DOCUMENT NO	REVISION	DATE OF REVISION
PB-HSE-PLN-00004SUM	Rev 2~~1~~	~~20/04~~28/05/2021~~/2020~~

MITSUI E&P Australia

PERTH BASIN FACILITIES ENVIRONMENT PLAN SUMMARY

REVIEW FREQUENCY

Next Revision Date	Revision Cycle
206/054/20252026	5 years

REVISION HISTORY

REVISION #	DATE	AMENDMENTS
2	28/05/2021	Reissued for DMIRS Assessment
1	20/04/2020	Reissued for DMIRS Assessment
0	21/05/2019	Submitted to DMIRS for review and approval

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RELATED DOCUMENTS

Document Number	Document Title
HSE-E-075	Perth Basin WIA Environment Plan
HSE-SC-306	MEPAU's Perth Basin Operations Risk Matrix
MEP-EXA-GDL-001	MEPAU Stakeholder Engagement Framework
MEP-HSE-POL-001	MEPAU HSE Policy
PB-HSE-PLN-00001	Waste Management Plan
PB-HSE-PLN-00002	Fauna Management Plan
PB-HSE-PLN-00003	Chemical and Hazardous Material Management Plan
PB-HSE-PLN-00004	Perth Basin Environment Plan
PB-HSE-PLN-00007	Perth Basin Emergency Response Plan
PB-HSE-PLN-00009	Perth Basin Oil Spill Contingency Plan
PB-HSE-PLN-00012	Weed and Vegetation Management Plan
PB-HSE-PRO-119	Surveillance Sampling Program
PB-OPS-PRO-00001	Permit To Work Procedure
PB-OPS-PRO-00029	Bulk Transfer Procedure

TERMS, ABBREVIATIONS AND DEFINITIONS

Term or abbreviation	Definition
ALARP	As Low As Reasonably Practicable
AWE Perth Pty Ltd	Subsidiary of Mitsui & Co. Ltd (trading as MEPAU)~~Subsidiary of Mitsui & Co. Ltd~~
C&M	Care and Maintenance (infrastructure is kept in accordance with a C&M plan ready for reinstatement to operating or decommissioning)
CMMS	Computerised Maintenance Management System
Comingled Waste Water	Defined term for collective waste water i.e. Produced Water, storm water, washdown water, oily water etc. (Stored in horizontal tanks and reinjected into WDW)
~~Commissioning~~	~~Unless specified otherwise, the term Commissioning shall generally refer to the entire commissioning works inclusive of Pre-Commissioning and Gas Commissioning.~~
DBCA	Department of Biodiversity, Conservation and Attractions
DBNGP	Dampier Bunbury Natural Gas Pipeline
Decommissioning	Decommissioning and removal of redundant infrastructure using machinery and potential ground disturbance activities~~Render unserviceable~~
DFES	Department of Fire and Emergency Services
DGF	Dongara Gas Field

Term or abbreviation	Definition
DMIRS	Department of Mines, Industry Regulation and Safety
DMS	Document Management System
DPF	Dongara Production Facility
DWER	Department of Water and Environmental Regulation
EP	Environment Plan
ERP	Emergency Response Plan
ESA	Environmentally Sensitive Area
GDE	Groundwater Dependent Ecosystem
HPF	Hovea Production Facility
HSEMS	Health, Safety and Environment Management System
MEPAU	Mitsui E&P Australia Group (Mitsui E&P Australia Pty Ltd and AWE Ltd)
MNES	Matters of National Environmental Significance
NGER	National Greenhouse and Energy Reporting
NPI	National Pollutant Inventory
OSCP	Oil Spill Contingency Plan
PGER(E)R	Petroleum and Geothermal Energy Resources (Environment) Regulations 2012
Redundant infrastructure	Small scale infrastructure including but not limited to valves, pipework, flowlines, pipelines, storage tanks and other associated infrastructure
SDS	Safety Data Sheet
~~Small scale infrastructure~~	~~Small scale infrastructure including but not limited to redundant valves, pipework, well site flowlines, storage tanks and other associated infrastructure requiring minor earth works~~
WDW	Water Disposal Well
WEP	Waitsia Export Pipeline
WGF	Woodada Gas Field
WGP	Waitsia Gas Project
WIA	Well Intervention Activity
WPF	Woodada Production Facility
XPF	Xyris Production Facility
YNR	Yardanogo Nature Reserve

1.0 INTRODUCTION

AWE Perth Pty Ltd (AWE) is a wholly owned subsidiary of AWE Limited. Mitsui ~~Exploration & Production (~~E&P~~)~~ Australia Pty Ltd and AWE Limited are wholly owned subsidiaries of Mitsui & Co. Ltd. Combined they form the unified brand Mitsui E&P Australia Group (MEPAU).

The onshore MEPAU Perth Basin Oil and Gas Fields are located near the town of Dongara approximately 360 kilometers north of Perth, Western Australia. Table 1-1 details the Perth Basin Oil and Gas Fields associated with this EP.

Table 1-1 Overview of the Perth Basin Oil and Gas Fields

Gas Field	Associated Facility	Status
Waitsia Gas Field (WGF)	Xyris Production Facility (XPF)	Operating
Dongara Gas Field (DGF)	Dongara Production Facility (DPF)	Partially under Care and Maintenance (C&M)
Hovea / Eremia Oil Field	Hovea Production Facility (HPF)	Partially under C&M
Woodada Gas Field (WGF)	Woodada Production Facility (WPF)	C&M

1.1 Purpose

The purpose of this Environment Plan (EP) is to give practical guidance in facilitating environmental management during ~~Commissioning,~~ Operations and Maintenance activities of the Perth Basin facilities. This EP includes the assessment of environmental aspects and impacts identified associated with these O&M activities and the management and mitigation strategies for these identified aspects.

This EP has been prepared to meet the requirements of the:

- Petroleum and Geothermal Energy Resources (Environment) Regulations 2012; and
- Petroleum Pipelines (Environment) Regulations 2012.

Guidance on the EP development was provided by the Department of Mines, Industry Regulation and Safety (DMIRS) ~~DMIRS~~ 'Guideline for the Development of Petroleum and Geothermal Environment Plans in Western Australia, November 2016' and the 'Guidance Note – Environmental Performance Objectives, Environmental Performance Standards and Measurement Criteria for Petroleum Environment Plans.'

1.2 Scope

The scope of this EP includes the day-to-day MEPAU petroleum activities undertaken in the Perth Basin Petroleum Permit areas L1, L2, L4 and L5 as described in Section 2.0.

This EP includes all Operations and Maintenance activities associated with the Perth Basin facilities, wells, flowlines and pipelines. Decommissioning and removal of redundant

infrastructure and rehabilitation on Private land is also included in the scope of this EP and managed under a Land Access Agreement (LAA) with each Landholder.

Well Intervention Activities (WIA) (including well plug and abandonment (P&A)) undertaken at Perth Basin well sites in the Petroleum Permit areas L1, L2, L4 and L5 are managed in accordance with the Perth Basin WIA Environment Plan [HSE-E-075].

Decommissioning and Rehabilitation of sites within Environmentally Sensitive Areas (ESAs) or Nature Reserves (NRs) are excluded from the scope of this EP.

1.3 Nominated Contact Details

The nominated contact details for the EP is included in Table 1-2.

Table 1-2 Nominated Contact Details

Contact Details	
Name	Kevin Davey
Address	Level 11 Exchange Tower, 2 The Esplanade, Perth WA 6000
Telephone number	08 6364 4788
Email address	Kevin.Davey@mepau.com.au

2.0 DESCRIPTION OF THE ACTIVITY

The EP includes ~~all Commissioning,~~ Operations and Care and Maintenance activities (including inspection, maintenance and~~,~~ repair ~~and potential removal of redundant equipment and infrastructure)~~ associated with the Perth Basin facilities. The EP also includes decommissioning and removal of redundant infrastructure and site reinstatement on Private land.

2.1 Timeframe and Schedule

Perth Basin facilities operate 24 hours/ day 7 days a week.

Decommissioning and site reinstatement activities will occur on an opportune basis and be undertaken during daylight hours.

2.2 Activity Description

The activities covered by the EP associated with the Perth Basin facilities include:

- ~~Commissioning,~~S ~~s~~tart-up and plant o~~O~~perations;
- Maintenance and inspection activities~~Care and maintenance~~;
- Vehicle, machinery and equipment use;
- Chemical storage and transport;
- Groundwater extraction;
- ~~Inspection and~~Various environmental monitoring ~~activities~~;

- Decommissioning and removal of redundant infrastructure including potential clearing and excavation;
- ~~Small scale removal and remedial activities; and~~
- Site reinstatement; and
- Supporting activities.

Personnel managing these activities are based at the DPF.

Table 2-1 lists the corresponding location figures for the Perth Basin facilities located in Attachment 1 of this EP.

Table 2-1 List of Location Figures

Aspect	Location Figures[1]	
Permit Boundaries	Attachment 1.01	
Field Layouts	Attachment 1.02	Waitsia Gas Project (WGP)
	Attachment 1.03	Dongara Gas Field (DGF)
	Attachment 1.04	Hovea & Eremia Field ~~– XAGGS~~
	Attachment 1.05	Woodada Gas Field (WGF)

2.2.1 WGP Activities

WGP activities include:

- XPF ~~commissioning,~~ start-up and plant operation;
- Reservoir fluid separation and gas conditioning (mercury removal);
- Transport of reservoir fluids and / or hydrocarbons via flowlines and pipelines (including conditioned gas export via the WEP (PL124) and compound to connect the XPF to the Dampier Bunbury Natural Gas Pipeline (DBNGP));
- Transport of Produced Water along the Produced Water line from the XPF Produced Water Storage Tank to the Waitsia-02 evaporation pond;
- Reservoir fluids, hydrocarbon and/or Produced Water load out / load in, including:
  - Tanker load out of condensate (from Liquid Stock Tank);
  - Tanker load out of Produced Water (from Produced Water Storage Tank or Waitsia-02 evaporation pond); ~~and~~
  - Tanker load in of methanol to Methanol Tank.
- Vehicle, machinery and equipment use;
- Chemical storage and transport;
- Groundwater extraction;

[1] All easting and northings referenced in this document are zone 50

- ~~Small scale redundant infrastructure removal activities (including but not limited to) valves, pipework, equipment, instruments, purged well site flowlines and other associated infrastructure requiring minor works;~~
- Maintenance and inspection activities (including but not limited to):
  - Pigging;
  - Planned, preventative and corrective maintenance of wellheads, pipelines and flowlines (including excavation activities);
  - Equipment, site inspections, bund management;
  - Maintenance and repair of equipment;
  - Maintenance, repair and replacement of Cathodic protection (CP) system;
  - Depressurising infrastructure and maintaining low pressure blanket gas to ensure that vessels, tanks and pipework are preserved (until wells are shut-in, suspended or decommissioned);
  - Clean-out and flushing of hydrocarbon containing infrastructure including pipelines, flowlines, separators and tanks;
  - Maintenance of firebreaks and cleared areas;
  - Weed and vegetation management and monitoring;
  - Chemical and waste management;
  - General housekeeping; ~~and~~
- Progressive removal and backfill of mud sumps, turkey's nest and flare pits;
- Various environmental monitoring (including groundwater and surface water sampling).

2.2.2 DGF Activities

DGF activities include:

- Condensate Storage and Loading System – Reservoir fluids, hydrocarbon and/or Produced Water load out / load in, including:
  - Tanker load in of condensate to DPF tanks for storage;
  - Tanker load out of condensate from DPF tanks for transport offsite; ~~and~~
  - Tanker load in of Produced Water to the DPF Water Treatment System;.
- Wastewater treatment, storage and disposal[2];
- Comingled Waste Water Treatment System maintenance (including down hole scale clean);
- Office and workshop activities;

[2] The Dongara Water Disposal Well (WDW) is 600 m in depth and extends into formations that are below the superficial and Yaragadee Aquifer.

- Control Room – Process variables and alarms from gas and water production are monitored by the YOKOGAWA Control System located in the Control Room. It is monitoring system only; where required adjustments are completed manually;
- Ground water extraction;
- Waste storage and chemical management;
- Vehicle, machinery and equipment use and storage;
- ~~Small scale redundant infrastructure removal activities (including but not limited to): valves, pipework, purged well site flowlines and other associated infrastructure requiring minor earth works;~~
- Maintenance and inspection activities (including but not limited to):
  - Planned, preventative and corrective maintenance of wellheads, pipelines and flowlines (including excavation activities);
  - Equipment, site inspections, bund management;
  - Maintenance and repair of equipment;
  - Depressurising infrastructure and maintaining low pressure blanket gas to ensure that ~~vessels,~~ tanks and pipework are preserved (until wells are shut-in, suspended or decommissioned);
  - Clean-out and flushing of hydrocarbon containing infrastructure including pipelines, flowlines, pig launcher/receiver, separators and tanks;
  - Maintenance of firebreaks and cleared areas;
  - General housekeeping;
  - Weed and vegetation management and monitoring; and
- Various environmental monitoring (including groundwater and surface water sampling).

2.2.3 Hovea and Eremia Oil Field~~PF~~ Activities

Hovea and Eremia Oil Field ~~HPF~~ activities include:

- Tanker load in / out of Produced Water and other wastewater;
- Wastewater treatment storage and disposal[3];
- Chemical storage and transport;
- ~~Groundwater extraction;~~
- Lay down / storage areas for machinery and equipment;
- Vehicle, machinery and equipment use;
- ~~Small scale redundant infrastructure removal activities (including but not limited to): valves, pipework, storage tanks, purged well site flowlines and other associated infrastructure requiring minor earth works;~~

[3] Eremia-04 WDW is 2200 m in depth and extends into formations that are below the superficial and Yaragadee Aquifer.

