CERVANTES 1

CONVENTIONAL

OIL EXPLORATION WELL

SECTION 38 REFERRAL

SUPPORTING DOCUMENTATION

Revision Control

0	09/07/2020	Submission of Supporting Document with Referral to EPA	ASW	MJ	KA
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Executive Summary

The Cervantes Oil Exploration Prospect is located 11 km south of Dongara / Port Denison in the onshore Perth Basin.

RCMA is proposing to drill one conventional oil exploration well to determine if there is oil in the prospect, involving the following activities:

1. Site Preparation (disturbance of up to 5.3 ha)
2. Equipment Mobilisation
3. Drill, Case and Cement, or Decommission the Well in accordance with Well Management Plan
4. Demobilisation
5. Site Restoration and Rehabilitation

If the well is a commercial discovery, the well would be connected by flowline to the existing nearby Jingemia Production Facility (JPF) (outside the scope of this exploration proposal).

The well has been located specifically to avoid the sensitive dunes in the Beekeeper Nature Reserve (BKNR) and utilise existing tracks to the well pad.

No hydraulic fracture stimulation ('fraccing') is involved in this proposal.

Summary of the Proposal	
Proposal Title	Cervantes 1 Conventional Oil Exploration Well
Proponent Name	RCMA Australia
Short Description	The proposal includes all activities associated with drilling a conventional oil exploration well The proposed development envelope is 36.5 ha with an area of disturbance of 5.3 ha No hydraulic fracture stimulation

Environmental Factors Summary

With the assistance of subject matter experts, RCMA 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 RCMA considers are not environmentally significant. Each of the key environmental factors are summarised below with reference to relevant sections providing further details.

Flora and Vegetation (Section 7.1)

The proposed development envelope clearing area is small (5.3 ha), with proposed impacts to locally mapped vegetation communities all <0.3%. A Priority Ecological Community (PEC) occurring in the proposed development envelope has been mapped locally over 681 ha and will not be significantly affected by the proposal (1.79 ha). Field reconnaissance and targeted surveys have identified that there is no significant flora within the vegetation communities of the proposed development envelope.

The suite of management measures, outlined in a Vegetation Management Plan and Hygiene Management Plan, will be implemented for this proposal to minimise impacts to flora and vegetation.

Terrestrial Fauna (Section 7.2)

The proposed development envelope is small in the context of the coastal belt and region with similarly small areas of impact proposed to the vegetation communities (habitats) present. Therefore, the impact of the proposal on the local fauna assemblage is expected to be minor and localised.

The Carnaby's Black-Cockatoo would be present as a regular migrant but only in small numbers, as the vegetation is of low foraging value for the species and there is no roosting or breeding habitat. The potential loss of foraging habitat for species such as the Carnaby's Black-Cockatoo is expected to be negligible due to the small proposed impact area, the low-quality foraging value of the vegetation and presence of similar habitat nearby.

The suite of management measures, including a Fauna Management Plan, to be implemented for this proposal will protect fauna and fauna habitat.

Inland Waters (Section 7.3)

Drilling activities are managed in accordance with Department of Mines, Industry Regulation and Safety (DMIRS) lead regulatory requirements, which include well construction, full chemical disclosure of any chemicals used down-hole and management of drilling wastewater. The suite of management measures to be implemented for this proposal will protect groundwater (the only inland water receptor in the proposal area).

Regulatory Assessment

Existing regulatory requirements necessitates RCMA to gain approval for all aspects of the proposal, even if a formal Environmental Protection Authority (EPA) assessment of this proposal were required. Consequently, RCMA concludes that as the environmental impacts associated with this proposal are not significant, they can be managed through best practice environmental management and assessment through established regulatory processes.

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Terms & Abbreviations

Abbreviation / Term	Descriptor
ALARP	As low as reasonably practicable
BKNR	Beekeepers Nature Reserve
BoM	Bureau of Meteorology
CO_2-e	Carbon Dioxide equivalent
DBCA	Department of Biodiversity, Conservation and Attractions
DMIRS	Department of Mines, Industry Regulation and Safety
DoEE	Department of Environment and Energy
DWER	Department of Water and Environmental Regulation
EIA	Environmental Impact Assessment
EP	Environmental Plan
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ESA	Environmentally Sensitive Area
GDE	Groundwater Dependent Ecosystem
IDE	Inflow Dependent Ecosystem
JPF	Jingemia Production Facilities
km	Kilometre
MNES	Matter of National Environmental Significance
NVCP	Native Vegetation Clearing Permit
OSCP	Oil Spill Contingency Plan
PDWSA	Public Drinking Water Source Protection Area
PGER Act	*Petroleum and Geothermal Energy Resources Act 1967*
RCMA	RCMA Australia Pty Ltd
SDS	Safety Data Sheet
TDS	Total dissolved solids
WA	Western Australia
WoNS	Weeds of National Significance

1. Introduction

This document has been prepared to provide supporting information for the referral of RCMA's conventional drilling proposal, Cervantes 1, within Production Licence L14, south of Dongara, Western Australia (Appendix A) under Section 38 of the *Environmental Protection Act 1986*. This document describes the proposal, potential environmental impacts and risks and proposed mitigation measures associated with all phases of the proposal.

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

2. The Proponent

This proposal is within Petroleum Production Licence L14 (Appendix B). The Permit is wholly owned by RCMA Australia.

RCMA is a part of Jade Energy, a privately owned Singapore energy trading and retail company with over 100,000 electricity customers. RCMA is an Australian upstream oil and gas company that has since 2016 been seeking investment opportunities in mature oil and gas production properties and oil and gas exploration.

The company is actively exploring the L14 licence area by reprocessing and reinterpreting past 3D and 2D seismic with the intention to drill exploration wells.

RCMA own and operate the Jingemia Production Facility (JPF), an onshore Perth Basin oil production facility situated in Petroleum Production Licence L14,3 km from the Cervantes 1 Conventional Oil Exploration Drill Site. A Cervantes 1 Development would utilise the existing JPF Facilities.

3. Proposal Description

3.1 Background

RCMA propose to drill the Cervantes 1 Conventional Exploration Oil Well 11 km south of Dongara/Port Denison within Production Licence L14. The proposed site is located within the BKNR in the northern Perth Basin (Appendix C). The proposed conventional exploration well has been deviated to avoid environmental sensitivities and will be drilled to a planned depth of 2562 mTVDss (true vertical depth). The well has been located specifically to avoid the sensitive dunes in the BKNR and minimise clearing by utilising existing tracks to the well pad. The additional cleared area for the proposal is 5.3 ha within a development envelope of 36.5 ha with 4.5 km of existing road and tracks utilised for access. Site preparation operations are planned to commence in quarter 1 2021 for drilling operations commencing in late quarter 1 2021, subject to availability of a suitable drilling rig.

3.2 Legislative Framework

This proposal is referred to the Environmental Protection Authority (EPA) under Section 38 of the *Environmental Protection Act 1986* (EP Act) to determine whether 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. RCMA has reviewed the EPA's Statement of Environmental Principles, Factors and Objectives as part of the EPA's framework for environmental considerations in EIA. This environmental referral document demonstrates that potential impacts of the proposal are not significant and can be managed within the DMIRS and other environmental regulation frameworks listed below.

3.2.1 EP Act, Part V, 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*.

DMIRS regulate clearing permits in the petroleum industry and will regulate the requirement and management of clearing permits for this proposal.

3.2.2 Petroleum & Geothermal Energy Resources Act 1967

Under the *Petroleum and Geothermal Energy Resources (PGER) (Environment) Regulations 2012* an Environment Plan (EP) must be accepted by DMIRS for petroleum related activities (including decommissioning and rehabilitation) 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 EP must demonstrate that the environmental impacts and risks are acceptable. Included with an EP is an Oil Spill Contingency Plan (OSCP) which covers all spill scenarios associated with the activity.

3.2.3 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). No significant impacts on MNES have been identified for this proposal and it has not been referred to the Commonwealth Department of Environment and Energy (DoEE) under the EPBC Act. This includes advice RCMA has received on potential impacts to Carnaby's Black Cockatoo foraging habitat.

3.2.4 Conservation and Land Management Act 1984

The *Conservation and Land Management Act 1984* promotes the conservation, protection and management of land and waters, including flora and fauna in conservation estate areas as listed by the Department of Biodiversity, Conservation and Attractions (DBCA). This act outlines restrictions in relation to entry and conduct in conservation estate land without lawful authority. The proposed Cervantes 1 Conventional Oil Exploration Well location is within the BKNR. Under Section 15A of the Petroleum Act 1967, the proposal will be referred to DBCA for their assessment and if approved, signed off by the Minister for Environment.

4. The Proposal

RCMA propose to construct the Cervantes 1 Conventional Oil Exploration Well within Production Licence L14 in the Shire of Irwin south of Dongara (Appendix A).

The proposal is predominantly within the BKNR and will involve the disturbance of 5.3 ha (Table 1) within the proposed development envelope of 36.5 ha (Figure 1). Access to the site is via existing widened access tracks.

Table 1: Proposal Disturbance

Aspect	Proposal Area	Previously Disturbed	Vegetation Clearing
Wellpad	2.6 ha	0 ha	2.6 ha
Access Track	5.1 ha	2.4 ha	2.7 ha
TOTAL	**7.7 ha**	**2.4 ha**	**5.3 ha**

The proposal is located on the cadastral areas indicated in Table 2 and Appendix D.

Table 2: Cervantes 1 Proposal Cadastre

Location	Tenure	Reserve	Victoria Location	Parcel
Wellpad & Access Track	Nature Reserve	24496	12174	P039607
JPF Access Track	Unallocated Crown Land	-	12751	P037432
Access Track	Railway Reserve	24496	12810	P039607
Alternate Access Track	Railway Reserve	36946	11434	-

4.1 Proposal Justification

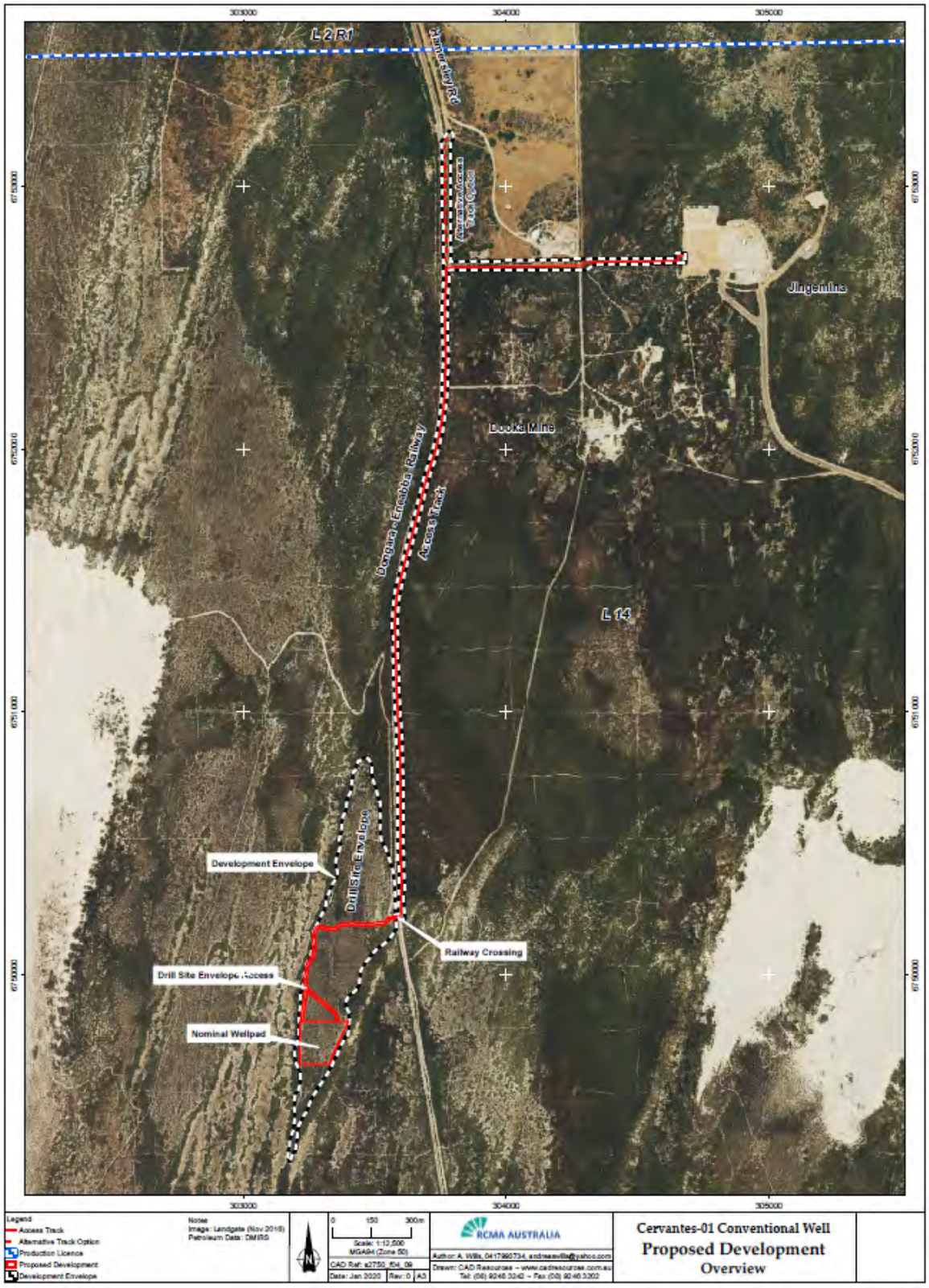
The proposal is necessary to drill (by conventional drilling techniques) an oil prospect identified via seismic survey and validated by appraisal, development and producing wells drilled in the surrounding region. The primary objective of the proposal is to verify the prospect and refine the detail of the Cervantes Reservoir Structure.

The subsurface target location is close to shore however the target will be directionally drilled with the surface location chosen to be as far away from the shoreline to as possible to minimise impact on dunal landform and minimise clearing of vegetation. The chosen surface location reduces the length of access track required in comparison with the vertical location and if there were a discovery, all oil could be piped to the JPF (3km away).

4.2 Proposal Timing

The proposal is planned to commence quarter 1, 2021. Mobilisation, site preparation, drilling and demobilisation are estimated to take approximately 60 to 90 days with an additional 20 days for site restoration.

Figure 1: Proposed Development Envelope



4.3 Description

The Cervantes 1 Oil Exploration Well Drilling Proposal involves five key stages:

1. Site Preparation
2. Equipment Mobilisation
3. Drill, Case and Cement, or Decommission the Well in accordance with Well Management Plan
4. Demobilisation
5. Site Restoration and Rehabilitation

These stages are described below.

4.3.1 Site Preparation

A hygiene station will be established as per the Hygiene Management Protocol.

Access Tracks

Access to the drill site will be from Brand Highway via JPF and will require the widening of existing access tracks. The tracks requiring widening, running from JPF to the Cervantes 1 Drill Site will be utilised to minimise vegetation clearing.

All equipment and materials will be mobilised via these access tracks to the well location.

Sheeting material will be sourced from an established limestone marl borrow pit approximately 15km east of the location.

Preparation of a Wellpad

The drill site will include the following elements:

- Levelling, sheeting and preparation of surfaces to support compressive loads and limit erosion to the existing landscape
- Conductor drilling
- Construction of:
  - Cellar for drilling rig
  - Flare pit
  - Residual drilling fluid and cuttings lined storage pond
  - Water holding pond (turkey nest)
  - VSP pit
- Baseline monitoring (soil and groundwater)
- Workshop area and office space
- Smoko shack
- Gen set and pump skid unit
- Toilet block and sewage holding tank
- Parking for light vehicles, trucks and trailers
- Bunded fuel and chemical storage areas

The overall well pad will be approximately 160m x 160m in area. This includes the drill site that will be compacted along with an external area to cater for soil and vegetation stockpiling and a fire break around the perimeter. The well pad occupies an area of ~2.6 ha.

