



mitsui E&P

Australia

Waitsia Gas Project Stage 2 – Environmental Referral Supporting Report

August 2019

Revision 0

P-WGP2-047

EXECUTIVE SUMMARY

Background

The petroleum exploration and production sector has been continually active in the northern Perth Basin since the 1960s. Mitsui E&P Australia ¹(MEPAU) is building on this long-standing presence and is progressively developing the Waitsia gas field, a free-flowing, conventional reservoir near the Dongara-Port Denison townsites, which will continue to provide ongoing operator presence in the region for at least the next 20 years. Since it was commissioned in 2016, the Waitsia Gas Project Stage 1 (Waitsia Stage 1), has been producing from existing wells through the Xyris Production Facility (XPF).

MEPAU is proposing to construct and operate the Waitsia Gas Plant (WGP) and related infrastructure, collectively known as the Waitsia Gas Project – Stage 2 (the Proposal). The Proposal is located in an agricultural area with extensive existing oil and gas field development, approximately 16 km east-south-east of the Dongara-Port Denison townsites (Figure 1-1). The Proposal will further develop the Waitsia gas field, a free-flowing conventional gas reservoir. The Waitsia gas field is considered to be the largest conventional onshore Australian gas discovery in more than 40 years.

The Proposal comprises the following components:

- Constructing a new gas plant (WGP), with a maximum export capacity of 250 terajoules (TJ) per day;
- Drilling up to six (6) new wells, supplementing the existing two (2) suspended appraisal wells;
- Installing a gathering system comprising flowlines and hubs to convey the extracted gas to the plant and the gas distribution network;
- Installing a flowline from the WGP for water re-injection to the formation via disused petroleum production wells.

In total, the Proposal would involve up to eight (8) production wells being connected to the WGP.

No hydraulic fracture stimulation is proposed given the free-flowing nature of the Waitsia gas field.

Table ES 1 shows a summary of the key Proposal characteristics. Table ES 2 shows the location and proposed extent of physical and operational elements. Figure 1-2 shows the various Proposal components.

Table ES 1: Summary of the Proposal

Proposal title	Waitsia Gas Project Stage 2 (the Proposal)
Proponent name	AWE Perth Pty Ltd
Short Description	The Proposal includes the development of a gas plant, six new production wells, four hubs and a number of flowlines/pipelines. The total area of the development envelope for the Proposal area is ~345 ha.

¹ AWE Perth Pty Limited is the legal entity, operator of the relevant Production Licences (L1 and L2), the proponent for the Proposal and operates under the Mitsui E&P Australia (MEPAU) brand.

Table ES 2: Location and proposed extent of physical and operational elements

Proposal title	Waitsia Gas Project Stage 2 (the Proposal)	
Physical Elements		
Gas Processing Plant	Figure 1-2 and Figure 2-1	The plant site is ~156 ha and is located on a completely cleared paddock. No clearing of vegetation is required.
Well sites	Figure 1-2 and Figure 2-1	Well sites vary between 1.5ha and 3.95ha. Total area for wells is ~25 ha. No well sites require clearing of vegetation.
Hubs	Figure 1-2 and Figure 2-1	Hubs vary between 0.45ha and 2.7ha. The total area for hubs is ~11 ha.
Flowlines/pipelines	Appendix - Figures 1 (A to H) and Figure 2	The total area within the flowline easements is ~153 ha. Within this total easement area, the maximum area of land to be cleared of native vegetation is ~17 ha.
Operational Elements		
Disposal of Produced Formation Water	Figure 2-6	Re-injection of approximately 1 million m ³ of Produced Formation Water over the expected 20-year life of the Proposal.
Air emissions	Section 4.7	Air emissions from the WGP.
Noise emissions	Section 4.8	Noise emissions from the WGP.

Stakeholder Engagement (Section 3)

As part of its operating presence, MEPAU has developed a comprehensive, transparent and inclusive engagement program with key stakeholders, especially those living and working in the Shire of Irwin. Since the early phase of the Proposal planning, MEPAU has been engaging with stakeholders on the various changes to the WGP from when it was initially designed to produce 100 TJ/day and to be located on Irwin Park Farm to the current 250 TJ/day design located on the farm property that already hosts production at the XPF.

Stakeholder feedback about the Proposal has been positive. Results of the most recent stakeholder perception survey, combined with direct feedback, consistently show the most common topics of interests about the Proposal are project timing and the potential economic opportunities for the regional community. Some interest has also been shown in ground water management and air quality.

Environmental Factors Summary

With the assistance of subject matter experts, MEPAU has assessed the full suite of relevant environmental factors and determined that the potential environmental impacts can be managed using established management techniques to levels that MEPAU considers are not environmentally significant. Each of the key environmental factors are summarised below with reference to relevant sections providing further details.

Vegetation (Section 4.3)

The proposed site for the WGP is a cleared, agricultural paddock and there is no native vegetation clearing required. Some native vegetation, of varying quality, will be cleared for the flowlines to connect wells that

form the gathering system for the overall Proposal. No conservation significant flora or vegetation is planned to be cleared.

A maximum area of ~17 ha is required to be cleared for the Proposal. The largest area of clearing is associated with construction of the Waitsia-03 flowline, in the southern part of the Proposal area. Clearing in this area has been minimised by using an existing access track, however the existing cleared area needs to be widened and will result in the removal of ~3 ha. Following construction, these areas will be partially rehabilitated.

In the other areas where clearing is proposed, the remnant vegetation has been largely degraded by a mixture of clearing, burning and grazing. A detailed survey of the affected areas outside the Waitsia-03 flowline was not required due to the fragmented and the degraded nature of the vegetation.

MEPAU will undertake further reconnaissance flora surveys and targeted searches (EPA, 2016a) of proposed clearing areas, to meet the requirements to obtain an NVCP, to further verify the vegetation communities in these areas and the potential presence of conservation significant flora taxa. However, based upon the vegetation assessments completed, vegetation associations present within the Proposal Area and the lack of conservation significant flora, the impact of the clearing is not evaluated to be significant at either a local or regional level.

Terrestrial Environmental Quality (Section 4.4)

Impacts to terrestrial environment quality are identified as standard construction risks that are not specific to this Proposal are regularly managed in industry through well-established construction management techniques. The Proposal area is not within an area of acid sulfate soil risk so acid sulfate soils management will not be required.

Fauna (Section 4.5)

Assessment of significant fauna was undertaken by subject matter experts who advised that although the Proposal area was considered relatively diverse and representative of the broader region, medium sized mammal fauna and components of other fauna groups were not present. Carnaby's Black Cockatoo, listed as threatened, is the only conservation significant species recorded from the project area. The assessment concluded that no suitable breeding or roosting trees for Carnaby's Black Cockatoo were identified within the surveyed areas (based on native vegetation areas proposed to be cleared). The proposed clearing of potentially suitable foraging habitat represents approximately 1% of unburnt banksia dominated vegetation across the adjacent Yandanogo Nature Reserve (an area of approximately 7,000 ha. (Woodman, 2018a)). Therefore, the potential impact is considered small scale and not regionally significant in the context of Carnaby's Black Cockatoo habitat.

Inland Waters (Section 4.6)

Water will be used during all phases of the Proposal lifecycle (e.g. throughout drilling, production and decommissioning activities). Drilling activities are managed in accordance with Department of Mines, Industry Regulation and Safety (DMIRS) lead regulatory requirements, which include full chemical disclosure of any chemicals used down-hole and management of drilling wastewater.

Design investigations for the WGP have concluded that re-injection of Produced Formation Water (PFW), collected during gas production, into disused petroleum production wells is the most efficient and environmentally acceptable management method. The water re-injection process involves the collection, storage, treatment and conveyance of PFW to be re-injected to reservoirs approximately 2 km deep. As groundwater is known to be present to depths of 150 m below the surface, there is significant separation between the injection reservoir and the useable groundwater aquifer. This activity will be regulated and managed in accordance with DMIRS lead regulatory approvals.

Surface water management will be through a stormwater collection system designed to appropriate engineering standards including bunded areas and lined evaporation ponds.

The potential impacts associated with the production and management of liquid waste were not deemed to be significant.

Air Quality (Section 4.7)

MEPAU has considered how Greenhouse gas (GHG) emissions and air quality can be reduced to as low as reasonably practicable (ALARP) throughout the planning and design phase of this Proposal. This included consideration of renewable energies to support operation of the WGP (Section 4.7.6).

An investigation into emissions resulting in potential impacts to air quality determined that emissions from the plant in conjunction with emissions from other sources in the region will comply with all relevant ambient air quality guidelines at the nominated sensitive receptor locations in the region. MEPAU is conducting further baseline air quality monitoring to verify this expectation.

The WGP, designed to produce 250 TJ/day, is calculated to be 97.5% energy efficient and will produce air emissions. Subject matter experts were commissioned to model and assess the potential impact of the WGP air emissions. These studies concluded that WGP emissions, in conjunction with emissions from other sources in the region, will comply with all relevant ambient air quality guidelines at the nominated sensitive receptor locations (i.e. nearest farm residences).

The maximum operational GHG emissions from the WGP is approximately 300,000 tonnes CO₂-e per year. This represents an increase of approximately 0.4% to the State's annual GHG emissions based on the 2013-2014 figure of 83.4 Mt. This is not a significant contribution to the total emissions in the state.

Social Surroundings (Section 4.8)

Potential impacts of the Proposal on the social surroundings, have been assessed with the following results:

- Indigenous heritage – no registered Aboriginal Heritage Sites will be affected by the Proposal. During initial ground disturbance works within areas of remnant bush land, MEPAU will engage Traditional Owner monitors and seek subject matter expert advice as required to help further ensure appropriate protection of any heritage values. In addition, MEPAU will honour the intent of a draft Heritage protocol with the Southern Yamatji Peoples and ensure existing heritage assessments are acceptable. If required, another heritage assessment would be undertaken and any additional mitigations detailed in the assessment would be implemented.
- Land use - The petroleum sector, which has been continually active in the region since the 1960s, coexists with other surrounding land uses, including agricultural and other extractive resources. Stakeholder engagement with surrounding owners specifically and the broader community more generally, indicates there is an understanding and acceptance of the compatibility of these two land use types.
- Visual impact - The visual impacts of the WGP are expected to be negligible. This is because the physical setting of the WGP site has been selected in consultation with relevant stakeholders, is remote, is located in undulating terrain that naturally reduced visual impact from stakeholders, is located away from public access and is located in an area with low population density. Further to this additional management measures have been introduced to minimise visual impacts to the lowest practicable extent.
- Noise generation – Noise modelling undertaken for the Proposal determined that predicted noise levels at the closest sensitive receptors are below the most stringent assigned noise level of 35 dB, thus MEPAU concludes the WGP will comply with the requirements of the Western Australian *Environmental Protection (Noise) Regulations 1997* at all times.
- Traffic –during the operational life of the Proposal, traffic will be minimal. The peak construction traffic estimates determined that approximately 100 heavy vehicle movements are likely required per week over the two-year construction period. While the expected access route to and from the site is via Brand

Highway and Pye Road, there are other alternative routes available which MEPAU can use to disperse traffic in periods of heavier use. Consequently, impacts to the local road network are not expected to be significant and can be managed to the smallest practicable extent.

- Social and economic benefits – The Proposal will bring significant social and economic benefits to the region and State. Stakeholder feedback and survey results support and encourage this conclusion.

In conclusion, MEPAU will apply and adapt this knowledge throughout the Proposal lifecycle and has prepared an overarching Environmental Management Plan (EMP) that describes the manner in which Key Environmental Factors are to be managed. The Proposal presents a significant development opportunity for the State, the Dongara-Port Denison region, MEPAU and other stakeholders. Based upon the evaluation against the Key Factors, MEPAU does not believe that the environmental impact is significant, and if managed in accordance with the mitigations detailed in this referral, will ensure that impacts are minimised to the smallest practicable extent. MEPAU is an existing Operator in the region with an established strong environmental performance record.

Existing regulatory requirements (Table 1-1) necessitates MEPAU to gain approval for all aspects of the Proposal, in most instances even if a formal EPA assessment of this Proposal were required. Consequently, MEPAU concludes that as the environmental impacts associated with this Proposal are not significant, they can be managed through these established regulatory processes.

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Abbreviations and terms

Abbreviation	Meaning
AASS	Actual acid sulfate soils
AGIG	Australian Gas Infrastructure Group
AHD	Australian Height Datum
ALARP	As low as reasonably practicable
ANZECC	Australian and New Zealand Environment and Conservation Council
APA	ATP Parmelia Pty Ltd
APPEA	Australian Petroleum Production and Exploration Association
AQMS	Air Quality Monitoring Stations
AS/NZS	Australian Standards, New Zealand Standards
ASS	Acid sulfate soils
AWE	AWE Perth Pty Ltd
BC Act	<i>Biodiversity Conservation Act 2016</i>
BOD	Basis of Design document
BOM	Bureau of Meteorology
°C	Degrees Celsius
BTEX	Benzene, toluene, ethylbenzene and xylene
CEMP	Construction Environmental Management Plan
Clearing envelope	The area of native vegetation that is present within the Proposal area
Clearing Regulations	<i>Environmental Protection (Clearing of Native Vegetation) Regulations 2004</i>
CO	Carbon monoxide
CO ₂	Carbon dioxide
CO ₂ -e	Carbon dioxide equivalent
CS	Contaminated Sites
dB(A)	A weighted decibels
DBCA	Department of Biodiversity, Conservation and Attractions
DBH	Diameter at breast height
DBNGP	Dampier to Bunbury Natural Gas Pipeline
DFES	Department of Fire and Emergency Services
DMIRS	Department of Mines, Industry Regulation and Safety
DoEE	Commonwealth Department of Environment and Energy
DoEE	Department of the Environment and Energy
DPF	Dongara Production Facility

Abbreviation	Meaning
DPLH	Department of Planning, Lands and Heritage
DRF	Declared Rare Flora
DWER	Department of Water and Environmental Regulation
EAG	Environmental Assessment Guidelines
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EP	Environment Plan
EP Act	<i>Environmental Protection Act 1986</i>
EP Regulations	<i>Environmental Protection Regulations 1987 ()</i> .
EPA	Environmental Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 ()</i> .
ESA	Environmentally Sensitive Area – as declared by the Minister for Environment
FeS ₂	Pyrite
Flowline	Pipes that carry reservoir fluids from wells to the processing facility
General Vegetation Area	A subset of the clearing envelope that that comprises vegetation in poor condition
GHG	Greenhouse gas
GHG MP	Greenhouse Gas Management Plan
GLCs	Ground level concentrations
Ha	Hectares
HDPE	High Density Polyethylene
Hg	Mercury
HPF	Hovea Production Facility
HSE	Health, Safety and Environment
IBRA	Interim Biogeographic Regionalisation for Australia
IBSA	Index of Biodiversity Surveys for Assessments
Km	kilometres
m	Metres
m ²	Square metres
m ³	Cubic meters
mm	Millimetre
MEPAU	Mitsui E&P Australia <i>AWE Perth Pty Limited is the legal entity, operator of the relevant Production Licences (L1 and L2), the proponent for the Proposal and operates under the Mitsui E&P Australia (MEPAU) brand.</i>

Abbreviation	Meaning
MGSF	Mondarra Gas Storage Facility
MNES	Matters of National Environmental Significance
Mt	Million tonnes
MWCCI	Mid West Chamber of Commerce and Industry ()
MWDC	Mid West Development Commission
NEPM	National Environment Protection Measure
NGER	National Greenhouse and Energy Reporting
Noise Regulations	Environmental Protection Noise Regulations 1997 ().
NOX	Oxides of nitrogen
NPI	National Pollutant Inventory
NVCP	Native Vegetation Clearing Permit
OSCP	Oil Spill Contingency Plan
PASS	Potential acid sulfate soils
PECs	Priority Ecological Communities
PFW	Produced Formation Water
<i>PGER</i>	<i>Petroleum and Geothermal Energy Resources</i>
PGER (Environment) Regulations 2012	<i>Petroleum and Geothermal Energy Resources (Environment) Regulations 2012</i>
PGER Act	<i>Petroleum and Geothermal Energy Resources Act 1967</i>
PGP	Parmelia Gas Pipeline
Pipelines	Pipes that carry processed hydrocarbons from the processing facility to market
PM _{2.5} and PM ₁₀	Particulate matter
SO ₂	Sulphur dioxide
SWL	Standing Water Levels
TAPM	The Air Pollution Model
TECs	Threatened Ecological Communities
the Proposal	Waitsia Gas Project – Stage 2
TJ	Terajoules
tpa	Tonnes per annum
TSP	Total suspended solid
VOCs	Volatile Organic Compounds
W02	Waitsia-02 groundwater monitoring bore
Waitsia-03 Area Vegetation	A subset of the clearing envelope that that comprises vegetation in good condition

Abbreviation	Meaning
WGP	Waitsia Gas Plant
WQPN	Water Quality Protection Notice
XAGGS	Xyris Area Gas Gathering System
XPF	Xyris Production Facility
YMAC	Yamatji Marlpa Aboriginal Corporation

1 INTRODUCTION

1.1 Purpose

Mitsui E&P Australia (MEPAU²) is proposing to construct and operate the Waitsia Gas Plant (WGP) and related infrastructure, collectively known as the Waitsia Gas Project – Stage 2 (the Proposal³), located in an agricultural area with considerable, long-standing active oil and gas field development. The site is approximately 16 km east-south-east of the Dongara-Port Denison townsites. Refer to Figure 1-1.

This report has been prepared to support the formal referral of the Proposal under Section 38 of the *Environmental Protection Act 1986* (EP Act). It describes the Proposal, potential environmental impacts and proposed mitigation measures associated with the construction and operation of the Proposal.

This report has been prepared in accordance with Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2016.

1.2 Project Description

1.2.1 Key Components

The Proposal involves further development of the Waitsia gas field (on Petroleum Titles L1 and L2), a free-flowing, conventional gas reservoir lying predominantly under cleared agricultural land already hosting petroleum production. The Proposal involves the following key elements:

- Constructing a new gas plant, WGP, with a maximum export capacity of 250 terajoules (TJ) per day;
- Drilling up to six (6) new wells, supplementing the existing two (2) suspended appraisal wells;
- Installing a gathering system comprising flowlines and hubs to convey the extracted gas to the plant and the gas distribution network;
- Installing a flowline from the WGP for water re-injection to the formation via disused petroleum production wells.

In total, the Proposal would involve up to (eight) 8 production wells being connected to the WGP. No hydraulic fracture stimulation is proposed given the free-flowing nature of the Waitsia gas field.

Figure 1-2 shows the various Proposal key components.

² AWE Perth Pty Limited is the legal entity, operator of the relevant Production Licences (L1 and L2), the proponent for the Proposal and operates under the Mitsui E&P Australia (MEPAU) brand.

³ The Proposal is owned through the unincorporated Waitsia Joint Venture comprised of AWE Perth Pty Limited (50%) and Beach Energy Limited (owners of Lattice Energy Resources (Perth Basin) Pty Limited (50%).

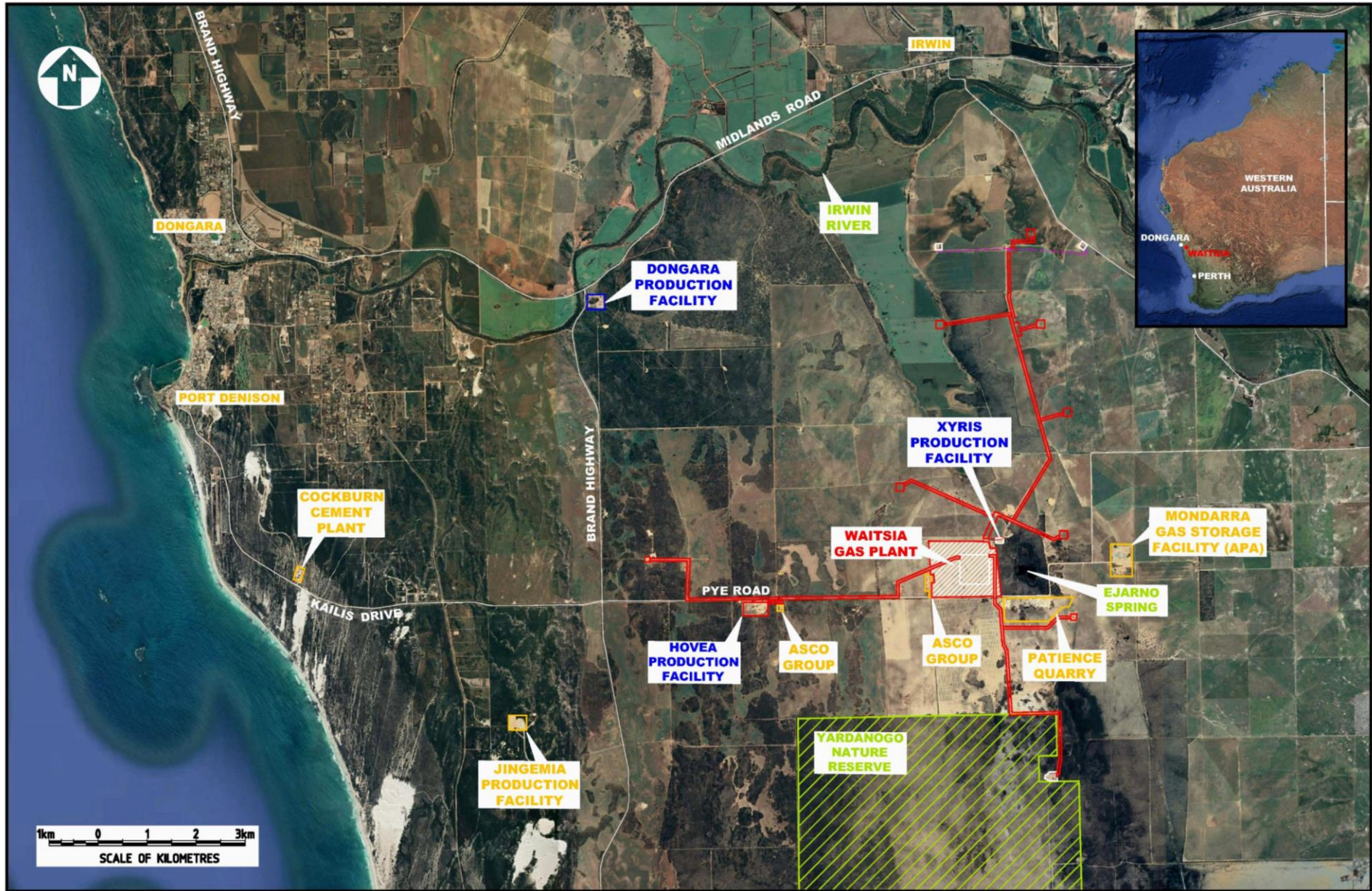


Figure 1-1: District Setting

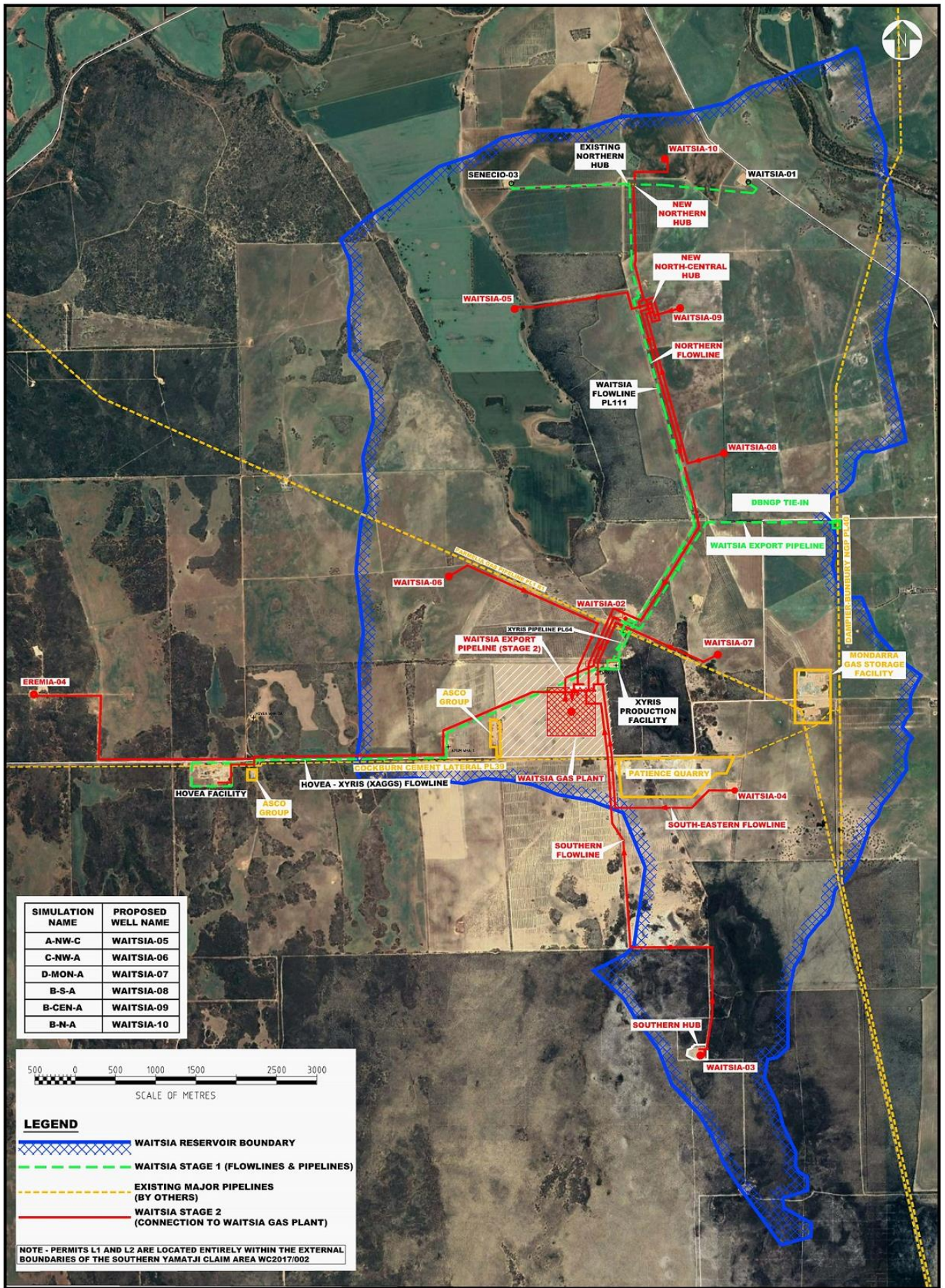


Figure 1-2: Waitsia Gas Project Stages 1 and 2 – Key Components

1.2.2 Waitsia Gas Plant

Gas extracted from the wells will be conveyed to centrally located gas gathering stations, or hubs, then directed via flowlines to the proposed WGP for processing prior to being exported to the nearby Dampier to Bunbury Natural Gas Pipeline (DBNGP).

The proposed WGP comprises the following components:

- Slug catcher to remove liquids and inlet separation as the gas enters the plant;
- Future inlet compression;
- Mercury removal equipment;
- Gas refining to remove carbon dioxide (also known as ‘gas sweetening’);
- Water content and hydrocarbon dew-point control;
- Export compression and metering;
- Produced water treatment;
- Support utilities.

1.2.3 Gathering System

The Gathering System for the Proposal comprises the flowlines that will convey gas from production wells to the hubs and various above-ground infrastructure. WGP will connect to the DBNGP via a short tie-in to an export pipeline constructed as part of the Waitsia Stage 1 Project. Over the life of the Waitsia gas field, the existing Northern Hub may be connected to the new Northern Hub through the installation of a cross-over manifold to allow Senecio-03 and Waitsia-01 gas to flow to the WGP. In addition to this, subject to further appraisal, the Waitsia-02 well may be connected to the WGP via an infield flowline. However, approval for the crossover manifold and Waitsia-02 flowline is not sought as part of this Proposal.

1.2.4 Wells

Currently, two wells are operating, with extracted gas from these wells being transported via a hub through flowlines for processing at the XPF as part of Waitsia Stage 1. Another existing well will be brought on stream to the XPF by July 2020 as part of the next phase of the Waitsia Stage 1 project. None of these activities form part of this Proposal.

In total, the Proposal would involve up to eight (8) production wells being connected to the WGP (Figure 1-2). No hydraulic fracture stimulation is proposed given the free-flowing nature of the Waitsia gas field.

A further stage of Waitsia gas field development could include connecting the existing three (3) Stage 1 wells to the WGP and / or drilling and connection of an additional eight (8) wells resulting in an expected 19 wells in total over the life of the Waitsia gas field. However, any additional wells connecting to WGP would be separate to this Proposal and subject to separate approvals.

1.3 The Proponent

The proponent is AWE Perth Pty Ltd (AWE).

AWE Perth Pty Ltd is a wholly owned subsidiary of AWE Pty Ltd. Mitsui E&P Australia Pty Ltd and AWE Pty Ltd are wholly owned subsidiaries of Mitsui & Co. Ltd. Combined they form the unified brand Mitsui E&P Australia (MEPAU). MEPAU has a Perth based operations office and an active gas production site in the Mid West region of Western Australia, the XPF.

Lattice Energy Resources (Perth Basin) Pty Limited (owned by Beach Energy Ltd), is a Waitsia Joint Venture partner on Production Licences L1 and L2.

1.4 Background

MEPAU is Operator of the Waitsia gas field located on agricultural land in the Shire of Irwin, about 16 km east-south-east of Dongara-Port Denison townsites and 367 km north of Perth (Figure 1-1). The field sits within the Geraldton Sandplains bioregion of Western Australia in predominantly cleared agricultural land.

The Waitsia gas field is considered to be the largest conventional onshore Australian gas discovery in more than 40 years. The Senecio-03 appraisal well, drilled in 2014, discovered the Waitsia gas field, a free-flowing, conventional reservoir. Development of the Waitsia gas field is occurring in stages with an initial extended production test using two wells, Waitsia-01 and Senecio-03 (collectively known as Waitsia Stage 1). The nearby Waitsia-02, Waitsia-03 and Waitsia-04 appraisal wells have been constructed and are currently suspended. Plans to further appraise Waitsia-02 by connecting the well to the XPF are included as part of the next phase of the Waitsia Stage 1 project, which is scheduled to begin production in Q3 2020.

The first phase of the Waitsia Stage 1 Project was commissioned in 2016 and has achieved an output of approximately 10 TJ per day using gas produced from the Waitsia-01 and Senecio-03 wells. Gas is transferred from these wells via the XPF and to consumers through the Parmelia Gas Pipeline (PGP).

The next phase of the Waitsia Stage 1 project comprises further upgrades to the XPF, connection of the previously drilled Waitsia-02 well to the XPF and construction of a gas export pipeline to connect the XPF to export pipelines (e.g. Dampier Bunbury Natural Gas Pipeline).

The Proposal is separate from Stage 1 as it comprises the construction of a new gas processing facility (Waitsia Gas Plant [WGP]), drilling of additional wells, construction of gas gathering hubs, and the construction of flowlines connecting wells to gathering hubs and the WGP. This stage will further develop the Waitsia gas field.

