



Petroleum Exploration Program
Sweetpea Petroleum Pty Ltd
16-Dec-2021

Unique Reference No. SWP2-3

Civil Construction and Water Bore Environment Management Plan

EP136 - Beetaloo Sub-basin, NT



Civil Construction and Water Bore Environment Management Plan

EP136 - Beetaloo Sub-basin, NT

Client: Sweetpea Petroleum Pty Ltd

ABN: 472 074 750 879

Prepared by

AECOM Australia Pty Ltd

Level 3, 9 Cavenagh Street, Darwin NT 0800, GPO Box 3175, Darwin NT 0801, Australia
T +61 8 8942 6200 F +61 8 8942 6299 www.aecom.com
ABN 20 093 846 925

16-Dec-2021

Job No.: 60611666

DEPWS Unique Reference No.: SWP2-3

AECOM in Australia and New Zealand is certified to ISO9001, ISO14001 and ISO45001.

© AECOM Australia Pty Ltd (AECOM). All rights reserved.

AECOM has prepared this document for the sole use of the Client and for a specific purpose, each as expressly stated in the document. No other party should rely on this document without the prior written consent of AECOM. AECOM undertakes no duty, nor accepts any responsibility, to any third party who may rely upon or use this document. This document has been prepared based on the Client's description of its requirements and AECOM's experience, having regard to assumptions that AECOM can reasonably be expected to make in accordance with sound professional principles. AECOM may also have relied upon information provided by the Client and other third parties to prepare this document, some of which may not have been verified. Subject to the above conditions, this document may be transmitted, reproduced or disseminated only in its entirety.

Cover Photo: View of EP136 vegetation community structure

Quality Information

Document Civil Construction and Water Bore Environment Management Plan

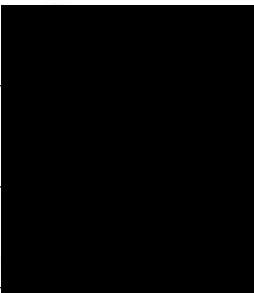
Ref 60611666
DEPWS Unique Reference No.:SWP2-3

Date 16-Dec-2021

Prepared by David van den Hoek, William Riddell, Sam Schroder

Reviewed by Alana Court, James Jentz, Abe Francis

Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
0	21-Dec-2020	Draft EMP for Pre-acceptance Review	Alana Court Associate Director - Environment	
1	11-Mar-2021	Final EMP for Formal Submission	Alana Court Associate Director - Environment	
2	22-Apr-2021	Final EMP for Formal Submission	Alana Court Associate Director - Environment	
3	16-Dec-2021	Modified EMP as per Advice Letter under Regulation 11.2(b)	Alana Court Associate Director - Environment	

Sweetpea Petroleum Pty Ltd Approval

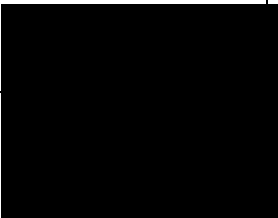
Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
3	16-Dec-2020	SWP2-3 Approved for Release	Gibson Porkime Northern Territory Operations Manager	
			David Close Vice President, Operations & External Affairs	

Table of Contents

Executive Summary	i
1.0 Introduction	1
1.1 Background	1
1.2 Project Proponent	2
1.3 Project Description	5
1.4 Project Location and Footprint	5
1.5 Land Tenure and Access	7
1.5.1 Government Departments	7
1.5.2 Pastoral Properties	7
1.5.3 Traditional Owners and Northern Land Council	8
1.5.4 Aboriginal Area Protection Authority	8
1.6 Objectives	9
2.0 Environmental Legislation and other Requirements	10
2.1 Summary of Key Legislation	10
2.2 Relevant Codes of Practice and Guidelines/Standards	17
2.3 Relevant Agreements and Operating Consent	18
3.0 Description of Regulated Activity	20
3.1 Proposed timetable	20
3.2 Civil Construction Program	22
3.2.1 Exploration Lease Pads	22
3.2.2 Access tracks	24
3.2.3 Gravel pits	28
3.2.4 Groundwater bore drilling and monitoring activity description	29
3.3 Support Facilities for the Program	32
3.3.1 Accommodation camp	32
3.3.2 Waste Management	34
3.3.3 Spill Management	35
3.3.4 Water Supply and Use	35
3.3.5 Greenhouse Gas Emissions	37
3.3.6 Rehabilitation	38
4.0 Summary of Existing Environment	39
4.1 Physical Environment	39
4.1.1 Climate	39
4.1.2 Topography	39
4.1.3 Land Systems	39
4.1.4 Geology	39
4.1.5 Soils	41
4.1.6 Hydrology	41
4.1.7 Hydrogeology	46
4.1.8 Groundwater Dependent Ecosystems	48
4.1.9 Bushfire	49
4.2 Natural Environment	49
4.2.1 Bioregions	49
4.2.2 Vegetation Communities	50
4.2.3 Native Flora	50
4.2.4 Weeds	50
4.2.5 Native Fauna	50
4.2.6 Feral Animals	51
4.2.7 Land Condition	52
4.3 Social and Cultural Environment	59
4.3.1 Socio economic summary	59
4.3.2 Land use and sensitive receptors	59
4.3.3 Pastoral Activity	61
4.3.4 Oil and Gas Exploration History of the Beetaloo Sub-Basin	61
4.3.5 Native Title	61