Disturbance Methods

The well has been located specifically to avoid the sensitive dunes in the BKNR and will minimise clearing by utilising existing tracks to the well pad. A maximum of 5.3 ha of native vegetation will be cleared as a result of the proposal. Vegetation clearing will be minimised as far as practicable.

Native vegetation will be cleared and stockpiled in low (<2 m windrows) to the side of the location. The topsoil will subsequently be scraped from the cleared area and stockpiled in low profile mounds away from natural drainage and the location levelled off as required by the Drilling Contractor. The stockpiled topsoil and vegetation will be reused during rehabilitation of the well location on completion of operations.

4.3.2 Mobilisation / Demobilisation

The drilling rig, ancillary services, personnel and supplies will be mobilised by road to the Cervantes project site. Access is via the JPF utilising the Brand Highway.

During mobilisation of the drill rig and associated services to site and during demobilisation at the end of the programme there will be approximately 70-80 trailer loads moved.

Vehicles and equipment movement will be restricted to the designated access tracks.

A crew change bus will be used to move personnel between Perth and site for rotational crew changes and between the main offsite accommodation and site for shift changes.

Utilisation of shared vehicles and a crew change bus will minimise vehicle movement to and from the site as much as practicable, minimising local traffic and vehicle-related safety and environment risks.

4.3.3 Drill, Case and Cement, or Decommission the Well

Once the drill rig is assembled on location, all activities associated with drilling (e.g. refuelling, batching of drilling water based muds (WBM) and cement) occur on the well pad.

The Cervantes 1 Proposal involves the following key stages:

- Drilling the well with a rotary drilling rig using recirculated WBM (primarily (>97%) water and non-toxic additives; barite, potassium chloride, calcium carbonate, sodium chloride and bentonite)
- Conducting wireline logging evaluation of the formations drilled
- Cementing well steel casing strings in place.

Rotary drilling is the process of utilising a drill string and drill bit to break small pieces of rock and remove these pieces of rock from the hole by circulating WBM down the drill string and up the annulus between the drill string and drilled hole. A blow out preventer (BOP) is installed once drilling is at a depth where it is possible for hydrocarbons to be intersected. This BOP (secondary well control) provides a mechanical means by which the well can be closed and secure the contents of the well should the WBM system fail to maintain a positive pressure on the drilled hole. If hydrocarbons are intersected, and flow

to surface is not prevented by the WBM, the BOP will be closed allowing a controlled release of these hydrocarbons to the flare pit. The flare pit and any firebreaks are constructed in compliance with any specific DFES permit requirements.

All drilling fluids will be contained within the WBM system. This system is constantly monitored by personnel and pit level sensors for volume changes.

4.3.4 Site Restoration and Rehabilitation

Progressive decommissioning is undertaken in accordance with the Rehabilitation Plan and involves the following activities:

- Erection of abandonment plaque
- Removal of any remaining ancillary equipment
- Removal of wellhead and cellar
- Decommission Turkey's Nest and flare pit and fencing
- Decommission mud sump and fencing
- Decommissioning of the water bore
- Rehabilitate drilling pad and access tracks

Monitoring is to be undertaken annually until set quantitative completion criteria are achieved as outlined in the Regulator approved Rehabilitation Plan.

4.3.5 Water Requirements

Groundwater will be used for WBM and cement mixing along with some fresh water trucked to site. The turkey nest / water storage pond will be used to hold a stock of water during drilling operations for mixing of WBM in the rig mud tanks.

Wastewater will be held in holding tanks prior to removal from site by a controlled waste contractor.

4.3.6 Proposal Schedule

The drilling is currently planned to commence in quarter 1, 2021 and will have a duration of approximately 60 to 90 days including site civil works and demobilisation (Table 3).

Table 3: Indicative Proposal Schedule

Activities	Approximate Duration	Indicative Timing
Site Preparation	~30 days	Early Quarter 1 2021
Mobilisation	~10 days	Mid Quarter 1 2021
Drilling	22-40 days	Mid to Late Quarter 1 2021
Demobilisation	~10 days	Early Quarter 2 2021

The timeframe and schedules for subsequent phases (well completion, well intervention, well testing, development, care & maintenance, decommissioning, rehabilitation) will be determined based on drilling results.

5. Stakeholder Engagement

RCMA has consulted with key stakeholders in relation to its Cervantes 1 Conventional Oil Exploration Activities. The stakeholder groups have and will include:

- DMIRS
- EPA
- DBCA
- Shire of Irwin
- ARC Infrastructure
- Landowners
- Neighbouring Hydrocarbon Facility Owners
- Southern Yamatji

Table 4 summarises the key consultation events, topics raised and responses

RCMA will continue to engage with stakeholders for the life of the Cervantes 1 Proposal.

Table 4: Consultation Record

Stakeholder	Date	Type of Consultation	People Involved	Summary of Discussions	Outcomes of Consultation
DMIRS Environment	14/10/2019	Meeting	Ken Aitken (RCMA) Stan Bowes (DMIRS) Jacqui Middleton (DMIRS) Rohan Kok (DMIRS) Chris Newport (RCMA)	Cervantes 1 Proposal	MEL to Meet with EPA MEL to Appoint Environmental Professional MEL to prepare Env applications with DMIRS/EPA in parallel MEL to plan a cross functional planning meeting with all regulatory departments present in early November.
DMIRS Environment	16/10/2019	Email	Ken Aitken (RCMA) Stan Bowes (DMIRS) Jacqui Middleton (DMIRS) Rohan Kok (DMIRS) David Maher (Jade) Aveline Chan (RCMA) Chris Newport (RCMA)	Follow up to DMIRS Environment Meeting on Cervantes 1 Proposal	Documentation of Actions from Meeting: • Meet with EPA within next 5-7 working days • Appoint Environmental Professional before end of October • Proceed preparing environmental applications with DMIRS/EPA in parallel on appointing environment professional • Plan a cross functional planning meeting with all regulatory departments present in early November
DMIRS Environment	17/12/2019	Meeting	Ken Aitken (RCMA) Stan Bowes (DMIRS) Jacqui Middleton (DMIRS) Rohan Kok (DMIRS) Andrea Wills (RCMA)	Cervantes 1 Proposal Update • Drilling surface location envelope identified • Surveys underway • Referral being drafted • EP being compiled	EP and OSCP to be submitted with referral end of January 2020
DMIRS Environment	20/02/2020	Meeting	Ken Aitken (RCMA) Stan Bowes (DMIRS) Jacqui Middleton (DMIRS) Rohan Kok (DMIRS) Andrea Wills (RCMA) Chris Newport (RCMA)	Cervantes 1 Proposal Update • Cervantes 1 Referral Update • EP and OSCP update, • Metgasco have an office in West Perth	Consensus for RCMA to submit EP and OSCP once supporting documentation has gone to DBCA
EPA	23/10/2019	Email	Helen Butterworth (EPA) Chris Newport (RCMA)	Confirmation of meeting on 28/10/2019	Request to complete “1.1 Pre-Referral EPA Factors Objectives Table” prior to meeting
EPA	28/10/2019	Meeting	Helen Butterworth (EPA) Robert Hughes (EPA) Chris Newport (RCMA) Ken Aitken (RCMA)	Briefing on proponents and Cervantes 1 Proposal	MEL to conduct flora and vegetation survey MEL to refer Proposal
EPA	16/12/2019	Email	Helen Butterworth (EPA) Ken Aitken (RCMA)	Request for an update meeting	Meeting organised for the 23/12/2019 and the Pre-referral EPA Factors Objectives Table submitted to EPA 18/12/2019
EPA	23/12/2019	Meeting	Helen Butterworth (EPA) Robert Hughes (EPA) Ken Aitken (RCMA) Andrea Wills (RCMA)	MEL updated EPA on Cervantes 1 Proposal progress.	Outcomes included: • Robert offered to provide names / links of relevant offset policies possibly relevant to track clearing • EPA also suggested highlighting reference to “conventional” and “this proposal is not fraccing” in the referral documentation • EPA suggested that the Woodman report be submitted for EPA technical review ahead of a January meeting pre-referral submission to ensure the submission was acceptable on first submission
EPA	10/02/2020	Email	Helen Butterworth (EPA) Andrea Wills (RCMA)	Submission of Desktop Flora Fauna Report	Confirmation of receipt email.
EPA	13/02/2020	Phone Email	Helen Butterworth (EPA) Andrea Wills (RCMA)	Advice from EPA on adequacy of Desktop Flora Fauna Report for referral submission	EPA advise MEL to conduct their on ground surveys in accordance with EPA guidance and submit to EPA for technical assessment prior to submission of the Cervantes 1 Referral
EPA	03/04/2020	Email	Helen Butterworth (EPA) Andrea Wills (RCMA)	Submission of Field Flora Fauna Report	Confirmation of receipt email.
EPA	30/04/2020	Phone and Email	Skye Tuffin (EPA) Andrea Wills (RCMA)	Submission of memo clarifying areas of impact	Confirmation of receipt email.
EPA	15/05/2020	Phone and Email	Skye Tuffin (EPA) Andrea Wills (RCMA)	Letter from Robert Hughes (EPA) in response to submission of field Flora and Fauna report.	RCMA to prepare a response and organise a meeting

Stakeholder	Date	Type of Consultation	People Involved	Summary of Discussions	Outcomes of Consultation
EPA	26/05/2020	Phone	Skye Tuffin (EPA) Andrea Wills (RCMA)	Request for a meeting to discuss EPA feedback on RCMA field Flora and Fauna report as there appears to be a misinterpretation of the vegetation part of the report for example the feedback states that community and condition mapping is required however there is community and condition mapping in Appendix K and N. The feedback also reports a significant reliance on the Denison data and requirements for surveying above and beyond the requirements of the EPA Guideline. The fauna specialist is working to respond to all concerns raised with no major issues on the feedback.	ST agreed to organise a "Microsoft TEAMS"meeting with the relevant EPA personnel. AW to email a list of RCMA attendees
EPA	03/06/2020	Meeting	Skye Tuffin (EPA) Helen Butterworth (EPA Kelly Freeman (DWER) Ken Aitken (RCMA) Andrea Wills (RCMA) Greg Woodman (WEC)	Meeting to discuss flora and vegetation aspects of EPA feedback on RCMA Flora and Fauna report. Apologies submitted by Wendy Hudleston (DWER) who was the DWER/EPA person who had reviewed the report. Without Wendy at the meeting it was difficult to have any meaningful discussion about the issues raised in her review namely the requirement for detailed survey, the requirement for Spring survey and the reliance on Denison data.	Group resolved that RCMA would forward their three main questions on the feedback and a second meeting with Wendy in attendance would be organised once she had reviewed the questions.
EPA	09/06/2020	Phone Message & Email	Skye Tuffin (EPA) Andrea Wills (RCMA)	Enquiry into status of second meeting	Advice that there will be no meeting before 15/06/2020
EPA	10/06/2020	Phone & Email	Helen Butterworth (EPA) Ken Aitken (RCMA)	Delay in meeting timing	Follow up email from HB advising that Kelly Freeman and Wendy Hudleston are reviewing and drafting a response to RCMA's three questions provided immediately following the first meeting. Once they have a response the EPA will contact RCMA to discuss
EPA	17/06/2020	Phone & Email	Skye Tuffin (EPA) Andrea Wills (RCMA)	Advice from EPA that a Spring survey is required to confirm the findings of the February survey	RCMA responded with proposed scope of Spring survey
EPA	23/06/2020	Email & Phone	Robert Hughes (EPA) Andrea Wills (RCMA)	Request for meeting to discuss scope of Spring survey	
EPA	24/06/2020	Meeting	Robert Hughes (EPA) Helen Butterworth (EPA) Skye Tuffin (EPA) Andrea Wills (RCMA) Ken Aitken (RCMA)	Discussion on level of survey required to confirm the findings of the February survey	RCMA to liaise with Greg Woodman on another scope and present to EPA
EPA	29/06/2020	Email & Phone	Andrea Wills (RCMA) Skye Tuffin (EPA)	RCMA provided scope for Spring survey	EPA phoned and provided email affirming that the scope was endorsed by EPA
Shire of Irwin	31/01/2020	Phone	Andrea Wills (RCMA) Reception (SoI)	Organisation of a meeting to present the Cervantes 1 Proposal to the Shire of Irwin	Email sent with information on project to Brendan Jeans (SoI)
Shire of Irwin	27/02/2020	Phone	Andrea Wills (RCMA) Brendan Jeans (SoI)	Proposed window for meeting date General discussion on oil and gas industry in Shire of Irwin including Metgasco personnel experience in Perth Basin	BJ to get back to MEL with proposed date and any additional information to be presented at meeting by MEL
Arc Infrastructure	03/12/2019	Phone	Garry Bird (Arc Geraldton) Andrea Wills (RCMA)	MEL to drill adjacent to Arc Infrastructure near Dongara-Eneabba Railway Line	Garry to forward details on to state government party responsible for consulting with industry such as Western Power etc
Arc Infrastructure	03/12/2019	Phone	Karen van der Merwe (Arc) Andrea Wills (RCMA)	MEL to provide some preliminary info on activity in the aim to set up a meeting	ASW forwarded information pack via email to thirdparty.services@arcinfra.com on 04/12/2019
Arc Infrastructure	16/12/2019	Phone	Karen van der Merwe (Arc) Andrea Wills (RCMA)	MEL information pack has not been received by Arc. ASW to resend	KVDM confirmed receipt of resent information pack
Arc Infrastructure	20/12/2019	Email	Jason Crowden (Arc) Andrea Wills (RCMA)	Jason suggested a meeting time after 06/01/2020	Meeting arranged for 10/01/2020
Arc Infrastructure	10/01/2020	Meeting	Jason Crowden (Arc) Cameron (Arc) Ken Aitken (RCMA) Andrea Wills (RCMA)	MEL introduction of project and discussion of information required to determine constraints on railway. MEL provided approximate railway crossing coordinates	Email confirmation of outcomes: • Arc to provide MEL with the width of the railway easement and the restrictions on the use of the railway crossing. • MEL are then to provide layouts showing proposed impacts under varying scenarios (construction, development, rehab)
Arc Infrastructure	30/01/2020	Email	Andrea Wills (RCMA)	Follow up from meeting. No response.	Follow up again 11/02/2020