MEPAU owns Irwin Park Farm, a freehold farming property, encompassing most of the infrastructure mentioned in this Proposal. A significant portion of the Waitsia gas field lies under Irwin Park Farm. The proposed WGP will be sited on the adjoining farm that lies to the south-west of Irwin Park Farm under an existing leasehold arrangement with the landowner. The WGP is located adjacent to the existing XPF, which is on the same farming property.

1.5 Legislative Framework

1.5.1 *Environmental Protection Act 1986, Part IV Environmental Impact Assessment*

This Proposal is referred to the Environmental Protection Authority (EPA) under Section 38 of the *Environmental Protection Act 1986* (EP Act) to determine whether or not the Proposal requires formal environmental impact assessment (EIA). In accordance with the Memorandum of Understanding with the EPA and DMIRS, DMIRS is the lead agency for assessing petroleum activity proposals, including environmental regulation of proposals that do not trigger formal EIA.

MEPAU has reviewed the EPA's Statement of Environmental Principles, Factors and Objectives as part of the EPA's framework for environmental considerations in Environmental Impact Assessment (EIA)⁴.

This environmental referral report demonstrates that potential impacts of the Proposal are not significant and are manageable. The report provides additional detail on the proposed management measures,

⁴ <http://www.epa.wa.gov.au/pages/framework-environmental-considerations-eia>

including commitments and a draft EMP. The report has also been prepared to show that other existing regulatory approvals processes would be appropriate in the regulatory management of the Proposal.

1.5.2 Environmental Protection Act 1986, Part V Environmental Regulation

1.5.2.1 Division 2 – Clearing of Native Vegetation

A Native Vegetation Clearing Permit (NVCP) is required under the EP Act prior to clearing native vegetation. Granting and administration of clearing permits is regulated under Part IV Division 3 of the EP Act managed under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. The proposed site for the WGP is a cleared, agricultural paddock and there is no native vegetation clearing required. However, for the flowlines, and some wells, that form the gathering system for the Proposal, clearing of some native vegetation, of varying quality, will be required (Appendix H (Figures 1 [A to H] and Figure 2).

The Proposal has a “clearing envelope” of ~29 ha. The “clearing envelope” is defined as the area of native vegetation that is present within the Proposal area. Within this clearing envelope, a maximum area of ~17 ha of native vegetation is required to be cleared. By having a larger clearing envelope MEPAU will have greater flexibility during the construction of flowlines, to realign the flowline routes should adverse ground conditions or environmental sensitivities be encountered. The majority of vegetation required to be cleared for the Proposal has been impacted by agricultural practices (Section 4.3) and clearing of native vegetation will be minimised within the clearing envelope identified as an upper limit.

1.5.2.2 Division 3 – Prescribed Premises, Works Approvals and Licences

Part V of the EP Act requires that premises prescribed under Schedule 1 of the EP Regulations require emissions and discharges during construction and commissioning of the premises to be authorised by a Works Approval, and a Licence to operate the premises. It is expected that the Proposal will be classified as a Category 10 prescribed premise in accordance with Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations). Category 10 is defined as follows⁵:

“Oil or gas production from wells: premises, whether on land or offshore, on which crude oil, natural gas or condensate is extracted from below the surface of the land or the seabed, as the case requires, and is treated or separated to produce stabilized crude oil, purified natural gas or liquefied hydrocarbon gases.”

MEPAU will apply to the Department of Water and Environmental Regulation (DWER) for the Works Approval and Prescribed Premises Licence for the Proposal.

1.5.3 Petroleum and Geothermal Energy Resources Act 1967 & Petroleum Pipelines Act 1969

The DMIRS is responsible for the administration of various acts including the *Petroleum and Geothermal Energy Resources (PGER) Act 1967* and the *Petroleum Pipelines Act 1969*. Under these acts, various subsidiary legislation has been enacted, which require MEPAU to seek additional approvals from DMIRS pertaining to construction and operation of the Proposal.

Under the Petroleum and Geothermal Energy Resources (PGER) (Environment) Regulations 2012 and the Petroleum Pipelines (Environment) Regulations 2012, an Environment Plan (EP) must be accepted by DMIRS for petroleum related activities (including decommissioning) before such activities can commence. The EP must evaluate all impacts and risks that are associated with an activity, and demonstrate that with the control measures identified, the impacts and risks are reduced to levels that are ALARP. Further to this, the

⁵ Schedule 1 of the Environmental Protection Regulations 1987 (EP Regulations)

EP must demonstrate that the environmental impacts and risks are acceptable. Included as part of an EP is the requirement to submit an Oil Spill Contingency Plan (OSCP) for approval. An EP cannot be approved without an approved OSCP. The OSCP covers all spill scenarios associated with the activity. Activities cannot commence without an approved EP.

Under the *Petroleum and Geothermal Energy Resources (PGER) (Resource Management and Administration) Regulations 2015*, a well management plan must be accepted by DMIRS that describes the history of all well activities relating to the planning, design, construction and management of a well throughout its life cycle.

Under the Petroleum and Geothermal Energy Resources (PGER) (Management of Safety) Regulations 2010 and Petroleum Pipelines (Management of Safety of Pipeline Operations) Regulations 2010 a safety case that covers the design, construction, operation and/or decommissioning stage of a facility must be accepted by DMIRS for these activities prior to their commencement. Table 1-1 details the petroleum approvals required for the Proposal. All activities, environmental factors, potential impacts and mitigations detailed in this Proposal must be detailed in the suite of approvals proposed.

1.5.4 Environmental Protection and Biodiversity Conservation Act 1999

A Proposal may be deemed a ‘Controlled Action’ under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) if it impacts on matters of National Environmental Significance (MNES). Although no significant impacts on MNES have been identified, MEPAU is referring this Proposal to the Commonwealth Department of Environment and Energy (DoEE) under the EPBC Act.

Further details of the impacts on flora and fauna are provided in Sections 4.3 and Section 4.5. The conclusions of the flora and fauna surveys and assessment work undertaken for the Proposal are that no MNES, Declared Rare Flora, listed flora or habitat of significance to Carnaby’s Black Cockatoos are impacted by the Proposal.

Consequently, the Proposal is considered unlikely to be determined a “Controlled Action” under the EPBC Act.

1.5.5 Other approvals and regulation

MEPAU has also formally engaged with the Shire of Irwin and the Department of Planning, Lands and Heritage (DPLH) with respect to planning requirements, with the following outcomes:

- An amendment to the Shire of Irwin Local Planning Scheme No 5 (District Zoning Scheme) to rezone the land is not required before the Proposal can be implemented.
- Regarding the requirement for a development approval, MEPAU has received written advice from the Shire of Irwin that a development approval is not required for the Proposal.
- The Shire of Irwin has advised in writing that an application to the Joint Development Assessment Panels is not required.

A summary of the anticipated regulatory approvals required for this Proposal are detailed in Table 1-1.

Table 1-1 Summary of regulatory approval requirements for the Waitsia Gas Project Stage 2

Proposal Activities	Type of Approval	Regulatory Agency	Legislation regulating the activity
Clearing of native vegetation	Native Vegetation Clearing Permit	DWER (DMIRS as delegated authority)	EP Act 1986, Part V Div 3, EP (Clearing) Regulations 2004
Drilling of up to a further six wells (Waitsia-05 to Waitsia-10) prior to WGP start-up ⁶ .	Environment Plan	DMIRS	PGER (Environment) Regulations 2012
	Well Management Plan	DMIRS	PGER (Resource Management and Administration) Regulations 2015
	Safety Case	DMIRS	PGER (Management of Safety) Regulations 2010
Construction of flowlines and pipelines	Environment Plan	DMIRS	PGER (Environment) Regulations 2012 Petroleum Pipelines (Environment) Regulations 2012
	Safety Case	DMIRS	PGER (Management of Safety) Regulations 2010
Construction of WGP	Environment Plan	DMIRS	PGER (Environment) Regulations 2012
	Safety Case	DMIRS	PGER (Management of Safety) Regulations 2010
Commissioning and operations of WGP and associated infrastructure	Environment Plan	DMIRS	PGER (Environment) Regulations 2012 Petroleum Pipelines (Environment) Regulations 2012
	Safety Case	DMIRS	PGER (Management of Safety) Regulations 2010
	Well Management Plan	DMIRS	PGER (Resource Management and Administration) Regulations 2015
Clearing of native vegetation and potential fauna habitat	Referral of a proposal – approval type to be determined through assessment	DoEE	EPBC Act 1999
Construction of WGP and associated operations infrastructure (prescribed premises)	Works approval	DWER	EP Act 1986, Part V Division 3
Plant day-use accommodation and associated infrastructure	Development / Planning Approval	Shire of Irwin	Planning and Development Act 2005
	Building Permit		Building Act 2011
	Permit to install an apparatus for the treatment of sewage		Health Act 1911
Construction of WGP and associated operations infrastructure (prescribed premises)	Licence	DWER	EP Act 1986, Part V Division 3

⁶ Dependent on the performance of these wells, a further stage of Waitsia gas field development could include connecting the three (3) Stage 1 wells to the WGP and / or drilling and connection of an additional eight (8) wells resulting in an expected 19 wells in total over the life of the Waitsia gas field. Approval for these additional wells are not sought as part of this Proposal.

Waitsia Gas Project Stage 2 – Environmental Referral Supporting Report

Proposal Activities	Type of Approval	Regulatory Agency	Legislation regulating the activity
Storage of Dangerous Goods	Dangerous Goods Storage Licence	DMIRS	<i>Dangerous Goods Safety Act 2004</i> Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007

2 THE PROPOSAL

2.1 Background – Existing Waitsia Stage 1

The MEPAU management and operations office is based in Perth. Since September 2016, MEPAU has been producing gas in the Mid West region of Western Australia from the Waitsia gas field via the XPF through the initial phase of the Waitsia Stage 1 Project.

The production capacity of the XPF was approximately 10 TJ per day based upon the initial phases of the Waitsia Stage 1 Project. The next phase of Waitsia Stage 1 comprises the upgrade of XPF and increasing production capacity to 30 TJ/day, connecting a previously drilled well (the Waitsia-02 appraisal well) to the facility and construction of the Waitsia Export Pipeline which connects the facility to the Dampier Bunbury Natural Gas Pipeline.

Since activities associated with Waitsia Stage 1 began in 2016, three additional appraisal wells were drilled, namely Waitsia-02, Waitsia-03 and Waitsia-04, to help further prove the resource and better understand the Waitsia gas field characteristics. These wells are currently suspended, which means they remain in place, but no production is currently occurring from them.

Regulatory approvals for Waitsia Stage 1 project have been managed through DMIRS (under *the* PGER Act) and DWER (EP Act Part V). MEPAU plans to re-commence production following completion of the next phase of the Waitsia Stage 1 project which is scheduled for completion in Q2 2020.

These activities are considered separate to the Waitsia Gas Project Stage 2, as they stand-alone from this proposal on the notion that if this proposal does not progress through to construction, Waitsia Stage 1 will proceed and operate regardless. Therefore none of these activities form part of this Proposal.

2.2 Waitsia Gas Project - Stage 2

Key components of the Proposal are set out in Table 2-1 and

Table 2-2. Figure 1-2 shows these key components.

Table 2-1: Summary of the Proposal

Proposal title	Waitsia Gas Project Stage 2 (the Proposal)
Proponent name	AWE Perth Pty Ltd
Short Description	The Proposal includes the development of a gas plant, six new production wells, four hubs and a number of flowlines/pipelines. The total area of the development envelope for the Proposal area comprises ~345 ha.

Table 2-2: Location and proposed extent of physical and operational elements

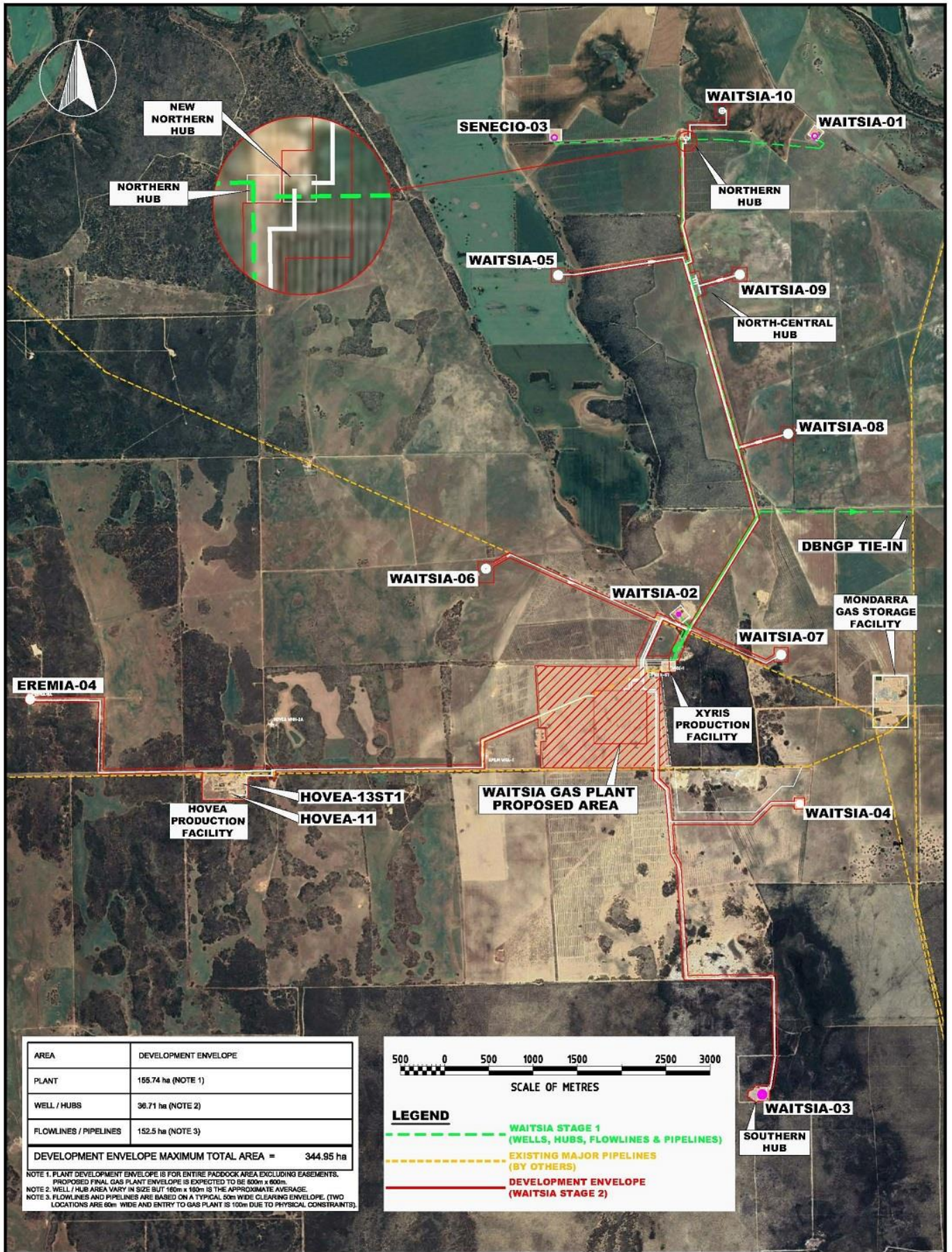
Proposal title	Waitsia Gas Project Stage 2 (the Proposal)	
Physical Elements		
Gas Processing Plant	Figure 1-2 and Figure 2-1	The plant site is ~156 ha and is located on a completely cleared paddock. No clearing of native vegetation is required.
Well sites	Figure 1-2 and Figure 2-1	Well sites vary between 1.5ha and 3.95ha. Total area for wells is ~25 ha. No well pad sites require clearing of native vegetation.
Hubs	Figure 1-2 and Figure 2-1	Hubs vary between 0.45ha and 2.7ha. The total area for hubs is ~11 ha. No hub sites require clearing of native vegetation.
Flowlines/pipelines	Appendix H (Figures 1 [A to H] and Figure 2)	The total area within the flowline easements is ~153 ha. Within this total easement area, the maximum area of native vegetation to be cleared is ~17 ha.
Operational Elements		
Disposal of Produced Formation Water	Figure 2-6	Re-injection of approximately 1 million m ³ of Produced Formation Water over the expected 20-year life of the Proposal.
Air emissions	Section 4.7	Air emissions from the WGP.
Noise emissions	Section 4.8	Noise emissions from the WGP.

In total, the Proposal would involve connecting up to eight (8) production wells to the WGP. No hydraulic fracture stimulation is proposed given the free-flowing nature of the Waitsia gas field.

Figure 1-2 shows the various project components of the Proposal.

A further stage of Waitsia gas field development could include connecting the three (3) Stage 1 wells to the WGP and / or the drilling and connection of an additional eight (8) wells resulting in an expected 19 wells in total over the life of the Waitsia gas field. As noted earlier, any additional wells are separate to this Proposal and will be subject to separate approvals.

The design and construction of the Proposal is subject to a “design competition” involving two contractors. A Basis of Design document (BOD) has been provided to these contractors which sets out the various design criteria for the Proposal to minimise potential environmental impacts and footprint extent. Two designs are being considered for the Proposal, of which one will be selected. Both designs fit within the Proposal footprint. There are no environmentally significant differences expected or identified to date between the two designs.



WAT-SK-113-01

Figure 2-1: Waitsia Gas Project – Stage 2 Development Envelope Key Location Plan

2.3 Project Justification

2.3.1 General

Developing the conventional, free-flowing Waitsia gas field will provide MEPAU with an ongoing presence in the Perth Basin. MEPAU and its predecessors have been operating in the Perth Basin for almost 50 years and the Proposal will extend this presence for decades. The current resource assessment indicates a project life of approximately 20 years.

The broader northern Perth Basin projects are shown on Figure 2-2, which demonstrates the extent of the northern Perth Basin petroleum province hosting MEPAU and other operators.

MEPAU proposes progressing the Waitsia Gas Project development, which will increase competition, provide supply diversity and improve energy security, by offering a new and low risk onshore gas resource.

Natural gas is one of the cleaner and more efficient energy sources available. In the move to a low-carbon future, natural gas is playing an increasingly important role as a clean partner fuel for renewable energy. It is integral as a transitional fuel where there is movement globally away from traditional energy generation to greater reliance on renewable energy.

Where practicable, MEPAU employs local people to run its gas production facilities and uses local businesses and support services. MEPAU is an active contributor to the Mid West economy, and to date has awarded \$6m in contracts during the initial Waitsia Gas Project Stage 1 activities. MEPAU also contributes through paying rates to local shires and royalties to the state government.

MEPAU commissioned a subject matter expert to prepare an independent report on the broader economic impact of the Proposal. This report concluded that the Proposal is expected to provide significant economic benefits to the local, regional and national economies. Key findings of this report follow:

- During the construction and operation of the facility, there will be significant economic benefits (both directly and indirectly) to the local region;
- The creation of an estimated minimum of 150 jobs during the development of the Proposal will have a significant impact in the Dongara-Port Denison area, the Shire of Irwin and neighbouring shires;
- During the operation phase there will be an estimated 12 - 15 permanent jobs associated with the WGP, that will deliver \$13 M per year to the region.

2.3.2 Location Options

The proposed location of the WGP has been selected for the following reasons:

- The WGP should ideally be close to the DBNGP to efficiently convey the processed gas to the broader market;
- The Proposal should ideally be located above the Waitsia gas reserve to efficiently collect and process the gas;
- The location of the Proposal should ideally be located such that it can build on existing infrastructure in Waitsia Stage 1, providing efficiencies and synergies.

The WGP site was also selected for environmental reasons. Alternative sites were considered to the north and also north-east, but the Proposal site provided reduced noise and air quality impacts to sensitive receptors.

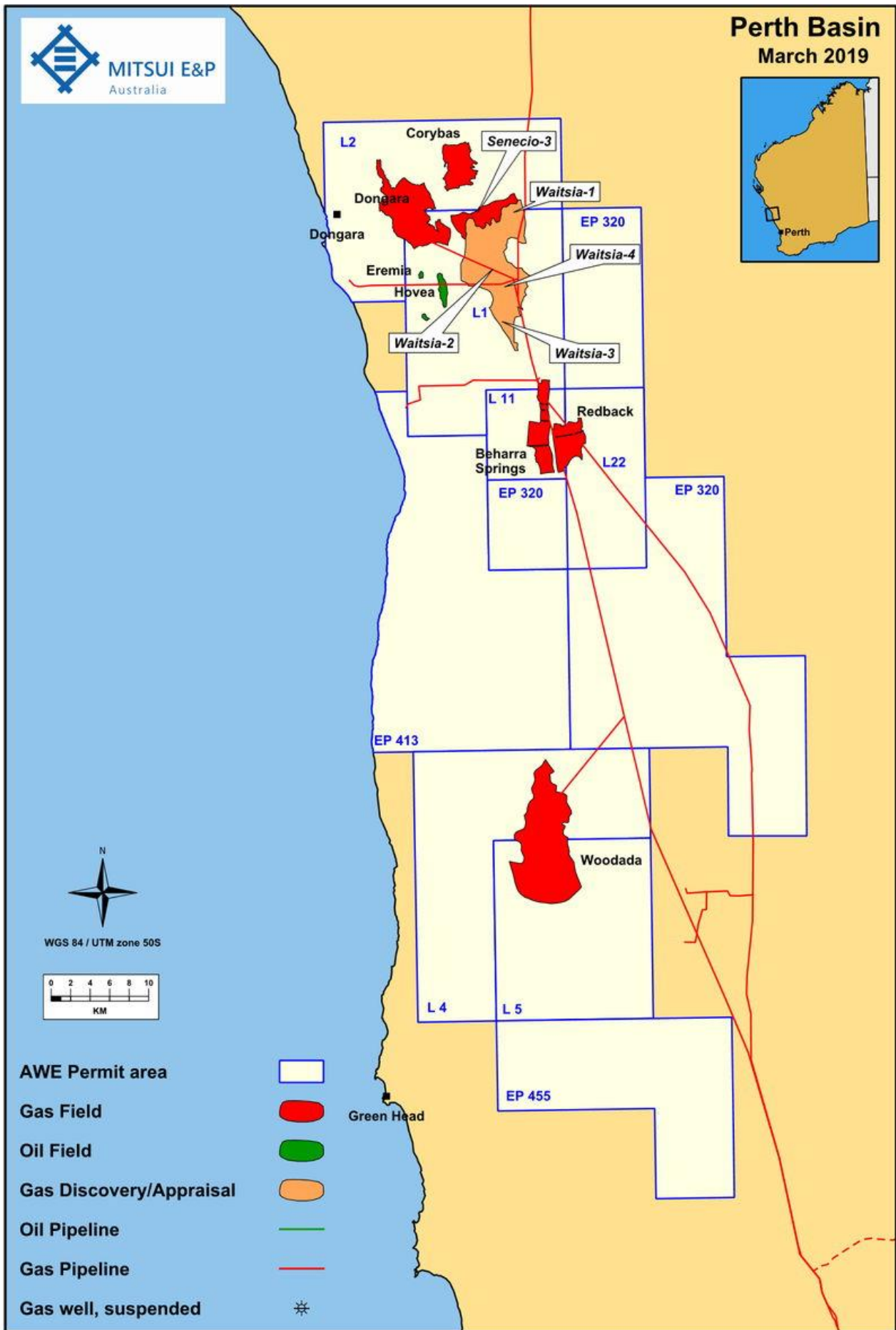


Figure 2-2: Perth Basin

2.4 Project Timing

The design, construction and commissioning of the Proposal is a significant undertaking which extends over an expected 36-month timetable set out in the Table below:

Table 2.1 – Proposed Project Timetable

Phase/Milestone	Completion
Conceptual Design	September 2019
Financial Investment Decision (FID)	December 2019
EPC Contract Award	January 2020
Commence Earthworks	Q1 2021
Plant Construction	Q2 2022
Plant Commissioning	Q4 2022
Ready for Start Up - operations	Q4 2022

2.5 The Waitsia Gas Plant

The WGP is an industrial facility that will process gas produced from deep underground conventional free flowing reservoirs. The WGP will be a self-contained and stand-alone facility with a fence around the perimeter. It will be operated from site, with remote monitoring capability. Once extracted from the reservoir via the wells, the gas will flow through flowlines and gathering hubs. It will be treated on arrival at the gas plant and the produced water and condensate will then be removed. After gas sweetening, water content control and hydrocarbon dew-pointing, treated gas will be compressed and exported to the DBNGP. Condensate will be stabilised, stored and loaded-out to road trains for road transport to Kwinana, south of Perth, approximately 380 km from the WGP.

The plant will be operated 24 hours a day for 365 days a year, except for maintenance shutdowns.

More specifically, the WGP comprises the following elements:

- Slug catcher – this provides the initial separation of free liquids from the gas stream and a buffer volume to prevent “slugs” of liquid entering the Plant;
- Future Inlet Compression – For when the reservoir pressure declines, and additional compression is needed for the cases where lower pressure will cause a loss of efficiency in the Plant;
- Inlet cooling - cooling is included for cases where the raw gas arrival temperature may cause a loss of efficiency in the Plant and/or loss of dewpoint control in the export pipelines;
- Inlet separation – this removes the condensed liquid from the gas stream after inlet cooling;
- Mercury removal – a separate mercury removal unit is included to remove mercury from the product to meet environmental and DBNGP specification limits;
- Gas sweetening - CO₂ removal to DBNGP specification limits;
- Water content and hydrocarbon dew-point control – reduction to levels that will satisfy the DBNGP specification limits;
- Export compression and metering – treated gas from the dewpoint control equipment is routed to sales gas compressors to boost the gas pressure to allow export of the gas into the DBNGP;
- Condensate treatment and storage – recovered condensate is stabilised and stored prior to transport off site by road;

- Produced water treatment, prior to conveyance to the re-injection wells, with evaporation ponds as a back-up in case of issues with the re-injection wells;
- Support utilities (further described below).

In the future, inlet compression and associated cooling may be added upstream of the gas sweetening stage. Condensate produced may also be directed to an incinerator to supplement fuel gas required for treatment of waste streams.

A conceptual layout of the plant is shown in Figure 2-3.

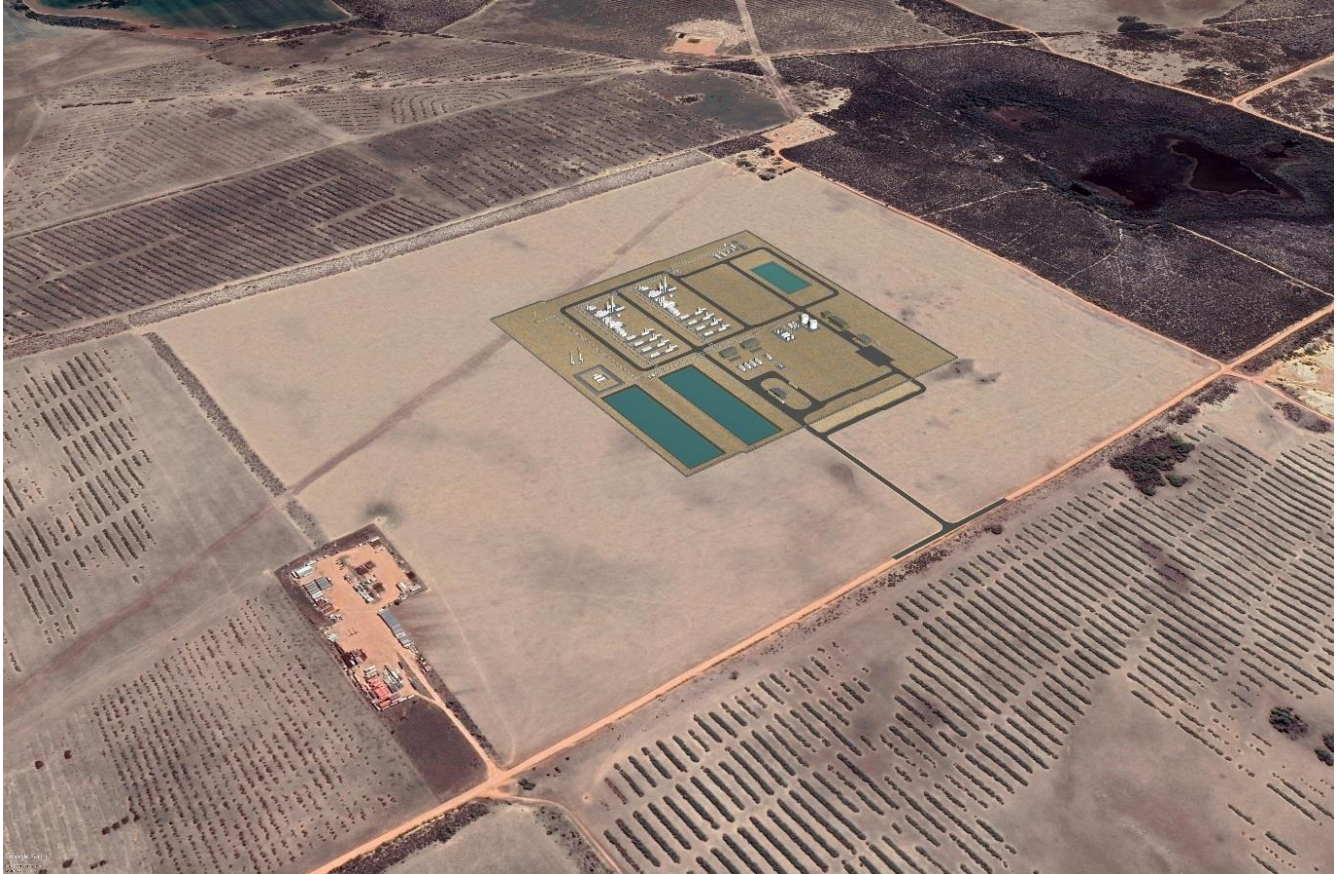


Figure 2-3: Conceptual Layout of the WGP (proposed plant location lies between XPF and Asco's laydown yard)

2.6 Support Utilities

The following support utilities will be provided at the WGP:

- A fuel gas system, with gas primarily sourced from the export compression system suction manifold;
- Power generation comprising duty and standby units, and an emergency generator;
- An instrument air system for control and emergency shutdown valves, operation of various pumps, atomisation of condensate in the incinerator, pressurisation of electrical instruments, and the purging or cooling of essential instruments;
- A flare system with an elevated high-pressure flare that allows MEPAU to safely manage large volumes of hydrocarbon gas in a process upset / emergency situation whereby hydrocarbon inventory can be safely depressurised in a controlled manner;
- An incinerator for disposal of the waste stream from the gas sweetening system;
- A fire water system, using treated bore water as the firefighting medium;

- A utility water system, also utilising bore water obtained from local water bores, supplying utility stations around the site;
- A water treatment package that treats bore water from the firewater tank for use as potable and demineralised water. Water is stored in appropriate fire, utility, or potable water tanks;
- A diesel system providing diesel fuel for the emergency firewater pump, the emergency diesel generator and a diesel fuel bowser for vehicles.

2.7 Gathering System

2.7.1 Overview

The Gathering System for the Proposal comprises the flowlines that convey the gas from the wellheads to the various items of above-ground infrastructure. The well sites will each have their own dedicated flowline directed to an associated hub. At the hubs, production fluids will be co-mingled in a Production Header and then directed to the WGP via a flowline. Each hub also has a Test Separator on its own header, and space allocated for future hub compression with associated header.