	4.3.6	Sacred Sites and Restricted Work Areas	61
	4.3.7	Archaeological Assessment	62
	4.3.8	Historic Heritage	62
5.0		Stakeholder Engagement	65
5.1		Identified Stakeholders	65
5.2		Summary of Engagement and Consultation Undertaken	66
	5.2.1	Pastoral Leaseholders	66
	5.2.2	Traditional Owners and Aboriginal People	67
	5.2.3	Gas Pipeline Operator	68
	5.2.4	Neighbouring Exploration Permit Holders/Operators	68
	5.2.5	Northern Territory Government Departments	68
5.3		Assessment of Merit of Stakeholder Claims and Objections	69
5.4		Future Stakeholder Engagement	75
6.0		Environmental Risk Assessment	76
6.1		Methodology	76
	6.1.1	ALARP and Risk Assessment	78
	6.1.2	Scientific Uncertainty	78
6.2		Cumulative Impacts	79
	6.2.1	Water Supply	79
	6.2.2	Flora and Fauna	79
	6.2.3	Greenhouse Gas Emissions	80
	6.2.4	Traffic	80
	6.2.5	Social and Community	80
7.0		Potential Impacts and Management	82
7.1		Risk Assessment Summary	82
7.2		Land Management Plan	84
	7.2.1	Potential impacts	84
	7.2.2	Objectives	85
	7.2.3	Land management tasks and responsibilities	86
7.3		Weed Management Plan	95
	7.3.1	Potential impacts	95
	7.3.2	Objectives	95
	7.3.3	Weed management tasks and responsibilities	96
7.4		Bushfire Management Plan	100
	7.4.1	Potential impacts	100
	7.4.2	Objectives	100
	7.4.3	Bushfire management tasks and responsibilities	101
7.5		Waste Management Plan	104
	7.5.1	Potential impacts	104
	7.5.2	Objectives	106
	7.5.3	Waste management tasks and responsibilities	107
7.6		Spill Prevention and Response Plan	111
	7.6.1	Potential impacts	111
	7.6.2	Objectives	111
	7.6.3	Spill prevention and response management tasks and responsibilities	112
	7.6.4	Spill response	116
	7.6.5	Spill assessment	116
	7.6.6	Spill emergency response plan	116
	7.6.7	Spill clean up	118
	7.6.8	Waste disposal	119
7.7		Noise, Vibration and Lighting Emissions Management Plan	120
	7.7.1	Potential impacts	120
	7.7.2	Objectives	120
	7.7.3	Noise, vibrations and lighting emissions management tasks and responsibilities	121
7.8		Air Quality and Emissions Management Plan	123
	7.8.1	Potential impacts	123
	7.8.2	Objectives	123

	7.8.3	Air quality and emissions management tasks and responsibilities	124
7.9		Vegetation, Flora, Fauna and Habitat Management Plan	126
	7.9.1	Potential impacts	126
	7.9.2	Objectives	126
	7.9.3	Vegetation, flora, fauna and habitat management tasks and responsibilities	127
7.10		Feral Animals and Pest species Management	132
	7.10.1	Potential impacts	132
	7.10.2	Objectives	132
	7.10.3	Feral animal and other pest species management tasks and responsibilities	133
7.11		Social Environment and Access	135
	7.11.1	Potential impacts	135
	7.11.2	Objectives	136
	7.11.3	Social environment and access management tasks and responsibilities	137
7.12		Cultural Heritage and Sacred Site Management Plan	141
	7.12.1	Potential impacts	141
	7.12.2	Objectives	141
8.0		Systems and Policies	146
	8.1	HSE Objectives and Key Performance Indicators	146
	8.2	HSEMS Induction	147
	8.3	Reporting	147
	8.3.1	Annual Environment Performance Report	148
	8.3.2	Incident Reporting	148
	8.4	Incident Management	149
	8.5	Environmental Monitoring	150
	8.6	Environmental Auditing	155
	8.7	EMP Management of Change Process	156
	8.8	Notice of Commencement	157
9.0		Rehabilitation Approach	158
	9.1	Natural regeneration	158
	9.2	Assisted natural regeneration	158
	9.3	Rehabilitation Monitoring	159
	9.4	Vegetation clearance considerations	159
10.0		References	161
Appendix A			
		Sweetpea's Legal Requirements	A
Appendix B			
		Environment Assessment Act Self-Assessment	B
Appendix C			
		Land Condition Assessment	C
Appendix D			
		Cultural Heritage Finds Protocol	D
Appendix E			
		Civil Construction and Water Bore Environmental Risk Assessment	E
Appendix F			
		Lease Pad, Gravel Pit and Accommodation Camp Rehabilitation Plans	F
Appendix G			
		EP136 Project Operations Health and Safety Management Plan	G
Appendix H			
		Weed Management Plan	H

Appendix I		
	Bushfire Management Plans	I
Appendix J		
	Stakeholder Engagement	J
Appendix K		
	Erosion and Sediment Control Plan	K
Appendix L		
	Traffic Impact Statement	L
Appendix M		
	Emergency Response Plan	M

List of Tables

Table 1	Geographical coordinates of the Civil Construction Program	iv
Table 2	Civil Construction and Water Bore Activity Inherent Risk Assessment Results	xi
Table 3	Civil Construction Footprint	5
Table 4	Key Commonwealth and Northern Territory Legislation Consideration	10
Table 5	Code of Practice and Relevant Guidelines/Standards	17
Table 6	Relevant Agreements and Operating Consent	18
Table 7	Gantt Chart of Civil Construction and Water Bore Schedule	21
Table 8	Seismic Survey Lines retained for Eastern or Western Access Tracks to Lease Pads and Gravel Pits	26
Table 9	Proposed Gravel Pit Locations	28
Table 10	Waste and Disposal Methods	34
Table 11	EP136 Estimated Water Usage for Civil Construction	36
Table 12	Estimated Greenhouse Gas Emissions for Civil and Water Bore Program	37
Table 13	1% AEP Results for each Lease Pad	44
Table 14	Summary of Licensed Water Allocations in the Beetaloo GBA Region	46
Table 15	Existing Water Bores in Proposed Activity Area	47
Table 16	Land Condition Assessment for Lease Pad Areas, Main Accommodation Camp Options and Gravel Pits	54
Table 17	Assessment of Merit of Stakeholder Comments, Claims and Objections	70
Table 18	Environmental and safety impact consequence severity rating matrix	77
Table 19	Qualitative measures of likelihood/frequency	78
Table 20	Qualitative risk analysis matrix level of risk based on likelihood/severity	78
Table 21	Cumulative Water Use	79
Table 22	Risk assessment summary	82
Table 23	Roles and responsibilities	83
Table 24	Construction activities waste production	104
Table 25	Waste register	108
Table 26	Spill clean-up application	118
Table 27	Civil Construction and Water Bore Program Planned Workforce	135
Table 28	HSE KPIs	146
Table 29	Reporting Frequency	147
Table 30	Summary of environmental monitoring program	150
Table 31	EP audit schedule	155
Table 32	Rehabilitation Monitoring Schedule	159
Table 33	Summary of Legislative Requirement for Civil Construction and Associated Activities	A-1
Table 34	Sweetpea's Self-Assessment under the NT Environment Protection Act	B-1
Table 35	Civil Construction and Water Bore Environmental Risk Assessment Table	E-1