Stakeholder	Date	Type of Consultation	People Involved	Summary of Discussions	Outcomes of Consultation
			Jason Crowden (Arc)		
Arc Infrastructure	27/02/2020	Email	Jason Crowden (Arc) Andrea Wills (RCMA)	Arc provided width of railway easement and advised that the crossing is a private crossing.	Arc to provide further details on the private crossing. MEL to provide project layouts to Arc.
Arc Infrastructure	15/04/2020	Email	Jason Crowden (Arc) Andrea Wills (RCMA)	MEL provided layouts covering project scenarios from site preparation through to rehabilitation	Meeting to follow
Arc Infrastructure	02/06/2020	Meeting	Jason Crowden (Arc) Ken Aitken (RCMA) Andrea Wills (RCMA)	Discussion on Arc internal questions on RCMA's proposal	Arc to send through queries for RCMA to respond to. Arc approval anticipated in 4 weeks.
Arc Infrastructure	15/06/2020	Phone	Jason Crowden (Arc) Andrea Wills (RCMA)	Enquiry as to status of Arc internal queries to be sent through to RCMA	Queries still being compiled and will be sent through once final submission has been provided to JC
DBCA	06/01/2020	Phone	Murray Baker (DBCA) Andrea Wills (RCMA)	Andrea briefed Murray on the Cervantes 1 Proposal to provide enough information for a meeting with appropriate DBCA personnel.	Murray is to get back to Andrea with possible meeting times. Andrea is to prepare material on: • Who is Metgasco / RCMA? • Proposal background including access routes • Management measures to be implemented
DBCA	15/01/2020	Meeting	Murray Baker (DBCA) Cass Gray (DBCA) Alanna Channa (DBCA)(phone) Ken Aitken (RCMA) Andrea Wills (RCMA)	Briefing on Cervantes 1 Proposal	RCMA to determine portion of access track in reserve vs railway easement RCMA to submit management strategies / management plans to DBCA prior to 15A referral: • Fire • Vegetation • Hygiene (Weed & Dieback) • Fauna • Access & Communications Protocol
DBCA	04/02/2020	Phone	Murray Baker (DBCA) Andrea Wills (RCMA)	DBCA Jurien Bay Feedback on Cervantes 1 Proposal: • There is a known PEC in that area (as was discussed in the meeting) • What is the fate of the marl on completion of the project? MEL anticipate removal for Wellpad however access tracks are dependent on DBCA desired long-term track requirements • What fill type will MEL be using? Limestone Marl	DBCA to follow up: • DBCA marl testing / interpretation requirements • Feedback MEL comms to Jurien Bay
DBCA	06/02/2020	Phone	Murray Baker (DBCA) Andrea Wills (RCMA)	DBCA follow up from previous conversation: • At this stage MEL proposal for Marl is adequate and should be documented in their Hygiene Management Plan • DBCA will need to consider decommissioning requirements	MEL to put together a proposal on decommissioning for DBCA to comment and amend.
DBCA	30/04/2020	Email	Murray Baker (DBCA) Andrea Wills (RCMA)	RCMA provided DBCA with supporting documents for DBCA review and endorsement	Confirmation of receipt email provided
DBCA	01/05/2020	Email	Cassyanna Gray (DBCA) Andrea Wills (RCMA)	DBCA request for Description of Activities	Section 1 and 2 of the Cervantes 1 EP provided to DBCA by RCMA
DBCA	04/06/2020	Phone	Cassyanna Gray (DBCA) Andrea Wills (RCMA)	Update on progress of DBCA document review	
DBCA	23/06/2020	Phone	Murray Baker (DBCA) Andrea Wills (RCMA)	Update on progress of DBCA document review	
DBCA	30/06/2020	Email and Phone	Cassyanna Gray (DBCA) Andrea Wills (RCMA)	DBCA notification that the Environmental Management Branch is going to present the Cervantes 1 proposal to the Conservation and Parks Commission (CPC). DBCA requested .shp files of the project area.	RCMA provide .shp files to DBCA and requested to see the information that was being presented to CPC
DBCA	07/07/2020	Email	Murray Baker (DBCA) Andrea Wills (RCMA)	DBCA provided advice on the supporting documents submitted by RCMA for DBCA review and endorsement. Recommendations centred around dieback and rehabilitation management.	RCMA will address DBCA's comments and recommendations and provide a response.
YMAC	18/03/2020	Phone	Callum Forsey (YMAC) Andrea Wills (RCMA)	Arrangements required to be made for on ground heritage assessment	RCMA to send email to YMAC outlining project footprint so that YMAC can provide details of steps to be taken

Stakeholder	Date	Type of Consultation	People Involved	Summary of Discussions	Outcomes of Consultation
YMAC	23/03/2020	Email	Callum Forsey (YMAC) Andrea Wills (RCMA) Glenn Archer (YMAC)	YMAC follow up email from phone call to provide details of YMAC lawyer for Southern Yamatji matters who will assist with progressing a survey agreement Provision of Survey Request Form	RCMA completed and returned the Survey Request Form and left messages with Glenn Archer to discuss the survey agreement
YMAC	02/06/2020	Email	Ebony Paskov (YMAC) Andrea Wills (RCMA)	Contact regarding draft agreement for on ground heritage survey prior to ground disturbing activities	Will phone 03/06/2020 AW forwarded draft information pack previously provided to Callum Forsey
YMAC	03/06/2020	Email	Ebony Paskov (YMAC) Andrea Wills (RCMA)	Advice that if a Petroleum Exploration and Heritage Protection Agreement was not in place then one would need to be drafted.	Follow-up phone call where EP agreed that she would draft the agreement and get back to AW by 05/06/2020
YMAC	16/06/2020	Email	Ebony Paskov (YMAC) Andrea Wills (RCMA)	Update from YMAC that the draft heritage agreement is being reviewed by the YMAC Heritage Unit	YMAC requested clarification on which party the agreement was with. RCMA confirmed that the agreement was with RCMA Australia.

6. Environmental Principles and Factors

6.1 Principles

RCMA has planned the proposed drilling of the Cervantes 1 Conventional Oil Exploration Well in accordance with the environmental principles outlined in the EPA's 2018 Statement of Environmental Principles, Factors and Objectives:

1. The precautionary principle
2. The principle of intergenerational equity
3. The principle of the conservation of biological diversity and ecological integrity
4. Principles relating to improved valuation, pricing and incentive mechanisms
5. The principle of waste minimisation

RCMA will continue to apply these principles for the life of the proposal (Table 5).

Table 5: Principles considered for the Proposal

#	Principle	Consideration
1	The precautionary principle 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: a. careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and b. an assessment of the risk-weighted consequences of various options.	• The risk assessment that was conducted by RCMA to consider the best surface location and environmental factors resulted in: a. Moving location from vertical top hole to avoid soil & landform impacts (the vertical top hole is over 3 sets of dune 900 m west of the proposed drill site) b. Use of existing access tracks to minimise additional clearing c. Location sited to minimise the environmental impact of a future development of the resource • Risk assessment of environmental aspects and impacts of all stages of activity has been undertaken • Timing of activity has been planned to minimise dieback introduction risk period
2	The principle of intergenerational equity The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.	• 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. • As the activity is on a railway access route, it is not creating new access into the BKNR • The location has been chosen as it is utilising existing infrastructure and has minimal impact on soil and landform creating enhanced rehabilitation success for future generations
3	The principle of the conservation of biological diversity and ecological integrity Conservation of biological diversity and ecological integrity should be a fundamental consideration.	The proposal will not threaten biological diversity or ecological integrity. There are no Declared Rare Flora (DRF) or Threatened Ecological Communities Located (TEC) within the proposed development envelope. The one Priority Ecological Community which exists within the proposed development envelope is known to occur over 681 ha locally as mapped during the Denison 3D Seismic Survey and will impact <1.8 ha as part of the proposal. The proposal does not impact on habitat of significance to rare fauna, specifically it does not impact CBC breeding or roosting habitat or quality foraging habitat.
4	Principles relating to improved valuation, pricing and incentive mechanisms a. Environmental factors should be included in the valuation of assets and services. b. The polluter pays principle – those who generate pollution and waste should bear the cost of containment, avoidance or abatement. 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. 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.	The proposal has considered the principles relating to the improved valuation, pricing and incentive mechanisms as appropriate for the activity. Environmental factors have been included in the decision making throughout the proposal planning. For example, the vegetation footprint has been reduced to ALARP. Environmental factors have been included in the planning valuation criteria for assets and services e.g. rig contracts and well pad design. As the generator of the waste, RCMA are responsible for the costs to contain, avoid and abate the cost of those wastes RCMA develop and implement an Environment Plan for the Cervantes 1 Proposal and adhere to all Objectives and Standards outlined within the plan including strict auditing.

#	Principle	Consideration
5	The principle of waste minimisation. 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. RCMA will implement the hierarchy of waste minimisation: • Avoid • Reuse • Recycle • Treat / dispose Examples include: • Cuttings will be shaken from muds and muds reused during drilling • Oily waste will be taken offsite by an oily waste recycling provider • Scrap steel will be recycled

7. Identification of Key Environmental Factors

Table 6 outlines the environmental factors listed in the EPA's 2018 Statement of Environmental Principles, Factors and Objectives and their applicability to the drilling of the Cervantes 1 Conventional Oil Exploration Well.

Of the environmental factors listed, the likely significant factors are flora and vegetation, terrestrial fauna and inland waters. These factors are addressed in Sections 7.1, 7.2 and 7.3. Factors that were not considered key environmental factors but have been described in Section 7.4 are labelled 'Other'.

Table 6: Key Environmental Factors Relevance to the Proposal

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.	• Clearing of Native Vegetation to support drill pad and access • Potential indirect impacts from dust, weeds and dieback	Yes
Landforms	To maintain the variety and integrity of significant physical landforms so that environmental values are protected.	Cervantes 1 is a deviated conventional oil exploration well, the surface location chosen to avoid impact on nearby sand dunes so that environmental values are protected	No
Subterranean Fauna	To protect subterranean fauna so that biological diversity and ecological integrity are maintained.	The short duration confined impact (<5m radius around wellbore) in a confined depth zone during drilling along with WBM, casing and cement design will ensure that stygofauna will not be adversely affected There will be no onsite groundwater abstraction or dewatering	No
Terrestrial Environmental Quality	To maintain the quality of land and soils so that environmental values are protected.	• Soil contamination from a potential diesel spill • Failure to manage waste satisfactorily	Other
Terrestrial Fauna	To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.	• Clearing of fauna habitat • Vehicle collision • Potential indirect impacts from waste, pond access	Yes
Water			
Inland Waters	To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.	• Groundwater contamination • Over abstraction of groundwater	Yes
Air			
Air Quality	To maintain air quality and minimise emissions so that environmental values are protected.	Minimal, temporary impacts not affecting environmental values from: • Diesel combustion emissions from the drilling rig, heavy vehicles and passenger vehicles • Dust generation from vehicles • Emergency flaring	Other
People			
Social Surroundings	To protect social surroundings from significant harm.	Location is remote from residential areas; noise and visual amenity will not create an issue.	Other
Human Health	To protect human health from significant harm.	No adverse human health impacts expected.	No

7.1 Key Environmental Factor – Flora and Vegetation

7.1.1 EPA Objective

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

7.1.2 Legislation, Policy and Guidance

- *Environmental Protection Act 1986*
- *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*
- *Biodiversity Conservation Act 2016*
- *Environment Protection and Biodiversity Conservation Act 1999*
- Technical Guidance Flora and Vegetation Surveys for Environmental Impact Assessment
- Environmental Factor Guideline Flora and Vegetation
- Protection of Naturally Vegetated Areas Through Planning and Development, Environmental Protection Bulletin No. 20
- Matters of National Environmental Significance: Significant Impact Guidelines 1.1 (Commonwealth of Australia 2013)

7.1.3 Receiving Environment

Desktop

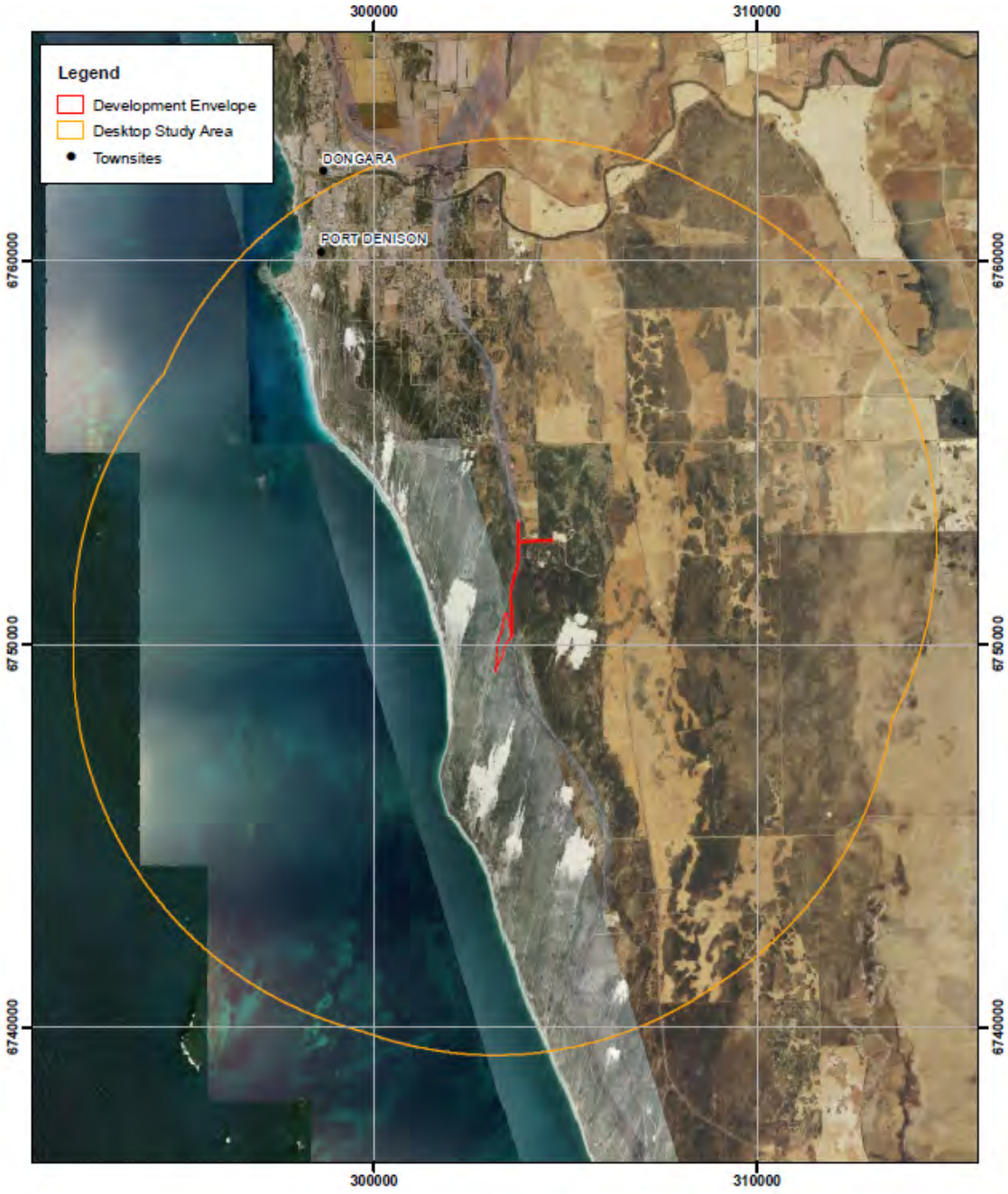
The Desktop Study Area and Proposed Development Envelope (Figure 2) have been subjected to a number of previous surveys (Table 7) which have provided good contextual information for the Cervantes 1 Flora Assessment of the proposed development envelope conducted for this Referral (Appendix E).

Table 7: Baseline Field Surveys – Flora and Vegetation

Year Completed	Consultant	Survey Name
2003	Hart, Simpson and Associates Pty Ltd.	Proposed EP 413 Denison 3D Seismic Survey Flora and Fauna Investigation - prepared for Origin Energy
2003	Woodman Environmental	Cliff Head Development Oil Pipeline and Processing Plant Flora, Vegetation and Phytophthora cinnamomi Survey – prepared for ROC Oil Company Ltd. (ROC Oil)
2005	Woodman Environmental	Denison 3D Seismic Survey Flora and Vegetation Study – prepared for ARC Energy Pty Ltd / Origin Energy
2020	Woodman Environmental	Cervantes 1 Conventional Well - Level 1 Fauna Survey, Reconnaissance and Targeted Flora and Vegetation Survey (Appendix E)

Although some of these surveys were undertaken 15 - 16 years ago, the surveys that have been undertaken are reliable and comprehensive (Woodman 2020a). This includes the Denison 3D Seismic Survey Flora and Vegetation Study (Woodman Environmental 2005) which covers the entire proposed development envelope and the majority of intact vegetation in the Desktop Study Area.

Figure 2: Desktop Area / Proposed Development Envelope



Desktop Study Area and Development Envelope	Author: Leah Firth	
	WEC Ref: Metgasco20-11-01	
WOODMAN ENVIRONMENTAL	Filename: Metgasco20-11-01-f01.mxd	
	Scale: 1:130,000 (A4)	
	Projection: GDA 1994 MGA Zone 50	
This map should only be used in conjunction with WEC report Metgasco 20-11.	Revision: 0 - 1st April 2020	

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 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 (Desmond and Chant 2001).

