CEO	Chief Executive Officer
Certified Improvement	An improvement to technology and/or processes approved by the Minister as an improvement that was or would be unlikely to occur in the ordinary implementation of the proposal (disregarding the effect of these conditions), and which is the subject of a report that: a) describes the improvement; b) demonstrates that the improvement was or would be unlikely to occur in the ordinary implementation of the proposal (disregarding the effect of these conditions); and c) has been reviewed by a suitably qualified peer reviewer, who has been approved by the DWER CEO, and who confirms that he or she agrees with the conclusions set out in the report.
Climate change	A change in global or regional climate patterns, in particular a change apparent from the mid to late 20th century onwards and attributed, largely, to the increased levels of atmospheric **Greenhouse Gas.**

Term or Abbreviation	Definition
DBNGP	Dampier to Bunbury Natural Gas Pipeline
DWER	Department of Water and Environmental Regulation
Emissions or GHG Emissions	**Greenhouse gas** emissions expressed in tonnes of carbon dioxide equivalent ($CO_{2\text{-}e}$) as calculated in accordance with the definition of 'carbon dioxide equivalence' in section 7 of the *National Greenhouse and Energy Reporting Act 2007* (Cth), or, if that definition is amended or repealed, the meaning set out in an Act, regulation or instrument concerning greenhouse gases as specified by the Minister.
EP Act	*Environmental Protection Act* 1986
GHGMP	Greenhouse Gas Management Plan
Greenhouse gas or GHG	Has the meaning given by section 7A of the *National Greenhouse and Energy Reporting Act 2007* (Cth) or, if that definition is amended or repealed, the meaning set out in an Act, regulation or instrument concerning greenhouse gases as specified by the Minister.
ha	hectare
km	kilometres
LNG	Liquefied natural gas
MEPAU	Mitsui E&P Australia
MS	Ministerial Statement
NGER	National Greenhouse and Energy Reporting
NGER Act	*National Greenhouse and Energy Reporting Act 2007*
Non-Reservoir Emissions	Proposal Emissions other than Reservoir Emissions.
PJ	Petajoule
Proposal Emissions Intensity	Proposal Emissions per terajoule of gas processed.
Proposal Emissions	Scope 1 GHG Emissions released to the atmosphere as a direct result of an activity or series of activities that constitute the proposal, calculated in accordance with: a) the *National Greenhouse and Energy Reporting Act 2007* (Cth) and its subsidiary legislation; or b) if that Act or the relevant subsidiary legislation is amended or repealed such that it does not provide a mechanism for calculating the *Proposal Emissions*, any

Term or Abbreviation	Definition
	other Act, regulation or instrument concerning greenhouse gases as specified by the Minister
Reservoir Emissions	The Proposal Emissions that were separated (from natural gas or products produced from extracted hydrocarbons) in an acid gas removal unit and released unused and unprocessed.
Scope 1 Emissions	Direct GHG emissions released to the atmosphere as a direct result of an activity, or series of activities at a facility level.
Scope 2 Emissions	Indirect GHG emissions released to the atmosphere from the indirect consumption of an energy commodity.
Scope 3 Emissions	Indirect GHG emissions other than Scope 2 Emissions that are generated in the wider economy. They occur as a consequence of the activities of a facility, but from sources not owned or controlled by that facility's business.
TJ	The terajoule (TJ) is equal to one trillion (10^{12}) joules
tcf	Trillion cubic feet (tcf) is a volume measurement of natural gas used by the oil and gas industry. This unit refers to the volume of gas at Standard Temperature and Pressure.
tCO_2-e	tonnes carbon dioxide equivalent
The Proposal	The Waitsia Gas Project Stage 2
Timing and Reporting Requirements	The Timing and Reporting Requirements are that the Authorised Offsets: a) were cancelled or retired between 1 July of the relevant period until 1 March in the year after the period ends; b) have been identified as cancelled or retired in the relevant report; c) have not been identified as cancelled or retired in any prior report; and d) have not been used to offset any GHG Emissions other than Proposal Emissions; and e) were not generated by avoiding Proposal Emissions.
WA	Western Australia
WGP	Waitsia Gas Plant
WGP2	Waitsia Gas Project Stage 2

1.0 SUMMARY

A summary of this Greenhouse Gas (GHG) Management Plan (GHGMP) is provided in Table 1-1.

Table 1-1 Summary of the Proposal

Proposal title	Waitsia Gas Project Stage 2 (WGP2)
Proponent Name	MEPAU Perth Basin Pty Ltd
Purpose of this GHGMP	The purpose of this GHGMP is to identify the direct and potential indirect impacts on GHG emissions and develop management measures that minimises impacts associated with the implementation of the Proposal. This GHGMP has been developed in accordance with the Instructions on how to prepare *Environmental Protection (EP) Act* 1986 Part IV Environmental Management Plans (EPA 2024); This GHGMP has also been prepared to demonstrate the commitment of MEPAU to achieving the objective of the MEPAU Climate Change Policy (Appendix 3),
Ministerial Statement	The Proposal has been assessed by the EPA (Assessment 2226) and on 1 February 2021, a Ministerial Approval was received via Ministerial Statement (MS) 1164, with associated Proposal implementation conditions.
Condition Clauses	Condition 8
Proposed Construction and Operation Dates:	Construction of the Proposal commenced in July 2021 and is anticipated to be finalised by mid-2026. The Waitsia Gas Plant (WGP) is expected to be operational for at least 20 years.
Plan Required Pre-Construction:	Yes.
Key Environmental Factor/s and Objective/s	Key environmental factor: Greenhouse Gas Emissions **EPA Objective**: *To reduce net greenhouse gas emissions in order to minimise the risk of environmental harm associated with climate change. (EPA, 2020)* **Management Plan Objective**: To mitigate GHG emissions having regard to the as low as reasonably practicable principle and to contribute to Western Australian GHG policy targets.
Key Provisions in the GHGMP	Management and reduction of contribution to state GHG concentrations from emissions through the implementation of the following key provisions: • Application of mitigation hierarchy and review and adoption of reasonable and practicable measures to mitigate Proposal Emissions; • Establish Proposal baseline emissions and maintain emissions within the agreed baseline, to comply with the Commonwealth Safeguard Mechanism;

Proposal title	Waitsia Gas Project Stage 2 (WGP2)
	• Implement GHG monitoring and reporting in accordance with the Commonwealth *National Greenhouse and Energy Reporting* (NGER) *Act* 2007; • Summary of design choices to demonstrate that all reasonable and practicable measures have been applied to avoid, reduce and offset a Proposal's Emissions over the life of the proposal; • Ongoing monitoring and preventative maintenance to minimise fugitive emissions of natural gas; • Ongoing monitoring and preventative maintenance to ensure that emissions remain within the agreed baseline for the Proposal; and • Adaptive management through five yearly review of reasonable and practicable measures to mitigate GHG emissions in response to developments in Commonwealth and State policies, markets, technology and regional infrastructure (Adaptive Management Review).

1.1 Ministerial Statement 1164 Conditions

Table 1-2 provides a summary of the conditions outlined in MS 1164 in relation to the GHGMP and the relevant sections of the GHGMP where these conditions have been addressed[1].

Table 1-2 Summary of MS 1164 Conditions Relating to the GHGMP

MS 1164 Condition No.	Description	Location in Document
8	**Greenhous Gas Management Plan**	-
8-1	For the period ending 30 June 2025, and for every subsequent period of five financial years, the proponent shall avoid, reduce and/or offset the quantity of Reservoir Emissions released to the atmosphere in that period.	MA4 Table 4-1
8-2	For the purposes of condition 8-1, Reservoir Emissions are avoided, reduced and/or offset for a period by the quantity of GHG Emissions represented by: (1) the amount of Non-Reservoir Emissions that have been avoided or reduced through a Certified Improvement; and/or (2) the amount of Authorised Offsets that meet the Timing and Reporting Requirements.	MA8 Table 4-1

[1] MEPAU's Compliance Assessment Plan [WAT-HSE-PLN-00004] outlines MEPAU's approach to compliance with all conditions of MS 1164.

MS 1164 Condition No.	Description	Location in Document
8-3	The proponent shall submit a report to the CEO each year by 31 March, commencing on the first 31 March after the date of this Statement, verifying for the previous financial year: (1) the quantity of Proposal Emissions, Reservoir Emissions and Non-Reservoir Emissions; (2) the number of terajoules of gas processed at the proposal facility; (3) the number of terajoules of gas produced from the proposal facility determined in accordance with NGER Item 30(1); (4) Total Emissions Intensity and Non-Reservoir Emissions Intensity, including calculations and calculation methodology for each.	MA3 Table 4-1
8-4	The proponent shall submit to the CEO by 31 March 2026, and every fifth 31 March thereafter: (1) a report specifying: (a) for each of the preceding five (5) financial years, the matters referred to in conditions 8-3(1) to 8-3(4); (b) for the period comprising five (5) financial years which ended on 30 June in the year before the report is due: (i) the amount of Non-Reservoir Emissions that have been avoided or reduced through a Certified Improvement as contemplated by condition 8-2(1), including describing the Certified Improvement that caused the avoidance or reduction; (ii) the type, quantity, identification or serial number, and date of retirement or cancellation of any Authorised Offsets which have been retired or cancelled as contemplated by condition 8-2(2), including written evidence of such retirement or cancellation; (iii) the progress towards meeting the interim and long-term reduction targets for Proposal Emissions as specified in the Greenhouse Gas Management Plan; and (iv) any measures that have been implemented to avoid or reduce Proposal Emissions; and (2) an audit and peer review of the report required by condition 8-4(1), carried out by an independent person or independent persons with suitable technical experience dealing with the suitability of the methodology used to determine the matters set out in the report, whether the report is accurate and whether the report is supported by credible evidence. This report is to be made publicly available as required by condition 8-9.	MA8 Table 4-1
8-5	Subject to, and to the extent that it is not inconsistent with, condition 8-1 or condition 8-2, the proponent shall implement:	Section 5.2