List of Figures

Figure 1	Project Location	ii
Figure 2	Location of Lease Pads, Access Tracks, Camp and Gravel Pits	iii
Figure 3	Eastern Access Track, showing existing and repurposed seismic lines	vi
Figure 4	Western Access Track, showing existing and repurposed seismic lines	vi
Figure 5	Project Location showing Land Tenure and Exploration Permits	3
Figure 6	Location of Lease Pads, Access Tracks, Camp and Gravel Pits	4
Figure 7	Conceptual well pad lay out	24
Figure 8	Eastern Access Track, showing existing and repurposed seismic lines	25
Figure 9	Western Access Track, showing existing and repurposed seismic lines	25
Figure 10	Groundwater Bore Location showing Land Tenure and Pastoral Infrastructure, Tanumbirini Station	30
Figure 11	Proposed design for upper aquifer, Anthony Lagoon monitoring bore	31
Figure 12	Proposed design for lower aquifer, Gum Ridge Formation monitoring bore	31
Figure 13	Generalised schematic of proposed field camp (refer Drawing 60611666-0008-02)	32
Figure 14	Land Systems within EP136	40
Figure 15	Location of Proposed Access Track Crossings within the Civil Construction Program	42
Figure 16	1% AEP Model Extent	43
Figure 17	Hydrology and Hydrogeology of the Permit Area	45
Figure 18	Regional groundwater flow in the CLA System (extract Huddleston-Holmes <i>et al.</i> 2020)	48
Figure 19	Land Condition Assessment for Well Sites and Gravel Pits and Access Tracks	53
Figure 20	EP136 – Sensitive Receptors	60
Figure 21	Areas of Cultural Heritage within the Civil Construction Program	64
Figure 22	Spill Response Strategy	117
Figure 23	Key questions for determining the applicable change process (DEPWS, 2021)	156

Table of Definition and Acronyms

Definitions/Acronyms	Meaning
Exploration Lease Pad	means the disturbance area required to accommodate the placement of a drilling rig and provide an area for above ground water holding ponds or tanks when required. In total, the design of the exploration lease pad area has allowed for approximately 11 ha to be cleared for each lease area, including the provision of firebreaks to reduce the potential risk to infrastructure, as well as accommodate the water monitoring bore pads and tanks. The well pad and the tank pad make up the exploration lease pad.
Well Pad	means the cleared area specific to the individual well pad based on approx. 280 m x 260 m. The well pad is a compacted area that includes flare pit, cellar and sump (nominal 180 m x 180 m) and an external perimeter area of 20 m width to cater for soil stockpiling and a firebreak. An additional 20 m buffer of managed vegetation will be established as an asset protection zone.
Tank Pad	means the cleared area specific for the tank pad, which is largely similar to those for well pad without the requirement of a flare pit, cellar and sump. The cleared area dimensions will be 230 m x 160 m. This includes the tank pad area (130 m x 190 m), an external area of 20 m for soil stockpiling and a fire break around the perimeter and a 20 m managed vegetation zone. The cleared perimeter comprises an asset protection zone around the tank pad.
Groundwater Monitoring Bore Pad	means the groundwater monitoring bore pads that will be constructed on two by 50 x 50 m water bore pads within the overall exploration lease pad.
mature trees and shrubs	means any tree with a trunk diameter of 25 centimetres or greater at 1.3 metres above ground, including Corymbia and Eucalypt species, as well as the stands of Bullwaddy and Lancewood.
bed and banks	in relation to a waterway, means the land over which normally flows, or which is normally covered by, the water of the waterway, whether permanently or intermittently, but does not include land from time to time temporarily covered by the flood waters of the waterway and abutting on or adjacent to its bed and banks, the bed being the relatively flat portion and the banks being the relatively steep portions of the land comprising the bed and banks.
waterway	means any of the following: a. a river, waterhole, creek, stream or watercourse b. a natural channel in which water flows, whether or not the flow is continuous c. a channel formed wholly or partly by the alteration or relocation of a waterway described in paragraph (a) or (b) d. a lake, lagoon, swamp or marsh, whether formed by geomorphic processes or modified by works: i. in which water collects, whether or not the collection is continuous; and ii. into, through or out of which a current (which forms the flow or part of the flow of a river, creek, stream or watercourse) passes, whether or not that passage is continuous e. land which is intermittently covered by water from a waterway described in paragraph (a), (b), (c) or (d) f. shallow groundwater immediately underlying the bed or banks of a waterway g. groundwater meaning water occurring or obtained from below the surface of the ground (other than water contained in works, not

Definitions/Acronyms	Meaning
	being a bore, for the distribution, reticulation, transportation, storage or treatment of water or waste).
interfere with a waterway	means any of the following: a. cause a material change to the shape of a waterway; b. cause a material change to the volume, speed or direction of the flow or likely flow of water in or into a waterway; c. cause an alteration to the stability of the bed or banks of a waterway, including by the removal of vegetation; d. cause a material change to the chemical or biological characteristics of a waterway or the water in a waterway.
AA 9	Access Authority 9 (from DITT)
AAPA	Aboriginal Areas Protection Authority
ABS	Australian Bureau of Statistics
AC2020/072	AAPA Certificate reference 2020/072
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ALA	Atlas of Living Australia
ALARP	As low as reasonably practicable
ANZECC	Australian and New Zealand Environment and Conservation Council
APPEA	Australian Petroleum Production and Exploration Association Limited
AS	Australian Standard
ASRIS	Australian Soil Resource Information System
ANRA	Australian Natural Resources Atlas
BoM	Bureau of Meteorology
CLA	Cambrian Limestone Aquifer
COP	Code of Practice
CPESC	Certified Professional in Erosion and Sediment Control
DoH	Department of Health (NT)
DAWE	Department of Agriculture, Water and the Environment (Commonwealth)
DENR	Department of Environment and Natural Resources (NT) previous department name for DEPWS
DEPWS	Department of Environment, Parks and Water Security (NT)
DIDO	Drive-in/Drive-out
DIPL	Department of Infrastructure Planning and Logistics
DITT	Department of Industry, Tourism and Trade (NT)
DIWA	Directory of Important Wetlands in Australia
DOH	Department of Health
DPIR	Department of Primary Industries and Resource (NT) previous department name for DITT
EAT	Eastern Access Road
EIS	Environmental Impact Statement