Regional Vegetation

Beard (1976) mapped vegetation of the Dongara area (including the proposed development envelope) related to physiognomy, at a scale of 1:1250,000. The vegetation mapping by Beard (1976) was used by Shepherd et al. (2002) and further updated in Beard et al. (2013) to describe vegetation system associations, at a scale of 1:250,000. A total of three vegetation system associations occur in the proposed development envelope, as summarised in Table 8. The majority (>99%) of the proposed development envelope is mapped as Greenough_432.

Table 8: Vegetation System Associations within Proposed Development Envelope

Vegetation System Association	Description	Current Extent (ha)	Pre-European Extent Remaining (%)	Current Extent Protected for Conservation (%)
Cliff Head_772	Shrublands; *Acacia lasiocarpa* and *Melaleuca acerosa* heath	4,615.26	95.61	81.15
Greenough_432	Shrublands; *Acacia rostellifera* and *Melaleuca cardiophylla* thicket	883.22	73.19	22.54
Greenough_17	Shrublands; *Acacia rostellifera* thicket	8,098.26	48.02	10.49

Conservation Significant Vegetation

The interrogation of the DBCA TEC and PEC Database (DBCA 2019d) returned one significant vegetation community that has a record in the Desktop Study Area (Table 9). This vegetation community is located approximately 9 km north of the proposed development envelope. The Subtropical and Temperate Coastal Saltmarsh TEC/PEC is described as an assemblage of plants, animals and micro-organisms associated with saltmarsh in coastal regions of sub-tropical and temperate Australia under tidal influence (DBCA 2019b).

Table 9: Significant Vegetation Returned from DBCA Database Searches

Vegetation Community	Conservation Status (WA)	EPBC Act Ranking
Subtropical and Temperate Coastal Saltmarsh	Priority 3	Vulnerable

The search of the DoEE SPRAT for MNES listed under the EPBC Act database did not return any TECs listed under the EPBC Act, which occur or have the potential to occur within the vicinity of the Desktop Study Area.

Priority Flora

The desktop assessment identified a total of 19 significant flora taxa or habitat for significant taxa, which are known from within the Desktop Study Area including 16 DBCA-classified Priority flora, and six Threatened flora (Table 10). A likelihood of occurrence assessment taking into account vegetation communities mapped within the proposed development envelope, identified a total of five significant flora taxa (all priority listed taxa) which are considered to potentially occur in the proposed development envelope including *Anthocercis intricata* (P3), *Dampiera tephrea* (P2), *Eucalyptus zopherophloia* (P4), *Haloragis foliosa* (P3) and *Thryptomene sp*. Lancelin (M.E. Trudgen 14000) (P3). The remaining 14 significant taxa are considered unlikely to occur primarily because suitable habitat is not considered to be present in the proposed development envelope.

Table 10: Significant Flora Taxa Known from Within the Desktop Study Area

Taxon	Status	Source*
Acacia telmica	P3	DBCA
Anthocercis intricata	P3	DBCA; HAS; WEC
Baeckea sp. Walkaway (A.S. George 11249)	P3	DBCA; WEC
Beyeria gardneri	P3	DBCA
Caladenia hoffmanii	Threatened	DoEE
Conostylis dielsii subsp. *teres*	Threatened	DoEE
Conostylis micrantha	Threatened	DoEE
Dampiera tephrea	P2	DBCA; WEC
Eucalyptus ebbanoensis subsp. *photina*	P4	DBCA
Eucalyptus impensa	Threatened	DoEE
Eucalyptus zopherophloia	P4	DBCA; HAS; WEC
Haloragis foliosa	P3	DBCA; HAS
Liparophyllum congestiflorum	P4	DBCA
Scholtzia calcicola	P2	DBCA
Stawellia dimorphantha	P4	DBCA; WEC
Stylidium sp. Three Springs (J.A. Wege & C. Wilkins JAW 600)	P2	DBCA
Tetratheca nephelioides	Threatened	DoEE
Thryptomene sp. Lancelin (M.E. Trudgen 14000)	P3	DBCA; WEC
Wurmbea tubulosa	Threatened	DoEE

*Sources are: DBCA – DBCA WA Herbarium and TPFL Databases (2019c); *NatureMap* – (DBCA 2007-); DoEE – DoEE (2020) HAS –Hart, Simpson and Associates (2003); WEC – Woodman Environmental (2005).	P1 - P3: Poorly-known species P4: Rare, Near Threatened and other species in need of monitoring Threatened: subset of 'Rare Flora' under *Wildlife Conservation (Rare Flora) Notice 2018*

Vegetation Communities

The vegetation of the entire proposed development envelope has been previously mapped as part of the Denison ARC Energy / Origin Energy 3D Seismic Survey Flora and Vegetation Study (Woodman Environmental 2005). A total of four vegetation communities have been mapped within the proposed development envelope (Table 11). In addition, areas of Mobile Dunes have been mapped, described as largely bare with outer slopes characterised by a closed scrub to low closed forest of *Acacia rostellifera* and *Melaleuca cardiophylla*. Dune slopes are to be avoided as part of this proposal.

Table 11: Proposed Project Disturbance – Vegetation Communities

Vegetation Community		Area to be impacted by Proposal	Area of Community recorded within Denison 3D Seismic Survey Study Area	Percentage Impact on Community
H8	Heath	3.25 ha	2261.78 ha	0.144%
T2	Dense Melaleuca thicket	0.07 ha	1528.11 ha	0.004%
T3	Dense Melaleuca thicket	0.20 ha	591.54 ha	0.034%
W1	Low woodland	1.79 ha	681.07 ha	0.263%
	TOTAL	5.31 ha		

Introduced Invasive species

A total of 75 introduced taxa or habitat for such taxa are known to occur in the Desktop Study Area (Table 12). Of these five are considered to be significant weeds including *Asparagus asparagoides*, *Lantana camara*, *Tamarix aphyllaare* (Declared Pests and Weeds of National Significance (WoNS)), *Echium plantagineum* (Declared Pest) and *Lycium ferocissimum* (WoNS).

Table 12: Introduced Taxa Known from Within the Desktop Study Area

Taxon	Common Name	Source*	Comments
Agave americana	Century Plant	DBCA; WEC	
Alternanthera pungens	Khaki Weed	DBCA	
Arctotheca calendula	Cape Weed	WEC	
Asparagus asparagoides	Bridal Creeper	DoEE	Declared Pest; WoNS
Asphodelus fistulosus	Onion Weed	DBCA; WEC	
Avena barbata	Bearded Oat	WEC	
Brassica tournefortii	Mediterranean Turnip	WEC	
Briza maxima	Blowfly Grass	WEC	
Briza minor	Shivery Grass	WEC	
Bromus diandrus	Great Brome	WEC	

Taxon	Common Name	Source*	Comments
Cakile maritima	Sea Rocket	DBCA; WEC	
Cenchrus ciliaris	Buffel Grass	DoEE	
Cenchrus echinatus	Burrgrass	DBCA	
Cenchrus longisetus	Feathertop	WEC	
Cenchrus setaceus	Fountain Grass	DBCA; WEC	
Chenopodium murale	Nettle-leaf Goosefoot	DBCA	
Centaurea melitensis	Maltese Cockspur	WEC	
Chenopodium murale	Nettle-leaf Goosefoot	WEC	
Cotula bipinnata	Ferny Cotula	WEC	
Cuscuta epithymum	Lesser Dodder	WEC	
Cynodon dactylon	Couch	WEC	
Dischisma arenarium	Dischisma	DBCA; WEC	
Echium plantagineum	Paterson's Curse	DBCA; WEC	Declared Pest
Eragrostis curvula	African Lovegrass	DBCA	
Erodium cicutarium	Common Storksbill	WEC	
Euphorbia peplus	Petty Spurge	WEC	
Euphorbia terracina	Geraldton Carnation Weed	DBCA; WEC	
Galium murale	Small Goosegrass	DBCA	
Glebionis coronaria	Summer Chrysanthemum	DBCA	
Hordeum leporinum	Barley Grass	WEC	
Hyparrhenia hirta	Tambookie Grass	DBCA	
Hypochaeris glabra	Smooth Cats-ear	WEC	
Lamarckia aurea	Goldentop	WEC	
Lantana camara	Common Lantana	DoEE	Declared Pest; WoNS
Lolium rigidum	Wimmera Ryegrass	WEC	
Lycium ferocissimum	African Boxthorn	DBCA; DoEE; WEC	WoNS
Lysimachia arvensis	Pimpernel	WEC	
Medicago polymorpha	Burr Medic	WEC	
Melilotus indicus	-	WEC	
Melinis repens	-	WEC	

Taxon	Common Name	Source*	Comments
Monoculus monstrosus	-	WEC	
Nicotiana glauca	Tree Tobacco	DBCA	
Oenothera drummondii subsp. *drummondii*	Beach Evening Primrose	DBCA	
Oenothera stricta subsp. *stricta*	Common Evening Primrose	DBCA	
Oxalis pes-caprae	Soursob	WEC	
Parentucellia latifolia	Common Bartsia	WEC	
Pelargonium capitatum	Rose Pelargonium	WEC	
Pentameris airoides	False Hairgrass	WEC	
Petrorhagia dubia	-	WEC	
Phoenix dactylifera	Date Palm	WEC	
Piptatherum miliaceum	Rice Millet	WEC	
Polycarpon tetraphyllum	Fourleaf Allseed	WEC	
Raphanus raphanistrum	Wild Radish	WEC	
Reichardia tingitana	False Sowthistle	DBCA	
Ricinus communis	Castor Oil Plant	WEC	
Schinus molle	Peppercorn Tree	DBCA	
Schismus barbatus	Kelch Grass	DBCA	
Schinus terebinthifolia	-	WEC	
Sisymbrium orientale	Indian Hedge Mustard	WEC	
Solanum nigrum	Black Berry Nightshade	WEC	
Sonchus oleraceus	Common Sowthistle	DBCA; WEC	
Spergula arvensis	Corn Spurry	WEC	
Spergula pentandra	Five Anther Spurry	WEC	
Spergularia ?rubra	Sand Spurry	WEC	
Symphyotrichum squamatum	Bushy Starwort	WEC	
Tamarix aphylla	Athel Tree	DoEE	Declared Pest; WoNS
Taraxacum khatoonae	Dandelion	WEC	
Tetragonia decumbens	Sea Spinach	WEC	
Trifolium arvense	Hare's Foot Clover	WEC	
Trifolium campestre	Hop Clover	WEC	

Taxon	Common Name	Source*	Comments
Trifolium hirtum	Rose Clover	WEC	
Ursinia anthemoides	Ursinia	WEC	
Verbesina encelioides	Crownbeard	DBCA	
?*Vulpia bromoides*	Squirrel Tail Fescue	WEC	
Vulpia muralis	-	WEC	

*Sources are:
DoEE – DoEE (2020);
DBCA – DBCA (2007-);
WEC – Woodman Environmental (2003, 2005).

Field Survey

A reconnaissance and targeted flora and vegetation survey was undertaken in 2020 (Appendix E).

Significant Flora

No significant flora was recorded within the Development Envelope during targeted searching in 2020. It is unlikely that the taxa would occur in the development envelope (Appendix E).

Vegetation Types

Vegetation type mapping undertaken in 2020 over the development envelope is presented in Figures 3 to 6 and vegetation community observations are presented in Table 13.

It is considered that vegetation community W1 represents the state listed PEC 'Copastal sands dominated by *Acacia rostellifera, Eucalyptus oraria* and *Eucalyptus obtusiflora*' (P1). This PEC is described as floristically similar to other *Acacia rostellifera* communities but is differentiated on structure, being dominated by mallee eucalypts. The vegetation community occurs on limestone ridges, in some swales in the coastal dunes between Cape Burney and Dongara, on the Greenough Alluvial Flats on limestone soil and near Tarcoola Beach. Some very small occurrences have also been recorded on the limestone scarp north of the Buller River (DBCA 2019b).

This PEC was mapped locally over 681 ha during the Denison 3D Seismic Survey and the area of impact within the proposed development envelope constitutes 0.263% of this area as presented in Figure 7.

Vegetation Condition

The condition of the majority of the vegetation in the proposed development envelope was rated Excellent. Generally, there was little evidence of unnatural disturbance, with weeds generally absent or at very low levels across the area. The vegetation condition subjected to edge effects when in proximity to vehicle tracks was generally rated as Good, with small areas rated as Degraded.

Dieback

The environmental conditions surrounding the Project Area such as low rainfall, sandy calcareous soils which provide good water drainage and unsuitable pH reduces the risk of dieback infestation to very low.

There was no evidence of dieback disease (*Phytophthora cinnamomi*) identified by field observations at the time of the 2004 survey in the vicinity of the proposed development envelope (>5 km)(Woodman Environmental 2005). This status is not expected to have changed due to the nature of the soils and vegetation and the lack of rainfall received in the area.

There was no evidence of dieback disease identified by field observations at the time of the 2020 survey in the proposed development envelope.