MS 1164 Condition No.	Description	Location in Document
	(1) The Waitsia Gas Project Stage 2 Greenhouse Gas Management Plan (P-WGP2-059 Rev 5) dated August 2020; or Page 8 of 17; (2) if that plan has been revised, the latest version of the plan that the CEO has confirmed in writing meets the requirements of condition 8-8.	
8-6	A summary document comprising of a summary plan and progress statement outlining key information from the Greenhouse Gas Management Plan (and reports to that time) must be provided every five years as per condition 8-4 and also if the Greenhouse Gas Management Plan is revised under condition 8-7. The summary must include: a) A graphical comparison of emission reduction commitments in the Greenhouse Gas Management Plan with 'actual' emissions for compliance periods; b) proposal performance against benchmarking for comparable facilities; c) emissions intensity; d) a summary of emission reduction measures undertaken by the proponent; and e) a clear statement as to whether interim targets have been achieved.	MA4 Table 4-1
8-7	The proponent: (1) may revise a Greenhouse Gas Management Plan at any time; (2) must revise the Greenhouse Gas Management Plan if there is a change to the proposal which means there is a material risk that condition 8-1 will not be achieved; (3) must revise the Greenhouse Gas Management Plan at least every five years to align with the five yearly reporting requirements specified in condition 8-4; and (4) must revise a Greenhouse Gas Management Plan if directed to by the CEO, within the time specified by the CEO.	Section 5.2
8-8	The proponent shall submit a revised Greenhouse Gas Management Plan referred to in condition 8-7 to the CEO that: (1) is not inconsistent with condition 8-1 and condition 8-2; (2) specifies the estimated Proposal Emissions, Reservoir Emissions, Non-Reservoir Emissions, Total Emissions Intensity and Non-Reservoir Emissions Intensity for the remainder of the life of the proposal; (3) includes comparison of each of the estimated Emissions and Emissions Intensity figures referred to in condition 8-8(2) for the remainder of the life of the proposal against other comparable projects;	Section 5.2

MS 1164 Condition No.	Description	Location in Document
	(4) specifies the estimated number of terajoules of gas to be processed at the proposal facility for the remainder of the life of the proposal; (5) specifies the estimated number of terajoules of gas to be produced at the proposal facility as determined in accordance with NGER Item 30(1) for the remainder of the life of the proposal; (6) identifies and describes any measures that the proponent will implement to avoid, reduce and/or offset Proposal Emissions, Reservoir Emissions or Non-Reservoir Emissions, and/or reduce Total Emissions Intensity; (7) specifies interim and long-term targets for avoiding, reducing and/or offsetting Proposal Emissions; and (8) provides for a program for the future review of the plan to: (a) assess the effectiveness of measures referred to in condition 8-8(6); and (b) identify and describe options for future measures that the proponent may or could implement to avoid, reduce and/or offset Proposal Emissions, Reservoir Emissions or Non-Reservoir Emissions, and/or reduce Total Emissions Intensity.	
8-9	The proponent shall make all Greenhouse Gas Management Plans and the reports (including summary plans and progress statements) publicly available within the specified timeframes on the proponent's website for the life of the proposal, or in any other manner specified by the CEO, within a time specified by the CEO: (1) the Greenhouse Gas Management Plan referred to in condition 8-5(1) within two (2) weeks of the issue of the Statement; (2) the report referred to in condition 8-3 within two (2) weeks of submitting a relevant report to the CEO; (3) the reports, summary plans and progress statements referred to in conditions 8-4 and 8-6 within two (2) weeks of submitting the relevant reports, summary statements and progress reports to the CEO; and (4) any revised Greenhouse Gas Management Plan referred to in condition 8-7 within two (2) weeks of receiving confirmation from the CEO as referred to in condition 8-5(2).	Section 7.0

2.0 INTRODUCTION

MEPAU Perth Basin Pty Ltd is a wholly-owned subsidiary of Mitsui E&P Australia Holdings Pty Ltd, which in turn is a wholly-owned subsidiary of Mitsui & Co., Ltd. The Mitsui E&P Australia Holdings Pty Ltd group of companies operates under the brand Mitsui E&P Australia (MEPAU).

3.0 CONTEXT, SCOPE AND RATIONALE

This GHGMP has been prepared to support the assessment, approval and implementation of the Proposal under Part IV of the *Environmental Protection Act* 1986 (EP Act).

The WGP2 was referred under the EP Act to the Environmental Protection Authority (EPA) on 23 August 2019 (EPA Assessment 2226). The EPA assessed the WGP2 as a significant proposal, through Assessment of Referral Information (ARI). The ARI included additional information requested under Section 40(2)(a) of the EP Act including this GHGMP, which was be subject to a two-week public review period.

On 1 February 2021, Ministerial Approval was received for the project via Ministerial Statement (MS) 1164.

Under s. 45C application of the EP Act, an application to amend the Development Envelope was submitted to the EPA due to further refine the well locations/reservoir targets and make associated minor changes to the flowline routes. MS 1164 was amended on 4 October 2021.

A s.45C application of the EP Act was submitted to the EPA on 12 June 2023 and amended on 27 November 2023 to amend the development envelope and footprint and increase the number of gas production wells to a maximum of nineteen (19) to allow further development of the Waitsia Gas Field and to enable the approved production rate to be achieved over the life of the project. MS 1164 was amended on 17 April 2024.

MEPAU recognises that climate change represents a significant global challenge and is committed to being a part of the solution by providing safe, reliable and affordable energy whilst mitigating GHG emissions. The MEPAU Climate Change Policy (Attachment 1) outlines company commitments to Climate Change including:

- Working with governments and stakeholders in the design of climate change regulation and policies;
- Incorporating climate change risks into our decision-making and business operations;
- Identifying, evaluating and implementing, solutions to mitigate greenhouse gas emissions having regard to the as low as reasonably practicable principle and to fuel efficiency initiatives, in our existing operations and new projects; and
- Measuring and reporting greenhouse emissions as required by the regulation of the jurisdiction we operate in.

The GHGMP has been prepared with due consideration to the:

- MEPAU Climate Change Policy;
- WA Government's GHG Emissions Policy for Major Projects (GoWA, 2019a);
- EPA's Greenhouse Gas Environmental Factor Guideline (EPA, 2023); and
- *National Greenhouse and Energy Reporting Act*, 2007 (NGER Act, 2007).

The GHGMP has applied the mitigation hierarchy (through the considered adoption of design, technology and management measures) and proposes reasonable and practicable measures to mitigate GHG emissions. This includes an adaptive management framework to respond to current uncertainties and future developments in Government policies, markets and technology.

This GHGMP has been written in accordance with the "Instructions on how to prepare EP Act Part IV Environmental Management Plans" (EPA, 2024).

3.1 The Proposal

The Proposal (known as WGP2) is a conventional gas proposal located approximately 16km East-South-East of the Dongara-Port Denison town sites (Figure 3-1). It includes the construction and operation of the 91.25 Petajoule per annum WGP, related wells and gas gathering infrastructure.

Table 3-1 provides a summary of the WGP2.

Table 3-1 Proposal Overview

Proposal Title	Waitsia Gas Project Stage 2
Proponent Activities	Development of a conventional gas reservoir by designing and constructing wells, a gathering system, gas processing plant and export pipeline to the Dampier to Bunbury Natural Gas Pipeline (DBNGP).
Short Description	Waitsia Stage 2 includes the following components: • Construction and operation of the WGP with a maximum export capacity of 91.25 Petajoule (PJ) per annum; • Up to nineteen (19) gas production wells; • Constructing of a (~1km) pipeline (PL 128) to connect the WGP to the existing Waitsia Export Pipeline (PL 124); • Installation of a gas gathering system comprising flowlines and hubs to convey the extracted gas to the WGP and the gas distribution network; • Installation of a flowline from the WGP to up to three (3) water injection wells to inject produced water into a disused petroleum formation; • Clearing of no more than 16.5 ha of native vegetation within a 580.9 ha development envelope; • Disturbance footprint of up to 479.2 ha within the 580.9 ha development envelope; and • Scope 1 Emissions up to ~300,000 tCO_2-e per annum; and • Construction and operation of a Temporary Construction Village, to support the activities.