Definitions/Acronyms	Meaning
EO	Environmental Outcome
EPA	Environment Protection Authority (NT)
EPS	Environmental Performance Standard
EP###	Exploration Permit (e.g. EP136)
EMP	Environment Management Plan
EPBC	Environment Protection and Biodiversity Conservation
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cmwth)
ESCP	Erosion and Sediment Control Plan
ESD	Ecological Sustainable Development
FIFO	Fly-in/Fly-out
GHG	Greenhouse Gas
GP	Gravel Pit
ha	Hectare
HSE	Health, Safety and Environment
HSEMS	Health, Safety and Environment Management System
IBA	Important Bird Area
IECA	International Erosion Control Association
JV	Joint Venture
km	Kilometre
km ²	Square Kilometres
km/hr	Kilometre per hour
LACA	Land Access and Compensation Agreement
LCA	Land Condition Assessment
LP	Lease Pad
L/s	Litres per second
m	metre
mAHD	metres Australian Height Datum
mbgl	metres below ground level
MC	Measurement Criteria
ML	Megalitres
ML/y	Megalitres/year
MNES	Matters of National Environmental Significance
mm	millimetre
mTOC	metres Top of Casing
NAFI	Northern Australian Fire Information
NALWTF	Northern Australian Land and Water Task Force
NEPM	National Environment Protection Measure

Definitions/Acronyms	Meaning
NLC	Northern Land Council
NPI	National Pollutant Inventory
NR	Natural Resources
NT	Northern Territory
NTD	Native Title Determination
NT EPA	NT Environment Protection Authority (NT)
NTG	Northern Territory Government
NVIS	National Vegetation Information System
OHS	Occupational Health and Safety
PER	Petroleum Environment Regulations
PMST	Protected Matters Search Tool
PPE	Personal Protective Equipment
PPL	Perpetual Pastoral Lease
PWCNT	Parks and Wildlife Commission Northern Territory
QC	Quality Control
RUSLE	Revised Universal Soil Loss Equation
RWA	Restricted Work Area
SDS	Safety Data Sheet
Sweetpea	Sweetpea Petroleum Pty Ltd
SPM	Spill Management Plan
SPU	Sewerage Processing Unit
SRTM	Shuttle Radar Topography Mission
SSCC	Sacred Site Clearance Certificate
TAGG	Transport Authorities Greenhouse Group
TARP	Trigger Action Response Plan
TIS	Traffic Impact Statement
TMP	Traffic Management Plan
TO/TOS	Traditional Owner/Traditional Owners
TPWC Act	<i>Territory Parks and Wildlife Conservation Act 1976</i>
WAT	Western Access Road
WMP	Weed Management Plan
WoNS	Weeds of National Significance
WMP	Waste Management Plan

Executive Summary

Sweetpea Petroleum Pty Ltd (Sweetpea), is proposing to carry out onshore gas exploration in the Barkly Region, Northern Territory (NT), specifically the area delineated under Exploration Permit 136 (EP136) in the Beetaloo Sub-basin (refer Figure 1). Sweetpea are the Title Holder and Operator of EP136 and a fully owned subsidiary of Tamboran Resources Ltd (Tamboran). Sweetpea's proposed 2022 to 2025 Exploration Work Program includes the civil construction of seven exploration lease pads and their associated access tracks, gravel pits and groundwater monitoring bores in preparation for proposed exploration activities including drilling, fracture-stimulation and testing within the northern part of EP136. The proposed seismic and gravity survey in the 2022 Work Program is covered under the approved Seismic Environment Management Plan (Seismic EMP) (unique identifier number SWP1-04).