- Maintenance and inspection activities (including but not limited to):
  - Planned, preventative and corrective maintenance of wellheads, pipework~~lines~~ and flowlines (including excavation activities);
  - Equipment, site inspections, bund management;
  - Maintenance and repair of equipment;
  - Depressurising infrastructure and maintaining low pressure blanket gas to ensure that ~~vessels, tanks~~flowlines and pipework are preserved (until wells are shut-in, suspended or decommissioned);
  - ~~Infrastructure including pipelines, flowlines, separators and tanks;~~
  - General housekeeping;
  - Weed and vegetation management and monitoring;
  - Maintenance of firebreaks and cleared areas; and
- Various environmental monitoring (including groundwater and surface water sampling).

2.2.4 WGF Activities

WGF activities include:

- Vehicle, machinery and equipment use;
- ~~Small scale redundant infrastructure removal activities (including but not limited to): valves, pipework, purged well site flowlines and other associated infrastructure requiring minor earth works;~~
- Maintenance and inspection activities (including but not limited to):
  - Planned, preventative and corrective maintenance of wellheads, pipelines and flowlines (including excavation activities);
  - Equipment, site inspections, checks;
  - ~~Maintenance and repair of equipment;~~
  - Depressurising infrastructure and maintaining low pressure blanket gas to ensure that ~~vessels, tanks and pipework~~pipelines and flowlines are preserved (until wells are shut-in, suspended or decommissioned);
  - Clean-out and flushing of hydrocarbon containing infrastructure including pipelines and~~,~~ flowlines~~, separators and tanks~~;
  - General housekeeping;
  - Weed and vegetation management and monitoring;
  - Maintenance of firebreaks and cleared areas; and
- Various environmental monitoring (including groundwater and surface water sampling).

2.3 Decommissioning and Site Reinstatement

For C&M facilities, flowlines, pipelines and well sites within private land, decommissioning and removal of redundant infrastructure will be conducted under this EP. On private land (i.e. agricultural) the completion criteria in line with this EP, is developed in consultation with the

landowner and LAA or a subsequent amendment. MEPAUs baseline is to remove all infrastructure and return the land to its previous state, unless an alternative agreement with the landowner is arranged. In general, completion criteria cover the following aspects:

- Improvements (i.e. fencing, access roads, water bores or well pads to remain);
- Decommissioning and removal of all redundant infrastructure and waste to a licenced waste facility;
- Landform recontouring;
- Topsoil and revegetation; and
- Environmental monitoring.

~~2.3~~2.4 Chemical Disclosure

DMIRS set out the requirements for chemical disclosure within the *Chemical Disclosure Guideline* (August 2013). The guideline details the chemical disclosure requirements for products, additives, chemicals and other substances used for the purpose of drilling undertaken in the course of any petroleum or geothermal related activities regulated under regulation 15(9) of the *Petroleum and Geothermal Energy Resources (Environment) Regulations 2012.*

The proposed chemicals are outlined within Attachment 2 and 3.

3.0 DESCRIPTION OF THE ENVIRONMENT

A description of the Environment in the Perth Basin Region is included in Table 3-1.

Table 3-1 Perth Basin Description of the Environment Summary

Aspect	Shire of Irwin (L1/L2)	Shire of Carnamah / Shire of Coorow (L4/L5)
Climate	The Bureau of Meteorology (BoM) Geraldton Station (008050) is the closest weather station to the town of Dongara. The region has a Mediterranean-type climate characterised by seasonal patterns of hot, dry summers and mild, wet winters. The area is subject to high wind speeds, dust storms, lightning storms, high summer temperatures and low winter night temperatures[4].	
Soil	Soils within the Perth Basin are light and sandy and well drained. The soils consist of calcareous and siliceous sand underlain by aeolianite, which is often exposed. The Perth Basin is situated entirely within the Geraldton Sandplains Biogeographical Region[5].	
Topography	The area consists of gentle slopes associated with the coastal sand plain and dune systems within the area.	
Surface Water	The Irwin River is the major coordinated drainage for the L1/L2 permit. There are a number of swamps surrounded by dense scrub, frequent limestone outcrops and the occasional laterite outcrop including Ejarno Spring adjacent to the XPF (500 m) and Zeus Wetlands.	Surface water includes Lake Logue, Eneabba Creek & Stockyard Gully.
Groundwater	The sub-surface geology of the Perth Basin consists of the Late Jurassic Yarragadee Formation, which is overlain by Tertiary Sediments[6]. Ground water flow direction generally westward. Ejarno Spring is a surface expression of groundwater.	Ground water flow direction generally westward. Groundwater at WGF is near or at the surface in the lakes and low-lying areas.
Acid Sulphate Soils	Information sourced from the Australian Soil Resource Information System indicates that the areas around the Perth Basin Activities are located within an area where acid sulphate soils are not known to occur L1/L2.	Information sourced from the Australian Soil Resource Information System indicates that the areas around the Perth Basin Activities are located within an area where acid sulphate soils are of low possibility L4/L5[7].
Matters of National Environmental Significance	An EPBC search showed there is 1 National Heritage Place and 1 Listed Threatened Ecological Community (both outside Perth Basin activity boundaries) and 73 listed threatened species and 40 listed migratory species within the wider study area protected by the Environmental Protection and Biodiversity Conservation Act 1999[6].	
Conservation Areas	Significant conservation areas within the Perth Basin region include recommended Red Book reserves, DBCA reserves, nature reserves and riparian vegetation. The locations of these environmental sensitivities are shown in Figure 3-1 to Figure 3-2. The nearest Conservation Area is Yardanogo Nature Reserve located approximately 2.5 km from the Perth Basin[7].	Significant conservation areas within the Perth Basin region include recommended Red Book reserves, DBCA reserves, nature reserves and riparian vegetation. The locations of these environmental sensitivities are shown in Figure 3-3. WGF is within Lake Logue Nature Reserve (an ESA).
Environmentally Sensitive Areas (ESAs)	The nearest ESA as declared under the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 is Zues Wetland 4 km from the Perth Basin[8].	The nearest ESA as declared under the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 is Lake Logue Nature Reserve which is WGF are within. Beekeepers Nature Reserve is located 1 km west of the WGF.
Groundwater Dependent Ecosystems (GDEs)	The nearest GDE is located 440 m southeast of the XPF along the margins of the Ejarno Spring.	Area to the west and north of WGF is listed as low potential GDE.
Vegetation Communities & Flora	The wider area is primarily private property with patchy remnant vegetation. The remnant vegetation is mainly heath and shrublands on sand over limestone, with scattered trees and some limestone exposures.	The vegetation in the western and northern half of permit areas L4 and L5 is either reserved for conservation or is vegetated and proposed as conservation reserve.
Weeds	Weeds are widespread across the Perth Basin, particularly within disturbed areas. A total of 17 weeds were recorded in the wider area, including the declared weed *Echium plantagineum* (Patterson's Curse)[9].	Small infestations of introduced species on existing well pads at WGF; eradication program in place.

[4] Bureau of Meteorology, 2020
[5] Beard, 1976
[6] Department of the Environment and Energy, EPBC Act Protected Matters Search Tool, 2019
[7] Department of Biodiversity, Conservation and Attractions, 2019
[8] Department of Water and Environmental Regulation, 2019
[9] EPBC Act 1999 Weeds of National Significance Search tool, 2019

Aspect	Shire of Irwin (L1/L2)	Shire of Carnamah / Shire of Coorow (L4/L5)
Dieback	Phytophthora Dieback is not known to occur within the area and unlikely to occur due to calcareous soils within the wider area[10]. The nearest reported dieback infestation identified within the wider study area is located approximately 60 km south of the Perth Basin[11].	WGF has known infestations of dieback predominantly associated with the lakes and creeks in the area.
Fauna	Predominantly introduced mammals (stock, rabbits and foxes) and native animals (reptiles and kangaroos).	Kangaroos, emus, echidnas, reptiles and native birds known to occur at WGF.
Aboriginal Heritage	Based on previous field and desktop surveys, three listed Aboriginal Sites relevant to the Wider Study Area have been identified – Registered Aboriginal Site Numbers 5482 (“Jenkins Hut Valley”), 5917 (“Irwin Park Station”), and 18907 (“Irwin River”)[12] and Waitsia-03 significant tree.	The lakes in the Eneabba area have been identified as significant to aboriginal people.
European Heritage	No aspects of European heritage at risk of impact from Perth Basin facilities operations.	No aspects of European heritage at risk of impact from Perth Basin facilities operations.
Socio-economic Environment	There are several individual farmhouses located within approximately 5 km of the activity area both to the west and east[13]. Other stakeholders within the area include the Mondarra Gas Storage Facility and the Asco Camp and Asco Laydown Yard, both on Pye Road	Socio-economic environment predominantly consists of mining and tourism.

[10] Department of Parks and Wildlife, 2015
[11] Glevan Consulting, 2012
[12] Department of Planning, Lands and Heritage, Aboriginal Heritage Inquiry System, 2019
[13] Google Earth, 2019