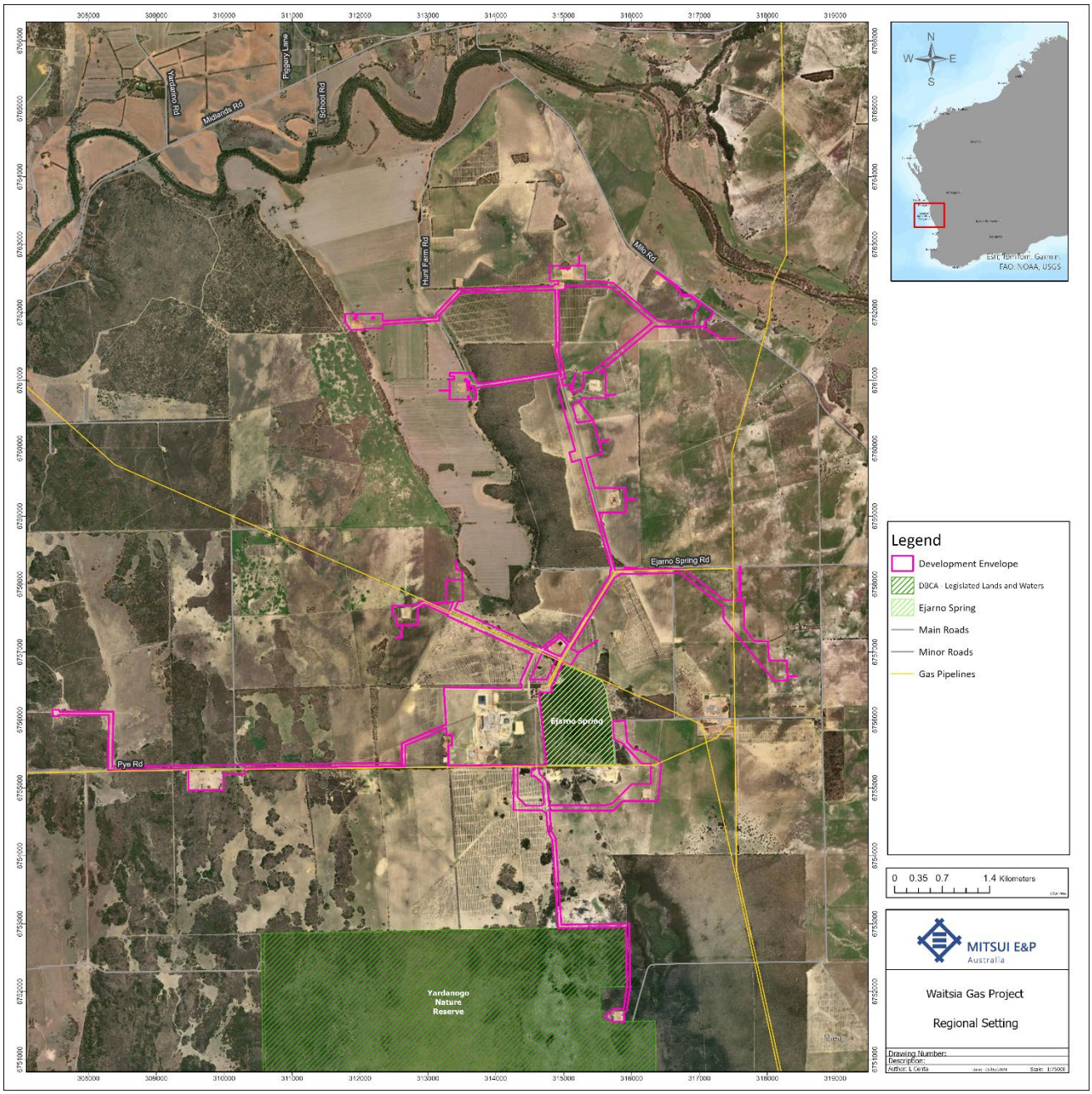


Figure 3-1 Regional Setting

3.1.1 Greenhouse Gas Emissions Inventory

A GHG emissions assessment was developed and accounts for all upstream (reservoir) and processing (WGP) emissions[2]. The assessment includes consideration of all GHGs listed under the NGER Act, with total emission represented as tonnes carbon dioxide equivalent (tCO_2-e).

The Proposal Emissions are estimated to be ~300,000 tCO_2-e per year (tCO_2-e/year), assuming an average reservoir carbon dioxide (CO_2) concentration of 6.0 mol%[3], an exported gas production rate of 250 TJ/day and operation 365 days per year. The Proposal Emissions includes

[2] The Proposal only includes Scope 1 Emissions. As the WGP will generate all required electricity on site there are no Scope 2 indirect emissions associated with consuming an energy commodity.

[3] Based on a reservoir range of 4.5 mol% in the north to 7.5 mol% in the south

~180,000 tCO_2-e/year related to reservoir CO_2 removal and ~ 120,000 tCO_2-e/year from the WGP operations (Table 3-2).

The Proposal will export an estimated 91.25 Petajoule (PJ) per annum. Therefore, the Proposal will have a Proposal Emissions Intensity of 3.29 tCO_2-e/TJ inclusive of gas processing and reservoir associate CO_2 emissions. The Proposal Emissions Intensity is comprised of:

- Gas processing emissions are estimated to be 1.32 tCO_2-e/TJ; and
- Reservoir associated emissions are estimated to be 1.97 tCO_2 e/TJ.

Table 3-2 Approximate Annual Greenhouse Gas Emissions from Processing Plant (MEPAU, 2020c)

Gas Processing Plant GHG Source	Estimated annual GHG Emissions (tCO_2-e/yr)
Hot utility water system	53,000
Export Gas Compression	27,800
Incinerator	18,300
Onsite Power Generation	15,400
Flare – Purge	440
Flare - Relief / Blowdown	330
Demineralised Water Tank (blanket)	260
Condensate Loading Package	210
Produced Water Evaporation Pond	180
Condensate Storage Tanks (blanket)	120
Flare – Pilot	60
Design margin	3,900
Total	**~ 120,000**

Figure 3-2 presents Scope 1 GHG Emissions by source, of which ~99% of emissions relate to five main sources.

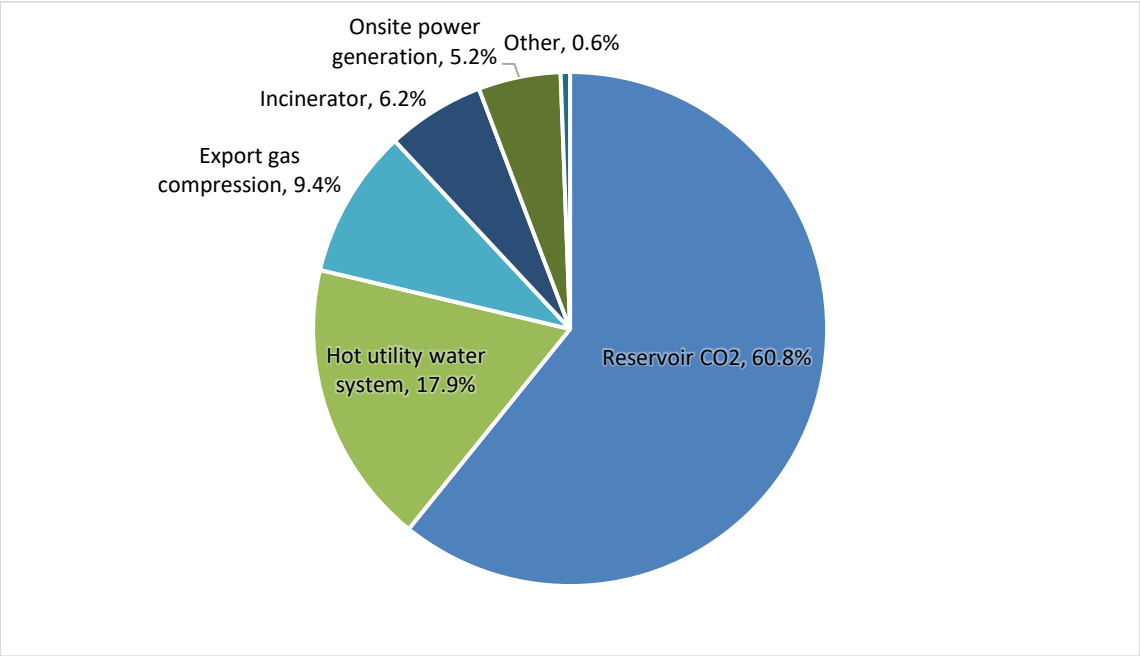


Figure 3-2 Breakdown of Scope 1 greenhouse gas emission sources

The calculated emissions intensity for the applicable Production Variables under the Safeguard Mechanism (NGER Rule) are detailed in Table 3-3.

Table 3-3 Calculated emissions intensity under the NGER Rule

Production Variable[4]	Description	Emission type	Estimated GHG emissions (tCO_2-e/year)	Emissions intensity
30	Processed natural gas (integrated extraction and processing)	Non-Reservoir Emissions	104,600	1.15 tCO_2-e/TJ
35	Reservoir carbon dioxide	Reservoir Emissions	180,000	1.97 tCO_2-e/TJ
57	Electricity generation	Non-Reservoir Emissions	15,400	0.42 tCO_2-e/MWh

GHG emissions related to the reservoir sourced CO_2 that must be removed as part of processing will vary depending on the CO_2 mol% of the Waitsia gas reserve (CO_2 reservoir content ranges from 4.5 mol% in the north of the reservoir to 7.5 mol% in the south with an expected average of 6.0 mol%).

The Proposal is estimated to have lower emissions relating to export gas compression due to the minimal transmission distance (~5 km) and lower entry pressure to the DBNGP.

4 As defined in NGER Rule 2015. To note Production Variable 57 is detailed as tCO_2-e/MWh, as per the NGER Rule.

3.2 Key Environmental Factors

The preliminary key environmental factors that have been identified by the EPA includes as: Air Quality, Flora and Vegetation, Inland Waters, and Social Surroundings. A summary of the Greenhouse Gas Emissions (GHG) key environmental factor with a specific focus on the impacts on Greenhouse Gas Emissions by the WGP2 are detailed in Table 3-4. The other key environmental factors and their management provisions are outlined in separate environmental management plans.

Impacts will be managed via the management measures detailed in Section4.0.

Table 3-4 Summary of Key Environmental Factor - Greenhouse Gas Emissions

Greenhouse Gas Emissions	
EPA objective	To minimise the risk of environmental harm associated with climate change by reducing greenhouse gas emissions as far as practicable.
Policy and guidance	• Environmental Factor Guideline: Greenhouse Gas Emissions (EPA, 2023) • National Environment Protection (Ambient Air Quality) Measure 1998 • Greenhouse Gas Emissions for Major Projects (GoWA, 2019a) • Climate Change in Western Australia – Issues Paper (DWER, 2019)
Project activities	• Conventional gas extraction; • Processing of natural gas; and • Export of compressed natural gas to the DBNGP.
Potential impacts	• Scope 1 Emissions - ~300,000 tCO_2-e at maximum export capacity of 91.25 Petajoule (PJ) per annun; • Scope 2 Emissions - There are no Scope 2 Emissions, as no electricity is imported or exported; • Scope 3 Emissions - 4.6 million tCO_2-e maximum export capacity of 91.25 Petajoule (PJ) per annum [5]. Total Scope 3 Emissions for the Proposal are estimated to be 37.7 million tCO_2-e.