The Gathering System is described further below.

- Construction of new wellhead facilities at up to eight (8) wells in total - Waitsia-03 to Waitsia-10.
- Construction of five (5) new hubs; new Northern Hub (adjacent to existing Northern Hub), North-Central Hub, Central Hub, South-Eastern Hub and Southern Hub. The Central Hub and South-Eastern Hub are co-located at the WGP (Figure 2-4 depicts an indicative hub).
- New Northern Flowline from the new Northern Hub to the WGP.
- New flowline from Waitsia-10 to the new Northern Hub.
- New flowlines from Waitsia-05, Waitsia-08 and Waitsia-09 to the new North-Central Hub with subsequent North-Central Flowline that connects to the Northern Flowline.
- New flowlines from Waitsia-03 and Waitsia-06 to a new Central Hub with subsequent Central Flowline to the WGP.
- New flowline from Waitsia-04 and Waitsia-07 to the South-Eastern Hub with subsequent South-Eastern Flowline to the WGP.
- New flowline from Waitsia-03 to the Southern Hub with subsequent Southern Flowline to the WGP.
- New section of the Waitsia Export Pipeline from the WGP to a new tie-in to the Waitsia Export Pipeline.

The Gathering System and its relationship to the WGP, wells and hubs is schematically shown on Figure 2-5.



Figure 2-4 Indicative Hub (Existing Northern Hub constructed as part of Waitsia Stage 1 is shown)

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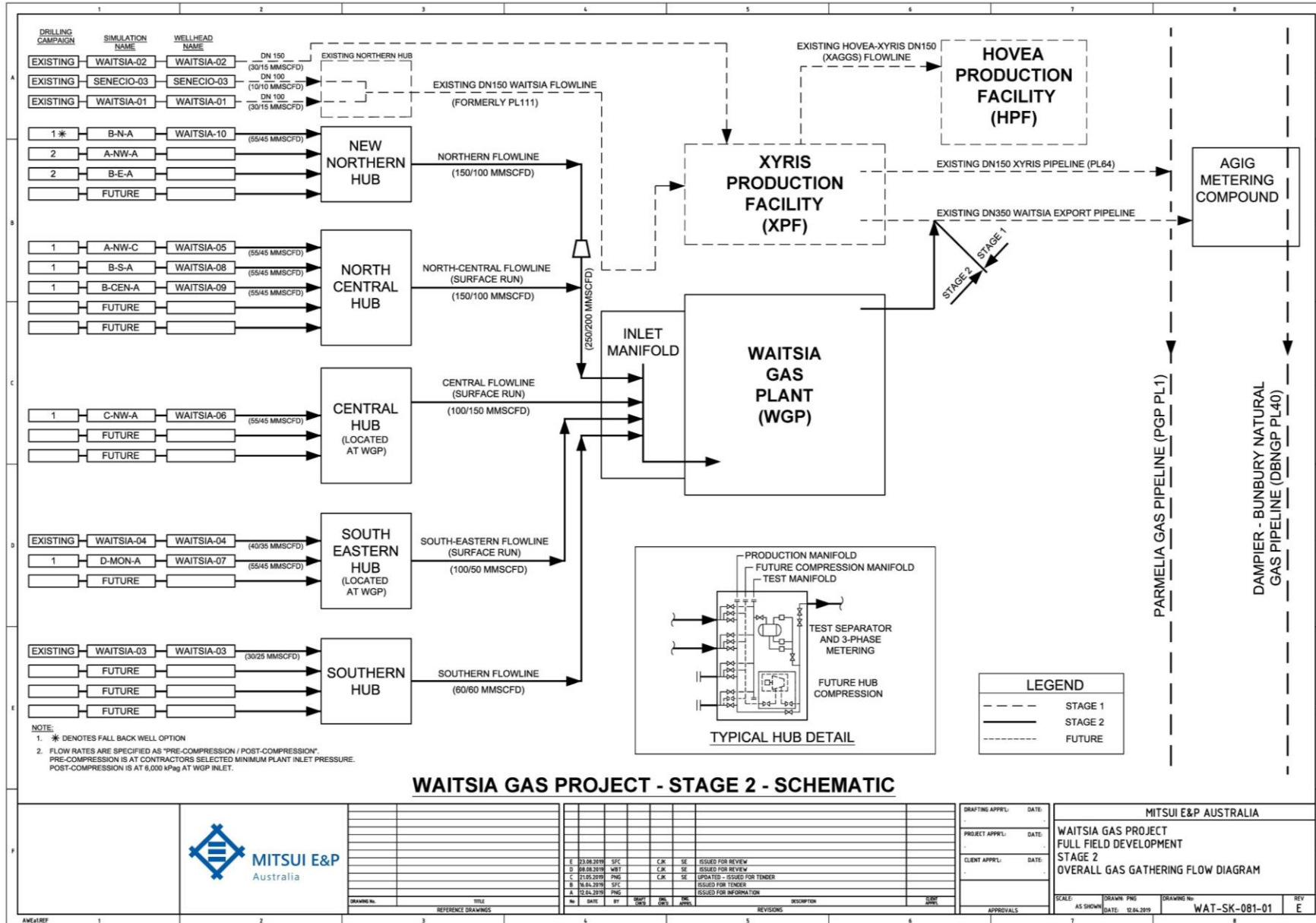


Figure 2-5: Schematic Plan of the Waitsia Gas Project – Stage 2

2.7.2 Flowline Construction

Construction of the flowlines involves open trenching and installing flowlines from the wells to the hubs and similarly for larger flowlines from the hubs to the WGP. The flowlines will be installed mostly on cleared tracks or within cleared areas. Where native vegetation clearing is required, this will be addressed as described below. Flowline installation will involve excavating trenches, laying the pipe, backfilling the trench and revegetating the area. Similarly, a pipeline from WGP to the Waitsia Export Pipeline will be constructed using the same method.

All flowline or pipeline construction activities, apart from hydrostatic pressure testing, will generally occur during daylight hours. Construction activities will take place over a seven-day working week with appropriate crew rostering. Typical night works expected would be limited to temperature and pressure monitoring during hydrostatic testing.

There are portions of land containing native vegetation (shown in Appendix H; Figures 1 [A to H] and Figure 2) where clearing is required prior to the construction of the flowlines. The construction details for the flowlines are shown on the pipeline construction easement detailed in Appendix H (Figure 2).

The flowline or pipeline installation process in these areas to be cleared will be as follows:

- Progressive corridor clearance will occur ahead of construction. The construction right of way (ROW) will be cleared to allow for construction equipment access, pipe layout areas, trench excavation and separate topsoil/subsoil windrow stockpiles.
- While the MEPAU pipeline easement is to be licensed as a 50 m wide corridor under DMIRS pipeline legislation, construction widths for individual flowline or pipeline installation are expected to be 30 m for most of the route and only deviated if sub-surface obstructions require flowline deviations. Where multiple flowlines or pipelines are installed in parallel, the construction width will be expanded by the minimum separation distance required under AS2885.
- Vegetation will generally be cleared using a grader. Cleared vegetative material will be windrowed along the edge of side-tracks within the clearing limit. Topsoil will generally be stripped using a grader to a nominal depth of 100 millimetres (mm) and will be windrowed along the edge of side-tracks within the clearing limit. Windrowed topsoil will be kept separate from windrowed vegetative material.
- Trench excavation will occur within the cleared easement where all excavated spoil will be stockpiled alongside the trench. Stockpiles will be separated into a stockpile for topsoil and a stockpile for sub-surface soil.
- If the construction width is restricted in order to minimise vegetation clearing, topsoil and excavated soil may be stockpiled separately at nearby locations and returned to site for backfilling.
- The flowlines will be carbon steel, externally coated line pipe, constructed and installed in accordance with AS2885 between 900 mm and 1,200 mm below natural ground level (and deeper where required by AS2885). The top width of the trench whilst open will be approximately 2,000 mm and typically 750 mm at its base. Lengths of pipe will be placed alongside the trench prior to use.
- When the field joint coating is applied ground drop sheets will be used to prevent environmental contamination of surrounding soil or vegetation. The field joints will be completed via grit blasting, followed by the application of suitably specified primer and application of an inner and outer tape wrap system.
- Bedding (where applicable) and padding of trenches will be undertaken with clean sand (either via screening of trench spoil or sand from a locally sourced and approved existing borrow pit).
- On completion of padding over the installed pipeline, the trench will be backfilled with the remainder of the excavated spoil and compacted.

- Hydrostatic testing of the pipeline and flowlines to ensure compliance with design requirements and in accordance with AS2885.5. Hydrostatic testing will occur over limited duration (i.e. 48hrs).
- Progressive rehabilitation and revegetation of areas no longer required to be kept clear will be undertaken. Areas to be rehabilitated will be ripped to reduce compaction, and topsoil will be re-spread over areas to be revegetated to a minimum settled thickness of 70 mm.

2.7.3 Flowlines and Pipeline Operation

The proposed flowlines and pipeline are designed to operate unmanned, 24 hours per day with weekly visits by WGP operators for routine inspections and maintenance. The proposed flowlines and pipeline are designed to operate for 25 years. Gas will be transported via flowlines to the WGP for processing, analysis and export into the DBNGP via the Waitsia Export Pipeline.

The flowlines will be operated in accordance with an EP, which will be submitted under the PGER Act (and other required approvals) for assessment and approval by DMIRS. The Waitsia Export Pipeline will be operated in accordance with the EP which will be submitted under the *Petroleum Pipeline Act 1969* (and other required approvals) for assessment and approval by DMIRS.

Wells, flowlines and pipelines are closed loop systems, thus no fugitive emissions are expected to arise from their operation.

2.8 Waste Management

2.8.1 Solid Waste

Solid wastes generated during construction and operation of the Gathering System and WGP will be segregated and stored at an appropriately designed facility for collection and treatment/disposal by an external contractor, who will be engaged by MEPAU.

The following design principles shall be followed by contractor/s when designing facilities where solid waste may be stored before disposal:

- Waste stations will be established around the site and shall include areas with enough bins to facilitate segregation (e.g. green waste, general rubbish, recycling, controlled waste etc.);
- Waste stations shall be located and designed to limit the potential for surface water and groundwater contamination;
- All controlled wastes (e.g. spent chemicals, empty chemical/ hydrocarbon containers) shall be stored in banded areas prior to disposal by licenced controlled waste contractors.

2.8.2 Sewage Disposal

The sewerage system proposed will be a septic tank and leach drain system. The septic tank and leach drain system will be designed and constructed to meet WA Department of Health *and Public Health Act 2016* requirements, including AS/NZS 1546.1 *On-site Domestic Wastewater Treatment Units - Septic Tanks*.

These sewerage facilities will be sited to ensure an overcapacity contingency allowance in the tank sizing for foreseen peak demands in personnel numbers such as during maintenance shutdowns. The system installed will be suitably sized for twenty (20) personnel on site, with an additional design contingency of twenty (20) personnel, to ensure that the tanks can handle shutdown campaign levels without excessive pumping or management of sewage disposal.

2.9 Services

Due to the relatively isolated location of the Proposal site, the Proposal will essentially be self-sufficient in terms of services and infrastructure, as detailed below:

- Power generation will be provided on site utilising gas powered generators.
- Diesel generators will be provided as a back-up power source.
- Water will be sourced from on-site bores. It is calculated that 43,800 kilo litres per year will be required.
- Telecommunications will be via fibre optical cable that MEPAU will contract to be connected from the Brand Highway.

2.10 Water Management

2.10.1 Overview

Water will be used during all phases of the Proposal lifecycle (e.g. throughout drilling, production and decommissioning activities). As identified above in Section 2.5, the gas processing system within the WGP generates produced formation water (PFW) that requires specific treatment and disposal. Appropriately designed stormwater disposal is also required.

Well construction (or drilling) will use conventional drilling fluid systems, and cuttings generated from the activity will be separated from the fluid and stored in mud sumps (lined pits). Fluids will be reconditioned and recycled, however at the end of the program, the mud sump will contain a mixture of cuttings and drilling fluids. The management of drilling activities is regulated under the PGER Act which is administered by DMIRS. Further information regarding chemical management associated with drilling activities is described in Section 2.10.4).

2.10.2 Produced Formation Water

The production of hydrocarbons at the WGP will result in a large volume of PFW being generated. As such PFW management was a key factor considered during the design stage. The methods for managing PFW arising from onshore oil and gas operations include:

- Transport, treatment and disposal offsite,
- Storing (and evaporation) via evaporation ponds, and
- Re-injection into subsurface formations.

The volumes of PFW generated transport treatment and disposal offsite requires a significant amount of logistics and truck movements. This method results in both significant environmental and economic impacts arising from transport emissions and HSE risks. The design investigations concluded that re-injection with supplementary storage is the most efficient method for PFW management.

The water re-injection process involves the collection, storage, treatment and conveyance of PFW to be re-injected via disused wells into the formation voids that formerly contained gas reservoirs.

A comprehensive assessment of the technical issues regarding re-injection for the Proposal concluded that it is an appropriate method of PFW disposal. The assessment considered numerous wells and assessed their history, integrity, injectivity and in some cases conducted modelling to determine maximum injectivity

volumes. The evaluation concluded that WGP PFW will be re-injected into the following disused production wells:

- Hovea-11.
- Hovea-13ST 1.
- Eremia-04.

These disused wells are in or near the Hovea Production Facility (HPF) and are shown on Figure 2-6. The integrity of these wells has been assessed, with advice provided to DMIRS in preparation for subsequent operational regulatory approvals under the PGER Act.

To mitigate against potential operational issues with the water re-injection process, two (2) evaporation ponds have been designed and will be installed as a back-up. These ponds will be dual lined with High Density Polyethylene (HDPE) with a leak detection system between the liners and will be subject to ongoing monitoring to confirm integrity of the liners and water quality.

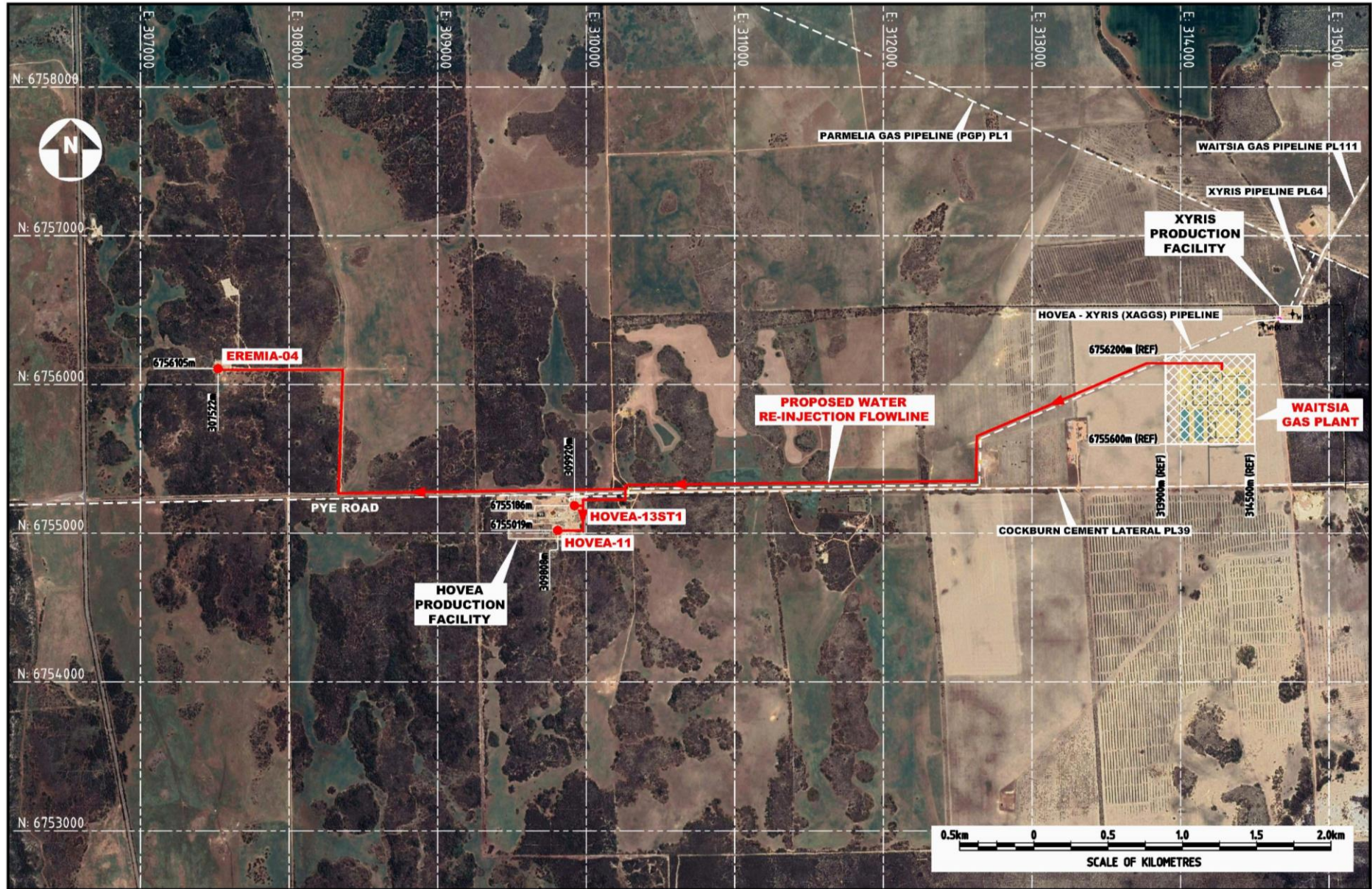


Figure 2-6: Process Water Re-injection Flowline Concept Plan

2.10.3 Surface Water Disposal and Management

The disposal and management of potentially contaminated stormwater will be via a comprehensive drainage system that collects and conveys the stormwater to an evaporation pond. The WGP site will also comprise several bunded areas that collect storm water that will then be transferred to the ponds via a drainage network.

The evaporation pond system will be dual lined with High Density Polyethylene (HDPE) with a leak detection system between the liners and be subject to ongoing monitoring to confirm integrity of the liners and water quality.

2.10.4 Chemical management

Drilling of wells, including chemical and wastewater management, is managed under the PGER Act and administered by DMIRS. Information about wastewater management is included to provide broader context. MEPAU will apply its current management practices to wells that are being developed as part of the Proposal, including chemical management and surveillance groundwater monitoring protocols.

The PGER (Environment) regulations require Operators to fully disclose all chemicals used down-hole during drilling operations. The chemicals MEPAU uses are assessed and approved by DMIRS for use and then made publicly available on the DMIRS website. Any environmentally hazardous chemicals stored on-site are stored in accordance with regulations, inside lined bunds and fenced areas.

Before drilling operations begin, MEPAU routinely undertakes baseline water quality studies and then conducts surveillance water quality monitoring during and after drilling operations and reports the results to regulatory authorities.

The surveillance monitoring program, including the proposed sampling method and location, is developed with advice from the DWER. The sampling procedure is conducted by a qualified independent technician with sign off from the landowner and company at the time of acquisition.

The samples are analysed by a NATA certified laboratory and copies of the analysis are provided to the landowners and appropriate regulatory body.

All groundwater monitoring results to date have been compliant.

2.11 Road Access

The Proposal area is relatively remote from Dongara-Port Denison, located approximately 16 km east-south-east of the townsites. The main access is via the Brand Highway and Pye Road. From Port Denison, to the south of Dongara, Kailis Drive and Pye Road provide another access route to the Proposal area. Pye Road finishes at the edge of the property on which the WGP is proposed to be located. After this point, it is a private farm road which is not available for general public access.

Pye Road is a lower order rural standard road that provides reliable access from the district road network to the Proposal area. Pye Road is utilised for access to a private road which in turn allows access to the XPF, the nearby Patience Sand Quarry, the Mondarra Gas Storage Facility (owned by APA) and several farming operations. MEPAU and APA currently jointly maintain the private road on behalf of the farmer.

2.12 Decommissioning

Since 2013, MEPAU, and subsidiaries, have been undertaking decommissioning activities throughout the Mid West petroleum permits as part of a campaign to progressively decommission and rehabilitate assets which are no longer in use. Decommissioning is an established industry practice undertaken at the end of life for a well, or facility, using a decommissioning plan approved by the government regulator. MEPAU is applying this specialist knowledge to the Proposal plans and is designing the project with the intention of returning each area affected to its former land use as per completion criteria developed and agreed with each landowner.

For example, the construction area of the WGP site is planned to be progressively returned to the landowner. When the WGP has eventually been decommissioned the site is also planned to be returned to the landowner for agricultural uses. Infrastructure such as access tracks and water bores that the landowner views as property improvements will be left in place for the landowner's ongoing use. Flowlines and other infrastructure may also be left in place with landowner consent. Well decommissioning involves environmentally sound and safe isolation of the well. Typical steps of the process include removing any production tubing, isolating productive formations from other formations by installing cement plugs at several intervals, pressure testing of the cement plugs, cutting off the well head below ground level, removing remaining surface equipment and facilities and rehabilitating the site to an agreed end use.

Landowners and nearby residents will be consulted prior to beginning any decommissioning activities.

Decommissioning and rehabilitation activities are subject to additional environmental approvals under the PGER (Environment) Regulations. Specifically, MEPAU is required to describe these activities within an EP that includes Environmental Performance Objectives and describe how these objectives are achieved. The EP is required to be accepted by DMIRS prior to decommissioning activities commencing.

3 STAKEHOLDER ENGAGEMENT

3.1 Overview –Stakeholder Engagement

MEPAU has a comprehensive integrated and inclusive stakeholder engagement plan in place for its operations in the northern Perth Basin. In accordance with this plan, which includes the Proposal, MEPAU has continually engaged with key stakeholders since the initial planning phase for the drilling of Senecio-03, the Waitsia gas field discovery well.

Engagement has continued throughout the drilling of subsequent appraisal wells (Waitsia-01, 02, 03 and 04) as well as Waitsia Stage 1 development and the Proposal planning phase. Initially the Proposal included a 100 TJ/day gas processing plant on Irwin Park Farm. The location and production size of the gas processing plant changed to the current site and 250 TJ/day production levels in late December 2018. MEPAU will continue to maintain effective communication with local and regional stakeholders throughout the delivery of the Project.

During this time, the key stakeholders that MEPAU has consulted include:

- Traditional Owners – Southern Yamatji through the Yamatji Marlpa Aboriginal Corporation (YMAC)
- Landowners (directly affected and adjacent).
- Local business owners and service providers.
- Residents and other stakeholders.
- Local Shires (Irwin, Coorow, Carnamah and Geraldton).
- Operators (ATP Parmelia Pty Ltd (APA), Australian Gas Infrastructure Group (AGIG), Patience Bulk Haulage).
- Government agencies (DMIRS, DWER, DPLH, DBCA, EPA, and the Mid West Development Commission).
- Joint Venture Partners (Beach Energy Limited, Norwest Energy NL).
- Membership organisations
- Mid West Chamber of Commerce and Industry (MWCCI)
- Australian Petroleum Production and Exploration Association (APPEA).

In addition, MEPAU conducts community perception surveys involving in-depth stakeholder interviews. They have been undertaken in 2015, 2016, 2017 and in 2019. The results are routinely shared with key stakeholders for their reference and use. Results of the 2019 survey showing key stakeholder issues and top ten questions are provided (Appendix A). MEPAU uses the results to update and refine the stakeholder engagement plan and associated activities.

A summary of engagement undertaken is provided in Table 3-1. The summary is not exhaustive. Engagement to date, shows the proposed mitigation measures meet local community interests in potential environmental impacts of the Proposal. In addition, feedback shows regional industry alliance and development organisations support this Proposal.

Table 3-1. Waitsia Gas Project Stage 2 stakeholder engagement summary

Stakeholder	Date	Type of Consultation	People Involved	Summary of Discussions	Outcomes of consultation
Local landowners	August 2016 - to present	Meetings and phone calls (averaging 2x month)	Potentially affected landowners and lessees within a ~5km radius of the proposed gas plant site (x7)	Proposal plans as well as land access matters.	<p>Key local stakeholders were kept up to date about Proposal plans and provided feedback.</p> <p>Changed proposed plant site to the current location due to the larger plant.</p> <p>Updated and developed land access agreements.</p>
Local Community	<p>16 August 2016</p> <p>26 October 2016</p> <p>7 December 2016</p> <p>16 February 2017</p> <p>10 May 2017</p> <p>8 November 2017</p>	Independently facilitated community roundtable workshops (x6 meetings, average of x21 people/workshop)	<p>Local residents, business owners and service providers (x12)</p> <p>Regional development agencies – MWDC (x1)</p> <p>Shire – Elected officials and senior personnel (x2)</p> <p>Regulators – DMIRS and DWER (x2)</p> <p>Perth based environmental NGO (x1)</p> <p>MEPAU personnel –Project, Operational and External Affairs personnel (x3)</p>	<p>Roundtable participants identified and prioritised issues including:</p> <ul style="list-style-type: none"> • Project and activity schedules • Regulatory approvals processes • Environmental baseline and surveillance monitoring (e.g. soil, air, groundwater) • Chemicals used during drilling activities and comparison to other industries • Regulatory investigation/audit results • Well integrity and historic wells • Decommissioning and rehabilitation • Gas consumers • Use of local service providers • Other resources developments 	<p>Provided key stakeholders access to detailed information about Operational activities as well as plans for the Proposal.</p> <p>In-depth examination of issues of interest identified by stakeholders.</p> <p>Consideration of feedback provided by workshop participants.</p> <p>Improved understanding of the various regulatory approvals processes, mainly environmental, required for the operational and development activities.</p>

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Stakeholder	Date	Type of Consultation	People Involved	Summary of Discussions	Outcomes of consultation
	August 2016, August 2017 August 2018 and August 2019	Regional event	Mingenew Expo – local landowners, elected officials, agricultural service providers MEPAU – Operational, Project and External Affairs personnel (x3)	MEPAU regularly hosts an information booth and staff are available to engage with expo attendees. The expo is the largest agricultural field day in the Mid West. Issues raised included: <ul style="list-style-type: none"> • opportunities for local businesses • project timing • historic exploration activity in the area 	Key stakeholders kept up to date about Proposal plans and provided feedback to MEPAU.
	From November 2017 - present	Website updates	Subscribers (~50)	Updates include: <ul style="list-style-type: none"> • Flow test updates • Information exchange sessions 	Key stakeholders kept up to date about Proposal plans and opportunities to provide feedback.
	15 May 2019	Email	Roundtable participants (~21) Landowners (x7) MEPAU Mid West website subscribers (~50) Shire of Irwin and City of Greater Geraldton (x2) Regulators (x4) Environmental NGOs (x2)Regional development agencies (x1) Local service providers (x10)	Email and flyer advising of upcoming Information exchange session including Proposal details	Promoted awareness of information exchange session and the Proposal to local stakeholders.
	22 May 2019 29 May 2019	Advertisement	Local newsletter readers	Advertisements for upcoming Information exchange session including Proposal details	Promoted awareness of information exchange session and the Proposal to local stakeholders.

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Stakeholder	Date	Type of Consultation	People Involved	Summary of Discussions	Outcomes of consultation
	29 May 2019	Information exchange session	Local residents, service providers, regional agencies, local newsletter, regional high school students and teachers (x23) MEPAU personnel – Executive, Project, Operational, Decommissioning and External Affairs personnel (x10)	Issues raised included: <ul style="list-style-type: none"> • regional economic benefits • opportunities for local businesses • timing of the project • produced wastewater reuse • gas export • decommissioning 	Key stakeholders were kept up to date about Operational activities as well as Proposal plans and were able to provide feedback.
Traditional Owners	30 March 2015	Aboriginal Heritage Survey	Amangu representatives (x5) Consultant Anthropologist (x1)	Engaged local Aboriginal groups to assist in site heritage survey for Waitsia project area.	Survey results established there are no Aboriginal heritage sites within or in close proximity to the surveyed proposed well site.
	21 June 2016	Verbal and written	Amangu representatives (x2) MEPAU – External Affairs (x1)	Activities update provided, including Waitsia project	Key stakeholders kept informed of proposed activities.
	15 August 2016	Meeting	Amangu elders (x7)	Activities update including Waitsia Gas Project.	Key stakeholders were kept up to date about Operational activities as well as Proposal plans and were able to provide feedback.
	28 November 2017	Meeting	Southern Yamatji Working Group – senior representatives (~40) MEPAU – Operations and External Affairs personnel (x2)	Activities update including Waitsia Gas Project.	Key stakeholders were kept up to date about Operational activities as well as Proposal plans and were able to provide feedback.
	13 December 2018	Meeting	Southern Yamatji Working Group – senior representatives (~40) MEPAU and JV Partner – Legal and External Affairs personnel (x4)	Activities update including Waitsia Gas Project.	Key stakeholders were kept up to date about Operational activities as well as Proposal plans and were able to provide feedback.
	7 February 2019	Meeting (informal)	Southern Yamatji Working Group (x2)– senior representatives	Activities update including Waitsia Gas Project. Key area of interest was potential training and employment	Key stakeholders were kept up to date about Operational activities as well as

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Stakeholder	Date	Type of Consultation	People Involved	Summary of Discussions	Outcomes of consultation
			MEPAU (x2) – Operational and External Affairs personnel	opportunities arising from the Proposal.	Proposal plans and were able to provide feedback.
Mid West Development Commission (MWDC)	12 December 2018	Regional event	MWDC hosted a Renewable Hydrogen Forum. It was attended by a number of government agencies and representatives of petroleum and energy companies and opened by the Minister for Regional Development.	Status of Mid West renewable hydrogen initiative announced by Government and interest by potential renewable energy users.	Increased awareness of status of renewable energy options for future consideration.
	25 March 2019	Informal briefing	MWDC (x1) CEO MEPAU (x1) – External Affairs personnel	Status update on the Proposal and timing.	Key stakeholders were kept up to date the Proposal status and were able to provide feedback.
	23 May 2019	Meeting	MWDC (x2) -CEO and Project Manager	Update on the Proposal and advice about business opportunities, including traditional owner businesses.	Key stakeholders were kept up to date about the Proposal plans and were able to provide feedback and advice about local service provider contacts.
Mid West Chamber of Commerce and Industry (MWCCI)	7 February 2017	Regional event	Wide range of Mid West business and community leaders, elected officials and media (~225) MEPAU – CEO and External Affairs personnel (x2)	CEO gave a presentation about Mid West activities, especially the Waitsia Gas Project – Stage 2. Support shown for Proposal, especially regional business opportunities.	Provided update to key stakeholders and promoted company ongoing commitment to the Mid West.
	12 December 2018	Event	MWCCI – members (x150) MEPAU – Project and External Affairs personnel (x2)	Opportunity to network with local business community and to give general update on proposed Waitsia development	Key stakeholders were given overview of Operational activities as well as Proposal plans and were able to provide feedback.
	28 February 2019	Event	MWCCI – members (x60) MEPAU – Project and External Affairs personnel (x2)	Opportunity to network with local business community and to give general update on proposed Waitsia development	Key stakeholders were given overview of Operational activities as well as Proposal plans and were able to provide feedback.