Figure 3-1 WGP – HPF – Eremia – XAGGS Environmental Sensitivities

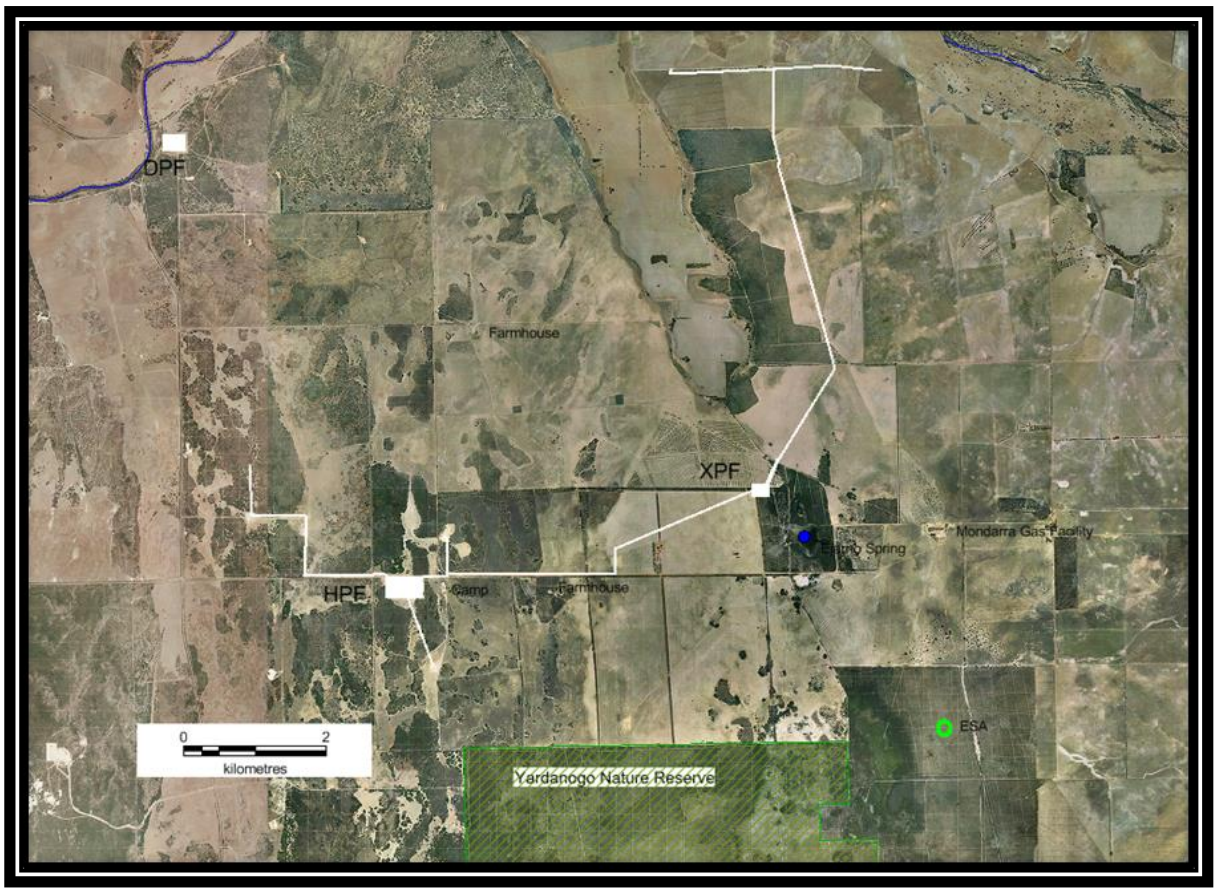


Figure 3-2 Dongara Gas Field Environmental Sensitivities

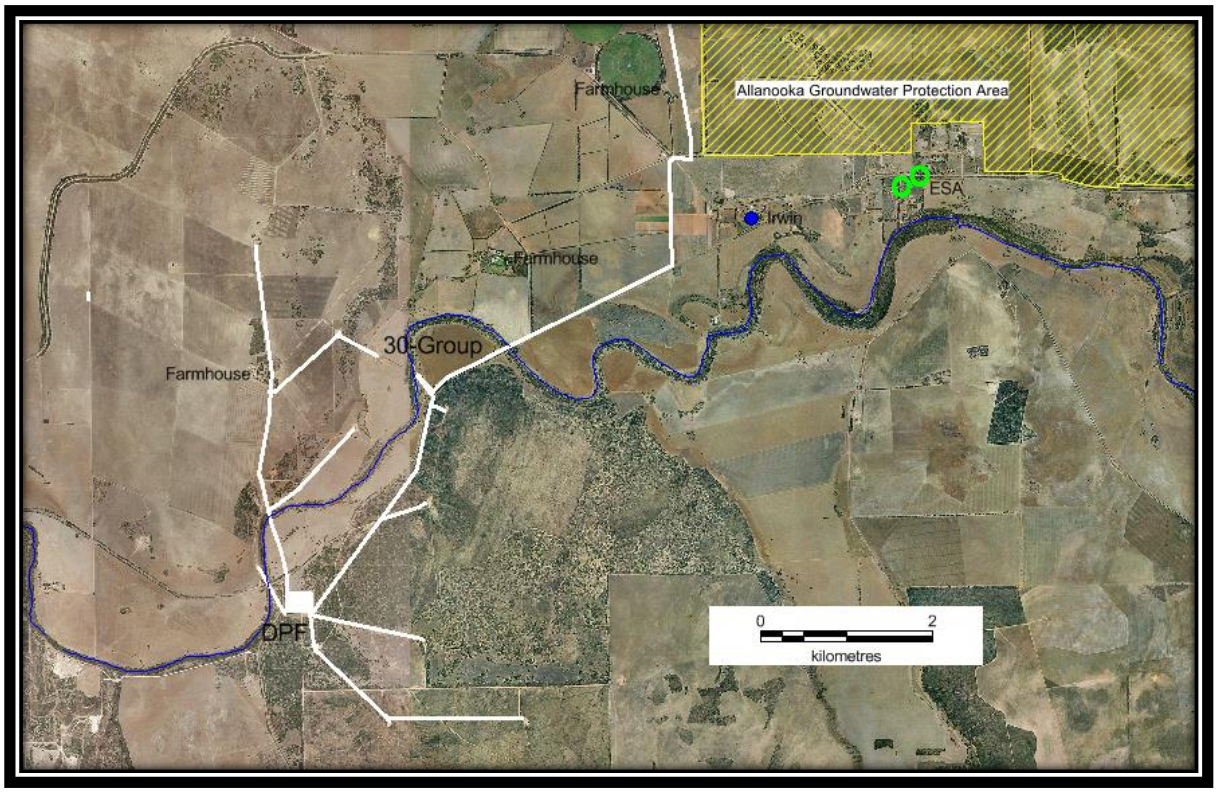
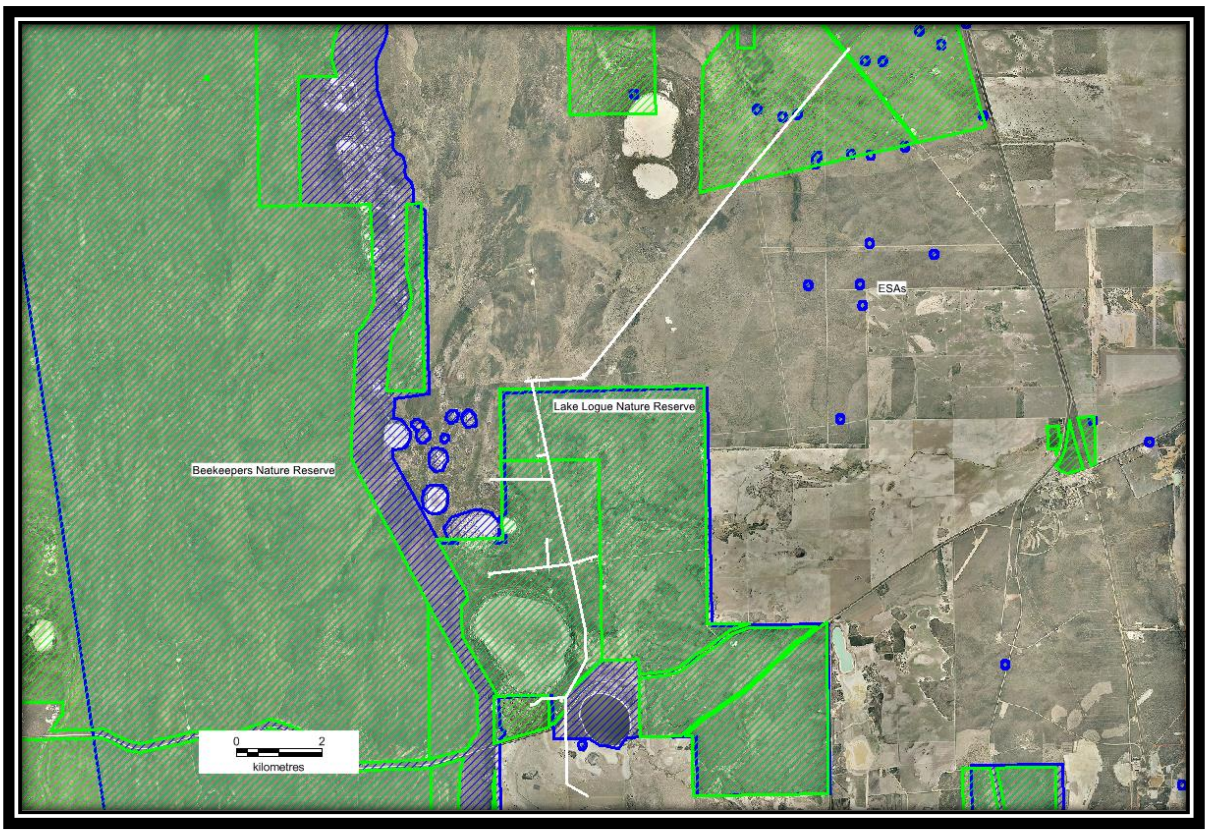


Figure 3-3 Woodada Gas Field Environmental Sensitivities



4.0 ENVIRONMENTAL RISK ASSESSMENT AND MANAGEMENT

Environmental r~~R~~isk assessments have been undertaken for the for the activities documented in this EP. Hazards and their associated aspects and their associated management and mitigation measures are detailed bellow in

Table 4-1.

Table 4-1 Risk Assessment Outcome Summary

Aspect	Hazard	Management and Mitigation Measures
Ground and Vegetation Disturbance	• Spread of non-indigenous species (weed / pathogens); • Dust generation causing smothering of vegetation or impacts to landowners; • Damage to heritage sites / artefacts; ~~and~~ • Unplanned disturbance to vegetation and fauna habitat; and • Inadequate site	• MEPAU Induction; • Permit to Work; • Clearing Vegetation Procedure and Record Form; • Weed and Dieback Hygiene Work Instruction; • Weed and Vegetation Management Plan; • Topsoil and vegetation material management; • Construction fill verified as having low weed / dieback risk; • Dieback Monitoring Program; • Monitoring of areas to be reinstated; • Complaints management system

Aspect	Hazard	Management and Mitigation Measures
	reinstatement.	• ~~Cultural Heritage induction and assessment~~Indigenous Heritage Survey; and • Heritage artefact identification requirements.
Fire	• Habitat and vegetation loss, fauna injury / fatality, or contamination (in the event petroleum facilities are damaged).	• Firebreaks around facilities; • Permit to Work; • Perth Basin Emergency Response Plan (ERP); • Department of Fire and Emergency Services (DFES) notifications; • Designated smoking areas; and • Remote monitoring capability for unmanned facilities.
Air Emissions	• Disturbance to sensitive fauna / relevant stakeholders.	• Computerised Maintenance Management System ~~(CMMS)~~ Maintenance; • Emissions are monitored and Reported; • National Pollutant Inventory Reporting; • NGER reporting; and • Complaints Management System.
Noise Emissions	• Disturbance to sensitive fauna / relevant stakeholders.	• Complaints Management System; • Noise monitoring if a change to routine inspections; and • Ongoing stakeholder consultation.
Physical Interaction with Fauna	• Death or injury to fauna	• Fauna management requirements; • Fauna exclusion and egress; • Reduced Speed Limits; and • Established roads and access tracks.
Surface Water Run-off	• Erosion or contamination of soil causing adverse effects on native vegetation.	• Evaporation pond (including turkey nest) design and inspections; • Removal of stormwater from concrete bunds; and • Surveillance Sampling Program.
Extraction of Groundwater	• Damage to vegetation due to drawdown of shallow groundwater	• Ground water licenses; • Surveillance Sampling Program; and • Meter calibration and monitoring.
Planned Discharge – Produced Water and Comingled Wastewater	• Contamination of soil and water causing adverse effects on native vegetation and wildlife.	• Chemical disclosure; • Limited oil in water concentration; • DWER Part V License Requirements; • Surveillance Sampling Program; and • Planned discharges are monitoring and reported.
Waste	• Attraction and / or injury of protected	• Waste Management Plan;

Aspect	Hazard	Management and Mitigation Measures
	fauna species within the vicinity of the facilities; and • Incorrect storage, handling and disposal of site waste materials (including hazardous waste).	• Fauna Management Plan; • ~~Mud Sump, Turkey's Nest and Flare Pit Removal~~ • ~~Mud Sump and Turkey's Nest~~ and Soil Validation ~~Samples~~; and • Surveillance Sampling Program.
Accidental Release – Asset Integrity	• Contamination of soil / groundwater; and • Contamination and subsequent toxic effects to vegetation and fauna.	• Well Management Plan; • DWER Part V license requirements; • Safety Management System; • ~~Removal of small scale infrastructure;~~ • Bulk Tank Certification; • Chemical and Hazardous Material Management Plan; • Workplace Inspections; • Evaporation pond (including turkey nest) design; • Evaporation pond inspections; • Computerised Maintenance Management System ~~(CMMS)~~ Maintenance; • Decommissioning of infrastructure on Private land; • Groundwater monitoring; • Validation soil assessment; • Surveillance Sampling Program; • Remote monitoring capability for unmanned facilities; • Perth Basin ERP; • Perth Basin Oil Spill Contingency Plan (OSCP); • Well exclusion barriers; and • Well Control Master Service Agreement.
Accidental Release – Chemical and Hazardous Material Handling, Storage and Use	• Contamination of soil / groundwater.	• Chemical and Hazardous Material Management Plan; • Transport of Dangerous Goods Evaporation pond inspections; • ~~Methanol Load-in and Injection Operations Procedure;~~ • ~~Chemical Injection Operation and Refilling~~Bulk Transfer Procedure; • Workplace Inspections; • Surveillance Sampling Program; • Perth Basin ERP; and • Perth Basin OSCP.

Aspect	Hazard	Management and Mitigation Measures
Accidental Release – Hydrocarbon release During Transfer	• Contamination of soil / groundwater.	• Bulk Tt~~t~~ransfer Pp~~p~~rocedure~~s~~; • Chemical Injection Operation and Refilling Procedure; • Refuelling ~~procedure~~process; • Computerised Maintenance Management System ~~(CMMS)~~ Maintenance; • Surveillance Sampling Program; • Perth Basin ERP; and • Perth Basin OSCP.

5.0 IMPLEMENTATION STRATEGY

To meet the requirements of Regulation 15(1) of the PGER(E)R, the EP describes the systems, practices, and procedures used to ensure that the environmental impacts and risks of the activities are continuously reduced to as low as reasonably practicable (ALARP), and the environmental performance objectives and standards detailed in the EP are achieved.

5.1 Management System Overview

5.1.1 Documentation Hierarchy

MEPAU's HSE Management System (HSEMS) is hierarchal in nature, with the key levels of documentation shown below in Figure 5-1.

Figure 5-1 HSEMS Documentation Hierarchy

The HSEMS establishes clear guidelines for personnel involved in this activity to achieve and maintain the standards set out in this EP.

5.1.2 Corporate HSE Elements

The objectives of the HSE Elements are to:

- Establish and formalise expectations for the progressive development and implementation of more specific requirements within each MEPAU business unit;
- Provide auditable criteria against which the HSEMS can be measured; and
- Provide a basis from which to drive continual improvement.

The 15 HSE Elements are listed below in Table 5-1. Those elements that are applicable for managing the environmental impacts and risks arising from activities covered under this plan are described further below.

Table 5-1 HSE Elements

HSE Element Number	Element Name	Relevant to support environmental management of this Activity
1	Leadership and Responsibility	☒
2	Hazard Identification and Risk Management	☒
3	Compliance	☒
4	Workforce Training and Competency	☒
5	Workforce Involvement and Stakeholder Engagement	☒
6	Design, Construction, Commissioning and Decommissioning	☐
7	Operations Management	☐
8	Asset Integrity Management	☐
9	Management of Contractors and Materials	☒
10	Occupational Health and Wellbeing	☐
11	Management of Change	☒
12	Incident Reporting and Investigation	☒
13	Emergency Preparedness and Response	☒
14	Information Management and Document Control	☒
15	Audit, Assessment and Review	☒

5.1.3 Systems, Practices and Procedures

Details of MEPAU systems, practices and procedures relating to the management of all potential impacts and risks of the activity are detailed in Table 5-2. The objective of these are to continuously reduce the potential impacts and risks of the activity to ALARP.