Figure 3: Vegetation Type Mapping - North West

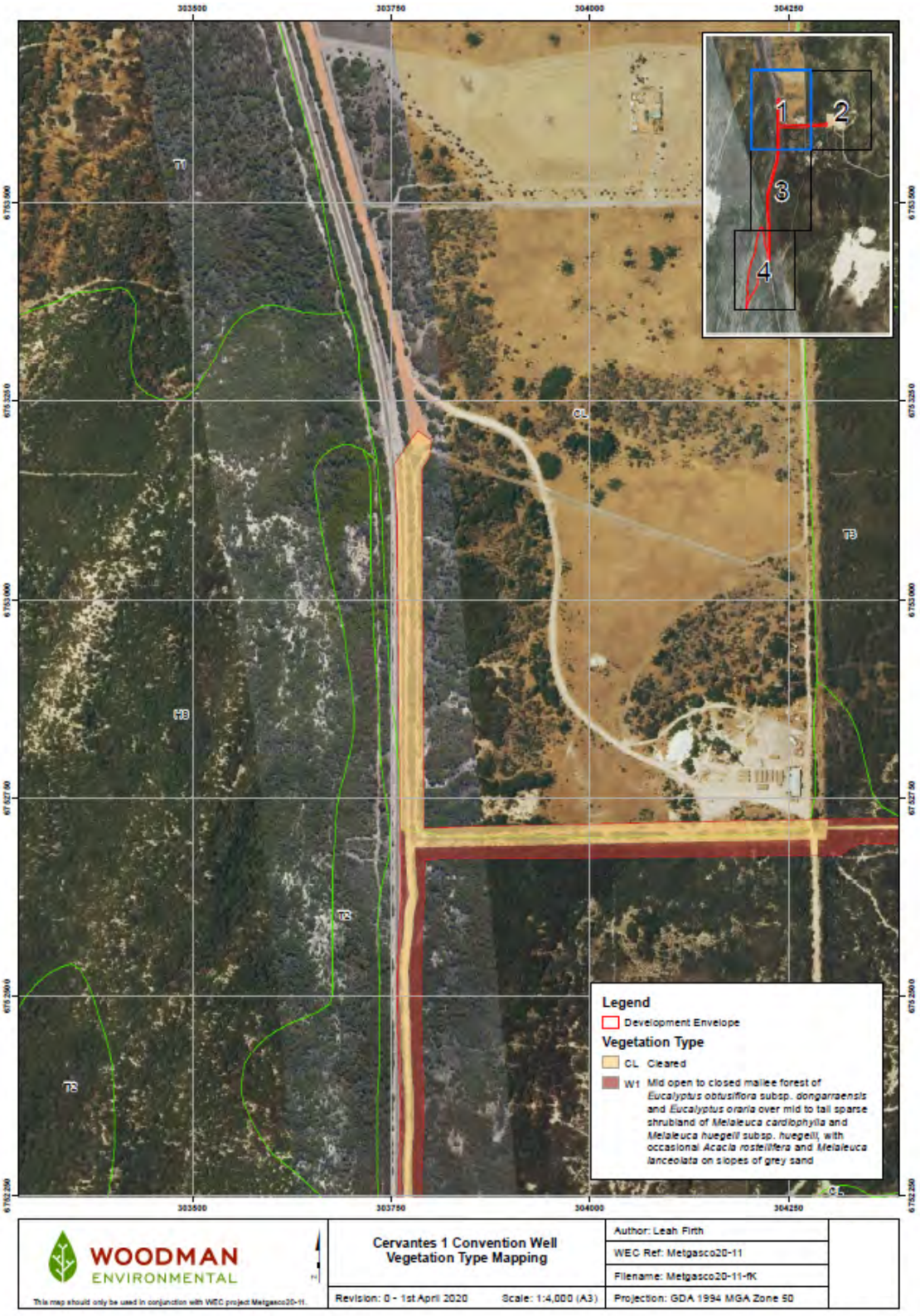


Figure 4: Vegetation Type Mapping - North East

Figure 5: Vegetation Type Mapping - Central

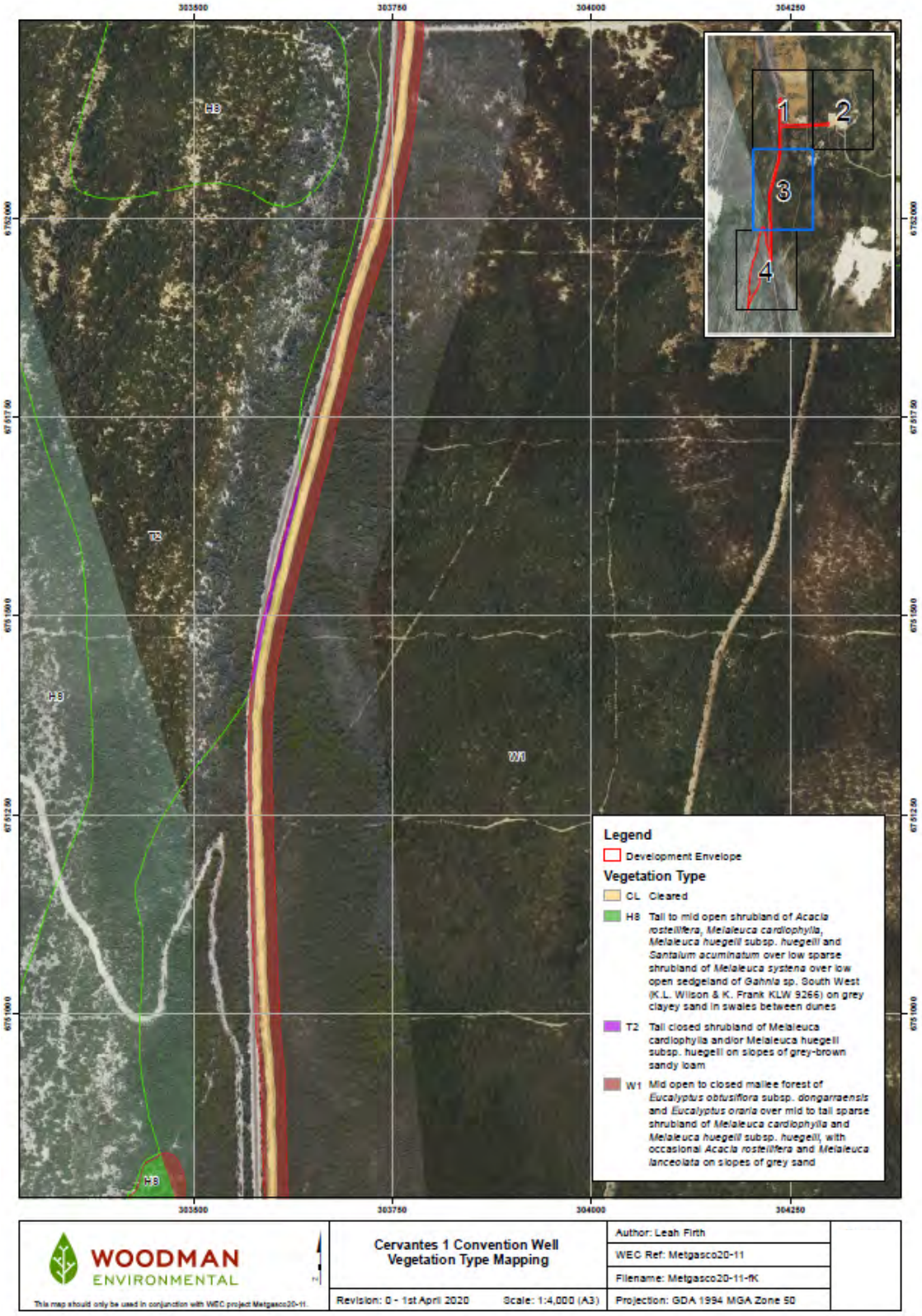


Figure 6: Vegetation Type Mapping - Southern

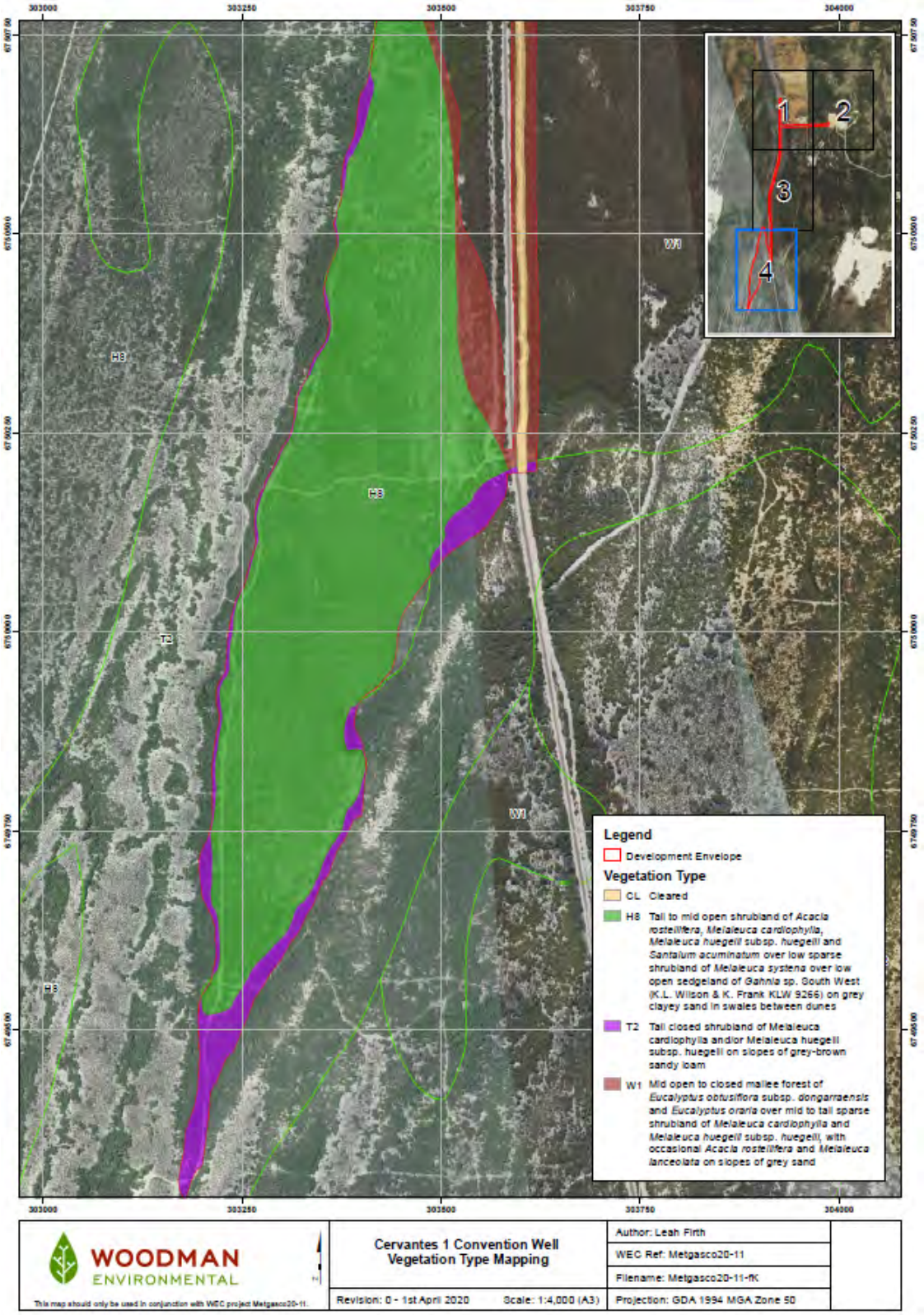
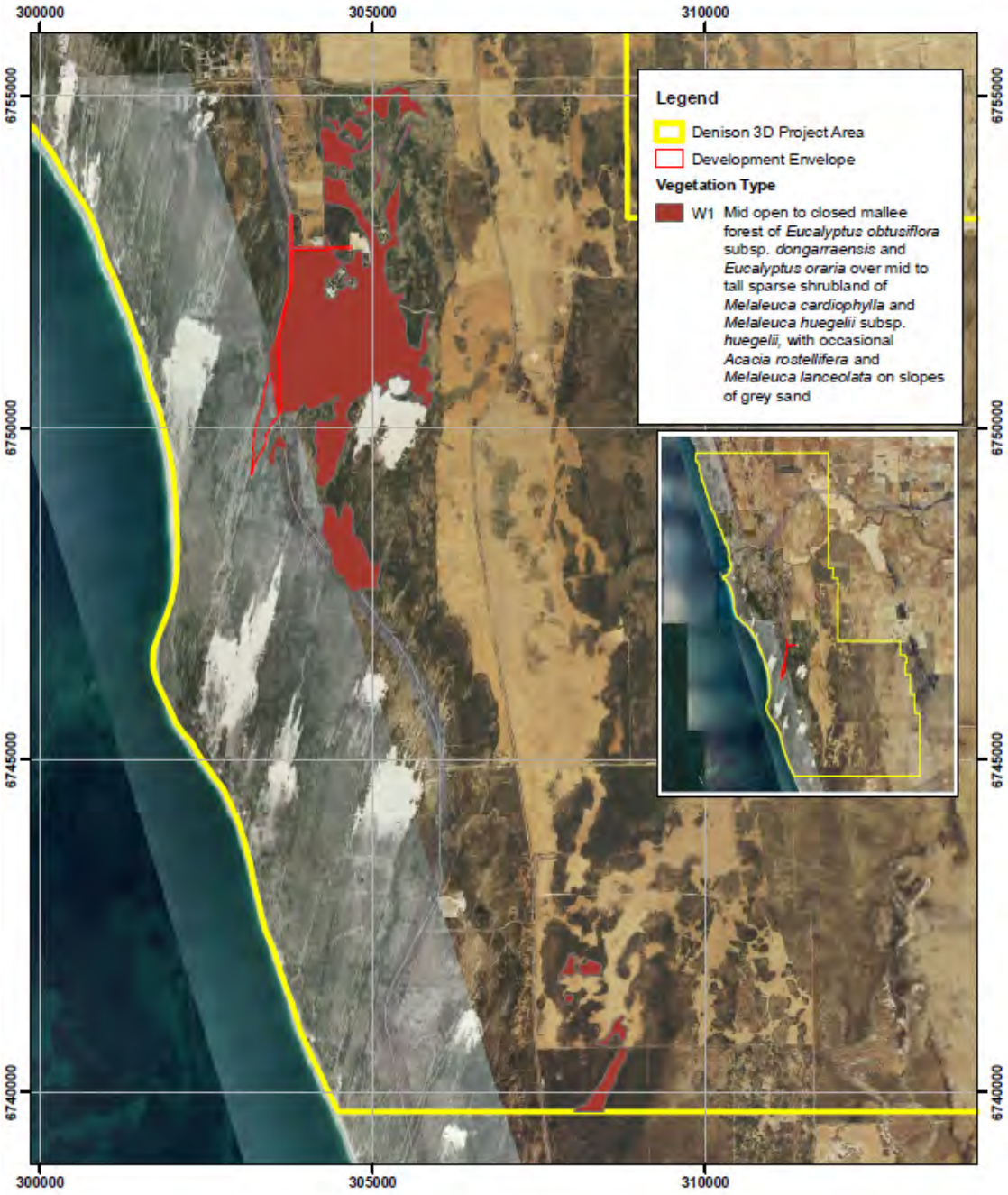


Table 13: Proposed Development Envelope Vegetation Communities

VT	Description	Image
H8	Tall to mid open shrubland of Acacia rostellifera, Melaleuca cardiophylla, Melaleuca huegelii subsp. huegelii and Santalum acuminatum over low sparse shrubland of Melaleuca systena over low open sedgeland of Gahnia sp. South West (K.L. Wilson & K. Frank KLW 9266) on grey clayey sand in swales between dunes. Plate 1: Vegetation Type H8 - Releve MET06	
T2	Tall closed shrubland of Melaleuca cardiophylla and/or Melaleuca huegelii subsp. huegelii on slopes of grey-brown sandy loam. Plate 2: Vegetation Type T2 - Releve MET12	
T3	Tall closed shrubland to low sparse shrubland of Acacia rostellifera, Melaleuca cardiophylla, Melaleuca huegelii subsp. huegelii, Melaleuca systena, Olearia sp. Kennedy Range (G. Byrne 66) over low sedgeland of Lepidosperma calcicola on flats of grey-brown sandy loam. Plate 3: Vegetation Type T3 - Releve MET02	
W1	Mid open to closed mallee forest of Eucalyptus obtusiflora subsp. dongarraensis and Eucalyptus oraria over mid to tall sparse shrubland of Melaleuca cardiophylla and Melaleuca huegelii subsp. huegelii, with occasional Acacia rostellifera and Melaleuca lanceolata on slopes of grey sand. Plate 4: Vegetation Type W1 - Quadrat MET09	

Figure 7: Vegetation Type W1 Mapped Widely as part of Denison 3D Project



Vegetation Type W1 (Priority Ecological Community 'Coastal sands dominated by *Acacia rostellifera*, *Eucalyptus oraria* and *Eucalyptus obtusiflora*') within Development Envelope and the Local Area	Author: Leah Firth
	WEC Ref: Metgasco20-11-01
	Filename: Metgasco20-11-01-f9.mxd
WOODMAN ENVIRONMENTAL	Scale: 1:75,000 (A4)
	Projection: GDA 1994 MGA Zone 50
This map should only be used in conjunction with WEC report Metgasco 20-11.	Revision: 0 - 2nd April 2020

7.1.4 Potential Impacts

The well has been located specifically to avoid the sensitive dunes in the BKNR and minimise clearing by utilising existing tracks to the well pad.

Direct Impacts

Loss of native vegetation due to clearing.

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)
- Accidental clearing of areas outside of the proposed 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.

Unlikely indirect impact is the introduction of dieback.

7.1.5 Assessment of Impacts

Regional and Local Significance

The well has been located specifically to avoid the sensitive dunes in the BKNR and minimise clearing by utilising existing tracks to the well pad.

Table 14 presents the current extent of each vegetation system association in relation to the area to be impacted by the proposal. As a temporary project which will be rehabilitated, the impact on the regional vegetation system is not significant (<0.6%).

Table 14: Vegetation Systems Disturbance

Vegetation System Association	Current Regional Extent (ha)	Area to be impacted by Proposal	Impact on Regional Vegetation
Cliff Head_772	4,615.26 ha	0.04 ha	0.00%
Greenough_432	883.22 ha	5.26 ha	0.57%
Greenough_17	8,098.26 ha	0.01 ha	0.00%
TOTAL		**5.31 ha**	

Locally, the vegetation communities to be impacted include H8, W1, T2 and T3 with the majority of clearing proposed to occur within H8 and W1. Potential impacts of the proposal on any single vegetation community are presented in Table 15. Proposed impacts on these vegetation communities are considered very low with proposed impacts to vegetation communities all well below 1% of the area recorded for each during the Denison 3D Seismic Survey.