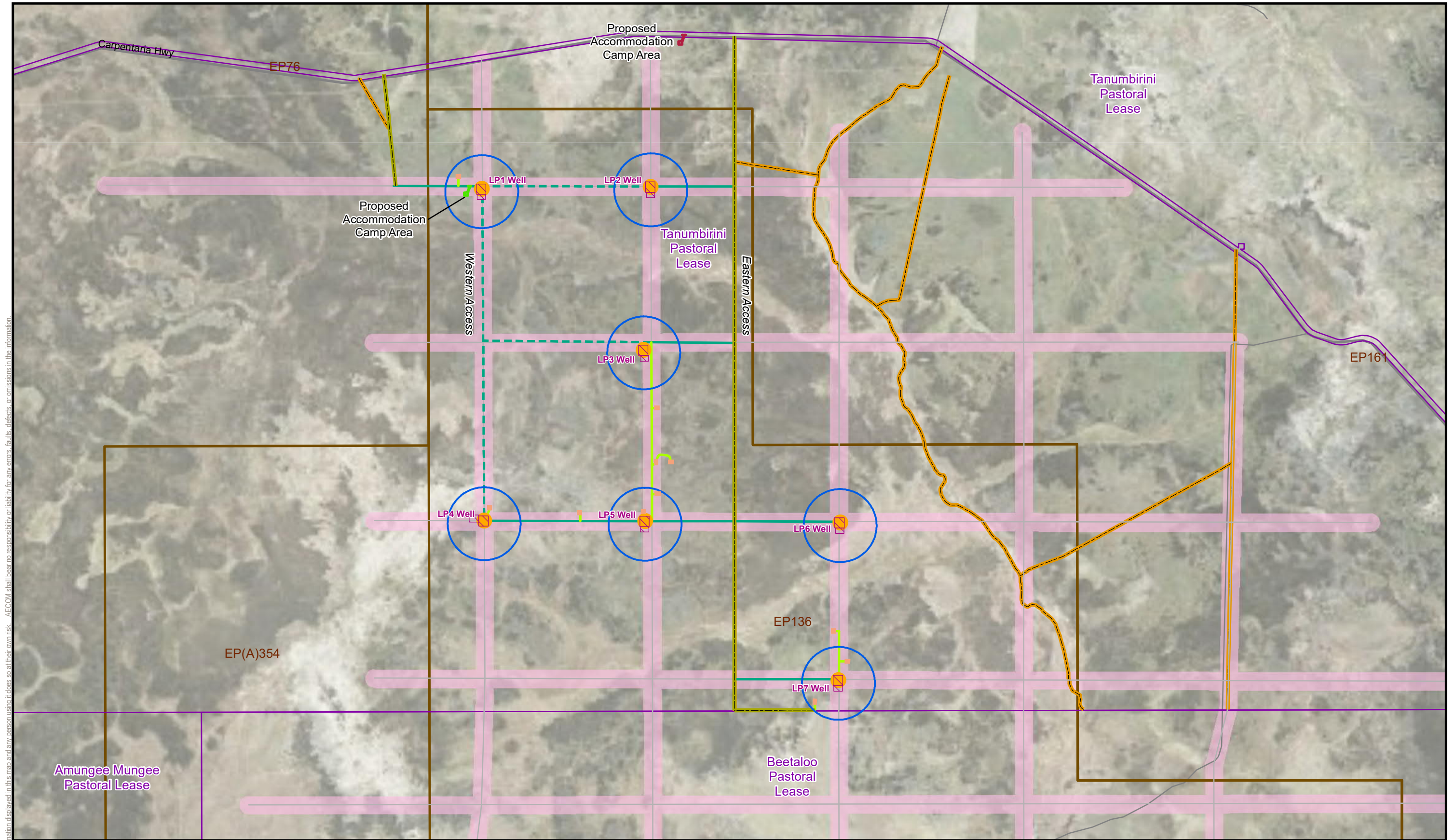
This Civil Construction and Water Bore Drilling Environment Management Plan (C&WB EMP) forms the basis of Sweetpea's application to the Northern Territory (NT) Minister for Environment for the proposed civil construction, groundwater bore drilling and monitoring program. The EMP has been prepared with reference to clauses in the *Schedule of Onshore Petroleum Exploration and Production Requirements*, 1 June 2021, the *Code of Practice: Onshore Petroleum Activities in the NT* (2019), Section 67 of the *NT Petroleum Act* (1984) and the Petroleum Environment Regulations (2016); and with reference to the Exploration Agreement between Sweetpea, Native Title Parties and the Northern Land Council (NLC) for Petroleum Exploration Permits 136 and 143 dated 18 July 2012; and with reference to Sweetpea's Title to EP136 granted on 28 August 2012 and the current title instrument dated 30 November 2021 describing the minimum work program commitments. Sweetpea will extend work program period to 2025 either through an approved renewal of the permit, or suspension of work program conditions for Years 4 and 5 and extension of term.

The overall objective of this EMP is to provide comprehensive strategies to minimise environmental impacts and the risk of any inadvertent adverse outcomes resulting from Sweetpea's civil construction and water bore drilling activities in the Beetaloo Sub-basin. Specifically, the EMP aims to:

- provide a description of the civil construction activities of seven lease pads, including access tracks (regulated activity)
- provide a description of groundwater monitoring bore drilling, including monitoring and water extraction activities at the exploration lease pad areas
- provide a description of site-specific aspects of the existing environment (physical, biological, social, cultural)
- provide site-specific impact management strategies to minimise environment and heritage risks associated with its construction activities, including ongoing monitoring and post-activity rehabilitation measures as well as preventative measures
- be a practical and usable document, with environmental management principles that are accessible, implementable and effective
- reduce environmental impacts and risks to a level that is as low as reasonably practicable (ALARP) and acceptable for the activities being undertaken
- ensure relevant regulatory requirements are addressed.

Regulated Activity Location

The civil construction and groundwater bore drilling activities are located within Tanumbirini Station perpetual pastoral leases (PPL) (NT Portion (Por) 701) in the northern section of EP136. The proposed activities comprise the construction of up to seven exploration lease pads, installation of further two groundwater monitoring and extraction bores at either the constructed exploration lease pads or the accommodation camp, construction access tracks to the exploration lease pads, and up to 10 gravel pits and their associated access track. The total construction footprint could be up between 126 ha to 146 ha (dependent on track options). The location of the exploration lease pads, access tracks, camp and gravel pits are provided in Figure 2. Note that up to 12 groundwater monitoring and extraction bores have been approved for construction under the approved Seismic EMP.



AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.



Projection: GDA 1994 MGA Zone 53

2 1 0 2 km

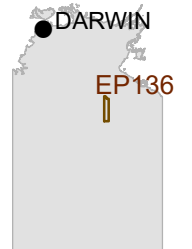
1:100,000 (when printed at A3)



www.aecom.com

- Well Site
- Existing Access
- Gravel Pit Access
- Western Access Option Access
- Eastern Access Option Access
- Seismic Lines - progressively rehabilitated
- Pastoral Track
- Highway
- Roads

- 250 m buffer to Seismic Line
- Gravel Pit Footprints
- Well Lease Area
- 1 km Bore Buffer
- EP136 Proposed Accommodation Camp Option
- Highway Proposed Accommodation Camp Option
- Native Title Register
- Petroleum Exploration Permit



DARWIN

EP136

Data sources:
Imagery: Digital Globe
Permit, Cadastre, Places, Bore - NT Gov 2019.
Pastora Infrastructure - AECOM 2020

Sweetpea Petroleum Pty Ltd,
Civil, Construction & Water Bore EMP

Location of Lease Pads, Gravel Pits,
Camp Pads, Seismic Lines and
Access Tracks

PROJECT ID	60611666
CREATED BY	prachi.kulkarni1
LAST MODIFIED	16-Dec-2021
VERSION	1

A3 size

Figure

2

The geographical coordinates and disturbance area associated with this EMP are provided in Table 1 and presented in Figure 2. The geographical coordinates present the area of disturbance for the seven exploration lease pads, and the options for the main field camp (on or off EP136), the eastern access track (EAT) or the western access track (WAT) and up to 10 gravel pits. The access track options presented in this EMP are clearly shown in Figure 3 (EAT) and Figure 4 (WAT).