Table 5-2 Systems, Practices and Procedures

Item	Objective to achieve ALARP	Document Name
Code of Practice for MEPAU sites	To outline the main HSE criteria to be observed by MEPAU and its contractors	MEPAU Health, Safety & Environment Policy [MEP HSE-POL-001]
Environment Plan	To document environmental management of operations	Perth Basin Facilities EP [PB-HSE-PLN-00004]
HSE Management System (HSEMS)	The HSEMS establishes clear guidelines for personnel involved in this activity to achieve and maintain the standards set out in this EP	Refer to Table 5-1
Oil Spill Preparedness and Response	To provide guidance on the management of a spill	Perth Basin OSCP [PB-HSE-PLN-0000914]
Emergency Response Plan	To provide guidance on the management of an emergency situation	Perth Basin ERP [PB-OPS-PLN-00007]
Permit to Work System	To ensure facilities are in a safe and environmentally acceptable condition before works starts and is kept in this condition until all personnel involved in the work have signed off completion	PTW Procedure [PB-OPS-PRO-00001]
Hazard and Incident Reporting	To outline the processes and requirements for hazard and incident reporting	Hazard and Incident Reporting Procedure [PB-HSE-PRO-00006]
Environmental Compliance Scheduling	To prompt environmental compliance requirements (reporting, auditing, licence renewal, document update)	INX InForm
Chemical and Hazardous Material Management	To provide guidance to ensure that MEPAU reduce and manage the health, safety or environmental risk or loss of amenity arising from the procurement, transport, storage and use of chemicals, hazardous materials and dangerous goods at all Perth Basin facilities.	Chemical and Hazardous Material Management Plan [PB-HSE-PLN-00003] and Approvals Procedure [PB-HSE-PRO-00020]
Construction Fill Risk Assessment	To guide and document the conditions, approval and details of clearing activities to ensure compliance with clearing permits and legislation as required	

Item	Objective to achieve ALARP	Document Name
Hygiene Management	To document the completion of hygiene inspections for personnel entrance into LLNR	Weed and Dieback Hygiene Work Instruction [PB-HSE-PLN-012-WIS-001], Vehicle / Equipment Hygiene Inspection Check [PB-HSE-FRM-00018] ~~Weed and Dieback Hygiene Work Instruction [PB-HSE-PLN-012-WIS001]~~ and Vehicle / Equipment Inspection Check Sheet [PB-HSE-FRM-00002]
Vegetation Clearing	To guide and document the conditions, approval and details of clearing activities to ensure compliance with clearing permits and legislation	Clearing Vegetation Procedure [PB-HSE-PRO-00010]
Sampling Surveillance Program	Outline groundwater and surface water monitoring program with guidance for compliance with WGP EP commitments	Surveillance Sampling Program [PB-HSE-PRO-119]
Waste Management	To provide guidance on the management of waste at Perth Basin facilities	Waste Management Plan [PB-HSE-PLN-00001]
Well Management	To document management of well operations	Well Management Plan
Routine HSE Inspections	A practice that provides regular assurance verification regarding HSE compliance with legislation, and company policies and procedures	Monthly HSE Inspection Checklist
Preventative Maintenance Management	To provide a preventative maintenance management tool that stores records, schedules maintenance and documents activities undertaken	Computerised Maintenance Management System ~~(CMMS)~~
~~-~~Training Management	To provide the framework for all personnel to have the competency for their respective roles for the management of safety and environmentally critical risks and daily work activities	Training Management Plan [PB-OPS-TRN-013]
Landowner Communications	To guide all personnel working at MEPAU owned assets on interactions with landowners (including tenants and staff)	Landowner Communication Procedure [HSE-PR-059]
Stakeholder Engagement	To provide guidance on how MEPAU personnel interact with stakeholders	MEPAU Stakeholder Engagement Framework ~~Stakeholder Engagement Plan [CP-PM-039~~MEP-EXA-GDL-001]

Item	Objective to achieve ALARP	Document Name
Audit Management	To plan and document the independent examination and verification of activities, records, processes, and other elements to determine conformity to documented requirements and standards	MEPAU Annual Audit Schedule

5.2 Environment Plan Review

Regulation 18 of the PGER(E)R requires that MEPAU submit a proposed revision of the accepted EP:

- Before the commencement of a new activity, or any significant modification, change of a new stage of an existing activity; or
- Before, or as soon as practicable after, the occurrence of any significant new environmental impact or risk, or significant increase in an existing environmental impact or risk which occurred or is to occur.

Additionally, Regulation 20 of PGER(E)R requires that MEPAU submit a proposed revision of this EP five years from the date when this EP is accepted by the Minister.

6.0 CONSULTATION

MEPAU are committed to stakeholder engagement and their commitment is documented in their MEPAU Stakeholder Engagement Framework [MEP-EXA-GDL-001] which includes:

- Stakeholder identification, analysis and mapping prior to the start of any company activity;
- Mobilise resources, build capacity and identify and prepare for stakeholder risks;
- Ensure that stakeholders are invited to participate with reasonable time to respond and that communications are appropriate for each stakeholder; and
- Monitor and evaluate stakeholder engagement to improve future engagements and business performance.

~~MEPAU are committed to stakeholder engagement and their commitment is documented in their Stakeholder Engagement Plan [CP-PM-039] which includes:~~

- ~~Identification and analysis of stakeholder groups;~~
- ~~Adopted method of communication with each stakeholder group;~~
- ~~Determination of the type of information that is required to be communicated and when;~~
- ~~Confirmation of the MEPAU resource that is responsible for implementing the commitments outlined in this EP;~~
- ~~Reporting responsibilities and relationships during communication and consultation processes;~~
- ~~A list of contacts and the contact details for all key stakeholders;~~

- ~~A calendar of activities (including how, when, to and by whom communications and consultations will occur); and~~
- ~~A point of reference for the specific obligations, commitments and requirements relating to those stakeholders, including those defined within resource consents and third party agreements.~~

~~MEP~~MEPAU maintains a database of stakeholder communication and are committed to ongoing consultation and open dialogue with key stakeholders for the duration of the project. In addition to direct engagement.~~,~~ MEPAU hosts a Mid-West website (www.mitsuiepmidwest.com.au) that includes project specific pages, blogs, a feedback form and hyperlinks to other websites. The website provides an additional method for MEPAU to communicate with stakeholders on a continuing basis.

In accordance with Regulation 17 of PGER(E)R, MEPAU completed a scoping exercise to determine which authorities, persons and organisations were considered to be relevant for the activities covered under this EP. As the assets are located in regional areas and distant from any town sites, the following stakeholders were identified and include:

- Landowners of the properties where the assets are located, and adjacent to them;
- Local government (Shires of Irwin and Carnamah);
- DMIRS, DWER and DBCA; and
- Southern Yamatji people (Traditional Landowners); and
- Joint Venture Partner – Beach Energy.

6.1 Ongoing Consultation

In accordance with Regulation 15(11) the implementation strategy must provide for appropriate consultation with relevant authorities and other relevant interested persons or organisations.

MEPAU will continue to consult with relevant stakeholders throughout the course of this EP. MEPAU will specifically engage and consult with relevant stakeholders on a frequency at their request.

However, based upon the nature and scale of the Operations, and as no specific triggers or frequency for updates have been requested to date, MEPAU plan to keep stakeholders informed through the wider MEPAU engagement process, and ongoing consultation with landowners where required as part of Land Access Agreements.

7.0 REFERENCES

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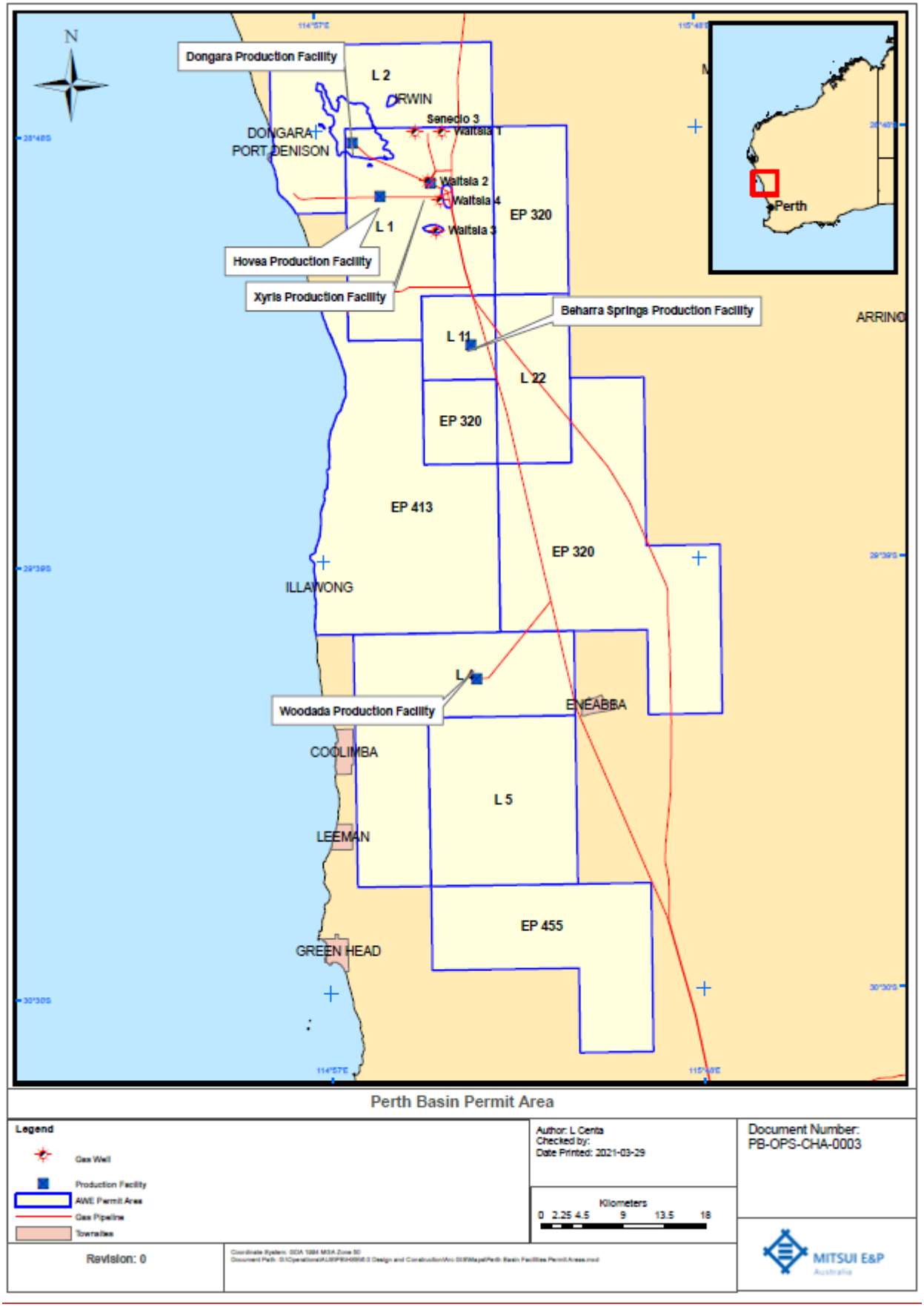
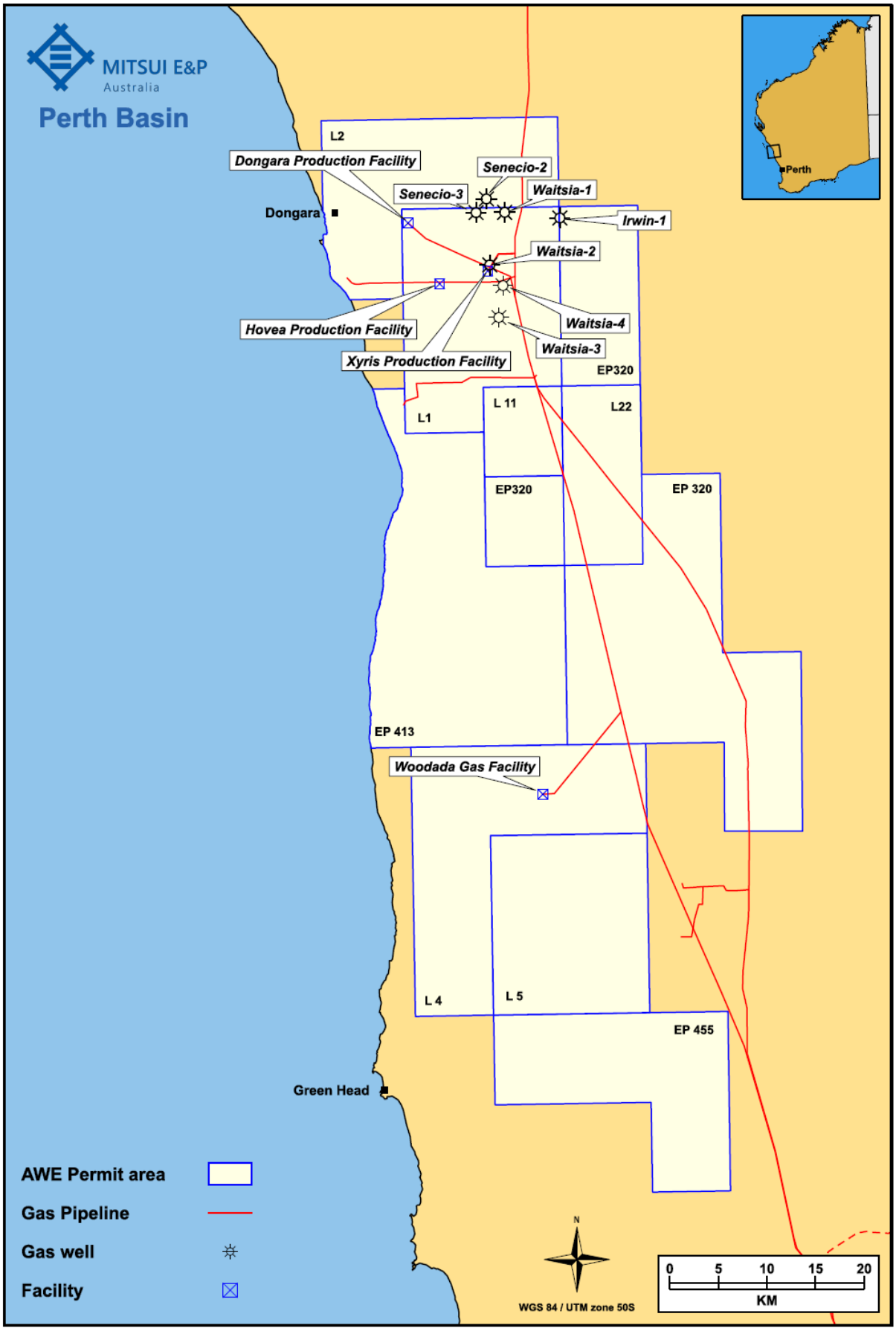
ATTACHMENTS