3.3 Conditions Requirements

The WGP2 has been assessed by the EPA (Assessment 2226) and on 1 February 2021, Ministerial Approval was received via MS 1164. Condition 8 outlines the objectives, requirements for implementation and reporting associated with this GHGMP.

[5] Scope 3 Emissions – estimated average annual GHG emissions of 4.6 million tCO_2 e, based on publicly available factors for gas consumption scenarios from NGER Act 2007 (updated 2019), Schedule 1, Part 2, Item 17. Similarly, based on the P50 reservoir volumes, total Scope 3 Emissions for the Proposal are estimated to be 37.7 million tCO_2e.

3.4 Rationale and Approach

A number of key information sources and aspects inform the rationale and approach of the management provisions outlined in Section 4.0. This section provides a concise description of the rationale and approach for the GHGMP. Specially, the following sub-sections summarise:

- Study findings (Section 3.4.1);
- Benchmarking assessment – Reservoir (Section 3.4.2);
- Benchmarking assessment – Process (Section 3.4.3);
- Key assumptions and uncertainties (Section 3.4.4);
- Management Approach (Section 3.4.5); and

Rationale for Choice of Provisions (Section 3.4.6).

3.4.1 Study Findings

A number of studies were undertaken or reviewed to assess the feasibility and practicability of various design components and aspects of the Proposal. Table 3-5 provides a summary of these studies.

Table 3-5 Recent Study Findings

Study	Description of Findings
A Comparison of Physical Solvents for Acid Gas Removal (Burr and Lyddon 2008)[6]	This study describes and compares the technology options for acid gas removal (e.g. hydrogen sulphide or CO_2) from natural gas streams. The more commonly used treatment technologies are summarised as follows: • Chemical solvent processes which rely on chemical reactions to remove acid gas constituents from gas streams and include compounds such as ethanolamines (often abbreviated to “amines”) and hot potassium carbonate. Heat is required to regenerate chemical solvents. Commonly used throughout the industry; • Physical solvents rely on the physical interaction between CO_2 and other gases. Pressure reduction and a lower degree of heat is required to regenerate the physical solvent, however solvent circulation rates are magnitudes greater than compared to chemical solvents; • The membrane process is most applicable for higher acid gas concentration gas streams. Waste streams (permeate) require significant recompression (power) and secondary treatment to reduce overall hydrocarbon losses and improve efficiencies;

[6] A more recent study, Pouladi et al, 2016 supports the study by Burr and Lyddon, 2008. Further, Pouladi et al, 2016 states that the amine process exhibits high reaction rate and high capacity of removal even at low concentration of CO_2 as an advantage over physical solvents.

Study	Description of Findings
	• Cryogenic fractionation has the advantage that the removed CO_2 can be obtained at relatively high pressure, which is advantageous for secondary CO_2 uses. However, this advantage is offset by significant refrigeration (power) requirements and specialised (cold service) materials; This study indicates that for the adopted design measures, the amine system is most appropriate as it maximises CO_2 removal for this particular reservoir. Therefore, the amine process was adopted.
WGP Plant Efficiency WGP2-KDL-041 (MEPAU, 2019a)	This internal decision record outlines the two processing technology options for carbon dioxide removal in the gas plant facility: amine absorption and membranes. Based on the overall processing plant configurations and overall system efficiencies (influencing overall emissions) MEPAU (2019a) determined that the amine absorption technology has a better process efficiency (in removing CO_2) but has a higher operational cost than the membrane technology over the life of the project.
Investigation of renewable energy options (MEPAU, 2020a)	An analysis of on-site electrical power generation options and grid supply / export of power for the Proposal was completed. The analysis included assessment of small-scale options for renewable energy supply to offices and buildings. It was determined that renewable energy options (geothermal, wind and solar systems) did not offer a commercial payback period or practical supply for offices and buildings. The analysis considered large-scale renewable energy systems (solar, wind and battery systems, in combination with either grid connection or on-site generation) to power the WGP equipment. It was concluded that grid connected options were not feasible due to technical and operational risk of connecting to the South West Interconnected System (SWIS). Connection with the SWIS would require twin feeders from 80 km away at Eneabba, which represents a single point of power failure for power supply to the WGP. Furthermore, it was concluded that it was economically unfeasible due to the high capital costs of high voltage transmission infrastructure required to connect to the SWIS. It was determined that the lowest net present cost (NPC) (excluding the cost of gas) is onsite (i.e. off-grid) electrical power generation using gas fired reciprocating engines and alternators. This option takes advantage of the available gas source from the WGP. As a sensitivity, the NPC was calculated assuming a gas price of $4/GJ (matching the current market) and a production rate of 250 TJ/d to compare the lowest NPC option to three renewable options. On this basis, all four options have very similar NPC; within 1%; after 20 years of operation. (MEPAU, 2020a). However the project

Study	Description of Findings
	only has gas reserves to support approximately seven (7) years of production at 250 TJ/d, in the most-likely reservoir outcome, requiring a gas price substantially higher than the mid to long term market price in WA to be attractive. *Renewable options will be revisited as technology evolves, costs reduce and the Waitsia field matures (in line with MA1, detailed in Table 3-1)*
Grid Connection WGP2-KDL-042 (MEPAU 2019b)	This internal decision record provides a summary of the practicability and economic feasibility of connecting the Proposal to the SWIS utility grid, based on stakeholder engagement completed with Western Power. This would eliminate the need for onsite power generation and would provide sufficient power for all Plant equipment. MEPAU (2019b) assessed that the risk to project reliability and schedule is unacceptably high for the Proposal since the utility provision is largely out of MEPAU's project control and that the supply line represents a critical single point of power generation failure. MEPAU (2019b) also concluded that based on the information available about the existing power grid, tariff structure and high-level budgetary estimates, utilising utility power for the Stage 2 development is not economic or practicable. Therefore, MEPAU did not pursue this option.
Use of renewables for WGP2 WGP2-KDL-051 (MEPAU 2019c)	This internal decision record evaluated the use of renewables for the Proposal MEPAU (2019d). The evaluation showed, when compared to gas fired electrical power generation, renewables resulted in a negative commercial outcome. In addition, renewable technology is currently not sufficiently developed to be totally relied upon to provide base load power requirements (Needham, 2008; Platt, 2018). Therefore, concurrent investment in gas fired electrical power generation is required to provide power generation when renewables cannot operate. This requirement further adds to the negative commercial outcome. MEPAU (2019d) determined that while it is uneconomic to install renewable energy even on a small scale, a solar power system will be installed to provide power to the Administration and Control Building (MEPAU 2019c). In conjunction, a heat pump system will be installed to support the climate control system for the Administration and Control Building (MEPAU 2019c). Solar panels and batteries will be utilised at remote well sites for control systems, safety systems, communications and localised lighting demands (MEPAU 2019c).
Natural Gas Reservoir Benchmarking	GHD (2020) completed a benchmarking assessment of reservoir CO_2 concentration and reservoir size of the Waitsia gas field against

Study	Description of Findings
assessment (GHD 2020)	other gas fields using publicly available data and information. The benchmarking exercise shows that in comparison to Australian reservoirs currently being extracted from, the Waitsia Gas Field has a reservoir CO_2 concentration representative of the national and Western Australian average. The Waitsia reservoir is smaller in reserve volume (with consequential reduced CO_2 emissions) in comparison to other gas fields. The results of the desktop assessment are presented in Section 3.4.2.

3.4.2 Benchmarking Assessment – Reservoir

GHD (2020) completed a benchmarking desktop assessment of natural gas reservoirs in Australia to compare reservoir CO_2 content and reservoir size. The benchmarking assessment by GHD did not include a comparison of processing plant emission intensity as this information is not publicly available. Comparison of the processing plant was not completed as there are differences in equipment between domestic gas production and export liquid natural gas (LNG) which does not allow a like-for-like comparison.

The benchmarking assessment selected a number of natural gas reservoirs within Australia that are currently being developed. The selection of natural gas reservoirs for comparison with the Proposal was based on:

- Location – Only reservoirs in Australia were selected to represent comparable operating conditions (including climatic conditions) and facility designs; and
- Available data – the data used has been solely obtained from publicly available environmental impact assessments (EIA), or similar. This is acknowledged to be a short-coming as the data is representative of expected emissions over a specified project lifecycle.

The results of the benchmarking assessment are shown in Table 3-6, and shown graphically in Figure 3-3 and Figure 3-4. The average reservoir CO_2 content indicates the GHG emission intensity of developing the gas, whereas reservoir CO_2 content and size of reservoir indicates the magnitude of CO_2 emissions.

The benchmarking exercise shows that in comparison to Australian reservoirs currently being extracted from, the Waitsia Gas Field has a reservoir CO_2 concentration representative of the national and Western Australian average. Note that all three Queensland reservoirs included in the benchmarking assessment are coal seam gas projects, which although the reservoir CO_2 content is lower, require significantly more energy to treat the gas to meet export gas requirements due to the fact that they require compression from very low pressure to reach the required inlet pressure at the LNG facility.

When comparing total reservoir size, the Waitsia Gas field is shown to be significantly smaller than the National and Western Australian average. By comparing CO_2 mol% and reservoir size, the magnitude of reservoir CO_2 potentially emitted to the atmosphere can be visualised.