Vegetation community W1 has affinities with the Coastal sands dominated by *Acacia rostellifera*, *Eucalyptus oraria* and *Eucalyptus obtusiflora* PEC (P1). The proposal will not

have a significant impact on this vegetation type (<0.263%) as identified during the Denison 3D Seismic Survey and presented in Table 15 and Figure 7.

Table 15: Proposed Vegetation Communities Disturbance

Vegetation Community	Area to be impacted by Proposal	Area of Community recorded locally***	Percentage Impact on Community
H8	3.25 ha	2261.78 ha	0.134%
T2	0.07 ha	1528.11 ha	0.004%
T3	0.20 ha	591.54 ha	0.034%
W1	1.79 ha	681.07 ha	0.263%
TOTAL	**5.31 ha**		

***within Denison 3D Seismic Survey Study Area

Conservation Significant Vegetation

There are no significant flora records from within the proposed development envelope area (5 km). The significant flora risk assessment identified five conservation significant flora taxa that could potentially occur within the proposed development envelope. The field survey was undertaken at a suitable time for identifying these taxa and no individuals were identified during the survey.

Given the relatively minor impacts to the vegetation communities presented in Table 15 and based on the absence of conservation significant taxa within the proposed development envelope, any potential impacts of the proposal are not significant.

7.1.6 Avoidance and Mitigation

Vegetation Impact Minimisation

RCMA will commission a targeted survey of the Project area in Spring 2020 to characterise the annual component of the flora and confirm the findings of the March 2020 Reconnaissance and Targeted survey. This survey will focus on the project area only and will determine whether any of the additional flora taxa recorded in Spring are conservation significant.

The following measures have been identified to avoid / minimise the impact on vegetation as part of the proposal:

- Wellpad location has been chosen to minimise clearing and avoid all sensitive dune vegetation
- Existing tracks have been selected as an access route to minimise the required clearing for the proposal
- Personnel will be accommodated in an offsite camp to avoid clearing of vegetation associated with the proposal
- Areas to be cleared will be demarcated prior to clearing activities to ensure that only specified areas to are cleared
- Speed limits will be imposed, and no off-track driving permitted (including dedicated parking spaces) for all proposal areas

- Vegetation and topsoil will be separately stockpiled in low profile mounds to maximise rehabilitation success
- A Vegetation Management Plan will be developed and implemented

Dieback Risk Minimisation Measures

The following measures have been identified to minimise the risk of dieback introduction (and therefore indirect impacts on vegetation):

- Imported material for the tracks and drill pad will be limestone marl sourced from a nearby quarry to minimise the risk of dieback introduction
- A DBCA-approved Hygiene Management Plan including hygiene management measures such as equipment and vehicle clean down will be in place for the proposal

7.1.7 Predicted Outcomes

The clearing associated with the proposal is limited and any impacts to flora and vegetation will not be significant. The outcomes of the proposal are predicted to be:

- No impact to conservation significant species
- An extremely low (0.263%) impact on the widely mapped W1 Priority Ecological Community (P1)
- Clearing 5.3 ha native vegetation
- No detrimental impacts to adjacent vegetation through the implementation of an Environment Plan and associated Vegetation and Hygiene Management Plans

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 will be maintained and the EPA Objective for this factor can be met for the proposal.

Based upon the predicted outcomes for the proposal, RCMA does not believe that it will result in a significant impact to flora and vegetation. RCMA has considered the WA Environmental Offsets Policy however RCMA 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.

RCMA believes that the provisions of the Petroleum and Geothermal Energy Resources (Environment) Regulations 2012 provide a suitable framework for the management of this proposal without the need for referral under Part IV of the *Environmental Protection Act 1986*.

7.2 Key Environmental Factor – Terrestrial Fauna

7.2.1 EPA Objective

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

7.2.2 Legislation, Policy and Guidance

- *Biodiversity Conservation Act 2016*
- *Environment Protection and Biodiversity Conservation Act 1999*
- Environmental Factor Guideline Terrestrial Fauna
- Technical Guidance Sampling methods for Terrestrial Vertebrate Fauna
- Technical Guidance Terrestrial Fauna Surveys

7.2.3 Receiving Environment

Terrestrial Fauna Studies

The desktop study (Appendix E) identified 207 fauna species as potentially occurring in the proposed development envelope including nine frogs, 50 reptiles, 122 birds, 16 native and ten introduced mammals (Table 16). The assemblage is likely to be typical of the coastal belt of the Geraldton Sandplains bioregion, however, this overall assemblage is unusual and has a limited distribution from just north of Perth to south of Dongara. The fauna assemblage of the proposed development envelope is reasonably complete except for many species of medium-sized and small mammals which have become locally extinct, as is common throughout the region.

Table 16: Composition of vertebrate fauna assemblage

Taxon	Number of Species Expected	Number of species in each category				
		Resident	Regular Visitor or Migrant	Irregular Visitor	Vagrant	Locally Extinct
Fish	0	0	0	0	0	0
Frog	9	8	1	1	0	0
Reptiles	50	49	0	0	0	1?
Birds	122	39	40	26	16	1?
Native Mammals	16	12	3	1	0	12
Introduced Mammals	10	5	0	3	2	-
Total	**207** (including 14 int.)	**113**	**44**	**30**	**18**	**12 (+2?)**

The proposed development envelope is comprised mostly of heath vegetation that supports a rich reptile assemblage and understorey-associated birds. The strip of Melaleuca thickets in the east may support additional middle-storey birds and some larger mammals. The small area of mallee woodland in the east is expected to support woodland-associated species.

The fauna assemblage includes a total of 15 vertebrate species of significance and four invertebrate species of significance (Table 17).

Table 17: Conservation Significant Fauna Species Expected to Occur

CS Species		Status	CS Level	Expected Status
INVERTEBRATES				
millipede	*Antichiropus Eneabba 1*		CS3	Resident
Bush Cricket	*Hemisaga vepreculae*	P2	CS2	Resident
Springtime Corroboree Stick Katydid	*Phasmodes jeeba*	P3	CS2	Resident
native bee	*Hylaeus globuliferus*	P3	CS2	Resident
REPTILES				
Woma	*Aspidites ramsayi*	P1	CS2	Possibly locally extinct
Carpet Python	*Morelia spilota imbricata*		CS3	Resident
Black-striped Snake	*Neelaps calonotos*	P3	CS2	Resident
BIRDS				
Malleefowl	*Leipoa ocellata*	Vu S3	CS1	Irregular visitor
Fork-tailed Swift	*Apus pacificus*	Mi S5	CS1	Regular migrant
Letter-winged Kite	*Elanus scriptus*	P4	CS2	Vagrant
Peregrine Falcon	*Falco peregrinus*	S7	CS1	Irregular visitor
Rainbow Bee-eater	*Merops ornatus*		CS3	Regular migrant
Carnaby's Black-Cockatoo	*Calyptorhynchus latirostris*	En S2	CS1	Regular migrant
Western Ground Parrot	*Pezoporus flaviventris*	Cr S1	CS1	Possibly locally extinct
Rufous Fieldwren	*Calamanthus campestris*		CS3	Resident
Shy Heathwren	*Calamanthus cautus*		CS3	Irregular visitor
Crested Bellbird	*Oreoica gutturalis*		CS3	Resident
MAMMALS				
Little Long-tailed Dunnart	*Sminthopsis* aff. *dolichura*		CS3	Resident

CS Species		Status	CS Level	Expected Status
Brush Wallaby	*Notamacropus irma*	P4	CS2	Resident
Total species expected:				**19**

P1 - P3: Poorly known species P4: Rare, Near Threatened and other species in need of monitoring CS1: Species listed under State or Commonwealth Acts CS2: Species listed as Prioirty by the DBCA but not listed under State or Commonwealth Acts CS3: Species not listed under Acts or in publications, but considered of at least local significance because of their pattern of distribution	Cr: Critically Endangered Species En: Endangered species Mi: Migratory species Vu: Vulnerable spoecies S1 – S5: Biodiversity Conservation Act 2016 listed species

Three species of threatened invertebrates have records within 50 km of the project area (all >12km away). The Springtime Corroboree Stick Katydid (*Phasmodes jeeba*) has been collected from near-coastal vegetation near Jurien and Dongara (Rentz 1996) and is thus very likely to be present. The Thorny Bush Katydid (*Hemisaga vepreculae*) and Woollybush Bee (*Hylaeus globuliferus*) are known from the broader area and are included on a precautionary basis. In addition, the millipede *Antichiropus Eneabba 1* is a short-range endemic (SRE) which is found in Eneabba but has also been recorded at Mt Adams, where it is associated with Acacia thickets close to wetlands (Metcalf & Bamford 2008).

Limestone at or close to the surface (such as in vegetation type H8; see Figure 5 and Figure 6) may have a higher likelihood of supporting SRE species than other areas, but the distribution of SRE invertebrates is likely to be more complicated than this. Vegetation type H8 and other vegetation types are extensive in the area compared with the impact footprint. Underlying limestone may be present throughout and can provide habitat for subterranean invertebrate fauna either above (troglofauna) or below (stygofauna) the groundwater level.

Field Survey

Field investigations (Appendix E) supported the results of the desktop study which identified 207 fauna species as potentially occurring in the project area: nine frogs, 50 reptiles, 122 birds, 16 native and ten introduced mammals. The fauna assemblage is fairly complete except for medium sized and small mammals which have been lost as is common throughout the region.

Opportunistic observations were recorded at all times when conducting field investigations. These included casual observations of fauna, records of road-killed animals or indirect evidence of fauna (e.g. scats, tracks, diggings or foraging evidence). Observations were made along all existing tracks within the survey area.

Carnaby's Black Cockatoo have been discussed further below as (of the conservation significant fauna species identified in Table 17) there is a specific referral guideline for Carnaby's Black Cockatoos (SEWPAC 2012) and specific investigation was required in the field.

Carnaby's Black Cockatoo

Carnaby's Black-Cockatoo is considered likely to be a regular migrant in the proposed development envelope. The inland subspecies of the Red-tailed Black-Cockatoo may also occur in the area irregularly or as a vagrant, but this is not of conservation significance. The Carnaby's Black-Cockatoo forages in proteaceous heath, banksia woodlands and eucalypt woodlands, and based on field survey the proposed development envelope does

not support critical foraging habitat. The Carnaby's Black-Cockatoo is unlikely to roost or breed in the proposed development envelope due to the lack of large trees, and the proposed development envelope is located within the non-breeding range of the species (DSEWPC 2012a). The closest published confirmed roost site is located approximately 17 km east of the proposed development envelope, while the closest published confirmed breeding site is located approximately 60 km southeast of the proposed development envelope (DBCA 2007-). The proposed development envelope has low-quality foraging habitat for Carnaby's Black-Cockatoo (based on site inspection).

7.2.4 Potential Impacts

Indirect Impacts

Potential direct impacts of the proposal on fauna could include:

- Clearing of <2.7 ha of vegetated fauna habitat fringing an existing access track for a period of up to 3 months
- Clearing of 2.6 ha of vegetated fauna habitat in a previously uncleared vegetated swale for a period of up to 6 months
- Vehicle movements on access tracks potentially causing fauna strike over a period of 90 days with most movements (40 each) over two ten-day periods prior to and post drilling
- Noise associated with drilling rig potentially deterring fauna from the vicinity of the drilling rig for up to 40 days
- Light emissions during drilling activities for a period up to 40 day could attract fauna although this would be combined with noise
- Fauna entrapment in excavations is unlikely due to fauna fencing

Indirect Impacts

Potential indirect impacts of the proposal on fauna could include increased feral animal activity.

7.2.5 Assessment of Impacts

Preliminary risk assessment has identified that potential impacts of the proposal are unlikely to significantly impact fauna values of the area despite the potential presence of several conservation significant taxa in the area. Given the small area of clearing required (5.3 ha) it is likely that impacts on fauna will be minimal.

Impacts to fauna can be managed through the implementation of management measures.

Project Area Size

The project area is small in the context of the coastal belt and region, so the impact of exploration works on the fauna assemblage is expected to be minor and localised. Vegetation and soils are extensive in the region. The loss of foraging habitat for species such as the Carnaby's Black-Cockatoo is expected to be negligible due to the small project area size, the low foraging value of the vegetation and presence of similar habitat nearby.

Fragmentation

Vegetation clearance may lead to fragmentation and loss of connectivity within the local area. However, clearance for exploration works is expected to be small and rehabilitation across all cleared areas is proposed, so this impact is likely to be negligible.

Fire Frequency

There is the potential for increased fires from introduced human presence and activity in the area, and this has the potential to impact both local and surrounding areas and fauna, especially if the fire is not contained. An emergency response plan will be in place prior to the commencement of works.

Feral Animals

Increased human activity has the potential to attract feral animals to the area which may impact fauna through predation and/or competition. Feral animals will also follow tracks which increases their presence in otherwise undisturbed landscapes. A Fauna Management Plan will be in place prior to commencement of works.

Subterranean Fauna

The soils are highly porous so surface hydrology should not be affected by the activity. Drilling will not interact with sub-surface hydrology and there will effectively be no vibration, so subterranean fauna will not be impacted in more than the immediate vicinity of the well bore (<5 m). Surface excavation and soil disturbance are also limited to the immediate vicinity of the well bore. The EPA (2016e) recommends that if there is a high likelihood of subterranean fauna being present, and where the impact is expected to be low, then low-intensity sampling for subterranean fauna should be carried out. In this case, however, while there is a high likelihood of subterranean fauna being present (extensive sub-surface limestone), this habitat is widespread and the area of impact is extremely small; the impact is therefore considered to be negligible in the context of available habitat.

Dust, Light, Disturbance and Noise

Impacts of these are difficult to predict and depend on the level of existing disturbance in the area which is likely to be low. Night operations using lighting may cause an increase in fauna mortality and should be avoided. These impacts will be temporary for the period of exploration activity (c. 90 days (<40 days for light disturbance)).

Carnaby's Black Cockatoo

The potential loss of foraging habitat for species such as the Carnaby's Black-Cockatoo is expected to be negligible due to the small proposed impact area, the low-quality foraging value of the vegetation and presence of similar habitat nearby. Referral of the proposal for this species would be required if >1 ha of quality foraging habitat was to be impacted, however based on site inspection the foraging habitat is of low quality. Therefore, referral of the proposal on this basis is not considered necessary.

7.2.6 Avoidance and Mitigation

A Fauna Management Plan will be developed and implemented.

Habitat Impact Avoidance

The following measures have been identified to avoid the impact on fauna as part of the proposal:

- Existing tracks have been selected as an access route to minimise the required clearing of fauna habitat for the proposal
- Personnel will be accommodated in an offsite camp to avoid clearing of fauna habitat associated with the proposal
- To protect stygofauna, there will be no onsite abstraction of groundwater or dewatering

Operations

The following measures have been identified to reduce the impact on fauna as part of the proposal:

- Construction is to be undertaken during daylight hours only to avoid fauna being attracted to vehicle lights
- Lighting during all phases of the proposal will be directed on operational areas only to minimise fauna attraction to light spill
- Excavations such as the mud sump and Turkey's Nest will have fauna exclusion fencing and fauna escape mechanisms
- All waste will be stored in appropriately covered receptacles to exclude fauna before being removed from site

7.2.7 Predicted Outcomes

The outcomes of the proposal are predicted to be:

- No significant impact on the 19 conservation significant fauna species possibly occurring in the region
- No impacts to Carnaby's Black-Cockatoo breeding / roosting habitat
- Negligible Carnaby's Black-Cockatoo foraging habitat loss due to the small proposed impact area and the low-quality foraging value of the vegetation
- Clearing of 5.3 ha vegetation that could result in fauna strike
- Temporary localised disturbance to local fauna populations arising from dust, light and noise for duration of proposal (<3 months)

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.

RCMA has received advice that due to the small area of low-quality Carnaby's Black Cockatoo foraging habitat that will be impacted by the proposal, no referrals are required for the project.