ATTACHMENT 1
PERTH BASIN LOCATION FIGURES

ATTACHMENT 1.01 PERMIT BOUNDARIES




MITSUI E&P
Australia
Perth Basin
Perth
L2
Dongara Production Facility
Senecio-2
Senecio-3
Waitsia-1
Dongara
Irwin-1
Waitsia-2
Hovea Production Facility
Waitsia-4
Waitsia-3
Xyris Production Facility
EP320
L1
L 11
L22
EP320
EP 320
EP 413
Woodada Gas Facility
L 4
L 5
EP 455
Green Head
AWE Permit area
Gas Pipeline
Gas well
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N
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0 5 10 15 20
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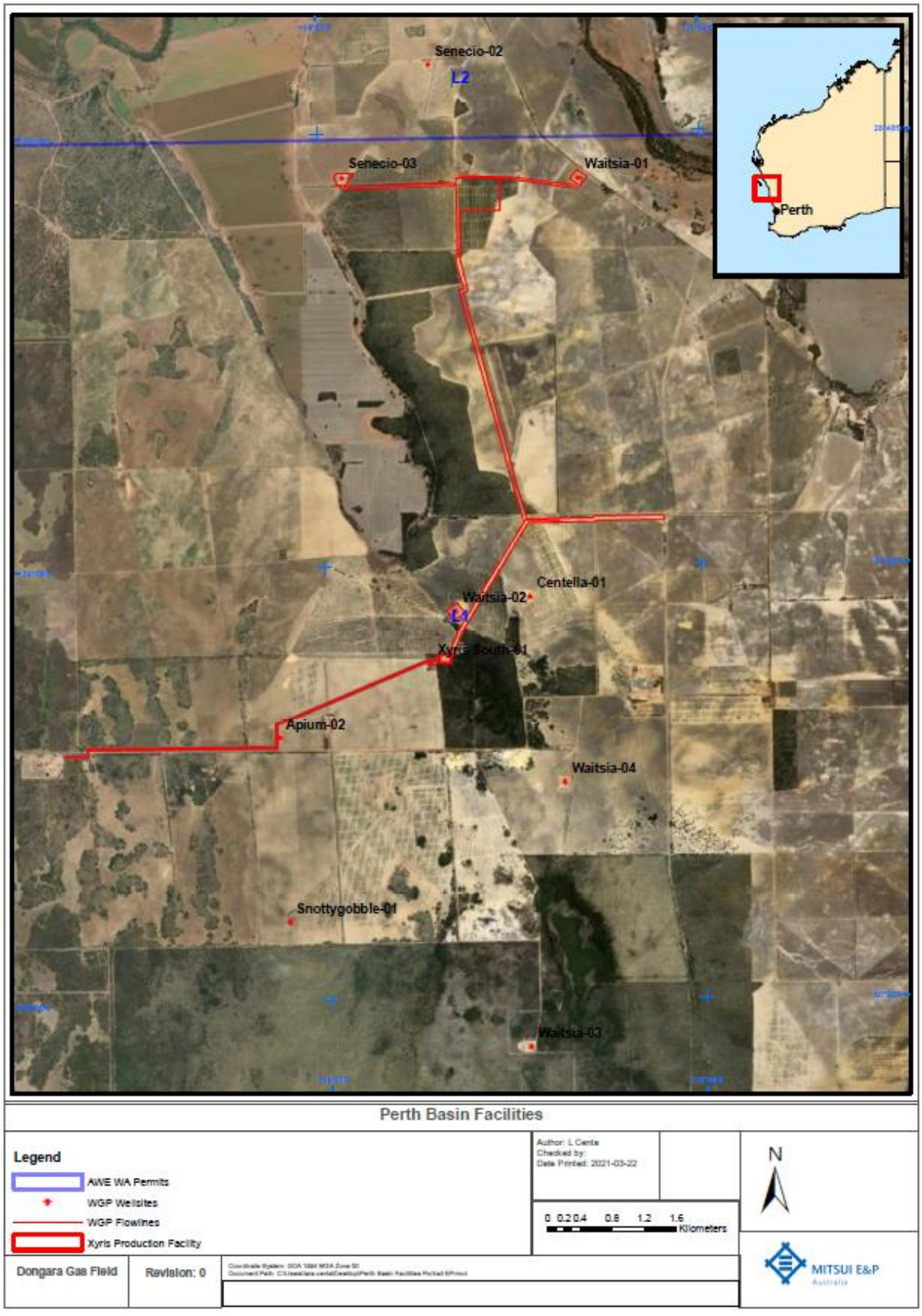
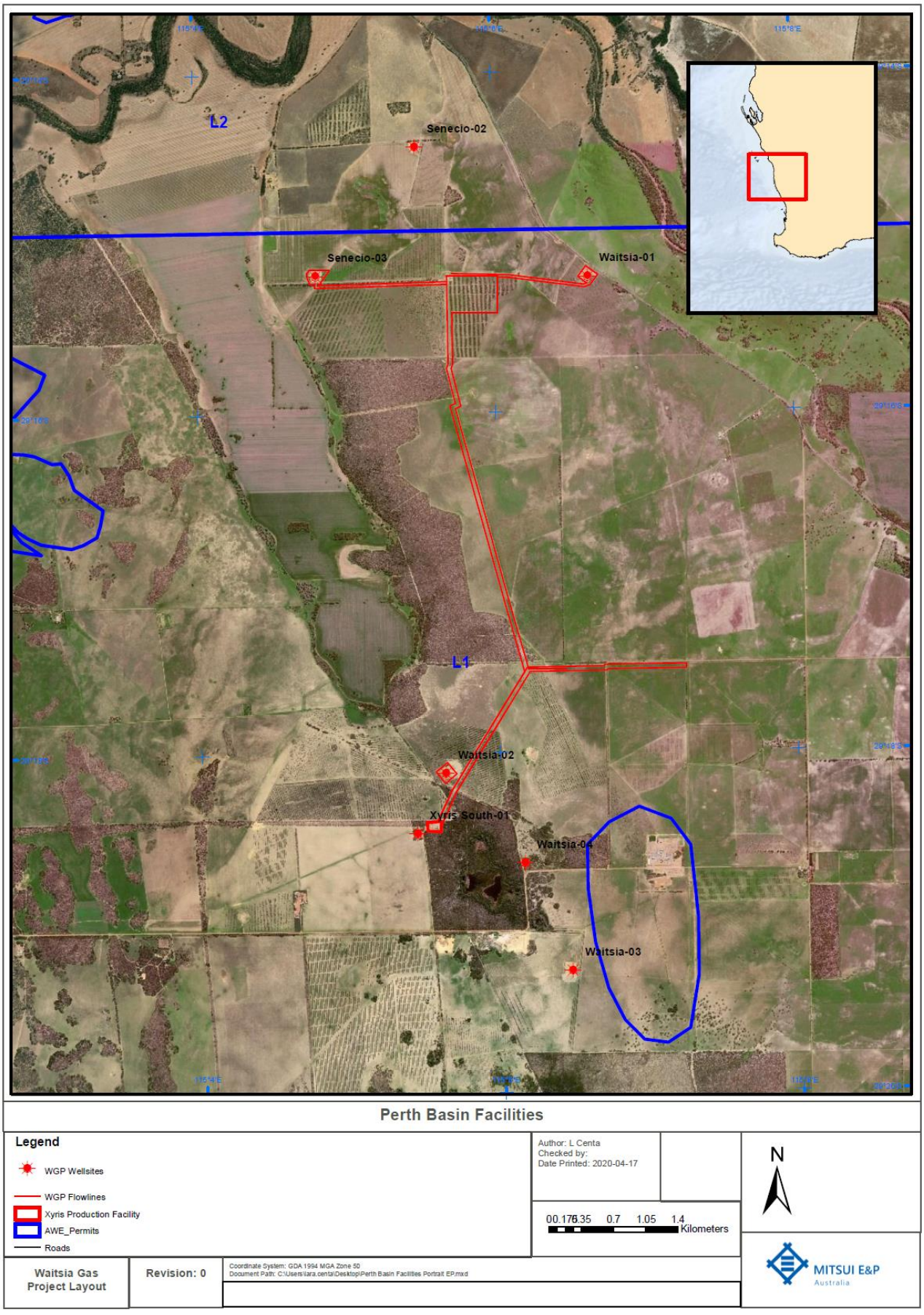
ATTACHMENT 1.02 WAITSIA GAS PROJECT FIELD LAYOUT




L2
Senecio-02
Senecio-03
Waitsia-01
L1
Waitsia-02
Xyris South-01
Waitsia-04
Waitsia-03
Perth Basin Facilities
Legend
WGP Wellsites
WGP Flowlines
Xyris Production Facility
AWE_Permits
Roads
Author: L Centa
Checked by:
Date Printed: 2020-04-17
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Kilometers
N
Waitsia Gas Project Layout
Revision: 0
Coordinate System: GDA 1994 MGA Zone 50
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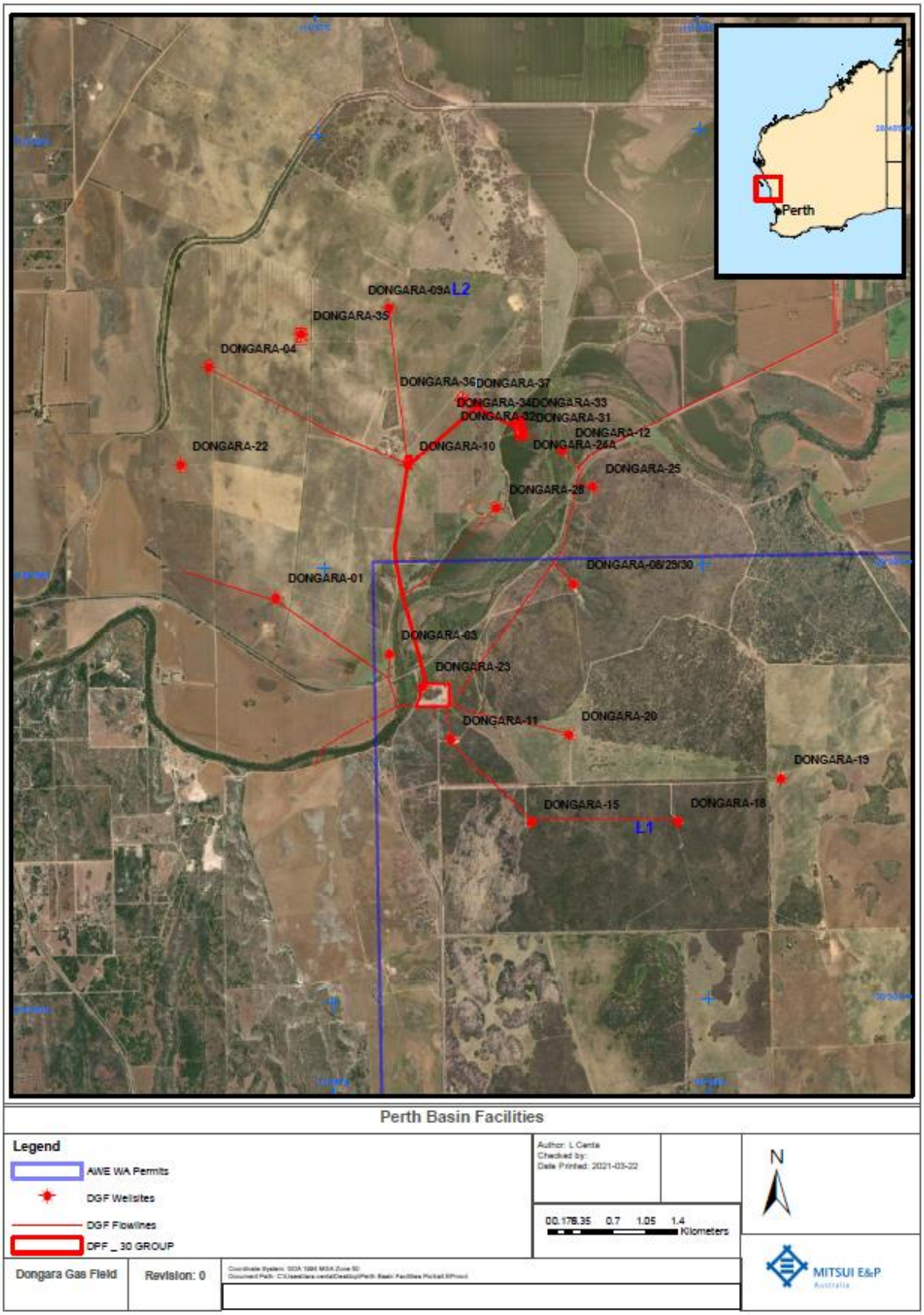
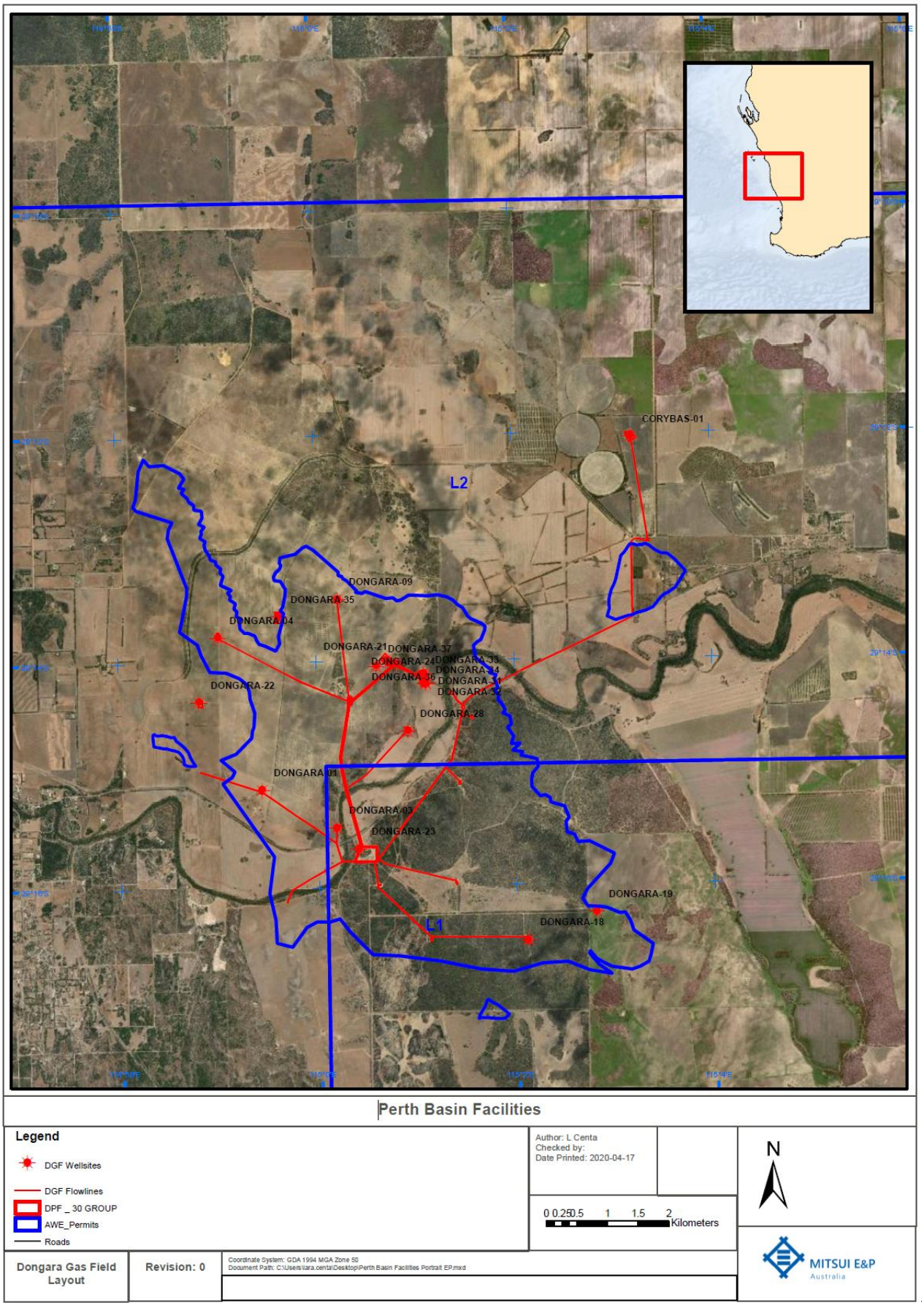
MITSUI E&P Australia