Table 3-6 Benchmarking of Reservoir CO_2 (GHD, 2020)

Reservoir	State / Territory	Average CO_2 reservoir content (mol%)	Size of reservoir (tcf[1])
Waitsia Gas Field[2]	WA	4.5-7.5	0.74
Shell -Prelude Gas Field	WA	9	3
Inpex - Ichthys – Brewster Reservoir	WA	8.5	7
Inpex - Ichthys – Plover Reservoir	WA	17	5.8
Chevron - Gorgon – Gorgon Reservoir	WA	14	16
Chevron - Gorgon- Janz Reservoir	WA	0.5	20
Santos – Reindeer Gas Field	WA	3.5	0.4
BHP – Macedon	WA	0.38	0.7
Santos – John Brookes	WA	5.8	1
ConocoPhillips – Barossa – Caldita (average)	NT	16-20	3.5
Santos - Gladstone LNG (Surat and Bowen Basin)	QLD	0.3	4
APLNG (average)	QLD	1	6.6
QGC- QLNG (average)	QLD	0.5	1.2

[1] tcf represents trillion cubic feet

[2] The Waitsia gas field reservoir size represents the 50% probability value.

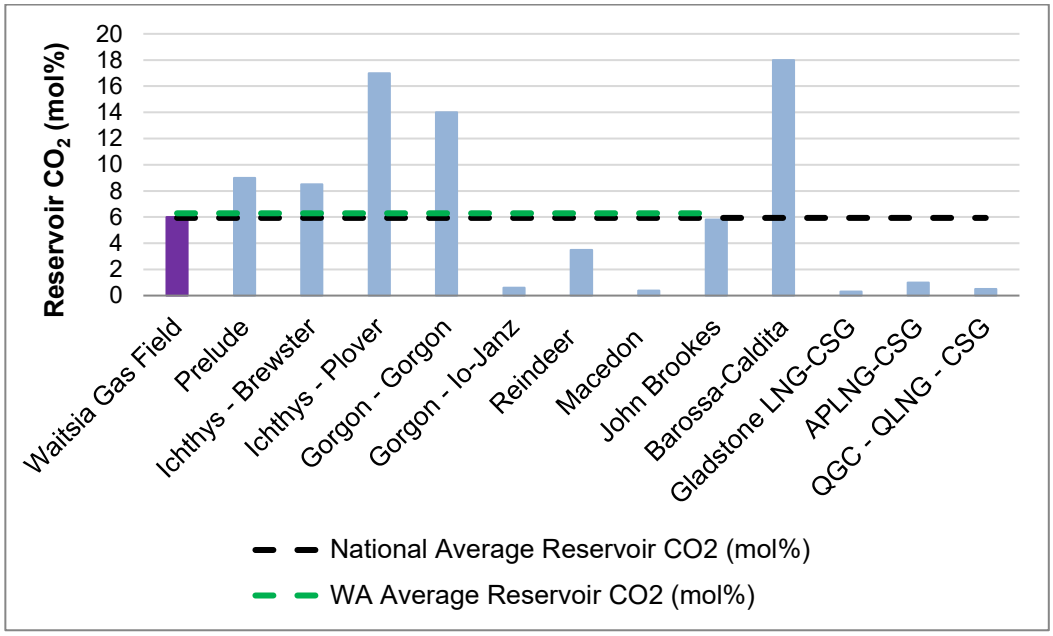


Figure 3-3 Australian Natural Gas Reservoir CO_2 Content

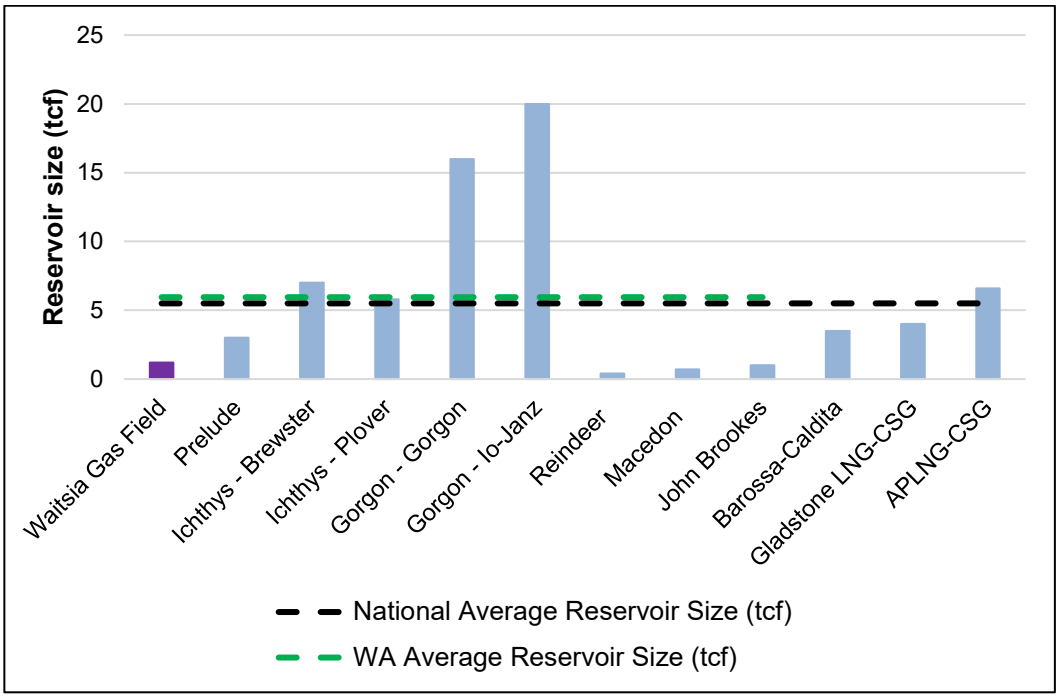


Figure 3-4 Australian Natural Gas Reservoir Size

While the pipeline distance required to transport processed gas to the export point has not been included in the above benchmarking assessment, the WGP2 is located ~5 km from the export point, the DBNGP. The pipeline distance influences the compression requirements of the exported gas, thus the Proposal GHG emission intensities associated within the gas processing plant total emissions will be lower compared to reservoirs with longer export distances.

3.4.3 Benchmarking Assessment – Process

Due to the size of the WGP, and as there has been a limited number of similar Gas Plants assessed by the EPA under Part IV of the EP Act, in terms of size and/or process configuration, it is difficult to benchmark WGP against similar facilities. However, based upon the size of the facility, there are similarities with the Woodside Macedon Gas Development in the Pilbara (approved by the EPA in 2010 (MS 844) and commenced production in September 2013).

Macedon Gas Project

The average annual GHG emission over the operating life of the Macedon Gas Plant[7] was estimated at 115,000 tonnes of CO_2-e (EPA, 2010). This represents the construction of only one gas "train" with an output of 100 TJ/day and where the use of compression is limited. Based on this information the Macedon gas processing emissions intensity is therefore estimated[8] to be 3.15 tCO_2-e/TJ, with effectively nil reservoir CO_2 related emissions.

[7] In its assessment of the Macedon project, the EPA (EPA, 2010) noted that the raw produced gas contained only trace amounts of carbon dioxide which would not be removed by the process. The gas would be supplied into the DBNGP to supply the domestic market. It is therefore assumed that CO_2 emissions are more than 95% associated with the Macedon gas plant operations, or considered to be total gas processing emissions.

[8] Assuming annual estimated emission of 115,000 tonnes of CO_2-e, an exported gas production rate of 100 TJ/day and operations 365 days per year.

In comparison, as detailed in Section 3.1.1, the WGP, at an exported gas production rate of 91.25 Petajoule (PJ) per annum has a Scope 1 Emissions (gas processing emission) of ~120,000 tCO_2-e/year from the WGP operations, with a gas processing emissions intensity of 1.32 tCO_2-e/TJ; and ~180,000 tCO_2-e/year related to reservoir CO_2 removal, with a reservoir related emissions intensity of 1.97 tCO_2-e/TJ. By the comparison of the WGP to the Macedon project, the gas processing emissions intensity of the WGP is ~42% less than the Macedon gas processing emissions. This reduction in gas processing emissions intensity is despite the fact the Waitsia Gas Plant processing configuration is more complex as it requires additional processing systems and equipment for CO_2 removal, which are not required on the Macedon project.

3.4.4 Key Assumptions and Uncertainties

The key assumptions and uncertainties that MEPAU have made with respect to the proposed approach to managing GHG emissions are summarised in Table 3-7.