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Stakeholder	Date	Type of Consultation	People Involved	Summary of Discussions	Outcomes of consultation
Midwest Employment and Economic Development	20 February 2019	Email and phone calls	MEEDAC – personnel (x1) MEPAU – External Affairs personnel (x1)	MEEDAC services and potential employment/training opportunities at MEPAU facilities and projects.	Awareness of the Proposal and potential employment/training opportunities, especially through lead contractors.
	23 July 2019	Email and phone calls	Expo organisers	Update on Waitsia Gas Project and potential employment/training opportunities	Awareness of expo opportunity and Proposal timing.
Local Operators	28 October 2016	Meeting	APA –(x2) operational and technical personnel w MEPAU (x2) – Project and Drilling personnel	Development plans for the Proposal, including proposed well locations near Mondarra Gas Storage Facility.	Awareness of respective development and operational plans and agreement on well location proposal.
	14 March 2018	Meeting	Tronox (x3)– Operational and Environmental personnel MEPAU (x3) – Project, Operational and External Affairs personnel	Development plans for the Proposal and for the approved mineral sand mine in the Dongara region.	Awareness of respective development and operational plans.
	27 March 2018	Meeting	Patience Bulk Haulage – Managers (x2) MEPAU – Project and External Affairs personnel	Development plans for the Proposal and for the sand quarry.	Awareness of respective development and operational plans.
	18 January 2019	Meeting	APA (x2) - Asset Manager (WA & NT) and General Manager WA MEPAU (x6) – Project personnel	Development plans for the Proposal, including Waitsia Gas Stage 1 and Stage 2.	Agreed to continue exploring opportunities for working together on Perth Basin gas processing opportunities.
	4 April 2019	Meeting	APA– 2 attendees: Asset Manager (WA & NT) and General Manager WA MEPAU – Project personnel (x4) – MEPAU – Gas Marketing, Legal and Project personnel	Update on Waitsia Gas Project and potential gas export pipeline routes to DBNGP.	Discussed options for design and construction of the combined Waitsia Stage 1 and Stage 2 export pipeline.

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Stakeholder	Date	Type of Consultation	People Involved	Summary of Discussions	Outcomes of consultation
	Ongoing	Meetings	Mid West onshore facilities operators through APPEA working group (x 5) MEPAU – Executive, Engineering and External Affairs personnel	Development and activities planned by regional Operators.	Awareness of respective development and operational plans.
Department of Biodiversity and Conservation Attractions (DBCA)	9 October 2018	Site tour	DBCA – Regional personnel (x2) Environmental Management Branch (x3) MEPAU – Operations and Environmental personnel (x4)	Visited Waitsia-03 well pad and discussed proposed Waitsia-03 flowline route.	No issues raised
Department of Mines, Industry Regulation and Safety (DMIRS)	12 June 2018	Briefing	DMIRS – Petroleum Environment Branch Personnel (x3) MEPAU – Project, Operational personnel (x4)	Activity update, including the Proposal.	Clarified required regulatory approvals and likely timeframes to meet project schedule.
	1 November 2018	Meeting	DMIRS – Petroleum Engineering personnel (x7) MEPAU – Executive, Project and Subsurface Drilling personnel (x3)	Discussed subsurface engineering and field management plan updates, including Waitsia Gas Project.	Clarified required regulatory approvals and likely timeframes to meet project schedule.
	12 December 2018	Meeting	DMIRS – Safety personnel (x2) MEPAU – Project, Operations and Safety personnel (x4)	Provided MEPAU activities update including Waitsia Gas Project and discussed safety approvals required.	Clarified required regulatory approvals and likely timeframes to meet project schedule.
	15 January 2019	Meeting	DMIRS – Petroleum environmental personnel (x2) MEPAU – Environmental personnel (x3)	Provided MEPAU activities update including Waitsia Gas Project and discussed environmental approvals required for WGP development.	Clarified required regulatory approvals (i.e. submit EP for geotechnical survey).
	9 May 2019	Meeting	DMIRS senior managers – Titles, Compliance,	Provided MEPAU activities update including Waitsia Gas Project	Clarified required regulatory approvals and likely timeframes to meet project schedule.

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Stakeholder	Date	Type of Consultation	People Involved	Summary of Discussions	Outcomes of consultation
			MEPAU – Executive, Project, Operations and External Affairs personnel (x6)		
	23 May 2019	Meeting	DMIRS environmental personnel (x2) MEPAU – Executive, Project, Operations and Environmental personnel (x5)	Provided MEPAU activities update including Waitsia Gas Project progress.	Clarified required regulatory approvals and likely timeframes to meet project schedule.
	28 June 2019	Meeting	DMIRS – Compliance, Technical, and Title personnel (x6) MEPAU – Executive, Legal, Project, Engineering, External Affairs, Safety personnel (x6)	Provided MEPAU activities update including Waitsia Gas Project.	Clarified required regulatory approvals and likely timeframes to meet project schedule.
Department of Planning, Land and Heritage (DPLH)	21 February 2019	Phone call and emails	DPLH – Planning personnel (x2) MEPAU – External Affairs personnel (x1)	Discussion related to Reserve 10877 (Lot 12297_DP220114) PGER Act and section 15 management of other agency interface with petroleum activities. Activities on state reserves.	General recognition that DMIRS via PGER Act is lead agency for interfacing with other government agencies on activities on state reserves.
Department of Water and Environmental Regulation (DWER) EPA Services Unit	16 June 2016	Meeting	DWER personnel (x2) MEPAU – Project and External Affairs (x2)	Overview of field development proposal including timing and location of drilling.	Confirmed policy meant proposed appraisal drilling wells would not require referral under the EP Act as potential environmental impacts would not be significant. The approvals process led by DMIRS would adequately consider potential environmental impacts.
	26 February 2019	Phone call	DWER – Assessment personnel (x1) MEPAU – External Affairs personnel (x1)	Discussed Waitsia update and identified next steps (eg meeting and timing) to help plan regulatory approvals requirements and schedule.	Arranged pre-referral meeting

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Stakeholder	Date	Type of Consultation	People Involved	Summary of Discussions	Outcomes of consultation
	June 2019	Briefing	DWER – Assessment personnel (x2)	Pre-referral meeting	Understanding of the referral and assessment process
	16 July 2019	Briefing	DWER – Assessment personnel (x2) MEPAU – Project and External Affairs personnel (x3)	Pre-referral meeting follow up	Draft referral status
Department of Fire and Emergency Services (DFES)	6 March 2017	Email	DFES - District Officer Mid West/Gascoyne South	Notification of upcoming drilling and well test campaign. Advice on any site specific requirements from a fire risk mitigation perspective for use when preparing Fire Ban exemption application.	Key stakeholder awareness of planned activities. Prepare Fire Ban exemption application incorporating advice.
Department of Water and Environmental Regulation (DWER)	14 July 2016	Meeting	EPA Services Unit (x2) MEPAU (x3)	Waitsia activities update, including drilling and field development plans. No specific feedback provided on proposed appraisal activity.	Proceed with DMIRS led approvals processes.
	13 December 2017	Meeting	EPA Services Unit (x2) MEPAU (x2)	Briefing to EPA regarding Waitsia-03 flowline route and 100 Tj/Day gas plant	Agreed EPBC referral regarding Waitsia-03 suggested to de-risk project. DMRIS lead approvals process.
	2 April 2019	Meeting	DWER Air quality branch (x2) MEPAU (x3)	Discussed air quality modelling approach for Waitsia Stage 2 (this proposal)	Confirmed modelling approach as used in this proposal. Use of Caversham data in lieu of other information acceptable. Collection of monitored data for WGP2 suggested. Proceed with DMIRS led approvals processes if assessment criteria conservatively met.

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Stakeholder	Date	Type of Consultation	People Involved	Summary of Discussions	Outcomes of consultation
	10 May 2019	Meeting	EPA Services Unit (x2) MEPAU (x4)	Briefing to EPA regarding 250 Tj/Day gas plant (this Proposal) EPA referral being developed	Proceed with EPA referral development
	16 July 2019	Meeting	EPA Services Unit (x2) MEPAU (x3)	Pre-referral meeting. Clarifications on referral development sought.	Proceed with EPA referral development
Department of Jobs, Tourism, Science and Innovation (JTSI)	4 April 2019	Meeting	JTSI – Executive and Managers (x5) MEPAU – Gas Marketing and Legal personnel	Discuss sanctioning options for Waitsia gas project.	Support for the Proposal.
	4 July 2019	Meeting	JTSI – Executive MEPAU – Gas Marketing and Legal personnel	Discuss sanctioning options for Waitsia gas project.	Support for the Proposal.
Water Corporation	2 March 2018	Email	Water Corporation - Manager Property Portfolio MEPAU – project personnel (x1)	Discussion related to survey and construction works on Reserve 10877 (Lot 12297_DP220114)	Water corporation listed as responsible agency for Reserve 10877. Has no objection to DPLH issuing access and indemnity agreement over land. DMIRS PGER Act to be followed.
Local Government	10 July 2018	Phone call and letter	Shire of Irwin – Planning personnel (x1) MEPAU – Project personnel (x1)	Clarified planning approvals by the Shire for the Waitsia Gas Project	Confirmed previous discussions with AWE and consultant’s advice that no Development Application was required for Waitsia Stage 2 as it was covered under the PGER Act.
	21 February 2019	Email	Shire of Carnamah – Senior staff (x1) MEPAU – External Affairs personnel (x1)	Sent email with MEPAU background activities update, including Waitsia Gas Project	Key stakeholders kept informed of proposed activities and feedback provided.
	25 February 2019	Phone call and email	Shire of Irwin – Planning personnel (x1) MEPAU – Project personnel (x1)	Discussed Waitsia Gas Project Stage 2 and the request for flowlines to cross unmade road reserves.	Shire in general supportive of request. Importance to bury pipeline to sufficient

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Stakeholder	Date	Type of Consultation	People Involved	Summary of Discussions	Outcomes of consultation
					depth. Keep flowline route to as close as possible to the edge of road reserve.
	28 February 2019	Briefing (informal)	Shire of Irwin Councillor (x1) and Senior staff (x1) MEPAU –External Affairs personnel (x1)	Activities update including Waitsia Gas Project and community investment opportunities.	Key stakeholders kept informed of proposed activities and feedback provided.
	23 May 2019	Regional business event	City of Greater Geraldton – Shire Mayor, CEO and senior personnel (x4) MEPAU – External Affairs (x1)	Provided activities update including overview of Proposal. Support for Proposal shown.	Key stakeholders kept informed of proposed activities and feedback provided.
	28 May 2019	Briefing	Shire of Irwin Councillors (x6) and Senior staff (x3) MEPAU – Executive, Project, Operation and External Affairs personnel (x4)	Activities update including Waitsia Gas Project. Feedback highlighted interest in economic benefits of the project and also the Decommissioning Project ongoing progress.	Key stakeholders kept informed of proposed activities and feedback provided. Support for Proposal shown.
Elected officials	15 August 2018	Informal briefing	Regional elected officials (Commonwealth and State) x3 MEPAU (x3) – Executives, Project and External Affairs personnel	Activities update including Waitsia Gas Project. Main interest was on the potential Proposal economic benefits.	Key stakeholders were kept up to date about Operational activities as well as Proposal plans and were able to provide feedback.
	23 April 2019	Briefing	Office of the Minister for Mines (x1)– Senior Advisor (x1) MEPAU (x2) – External Affairs personnel	MEPAU activities update, including the proposed Waitsia Gas Project and options being considered.	Key stakeholders were kept up to date about Operational activities as well as Proposal plans and were able to provide feedback.
	11 June 2019	Briefing	Regional elected officials (x3) – Labor, National and Liberal party officials MEPAU – Executive and External Affairs personnel	MEPAU activities update, including the proposed Waitsia Gas Project. Ongoing support for the Proposal provided, especially for forecast regional economic benefits.	Key stakeholders were kept up to date about Operational activities as well as Proposal plans and were able to provide feedback.

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Stakeholder	Date	Type of Consultation	People Involved	Summary of Discussions	Outcomes of consultation
	18 June 2019	Briefing	Office of the Minister for Mines– Chief of Staff MEPAU – Gas Marketing and External Affairs personnel	Sanctioning options for the Waitsia Gas Project	Key stakeholders were kept up to date about Operational activities as well as Proposal plans and were able to provide feedback.
	26 July 2019	Briefing	Office of the Minister for Environment (x2) – Senior Advisors MEPAU (x3) – Executive and External Affairs personnel	MEPAU activities update, including the proposed Waitsia Gas Project. Timing of environmental approvals particularly the s.38 referral to the EPA by MEPAU.	Key stakeholders were kept up to date about Operational activities as well as Proposal plans and were able to provide feedback.
Education Institutions	27 February 2019	Meeting	CR TAFE – Course Administrators (x2) MEPAU – Operations and External Affairs personnel (x2)	MEPAU STEM scholarships at CR TAFE and potential employment/training opportunities. Update on Proposal scope and timing.	Awareness of the Proposal timing and identifying work experience opportunities for MEPAU scholarship recipients.
	Q1-Q3 2019	Career program	Dongara District High School and Jurien Bay District High School students and teachers (x23) MEPAU – Executive, Operational, Project and External Affairs personnel	Update on Waitsia Gas Project and potential employment/training opportunities Sponsoring the Next Generation high school career initiative, including hosting site tours, class-room activities and a careers expo for Dongara District High School and Jurien Bay District High School	Awareness by regional students and teachers of the Proposal and of careers available through the onshore petroleum sector.
Media	13 March 2019	Email and phone call	Business News (WA) – Journalist (x1) MEPAU – External Affairs personnel (x1)	Status of Waitsia Gas Project and company.	Media article about the Proposal in a state- wide business journal.
	13 March 2019	Email and phone call	West Australian – Journalist (x1) MEPAU – External Affairs personnel (x1)	Enquiry about Government policy developments and Waitsia Gas Project status.	Media article about the Proposal in the state-wide newspaper.

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Stakeholder	Date	Type of Consultation	People Involved	Summary of Discussions	Outcomes of consultation
	28 May 2019	Email and phone call	Geraldton Guardian – Journalist (x1) MEPAU – External Affairs personnel (x1)	Enquiry about Waitsia Gas Project.	Media article about the Proposal in the local regional newspaper.

3.2 Stakeholder Engagement – Key Outcomes

Outcomes from the ongoing stakeholder engagement are summarised below:

- Overall, there has been strong support shown for the Proposal from the initial to the current design.
- Regional economic development and local employment opportunities are priority issues shared across all stakeholder groups at local, regional and state levels.
- Regular engagement with directly affected and immediate neighbours of the project have consistently shown support and provided feedback during project design phase. This has included matters such as the location of some facilities and access routes. Initial concerns regarding potential impacts such as noise and visual amenity were limited and were resolved early in the Proposal design phase.
- Land access agreements, addressing compensation, are in place with each landowner directly affected by the Proposal.
- MEPAU is in the final stages of negotiating Production Licences L1 and L2 permit renewal with the registered Native Title claimants, Southern Yamatji, in the context of Right To Negotiate under the *Native Title Act 1993*. The key issues raised during negotiation discussions and also through general engagement with Southern Yamatji representatives have been providing support for Traditional Owners' businesses as well as training and employment opportunities, especially those likely to be generated by the Proposal.
- Briefings with key senior elected officials and government agencies have all been supportive.

Interaction with the broader community is summarised in the following points:

- Engagement with the residents from Irwin townsite has mainly been through the community roundtable workshops, website updates, one-on-one meetings and regional events such as the Mingenew Expo. Anecdotal feedback shows the interface is being managed well with anticipated concerns about amenity, noise and air emissions being addressed with presentation of more detailed design and quantitative information about the Proposal.
- A community information exchange session was held on 29 May 2019 in Dongara-Port Denison presenting the latest Proposal design to the broader community. The session was broadly promoted with advertisements placed in the local newsletter, emails sent to regular participants of the Community Roundtable Workshops and landowners, website announcements and direct invitations. A promotional flyer is provided (Appendix B). Approximately 35 people attended the session. A summary of the discussion items follows:
 - Land use change – showed that the proposed WGP is located on cleared, low productivity, farmland and close to other similar facilities – a “good” location.
 - Visual amenity – showed the plant in comparison to other nearby facilities and that the proposed location and design minimises visual impact.
 - Environmental management – showed potential impacts for air, noise and water as well as the proposed management measures.
 - Benefits of ongoing presence in the Mid West region – this is the top stakeholder query, including what the Proposal will provide regionally to the community in terms of investment and facilities.
- Since the Waitsia gas field discovery, local media have frequently reported on the Waitsia gas field and Proposal plans. Following the Community Information Exchange Session in May, the local regional newspaper included an article about the development plans and focussed on the regional economic benefits it would bring. No media or stakeholder enquiries have been received since then.

3.3 Waitsia Gas Project Stage 2 – Proposed Stakeholder Engagement

Ongoing engagement will be carried out throughout the life of the Proposal. The following range of activities is planned during the approvals, construction, operations and decommissioning phases:

- Individual briefings for interested landowners, Traditional Owners and community groups.
- Ongoing briefings of elected officials, regulators and government agencies.
- Participating in relevant regional events.
- Continued liaison with MWDC and MWCCI regarding local content opportunities and participating in any workshops held by the lead contractor to assist local service providers with contract opportunities.
- Ongoing community information exchange and activity update events, including another information exchange session following the Proposal referral submission and at the completion of the Proposal design phase, shortly after the FID has been made.
- An updated stakeholder perception survey for 2020 and subsequent years.
- Ongoing updates on the Mid West stakeholder website communicating key Proposal details, including timing.
- A community celebration of commencement of Proposal operations, like the community celebration held for Waitsia Stage 1.

4 ENVIRONMENTAL PRINCIPLES AND FACTORS

4.1 Principles

Section 4A of the EP Act establishes the object and principles of the Act. In accordance with the EPA Statement of Environmental Principles, Factors and Objectives (EPA 2018), this section describes how each of the five principles of the EP Act has been applied to the Proposal (Table 4-1).

Table 4-1: Environmental Protection Act 1986 Principles

Principle	Summary of the Proposal Against EP Act Principles
<p>Precautionary principle</p> <p>Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, decision should be guided by:</p> <p>a. Careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and</p> <p>b. An assessment of the risk-weighted consequences of various options.</p>	<p>The Proposal has a relatively small disturbance footprint as a significant proportion of the development is located on previously disturbed and cleared areas. Baseline and targeted flora and fauna surveys have been undertaken for the vegetated areas potentially impacted by the Proposal which indicate no conservation significant flora or vegetation is present. Assessments for all key factors including noise and air emissions indicate potential impacts are insignificant and manageable.</p> <p>The conclusion is that the Proposal does not present a threat of serious irreversible damage (direct or otherwise) to the environment.</p>
<p>Inter-generational equity</p> <p>The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.</p>	<p>Significant environmental impacts are not expected from the Proposal. The Proposal has minimised environmental disturbance to ensure the health, diversity and productivity of the environment is maintained.</p>
<p>Conservation of biological diversity and ecological integrity</p> <p>Conservation of biological diversity and ecological integrity should be a fundamental consideration.</p>	<p>The Proposal will not threaten biological diversity or ecological integrity</p>
<p>Principles relating to the improved valuation, pricing and incentive mechanisms</p> <p>a. Environmental factors should be included in the valuation of assets and services.</p> <p>b. The polluter pays principle – those who generate pollution and waste should bear the cost of containment, avoidance or abatement.</p> <p>c. The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any wastes.</p> <p>d. Environmental goals, having been established, should be pursued in the most cost - effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solutions and responses to environmental problems.</p>	<p>The Proposal has considered the principles relating to the improved valuation, pricing and incentive mechanisms as appropriate for the activity.</p> <p>Environmental factors have been included during design and in the decision making throughout the Proposal development. For example, the vegetation footprint has been reduced to ALARP, the WGP location has been selected to minimise impacts to stakeholders and operational efficiency has been evaluated in reviewing processing technologies.</p> <p>The pollution and wastes arising from the Proposal have been identified, and MEPAU acknowledge that the cost associated with the management of these form part of this Proposal.</p> <p>Justification for the Proposal includes incentives to reduce the environmental footprint and costs via:</p> <ul style="list-style-type: none"> • Promoting increased economic activity in the region (Section 4.8.7), • Minimise the volume of GHG emissions generated from the Proposal via

Principle	Summary of the Proposal Against EP Act Principles
	<ul style="list-style-type: none"> Assessing the operational efficiency of a wide range of processing technologies; and Considering the use of renewables to reduce the operational emissions.
Waste minimization All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.	The Proposal will generate minimal waste streams. Key waste streams have been evaluated and management techniques identified to minimise environmental impacts. Wastewater is collected and treated with conventional methods.

4.2 Identification of Key Environmental Factors

Key environmental factors are those parts of the environment that may be impacted by an aspect of a Proposal. The EPA has 14 environmental factors, organised into five themes: Sea, Land, Water, Air and People.

The key environmental factors and the EPA's objectives are provided in Table 4-2. The relevance of each factor to the Proposal is summarised and the Key Environmental Factors that require further consideration have been identified.

Table 4-2: Identification of Key Environmental Factors

Factor	Objective	Relevance to Proposal	Key Factor
Sea			
Benthic Communities and Habitat	To protect benthic communities and habitat so that biological diversity and ecological integrity are maintained.	No impacts to benthic habitats.	No
Coastal Processes	To maintain the geophysical processes that shape coastal morphology so that the environmental values of the coast are protected.	No impacts to coastal processes.	No
Marine environmental quality	To maintain the quality of water, sediment and biota so that environmental values are protected.	No impacts to marine environmental quality.	No
Marine fauna	To protect marine fauna so that biological diversity and ecological integrity are maintained.	No impacts to marine fauna.	No
Land			
Flora and Vegetation	To protect flora and vegetation so that biological diversity and ecological integrity are maintained.	Flowline construction will require some vegetation clearing.	Yes
Landforms	To maintain the variety and integrity of significant physical landforms so that environmental values are protected.	The impact on the landform of the Proposal site and its surrounds is not significant.	No

Factor	Objective	Relevance to Proposal	Key Factor
Subterranean Fauna	To protect subterranean fauna so that biological diversity and ecological integrity are maintained.	The Proposal will not impact on subterranean fauna. Investigations conducted by AWE for previous projects in the area indicate that although there is the potential for subterranean fauna to be present, as suitable habitat is linked to groundwater, similarly to their presence in the Pilbara, they are not expected to be present in the Proposal area much deeper than 30 m (Halse et al. 2014). Given the nature of these activities, the construction of petroleum wells and re-injection of PFW into deep formations (~2 km below the ground surface) is not expected to result in any interaction or disturbance to subterranean fauna.	No
Terrestrial Environmental Quality	To maintain the quality of land and soils so that environmental values are protected.	The Proposal site is a cleared, agricultural paddock. Acid sulfate soils are not present. Erosion potential will be managed through design.	Yes
Terrestrial Fauna	To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.	Construction will impact natural habitat.	Yes
Water			
Inland Waters	To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.	Inland waters occur near the Proposal, including groundwater and surface water.	Yes
Air			
Air Quality	To maintain air quality and minimise emissions so that environmental values are protected.	The Project will create new air emissions.	Yes
People			
Social Surroundings	To protect social surroundings from significant harm.	The Project area is within a low-density rural area, but with existing dwellings nearby. Potential noise and visual amenity issues may be created.	Yes
Human Health	To protect human health from significant harm	No adverse human health impacts expected.	No

4.3 Key Environmental Factor – Flora and Vegetation

4.3.1 EPA Objective

To protect flora and vegetation so that biological diversity and ecological integrity are maintained.

4.3.2 Legislation, Policy and Guidance

- *Environmental Protection Act 1986 (EP Act).*
- *Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (Clearing Regulations).*
- *Biodiversity Conservation Act 2016 (BC Act).*

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- Technical Guidance Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016a).
- Environmental Factor Guideline Flora and Vegetation (EPA 2016b).
- Protection of Naturally Vegetated Areas Through Planning and Development, Environmental Protection Bulletin No. 20 (EPA 2013).

4.3.3 Receiving Environment

Desktop assessments of the Proposal area, Targeted Surveys and a Detailed Survey as defined in Sections 4.2 and 4.3 of the *Technical Guidance for Flora and Vegetation Surveys for Environmental Impact Assessment* (Environmental Protection Authority (EPA) 2016a) have been undertaken to gain an understanding of the flora and vegetation composition of the Proposal area. Although a desktop assessment was conducted for the entire Proposal area, Targeted and Detailed surveys focused on the area of native vegetation considered to be the most intact, namely the area of vegetation detailed in Appendix H (Figure 1E), that will be impacted by construction of a flowline.

In addition to the surveys completed specifically to support this Proposal, the flora and vegetation composition for the Proposal area and surrounds, are well understood given the numerous surveys that have been conducted for previous oil and gas activities in the area. Flora and vegetation studies relevant to the Proposal are provided in Table 4-3.

Table 4-3 Baseline Studies – Flora and Vegetation

Year Survey Completed	Consultant	Survey Name ⁷
2004a	Woodman Environmental	Proposed Xyris Pipeline Vegetation Assessment. Unpublished report prepared for ARC Energy, July 2004.
2004b	Woodman Environmental	Denison 3D Seismic Survey Flora and Vegetation Study. Unpublished report prepared for ARC Energy and Origin Energy, December 2004.
2004c	Woodman Environmental	Proposed Xyris Area Gas Gathering System (XAGGS) Vegetation Assessment. Unpublished report prepared for ARC Energy, December 2004.
2015	Maia Environmental Consultancy	AWE Perth Pty Ltd, Waitsia Gas Field: Flora and Vegetation Desktop Study, February 2015
2016	Maia Environmental Consultancy	Waitsia-04 Area Level 1 Flora and Vegetation Reconnaissance and Targeted Flora Survey ⁸ .
2018a	Woodman Environmental	Waitsia-03 – Flowline Corridor - Flora, Vegetation and Fauna Assessment (including a Level 2 Flora and Vegetation assessment along the proposed flowline route and wider area).
2018b	Woodman Environmental	Proposed Xyris Lateral – Flora and Vegetation Assessment
2019	Woodman Environmental	Waitsia Gas Project Stage 2 – Xyris West Vegetation Desktop Review.

The Woodman Environmental reports (2018a, 2018b and 2019) are provided as Appendix C.

⁷ Surveys were completed prior to IBSA requirement coming into effect

⁸ Note that the report title refers to initial well location name. Well location name was changed from Waitsia-04 to Waitsia-03 following the survey.

4.3.3.1 Regional Biogeography

The Proposal is within the Geraldton Sandplains IBRA (Interim Biogeographic Regionalisation for Australia) Bioregion (DoEE, 2012). The vegetation of the region is described as scrub heath on sandplains near the coast, composed mainly of proteaceous shrub-heaths, rich in endemics, on the sandy earths of an extensive, undulating, lateritic sandplain (Beard 1990; Desmond and Chant 2001).

The Proposal area occurs specifically within the Geraldton Sandplains 3 (Lesueur Sandplain) subregion. The subregion contains shrub-heaths rich in endemics occurring on a mosaic of lateritic mesas, sandplains, coastal sands and limestones, with heath on lateritised sandplains occurring along the subregion's north-eastern margins (Desmond and Chant 2001).

Significant conservation areas in the broader Proposal areas include recommended Red Book Reserves, DBCA reserves, nature reserves and riparian vegetation. Figure 4-1 provides details the Development Envelope within the regional environmental values. No regional environmental values will be impacted by this Proposal.

4.3.3.2 Vegetation Communities

Using Beard (1976) and Shepherd et al. (2002), four broadscale vegetation communities are present within the Proposal area (Table 4-4). These communities are relatively well represented with even the smallest vegetation community Eridoon_433 estimated to comprise 69% of the pre-European extent remaining (Table 4-4).

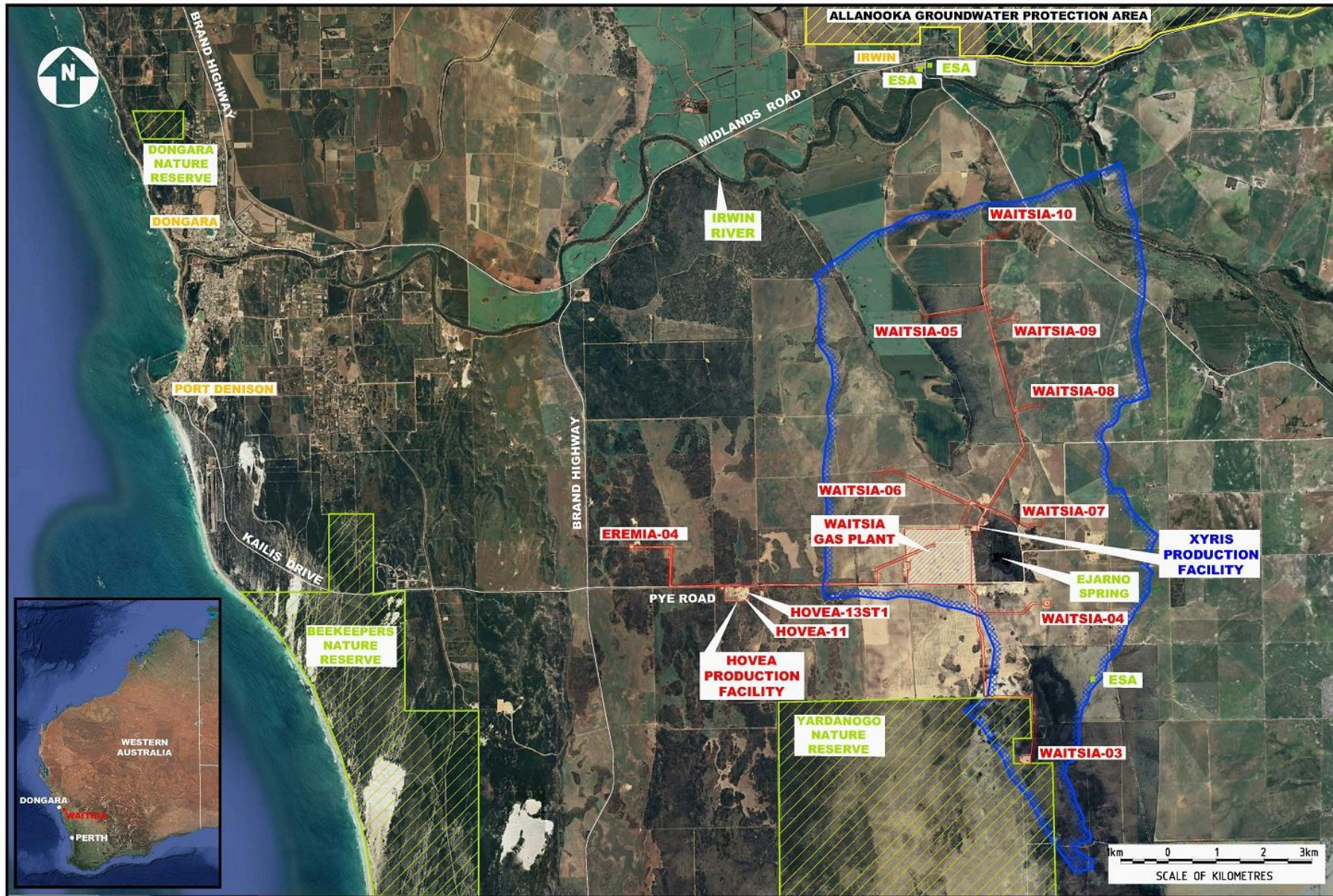
Table 4-4: Extent of the Vegetation System of the Project Area (Government of Western Australia, 2018)

Vegetation System	Description	Current Extent (ha)	IBRA Region Extent (ha)	Percentage of Pre-European Extent Remaining	Percentage of Current Extent Reserved for Conservation
Illyarrie_433	Mosaic: Shrublands; Acacia rostellifera & Melaleuca cardiophylla thicket / Sparse low woodland; illyarrie	14,746.34	14,327.99	45.43	10.87
Eridoon_378	Shrublands; scrub-heath with scattered Banksia spp., Eucalyptus todtiana and Xylomelum angustifolium on deep sandy flats in the Geraldton Sandplain Region	60,826.7	60,826.7	65.0	21.9
Eridoon_392	Shrublands; Melaleuca thyoides thicket	429.8	429.8	97.9	3.3
Eridoon_433	Mosaic: Shrublands; Acacia rostellifera & Melaleuca cardiophylla thicket / Sparse low woodland; illyarrie	132.73	132.73	69.08	49.68

For the purpose of discussing this key environmental factor, vegetation within the Proposal area was split into two key areas:

- General Vegetation; areas that have be previously disturbed / cleared, and
- Waitsia-03 Area Vegetation; areas that comprise vegetation in good condition.