Based upon the predicted outcomes for the proposal, RCMA does not believe that it will result in a significant impact to terrestrial fauna. RCMA has considered the WA Environmental Offsets Policy however RCMA 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.

RCMA believe that the provisions of the Petroleum and Geothermal Energy Resources (Environment) Regulations 2012 provide a framework for the management of this proposal without the need for referral under Part IV of the *Environmental Protection Act 1986*.

7.3 Key Environmental Factor – Inland Waters

7.3.1 EPA Objective

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

7.3.2 Legislation, Policy and Guidance

- *Environmental Protection Act 1986*
- *Environment Protection and Biodiversity Conservation Act 1999*
- Environmental Factor Guideline Inland Waters
- Chemical Disclosure Guideline, August 2013

7.3.3 Receiving Environment

The proposed drill site is located ~300 km north-northwest of Perth and 11 km south of Dongara / Port Denison. The proposed location is within the BKNR, and ~1.5 km east of the nearest surface water receptor – the Indian Ocean. Table 18 lists the Hydrogeological Setting.

Table 18: Hydrogeological Setting

Physiographic Region	Swan Coastal Plain, Quindalup dunes
Groundwater province	Perth Basin
Groundwater area	Arrowsmith

The proposed Cervantes Reservoir lies within the sedimentary Perth Basin. This basin lies onshore and offshore and extends for about 700 km along the southern portion of the west coast of Western Australia. The basin is bounded to the east by the Darling Fault, which extends the full length of the basin. The onshore portion of the basin averages 65 km in width and extends from the southern coast to Geraldton in the north (DoW, 2017). The northern Perth Basin in the region contains sedimentary rocks of Early Permian to Late Jurassic age and reaches thicknesses greater than 5,000 m.

The proposed Cervantes 1 Drill Site overlies the Superficial Swan aquifer which has the following characteristics in the area (DoW, 2017 unless otherwise stated):

- predominantly saturated
- comprised of lenses of Safety Bay Sand (calcareous sand) overlying Tamala Limestone (calcarenite sand deposit)
- estimated formation thickness of 20-30 m
- based on the surrounding topography, the depth to groundwater estimated to be <10m bgs
- expected salinity of ~3,000-7,000 mg/L total dissolved solids (TDS) (saline)
- hydraulic gradient is broadly west toward the Indian Ocean

- groundwater recharge is predominantly via rainfall, and upward groundwater flow from the underlying Yarragadee aquifer is expected in areas where the aquifers are hydraulically connected (Nidagal 1995; Irwin 2007)
- groundwater discharges predominantly into the ocean at the coast over a seawater interface, which may be encountered up to 1.5 km inland (Moncrieff & Tuckson, 1989)

The Yarragadee Formation is the main formation that sub-crops in the area and underlies the Superficial aquifer in the vicinity of the Cervantes 1 Drill Site, where it has an expected thickness of ~400 m and expected salinity of ~7,000-14,000 mg/L TDS (saline). The Yarragadee aquifer is the largest regional aquifer in the northern Perth Basin and consists of a multilayered sequence of sandstone beds with very fine to very coarse grained and granule sized quartz sand with variable amounts of matrix clay and interbedded siltstone, shale and claystone (DoW, 2017).

Groundwater recharge into the Yarragadee is mostly by direct rainfall (east of the Swan Coastal Plain), as well as downward leakage from overlying aquifers and river recharge. Groundwater also discharges from the Yarragadee via upward flow into overlying aquifers, such as in the vicinity of Cervantes 1 Drill Site, and some groundwater discharges offshore into the Indian Ocean (DoW, 2017).

Formations which underlie the Yarragadee aquifer, such as the Cattamarra Coal Measures and Eneabba Formation, which in other areas can contain fresh groundwater, occur at considerable depth within the area and are likely to contain brackish to saline groundwater (DoW, 2017). Although some connectivity exists between the aquifers, it is impeded by several confining layers (Rockwater, 2015).

A search of the Department of Water and Environmental Regulation (DWER) online registered groundwater abstraction bores in the vicinity of the site indicated that the nearest registered groundwater bore is located ~3.0 km north-east and up-hydraulic gradient (inferred) of the site (AWRC #70110399) and is understood to have historically been used for water supply to the abandoned Dooka gypsum mine. The remaining five bores listed in the vicinity of 70110399 are used for supply, monitoring and injection associated with JPF.

Due to the up-gradient location, separation distance and use of the abovementioned groundwater bores, human receptors using these bores are not considered to be at risk of exposure to contaminants associated with future proposed drilling or production activities at the Cervantes 1 Drill Site.

The nearest potential human receptors in the vicinity of the site are farm residents ~2.6 km north-northeast – up and across hydraulic gradient of the site. No human receptors exist down-hydraulic gradient of the site i.e., between the site and the Indian Ocean.

The Allanooka-Dongara Water Reserve (P1) represents the nearest Public Drinking Water Source protection area (PDWSA) and is located ~18 km to the north-northeast of the site (DoW, 2010).

No DWER environmentally sensitive areas, DBCA important wetlands, RAMSAR sites, *Rights in Water and Irrigation Act 1914* (RIWI) surface water areas or irrigation districts are located within 5 km of the site. The proposed site is located within the Arrowsmith RIWI Groundwater Area.

The following information provided on Groundwater Dependent Ecosystems (GDEs) was sourced from the Bureau of Meteorology (BoM, 2019) and the Department of Water (DoW, 2017). GDEs are natural ecosystems that require access to groundwater to meet all or some of their water requirements on a permanent or intermittent basis. Potential GDEs in the vicinity of the site predominantly exist as native vegetation overlying a shallow water table – the Superficial aquifer. These areas are also considered as likely Inflow Dependent Ecosystems (IDEs) – landscapes that are seasonally or permanently wetter than surrounding areas that use and receive water from inflows in addition to rainfall (e.g. surface water, soil water, irrigation).

The identified GDEs and IDEs in this area may be considered potential sensitive receptors for future surface activities associated with the proposed drill site.

No aquatic or subterranean GDEs/IDEs exist within a 5 km radius of the proposed development envelope.

7.3.4 Potential Impacts

Contamination of groundwater from drilling fluids:

- Well bore (negligible)
- Failure of mud sump liner

7.3.5 Assessment of Impacts

RCMA will select low-toxicity drilling fluids for drilling the well, 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 proposed development envelope (18 km) and given the distance to the closest residential ground-water extraction bore, impacts from this activity are not expected to be significant in the immediate area or regionally.

Monitoring of previous oil and gas drilling programs in the region has not identified any groundwater contamination events.

7.3.6 Avoidance and Mitigation

Measures in place that will protect Inland Waters are outlined below.

Well Construction

The Cervantes 1 Well Construction will be made up of cemented casing strings for the purpose of:

- Reaching formations of interest safely and allowing containment of hydrocarbons if intersected.
- Maintaining wellbore stability.
- Allowing zonal isolation (protection of freshwater aquifers and isolation of hydrocarbon bearing formations).

There is no hydraulic fracture stimulation ('fraccing') as part of this project.

Casing strings are secured in place by cement, and both the casing and cement are designed to withstand the environmental conditions they will be exposed to during the

life of the well. Well construction design will be detailed within the Well Management Plan that is submitted for assessment and approval by DMIRS.

In the event no hydrocarbons of commercial value are intersected, the well will be plugged and isolated with cement prior to decommissioning and rehabilitation activities.

The surface casing will run to a depth to protect overlying freshwater aquifers. The surface casing in this well will isolate the entire Yarragadee formation.

In the event the well is suspended for future use with a production casing string, this string will be designed to meet any future pumping or producing activity requirements and cemented in place to provide a further integrity barrier for any freshwater aquifers.

Casing integrity will be tested and confirmed when installed during drilling. If the well is then suspended for future activities (eg. well test), pressure gauges on the wellhead are utilised to monitor integrity between the innermost casing string and casing annuli.

Low Toxicity Muds

The WBM planned for the Cervantes 1 Well present a low risk to human health and the environment. The main substances mixed with water to form the WBM include bentonite, potassium chloride, sodium chloride, barite, limestone and stone dust. These ingredients with the water make up approximately 96% of the drill fluids. Although biocides, polymers and oxygen scavengers are present in minor quantities, all the disposed fluids will be contained within a lined mud sump for evaporation.

RCMA will disclose all proposed drilling muds to DMIRS and publicly as per the requirements of the *Petroleum and Geothermal Energy Resources (Environment) Regulations 2012* Regulation 15(9).

Mud Sump Design

The mud sump will be lined with Enviro Liner 6030HD liner (hereafter referred to as 'Enviro Liner') (Thickness: 0.75 mm; Water Vapour Permeability 3 x 10-13 cm/sec); this will prevent the vertical migration of contaminants into the underlying soils or the aquifer. The Enviro Liner is the preferred option as the product is flexible, puncture resistant, resistant to UV exposure and suited for the storage of muds and cuttings. The Enviro liner is specifically designed for oilfield applications including use in a high salinity environment. The 0.75 mm Enviro liner can be shop welded as opposed to thicker liners or HDPE liners that must be field welded, thereby providing improved quality control on the welding process. This liner exhibits the axi-symmetric benefits of an LLDPE liner with the strength properties of the equivalent HDPE liner.

RCMA will ensure a minimum freeboard capacity of approximately 0.5 m is maintained within the mud sump throughout the course of operations. This is a volume sufficient to prevent any overflow as the average annual pan evaporation rate for the Perth Basin is between 2,000-2,400 mm whilst the average rainfall rates are approximately 600-800 mm annually (BoM 2019).

Validation Sampling

Groundwater and soil sampling will be undertaken prior to and after proposal activities to confirm that no contamination of groundwater has occurred. Identified issues will be investigated and remediation implemented.

Oil Spill Contingency Plan

An OSCP is in place for the proposal to provide a practical reference tool for personnel responding to a spill incident. The OSCP includes:

- preparations to be made for the possibility of an oil spill
- emergency response arrangements to be implemented if an oil spill occurs
- recovery arrangements to be implemented if an oil spill occurs

This plan provides a practical reference to personnel to ensure they have the tools to in place and the reference material to respond to a liquid spill on site which will prevent escalation of an incident and potential groundwater contamination.

Groundwater Abstraction Monitoring

Groundwater will be brought from an offsite already allocated groundwater source. A flowmeter will be in place for the licenced groundwater abstraction bore (2.5 ML) and will be monitored daily during abstraction operations. This will ensure that groundwater resources are not adversely affected by over abstraction from this offsite existing licenced bore.

Sewage Holding Tanks

Sewage resulting from the sewage treatment system will be held in holding tanks on site prior to being taken offsite by a controlled waste carrier to licenced disposal facility. This will ensure that no sewage is left on site, protecting the groundwater from the risks associated with nutrient-rich water.

7.3.7 Predicted Outcomes

Based upon the predicted outcomes for the proposal, RCMA does not believe that it will result in a significant impact to the inland waters. The Environmental Factor of Inland Waters should be managed under the existing regulatory arrangements under the *Petroleum and Geothermal Energy Resources Act 1967* as:

- The risk management strategy for sources of risk to Inland Waters as per 7.3.6 above are outlined in the Implementation Strategy of the DMIRS regulated Environment Plan as per the requirements of the *Petroleum and Geothermal Energy Resources (Environment) Regulations 2012* Regulation 15
- RCMA will disclose all proposed drilling mud chemicals to DMIRS and publicly as per the requirements of the *Petroleum and Geothermal Energy Resources (Environment) Regulations 2012* Regulation 15(9)
- RCMA has considered the WA Environmental Offsets Policy, however RCMA 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.

7.4 Other Environmental Factors

Table 19 outlines potential activities and impacts and their management associated with Other Environmental Factors relevant to the proposal but not considered Key Environmental Factors.

Table 19: Other Environmental Factors and Proposed Management

Factor	EPA Objective	Description	Key Factor?	Statute	Responsible Agency	Proposed Management
Terrestrial Environmental Quality	To maintain the quality of land and soils so that environmental values are protected.	Soil contamination from a potential diesel spill	No	EP Act 1986 DGS Act 2004 PGER Act 1967	DWER DMIRS Resources Safety DMIRS Environment	• Large storage tank is self-bunded • Diesel transfer operations are manned • Spill trays are utilised for all diesel transfers • Spill kits are located as per OSCP • OSCP in place and induction includes the requirements of personnel • Contaminated material is taken offsite for reuse or disposal • Standard operating procedures in place for handling and use of hazardous materials • Bunding of liquid chemicals in accordance with SDS requirements • Bunds are inspected during housekeeping inspections to determine integrity and maintenance of capacity • Drilling sump materials will be taken offsite for disposal / reuse offsite • Validation sampling on site will confirm no potential contamination has been left
		Failure to manage waste satisfactorily		EP Act 1986 PGER Act 1967	DWER DMIRS Environment	• Use of covered waste receptacles • Specific waste segregation onsite • Bunding of waste hydrocarbon products • Site inductions cover waste management requirements • Offsite disposal through licensed contractors
Air Quality	To maintain air quality and minimise emissions so that environmental values are protected.	Minimal, temporary impacts not affecting environmental values from: • Diesel combustion emissions • Dust generation from vehicles	No	EP Act 1986 PGER Act 1967	DWER DMIRS Environment	• Nearest resident 2.6 km will be unaffected by dust or vehicle emissions • Speed limits for vehicle traffic imposed across proposed development envelope • Speed limits adhered to in order to reduce dust emissions • Induction includes vehicle speed limits • The application of water (or appropriate suppressants) to access roads, working surfaces and stockpiles (as required) • Water sprayed on soil and /or access track as required • Vehicles and equipment regularly maintained • Drilling rig activity is short duration with <500 t CO_2-e Scope 1 and 2 emissions
Social Surroundings	To protect social surroundings from significant harm.	Location is remote from residential areas; noise and visual amenity will not create an issue	No	EP Act 1986 PGER Act 1967	DWER DMIRS Environment	• Stakeholder engagement prior to commencement of activity – appropriate engagement method identified • The nearby stakeholders would be engaged on timing of the activity • Reduction of traffic by avoiding Hamersley road. • Single mobilisation/demobilisation of plant/equipment for drilling activities. • Noise and aesthetic impacts are anticipated to be negligible when considering the remote location, duration of activity and distance to nearest sensitive receptors. • Visible and clear signage and direction to drilling site • Nearest resident 2.6 km will be unaffected by noise or light emissions • Light directed onto operational areas only • Vehicles and equipment to be used only within the approved proposal footprint

8. Significance Test

RCMA has assessed the impacts associated with the proposal to determine the significance of these impacts on the receiving environment (Table 20). The conclusion for all Key Factors is that although there would be some minor impacts, due to the site selection and nature of the activity, no impacts were deemed to be significant.

Table 20: Significance Criteria Assessment

Criteria	Assessment
Values, sensitivity and quality of the environment which is likely to be impacted	The proposal is located within the Mid-West region of Western Australia. The proposal will not affect any environmentally sensitive areas (ESAs). The majority of the vegetation is in Very Good to Excellent condition. No TECs, Threatened or Priority flora have been recorded within the proposed development envelope. A PEC has been mapped in the W1 vegetation community however this community is mapped widely locally (681 ha) outside of the area to be impacted (1.79 ha). Nineteen conservation significant fauna species may occur in the proposed development envelope. None of the terrestrial fauna habitats present are restricted to the proposed development envelope. Potential impacts to fauna values are minor, given the widespread, common habitats represented in the development envelope.
Extent (intensity, duration, magnitude and geographic footprint) of the likely impacts. Consequence of the likely impacts (or change). Resilience of the environment to cope with the impacts or changes	A maximum of 5.3 ha will be cleared as a result of the proposal. The proposal is within the Lesueur subregion of the Geraldton Sandplains bioregion and contains Beard vegetation associations 772 and 432. Approximately 95.61% of the pre-European extent of Vegetation Association 772 and approximately 73.19% of the pre-European extent of Vegetation Association 432 remains. Based on the above disturbance area, impacts associated with the proposal are minimal. The overall effects of the proposal are not expected to be significant at a local or regional level.
Cumulative impact with other projects	A maximum of 5.3 ha will be cleared as a result of the proposal. Much of the Midwest region retains extensive areas of native vegetation, including within the BKNR. Given the very small area of vegetation likely to be affected by the proposal, the overall cumulative impacts to preliminary key environmental factors are low. Rehabilitation of cleared areas will be undertaken following completion of the proposal. Cervantes 1 can be successfully rehabilitated in the same or better manner then other past petroleum projects conducted in or near the BKNR.