Table 3-7 Assumptions and Uncertainties in Greenhouse Gas Management

No.	Assumptions and Uncertainties
1	**State of WA and Commonwealth GHG policy** State and Commonwealth Government policies continue to evolve. Key uncertainties remain. They include: • the State's contribution to Commonwealth targets versus other states; The State of Western Australia is proposing to release a State Climate Policy and Energy Transformation Policy in 2024. MEPAU has proposed management provisions that have been developed with consideration of the current state of GHG policy in Australia. An adaptive management approach has been proposed that aligns with anticipated milestones in State and Commonwealth GHG policy evolution.
2	**Market price carbon emissions** Over the course of 2022 and 2023 the federal government has introduced and enacted reforms to the safeguard mechanism which has created an escalating compliance cost of safeguard facilities. It is expected that Waitsia will become a safeguards facility and incur a compliance cost. MEPAU have created a Carbon Solutions business that is responsible for managing this future compliance obligation and have undertaken workshops to identify and assess numerous direct emission reduction opportunities These opportunities are considered along-side market based sources to reduce compliance including origination of carbon projects and purchasing directly in the market. The spot market is an indicator of the current cost of ACCU's and there are numerous forecasts that project the future price of carbon which is used to inform MEPAU's decision making on managing the forward compliance obligation. MEPAU will assess opportunities for future project investments to avoid and/or reduce net CO_2 emissions in line with its adaptive management approach (as detailed in Section 5.0).
3	**Cost of technology for renewable energy**

No.	Assumptions and Uncertainties
	MEPAU, 2020a concluded that the market price for renewable energy technology in Western Australia is cost prohibitive when considering the scale of equipment, reliability and capacity necessary to power the WGP. MEPAU has stated that the current basis of design takes into consideration the capital investment required, as well as other considerations such as efficiency. The cost of renewables has changed significantly over the last 10 years, and further downward trends are expected. It is possible that installation of renewable technology will become a viable option in the future, and this will be assessed in line with MEPAU's adaptive management approach (as detailed in Section 5.0).
4	**Availability of electrical power transmission infrastructure** As part of the design process, MEPAU consulted with Western Power. Western Power indicated they do not intend to develop the required infrastructure in the Dongara-Port Denison area during the next five years. As of January 2020, the availability of electrical power transmission in the region of the Proposal is limited and the nearest connection point is over 80 km away. MEPAU has assessed that connection to a reliable electrical grid represents an unacceptable risk to the project during construction and operation, particularly as this option presents a clear "single point of failure". Further, it would require substantial capital investment beyond the economics of the project. There is the potential that this may change within the project lifetime and this will be reviewed as part of MEPAU's adaptive management approach (as detailed in Section 5.0).
5	**Options and viability of processing technology** Each gas reservoir has unique characteristics and the selection of the most appropriate processing technology relies upon a multitude of factors, often specific to the reservoir. MEPAU engaged a consultant to study the commercially available technologies for gas processing and assess their suitability to the Waitsia reservoir at a screening level. The study concluded that several different combinations of processing technology were suitable and comparable. Further, it concluded that the final technological solution would need to holistically consider and balance all aspects. Examples of areas of technological solutions include plant efficiency (which affects CO_2-equivalent emissions), fuel consumption, air and water emissions, footprint, visual amenity, constructability, operability, plant capacity and plant life. Using the results of the study, MEPAU conducted a design competition to encourage the optimisation of efficiency and selection of appropriate (i.e. suitability with the resource) overall plant technologies, including emission mitigation measures, for the scale and regional location of the plant. The design competition completed by MEPAU selected a combination of amine for gas sweetening and a low temperature separator for hydrocarbon and water dewpoint requirements. Whilst it is unlikely that a more energy efficient technology will become a viable option over the life of the reservoir, new technology will be assessed in line with MEPAU's adaptive management approach.
6	**Reservoir CO_2 concentration**

No.	Assumptions and Uncertainties
	The GHG emission estimates are variable depending on the CO_2 proportion within the gas reservoir. CO_2 reservoir content ranges from 4.5 mol% in the north of the reservoir to 7.5 mol% in the south with an expected average of 6.0 mol%. The average reservoir CO_2 concentration of 6.0 mol% used to estimate GHG emissions represents a reasonable assumption based on the distribution of gas and CO_2 concentrations in the reservoir, however it is possible for the actual GHG emissions to vary within the range of 4.5 to 7.5 mol%. For example, should natural gas extracted in the first project years contain lower or higher levels of CO_2, then the total annual GHG emissions will decrease or increase accordingly. MEPAU will monitor reservoir CO_2 emissions and assess abatement opportunities in accordance with their adaptive management approach.
7	**Processing Plant CO_2 Emissions** The GHG emission estimates for the processing plant are primarily dependent on the reservoir CO_2 concentration. However, there is a minimum baseload of CO_2 emissions due to the fact that individual equipment have certain minimum operating requirements. The calculation of these emissions is based on best available data generated by the plant designer and represents industry best practice design margins as to the performance of the plant across the range of operational conditions and production levels. MEPAU will monitor CO_2 emissions from the whole of plant and individual equipment to assess abatement opportunities in accordance with their adaptive management approach.

3.4.5 Management Approach

MEPAU will implement management-based provisions for this GHGMP. The management approach is based on the following objectives:

- Alignment with the State Government's commitment to working with the Commonwealth Government's target of reducing greenhouse gas emissions by 26 to 28% by 2030;
- Alignment with the State Government's *Greenhouse Gas Emissions Policy for Major Projects* and commitment to help achieve the State's aspiration of net zero emissions by 2050 (as demonstrated in Figure 4-1);
- Alignment with EPA Guidance (EPA, 2020), through applying the mitigation hierarchy (i.e. considering reasonable and practicable measures to mitigate GHG emissions);
- Adopting design, technology and management measures to mitigate GHG emissions, having regard to the as low as reasonably practicable principle;
- Commitment in supporting the State Government in developing technical guidance to support greenhouse gas emission reduction within the gas industry;
- Compliance with relevant State and Commonwealth GHG emission monitoring and reporting requirements, including NGER and the Safeguard Mechanism; and
- Adaptive management to respond to current uncertainties and future developments in Government policies, markets and technology.

3.4.6 Rationale for Choice of Provisions

In line with the mitigation hierarchy detailed in EPA, 2020, MEPAU has proposed the management provisions outlined in Section 4.0 based on the following rationale:

- GHG abatement opportunities adopted in this GHGMP have been assessed by MEPAU to determine whether they are reasonable and practicable against multiple criteria including safety, technical performance, operability, emissions reduction, availability, scale, and economic return. MEPAU considers that reasonable and practicable GHG abatement measures are considered 'good industry practice';
- There is potential for substantial changes in GHG policies, markets and technology as well as regional energy infrastructure over the Proposal lifetime, which may influence the reasonableness or practicability of GHG abatement measures. As this GHGMP is dynamic, MEPAU will complete periodic reviews of policies, markets, technology and infrastructure as part of their adaptive management approach;
- MEPAU have proposed a major refit milestone for the Proposal during its lifetime, which offers a potential opportunity to implement further GHG abatement measures if these become practicable due to policy, market, technological or infrastructure changes. The milestone has been set at a practicable frequency to enable sufficient time to plan, design and procure and implement abatement opportunities ahead of the major refit milestone;
- MEPAU will continuously monitor GHG emissions to:
    - Respond to resolve any exceedances or unplanned emissions as soon as reasonably practicable;
    - Report in accordance with legislative requirements; and
    - Measure achievements in reductions of adopted technologies.

4.0 GREENHOUSE GAS MANAGEMENT

4.1 Greenhouse Gas Management Provisions

Table 4-1 identifies the legal outcome and management-based provisions (respectively) that MEPAU will implement to ensure that the environment outcomes are met during the implementation of the WGP2.

Table 4-1 Management Based Provisions for Greenhouse Gas Emissions

EPA Objective	**To minimise the risk of environmental harm associated with climate change by reducing greenhouse gas emissions as far as practicable.**		
Management Action or Environmental Criteria	**Management Target / Response Actions**	**Monitoring**	**Reporting**
MA1 Application of the mitigation hierarchy and review and adoption of reasonable and practicable measures to mitigate Proposal Emissions.	Review of GHG emissions abatement opportunities (see Section 4.2.1) with consideration to outcomes to support MA8.	Annually	Internal review of GHG emissions abatement opportunities to support NGER Reporting
MA2 Establish Proposal baseline emissions and maintain emissions within the baseline, to comply with the Commonwealth Safeguard Mechanism.	Establish a baseline for the Proposal as part of the Safeguard Mechanism and submit this to the Commonwealth Clean Energy Regulator.	As directed by the Commonwealth Clean Energy Regulator.	Reporting requirements as per **MA3**.
MA3 Implement GHG monitoring and reporting in accordance with the NGER Act.	Maintain emissions below the established baseline and report as required. MEPAU is currently progressing through an Emission Intensity Determination, which will define a number of the Waitsia production variables. New variables such as Reservoir CO_2 be defined at International Best Practice. These variables will be combined to determine the facilities baseline emissions which will be applied once the facility triggers the safeguard mechanism. Monitor and report on all Scope 1 GHG emissions to the DWER Chief Executive Officer (CEO), verifying the: • Quantity of Proposal Emissions, Reservoir Emissions and Non-Reservoir Emissions; • Number of terajoules of gas processed at the proposal facility; • Number of terajoules of gas produced from the proposal facility determined in accordance with NGER Item 30(1); and • Total Emissions Intensity and Non-Reservoir Emissions Intensity, including calculations and calculation methodology for each.	Annually	NGER and Safeguard reporting by 31 October to the Clean Energy Regulator in accordance with the NGER Act and Safeguard Mechanism. Annual Greenhouse Gas Management Report to the DWER CEO by 31 March.
MA4 Achieve Emission Reduction Targets.	Implement initiatives to achieve the Emission Reduction Targets to reduce Proposal Emissions, by either avoiding, reducing or offsetting: • For the period ending 30 June 2025, and for every subsequent period of five financial years, the full quantity of Reservoir Emissions, (calculated as being 60.8%, Refer Section 3.1.1) from the start of operations; and • A further 10% of Proposal Emissions, adjusted to the average actual production levels for the period of production, by the financial year ending 30 of June 2040.	By the 31 March 2026 and every fifth 31 March thereafter.	Reporting requirements as per **MA8**. A summary document comprising of a summary plan and progress statement outlining key information from the GHGMP (and reports to that time). The summary must include: a) A graphical comparison of emission reduction commitments in the **GHGMP** with 'actual' emissions for compliance periods; b) proposal performance against benchmarking for comparable facilities; c) emissions intensity; d) a summary of emission reduction measures undertaken by the proponent; and e) a clear statement as to whether interim targets have been achieved.
MA5 Preventative maintenance to minimise fugitive emissions of natural gas.	Establish and implement a leak detection and repair (LDAR) programme that will identify issues.	Annually.	Compliance Assessment Report (CAR) to DWER.