As detailed in Figure 2-1 and Appendix H (Figure 1A) the vegetation of the general Proposal area (referred to in referral as *General Vegetation*) has been largely historically cleared (Maia, 2015). Vegetation communities within this area consist of Illyarrie_433, Eridoon_433 and Eridoon_378 and although detailed surveys have not been undertaken within the General Vegetation area, MEPAU will undertake further reconnaissance flora surveys and targeted searches (EPA, 2016a) of proposed clearing areas, to meet the requirements to obtain an NVCP, to further verify the vegetation communities in these areas and the potential presence of conservation significant flora taxa.



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Figure 4-1: Regional environmental values.

The largest intact portion of native vegetation is on the southern boundary of the Proposal area (as detailed in Appendix H [Figure 1E] (referred to as the *Waitsia-03 Area Vegetation*)). A Targeted Survey and a Detailed Survey was conducted from 6th – 10th November 2017 to assess the flora and vegetation of this area. The survey verified that although four vegetation communities were present, these broadly matched to the two vegetation types Eridoon_378 and Eridoon_392, noting that the wetland thickets present within the survey area were mapped as Eridoon_392 but did not contain *Melaleuca thyoides* (Woodman, 2018a). The survey also noted that vegetation within the Waitsia-03 area represented 0.31 % of similar vegetation across Yardanogo Nature Reserve.

4.3.3.3 Conservation significant vegetation

Across both the General Vegetation area and Waitsia-03 Area Vegetation, no threatened flora taxa, listed under the BC Act or the EPBC Act, are known to occur within or near the Proposal area (Woodman, 2018a, Woodman, 2018b and Woodman, 2019). The search of the DoEE Species Profile and Threats Database (DoEE 2019a) for MNES listed under the EPBC Act (Woodman, 2019 - Appendix C) returned 11 Threatened flora taxa which may occur, or whose habitat may occur within the area (Woodman, 2019 - Table 5). None of these are considered to have a possible likelihood of occurrence within the Proposal area based on location of nearest record, poor vegetation condition and/or habitat preference.

No TECs or PECs are known to occur within the Proposal area based on the results of the database searches, or review of current TECs or PECs listings. None of the previous surveys undertaken in the area (Table 4-3) identified vegetation systems that were classified as representing any of the listed State or Commonwealth TECs or PECs.

4.3.3.4 Priority Flora

The desktop assessment of the entire Proposal area identified that 15 priority taxa are known to be present within the region. The locations of these taxa are presented in Appendix C (Figure 3) and habitat and flowering period presented in Appendix C (Table 8) (Woodman, 2019). The targeted survey conducted within Waitsia-03 Area Vegetation identified that five priority taxa are present within the clearing envelope. Information regarding the distribution and presence of these species in the broader area is included in Table 4-5




Table 4-5: Priority Taxa

Name	Conservation Status	Species Distribution (Western Australian Herbarium, 1998)	Number of Records (DBCA, 2019)
<i>Austrostipa</i> sp. Cairn Hill (M.E. Trudgen 21176)	P3	Species has been recorded inward on a line from Shark Bay Esperance throughout the South West of WA	This species has been reported 73 times
<i>Baeckea</i> sp. Walkaway (A.S. George 11249)	P3	Recorded within the Avon Wheatbelt and Geraldton Sandplains IBRA regions	Unknown
<i>Banksia elegans</i>	P4	Recorded within the Avon Wheatbelt and Geraldton Sandplains IBRA regions	This species has been reported 46 times
<i>Comesperma griffinii</i>	P2	Recorded within the Avon Wheatbelt, Esperance Plains, Geraldton Sandplains, Mallee and Swan Coastal Plain IBRA regions	This species has been reported 14 times
<i>Stawellia dimorphantha</i>	P4	Recorded within the Avon Wheatbelt, Esperance Plains, Geraldton Sandplains, Mallee and Swan Coastal Plain IBRA regions.	Presence of this species has been reported 67 times

4.3.3.5 Vegetation condition

Apart from Waitsia-03 Area Vegetation, the remnant vegetation within the Proposal area has been largely degraded over many decades by a mixture of partial clearing, burning and grazing. Most areas are fragmented remnants, exposed to continuing stock grazing, and the built road reserves have been disturbed by both road works and infrastructure including a natural gas pipeline along the length of Pye Rd. Because of this degree of disturbance, weeds are common, the vegetation has been thinned and, in areas, dominated by a few disturbance preferring species. Table 4-6 includes photos depicting the indicative degraded nature of vegetation proposed to be cleared.

Table 4-6: Photos depicting the indicative degraded nature of vegetation proposed to be cleared

#	Location	Figure reference	Photo
1	Degraded vegetation - west of XPF Orientation – to the east.	Appendix H - Figure 2	
2	Degraded and cleared vegetation – Access track to Eremia-04 Orientation – to the north	Appendix H - Figure 1F	
3	Degraded and cleared vegetation – Access track to proposed Waitsia-05 well pad. Orientation – to the west.	Appendix H - Figure 1B	

4.3.3.6 Introduced and invasive species

Vegetation in the Proposal area has been subject to weed incursion which can be attributed to historical land clearing and agricultural practices. Woodman (2019) identified four introduced flora taxa via the DBCA

NatureMap database search. The search of the DoEE Species Profile and Threats Database (Woodman, 2019) also identified four significant invasive flora taxa or habitat for such taxa, that may occur within the broader Proposal area. None of these taxa are listed as Declared Pests under the *Biosecurity and Agriculture Management Act 2007*.

4.3.3.7 Dieback

The project area lies at the northern limit of the portion of Western Australia where significant plant disease caused by *Phytophthora cinnamomi* is known to occur. The environmental conditions of the area significantly affect the pathogens ability to survive or flourish and spread over time. All land with an annual average rainfall of more than 400 millimetres and suitable soil composition is considered vulnerable to *Phytophthora* Dieback (Department of Parks and Wildlife, 2015).

A specific dieback assessment was undertaken by subject matter experts (Glevan, 2018) relating to the area depicted in Appendix H (Figure 1E) prior to (2016) and post drilling of Waitsia-03 (2018). Although the surveys were not able to conclusively verify that Dieback was not present in this area due to a lack of reliable indicator species, Glevan (2018) noted that there was no evidence to suggest that Dieback did occur in this area. Results of these surveys were provided to the DMIRS in 2018.

4.3.4 Potential impacts

4.3.4.1 Direct Impacts

Although the area of impact has been minimised to the lowest practicable extent by utilising existing cleared areas to site infrastructure, the proposal will result in a direct loss of vegetation and flora through clearing to construct access roads and flowlines. The areas where vegetation clearing is proposed, as described Table 4-7 and Table 4-8, are shown in Appendix H (Figures 1 [A to H] and Figure 2). Table 4-9 provides a breakdown of vegetation clearing areas by vegetation system. The direct impacts of this Proposal are:

- The construction of access tracks and flowlines will result in clearing of approximately:
- ~3 ha (or 0.8% of the Development Envelope) of native vegetation in good condition;
- ~14 ha (or 4.1% of the Development Envelope) of native vegetation in poor condition; and
- At least 5 different priority listed taxa.

Table 4-7: Clearing of vegetation as a percentage of overall Development Envelope

Area of impact	Hectares	% of Development Envelope
Development Envelope Maximum Area	~345	100%
Waitsia-03 Area Vegetation		
Indicative Flowline Easement	~3	0.8
Clearing Envelope	~5	1.5
General Vegetation Area		
Indicative Flowline Easement	~14	4.1
Clearing Envelope	~24	7.0
Existing agricultural or other cleared land	~316	91.5

Table 4-8: Clearing Summary

Location	Figure No. in Appendix H	Vegetation Quality	Vegetation System	Fragmented remnant	Indicative Flowline Easement - Maximum Area to be Cleared	Clearing Envelope excluding existing cleared areas
General Vegetation						
Flowline and access road easements – Waitsia 05	1B	Moderate	ERIDOOON_378	Yes	2.1 ha	4.1 ha
Flowline and access road easements – Waitsia 07	1C	Poor	ERIDOOON_378	Yes	1.1 ha	1.6 ha
Flowline and access road easements – Waitsia-03 and 04	1D	Poor	ERIDOOON_378	Yes	0.8 ha	1.4 ha
			ERIDOOON_433	Yes	1.6 ha	2.9 ha
Flowline and access road easements – PFW re-injection Line	1G	Poor	ILLYARRIE_433	Yes	3.4 ha	3.4 ha
Flowline and access road easements – PFW re-injection Line	1H	Poor	ERIDOOON_378	Yes	0.20 ha	0.4 ha
Pipeline and flowline easements – XPF area	2	Poor	ERIDOOON_378	Yes	0.4 ha	0.8 ha
Sub-Total					~14 ha	~24 ha
Waitsia-03 Area Vegetation						
Flowline and access road easements – Waitsia-03	1E	Good	Eridon_392	Partial	0.9 ha	2.0 ha
			ERIDOOON_378		1.5 ha	3.3
Sub-Total					~3 ha	~5 ha
TOTAL Clearing					~17 ha	~29 ha

Table 4-9: Summary of Vegetation System Disturbance

Vegetation System	Maximum area to be cleared (ha)	Clearing Envelope (ha)	Current Extent (ha)	Percentage of Clearing Envelope Regarding Regional Current Extent (%)	Percentage of Clearing Envelope Regarding Regional Local (IBRA) Extent (%)
Illyarrie_433	8.1	12.5	14,746.34	0.0005	0.0005
Eridoon_378	6.1	11.6	60,826.7	0.0001	0.0001
Eridoon_392	0.9	2.0	429.8	0.002	0.002
Eridoon_433	1.60	2.87	132.73	0.01	0.01

4.3.4.2 Indirect Impacts

In addition to direct impacts to vegetation and flora arising from the Proposal, the following indirect impacts to vegetation and flora may arise:

- Introduction or spread of non-indigenous species (weed / pathogens), and
- Accidental clearing of areas outside of the Proposal Development Envelope.

4.3.5 Assessment of Impacts

4.3.5.1 Regional and Local Significance

As described in Table 4-7, a total clearing area of ~17 ha is estimated for the Proposal. When broken down by vegetation system, the direct impact of this proposal is limited to clearing no more than 0.01% of a single vegetation system. Having regard to the extent and distribution of these systems both locally and regionally, the removal of 0.01% of a vegetation system is not considered to be significant.

Of the ~29 ha clearing envelope, ~5 ha is considered to be in good condition, with the remaining vegetation comprised of remnant disturbed vegetation in poor condition. Vegetation that is in good condition is located within the proposed Waitsia-03 area which in turn is adjacent to the Yardanogo Nature reserve which is comprised of similar vegetation. When considered in the context of the adjacent reserve, the vegetation systems within the Waitsia-03 area are well represented locally with the adjoining reserve comprising an area of approximately 7,000 ha. The small scale and low impact of the proposed flowline suggest that clearing within this area is not expected to impact the adjoining reserve, nor exacerbate existing habitat fragmentation. Therefore, the loss of vegetation within the Waitsia-03 area of the Proposal area is not considered to result in significant local or regional impacts.

Approximately 14 ha (or 4.1% of the Development Envelope) of General Vegetation, broadly considered as poor-quality native vegetation, will be cleared for access roads and flowline construction. Typical of remnants within an agricultural landscape this vegetation (see Table 4-6) is considered to have negligible local and regional significance due to its fragmented and heavily impacted characteristics. MEPAU will undertake further reconnaissance flora surveys and targeted searches (EPA, 2016a) of proposed clearing areas, to meet the requirements to obtain an NVCP, to further verify the vegetation communities in these areas and the potential presence of conservation significant flora taxa.

4.3.5.2 Conservation Significant Vegetation

The Woodman reports (2018a, 2018b and 2019) are provided at Appendix C. These reports conclude that no riparian vegetation, declared rare flora, threatened ecological communities or priority ecological communities, as listed under the BC Act or EPBC Act, have been recorded within the proposed clearing area, or the abutting area.

Consequently, the Proposal poses no impact to conservation significant flora.

4.3.5.3 Priority Flora

Five flora taxa listed as priority flora by the DBCA are known to occur within the proposed clearing envelope. As described in Table 4-5, priority taxa identified during detailed surveys that are known to occur within the clearing envelope are known to have a wider distribution outside of the Geraldton Sandplains IBRA region. In accordance with the Desktop survey, priority species are known to occur throughout the Yardanogo Nature reserve indicating that priority taxa are well represented in the local area. Consequently, the removal of priority taxa is not expected to affect local populations nor regional populations given their wide distribution.

4.3.5.4 Indirect Impacts

In addition to the direct impacts evaluated above, the following indirect impacts were identified for the proposal:

- Introduction or spread of non-indigenous species (weed / pathogens), and
- Accidental clearing or areas outside of the Proposal Development Envelope.

Indirect impacts identified for the Proposal are considered standard impacts for projects within and adjacent to native vegetation that can be suitably managed via standard mitigation measures.

4.3.5.5 Application of Legislation, Policy and Guidance.

Approval to clear native vegetation and flora are regulated under the Part V of EP Act and the PGER (Environment) Regulations 2012.

In accordance with Part V of EP Act, and the Clearing Regulations, a Native Vegetation Clearing Permit application⁹ will be submitted to DMIRS (as delegated agency) to seek approval to clear vegetation (as detailed in Table 4-8). The assessment of clearing permit applications considers the application against the clearing principles for native vegetation under Schedule 5 of the EP Act which includes consideration of vegetation and flora value / significance. Based upon the information provided within this report, impacts to vegetation and flora are not significant and can be managed under this part of the EP Act. Currently two NVCP (See Appendix H; Figure 2) are in place which cover part of the clearing envelope. Namely:

- NVCP CPS/1 6875/1 has been utilised to clear vegetation to accommodate a flowline and the pipeline (PL64) for the Waitsia Stage 1 Project (See Appendix H; Figure 2).
- NVCP CPS/1 6938/1 is in place to accommodate clearing of native vegetation associated with XPF (See Appendix H; Figure 2). This NVCP will be used to clear vegetation within the NVCP boundary required for the Proposal.

In addition, under the *PGER (Environment) Regulations 2012* a DMIRS approved Environment Plan is required to manage both direct and indirect impacts on Flora and Vegetation associated with the Proposal. Specifically, the EP has to consider impact significance and demonstrate that impacts and risks are reduced to a level that is ALARP and acceptable prior to acceptance by DMIRS. No activities covered in this Proposal can commence until an EP is accepted by DMIRS.

Consequently, as impacts associated with this key factor will not be significant, they are able to be suitably managed under these other regulatory requirements.

4.3.6 Avoidance and Mitigation

Throughout the scoping phase of this Proposal, MEPAU conducted site selection analysis to, where possible, reduce the environmental footprint of the Proposal. Specifically, the location of the WGP and flowline alignments were selected to avoid vegetated areas and minimise the amount of vegetation and flora that was directly impacted by the proposal. Specifically, ~91.5 % of the development envelope is located within existing agricultural or other cleared land and only ~1.5 % of the development envelope is situated in good quality native vegetation.

Although not a specific mitigation that can be counted during the construction and operational phase of this Proposal, this is possibly the most important mitigation measure as MEPAU has managed to balance the

⁹ To note, Woodman 2018a provides the basis to the NVCP application, for the detailed area, as it details the responses to the 10 clearing principles.

project needs, whilst locating the WGP in a location that has reduced the direct vegetation and flora impacts to a level that is as low as practicable.

MEPAU plan to conduct targeted surveys of the General Vegetation Area prior to completing clearing activities. This survey will allow flowline alignments to be adjusted to avoid of conservation significant species in the unexpected case they are present.

Following construction, MEPAU plan to rehabilitate some of the areas cleared for flowline installation. The rehabilitation of these areas will be conducted under a DMIRS accepted Environment Plan.

Additional mitigation measures to manage potential vegetation and flora impacts are detailed in the Waitsia Gas Project Stage 2 – Environmental Management Plan and is attached as Appendix G.

4.3.7 Predicted Outcomes

The outcomes of the Proposal are predicted to be:

- No impact to conservation significant species or communities.
- Clearing ~3 ha of native vegetation in good condition.
- Clearing ~14 ha of degraded remnant native vegetation in poor condition.
- Clearing of priority taxa that is known to have a widespread distribution.
- No detrimental impacts to adjacent vegetation through the implementation of a CEMP or EP.

Based upon the nature and scale of the vegetation and flora impacts associated with this Proposal and with the mitigations identified, biological diversity and ecological integrity of vegetation and will be maintained and the EPA Objective for this factor can be met for the Proposal.

Based upon the predicted outcomes for the Proposal, MEPAU does not believe that it will result in a significant impact to flora and vegetation. MEPAU has considered the WA Environmental Offsets Policy however MEPAU does not believe actions to offset the predicted outcomes of this Proposal are required as the Proposal is not expected to have a significant impact to flora and vegetation.

4.4 Key Environmental Factor - Terrestrial Environmental Quality

4.4.1 EPA objective

To maintain the quality of land and soils so that environmental values are protected.

4.4.2 Legislation, Policy and Guidance

- Environmental Factor Guideline Terrestrial Environmental Quality (EPA 2016e).
- *Dangerous Goods Safety Act 2004* and associated Regulations 2007.
- Contaminated Sites (CS) Act 2003 and Contaminated Sites Regulations 2006.
- Environmental Protection (Controlled Waste) Regulations 2004.
- *Soil and Land Conservation Act 1945*.
- Environmental Protection (Unauthorised Discharges) Regulations 2004.
- Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes (DER 2015a).
- Treatment and Management of Soil and Water in the Acid Sulfate Soil Landscapes (DER 2015b).

4.4.3 Receiving Environment

The locality surrounding the Proposal area falls within the area known as the Spearwood regolith-landform land system (Blacktop, 2017). The Spearwood Dune System consists of slightly calcareous sands deposited by wind action. The associated dunes accumulated as shoreline deposits and coastal dunes during interglacial periods (about 11,700 years ago) of high sea-level. The soils were originally comprised of lime sand, quartz sand and minor fine-grained, black, heavy mineral concentrations.

The carbonate material has been mostly leached (dissolved), leaving dunes consisting almost entirely of quartz sand. The yellow sand colour is derived from hydrated iron oxide. The yellow sand in some areas of the Spearwood system is sourced for use in the building industry (e.g. Patience Sand Quarry, Pye road). The Spearwood sands have evolved from the in-situ weathering of the underlying Tamala Limestone. Tamala Limestone is the geological name given to the widely occurring aeolianite limestone deposits on the western coastline of Western Australia, between Shark Bay in the north and nearly to Albany in the south.

The findings of Blacktop 2017 support geological literature, with the test pit sites within the Proposal area found to comprise deposits of yellow quartz sand. The sand was found overlying soft limestone strata at 4m depth at two sites.

4.4.4 Potential Impacts

4.4.4.1 Direct Impacts

The direct impacts to terrestrial environmental quality associated with this proposal will mainly be experienced during the construction phase of the project. During the construction phase of the project, there will be the requirement for civil works to be completed to enable the construction of suitably engineered hardstands for key components of the Proposal including the WGP and well sites.

The potential construction impacts that may occur from the Proposal include:

- Excavation and exposure of Acid Sulfate Soils,
- Erosion or scouring from reduction in soil stability during civil works, and
- Impairment of soil drainage due to construction of engineered hardstands.

4.4.4.2 Indirect Impacts

Indirect impacts to terrestrial environmental quality are most likely to arise from a contamination of soils due to spill events that may occur during either the construction or operations phase.

4.4.5 Assessment of Impacts

4.4.5.1 Acid Sulfate Soils (ASS)

The classification of acid sulfate soils (ASS) includes both actual acid sulfate soils (AASS) and potential acid sulfate soils (PASS). ASS are soils that are generating acidity, whereas PASS are soils that have the potential to generate acidity. ASS are soils containing naturally occurring, fine-grained metal sulphides typically pyrite (FeS_2), formed under saturated, anoxic/reducing conditions. They generally occur in marine or estuarine sediments, predominantly confined to coastal lowlands.

Within these sediments, most soils that present an environmental risk are generally confined to Holocene aged material (<10,000 years). Where these materials have oxidised, they commonly have a mottled appearance (orange and yellow discolouration) due to the presence of oxidised iron minerals. Although the soils described above represent typical conditions where ASS occurs, the presence of ASS materials is not

limited to these soil types. In Western Australia, ASS materials have been identified in other soil types such as leached sands and silts. Accordingly, for areas where no data is available, the extent of ASS materials should be established through field investigations.

Blacktop Consulting Engineers consulted the DWER ASS Risk Maps for Geraldton to determine the potential for acid sulfates at the site. The ASS risk mapping suggests that the area is not considered to present an ASS risk (Blacktop 2017). This is supported by observations of site soils which did not identify any soils which might present an ASS risk.

4.4.5.2 Erosion and Scouring

When soils contain significant organic matter, compaction can be very difficult to achieve, and this can lead to the potential for erosion. Organic matter which has entered the soil from stands of Wattle and Acacia species tends to suppress the ability of soils to take on moisture and hence can make the process of soil moisture conditioning and the achievement of compaction very difficult. Where topsoil organics (very dark soil or rootlets in soil) exist, Blacktop Consulting Engineers recommend the topsoil layer from 0 – 150mm should be stripped and removed from site or placed in landscaping areas.

Provided that soil materials on the site are well compacted following the removal of topsoil organics and are protected from excessive stormwater ingress to prevent them from becoming soaked, Blacktop Consulting Engineers conclude that the material will provide a suitable foundation material for construction activities.

The soils at the WGP site contain fine particles which are easily transported by water and wind movement. As such, soils are susceptible to scouring from medium to high velocity overland water flow or strong winds.

As both erosion and scouring are common construction risks for all large-scale civil activities, there are well understood mitigations that will be applied to reduce the likelihood that such impacts will occur. With the provision of standard mitigations, these impacts are not expected to be significant.

4.4.5.3 Drainage

Blacktop Consulting Engineers expect that the underlying sandy soils will provide good drainage capability when constructing WGP. Several facilities occur within the region to verify that with good drainage design such as using soak wells outside of areas of limestone, these impacts are not expected to be significant.

4.4.5.4 Contamination of Soil

The construction and operation of the Proposal will include (at various stages) the production, transport and storage of reservoir fluids, as well as the transport and storage of condensate and PFW. In addition to hydrocarbons, chemicals will be used for various purposes throughout the construction and operation of the facility. The transport, storage and use of hydrocarbons and chemicals has the potential to result in spill events.

To understand the extent of potential impacts associated with a spill event MEPAU reviewed the activities to identify the types and volumes of instantaneous spill events that may arise from this proposal. These included

- Accidental loss of chemicals to hardstand area (in the order of 1 m³),
- Accidental loss of hydrocarbons to bunded areas (in the order of 80 m³),
- Loss of infrastructure integrity causing a release to the environment.

To understand the potential magnitude of an impact arising from an unlikely but conservatively large spill scenario, MEPAU considered the loss of 381 m³ of produced water (or the equivalent of a single day's PFW production at peak rates. See 4.6.5.2).

As PFW has a high viscosity it would behave similar to hydrocarbons upon release and in the event of a spill it would rapidly spread whilst penetrating into the soils due to the typical sandy soil characteristics of the Proposal area.

Based upon Grimaz et. al. (no date) it is anticipated that in the unlikely circumstances that a significant release (such as a spill of 381 m³ of PFW) could result in an area in the order of 6,900 m² (or 0.2% of the Proposal development envelope) being contaminated. Based upon the viscosity of produced formation water and assuming no containment and recovery activities are in place, there is the potential that hydrocarbons may seep through to a depth of approximately 6 m.

Noting that the facility is located approximately 20 m AHD and depth to groundwater from the closest bore indicates water levels are below 11.2 m (Department of Water, 2019), contamination of groundwater would not be expected.

Hydrocarbons and chemicals are expected to behave similar to PFW upon release, but any spill volume is expected to be much smaller. As these materials will be stored within bunded areas in accordance with relevant Australian Standards, the likelihood of an event that results in a large volume that reaches the environment is very low. Accordingly, the evaluation provided in this report is expected to be conservative enough to indicate that given the location of the facility, MEPAU does not believe that any contamination of soil event associated with the Proposal would result in a significant impact.

Under the PGER Act, MEPAU will develop an Environment Plan and Oil Spill Contingency Plan for each stage of the Proposal. The EP and Oil Spill Contingency plan will specifically identify credible worst-case spill scenarios and identify management actions that are in place to prevent these events from occurring, and mitigation strategies to identify how these events will be managed should they occur.

4.4.5.5 Application of Legislation, Policy and Guidance

Under the PGER (Environment) Regulations 2012 a DMIRS approved Environment Plan is required to manage both direct and indirect impacts on terrestrial environmental quality associated with the Proposal. Specifically, the EP is to include an Oil Spill Contingency Plan that describes how spill events will be managed and demonstrates the operator has sufficient arrangements to implement an appropriate response. The EP and OSCP has to consider impact significance and demonstrate that impacts and risks are reduced to a level that is ALARP and acceptable prior to acceptance by DMIRS. No activities covered in this Proposal can commence until an EP or Oil Spill Contingency plan is accepted by DMIRS.

4.4.6 Avoidance and Mitigation

MEPAU commissioned a geotechnical and soils assessment of the Proposal area by Blacktop Consulting Engineers (Blacktop 2017). MEPAU has considered mitigation and management measures recommended by BCE, and these along with other mitigation and management measures those have been included into the EMP (Appendix G).

Further to this, the spill risk associated with each stage of the project is required to be assessed and addressed in an EP and Oil Spill Contingency plan. Specifically, spill prevention and mitigation will be described for each activity. These documents also include the identification of systems, procedures, equipment and personnel training requirements to ensure that any impacts and risks associated with spill events can be avoided and mitigated to a level that is commensurate to the specific risk profile of that activity. As described in Section 4.4.5.5, these documents are required to be accepted by DMIRS prior to activity commencement.

4.4.7 Predicted Outcomes

The outcomes of the Proposal are predicted to be:

- No impacts to terrestrial environmental quality arising from Acid Sulfate Soils,
- No detrimental impacts from erosion, scouring or drainage through the implementation of a CEMP or EP, and
- No permanent impacts arising from unlikely soil contamination events through the implementation of activity specific spill management measures.

Based upon the predicted outcomes for the Proposal, MEPAU does not believe that it will result in a significant impact to terrestrial environment quality with any impacts very unlikely to occur in the first place. MEPAU has considered the WA Environmental Offsets Policy however MEPAU does not believe actions to offset the predicted outcomes of this Proposal are required as the Proposal is not expected to have a significant impact to terrestrial environmental quality.

4.5 Key Environmental Factor - Terrestrial Fauna

4.5.1 EPA objective

To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.

4.5.2 Legislation, Policy and Guidance

- Biodiversity Conservation Act 2016.
- Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).
- Environmental Factor Guideline Terrestrial Fauna (EPA 2016c).
- Technical Guidance Sampling methods for Terrestrial Vertebrate Fauna (EPA 2016d).
- Technical Guidance Terrestrial Fauna Surveys (EPA 2016e).

4.5.3 Receiving environment

4.5.3.1 Terrestrial Fauna Studies

Several studies of significant fauna have been undertaken by Bamford Consulting Ecologists during the development of the Waitsia field (and other earlier developments) to understand the ecology and potential presence of conservation significant species within the Proposal area. This has included both desktop assessments and Level 1 fauna surveys within the Proposal area.

Fauna studies relevant to this Proposal are provided in Table 4-10. Bamford Consulting Ecologists (2018 and 2019) are provided in Appendix D.

Table 4-10: Baseline studies – Terrestrial Fauna

Year Survey Completed	Consultant	Survey Name
2012	Bamford Consulting Ecologists	Survey for the Western Ground Parrot <i>Pezoporus flaviventris</i> within the Dongara Project Area and Beekeepers Nature Reserve (Unpublished report to Tronox JV).
2015	Bamford, M.J., Everard, C. and Chuk, K.	Waitsia Wells, Dongara – Fauna Assessment
2016	Bamford, M.J.	AWE Waitsia-03; Significance of site for Black Cockatoos.

Year Survey Completed	Consultant	Survey Name
2018	Bamford Consulting Ecologists	Fauna Assessment of Waitsia-03 access track and pipeline with regarding to clearing principles detailed in Schedule 5, (WA) Environmental Protection Act 1986.
2018a	Woodman Environmental Pty Ltd	Waitsia-03 – Flowline Corridor - Flora, Vegetation and Fauna Assessment
2019	Bamford Consulting Ecologists	Fauna Assessment for Additional Clearing in the Waitsia Project Area.

The key features of the fauna assemblage expected in the overall Proposal area (Bamford Consulting Ecologists, 2019) are:

- **Uniqueness:** The assemblage is not particularly unique as similar assemblages and environments occur in greater region of the northern coastal plain (Geraldton Sandplains bio-region), but Ejarro Spring is likely to attract waterbirds (in small numbers) that are not usually seen in this region.
- **Completeness:** The assemblage is incomplete due to the historical loss of native vegetation when it was converted to farmland and the consequent loss of habitats. The introduction of feral predators has also contributed to species loss. Loss of mammal species is notable. Many of the birds may also have declined but still occur in larger areas of native vegetation or as irregular visitors.
- **Richness:** The assemblage appears rich because of the inclusion of many species, such as waterbirds, that may be only occasional visitors. The Geraldton Sandplains bio-region is recognised as being biodiverse.

4.5.3.2 Carnaby's Black Cockatoo

Fauna studies undertaken determined that Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) is the only known conservation significant species (listed as endangered under both the EPBC Act and BC Act) occurring in the Proposal area. Carnaby's Black Cockatoo is endemic to, and widespread in, the south-west of Western Australia (DoEE 2019b).