Table 1 Geographical coordinates of the Civil Construction Program

Infrastructure	Name	Location Lat/Long	Length (km)	Footprint Area (Ha)	Total Area of Vegetation Clearing (Ha)
Lease Pads					
Lease Pad 1	LP1	-16.517663°, 134.515147°	-	11.0	10.65*
Lease Pad 2	LP2	-16.517668°, 134.558468°		11.0	11.0
Lease Pad 3	LP3alt	-16.558253°, 134.556614°	-	11.0	10.65*
Lease Pad 4	LP4	-16.600557°, 134.515315°		11.0	11.0
Lease Pad 5	LP5new	-16.600649°, 134.556760°	-	11.0	11.0
Lease Pad 6	LP6	-16.600930°, 134.606624°	-	11.0	11.0
Lease Pad 7	LP7	-16.639982°, 134.606535°	-	11.0	11.0
Main Camp Options	Highway Camp	-16.480922°, 134.565871°	-	1.3	0.0*
	LP1 Camp	-16.519364°, 134.510563°			1.3
Lease Pad Disturbance Total			-	78.30	77.60
Lease Pad Access Track Option 1 – Eastern Access, Plus access to Pad 1					
Access into EP136 from Carpentaria Highway	Eastern Access Track (EAT) (existing pastoral track, maintain 18 m class 5 pastoral 2 (type c)), with exception of 0.61 km at RWA2 which is for transit only. Length from Carpentaria Highway to Pad 7 turn-in.		17.65	30.65	0
Access to Lease Pad (LP) LP1	Ingress from the western Carpentaria Highway intersection to LP1 (existing pastoral track and repurposed seismic line 9, with only extra clearing up to 18 m class 5 pastoral 2 (type c))		5.52	9.94	2.43*
Access to LP2	Track off EAT to LP2 (repurposed seismic line 9, with only extra clearing for 18 m class 5 pastoral 2 (type c))		2.18	3.92	2.83*
Access to LP3	Track off EAT to LP3 (repurposed seismic line 8, with only extra clearing 18 m class 5 pastoral 2 (type c))		2.28	4.10	2.28*
Access Tracks to remaining LPs	LP4, LP5, LP6 and LP7 Access Tracks (repurposed seismic line 6 and 7, with only extra clearing for 18 m class 5 pastoral 2 (type c))		11.94	21.49	15.52*
LP Access Track Option 1 Disturbance Total			39.56	70.10	23.06
Access Track Option 2 – Western Access Track					
Access to Lease Pad (LP) LP1	Ingress from the western Carpentaria Highway intersection to LP1 (existing pastoral track and repurposed seismic line 9, with only extra clearing up to 18 m class 5 pastoral 2 (type c))		5.52	9.94	2.48*

Infrastructure	Name	Location Lat/Long	Length (km)	Footprint Area (Ha)	Total Area of Vegetation Clearing (Ha)
Access to LP2	Track from LP1 to LP2 (repurposed seismic line 9, with only extra clearing for 18 m class 5 pastoral 2 (type c))		4.38	7.88	5.69*
North-South Access to LP3, LP4	Western Access Track (WAT) (existing Pastoral Track and repurpose of seismic line 10 between LP1 and LP4. 18 m class 5 pastoral 2 (type c))		9.18	16.52	11.93*
Access to LP3	Track off WAT to LP3 (repurposed seismic line 8, from intersection of WAT to LP3 to 18 m class 5 pastoral 2 (type c))		4.43	7.97	5.76*
Access Tracks to remaining LPs	LP4, LP5, LP6 and LP7 Access Tracks (repurposed seismic line 6 and 7, with only extra clearing for 18 m class 5 pastoral 2 (type c))		11.94	21.49	15.52*
LP Access Track Option 2 Disturbance Total			35.45	63.80	41.38
Gravel Pit Options (Final Gravel Pit Footprint Centre Points)					
Gravel Pit 1	GP1	-16.515163°, 134.508993°	-	2.0	2.0
Gravel Pit 2	GP2	-16.572622°, 134.559877°	-	2.0	2.0
Gravel Pit 3	GP3	-16.586119°, 134.559696°	-	2.0	2.0
Gravel Pit 4	GP4	-16.586022°, 134.563468°	-	2.0	2.0
Gravel Pit 5	GP5	-16.593853°, 134.560048°	-	2.0	2.0
Gravel Pit 6	GP6	-16.597240°, 134.516823°		2.0	2.0
Gravel Pit 7	GP7	-16.598583°, 134.539951°	-	2.0	2.0
Gravel Pit 8	GP8	-16.598259°, 134.556367°	-	2.0	2.0
Gravel Pit 10	GP10	-16.628015°, 134.605151°	-	2.0	2.0
Gravel Pit 11	GP11	-16.635584°, 134.608731°	-	2.0	2.0
Gravel Pit 12	GP12	-16.644924°, 134.600328°	-	2.0	2.0
10 x Gravel Pit Disturbance Total			-	20.0	20.0
Gravel Pit Access					
Gravel Pit (GP) Access Track (8 m wide)	GP Access Track		7.80	6.24	6.24
Access Track Disturbance Total			7.80	6.24	6.24
Total Footprint Option 1 EAT			47.36	174.60	126.90
Total Footprint Option 2 WAT			43.25	168.34	145.22

*disturbance areas of Lease Pad 1, Lease Pad 3, Main Camp and Lease Pad Access Tracks have previously been approved under the Seismic EMP to 8 m. The disturbance area covered by the Seismic EMP will be **absorbed** into the overall Civil Construction and Water Bore EMP, but the total vegetation clearing only accounts for new clearing under this EMP.