EPA Objective	To minimise the risk of environmental harm associated with climate change by reducing greenhouse gas emissions as far as practicable.		
Management Action or Environmental Criteria	**Management Target / Response Actions**	**Monitoring**	**Reporting**
	Establish and implement a maintenance program to minimise emissions from pressure relief valves, including mandated inspection and testing frequencies and in-service monitoring programs. Establish a target for number of pressure relief instances and quantity of leaked emissions. Monitoring and reporting of fugitive emissions data.		CAR to include: • Pressure relief instances and emissions quantification; • Monitoring and reporting of fugitive emissions data.
MA6 Preventative maintenance to ensure that emissions remain within the agreed baseline for the WGP2.	Establish a comprehensive monitoring program to facilitate assessment of plant efficiency and operating conditions. Develop procedures to address plant non-conformances.	Ongoing, from WGP start-up, with 3 monthly reporting.	Preparation of an internal quarterly Plant Performance Report.
MA7 Adaptive management through five yearly review of reasonable and practicable measures to mitigate GHG emissions in response to developments in Commonwealth and State policies, markets, technology and regional infrastructure.	Five yearly reviews undertaken. GHGMP updated with five yearly review findings.	By the 31 March 2026 and every fifth 31 March thereafter	Preparation of an internal Abatement Opportunities Assessment Report.
MA8 Emission Reduction Targets Review.	Periodic Greenhouse Gas Management Report – Emission Reduction Targets Review to DWER CEO that will: 1. Specify: a) for each of the preceding five financial years: i. verify actual quantity of Proposal Emissions, Reservoir Emissions and Non-Reservoir Emissions; and ii. detail the volume of processed natural gas and the Proposal Emissions Intensity. b) for the period comprising five financial years which ended on 30 June in the year before the report is due: i. the amount of Non-Reservoir Emissions that have been avoided or reduced through Certified Improvements, including describing the Certified Improvements that caused the avoidance or reduction; ii. the type, quantity, identification or serial number, and date of retirement or cancellation of any Authorised Offsets (that meet the Timing and Reporting Requirements) which have been retired or cancelled, as contemplated by MA4, including written evidence of such retirement or cancellation; and iii. the progress towards meeting the Emission Reduction Targets for Proposal Emissions as specified in the GHGMP; and iv. any measures that have been implemented to avoid or reduce Proposal Emissions; and 2. Include an audit and peer review of the report, carried out by an independent person or independent persons with suitable technical experience dealing with the suitability of the methodology used to determine the matters set out in the report, whether the report is accurate and whether the report is supported by credible evidence.	By the 31 March 2026 and every fifth 31 March thereafter.	Periodic Greenhouse Gas Management Report – Emission Reduction Targets Review to the DWER CEO

4.1.1 MA1 - Greenhouse Gas Emission Abatement Opportunities

As part of the development of the EPA referral (EPA Assessment 2226), MEPAU conducted an extensive review of reasonable and practicable GHG emission abatement opportunities. As outlined in Table 3-2, those opportunities have been adopted into the final design of the WGP and have met the EPA's Greenhouse Gas Emissions Environmental Factor Guideline to demonstrate that all reasonable and practicable measures have been applied to avoid, reduce and offset a proposal's Scope 1 Emissions over the life of the proposal. Table 4-2 provides a summary of the adopted GHG emission abatement opportunities/ measures, which are reasonable and practicable and considered to be best or leading industry practice.

A review of reasonable and practicable GHG emission abatement opportunities will be conducted on an annual basis as detailed in Table 4-1 (MA1).

Table 4-2 Greenhouse Gas Abatement Opportunities Adopted During WGP Design

Greenhouse Gas Abatement Opportunity Adopted	Mitigation Hierarchy	CO2-e mitigated (Tonnes CO_2/year)[9]	Justification
Direct fired gas boiler. Using a direct fired gas boiler (Hot Water system) to convert 85% of chemical energy (thermal efficiency) into a temperature change.	Reduce	73,600	Using a direct fired gas boiler converts 85% of chemical energy (thermal efficiency) into a temperature change. An alternative would be the use of an electric heating element, powered from the plant through power generation system. The efficiency of conversion of gas to electricity and then electricity to heat is in the order of 35%.
Gas engines for compression. Export gas compression using gas engines with a reciprocating compressor.	Reduce	2,800	Use of gas engines over the alternative of gas turbines provides a configuration that is the most efficient, as it most closely matches the expected operating points, enables flexibility over operating conditions and processing load.
Gas engines for onsite electrical power generation.	Reduce	3,700	Gas engines have a higher thermal efficiency compared to gas turbines. Gas engines have been selected as these are able to better adapt to changing power demands, thereby optimising energy production.
Chemical (amine) solvent for CO_2 removal. Amine system for reservoir CO_2 removal.	Reduce	33,000	Either physical or chemical solvents are used to remove CO_2 in the Australian Oil and Gas Industry, however the amine (chemical solvent) system offers better outcomes for this reservoir.
Battery Energy Storage System. Use of a Battery Energy Storage System (BESS) to operate as a standby spinning reserve.	Avoid	5,800	Installation of a BESS to provide spinning reserve is not typical in the Australian oil and gas industry. The BESS avoids the need to have a gas engine-generator running as spinning reserve. This is leading industry practice.
Gas recirculation. Recirculation of hydrocarbons present within the processing plant via a Plant Recycle Line. Upon plant startup, off-specification gas is recirculated back to the process start and retreated, until gas specifications are achieved, and gas export can commence.	Avoid	2,600	Upon plant start-up, off-specification gas is recirculated back to the process start and re-treated, until gas specifications are achieved, and gas export can commence. This avoids the need to flare the off-specification gas.
Small scale solar power generation. Solar panels on office administration buildings to provide power to building. Solar panels and batteries at remote well sites to provide power to well site.	Reduce	28	Installation of: • solar panels and a heat pump on the administration building; and • solar panels and batteries at remote well sites. The use of solar panels reduces the need to draw power from other sources. This considered good industry practice and design optimisation.
Other design elements.	Reduce	-	Other design elements that avoid and reduce emissions, not accounted for in the C02-e mitigated totals, include: • Instrument air reticulated to remote sites and used as the power mechanism for actuated valves. This avoids the use of instrument gas at remote sites (with the associated fugitive emissions); • Remote well site chemicals delivered by a centralised and reticulated system, reducing the frequency of vehicle movements;

[9] MEPAU, 2020b.

Greenhouse Gas Abatement Opportunity Adopted	Mitigation Hierarchy	CO2-e mitigated (Tonnes CO_2/year)[9]	Justification
			• Remote control, operation and monitoring of remote well sites, reducing the number of vehicle movements by the operations team.
Total (Tonnes CO_2/year)		***121,528***	

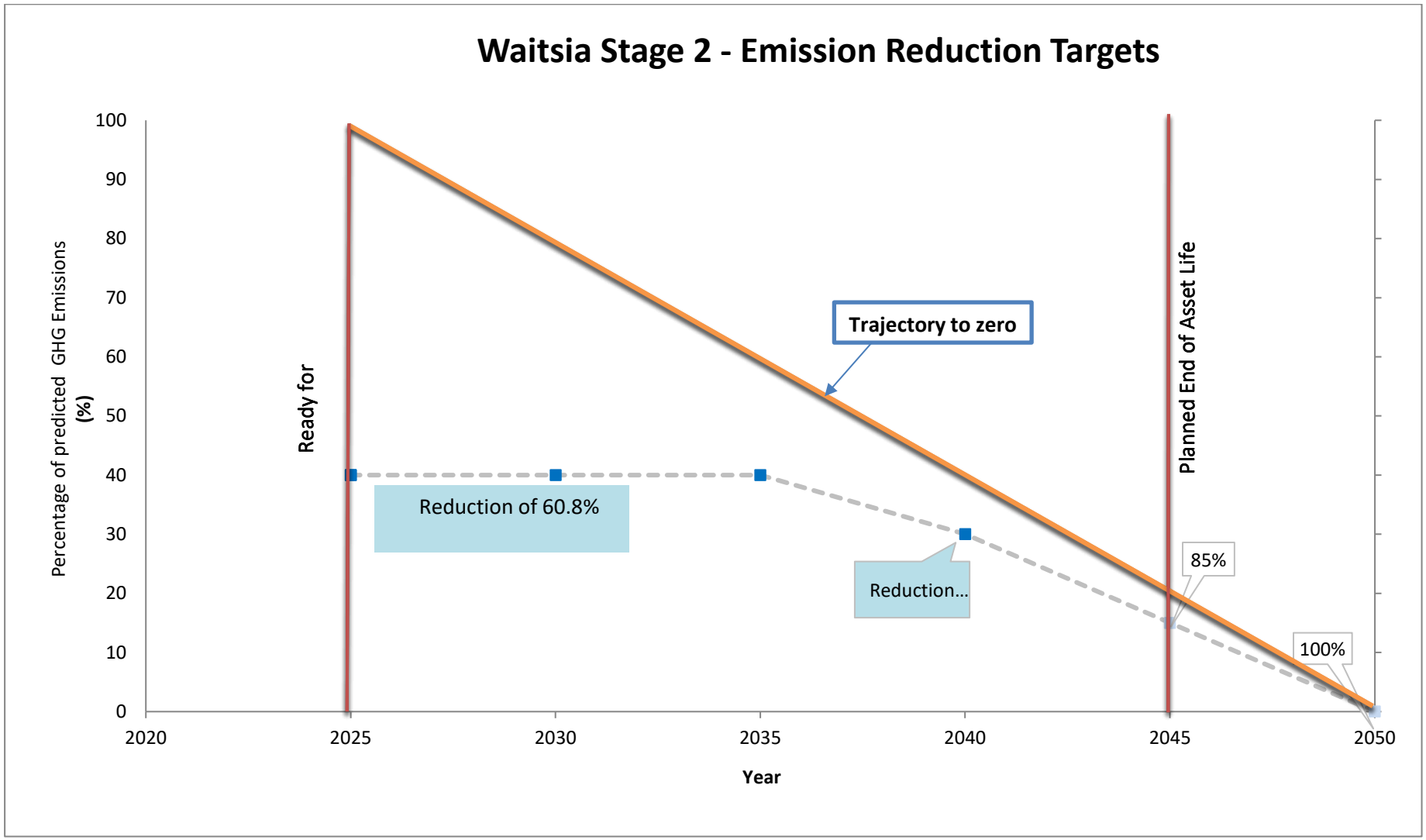
4.1.2 MA4 – Achieve Emission Reduction Targets

MEPAU acknowledges that the West Australian Government has committed to work with the Commonwealth Governments interim target of GHG emission reductions of 26 % to 28 %, below 2005 levels, by 2030 at a national level. Further, MEPAU recognises the Western Australian Government's commitment to working with all sectors of the Western Australian economy to achieve net zero GHG emissions by 2050.