In Woodman 2018a, a study of the Waitsia-03 Area Vegetation (Appendix H; Figure 1E), patterns of biodiversity could not be examined, but it predicted that the dampland/playa areas in the broader study area may provide seasonal refugia and breeding habitat for a range of fauna species e.g. frogs and waterbirds. The mixed tall shrublands were assessed for their foraging value for Carnaby's Black-Cockatoo (Bamford 2016) and it was concluded that: 3 ha of such vegetation in the Waitsia-03 Area Vegetation represented 0.31 % of similar vegetation across Yandanogo Nature Reserve; and that 3 ha had a carrying capacity of <0.2 birds/year (based on regional habitat assessments conducted by Williams *et al.* 2016).

The proposal area was visited on 3 October 2016 by Bamford Consulting Ecologists to access the vegetation at the site to gain further information on banksia density and numbers of cones. The banksia shrubland within the Bamford Consulting Ecologists study area was dominated by *Banksia attenuate* with variable densities of *Banksia elegans* and a thicket of *Banksia prionotes*. As a food source, most of the banksias had very few cones at the time of the survey.

The following was identified during the site survey:

- *B.elegans* has small inflorescences and most specimens had no cones.
- *B.prionotes* had recently flowered and some of the flowers had been damaged by Carnaby's Black Cockatoos, but few of the flowers appeared to be developing into seed-bearing cones.
- *B.attenuata* had large number of cones but following examination of the position of the cones on the stems, most appear to have resulted from the flowering season of summer 2013/14.

A subsequent site visit by Bamford Consulting Ecologists was conducted on 13 December 2017. During this assessment large trees within the survey area were assessed for their potential nesting habitat for Carnaby's Black Cockatoo. Assessment of trees with the potential to provide nesting habitat was based on the criteria in the Department of Sustainability, Environment, Water, Population and Communities (2012) guidelines. Breeding habitat is defined by the guidelines as trees known to support breeding within the range of species with either a suitable nest hollow or a suitable diameter at breast height (DBH) to develop a nest hollow. For most species, a suitable DBH is 500mm (DSEWPC, 2012). Although the survey identified four trees (Figure 4-2) that had the potential to support Carnaby's Black Cockatoo breeding, none of the trees met the required criteria as all measured <500mm DBH and none presented nest hollows. These four potential nesting trees will be retained and not cleared as part of this proposal.

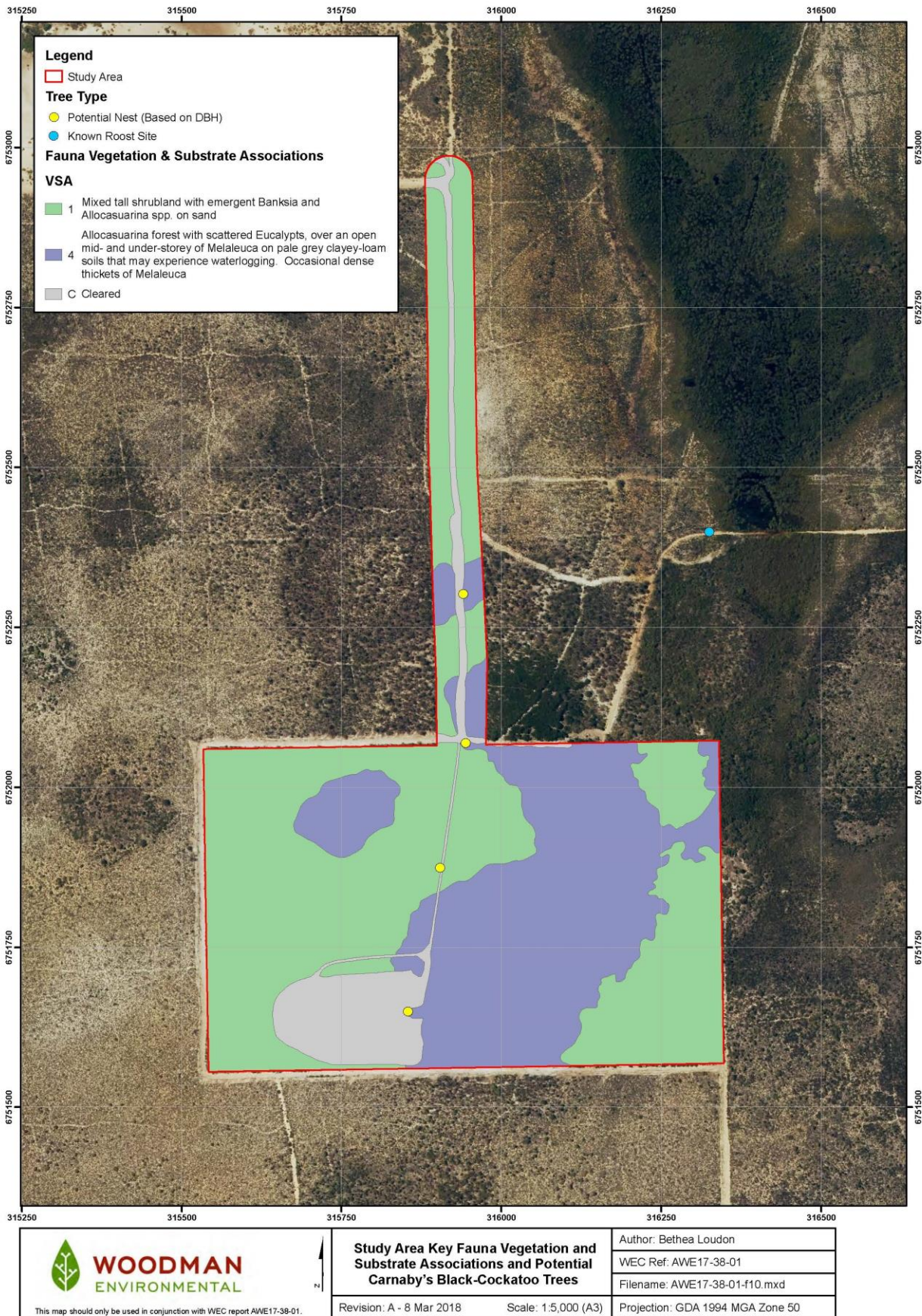


Figure 4-2: Carnaby Black Cockatoo known Roost Tree and potential nesting trees within the vicinity of the Waitsia-03 flowline route (Woodman, 2018a).

Note – the potential nesting trees will be retained and not cleared as part of this proposal.

4.5.4 Potential impacts

4.5.4.1 Construction Phase Impacts

Construction of the Proposal will result in the clearing of ~17 ha of native vegetation (Table 4-7). Potential impacts associated with native vegetation clearing include:

- Death or displacement of native fauna species – clearing and construction works, and vehicle movements could result in the injury or death of native fauna.
- Habitat fragmentation in the immediate area of clearing.

There will also be temporary increase in secondary impacts such as light, dust, noise and vibration during construction. These secondary impacts may result in native fauna avoiding the area. However, given the nature of the impact and duration it is not expected to be a permanent impact.

4.5.4.2 Operational Phase Impacts

Operation of the WGP and general operational activities will result in an increase in vehicle movements (See Section 4.8.5.3) within the Proposal area. However, vehicle movements during operations are not expected to be significantly higher than what the Proposal area currently experiences, as the area is already developed, and vehicle movements occur within this area on a daily basis.

4.5.5 Assessment of Impacts

Both the direct and indirect impacts associated with the Proposal are not expected to have a significant impact on terrestrial fauna. This is primarily due to:

- The area of the Proposal is within an area where both agricultural and industrial activities have been common for decades and fauna are likely to be accustomed to noise and traffic movement.
- The fauna assemblage of the Proposal area is considered intact, relatively diverse and representative of the general Mid West region. Medium-sized mammal fauna and minor components of other fauna groups are noted as lacking.
- Of the area entire proposal area (300ha) only 17 ha of native vegetation is to be cleared. Most of this area is an area of existing fragmented vegetation in a broadacre agricultural landscape.
- An assessment of the significance of the broader Proposal area for Carnaby's Black Cockatoo was undertaken in November 2016, by Bamford Consulting Ecologists. Part of the surveyed area supports a mixed banksia shrubland that was identified as potential foraging habitat for Carnaby's Black Cockatoo. While much of the proposed activity for Proposal is located on cleared lands, approximately 17 ha, within a development envelope of approximately 345 ha, will be cleared, with some areas rehabilitated.
- The proposed clearing of the Mixed tall shrubland (Woodman 2018a) that is potentially suitable foraging habitat for Carnaby's cockatoo, represents approximately 0.31 % of unburnt banksia dominated vegetation across the adjacent Yandanogo Nature Reserve (an area of approximately 7,000 ha.). Therefore, the potential impact is considered small scale and not regionally significant in the context of Carnaby's Black Cockatoo habitat.
- Assessments have determined the presence of roosting trees; however, no nesting trees have been identified. Roosting trees have been avoided in the design of the project and thus will not be impacted by the Proposal.

4.5.5.1 Application of Legislation, Policy and Guidance

As described above, the key impacts to Terrestrial fauna are associated with the removal of foraging habitat for Carnaby's Black Cockatoo (a matter of National Environmental Significance under the EPBC Act).

Impacts to matters of National Environmental Significance are regulated under the EPBC Act. MEPAU will refer the proposal to the DoEE under the EPBC Act with the recommendation that impacts are not considered to be significant in line with the assessment completed in this Section and suggest that MEPAU does not deem the Proposal be considered to be a 'controlled action'.

Approval to clear native vegetation and flora is regulated under the Part V of EP Act and impacts to vegetation, flora and terrestrial fauna are also regulated under the PGER (Environment) Regulations 2012.

In accordance with Part V of EP Act, and the Clearing Regulations, a Native Vegetation Clearing Permit application¹⁰ will be submitted to DMIRS (as delegated agency) to seek approval to clear vegetation (as detailed in Table 4-8). The assessment of clearing permit applications considers the application against the clearing principles for native vegetation under Schedule 5 of the EP Act which includes consideration of the value / significance of vegetation as significant habitat for indigenous fauna. Based upon the information provided within this report, indirect impacts to terrestrial fauna associated with the impacts to vegetation and flora are not significant thus can be managed under this part of the EP Act. Currently two NVCP (See Appendix H; Figure 2) are in place which cover part of the clearing envelope. Namely:

- NVCP CPS/1 6875/1 has been utilised to clear vegetation to accommodate a flowline and the pipeline (PL64) for the Waitsia Stage 1 Project (See Appendix H; Figure 2).
- NVCP CPS/1 6938/1 is in place to accommodate clearing of native vegetation associated with XPF (See Appendix H; Figure 2). This NVCP will be used to clear vegetation within the NVCP boundary required for the Proposal.

In addition, under the PGER (Environment) Regulations 2012 a DMIRS approved Environment Plan is required to manage both direct and indirect impacts on terrestrial fauna associated with the Proposal. Specifically, the EP has to consider impact significance and demonstrate that impacts and risks are reduced to a level that is ALARP and acceptable prior to acceptance by DMIRS. No activities covered in this Proposal can commence until an EP is accepted by DMIRS.

As impacts associated with this key factor are not significant, they can be suitably managed under these other regulatory requirements.

4.5.6 Avoidance and Mitigation

Throughout the scoping phase of this Proposal, MEPAU conducted site selection analysis to, where possible, reduce the environmental footprint of the Proposal. Specifically, the location of the WGP and flowline alignments were selected to avoid vegetated areas and minimise the amount of vegetation and flora that was directly impacted by the proposal. Specifically, 91 % of the development envelope is located within existing agricultural or other cleared land and only 1.5 % of the development envelope is situated in good quality native vegetation suitable for Carnaby Black Cockatoo foraging habitat (and only half of this area is required to be cleared). In addition, trees that were assessed (Figure 4-2) to determine if they were suitable Carnaby Black Cockatoo nesting trees (Woodman, 2018a) will be retained and not cleared as part of this proposal.

Although not a specific mitigation that can be counted during the construction and operational phase of this Proposal, this is possibly the most important mitigation measure as MEPAU has managed to balance the

¹⁰ To note, Woodman 2018a provides the basis to the NVCP application, for the detailed area, as it details the responses to the 10 clearing principles.

project needs, whilst locating the WGP in a location that has reduced the direct impact to terrestrial fauna to a level that is as low as practicable.

Additional mitigation measures to manage fauna impacts are detailed in the Waitsia Gas Project Stage 2 – Environmental Management Plan and is attached as Appendix G.

4.5.7 Predicted Outcomes

The outcomes of the Proposal are predicted to be:

- No impacts to Carnaby Black Cockatoo breeding / roosting habitat,
- Clearing of 3 ha of native vegetation in good condition that is suitable habitat to support Carnaby Black Cockatoo foraging
- Clearing of 17 ha of vegetation (in varying condition) that may result in fauna strike
- Temporary localised disturbance to local fauna populations arising from dust, light and noise generation during the construction phase.

Based upon the nature and scale of the terrestrial fauna impacts associated with this Proposal and with the mitigations identified, significant impacts to biological diversity and ecological integrity are not expected and thus the EPA Objective for this factor will be met.

Based upon the predicted outcomes for the Proposal, MEPAU does not believe that it will result in a significant impact to terrestrial fauna. MEPAU has considered the WA Environmental Offsets Policy however MEPAU does not believe actions to offset the predicted outcomes of this Proposal are required as the Proposal is not expected to have a significant impact to terrestrial fauna.

4.6 Key Environmental Factor - Inland Waters

4.6.1 EPA objective

To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.

4.6.2 Policy and Guidance

- Environmental Key Factor Guideline – Inland Waters (EPA 2016f).
- Australian and New Zealand Environment and Conservation Council (ANZECC) Water Quality Guideline (2000).
- Department of Water and Environmental Regulation Water Quality Protection Notice (WQPN) 26, (liners for containing pollutants, using synthetic membranes).

4.6.3 Receiving Environment - Hydrological context

4.6.3.1 Regional Overview

An aquifer is a body of permeable rock which may contain or transmit groundwater. The main regional aquifer beneath the Waitsia gas field is the Yarragadee Aquifer, which is composed of between 500 m to 1600 m of sandstone and siltstone in the Waitsia Reservoir. Available data indicates that the groundwater levels in the region vary from 75 m Australian Height Datum (m AHD) to 15 m AHD and the hydraulic gradient is towards the south west (Department of Water, 2017). Earth Tech (2002) indicate that the ground water levels within the Proposal area can be present to a depth of 150m below the surface.

Salinity in the Yarragadee Aquifer is typically fresh to marginal near the surface and increases to brackish with depth. Formations which underlie the Yarragadee Aquifer, such as the Eneabba Formation and Lesueur Sandstone, which in other areas can contain fresh groundwater, occur at considerable depth at this location and are likely to contain brackish to saline groundwater.

The Allanooka-Dongara Water Reserve is located about 12 km north of the WGP, on the northern side of the Irwin River and more than 4 km from the nearest Proposal production well. The reserve is listed as Priority one (P1) Public Drinking Water Source protection area. There is little hydraulic connection between the Allanooka – Dongara Water Reserve and the Proposal.

The Irwin River is a significant hydrological feature location to the north of the Proposal area that meanders towards the west and discharges into the Indian Ocean. The Indian Ocean is situated 16 km west from the Proposal area.

The closest surface water body to the WGP site is Ejarno Spring, located approximately 600 m to the east.

Ejarno Spring is associated with a topographic depression resulting in the shallow expression of groundwater (AWE 2015b). The Ejarno Spring area is underlain by the Guildford Formation suggesting that the spring discharges into a groundwater system that may be perched and is unlikely to be significantly impacted by small changes in groundwater level in the Yarragadee Aquifer (AWE 2015b).

The Proposal site is located within the Arrowsmith Region where the Yarragadee Aquifer is unconfined throughout this region¹¹.

Regional groundwater movement is from east to west.

Figure 4-3 is an extract from Hydrogeology of the Dongara Borehole Line (Irwin, 2007) and highlights the depth of the Yarragadee Aquifer near the WGP site and the Proposal area (Dongara borehole DL2 is near the WGP site).

¹¹ Hydrogeology of the Dongara Borehole Line, Dept of Water, report HG4, November 2007

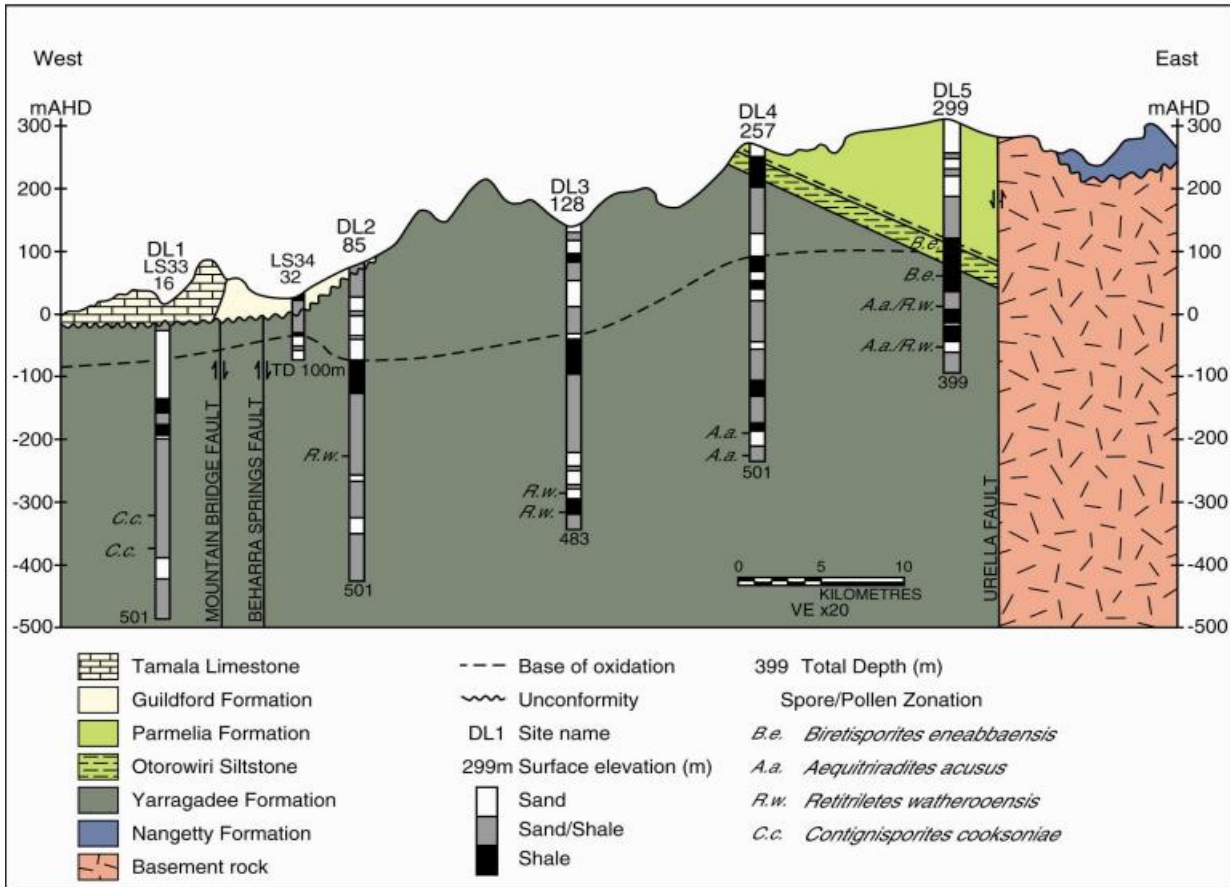


Figure 4-3: Regional Geology

4.6.3.2 Local Water Quality

As part of its overall operations, MEPAU has developed a comprehensive surveillance water quality monitoring program to ensure environmental management measures are effective. It also allows informed responses to regulatory requirements for water quality monitoring.

The most relevant groundwater quality monitoring results for the Proposal are provided by the Waitsia-02 groundwater extraction bore (W02). W02 is the monitoring well closest to, and up-gradient from, the WGP and provides a suitable groundwater quality baseline reference. Groundwater and surface water monitoring have been conducted at, and near, the Waitsia-02 site since June 2015 by an experienced third-party subject matter expert (GEMEC, 2018). Monitoring initially consisted of a baseline phase, prior to drilling, and until January 2017 samples were collected biannually and tested for a comprehensive analytical suite. Ongoing surveillance monitoring has been conducted on samples collected annually and tested for petroleum hydrocarbons and hydrogeochemical indicators.

In addition to the groundwater samples collected from W02, surface water samples have been collected from two locations within the nearby Ejarno Spring (ES1 and ES2). Dissolved sodium and chloride were dominant within both groundwater and surface water, with total dissolved solids ranging from marginal to brackish. Groundwater was of neutral pH and moderate hardness, with surface water very slightly alkaline and hard to very hard. Concentrations of dissolved metals and metalloids were generally consistent between groundwater and surface water samples, with dissolved barium, boron, iron and lithium detected during each event.

Minor concentrations of methane have been detected in surface water samples collected from Ejarno Spring, a result of the decomposition of organic material – a common wetland process. The conclusion of the wetland source of methanogenesis was supported by the absence of formation supplied ethane in the

surface water samples. Petroleum hydrocarbons including BTEXN, TRH, PAHs, phenols and OCPs have not been detected in any groundwater or surface water samples collected to date.

MEPAU's also conducts a broader operational surveillance groundwater monitoring program for its activities throughout the Perth Basin, with the results of W02 indicating water quality is generally consistent throughout the region.

4.6.4 Potential Impacts

4.6.4.1 Construction Phase Impacts

Construction of the Proposal will result in drilling up to an additional 6 production wells for a total of eight (8) production wells and management of wastes in lined ponds. Potential impacts associated with well construction include:

- Contamination of groundwater from drilling fluids.

4.6.4.2 Operational Phase Impacts

Operation of the WGP requires produced formation water waste stream to be managed via re-injected down well / evaporation ponds. These activities have the potential to result in:

- Contamination of groundwater from produced formation water.

4.6.5 Assessment of Impacts

4.6.5.1 Contamination of Groundwater from Drilling Fluids

MEPAU has a good understanding of the baseline surface and groundwater quality within the Proposal area given the comprehensive monitoring that has been undertaken for a prolonged period of time. MEPAU will select low toxicity drilling fluids whilst drilling the initial top-hole sections, and consequently if contamination of groundwater from drilling fluids occurred, it would be expected to result in no more than a localised and temporary impact. As there is little hydraulic connection between the Allanooka – Dongara Water Reserve and the Proposal, and given the sizable distance to the closest¹² residential ground-water extraction bore, impacts from this activity are not expected to be significant.

Further to this, monitoring of the previous drilling programs in the region have not identified any groundwater contamination events from these activities.

4.6.5.2 Contamination of Groundwater from Produced Formation Water

Produced Formation Water Re-injection

As outlined in Section 2.10.2, the design investigations have concluded that water re-injection to the disused petroleum production wells is the most efficient method for disposal of PFW. The water re-injection process involves the collection, storage, treatment and conveyance of PFW to be re-injected underground via disused production wells.

Based on MEPAU modelling, the daily Total Produced Water volume (Produced Formation Water and Condensed Water) from the reservoir will initially be approximately 142 m³ per day and is expected to peak at approximately 381 m³ per day after about four (4) years before then reducing back to 142 m³ per day over

¹² the closest residential ground-water extraction bore is more than 10 kilometres to the north-west of the Proposal area, in the semi-rural outer areas of Dongara - Port Denison

the subsequent seven (7) years. The Total Produced Water volume required to be disposed of over the 20-year life of the operation will be approximately 1 million m³.

As shown in Figure 4-3, the aquifers in the region are thick bands of rock. Re-injection of PFW will be through existing, disused wells that 2 km below the surface. The Yaragadee Aquifer is up to 1600 m thick, but groundwater in the region is less than 150 m deep. Geological separation between the injection reservoir and useable groundwater sources indicate the migration from reservoir to groundwater is highly unlikely. As such, impacts arising from this activity are not expected.

MEPAU has undertaken an assessment of the technical issues around re-injection and concluded that it is an appropriate method of PFW disposal. Key outputs of this assessment, and information regarding design, management, operation and well integrity is to be included in the Well Management Plan which (as described in Section 1.5.3), is required to be accepted by DMIRS prior to activities commencing. Key outputs of the assessment include:

- Approximately 142m³ of PFW is estimated to be generated daily. MEPAU has proven that in a design sense the nominated wells can accommodate these volumes via re-injection.
- The relevant EPA Inland Water Environmental Factor Guideline (Section 4.6.2) requires a description of the approach to maintaining well integrity for wells which intercept multiple aquifers. The integrity of the receiving wells has been assessed. Advice has been provided to DMIRS in preparation for subsequent operational regulatory approvals under the PGER Act. In summary, MEPAU plans to approach the maintenance of well integrity similar to other well integrity maintenance within the Perth Basin.
 - Design and Construction: The wells are each designed with regard to specific formations and aquifers. Casing and cementing designs are included in the Well Management Plan (accepted by DMIRS), and integrity inspections of cementing and casing installation is conducted during well construction.
 - Operation: Production casing will be subject to regular integrity testing. This involves pressurising the production casing to a set pressure, then holding and observing the pressure for a set period of time. Where the pressure remains constant, well integrity is considered intact. The frequency of these tests will be documented in the DMIRS accepted WMP and for injection wells also in the Part V licence conditions. Where integrity of production casing is compromised, the well will be shut-in and not used again until the integrity issues are resolved (such as the replacement of the production casing).
- The existing Part V EP Act licences for DPF and HPF permit the use of hydrocarbon containing PFW re-injection.
- PFW transfer is planned to be via an existing and unused flowline, XAGGS Flowline, connecting the XPF to the HPF, which is in care and maintenance. Use of this flowline would be a beneficial re-use of existing assets.
- The quality of the PFW being re-injected will be managed by sampling and treatment at both the WGP site and the bore locations.
- In order to provide operational flexibility and redundancy, MEPAU proposes to have at least two reinjection wells available to receive PFW, with only one being used at any one time.
- As part of the PFW contingency plans, produced water evaporation ponds will be provided on the WGP site. These are for contingency purposes in the unlikely event that PFW re-injection is not possible.

Produced Formation Water Storage

MEPAU has a good understanding of the baseline surface and groundwater quality within the Proposal area given the comprehensive monitoring that has been undertaken for a prolonged period of time. As there is little hydraulic connection between the Allanooka – Dongara Water Reserve and the Proposal, and given the distance to the closest residential ground-water extraction bore, even in the event a spill event occurred from an evaporation pond, impacts from this activity are not expected to be significant.

The WGP will meet the guidance detailed in Water Quality Protection Notice (WQPN) 26, (liners for containing pollutants, using synthetic membranes) and good industry practice. This will include PFW evaporation pond design to the following specifications:

- Dual 1.5mm thick High-Density Polyethylene (HDPE) liner.
- Freeboard of 500 mm plus sufficient allowance for significant rainfall events (1 in 100-year Average Recurrence Interval 24-hour rainfall event).
- Leak detection system.

4.6.5.3 Application of Legislation, Policy and Guidance

The management of liquid wastes are regulated under the Part V of EP Act and risks arising from the generation and management of liquid wastes is also regulated under the PGER (Environment) Regulations 2012.

The DWER regulates industrial emissions and discharges to the environment through a works approval and licensing process. As the Proposal is considered to be an industrial premise with production capacities above the EP Act thresholds, the re-injection of PFW will trigger regulation under Part V of the EP Act. Part of the application under Part V of the EP Act requires all emissions and discharges to be identified, evaluated and controls identified to enable DWER to approve the activity. In line with the assessment conducted in this Section, impacts arising from PFW injection are not significant, and can be sufficiently managed under this section of the Act.

Under the PGER (Environment) Regulations 2012 a DMIRS approved Environment Plan is required to manage impacts to inland waters arising from planned emissions and unplanned releases associated with all construction and operational activities. Specifically, the EP has to consider impact significance and demonstrate that impacts and risks are reduced to a level that is ALARP and acceptable prior to acceptance by DMIRS. No activities covered in this Proposal can commence until an EP is accepted by DMIRS.

As described in Section 4.6.5, the risk of groundwater contamination associated with PFW re-injection is low given groundwater is planned to be injected into deep reservoirs that are geological separated from useable groundwater aquifers. Further to this, MEPAU will implement an extensive water monitoring program in accordance with subsequent environmental approvals (part V of the EP Act and the PGER (Environment) Regulations 2012), that will ensure proactive identification, management and reporting of any localised environmental impacts in the unlikely event they occur. Consequently, as impacts associated with this key factor will not be significant, they can be suitably managed under these other regulatory requirements.

4.6.6 Avoidance and Mitigation

Throughout the scoping phase of this Proposal, MEPAU conducted various studies to understand the feasibility for re-injecting PFW into subsurface formations to avoid the need and environmental impacts associated with the offsite disposal of large volumes of liquid wastes. Although not a specific mitigation that can be counted during the construction and operational phase of this Proposal, this is possibly the most important mitigation measure as MEPAU has managed to balance the project needs whilst identifying a suitable disposal solution for PFW that has a minimal (if any) impact on the environment.

Technical investigations have determined that the solutions are technically feasible and following licensing under Part V of the EP Act and the PGERA, the measures for managing the integrity of injection wells will be verified and reported on regularly.

Additional mitigation measures to manage impacts to inland waters are detailed in the Waitsia Gas Project Stage 2 – Environmental Management Plan and is attached as Appendix G.

4.6.7 Predicted Outcomes

The outcomes of the Proposal are predicted to be:

- As groundwater is known to be present to depths of 150 m and given MEPAU plan to reinject PFW approximately 2 km below the ground surface, there is significant separation between the injection reservoir and the useable groundwater aquifer, thus no impacts to useable aquifers are expected.
- Significant engineering design (into PFW system and evaporation pond) is expected to prevent any environmental impacts occurring from this Proposal.
- Should spill events occur, temporary localised impacts are not expected to affect PDWSA's or residential bores.
- Surface water management will be through a stormwater collection system designed to appropriate engineering standards including bunded areas and a lined evaporation pond.

MEPAU currently undertakes a comprehensive water quality monitoring program for its operations under the current *EP Act* Part V licences and/or the Environment Plans for activities prepared under the PGER Act. MEPAU anticipates that an appropriate level of water monitoring will be required through other legislative requirements.

Based upon the predicted outcomes for the Proposal, MEPAU does not believe that it will result in a significant impact to the inland waters. MEPAU has considered the WA Environmental Offsets Policy however MEPAU does not believe actions to offset the predicted outcomes of this Proposal are required as the Proposal is not expected to have a significant impact to inland waters.

4.7 Key Environmental Factor - Air Quality

4.7.1 EPA objective

To maintain air quality and minimise emissions so that environmental values are protected.

4.7.2 Policy and Guidance

- Environmental Factor Guideline Air Quality (EPA 2016g) Measure (NEPC 2016).
- National Environment Protection (Ambient Air Quality).
- Environmental Protection Bulletin No. 24 – Greenhouse Gas Emissions and Consideration of Projected Climate Change Impacts in the EIA Process.

4.7.3 Receiving Environment

4.7.3.1 Physical Meteorological Conditions

As noted previously in this report, the Proposal is located within an agricultural area 16 km east-south-east Dongara – Port Denison. In terms of documenting the existing climate at the WGP site, the closest meteorological monitoring stations with applicable data available were Geraldton Airport (68 km away) and Mullewa (95km away). As Geraldton is located on the coast and Mullewa is in a semi-arid environment, and both towns are a significant distance from the WGP, neither dataset was considered suitable for use in an air quality assessment for the Proposal.