Criteria	Assessment
Level of confidence in the prediction of impacts and the success of proposed mitigation	The environmental impacts of this proposal will be addressed through the management measures identified in an EP that has been submitted to DMIRS, providing a high level of confidence in the anticipated impacts of the proposal. The EP addresses a number of factors, including (but not limited to): flora and vegetation, fauna, well construction and groundwater management and rehabilitation and closure. The desktop flora and fauna assessment for this proposal has been undertaken by a highly reputable ecological consultancy, with specialist ecological knowledge and experience in the North Perth Basin. The results of this assessment are reliable and provide a high level of confidence that the impacts of the proposal on flora and fauna will be low.
Objects of the act, policies, guidelines, procedures and standards against which a proposal can be assessed	Legislation, policies, guidelines, procedures and standards have been considered. RCMA has considered relevant legislation and the principles of environmental protection in the design of the proposal and will continue to do so during implementation. Relevant guidance has been considered and implemented.
Presence of strategic planning framework	Not applicable
Presence of other statutory decision-making processes which regulate the mitigation of the potential effects on the environment to meet the EPA objectives and principles for EIA	The key regulatory control required for the proposal to ensure appropriate management is an approved Environment Plan under the requirements of the *Petroleum and Geothermal Energy Resources (Environment) Regulations 2012* Regulation 6.
Public concern about the likely effect of the proposal, if implemented, on the environment	RCMA has commenced consultation with key stakeholders in relation to its exploration activities in the local area, including State government agencies (including DMIRS, DBCA) and community stakeholders. RCMA will continue to consult with relevant stakeholders throughout the life of the proposal as part of normal business practice, providing updates to relevant stakeholders as required. The list of stakeholders will continue to be developed and revised as required.

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, RCMA does not believe actions to offset the predicted outcomes of this proposal are required.

RCMA believe that the management of the environmental factors can be regulated within the *Petroleum and Geothermal Resources Act 1967* framework regulated by the DMIRS as evidenced in this document.

9. Conclusions

9.1 Overview

This report has been prepared to support the referral of the Cervantes 1 Conventional Oil Well Drilling Proposal to the EPA under Section 38 of the *Environmental Protection Act 1986* and assist the EPA to decide whether the proposal requires formal EIA.

This environmental referral report indicates that potential impacts of the proposal are not significant and can be adequately managed through the established petroleum environment regulatory process.

This environmental referral report identifies suitable management measures for potential environmental impacts and risks associated with the proposal and demonstrates that many of the risks have been avoided through the appropriate siting of the drill site, and that potential impacts and risks that cannot be avoided can be readily mitigated and managed.

The significance of environmental factors are summarised below.

9.2 Flora and Vegetation

Impacts to flora and vegetation will be minimised by utilising existing access tracks, resulting in 5.3 ha of clearing required. Cleared areas will be rehabilitated in consultation with the DBCA. No conservation significant flora is planned to be cleared. An area of 0.263% of a PEC mapped locally will possibly be impacted by the proposal. 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.

9.3 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.

The possible fauna assemblage for the area includes 19 species of significance that are likely to occur in the area including the Carnaby's Black-Cockatoo. The Carnaby's Black-Cockatoo does not roost or breed in the proposal area, and the area has low-quality foraging habitat.

9.4 Inland Waters

Impacts to groundwater arising from drilling are not significant and are subject to significant additional regulation associated with well bore construction and full disclosure of chemical use to DMIRS.

Risks to groundwater associated with spills are managed through engineering controls and thorough spill response planning regulated by DMIRS.

The potential impacts to inland waters associated with the proposal are not deemed to be significant.

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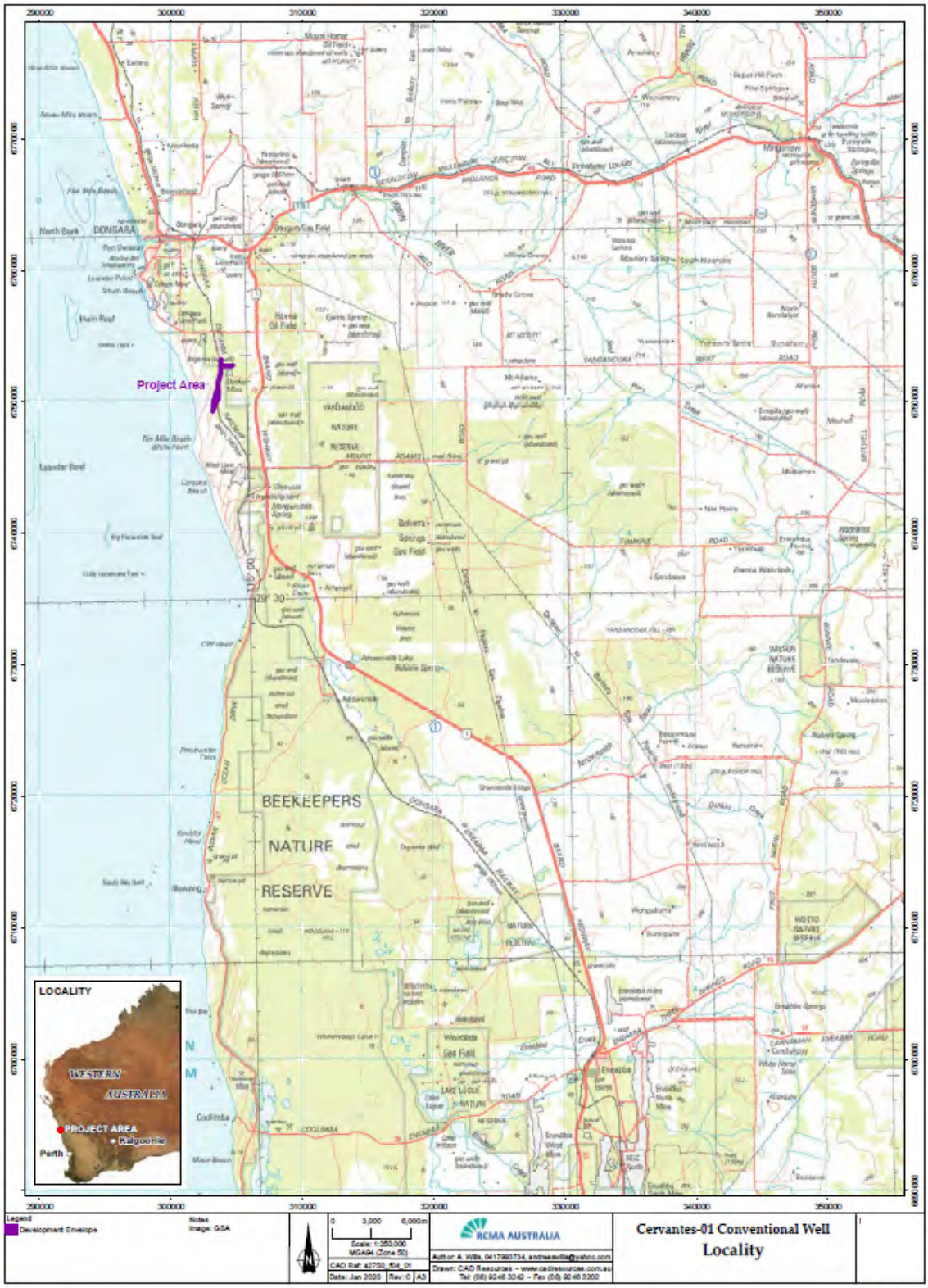
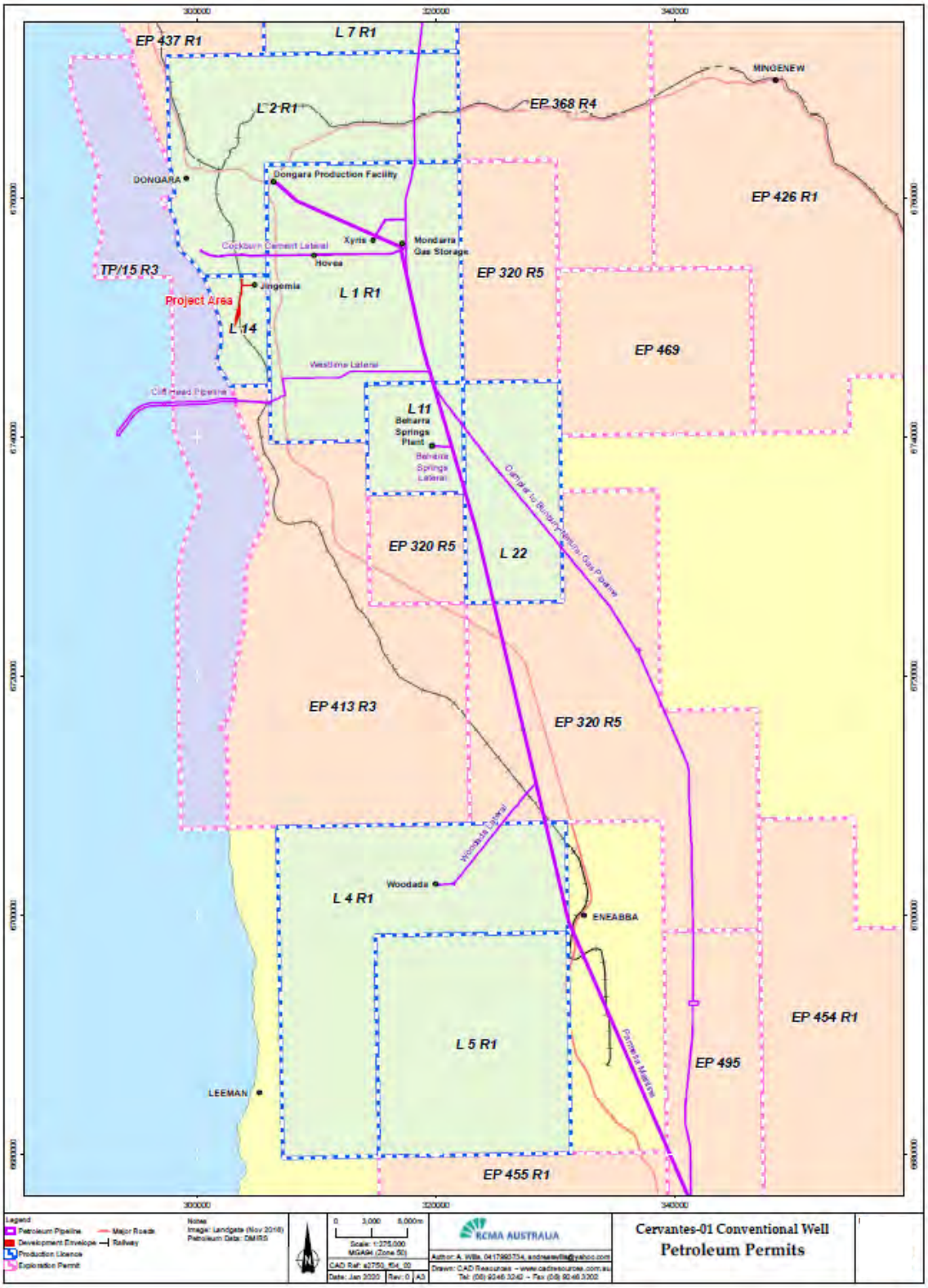
Appendix A Proposal Area

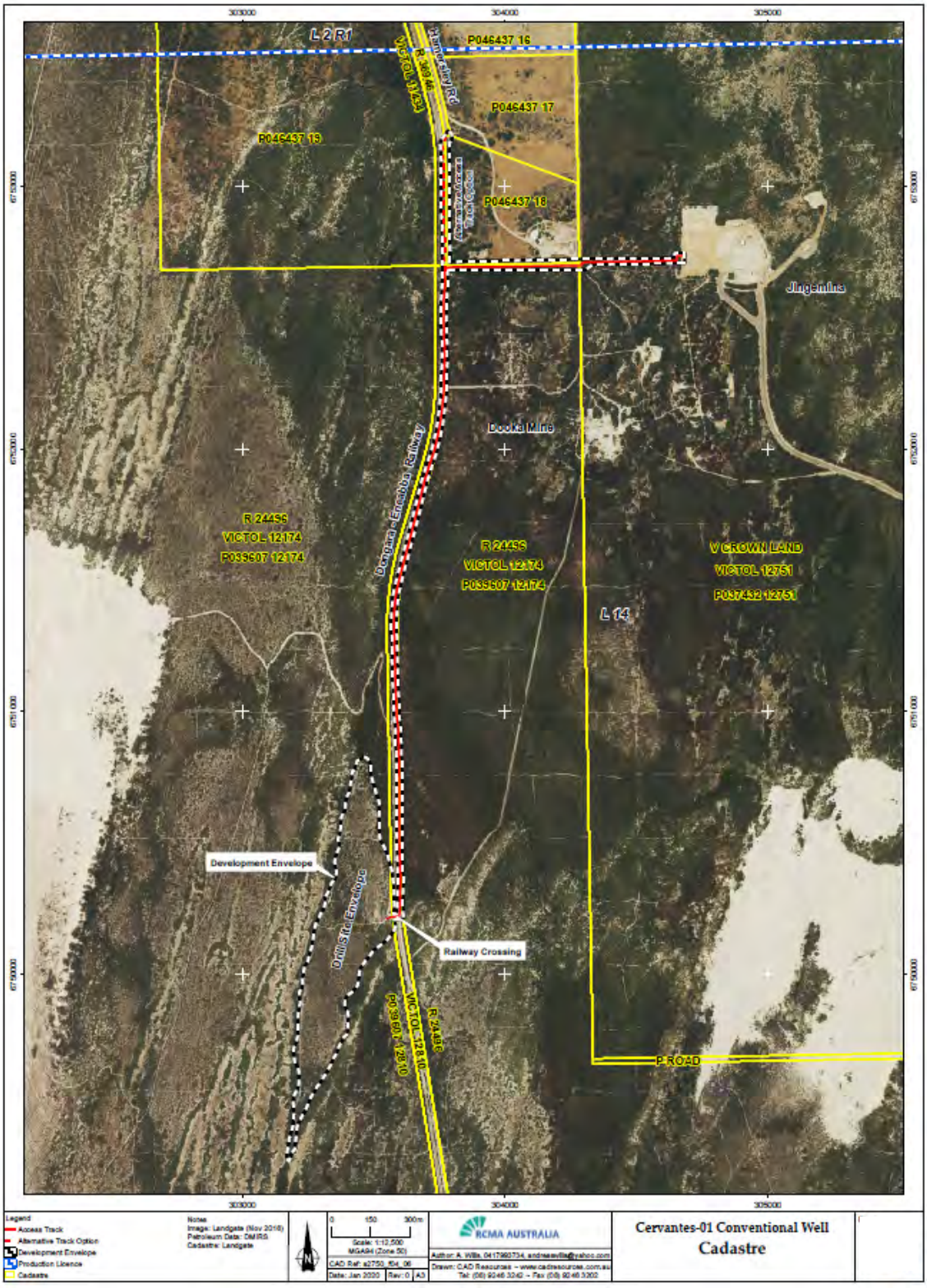


Appendix B Petroleum Permits



Appendix C Environmental Sensitivities

Appendix D Cadastre



Appendix E Reconnaissance and Targeted Flora and Level 1 Fauna Survey (March 2020)