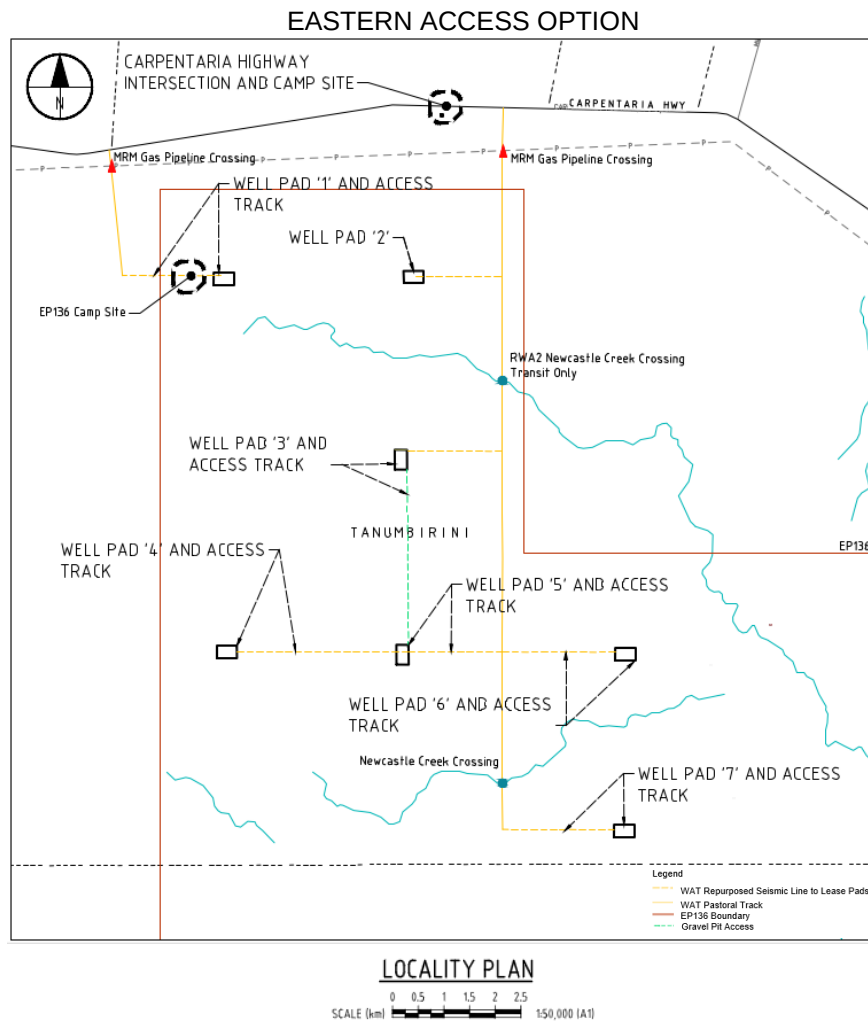


Figure 3 Eastern Access Track, showing existing and repurposed seismic lines

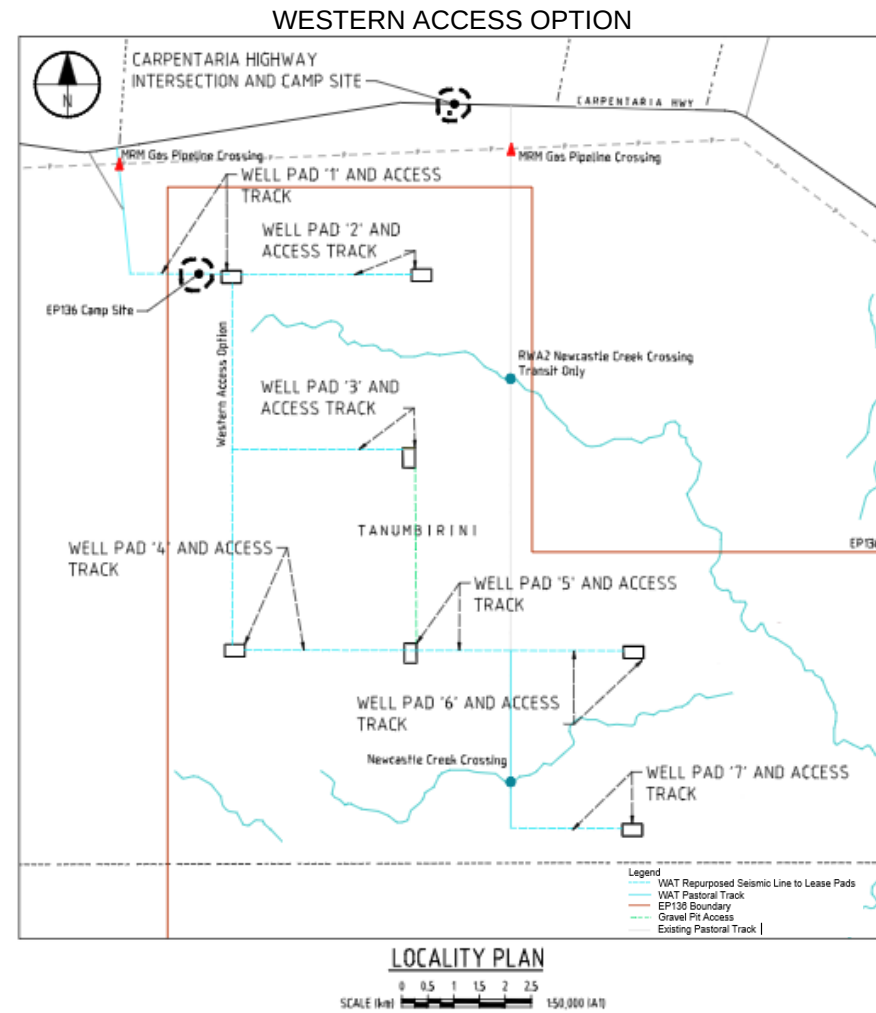


Figure 4 Western Access Track, showing existing and repurposed seismic lines

The civil works program aims to use a combination of two existing pastoral lease tracks that come off the Carpentaria Highway and cleared seismic lines to minimise disturbance areas and avoid the need for additional vehicle crossings within the AAPA certificate C2020/072 restricted work area 2 (RWA2) on Newcastle Creek, which is considered a sensitive area.