In the absence of suitable available monitoring data, MEPAU engaged Ramboll to develop a meteorological dataset to summarise the wind speeds and direction within the Proposal area. The Air Pollution Model (TAPM) prognostic meteorological model developed by CSIRO was used to generate a gridded meteorological

dataset which was then used as inputs into the CALMET meteorological processor to develop a meteorological data file suitable for use in CALPUFF (Ramboll, 2019).

An annual wind rose generated by the CALMET meteorological processor using TAPM generated data for the WGP2 site is presented in Figure 4-4, with the annual frequency of wind speeds presented in Table 4-11. The modelling undertaken by Ramboll (2019) shows a typical wind pattern for the Mid-West, including strong winds from the south/south west and the east/north east. The modelling outcomes are included as Appendix E.

Table 4-11: Distribution of Wind Speeds for 2019 (Ramboll, 2019)

Wind Speed (M/s)	Calms	0.5-1.5	1.5-3.0	3.0-4.5	4.5-6.0	6.0-7.5
(%)	0.7	11.4	37.1	29.0	16.1	0.6

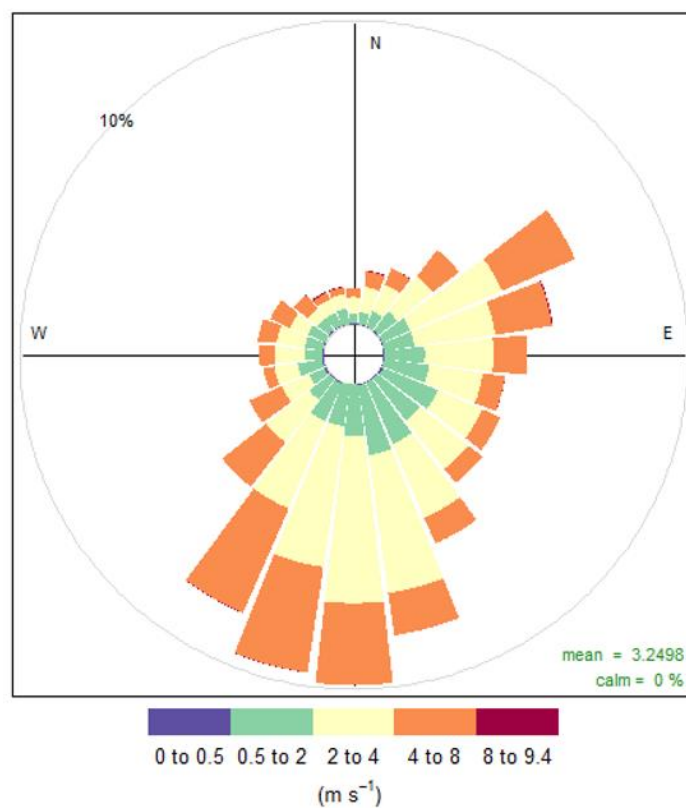


Figure 4-4: CALMET Generated Wind Rose (Ramboll, 2019)

4.7.3.2 Air Quality

No background air quality data was present for the Proposal area and subsequently, MEPAU used public information from a suitable reference site to understand the likely ambient air quality within the Proposal area. DWER monitors air quality at several Air Quality Monitoring Stations (AQMS) located in both regional and metropolitan locations within Western Australia in accordance with the National Environment Protection (Ambient Air Quality) Measure (NEPM). Only two sites monitoring the pollutants of interest were identified that were not in a densely populated area and were not under the strong direct influence of a large polluting source: Caversham (NE suburbs of Perth) and Rolling Green (outer east rural site). In consultation with the DWER Air Quality branch, MEPAU selected Caversham to provide an indication of air quality within the Proposal area. Caversham was selected over Rolling Green as it is expected to have higher concentrations of most pollutants allowing a suitably conservative assessment to be undertaken.

Air quality data for the Caversham AQMS (DWER, 2019) is detailed in Table 4-12. The annual average concentrations of PM_{2.5} at Caversham AQMS are above guideline levels however, given that the reason for this exceedance was due to fire activity in the area, it is likely that background PM_{2.5} concentrations within the Proposal area will be significantly below the concentrations identified for Caversham. Other emission sources are present in the region including the Mondarra Gas Storage Facility (MGSF), the XPF and the nearby Patience Bulk Haulage sand quarry operation. To verify MEPAU’s expectation that background PM_{2.5} concentrations are significantly lower in the Proposal area, baseline air quality monitoring is currently being undertaken.

Table 4-12: Air Quality from Caversham AQMS

Pollutant	Averaging Period	Representative Background (µg/m3)
NO2	15-Minute 1-hour, 8-hour	39
	Annual	10
SO2	15-Minute 1-hour, 8-hour	31
	1-day	9
	Annual	9
CO	8-hour	250
PM ₁₀	24-hour	20
	Annual	16
PM _{2.5}	24-hour	9
	Annual	9

4.7.3.3 Dust

Rural and industrial properties surround the Proposal area, and comprise blocks of native vegetation, farming land, and unsealed roads. Generation of dust from driving on unsealed road and farming activities are anticipated to generate similar levels of dust as expected for this Proposal.

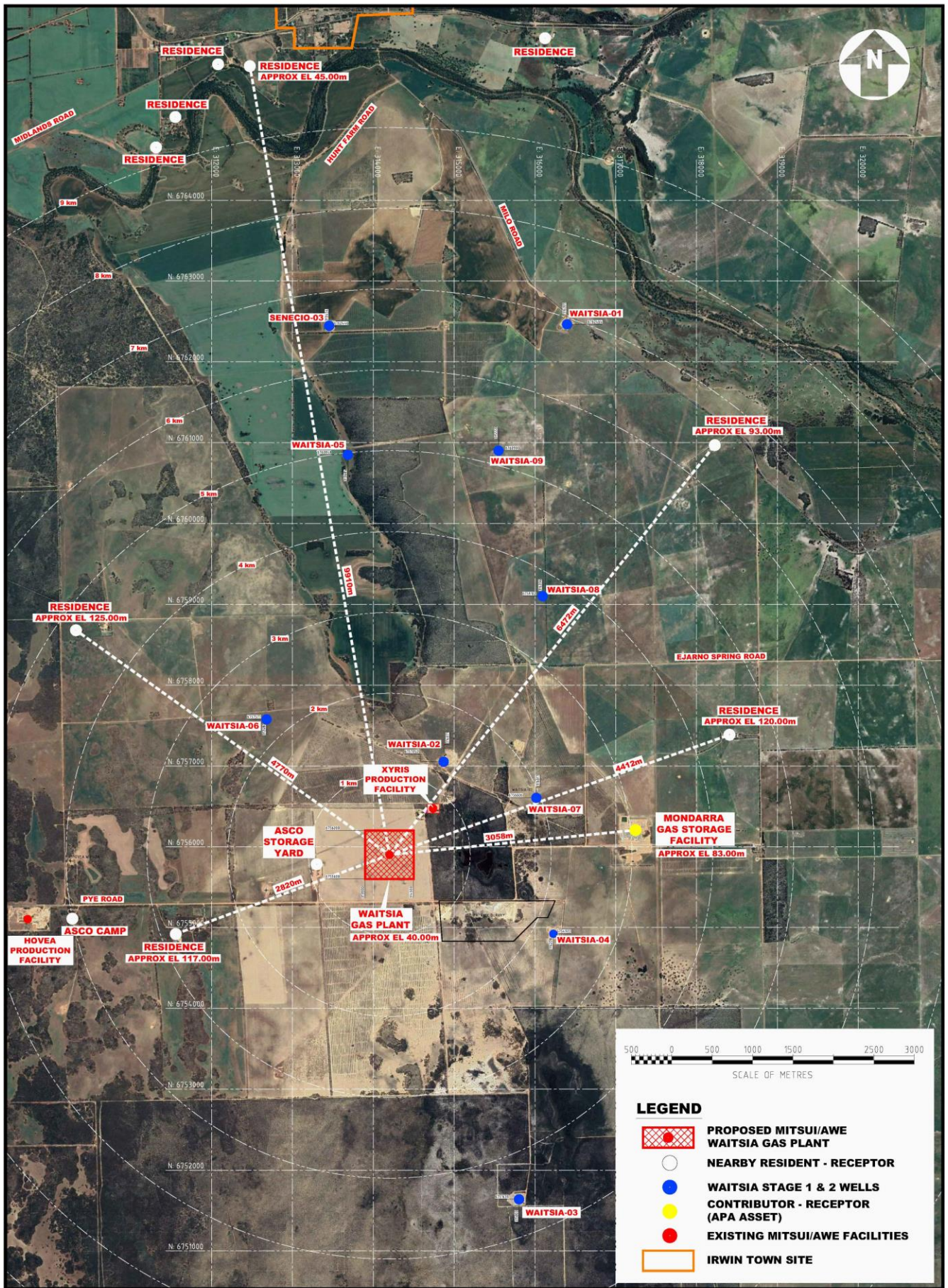
Dust can be present as a PM_{2.5} or PM₁₀ pollutant. Thus, baseline air quality monitoring currently being undertaken by MEPAU will verify background levels of these pollutants of concern in the Proposal area.

4.7.3.4 Sensitive Receptors

Receptors sensitive to air emissions arising from this Proposal were identified to be:

- Neighboring residential properties; and
- Neighboring facilities.

The proximity of the proposed WGP to identified sensitive receptors is provided in Figure 4-5 and summarised in Table 4-13.



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Figure 4-5: Sensitive Receptors

Table 4-13: Proximity of Sensitive Receptors to the WGP

Sensitive Receptor	Distance to WGP (m)	Receptor Elevation (m)
Residence	2820	117
Mondarra Gas Storage Facility	3058	83
Residence	4421	120
Residence	4770	125
Residence	6472	93

4.7.4 Potential Impacts

During the construction phase of the Proposal, sensitive receptors have the potential to be exposed to reduced air quality via:

- Use of construction vehicles and equipment / temporary power generation (generators); and
- Dust generation.

Operation of the WGP will result in the generation of GHG emissions such as carbon dioxide (CO₂) due to extraction of CO₂ to meet gas pipeline requirements.

Other emissions of potential concern include oxides of nitrogen (NO_x), sulphur dioxide (SO₂), carbon monoxide (CO), particulate matter including PM_{2.5} and PM₁₀, VOCs (including benzene, toluene, ethylbenzene and xylene) (BTEX) and mercury (Hg). Modelling has been carried out to assess the potential impacts.

4.7.5 Assessment of Impacts

4.7.5.1 Construction

The operation of typically diesel-powered vehicles, heavy equipment and power generation during construction will result in generation of combustion emissions. Emissions generated will include NO_x, SO₂, PM₁₀ and VOCs however given their limited nature they are expected to rapidly disperse upon release. The combustion emissions associated with the types of vehicles, machinery and equipment required during construction are not expected to be significantly different from other sources in the region.

Typically, during early stages of construction dust is generated from vegetation clearing activities, and activities on unsealed surfaces. MEPAU will undertake dust suppression activities on a regular basis to minimise potential impacts to the workforce and nearby and regional receptors. Dust can cause reduced air quality, acute and chronic health effects, as well as amenity impacts due to reduced visibility and settling on surfaces causing soiling and staining (DEC 2011). The potential impact of dust is determined by particle size, chemicals composition and concentration (DEC 2011). The total suspended solid (TSP) fraction of dust is typically responsible for nuisance or loss of amenity whereas the smaller PM₁₀ and PM_{2.5} fractions are more commonly associated with the potential for health impacts due to their ability to penetrate the lungs (DEC 2011).

The nearest sensitive receptor is located approximately 2.5 km west of the Proposal area. Based on the use of dust suppression techniques and this separation distance, as well as the surrounding land uses being either rural or industrial, air emissions arising from vehicles, heavy equipment and generator use or dust emissions are not considered to represent a significant or long-lasting impact to air quality, health or aesthetics during the construction phase.

4.7.5.2 Operations

Air Quality

MEPAU commissioned subject matter experts (Ramboll 2019) to undertake air dispersion modelling to assess the potential air quality impacts of atmospheric emissions from the proposed WGP, comparing the ground level concentrations (GLCs) predicted at sensitive receptor locations against the relevant ambient air quality criteria above.

This evaluation focuses on air emissions generated during normal operations, as emissions generated from commissioning, start-up or upset conditions will be infrequent. And short in duration The Proposal area is located within an area where wind speeds of 1.5 m/s and greater are experienced 87% of the time (Section 4.7.3.1). Consequently, air emissions generated from non-operational activities or events would be expected to rapidly disperse and dilute, and when considered over annual averaging periods do not contribute significantly to annual pollutant exposures. Plant designs were provided by the tenderers and modelling has been completed for the designs. These reports (Ramboll 2019) are provided in Appendix E. Due to the spatial distribution of several sources in the region, the air dispersion modelling has been using the CALPUFF air dispersion model with a meteorological dataset from 2018.

In consultation with DWER (Air Quality Branch), the results of the modelling were then also assessed with a derived background concentration using data provided for the Caversham AQMS (Table 4-12). As shown in Table 4-14, the results of the modelling study indicated that when assessed cumulatively with an indicative background concentration, all compounds and averaging periods were still well below the ambient air quality guidelines with the exception of annual averages of PM_{2.5}. The annual average concentrations of PM_{2.5} monitored at Caversham for the modelled year were already above the guideline before the addition of other regional and WGP sources. Given its rural nature, and per Section 4.7.3.2 it is likely that background PM_{2.5} concentrations at the WGP will be significantly below the concentrations monitored at Caversham. Predicted concentrations of PM_{2.5} from WGP in isolation at all sensitive receptor locations were determined to be less than 1% of the ambient annual average air quality guideline. The modelling assessed several scenarios including normal operations in isolation and cumulatively with other sources in the region. Based on the information provided by the designers, emissions from the proposed WGP in conjunction with emissions from other sources in the region comply with all relevant ambient air quality guidelines at the nominated sensitive receptor locations in the region, apart from the annual averages of the PM_{2.5} guideline.

Table 4-14 below shows the percentage of the air quality guideline achieved at the nearby house; the closest residence to the WGP to the west utilising background air quality information provided by DWER. This is the highest % exceedance and essentially is a worst-case scenario from the modelling outputs.

Table 4-15 summarises the predicted levels without background levels.

Table 4-14: Percentage of the Air Quality Guideline (Background and Normal Operations) at the Nearest Residence

Pollutant (annual average)	Background (% of Guideline)	Normal Operations (% of Guideline)	Normal Operations In Addition to Background (% of Guideline)
NO ₂	16%	6 %	22%
SO ₂	15%	0.008 %	15%
CO (8-hour maximum)	3%	1.4 %	4%
PM ₁₀	64%	0.5 %	65%
PM _{2.5}	113%	2 %	114%

Table 4-15: Predicted Percentage of the Air Quality Guideline (during Normal Operations¹³) at the Nearest Residence

Pollutant (annual average)	Normal Operations (% of Guideline)
Mercury	0.0025 %
Benzene	0.36 %
Toluene	0.007%
Ethylbenzene	0.6 %
Xylene	0.002 %

Greenhouse Gas Assessment

MEPAU has calculated that the maximum operational GHG emissions from the WGP is approximately 300,000 tonnes CO₂-e per year. This is comprised of 220,000 tonnes of scope 1 emissions and 80,000 tonnes of scope 2 emissions. This represents approximately 0.4% of the State's GHG emissions based on the 2013-2014 figure of 83.4 Mt.

Due to the size of the WGP, and as there have been limited numbers of Gas Plants considered by the EPA through the EP Act Part IV process, it is difficult to benchmark WGP against similar facilities. However, based upon the size of the facility, there are similarities with the Macedon Gas Plant in the Pilbara (approved by the EPA in 2010) and more recently, the Albermarle Lithium Processing facility at Kemerton (approved by the EPA in 2018).

Macedon Gas Project

The average annual GHG emission over the operating life of the Macedon facility is 115,000 tonnes of CO₂-e. This represents the construction of only one gas "train" with an output of 100 TJ/day and where the use of compression is limited.

In its assessment of the Macedon project, the EPA noted that the proponent had committed to further consider, at the Front-End Engineering phase, GHG efficiency measures in the plant design and to benchmark the project GHG efficiency against comparable projects.

The EPA also 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. In this regard, the EPA reiterated that it has distinct preference for the use of natural gas over coal in the production of power in Western Australia and therefore welcomes an increase in the availability of natural gas.

Albermarle Lithium Processing Facility, Kemerton

Albermarle Lithium Pty Ltd is proposing to establish the Albermarle Kemerton Plant, a Lithium Hydroxide Product manufacturing plant on a site approximately 17 kilometres north-east of Bunbury and 153km south of Perth. The Albermarle Kemerton Plant will produce up to 100,000 tonnes per annum (tpa) of lithium hydroxide product from five 20,000 tpa process trains.

The project was given approval under Part IV of the EP Act in October 2018. A condition of that approval required the preparation and approval of a Greenhouse Gas Management Plan (GHG MP) for the

¹³ Background levels are not known for the pollutants of concern presented in this Table, thus have been presented separately.

construction and operation of the plant. The management plan has been prepared to satisfy the conditions of the environmental approval issued by the EPA and the Minister for Environment.

GHG emissions from the facility are estimated to contribute 0.4% to WA's annual emissions and were not considered significant. The GHG emissions intensity was estimated to be 6.6 t CO₂-e per tonne of lithium hydroxide produced. GHG minimisation measures have been identified for the construction and operation of the facility and include measures related to the selection of fuel and energy sources, plant process and technology that maximise energy efficiency and reduce emissions.

Conclusion

The benchmarking exercise has identified that there have been limited projects involving gas plants like WGP recently considered by the EPA. However, more broadly, the methodology adopted by the EPA for projects where the contribution to the State's total GHG emissions has not been significant, has been to look at the project design process to identify measures to increase energy efficiency and for proponents to prepare a GHG MP to show how the generation of emissions is to be managed into the future. MEPAU intend to prepare a GHG MP for WGP, and in accordance with the EPA Guideline Air Quality Guideline, does not believe that increasing the states emissions by 0.4% constitutes a significant increase in the States emissions.

4.7.5.3 Application of Legislation, Policy and Guidance.

The management air quality and reporting of atmospheric emissions is a heavily regulated. Specifically, air quality resulting from emissions to air is regulated under the Part V of EP Act and impacts and risks arising from atmospheric emissions is also regulated under the PGER (Environment) Regulations 2012. In addition to this, GHG emissions are also required to be reported under the National Greenhouse and Energy Reporting Act.

The DWER regulates industrial emissions and discharges to the environment through a works approval and licensing process. The Proposal is considered to be an industrial premise with production capacities above the EP Act thresholds. Consequently, approval under Part V of the EP Act is required. The application requires all emissions and discharges to be identified, evaluated and mitigations identified. In line with the assessment conducted in this Section, any impacts arising from atmospheric emissions are not expected to be significant and can be sufficiently managed under this section of the Act.

Under the PGER (Environment) Regulations 2012 a DMIRS approved Environment Plan is required to manage impacts arising from atmospheric emissions associated with all construction and operational activities. Specifically, the EP has to consider impact significance and demonstrate that impacts and risks are reduced to a level that is ALARP and acceptable prior to acceptance by DMIRS. No activities covered in this Proposal can commence until an EP is accepted by DMIRS.

The emissions associated with this Proposal are estimated to result in an increase of the GHG emissions in Western Australia by 0.4%. As this does not constitute a significant increase in the emissions of Western Australia and as impacts associated with this key factor are not expected to be significant, they can be suitably managed under these other regulatory requirements.

4.7.6 Avoidance and Mitigation

Throughout the scoping phase of this Proposal, MEPAU has considered proximity to sensitive receptors in siting of the WGP. The previous location of the WGP was closer to sensitive receptors and following consultation with landowners (See Table 3 – Local landowners) in the region a new location for the WGP was selected. Through avoidance of a greater impact, MEPAU has managed to balance the project needs, whilst locating the WGP in a location that is as far away as practicable from sensitive receptors.

MEPAU has considered how GHG emissions and air quality can be reduced to ALARP throughout the planning and design phase of this Proposal, via:

- Reviewing and assessing a wide range of processing technologies;
- Considering the use of renewables to reduce the operational emissions; and
- Introducing an operating philosophy that mandates combustion or flaring instead of cold venting.

Processing technologies

During the planning phase of the Proposal, MEPAU has formally considered and reviewed a wide range of processing technologies. Specifically, from as early as Concept Selection stage, MEPAU has evaluated the process efficiency of various technologies and used this in supporting design decisions to select highly efficient designs. By increasing processing efficiencies, the emissions associated with operation of the facility will be inherently reduced.

As part of the nature of the “design competition”, each tendering contractor has conducted an analysis of the available technologies and selected robust designs that utilise the best available technology in order to offer MEPAU the most efficient plant

Renewables for facility operation

MEPAU has conducted a feasibility study into the use of renewables to support the Proposal. The studies considered small / short-term and larger / long term solutions assessing the cost against the lifecycle associated with the Proposal. The studies concluded that for applications associated with operating the WGP, the economic return did not align with the Proposal lifecycle, thus renewables have not been selected for use. However, for smaller scale, remote application such as powering well sites and hubs, the economic return was aligned with the Proposal lifecycle, thus MEPAU plan to use renewable technology for these locations where practicable.

Combustion and Flaring

Cold venting results in the release of methane, carbon dioxide, volatile organic compounds, sulphur compounds and gas impurities to the atmosphere. Combustion or flaring causes these gases to oxidise and form carbon dioxide, which, when compared to methane, has significantly lower global warming potential. By adopting the operating philosophy that combustion or flaring are the preferred methods of disposal of hydrocarbon during upset or abnormal operating conditions, emissions associated with this activity are significantly reduced.

Mitigation measures to manage potential Air Quality impacts (including GHG emissions) are detailed in the Waitsia Gas Project Stage 2 – Environmental Management Plan and is attached as Appendix G.

4.7.7 Predicted Outcomes

The outcomes of the Proposal will include:

- Localised reduction in air quality during construction of the Waitsia Gas Plant associated with the use of heavy vehicles, machinery and equipment that are not expected to impact the closest sensitive receptor located 2.5 km away.
- Localised reduction in air quality associated with generation of dust emissions that are not expected to cause impacts to sensitive receptors.
- Modelling indicates compliance with NEPM targets (subject to verification of air quality baseline currently being undertaken by MEPAU)
- MEPAU has calculated that the maximum operational GHG emissions from the WGP is approximately 300,000 tonnes CO₂-e per year expected to represent an increase in the State’s emissions by 0.4% based on 2013-2014 figures.

Based upon the nature and scale of air emissions impacts associated with this Proposal and with the mitigations identified in this Section, MEPAU will maintain air quality such that environmental values are protected. In accordance with the EPA Guideline Air Quality Guideline, increasing the States emissions by 0.4% does not constitute a significant increase in the State's emissions. Consequently, MEPAU will meet the EPA's Objective for this factor.

Based upon the predicted outcomes for the Proposal, MEPAU does not believe that it will result in a significant impact to the air quality. MEPAU has considered the WA Environmental Offsets Policy however MEPAU does not believe actions to offset the predicted outcomes of this Proposal are required as the Proposal is not expected to have a significant impact to air quality.

4.8 Key Environmental Factor – Social Surroundings

4.8.1 EPA objective

To protect social surroundings from significant harm.

4.8.2 Legislation, Policy and Guidance

- Environmental Factor Guideline Social Surroundings (EPA 2016h).
- Guidance for the Assessment of Environmental Factors, Assessment of Aboriginal Heritage No. 41 (EPA 2004).
- Environmental Protection Noise Regulations 1997 (Noise Regulations).
- Aboriginal Heritage Act 1972.

4.8.3 Receiving environment

4.8.3.1 European heritage

No World Heritage Sites or Commonwealth Heritage Sites occur within 10 km of the Proposal area (DoEEa, 2019).

A search on the inHerit Western Australia database (<http://inherit.stateheritage.wa.gov.au>) did not identify any Sites within the Proposal area (Heritage Council 2019). The closest listed Sites are to the north of the Proposal area, ~8 km north of the proposed WGP. The sites are Yardarino School – Place No. 1245 and Irwin Park Farmhouses – Place No. 1244.

4.8.3.2 Aboriginal heritage

MEPAU has commissioned a number of Archaeological and Anthropological surveys and assessments on the potential Aboriginal heritage significance of the area, including:

- *Aboriginal Heritage Survey of the Waitsia Project Area* - R and E O'Connor Pty Ltd, March 2015 (REO 2015).
- *Report on an Archaeological Survey of AWE Waitsia Project* – John Cecchi Heritage Management Consultancy - March 2015 (JCHMC, 2015).
- *Report on an archaeological assessment at the Waitsia-03 project area for AWE Limited* – Terra Rosa Consulting - December 2017 (TRC, 2017).

The Aboriginal Heritage Survey (REO, 2015) involved the Amangu and Widi Mob groups in an initial consultative process and a field inspection (noted in Figure 4-6 as *Archaeological Survey sample areas*). The survey results confirmed the presence of two sites of Aboriginal heritage significance (as detailed below). It

also identified that Ejarno Spring is a place of importance and significance to the Amangu and Widi Mob groups. The survey report concluded that, subject to non-disturbance of the sites of Aboriginal heritage significance, works within the project area should proceed.

A search of the Aboriginal Heritage Inquiry System (DPLH, 2019) identified that there are two sites of Aboriginal heritage significance within the Proposal area. They are:

- DAA Site ID 5482 'Jenkins Hut Valley'¹⁴.
- DAA Site ID 18907 'Irwin River SC04'. The site is described as of mythological and historical significance. This site comprises the Irwin River up to its high-water mark and its tributaries. This site is located within the Project (JCHMC, 2015).

Figure 4-6 shows their location in relation to the Proposal area.

In addition, in 2017 during the process of preparing and clearing the drill pad for the Waitsia-03 well a "scar tree" was identified by Aboriginal monitors and site personnel. Well pad construction was undertaken in a manner to avoid any potential impact to the tree. Later, Terra Rosa, 2018 confirmed that the tree was culturally modified. The "scar tree" is regularly monitored by MEPAU.

¹⁴ To note, JCHMC, 2015 notes the location of Jenkins Hut Valley (Site ID 5482) is incorrectly located on DPLH, 2019 due to conversion of coordinates. An amendment application has been made to DPLH. Figure ## correctly locates the site.

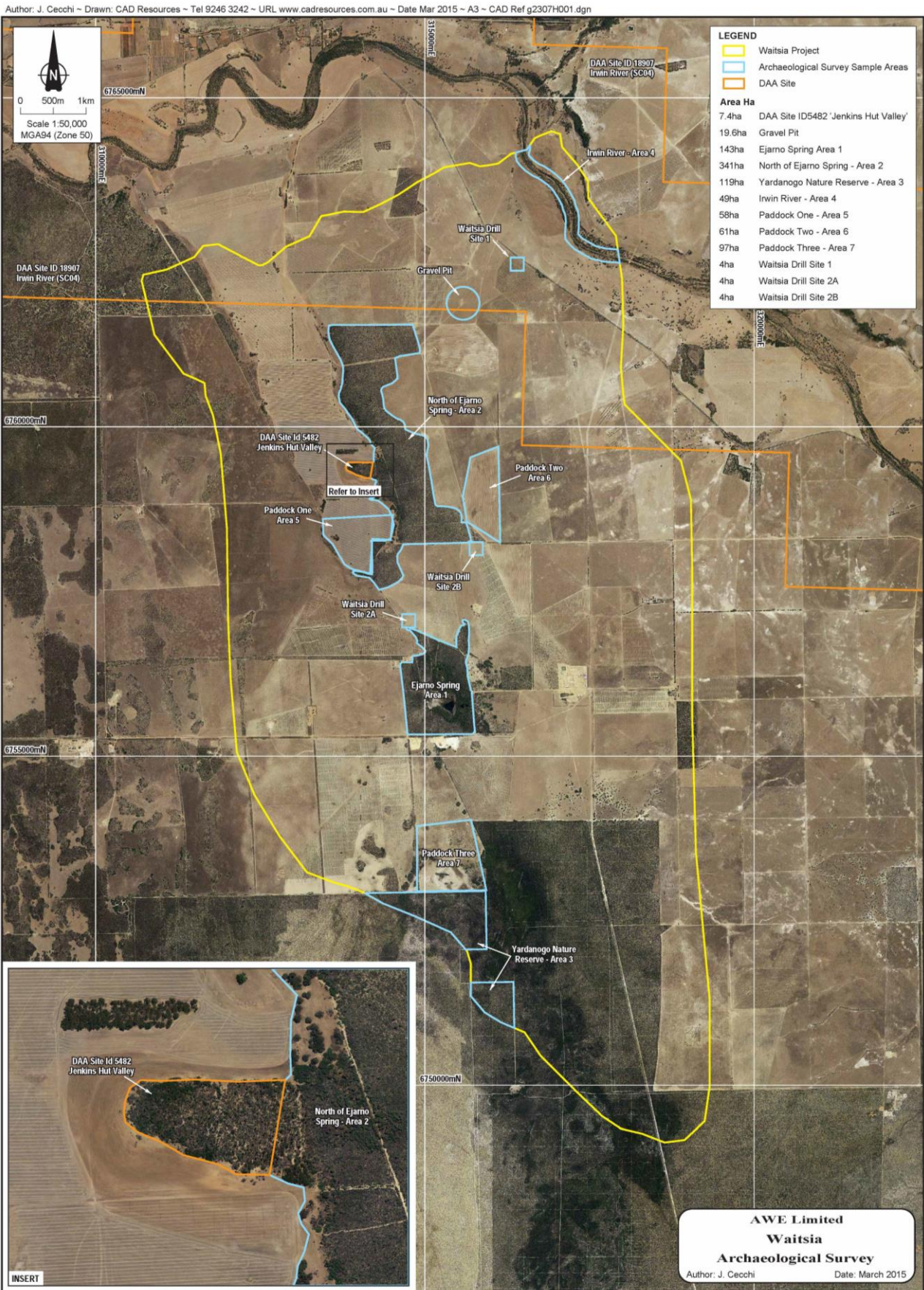


Figure 4-6: Location of two sites of Aboriginal heritage significance in relation to the Proposal area

4.8.3.3 Native Title Claim

The Proposal area occurs within the L1 and L2 licence areas (licence areas). The licence areas have a registered native claim placed upon them. This is the Southern Yamatji Claim by way of native title determination application WAD 19/2019 Southern Yamatji and State of Western Australia & Ors (Southern Yamatji).

Renewal applications for the licence areas were lodged in May 2014 prior to the expiry of the relevant 21-year terms which were in place at that time. Due to a legislative amendment which varied the term of the renewal from a period of 21 years to a perpetual term, the renewal of the licence areas became subject to the 'future act' regime (and right to negotiate process) of the *Native Title Act 1993*.

The Licence Area Joint Venture is currently negotiating with the Southern Yamatji in this context and expects to finalise negotiations in H2 2019. Once the binding agreement is in place the State of WA will renew the licence areas.