ATTACHMENT 1.03 DONGARA GAS FIELD LAYOUT

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DONGARA-09
DONGARA-35
DONGARA-04
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DONGARA-36
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DONGARA-32
DONGARA-22
DONGARA-28
DONGARA-01
DONGARA-03
DONGARA-23
DONGARA-19
L1
DONGARA-18
Perth Basin Facilities
Legend
DGF Wellsites
DGF Flowlines
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AWE_Permits
Roads
Author: L Centa
Checked by:
Date Printed: 2020-04-17
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Kilometers
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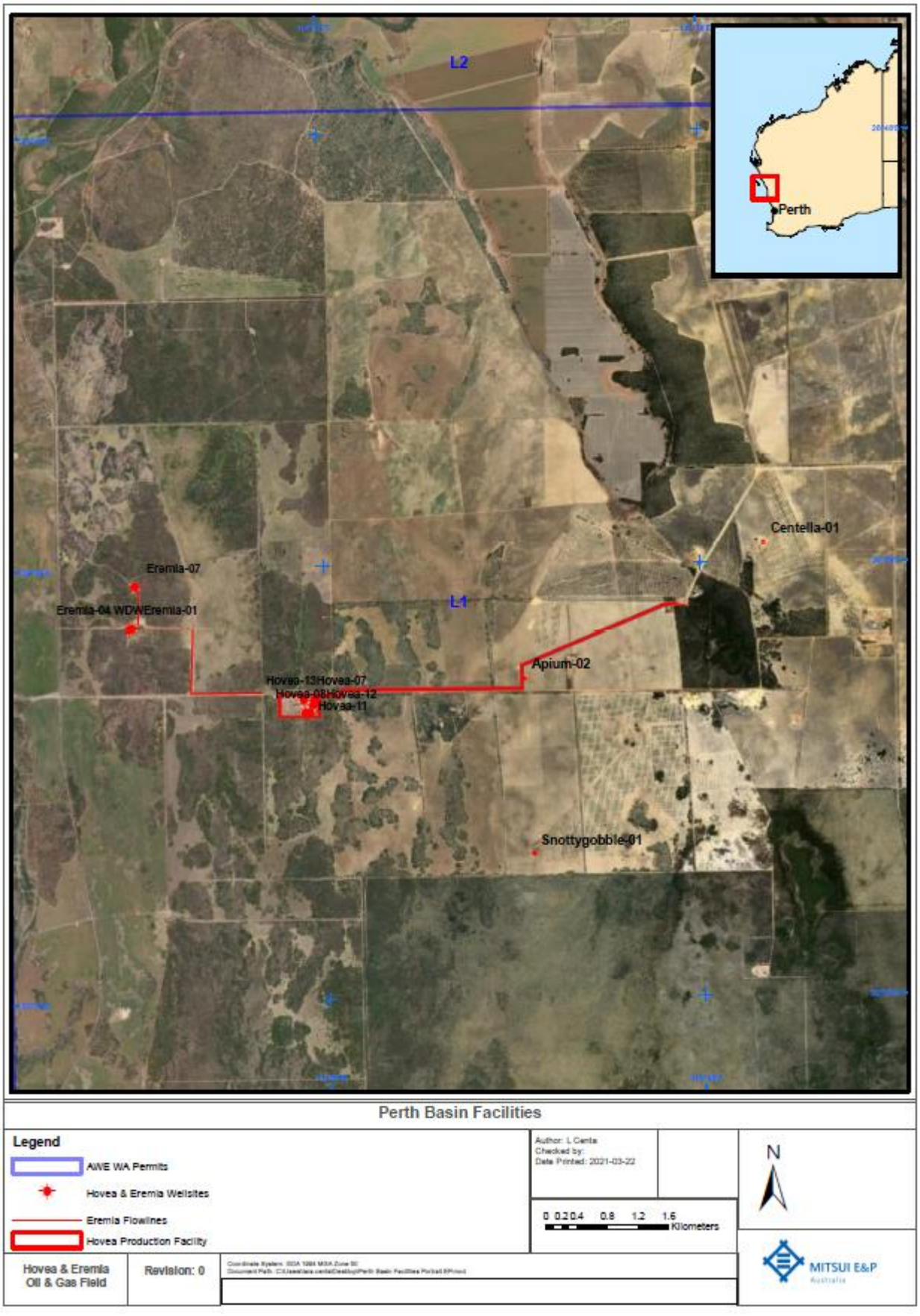
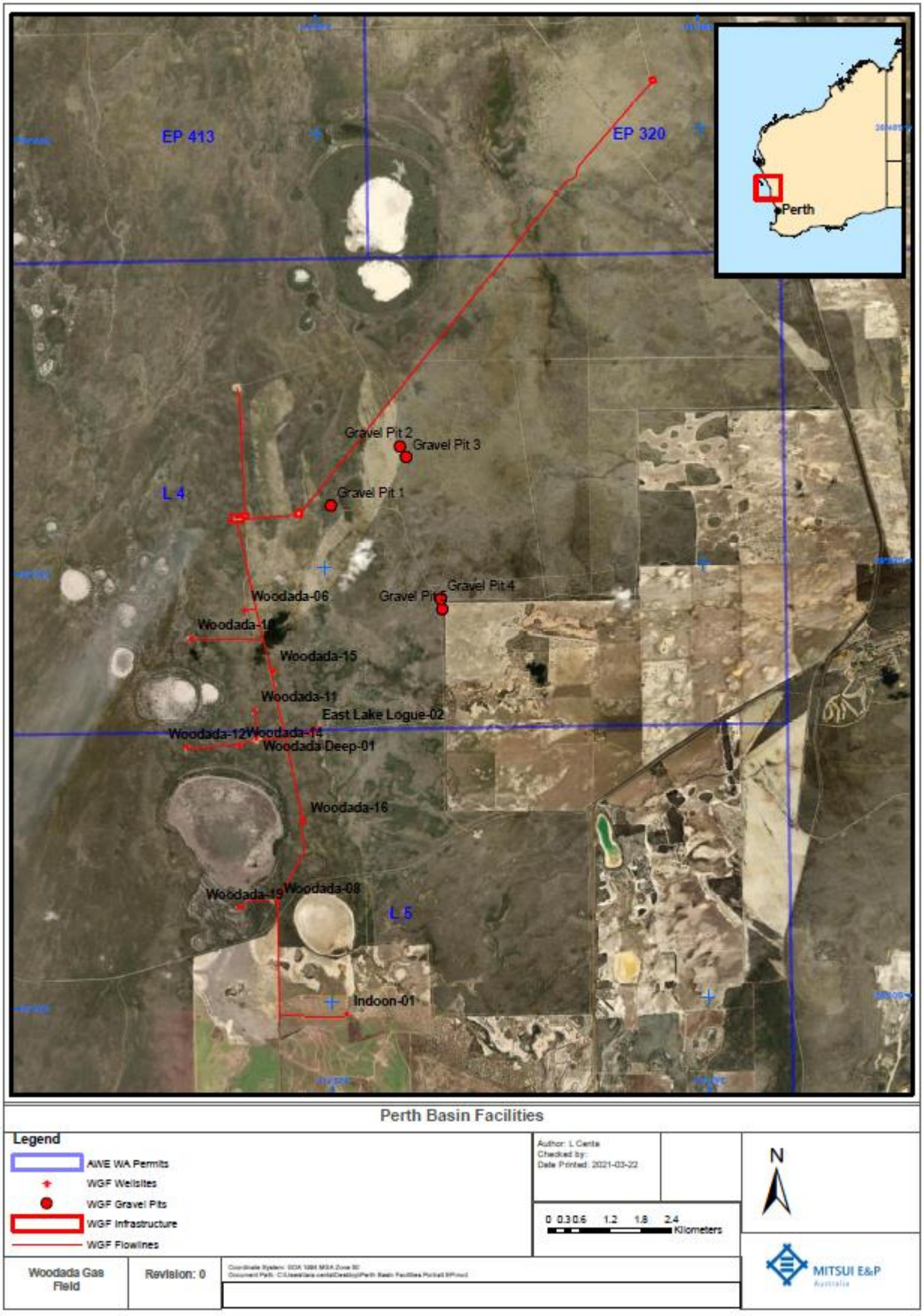
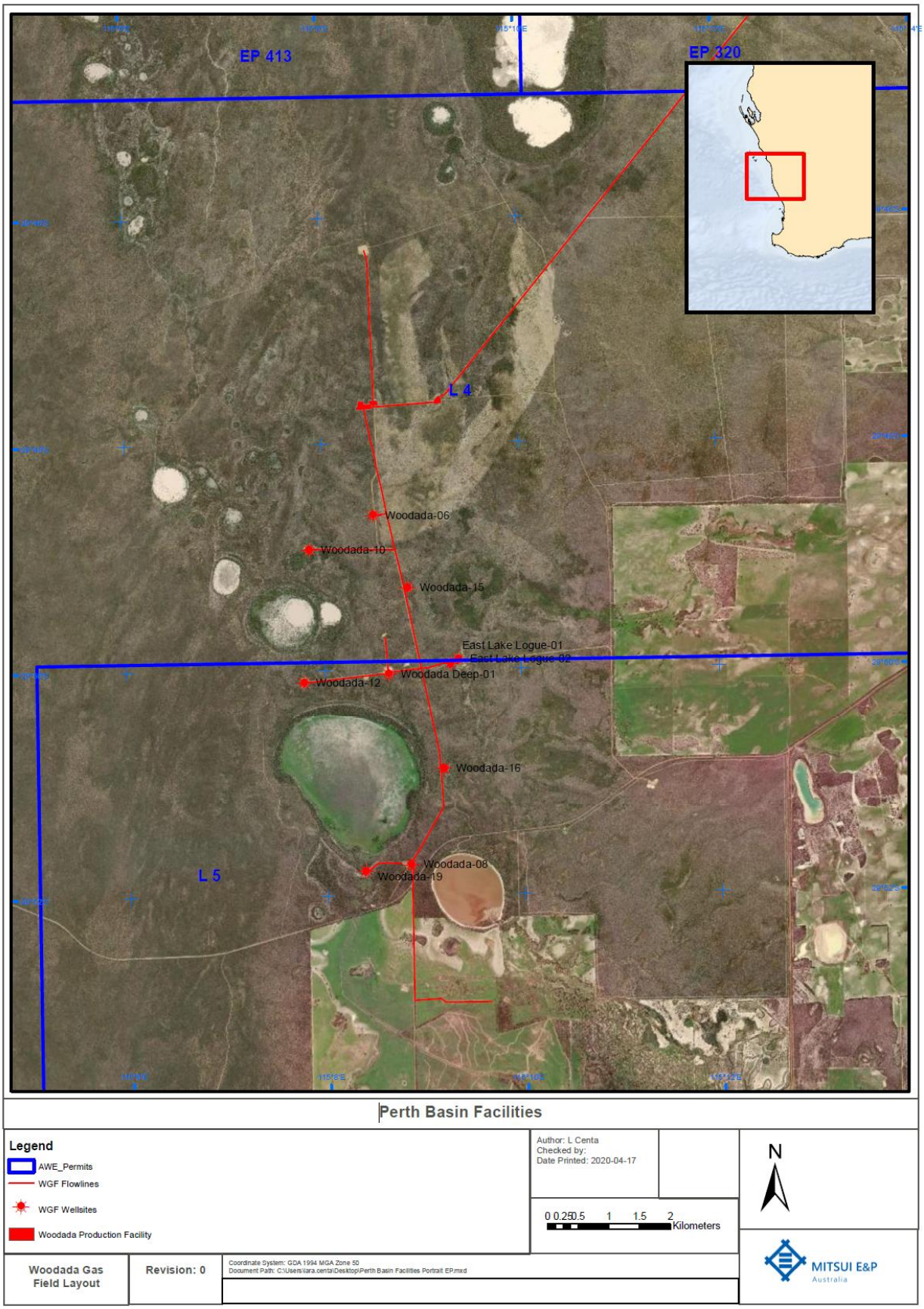
Australia

ATTACHMENT 1.04 HOVEA &~~–~~ EREMIA ~~– XAGGS~~ FIELD LAYOUT



ATTACHMENT 1.05 WOODADA GAS FIELD LAYOUT

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L 4
L 5
Woodada-06
Woodada-10
Woodada-15
East Lake Logue-01
East Lake Logue-02
Woodada Deep-01
Woodada-12
Woodada-16
Woodada-08
Woodada-19
Perth Basin Facilities
Legend
AWE_Permits
WGF Flowlines
WGF Wellsites
Woodada Production Facility
Author: L Centa
Checked by:
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0 0.25 0.5 1 1.5 2
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Woodada Gas Field Layout
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MITSUI E&P Australia