MEPAU is committed to working with the Western Australian Government to achieve the State's aspiration of net zero greenhouse gas emissions by 2050. To enable this, MEPAU have committed to Emission Reduction Targets that avoid, reduce or offset the Scope 1 Reservoir CO_2e emissions (calculated as 60.8% of Proposal Emissions Refer Section 3.1.1) commencing from start of operations. In addition to this, to demonstrate commitment to zero emissions, and to ensure a continued trajectory of emissions down to net zero, MEPAU have committed to an Emission Reduction Target of a further 10% (calculated to be aggregated to 70%) of Proposal Emissions by the financial year ending 30 June 2040.

Figure 4-1 graphically details the reduction in emissions provided for by the emission reduction targets, and alignment with the trajectory to zero emissions by 2050. To note the planned end of asset life of the Waitsia Gas Plant is 2044.

Figure 4-1 Emission Reduction Targets



NOTE – ■ represents a commitment point for Emission Reduction Targets. MEPAU will assume this commitment.

MEPAU will focus on achieving emission reductions through avoidance or reduction of emissions, when appropriate. If required, MEPAU acknowledges that there are sufficient offsets available to meet all established targets.

For the purposes of MA4, Reservoir Emissions are avoided, reduced and/or offset for a period by the quantity of GHG Emissions represented by the:

- Amount of Non-Reservoir Emissions that have been avoided or reduced through a Certified Improvement; and/or
- Amount of Authorised Offsets that meet the Timing and Reporting Requirements.

In accordance with EPA Guidance (EPA, 2020), compliance offsets that may be required under the Safeguard Mechanism would be recognised as a contribution to GHG Emission Reduction Targets under the GHGMP.

MEPAU acknowledges the Western Australia Government's focus on economic development and diversification brought about by its commitment to GHG emissions reduction. MEPAU is prepared to work with the Western Australia Government to establish a framework regarding undertakings to develop Western Australian expertise, carry out research, pilot new initiatives and technologies, and support local communities, as an alternative to purchasing direct offsets to meet the emission reduction targets.

MEPAU notes that the Emission Reduction Target commitment is made even though the Waitsia Gas Plant is a new plant, with considerable greenhouse gas abatement opportunities already factored into its design (as detailed in Table 4-1). Further, MEPAU considers its commitment to reduce GHG emissions to be an actual demonstration of its genuine intent to work with the Western Australian Government to contribute to achieving the net zero greenhouse gas emissions by 2050 aspiration.

5.0 ADAPTIVE MANAGEMENT

MEPAU have in place an adaptive management approach that will embed a continuous cycle of monitoring, evaluating, and implementing change (where appropriate), whilst maintaining ongoing reporting to ensure any relevant future improvement opportunities, not yet identified, will be captured and actioned.

The management actions presented in this GHGMP shall be monitored, evaluated, reviewed, and updated, as required, considering:

- Changes to the uncertainties or assumptions, as noted in Section 3.4.4;
- Evaluation of routine emissions monitoring data;
- Ensuring the implemented abatement delivers predicted emission reductions;
- New and relevant data/information gained as a result of implementing this GHGMP, or from external sources;
- Effectiveness of internal processes and procedures to reduce and manage GHG emissions;
- Changes in State or Commonwealth legislation or policy; and
- Monitoring and corrective actions.

GHG emissions will be monitored during operation. Any non-conformances to the targets outlined in Table 4-1 will be reported, investigated, rectified or mitigated as soon as possible to

ensure ongoing mitigation of GHG emissions. Where relevant, procedures will be amended or updated, and inductions and other workforce communication will be undertaken in a timely manner to minimise the risk of re-occurrences.

5.1 Timeline for Adaptive Management

An overview of the various action and review requirements that will feed into the adaptive management process is included as Table 6-1.

Table 6-1 Adaptive Management Timeline

Year	MEPAU action	Policy release (anticipated)
2020	GHGMP updated to reflect Ministerial Conditions	WA Whole of System Plan – Energy Transformation Strategy (Q3) (GoWA, 2019b) State Climate Policy
2021	Review status/forecast of policies, markets, technology and regional infrastructure	
31 March 2021 and then annually thereafter	*Proposal Annual Greenhouse Gas Management Report*	-
2024	**Forecast date of WGP start-up**	**-**
October 2024 and then annually thereafter	*Assessment of GHG emissions abatement opportunities*	-
By the 31 March 2026 and every fifth 31 March thereafter	*Proposal Periodic Greenhouse Gas Management Report –Emission Reduction Targets Review*	
By the 31 March 2026 and every fifth 31 March thereafter	Review of reasonable and practicable measures to mitigate GHG emissions in response to developments in Commonwealth and State policies, markets, technology and regional infrastructure	-
2031	Plan procurement for Gas Processing Plant major 10-year maintenance / refit milestone	-
2032	Implement procurement for Gas Processing Plant major 10-year maintenance/ refit milestone	-
2033	Implement construction for Gas Processing Plant major 10-year maintenance/ refit milestone	-

Year	MEPAU action	Policy release (anticipated)
2044	Planned end of Waitsia Gas Plant life. Final Emission Reduction Target Reporting.	-

5.2 Management Plan Revision

This GHGMP is intended to be dynamic and it may be updated to reflect changes in management practices, technologies, the natural environment and State and/or Commonwealth government policy over time. This approach will also allow flexibility to adopt new technologies and/or management measures.

MEPAU will review and evaluate the management actions outlined in this GHGMP every five years (Adaptive Management Review) to ensure the actions are adequately addressing the relevant key risks and meeting State and/or Commonwealth legislation and policy.

If the five-yearly review cycle triggers a revision of the GHGMP, or an as needs review and revision is undertaken, a revised GHGMP will be submitted, approved and published in accordance with the proposal Ministerial Statement condition requirements.

In accordance with MS 1164, MEPAU must revise the GHGMP:

1. If there is a change to the proposal which means, there is a material risk that condition 8-1 will not be achieved;
2. At least every five years to align with the five yearly reporting requirements specified in condition 8-4; and
3. If directed to by the DWER CEO, within the time specified by the DWER CEO.

Amendments to management actions will be made on an “as needs” basis. This will include:

- Amendment of management actions that are not achieving the desired outcomes;
- Monitoring that identifies additional impacts requiring additional management actions or changes to existing management actions;
- Changes to relevant legislation that may affect the implementation of management actions; and/or
- Improvements to management practices to achieve a greater environmental outcome.

6.0 STAKEHOLDER CONSULTATION

Consistent with the EPA’s expectations for the GHGMP to align with the principles of v, MEPAU consulted with relevant stakeholders. MEPAU will continue to maintain effective communication with local and regional stakeholders throughout the delivery of the WGP2.

A summary of stakeholder engagement completed as of August 2019 is provided in Table 3-1 of the *Environmental Referral Supporting Report* (MEPAU 2019d).

Any additional consultation regarding the GHGMP will be captured in subsequent revisions.

7.0 PUBLIC AVAILABILITY

A copy of this GHGMP is available on the MEPAU website. As per MEPAU’s Compliance Assessment Plan [WAT-HSE-PLN-00004], this GHGMP and any revisions, and any associated

reports (including summary plans and progress statements) within two (2) weeks of submitting the relevant reports, summary statements and progress reports to the DWER CEO..

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ATTACHMENTS

ATTACHMENT 1
MEPAU CLIMATE CHANGE POLICY

MITSUI E&P
Australia

CLIMATE CHANGE POLICY

Objective

Mitsui E&P Australia (MEPAU) recognises that climate change presents a significant global challenge. MEPAU is committed to being a part of the solution by providing safe, reliable and affordable energy whilst mitigating greenhouse gas emissions.

We believe that a variety of energy sources are required to meet the world's energy demand and that natural gas, in particular, will play an increasingly important role globally in the energy mix due to its relatively low environmental load compared to other fossil fuels. Moreover, developing energy resources can provide significant economic and social benefits.

Policy Commitments

To achieve our objective, MEPAU is committed to:

- Working with governments and stakeholders in the design of climate change regulation and policies;
- Incorporating climate change risks into our decision-making and business operations;
- Identifying, evaluating and implementing, solutions to mitigate greenhouse gas emissions having regard to the as low as reasonably practicable principle and to fuel efficiency initiatives, in our existing operations and new projects; and
- Measuring and reporting greenhouse emissions as required by the regulation of the jurisdictions we operate in.

This policy will be reviewed regularly and updated as required.

Ken Yamamura
Managing Director & Chief Executive Officer

14/2/2023
Date