Notwithstanding that the permits have not been formally renewed, the Joint Venturers continue to enjoy all of their rights and entitlements under the licence areas pursuant to section 65(11) of the *Petroleum and Geothermal Energy Resources Act 1967* whilst the application is being processed and the Joint Venturers are 'holding over'.

4.8.3.4 Heritage Commitments in the NT Act Agreement

Once the heritage agreement is in place the state will renew the petroleum titles.

A binding heritage agreement which is being negotiated with the Southern Yamatji peoples and their representative body YMAC (Southern Yamatji) contains a package of benefits and commitments by the Joint Venturers to the Southern Yamatji. One of the key commitments made to the Southern Yamatji is to follow the terms of a heritage protocol with respect to future petroleum operations.

The heritage protocol will be annexed to the agreement and is based on an existing Southern Yamatji heritage protocol to which MEPAU is party to as a non-operating titleholder.

The heritage protocol will require that the Joint Venture consult with the Southern Yamatji with respect to future petroleum operations and undertake clearance surveys where the Joint Venture is carrying out ground disturbance activities unless the Southern Yamatji consider that such a survey is not necessary (i.e. an adequacy test) either because an appropriate survey has already been undertaken or otherwise by agreement between the Joint Venturers and the Southern Yamatji.

Whilst the protocol is still being finalised and the timeframes have not been agreed, there is potential that a survey will be required to be completed.

4.8.3.5 Surrounding Land Use

The Proposal is within a rural district which has been historically used for agricultural uses, mainly grazing and cropping. This land use is reflected in the Shire of Irwin Town Planning Scheme No. 5 whereby all the land that is part of the Proposal area is zoned – General Farming. The Irwin Shire Council has formally advised MEPAU that a development application is not required. MEPAU understands that as the Proposal is subject to the PGER Act, it is exempt from the operation of the statutory planning framework.

Since the discovery of the Dongara gas field in the 1960s this rural area has incrementally changed to the point where there are significant other rural/industrial uses operating in a complementary way with the agricultural base. It is evident that a change to a quasi – industrial district has occurred with the petroleum industry as a key element successfully coexisting with other land uses. As part of routine project planning,

MEPAU uses lessons learned from previous activities to continually improve its interaction with other land users. For example, the efforts taken to ensure that Waitsia Stage 1 did not compromise Irwin Park Farm productivity have been used for planning the Proposal.

The key uses that show this transition are shown on Figure 1-1. Specific land uses nearby are described below:

- Mondarra Gas Storage Facility – operated by APA.
- Patience Bulk Haulage Sand Quarry – local extractive industry providing construction materials to the region.
- XPF– gas production facility with current capacity of approximately 10 TJ per day, operated by MEPAU.
- HPF – presently receiving wastewater from Waitsia Stage 1, operated by MEPAU.
- DPF – an aged production facility currently in care and maintenance, operated by MEPAU.
- Asco Group Facilities – a permanent, 50-person camp and separate 6ha laydown facility.
- Jingemia Production Facility –operated by RCMA
- Various well pad sites – specifically Waitsia-02, -03 and -04, operated by MEPAU.

In addition, the WGP should ideally be sited close to the DBNGP to provide efficient conveyance of the processed gas into the supply pipeline and then on to customers. This continues the mixture of land uses coexisting in the region for nearly 50 years.

The Shire of Irwin Local Planning Strategy provides the planning framework in the Shire of Irwin and the strategic basis for the local planning scheme. The Strategy expresses the strategic vision, policies and proposals of the local government that are relevant to the implementation of its scheme. It also provides a means to interpret State and regional policies at the local level allowing the implementation of broader objectives relating to urban form and development. The preparation of the Local Planning Strategy is required by the *Planning and Development (Local Planning Schemes) Regulations 2015*.

The Shire of Irwin Local Planning Strategy recognises that petroleum industries play an important economic role in the region and it is therefore necessary to adequately plan for and protect these industries where appropriate. MEPAU recognises and welcomes the level of interest shown in the Proposal by residents and service providers. MEPAU has a project objective to make local business opportunities a priority and benefit the region.

While the advent of the Proposal will continue this transition, the change in land use is well accepted by most of the nearby landowners. Each of the immediate nearby landowners are involved in commercial arrangements with MEPAU and /or other projects in the area, are familiar with the sector and have developed constructive working relationships.

4.8.3.6 Regional Background Demographics

The Project is based in the Mid West region of Western Australia near the coastal twin towns of Dongara and Port Denison. Dongara is the seat of the Shire of Irwin.

Industries in the area historically include western rock lobster fishing, broad acre farming as well as oil and gas and mineral sands developments. Dongara-Port Denison markets itself as the 'Rock lobster capital of Australia'. Land use east of Dongara-Port Denison is mainly broad scale agriculture and cropping with at least one intensive horticultural business. Since the first onshore gas field discovery, Dongara gas field, in 1964 and the first production gas pipeline, the Parmelia Gas Pipeline, in 1971 these industries have coexisted and supported the regional economy. More recently, Dongara-Port Denison has been promoting itself as a tourism destination.

Oil and gas activities are regularly undertaken throughout other Shires in the Mid West region by MEPAU and other operators. The discovery of the Waitsia gas field in 2014 has been credited with triggering a resurgence of exploration and development interest in the northern Perth Basin facilitating further knowledge and awareness of the sector, which had been relatively quiet in the Mid West since the fall of oil prices in the early 2000s. This decline coincided with reduced western rock lobster fishing boats in the region and throughout Western Australia. Since 2005, the number of operating rock lobster boats in Western Australia has more than halved. Although the Dongara region is marketing itself for tourism, many local businesses, which are heavily dependent on seasonal tourism, have closed in the past decade.

The key demographic characteristics of the Dongara-Port Denison district, which hosts the Waitsia gas field, provide the basis for the social and economic benefits expected to flow to the local and regional community from the Proposal. These key characteristics are set out below:

- Dongara (including Port Denison) is a relatively small community with a population of 2,790; the entire Shire of Irwin population is 3,571.
- Dongara is 63 km from the City of Greater Geraldton which has an urban population over 32,000. The city is the third most populous place in Western Australia after Perth and Bunbury.
- Compared to the WA state averages, Dongara has an older population – with decreases in the younger age brackets of population and an increase in the older categories, suggestive of a rapidly aging population.
- The indigenous population proportion is on par with the WA average although significantly different to Inner Regional indigenous proportions.
- There are high levels of unemployment in Dongara and Port Denison (8.5% and 7.8% respectively).
- High proportion of persons employed in mining (15.3%) and public administration and safety (13.5%), with technicians and trades workers (19.5%) and labourers (16.7%) are key occupations within Dongara - Port Denison.
- Total weekly household (\$1,018/\$1,085 vs \$1595) and personal (\$489/\$682 vs \$724) income levels substantially lower than State averages across the population.

4.8.3.7 Noise

MEPAU engaged Herring Storer Acoustics to conduct an acoustic assessment for the Proposal. HSA (2019) provided assigned outdoor noise levels for sensitive receptors within the vicinity of the WGP (Table 4-16).

Table 4-16: Assigned Outdoor Noise Levels

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		LA ₁₀	LA ₁	LA _{max}
Sensitive receptors (nearest residences)	0700 - 1900 hours Monday to Saturday	45	55	65
	0900 - 1900 hours Sunday and Public Holidays	40	50	65
	1900 - 2200 hours all days	40	50	55
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	35	45	55
Industrial boundary	All times	65	80	90

4.8.4 Potential Impacts

Impacts to identified sensitive receptors and social surroundings are expected to be highest during construction, and include:

- Reduction in visual amenity,
- Increased noise emissions,
- Impacts to heritage artefacts,
- Increased traffic, and
- Social and Economic Impacts.

4.8.5 Assessment of Impacts

4.8.5.1 Visual amenity

The locality around the WGP site can be described as undulating as evident from Photographs 1 and 2. The site itself is relatively flat with an overall gradient rising from west to east. This rise is from 40 m AHD to 70 m AHD over the 1 km width of the WGP site. The site has been regularly cropped and harvested which accentuates its low relief.

The view shown in Figure 4-7 is looking east with a scaled 3D model of the indicative WGP layout included. The plant's components are noticeable but are not intrusive into the rural landscape.

Related to the issue of visual impact is the potential impact of lighting at the WGP site. The objective of the lighting design for the WGP is to achieve a level of lighting in each area that allows safe and efficient operation of the Plant. At the same time the lighting will be designed to be unobtrusive from sensitive receptors nearby. Figure 4-7 shows the layout of the WGP is unobtrusive in the landscape and highlights that the potential impacts from lighting are expected to be minimal. Plant lighting can be switched off by area to minimise visual impact.

Flaring is only expected to occur at infrequent intervals during non-operational activities. Consequently, flaring is not expected to significantly contribute to visual amenity impacts.



Figure 4-7: Photograph of View looking east to the WGP site (indicative)

4.8.5.2 Noise

MEPAU commissioned subject matter experts, Herring Storer Acoustics consultants, to undertake an acoustics study of the Proposal. The study focussed on the predicted noise levels at two sensitive receptors to the south west and the east (Figure 4-5 and Figure 4-8).

Given that an existing production facility (XPF) is operational within close proximity of the proposed WGP location, the study involved the modelling of noise generated from the components of the WGP and surrounding facilities such as XPF to understand if the cumulative impact arising from the proposal were significant. The outputs of the modelling were focussed on the achievement of assigned noise levels in the Noise Regulations. The draft report from Herring Storer Acoustics is provided in Appendix F.

The nearest noise sensitive residence is situated approximately 2.5km to the southwest of the proposed WGP (Figure 4-5). Whilst considered as a highly noise sensitive premises for the assessment, it is noted that this residence belongs to the owner of the land the proposed WGP is to be constructed on who is leasing the land to MEPAU under a contracted agreement. Both the existing HPF and XPF are located on the same property. The second nearest noise sensitive residence is situated approximately 4.5 km to the east of the proposed WGP.

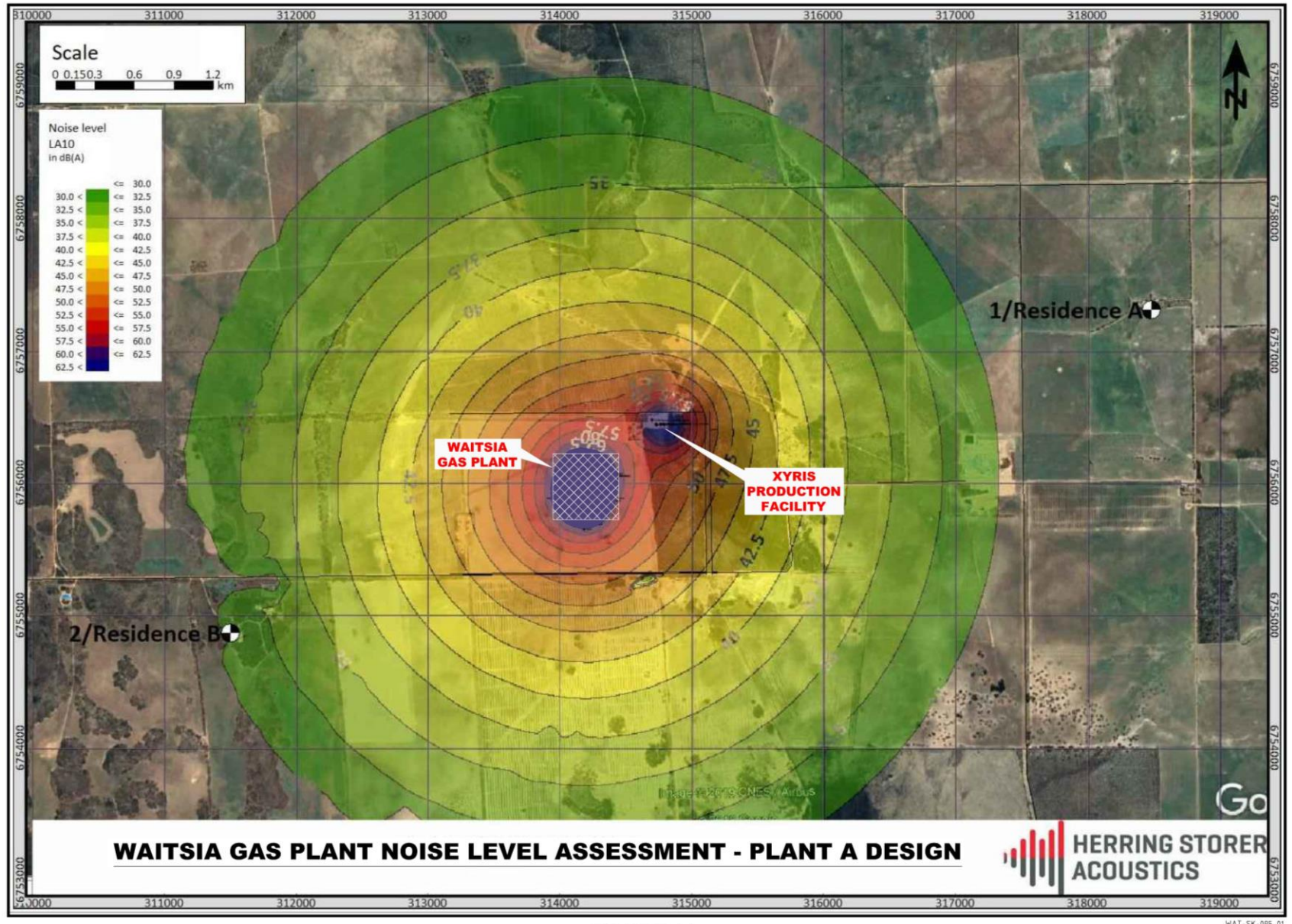


Figure 4-8: WGP Noise Level Assessment (HAS 2019)

The highest predicted noise emissions for the nearest noise sensitive premises is 30 dB(A) arising from operation of the proposed WGP in addition to operation of the XPF (Figure 4-8).

For the most stringent time (night) the assigned noise level is 35 dB(A). The operating scenario considers all noise sources from the proposed facilities operating at the same time. The calculated noise level of an LA10 Level of 30 dB(A) is assessed under the highest night-time propagation weather conditions. Given this, the noise modelling would be considered conservative, as it is unlikely that all noise sources are operating at the same time under the worst-case propagation conditions.

It is predicted that operational noise will not have 'tonality' characteristics, due to the distance, and the fact that modelled noise levels approach the existing background noise level. Hence noise characteristics such as tonality will be increasingly weak and would not be applicable. At noise emission levels around 30 dB(A) it will generally be the case that the noise emission level is low enough that the influence of background noise will result in the noise emission not being 'technically tonal', although that does not mean that some characteristics would not be audible.

For the purposes of subregulation (1) (a), a noise emission is taken to "significantly contribute to" a level of noise if the noise emission as determined under subregulation (3) exceeds a value which is 5 dB below the assigned level at the point of reception.

Hence, if the noise received at a premise is 5 dB(A) or more below the assigned noise level, then noise received at that premises is considered to be not "significantly contributing" and deemed to comply with the requirements of the *Environmental Protection (Noise) Regulations 1997* regardless of any other noise received at that premises from other sources.

It is concluded that the WGP will not exceed the most stringent assigned noise level of 35 dB(A) at the closest sensitive receptor, is not considered to be "significantly contributing" to a level of noise at sensitive locations, and thus will comply with the requirements of the *Environmental Protection (Noise) Regulations 1997* at all times.

The identified receptor locations situated to the west-south-west are the nearest noise sensitive premises. Assessable noise levels at this receptor is below the most stringent assigned noise level of 35 dB(A). This is for the worst-case operating conditions for all noise sources operating at the same time, which is unlikely.

4.8.5.3 Traffic

One of the key determinants of impacts around social surroundings factors can be the levels of traffic generated during both the operation and construction phases and how the impact of this traffic is managed. The Proposal area is fortunate in this regard because of its remote location and relatively direct and unencumbered access route to the site via Brand Highway and Pye Road. Furthermore, the gravel section east of HPF is a private road and therefore access is restricted.

However, the construction phase will bring increased traffic onto this local road network and will require considered management.

Construction Traffic

The construction phase of the project is planned to commence with site earthworks and major civil construction in Quarter 4 2020. The full construction period then continues to the end of Quarter 3 2022. A full two-year construction period is anticipated.

Within this construction period there will be sub-phases where traffic movements will intensify. Construction of wells and flowlines are only expected to cause a temporary increase traffic as major equipment (such as the drilling rig) is moved from one well site to the next. Consequently, the breakdown of expected traffic movements over the construction period of the WGP is detailed in Table 4-17 below.

Table 4-17: Traffic Generation during the Construction Phase – indicative

Activities	Route	Vehicle	Qty	Frequency
Major Equipment Transportation				
Fabricated Skid/Vessels Transport (Perth or surrounds to Site)	Mitchell Freeway, Brand Highway, Pye Road	Flat Top Truck	135	As required per Schedule
Equipment Package Transport (Fremantle Port to Site)	Mitchell Freeway, Brand Highway, Pye Road	Flat Top Truck	30	As required per Schedule
Pre-Engineered Buildings (Perth or surrounds)	Mitchell Freeway, Brand Highway, Pye Road	Flat Top Truck	4	As required per Schedule
Resource Movements				
(R&R) (Perth - Dongara Region)	Mitchell Freeway, Brand Highway	Coach	2	Weekly (x4)
Accommodation/Site Transfers	Brand Highway, Pye Road	Coach	3	Daily (x2)
Staff	Brand Highway, Pye Road	Utes	5	Daily (x2)
Subcontractors / visitors etc	Brand Highway, Pye Road	Various	20	Daily (x2)
Miscellaneous				
Early Works / Mobilisation	Mitchell Freeway, Brand Highway, Pye Road	Various	20	Per week during civil activities
Concrete Deliveries	Brand Highway, Pye Road	Concrete Truck	20	Per week during civil activities
Bulk Materials (Containers)	Mitchell Freeway, Brand Highway, Pye Road	Flat Top Truck	30	As required per Schedule
Piling Materials	Brand Highway, Pye Road	Flat Top Truck	30	Per week during piling activities
Cranes	Brand Highway, Pye Road	Crane	4	Possibly 1 road movement per week for 100T rest just mob and demob

As estimated in Table 4-17, it is evident that the number of Heavy Vehicles (flat top trucks, cranes and concrete trucks) will be relatively infrequent. Approximately 100 movements of this nature are likely per week over the 2-year construction period. Traffic movements are not likely to be constant over the construction period, though increased movements are expected in the mornings and evenings. While the most likely access route to and from the site is via Brand Highway and Pye Road, there are other alternative routes available including Midlands Road and Pye Road/Kailis Drive which can also be used to disperse traffic in periods of heavier use and in an emergency scenario. Given traffic congestion can be managed through the use of alternative routes during peak construction periods, increasing traffic movements on the established roads is not expected significantly increase traffic congestion.

Operational Traffic

The operational workforce on the site has been estimated at some 12-15 permanent positions. This reduces the number of traffic movements generated in the operational phase from the construction phase. Based on this level of workforce, the operational traffic movements are as follows:

- Operators – Approximately 15 vehicles in/out every day with 12 expected during the day and three at night.

- One delivery vehicle per day (on average) – this could vary from a courier van to a 3-tonne truck to a semi-trailer.
- Two utility vehicle visits to wellheads and/or hubs every morning and afternoon - total four movements per day.
- Condensate tanker - pocket road train size - 1 every 2 weeks.
- Yearly shutdown activity with a duration of 10 days. Estimate 20 people in/out (ride sharing) and 4 trucks and cranes.

As such, during the operational phase, increasing traffic frequency on major roads as detailed above is not expected to have a significant impact.

4.8.5.4 Impacts to Heritage Artefacts

As described in Table 4-7, 91.5% of the overall development envelope is situated within existing agricultural or other cleared lands. In general, due to the disturbed nature of the cleared lands it is unlikely that any heritage artefacts will be uncovered due to years of sustained disturbance from agricultural (and other) activities.

Heritage surveys have identified two sites of Aboriginal heritage significance. Acknowledging the planned binding agreement between Southern Yamatji and Joint Venture parties, existing heritage surveys will be provided to the Southern Yamatji to determine their adequacy. If a new heritage survey is required, it will be completed following agreed protocols.

The Proposal will avoid the two identified sites of Aboriginal heritage significance. Further, as ground disturbance and vegetation clearing are standard activities in the region, MEPAU has a clear protocol for consulting and managing these activities where there is the potential to uncover heritage artefacts. If new heritage survey is required, MEPAU will follow suggested mitigations detailed in this plan.

Consequently, with mitigations in place, the proposal is not expected to have a significant impact on the cultural heritage of the region.

4.8.5.5 Social and Economic Impacts

As documented in Section 2.3, an independent report on the broader economic impact of the Proposal concluded the following economic benefits were likely to accrue as a result of the Proposal:

- During the construction and operation of the facility, there will be significant economic benefits (both directly and indirectly) to the local region.
- The creation of an estimated 150 jobs during the development of the Waitsia project will have a significant economic impact in Dongara, the Shire of Irwin and neighbouring shires.
- During the operational phase there will be an estimated 12 - 15 permanent jobs associated with the WGP and approximately \$13M direct economic impact per year to the region.

MEPAU will continue to seek to employ local people to run its gas production facilities and use local businesses and support services where practicable.

The overall conclusion is that the Proposal will bring significant economic and social benefit to a community where there is relatively higher unemployment, lower than average wage levels, lower levels of labour force participation and a local workforce with experience in the mining/resource and technician/trades sectors that is readily able to capitalise on the opportunities provided by the project. Stakeholder feedback and survey results support this conclusion.

4.8.5.6 Application of Legislation, Policy and Guidance.

The management of impacts to social surroundings is regulated under various legislation including the Environmental Protection Noise Regulations 1997 (Noise Regulations), Aboriginal Heritage Act 1972, Native Title Act 1993 and PGER (Environment) Regulations 2012.

As described in this section, as thresholds described in the Noise regulations are expected to be met, no heritage artefacts are expected to be impacted and licence negotiations are underway, impacts to social surroundings are not expected to be significant.

Under the PGER (Environment) Regulations 2012 a DMIRS approved Environment Plan is required to manage impacts to relevant stakeholders associated with all construction and operational activities. Specifically, the EP has to consider impact significance and demonstrate that impacts and risks are reduced to a level that is ALARP and acceptable prior to acceptance by DMIRS. No activities covered in this Proposal can commence until an EP is accepted by DMIRS.

4.8.6 Avoidance and Mitigation

Throughout the scoping phase of this Proposal, MEPAU has considered proximity to sensitive receptors in siting of the WGP. The previous location of the Plant was close to sensitive receptors and following consultation with landowners (See Table 3 – Local landowners) in the region, MEPAU selected a new location for the WGP. Through avoidance of a greater impact, MEPAU has managed to balance the project needs, whilst locating the WGP in a location that is as far away as practicable from sensitive receptors.

Mitigation measures to manage potential impacts to social surroundings (including noise, traffic and cultural heritage) are detailed in the Waitsia Gas Project Stage 2 – Environmental Management Plan and is attached as Appendix G.

4.8.7 Predicted Outcomes

The outcomes of the Proposal will include:

- Visual amenity: A change to the rural landscape that is noticeable but not intrusive.
- Noise emissions arising from the Proposal are not expected to be above 35 dB(A) at nearby residential properties during operations.
- During construction of the facility, approximately 100 heavy vehicle movements are expected per week over the 2-year construction period.
- No impacts to heritage artefacts / local cultural heritage are expected
- Direct and indirect economic benefits from the Proposal including creation of a significant number of jobs during the construction phase, and a sustained direct economic benefit to the region during operations.

Based upon the nature and scale of social impacts associated with this Proposal and with the mitigations identified, the Proposal will not generate impacts that will cause significant harm to the local community. Consequently, MEPAU will meet the EPA Objective for this factor.

5 CONCLUSIONS

5.1 Overview

The report has been prepared to support the referral of the Proposal to the EPA under Section 38 of the *Environmental Protection Act* and assist the EPA to decide whether or not the Proposal requires formal EIA and if so at what level.

This environmental referral report shows that potential impacts of the Proposal are not significant, are manageable and that the Proposal is environmentally acceptable. Further to this, this environmental referral report has demonstrated that due to the lack of significant impacts associated with the Proposal, regulatory approval of the Proposal can be suitably managed through other established petroleum and environmental regulatory processes.

This environmental referral report identifies suitable management measures for the potential environmental impacts associated with construction and operation of the Proposal and demonstrates that the potential environmental impacts can be readily managed using conventional industry standard techniques.

Based upon the investigations undertaken by technical specialists, the significance of environmental impacts for Key Factors are summarised below.

5.2 Flora and Vegetation

Impacts to flora and vegetation has been minimised by utilising existing cleared and disturbed areas, resulting in a maximum clearing area of ~17 ha. The majority of this vegetation is in poor condition with only ~3 ha evaluated as being in good condition. A significant amount of this area will be rehabilitated. No conservation significant flora or vegetation is planned to be cleared. Given the vegetation associations present, condition of vegetation and composition of flora, the impact of the clearing is not expected to be significant at either a local or regional level.

5.3 Terrestrial Environmental Quality

The construction of the Proposal could result in erosion, scouring and depletion of soil qualities. These potential impacts are considered standard construction risks that are not specific to this Proposal and will be managed through well-established construction management techniques.

The Proposal area is not within an area of acid sulfate soil risk so acid sulfate soils management will not be required.

5.4 Terrestrial Fauna

Impacts on terrestrial fauna will be minimal and predominantly linked to vegetation clearing which is small in area and is not regionally significant. Based upon baseline fauna surveys conducted for the Proposal, Carnaby's Black Cockatoo, was the only conservation significant species recorded. In relation to Carnaby's Black Cockatoos, relevant surveys have concluded that no suitable breeding or roosting trees are present within the areas proposed to be disturbed. The proposed clearing of potentially suitable foraging habitat represents approximately 0.31% of unburnt banksia dominated vegetation across the adjacent Yandanogo Nature Reserve (an area of approximately 7,000 ha. (Woodman, 2018a)).

Woodman (2018a and 2019) and Bamford (2018 and 2019) conclude that these potential impacts are negligible to minor and can be mitigated by implementation of appropriate management actions.

This matter will be referred concurrently to the DoEE under the EPBC Act with the recommendation that it is deemed to not be a 'controlled action'.

5.5 Inland Waters

Impacts to groundwater arising from well construction were not assessed to be significant, with this part of the Proposal subject to additional regulation by DMIRS requiring full chemical disclosure of any chemicals used down-hole and management of drilling wastewater.

MEPAU propose to dispose of PFW via several disused petroleum production wells, which is a routine production activity both locally and regionally. Design investigations for the WGP have concluded that re-injection of PFW, collected during gas production, into disused petroleum production wells that are approximately 2 km deep, is the most efficient and environmentally acceptable management. PFW will be treated at the WGP site and conveyed to the disposal aquifer via appropriately certified flowlines and former production wells. The integrity of these flowlines and wells will be certified by DMIRS and monitored through routine means to appropriate standards.

Surface water management will be through a stormwater collection system designed to appropriate engineering standards including bunded areas and a lined evaporation pond.

The potential impacts to inland waters associated with the production and management of liquid waste were not deemed to be significant.

5.6 Air Quality

5.6.1 Emissions

Air quality modelling indicates that based on the information provided, emissions from the plant in conjunction with emissions from other sources in the region will likely comply with all relevant ambient air quality guidelines at the nominated sensitive receptor locations in the region. Baseline air quality monitoring is currently being undertaken to verify this expectation.

5.6.2 Greenhouse Gas

The maximum operational GHG emissions from the WGP is about 300,000 tonnes CO₂-e per year. This represents an increase of approximately 0.4% to the State's annual GHG emissions based on the 2013-2014 figure of 83.4 Mt. This is not considered to be a significant contribution to the State's emissions.

Through the project design, process measures will be identified to increase energy efficiency. MEPAU will prepare a GHG MP to show how the generation of emissions is to be managed into the future.

5.7 Social Surrounds

5.7.1 Indigenous Heritage

No registered Aboriginal Heritage Sites will be affected by the Proposal.

MEPAU will honour the intent of a yet to be signed Heritage protocol with the Southern Yamatji peoples and ensure existing and future heritage assessments associated with the Proposal meet their requirements. Given the potential for in-situ archaeological material and skeletal material to be uncovered within areas of remnant bush land MEPAU will engage Traditional Owner monitors and seek subject matter expert advice, as required, during initial ground disturbing works within those areas to help further ensure conservation of any heritage values.

5.7.2 Land Use

The construction and operation of the Proposal will not introduce a new industry to the area as the area already comprises several co-existing resource industry and agricultural uses. It does not change the land use balance in the locality but more so, consolidates uses of an industrial nature in an area that has been a long-standing location for the oil and gas sector.

No significant impacts associated with land use are expected to arise from this Proposal.

5.7.3 Visual Impact

The visual impacts of the WGP are expected to be negligible. This is because the physical setting of the WGP site has been selected in consultation with relevant stakeholders, is remote, undulating and low in population density. The layout of the WGP is unobtrusive in the landscape and through the design process, potential impacts are expected to be minimal.

5.7.4 Noise

Noise modelling undertaken for the Proposal determined that predicted noise levels at the closest sensitive receptors are below the most stringent assigned noise level of 35 dB(A). This is for the worst-case operating conditions for all noise sources operating at the same time, which is unlikely.

It is concluded that the Proposal will comply with the requirements of the Western Australian *Environmental Protection (Noise) Regulations 1997* at all times.

5.7.5 Traffic

The site has direct access from Brand Highway and Pye Road. An alternative but less efficient access exists via the Midlands Highway. There will be periods of more intense activity as the construction moves through the different phases. The peak construction traffic estimates determined that approximately 100 heavy vehicle movements are likely required per week over the two-year construction phase. This does not represent a significant increase in traffic over this period, and as traffic congestion can be managed through the use of alternative routes during peak construction periods, increasing traffic movements on the established roads is not expected significantly increase traffic congestion.

5.7.6 Social and Economic Benefit

The Proposal will bring significant economic and social benefit to a community where there is relatively high unemployment, lower than average wage levels, lower levels of labour force participation and a local workforce with experience in the mining/resource and technician/trades sectors and readily able to capitalise on the opportunities provided by the Proposal.

6 OFFSETS

MEPAU has conducted an assessment of the impacts associated with the Proposal to determine the significance of these impacts on the receiving environment. The conclusion for all Key Factors is that although there would be some minor impacts, due to the site selection and plant design, no impacts were deemed to be significant.

Each Key Factor was assessed individually, and as the Proposal is not expected to have a significant environmental or social impact, and having regard to the WA Environmental Offsets Policy that states that environmental offset are used to address significant residual environmental impacts of a development or activity, MEPAU does not believe actions to offset the predicted outcomes of this Proposal are required.

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APPENDICES

Appendix A 2019 Stakeholder Perception Survey results

Appendix B Invitation to Community Information Exchange Session

Appendix C Woodman Environmental - Flora Survey Reports

Appendix D Bamford Consulting Ecologists - Fauna Survey Reports

Appendix E Ramboll - Air Quality Report

Appendix F Herring Storer Acoustics – Noise Report

Appendix G Waitsia Gas Project Stage 2 – Environmental Management Plan

Appendix H Environmental Figures