ATTACHMENT 2
DPF WDW CHEMICAL DISCLOSURE

Products Potentially Discharged "Down Hole" for DPF WDW

Table 2.1 System Details

Operator	AWE Perth Pty Ltd (trading as MEPAU)
Project / Well	DPF Water Disposal Well (WDW)
System	DPF Waste Water System
Total Volume	1,000 kL
Note	Concentrations of product in the Produced Water are absolute maximums based on the volume of the individual chemical injected into the gas stream

Table 2.2 Product List for DPF WDW

Product Name	Supplier	Purpose	Toxicity, Eco toxicity & Biodegradability Data	% Product in System Fluid
Wastewater	MEPAU	Product separated from gas / stormwater / wastewater		92.95%
Methanol (97%)	Halliburton	Hydrate Inhibitor	Acute Toxicity • ErC50 (96h) 22000 mg/L (*Pseudokirchnerella subcapitata*) (algae) • LC50 28200 mg/L (*Pimephales promelas*) • LC50 (96h) 12700 – 15400 mg/L (*Lepomis macrochirus*) (fish) • IC50 (3h) > 1000 mg/L (activated sludge) • EC50 (96h) 18260 mg/L (*Daphnia magna*) • NOEC (21d) 122 mg/L (*Daphnia magna*, Reproduction) (chronic toxicity fish) **Persistence and Degradability** • (95-97% @ 20d) **Bioaccumulative potential** • Log Pow -0.77 • BCF = 1.0 – 4.5 (*Cyprinus carpio*) • BCF < 10 (*Leuciscus idus melanotus*)	6.2%
CORR 10331A	EcoLab~~Champion Technology~~	Corrosion Inhibitor	Acute Toxicity *Component 1 (60-100%)* • Non-hazardous according to Safe Work Australia criteria, non-dangerous goods according to ADG. N-Benzyl-Alkylpyridinium Chloride *(5-10%)* • EC50: 0.16 mg/l Exposure time: 72 h Benzyl(Coconut Oil Alkyl)Dimethylammonium Chloride *(1-5%)* No data available Diethylenetriamine and tall-oil (fatty) acid *(1-5%)* • LC50: 0.3 mg/l Exposure time: 48 h (daphnia) Ethoxylated Mono-Tallow Alkyl-Amine *(1-5%)* No data available Methanol *(1-5%)* • LC50: 15,400 mg/l Exposure time: 96 h (fish) • NOEC: 7,900 mg/l Exposure time: 8.3 d	0.1%

Product Name	Supplier	Purpose	Toxicity, Eco toxicity & Biodegradability Data	% Product in System Fluid
			• EC50: > 10,000 mg/l Exposure time: 48 h (daphnia) • EC50: 22,000 mg/l Exposure time: 72 h (algae) • Toxicity to bacteria <1,000 mg/l 2-Mercaptoethano *(1-5%)* • Toxicity to fish: no data available • EC50: 0.89 mg/l Exposure time: 48 h (daphnia) • EC50 *Scenedesmus subspicatus* (cell multiplic. inhib. test) 12 mg/L/72 hr • Toxicity to microorganisms: no data available Biodegradation/bioaccumulation • No data available	
NALCO EC9356A	Nalco Champion	H_2S Scavenger	Acute Toxicity Hexahydro-1,3,5-Trimethyl-S-Triazine: • LC50: >1.908 mg/L exposure time 96 hr (fish) • LC50: 20.352 mg/L exposure time 48 hr (daphnia and other aquatic invertebrates) • EC50: 1.145 mg/L exposure time 72 hr (algae) Biodegradation/bioaccumulation Hexahydro-1,3,5-Trimethyl-S-Triazine: • Log Pow: 1.4 • Biodegradation (14d): 73% (OECD 306)	0.05%
HSCV27157B	EcoLab	H_2S Scavenger	Acute Toxicity Hexahydro-1,3,5-Trimethyl-S-Triazine • LC50: > 1.908 mg/l exposure time: 96 h (fish) • LC50: 20.352 mg/l exposure time: 48 h (daphnia and other aquatic invertebrates) • EC50: 1.145 mg/l (algae) Biodegradation/bioaccumulation No data available	0.2%
EC6733A	Nalco Champion	Biocide	Acute Toxicity Tetrakis(hydroxymethyl)phosphonium sulphate (supplier data, 75% active in water) (60-90%): • LC50: 72 mg/L exposure time 96 hr (fish) • LC50: 0.6 mg/L exposure time 48 hr (daphnia and other aquatic invertebrates) • EC50:0.16 mg/L exposure time 72 hr (algae) Benzyl-(C12-C16 Linear Alkyl)-Dimethyl-Ammonium Chloride (5-10%): • LC50: 1.7 mg/L exposure time 96 hr (fish) • LC50: 0.4 mg/L exposure time 48 hr (daphnia and other aquatic invertebrates) • EC50: 0.26 mg/L exposure time 72 hr (algae) Formaldehyde (0.1-1%): • LC50: 611 mg/L exposure time 96 hr (fish) • LC50: 38 mg/L exposure time 48 hr (daphnia and other aquatic invertebrates) • EC50: 4.1 mg/L exposure time 72 hr (algae) Biodegradation/bioaccumulation Tetrakis(hydroxymethyl)phosphonium sulphate (supplier data, 75% in water) (60-90%): • Log Pow: 0 • Biodegradation (28d): 60% (OECD 306) Benzyl-(C12-C16 Linear Alkyl)-Dimethyl-Ammonium Chloride (5-10%):	0.2%

Product Name	Supplier	Purpose	Toxicity, Eco toxicity & Biodegradability Data	% Product in System Fluid
			• Log Pow: 0.1-1.9 • Biodegradation (28d): 34% (OECD 306) Formaldehyde (0.1-1%): • Log Pow: <0 • Biodegradation (28d): 83% (OECD 306)	
~~HCL 15%~~	~~Telford~~	~~Acid to remove scale~~	~~Acute/Chronic toxicity *HCL as an ingredient:* 15%~~ ~~LD50 (Oral): >900 mg/Kg (rat)~~ ~~LC50 (Inhalation): 300 ppm/hr (rat)~~ ~~Biodegradation/Bioaccumulation:~~ ~~When released into the soil, this material is not expected to biodegrade. When released into the soil, this material may leach into groundwater.~~ ~~Water: 58%~~ ~~Natural product.~~	~~0.5%~~
Seaguard AFFF 3%	Seaguard Chemicals and Firefighting	Fire extinguishing agent (in case of discharge from bund following an incident / exercise)	Acute Toxicity • No data available Biodegradation/bioaccumulation • No data available	0.08%
Flamestop Fluorine Free & Alochol Resistant Concentrate	FlameStop	Fire extinguishing agent (in case of discharge from bund following an incident / exercise)	Aquatic Toxicity Acute (short term) fish toxicity - Effective dose LC50 ~240 mg/L (96h exposure time) species *Leuciscus idus* (golden orfe) method OECD 203 Actute (short term) toxicity to crustacea - Effective dose EC50 ~210 mg/L (48h exposure time) species *Daphnia magna* (Big water flea) method OECD 202 Acute (short term) toxicity to aquatic algae and cyanobacteria - Effective dose EC50 ~210 mg/L (72h exposure time) *species Scenedesmus subspicatus* method OECD 201 Effects in sewage plants - respiratory inhibition of municipal activated sludge method 500 mg/L – concentration: 100% dilution: >2000 166,000 mg/L – concentration: 3% dilution >60 Technically correct releases of minimal concentrations to adapted biological sewage plants, will not disturb the biodegradability of activated sludge. The product may lead to foaming in sewage plants. Biodegradation Readily biodegradable (according to OECD criteria). Degradation rate ~99% (time 28d). Analytical method BOD (% of COD) OECD 302B/ ISO 9888/ EEC 92/69/V, C.9 (Type Aerobic biological treatment) Chemical Oxygen Demand (COD) ~488,000 mg*02/L Concentration: 100% Method: DIN EN 38409-H41-1 ~14,640 mg*02/L Concentration: 3% Method: DIN EN 38409-H41-1 ~170,000 mg*02/L Concentration: 100% Method: DIN EN 1899-1 Test durarion: 5d ~5,100 mg*02/L Concentration: 3% Method: DIN EN 1899-1 Test durarion: 5d Bioaccumulative Potential 1,2-Ethandiol: No indication of bioaccumulation potential 2-(2-Butoxyethoxy)ethanol: No indication of bioaccumulation potential Triethanolammonium-laurylsulfate: No indication of bioaccumulation potential Alkylamidobetaine: No indication of bioaccumulation potential Mobility in soil If product enters soil, it will be mobile and may contaminate groundwater Results of PBT and VPVB Assessment 1,2-Ethandiol: This substance does not meet the PBT/vPvB criteria of REACH, annex XIII.	0.08%

Product Name	Supplier	Purpose	Toxicity, Eco toxicity & Biodegradability Data	% Product in System Fluid
			2-(2-Butoxyethoxy)ethanol: This substance does not meet the PBT/vPvB criteria of REACH, annex XIII. Triethanolammonium-laurylsulfate: This substance does not meet the PBT/vPvB criteria of REACH, annex XIII. Alkylamidobetaine: This substance does not meet the PBT/vPvB criteria of REACH, annex XIII.	

Table 2.3 "Down Hole" Products Ingredients for DPF WDW

Chemical Name	CAS number	Mass fraction (%)
Wastewater		92.95
Methanol	67-56-1	6.2015
Water	7732-18-5	0.27405
N-Benzyl-Alkylpyridinium Chloride	68909-18-2	0.0125
Benzyl(Coconut Oil Alkyl)Dimethylammonium Chloride	61789-71-7	0.0044
Fatty amino compound	61790-69-0	0.0044
Ethoxylated Mono-Tallow Alkyl-Amine	61791-26-2	0.0044
2-Mercaptoethanol	60-24-2	0.0044
Hexahydro-1,3,5-Trimethyl-S-Triazine	108-74-7	0.025
Monomethylamine	74-89-5	0.0001
Tetrakis(hydroxymethyl) phosphonium sulfate	55566-30-8	0.05
Benzyl-(C12-C16 Linear Alkyl)-Dimethyl-Ammonium Chloride	68424-85-1	0.0014
Formaldehyde	50-00-0	0.0014
Cocamidopropyl Betaine	61789-04-0	0.002
Fluorocarbon surfactant		0.004
Fatty acids, coco, compounds with diethanolamine	61790-63-4	0.004
Sodium Laureth-5 Sulfate	9004-82-4	0.004
Dipropylene glycol, monomethyl	34590-94-8	0.008
1,2-Ethandiol	107-21-1	0.012
2-(2-Butoxyethoxy)ethanol	112-34-5	0.008
Triethanolammonium-laurylsulfate	85665-45-8	0.008
Alkylamidobetaine	147170-44-3	0.004
	TOTAL	100% (excluding contingency volumes)

~~Chemical Name~~	~~CAS number~~	~~Mass fraction (%)~~
~~Wastewater~~		~~92.95~~
~~Methanol~~	~~67-56-1~~	~~6.2015~~
~~Water~~	~~7732-18-5~~	~~0.16505~~
~~N-Benzyl-Alkylpyridinium Chloride~~	~~68909-18-2~~	
~~Benzyl(Coconut Oil Alkyl)Dimethylammonium Chloride~~	~~61789-71-7~~	~~0.0125~~
~~Fatty amino compound~~	~~61790-69-0~~	~~0.0044~~
~~Decylalcohol, ethoxylated, phosphate~~	~~52019-36-0~~	~~0.0041~~

~~Ethoxylated Mono-Tallow Alkyl-Amine~~	~~61791-26-2~~	~~0.0021~~
~~Formaldehyde~~	~~50-00-0~~	~~0.0014~~
~~2-Mercaptoethanol~~	~~60-24-2~~	~~0.0010~~
~~Ethanediol~~	~~107-21-1~~	~~0.0008~~
~~Acetic acid~~	~~64-19-7~~	~~0.0008~~
~~Monomethylamine~~	~~74-89-5~~	~~0.0001~~
~~Hydrochloric Acid~~	~~7647-01-0~~	~~0.5~~
~~1,2-Ethandiol~~	~~107-21-1~~	~~0.012~~
~~2-(2-Butoxyethoxy)ethanol~~	~~112-34-5~~	~~0.008~~
~~Triethanolammonium-laurylsulfate~~	~~85665-45-8~~	~~0.008~~
~~Alkylamidobetaine~~	~~147170-44-3~~	~~0.004~~
	~~**TOTAL**~~	~~100% (excluding contingency volumes)~~

~~ATTACHMENT 3~~
~~EREMIA-04 CHEMICAL DISCLOSURE~~

Products Potentially Discharged "Down Hole" for Eremia-04

Table 3.1 System Details

Operator	AWE Perth Pty Ltd (trading as MEPAU)
Project / Well	Eremia-04
System	Well Intervention Fluid
Total Volume	1,000 kL

Table 3.2 Product List for Eremia-04

Product Name	Supplier	Purpose	Toxicity, Eco toxicity & Biodegradability Data	% Product in System Fluid	SDS Attached?
Water	Town or Bore water	Base fluid	N/A – Natural product.	77.631%	N/A
Idcide 20	Newpark Drilling Fluids	Biocide	Acute Toxicity: 75% Tetrakis (hydroxymethyl) Phosphonium Sulphate (55566-30-8): LC50 (Rainbow Trout) = 119 mg/L/96 hr LC50(Bluegill Sunfish) = 93 mg/L/ 96 hr EC50 (Daphnia Magna) = 19 mg/L/48 hr LC50 (Brown Shrimp) = 340 mg/L/96 hr LC50 (Mysid Shrimp) = 9.5 mg/L/96 hr LC50 (Sheepshead Minnow) = 94 mg/L/96 hr LC50 (Juvenile Plaice) = 86 mg/L/96 hr Waste Water management EC50 (Activated Sludge) = 24 mg/L/3 hr. Water: 25% Natural product. Biodegradation/bioaccumulation: No specific studies undertaken to date.	0.051%	Attachment 7

Product Name	Supplier	Purpose	Toxicity, Eco toxicity & Biodegradability Data	% Product in System Fluid	SDS Attached?
Sodium sulphite	Newpark Drilling Fluids	Oxygen Scavenger	Acute Toxicity: LD50 (ingestion) 820 mg/kg (mouse) LD50 (intraperitoneal) 950 mg/kg (mouse) LD50 (intravenous) 175 mg/kg (mouse) LDLo (ingestion) 2825 mg/kg (rabbit) LDLo (intravenous) 400 mg/kg (cat) LDLo (subcutaneous) 600 mg/kg (rabbit) Biodegradation/bioaccumulation: This product is completely biodegradable. Sodium Sulphite is an oxygen scavenger when introduced to water. • Bioaccumulation of this product has not been determined.	0.021%	Attachment 7
Ancor 1	Newpark Drilling Fluids	Corrosion Inhibitor	Acute Toxicity: May be harmful if swallowed, in contact with skin, and/or if inhaled. Toxicity Data available for the ingredient: TRIETHANOLAMINE (102-71-6): LD50 (Ingestion): 2200 mg/kg (rabbit) LD50 (Intraperitoneal): 1450 mg/kg (mouse) LD50 (Skin): > 20 mL/kg (rabbit) TDLo (Ingestion): 16 g/kg/64 weeks (mouse – cancer) Biodegradation/bioaccumulation: • In soil and water, triethanolamine will biodegrade fairly rapidly following acclamation (half-life in the order of days to weeks).	0.705%	Attachment 7
Xanthan Gum (P)	Newpark Drilling Fluids	Viscosifier	Acute/Chronic toxicity *Xanthan Gum as an ingredient*: 90%: LD50 (Oral): >1000 mg/kg (mouse) 88.885 LD50 (Intraperitoneal): >50 mg/kg (mouse) LD50 (Intravenous): 100-250 mg/kg (mouse)	0.049%	Attachment 7

Product Name	Supplier	Purpose	Toxicity, Eco toxicity & Biodegradability Data	% Product in System Fluid	SDS Attached?
			LD50 (Oral): >45,000 mg/kg (rat) LD50 (Oral): >20,000 mg/kg (dog) Biodegradation/Bioaccumulation: This product is not anticipated to cause adverse effects to animal or plant life if released to the environment in small quantities. Not expected to bioaccumulate. Water: 10% • Natural product.		
HCL 15%	Telford	Acid to remove scale	Acute/Chronic toxicity *HCL as an ingredient*: 15% LD50 (Oral): >900 mg/Kg (rat) LC50 (Inhalation): 300 ppm/hr (rat) Biodegradation/Bioaccumulation: When released into the soil, this material is not expected to biodegrade. When released into the soil, this material may leach into groundwater. Water: 58% Natural product.	1.302%	Attachment 7
Fracseal Fine/Cellplug/NDFT 377 (LCM – cellulose fibre)	Newpark Drilling Fluids	Prevent lost circulation	Acute Toxicity: Cellulose (9004-34-6) LC50 (inhalation) > 5800 mg/m^3/4 hours (rat) LD50 (ingestion) > 5000 mg/kg (rat) LD50 (intraperitoneal) > 31600 mg/kg (rat) LD50 (skin) > 2000 mg/kg (rabbit) Biodegradation/bioaccumulation: Main ingredient is Cellulose, an organic material which is readily biodegradable.	0.385%	Attachment 7
Quickseal F/M/C	Newpark Drilling Fluids	Lost circulation material	This product consists of 100% organic fibres (plant material) and is therefore not anticipated to cause adverse effects to animal or plant life if released to the environment in small quantities	0.256%	Attachment 7

Product Name	Supplier	Purpose	Toxicity, Eco toxicity & Biodegradability Data	% Product in System Fluid	SDS Attached?
			Acute Toxicity: No LD50 data available for this product. Biodegradation/bioaccumulation: This product is not expected to bioaccumulate.		
Rheopac LV	Newpark Drilling Fluids	Viscosifier	Acute Toxicity: Aquatic toxicity: LC50 (Fresh Water Trout) > 21,000 ppm/96hrs. LC50 (Salt Water Stickel Back) > 56,000 ppm/96hrs. Biodegradation/bioaccumulation: This product is not anticipated to cause adverse effects on animal or plant life if released to the environment in small quantities. Not expected to bioaccumulate.	0.087%	Attachment 7
KCL	Newpark Drilling Fluids	Weighting Agent	Acute Toxicity: LD50 (Ingestion): 1500 mg/kg (mouse) LD50 (Intraperitoneal): 620 mg/kg (mouse) Chronic Toxicity: Not listed as a carcinogen. No data available to indicate product or components present at greater than 1% are chronic health hazards. Biodegradation/bioaccumulation: Low bioaccumulation in water/soil. High mobility.	10.907%	Attachment 7
Salt/NaCl	Newpark Drilling Fluids	Weighting Agent	Acute Toxicity: Oral Toxicity LD50: 3000 mg/kg (Rat) Oral Toxicity LD50: 4,000 mg/kg (Mouse) Dermal Toxicity LD50: >10,000 mg/kg (Rabbit) Chronic Toxicity: Not listed as a carcinogen. No data available to indicate product or components present at greater than 1% are chronic health hazards. Biodegradation/bioaccumulation:	2.150%	Attachment 7

Product Name	Supplier	Purpose	Toxicity, Eco toxicity & Biodegradability Data	% Product in System Fluid	SDS Attached?
			Low bioaccumulation in water/soil. High mobility.		
Calcium Chloride	Newpark Drilling Fluids	Weighting Agent	Acute Toxicity: CALCIUM CHLORIDE ANHYDROUS as an ingredient (10043-52-4): LD50 (Ingestion): 1000 mg/kg (rat) LD50 (Intraperitoneal): 210 mg/kg (mouse) LD50 (Intravenous): 42 mg/kg (mouse) LD50 (Subcutaneous): 823 mg/kg (mouse) LDLo (Ingestion): 1384 mg/kg (rabbit) LDLo (Intravenous): 150 mg/kg (guinea pig) LDLo (Subcutaneous): 249 mg/kg (cat) TDLo (Intravenous): 20 mg/kg/1 hour (woman) SODIUM CHLORIDE (7647-14-5): LC50 (Inhalation): > 42000 mg/m3/1 hour (rat) LD50 (Ingestion): 3000 mg/kg (rat) LD50 (Intraperitoneal): 2602 mg/kg (mouse) LD50 (Intravenous): 645 mg/kg (mouse) LD50 (Skin): > 10000 mg/kg (rabbit) LD50 (Subcutaneous): 3000 mg/kg (mouse) LDLo (Ingestion): 8000 mg/kg (rabbit) LDLo (Intravenous): 300 mg/kg (guinea pig) LDLo (Subcutaneous): 2160 mg/kg (guinea pig) TDLo (Ingestion): 12357 mg/kg (human) Biodegradation/bioaccumulation: Biodegradability does not pertain to inorganic substances. This product does not bioaccumulate.	6.180%	Attachment 7
Contingency Volumes					

Product Name	Supplier	Purpose	Toxicity, Eco toxicity & Biodegradability Data	% Product in System Fluid	SDS Attached?
TEA (Contingent Chemical)	Newpark Drilling Fluids	Corrosion Inhibitor	Acute Toxicity: May be harmful if swallowed, in contact with skin, and/or if inhaled. Toxicity Data available for the ingredient: TRIETHANOLAMINE (102-71-6): LD50 (Ingestion): 2200 mg/kg (rabbit) LD50 (Intraperitoneal): 1450 mg/kg (mouse) LD50 (Skin): > 20 mL/kg (rabbit) TDLo (Ingestion): 16 g/kg/64 weeks (mouse – cancer) Biodegradation/bioaccumulation: In soil and water, triethanolamine will biodegrade fairly rapidly following acclamation (half-life in the order of days to weeks). The substance is expected to be readily biodegradable according to the AS 4351 Part 2 test method.	0.705%	Attachment 7
RX 7492	NewPark Drilling Fluids/Roemex	Cleaning agent	Acute toxicity: Acute Toxicity – Fish LC50 96 hours 0.71 mg/l *Pimephales promelas* (Fat-head Minnow) Acute Toxicity – Aquatic Invertebrates EC50 0.4 mg/l Daphnia magna Acute Toxicity – Aquatic Plants IC50 4 mg/l *Selenastrum capricornutum* Biodegradation/bioaccumulation: Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.	0.267%	Attachment 7
Bromine Trifluoride	Chammas Cutters	Oxidizer for cutting steel tubing	Acute/Chronic toxicity of Bromine fluoride (BrF3) as an ingredient: 100% Bromine Trifluoride is irritating and corrosive to all living tissues. Product is supplied inside a sealed cylinder for transportation	0.007%	Attachment 7

Product Name	Supplier	Purpose	Toxicity, Eco toxicity & Biodegradability Data	% Product in System Fluid	SDS Attached?
			Purpose and handled by trained personnel; seal discs can only be sheared at carefully controlled temperature and pressure. LC50 (Inhalation): >230 ppm/hr (monkey) LC50 (Inhalation): >299 ppm/hr (rat) Biodegradation/bioaccumulation: Products of degradation: halogenated compounds.		
Guar Gum	Newpark Drilling Fluids	Viscosifier (Substitute for Xanthem Gum)	Acute Toxicity: GUAR GUM (9000-30-0) This product is expected to be of low toxicity. Under normal conditions of use, adverse health effects are not anticipated. Oral Toxicity (LD50) 6000 mg/kg (Hamster) TDLo (oral) 228,000 mg/kg/13 weeks continuous (rat) Biodegradation/bioaccumulation: This product is not anticipated to cause adverse effects on animal or plant life if released to the environment in small quantities. Not expected to bioaccumulate.	0.049%	Attachment 7
Calcium Carbonate	Newpark Drilling Fluids	LCM	Acute Toxicity: Oral Toxicity LD50: 7,340 mg/kg (Rat) Fish Toxicity TLM96: 100-500 ppm (Oncorhynchus mykiss) Crustaceans Toxicity TLM96: 478,520 ppm (Mysidopsis bahia) SPP @ 8 ppb. Chronic Toxicity: No data available to indicate product or components present at greater than 1% are chronic health hazards. Biodegradation/bioaccumulation: Sparingly soluble in water as hydroxide to form an alkaline solution. Low mobility in most ground conditions. Not expected to bioaccumulate.	0.098%	Attachment 7
Fluorodye UC	Newpark Drilling Fluids/Nalco	Tracer	Acute Toxicity: Ethylene glycol has moderate toxicity to aquatic life on both a short term and long term basis.	0.0524%	Attachment 7

Product Name	Supplier	Purpose	Toxicity, Eco toxicity & Biodegradability Data	% Product in System Fluid	SDS Attached?
			ACETIC ACID (64-19-7) LC50 (Inhalation): 5620 ppm/1 hour LCLo (Inhalation): 16000 ppm/4 hours (rat) LD50 (Ingestion): 3310 mg/kg (rat) LD50 (Intravenous): 525 mg/kg (mouse) LD50 (Skin): 1.06 g/kg (rabbit) LDLo (Ingestion): 600 mg/kg (rabbit) LDLo (Subcutaneous): 600 mg/kg (rabbit) TCLo (Inhalation): 816 ppm/3 minutes (human) TDLo (Ingestion): 1470 ug/kg (human) ETHYLENE GLYCOL (1,2-ETHANEDIOL) (107-21-1) LC50 (Inhalation): 10876 mg/kg (rat) LD50 (Ingestion): 1670 mg/kg (cat);> 2000 mg/kg (rat) LD50 (Skin): 9530 mg/kg (rabbit) LDLo (Ingestion): 398 mg/kg (human) TCLo (Inhalation): 10,000 mg/m^3 (human - cough) TDLo (Ingestion): 5,500 mg/kg (child - anaesthesia) RHODAMINE (81-88-9) LD50 (Ingestion): 887 mg/kg (mouse) LD50 (Intraperitoneal): 112 mg/kg (rat) LD50 (Intravenous): 89 mg/kg (rat) LD50 (Subcutaneous): 180 mg/kg (mouse) LDLo (Ingestion): 500 mg/kg (rat) Biodegradation/bioaccumulation: In water and soil ethylene glycol is expected to degrade in several days to a week. The major degradation product is hydroxyacetaldehyde. Ethylene glycol is not expected to bioaccumulate.		

Table 3.3 "Down Hole" Products Ingredients for Eremia-04

Chemical Name	CAS number	Mass fraction (%)
Water	7732-18-5	78.941
Tetrakis (hydroxymethyl) Phosphonium Sulphate	55566-30-8	0.724
Sodium sulphite	7757-83-7	0.021
Triethanolamine	102-71-6	0.705
Xanthan Gum	11138-66-2	0.044
Disodium Pyrophosphate	7758-16-9	0.001
Hydrochloric Acid	7647-01-0	0.195
Cellulose	9004-34-6	0.116
Sodium Carboxymethyl Cellulose	9004-32-4	0.077
Sodium Chloride	7647-14-5	2.337
Sodium Glycolate	2836-32-0	0.001
Potassium Chloride	7447-40-7	10.907
Calcium Chloride Anhydrous	10043-52-4	5.933
Contingency Chemical Ingredients		
Triethanolamine	102-71-6	0.426
Diethanolamine	111-42-2	0.213
Ethanolamine	141-43-5	0.071
D-Limonene	5989-27-5	0.160
Bromine Trifluoride	7787-71-5	0.007
Water	7732-18-5	0.107
Guar gum	9000-30-0	0.044
Quartz (Crystalline Silica)	14808-60-7	0.0098
Calcium Carbonate	471-34-1	0.09702

Chemical Name	CAS number	Mass fraction (%)
Orange terpenes	8028-48-6	0.1869
Terpene Hydrocarbons	68956-56-9	0.0801
Ethylene Glycol	107-21-1	0.01572
Acetic Acid	64-19-7	0.01572
C.I. Basic Violet 10 (Rhodamine B or D&C Red No 19)	81-88-9	0.01572
	TOTAL	100% (excluding contingency volumes)