Required sections of seismic lines will be formed as class 5 pastoral 2 (type c) unsealed track in accordance with NTG standard drawing CS3003 *Typical cross sections for urban and rural environments* (2017) and will be implemented in accordance with the Erosion and Sediment Control Plan (Appendix K).

Civil Construction Activity Description

Sweetpea intend to construct up to seven exploration lease pads including a well pad and associated water tank pad to support the exploration activities. The exploration lease pads have been sized to accommodate the placement of a drilling rig and provide an area for above-ground water holding ponds or tanks when required. In total, the design of the exploration lease pad area has allowed for approximately 11 ha to be cleared for each lease area, including the provision of firebreaks to reduce the potential risk to infrastructure, as well as accommodate the water monitoring bore pads.

The civil construction works will be required to establish access tracks, exploration lease pads, construct monitoring bores and build ancillary infrastructure including a central accommodation camp for staff undertaking subsequent drilling, fracture-stimulation and testing operations.

The work activities required for the construction of each of the exploration lease pads and access tracks include:

- The installation of exploration lease pad, inclusive of the well pad (280 m x 260 m) and tank pad (230 m x 160 m), including the provision of fire breaks and turning areas for plant and vehicles. The exploration lease pads also include two groundwater monitoring bore pads (50 m x 50 m), as well as the ancillary infrastructure required to conduct activities.
- The installation of access tracks to the exploration lease pad locations. Access tracks are to be situated along existing cleared tracks and the redundant seismic lines where suitable. Two primary access options proposed under this EMP are summarised as follows:
 - Option 1 Eastern Access Track (EAT) – 39.5 km length x 18 m wide, including 17.6 km of existing pastoral track and 21.9 km of repurposed 2D seismic lines.
 - Option 2 Western Access Track (WAT) – 35.2 km length x 18 m wide, including 3.1 km of existing pastoral track and 32.1 km of repurposed 2D seismic lines.

The tank pad will be constructed at every exploration lease pad to hold water used during the planned future drilling and stimulation and returned flowback fluids (subject to a separate EMP). The tank pad will be located alongside the well pad and construction requirements are largely similar without the requirement for a flare pit, cellar and sump.

Eleven gravel pits have been identified, with 10 out of the 11 planned to be used for the construction of exploration lease pads, access tracks and an accommodation camp. Gravel pits will be progressively cleared prior to taking borrow material, with vegetation and topsoil stockpiled separately for future revegetation. Gravel volumes required to be extracted to construct each lease pad and associated tracks will vary but is estimated at approximately 20,500 m³ per lease, with total gravel quantity for entire program estimated at 143,500 m³.

Gravel pits are anticipated to be up to 3 m deep, with final depth dependent on the level of gravel present at each identified gravel site. Gravel pit rehabilitation would commence within 12 months once there is no viable gravel left within the sites. If viable gravel remains within the pit, they would remain open for up to five years for future exploration activities to reduce the ultimate disturbance footprint. Gravel pits will be recontoured back to a stable, safe and non-polluting form at completion of activities.

The primary proposed access track (Figure 2 “Western Access Track”) will utilise an existing track that joins the Carpentaria Highway in the north to the Tanumbirini Station property boundary in the south via an upgraded seismic line. Access to exploration lease pads will branch-off this track.

Access tracks will be constructed as a 6 m gravelled useable running surface with additional approximate 2 m minimum shoulders cleared on either side. Mitre drains and flow control banks (whoa boys) will be installed, where required, to minimise erosion along access tracks table drains. Access track disturbance is estimated to average 18 m in width. The existing pastoral lease track (Figure 2 “Eastern Access”) may be used during civils and water bore drilling, however, no disturbance is anticipated, and no works will occur in RWA2 of Newcastle Creek.

Rock protection may be required to be installed at any floodway’s intersected by access tracks to manage and minimise erosion (no works to be carried out within RWA2 as defined by AAPA Authority Certificate C2020/072, which allows for transit only). Crossings will be bed level crossings, constructed flush with the existing invert level of the specific watercourse.

Crossings may incorporate a stable rock base, stabilised approaches (rock base, ramps, artificial matting or similar) and flow diversion berms (to shed road runoff), designed to be stable in large rainfall events.

Groundwater Bore Drilling and Monitoring Activity Description

Sweetpea plan to install an additional two groundwater bores within the northern survey area of EP136, all on Tanumbirini Station (Figure 2) under the scope of this EMP. The water bores would initially serve for groundwater monitoring to meet the mandatory requirements of section B.4.17 of the *Code of Practice: Onshore Petroleum Activities in the NT* (2019) and/or camp supply bores.

An application for a Bore Work Permit will be made pursuant to section 57 of the *Water Act 1992*. The groundwater monitoring bores will be constructed on water bore pads within the overall exploration lease pad or proposed camp pad in accordance with DEPWS requirements including the Code of Practice, the *Preliminary Guideline: Groundwater Monitoring Bores for Exploration Petroleum Wells in the Beetaloo Sub-basin* and the *Minimum Construction Requirements for Water Bores in Australia 4th Edition*, 2020 (<https://www.adia.com.au/documents/item/290>).

The Code of Practice requires that each discrete groundwater aquifer at the proposed exploration well location is monitored. Based on information on regional aquifers and other water bores in the area, it is expected that to comply with this requirement groundwater monitoring bores will be required at each exploration well site to monitor the aquifers typically found in the Cambrian Limestone Aquifer (CLA), the Gum Ridge and Anthony Lagoon formations, with a depth of ~100 m to ~400 m BGL depth. Additional aquifers (such as recently described Bukalara Formation) may also be present within the area which may require additional water bores to be installed.

The water monitoring bores designated the “control” bores at each well location are to be located ‘upstream’ of the regional groundwater flow which is generally in a south to north / north-west direction in the Beetaloo Basin with the additional “impact” monitoring bores located “downstream” of the groundwater flow.

The construction of the water bores will require approximately 0.05 megalitres (ML) of water per bore installation. A water extraction licence has been awarded in accordance with the *Water Act 1992*. The water extraction licence covers water bore installation, civil construction and future exploration activities from 2021-2025 as required. Potable water would either be carted to site from a commercially available water supply source or from onsite water bores (depending if meets potable drinking water quality guidelines).

The bores will be gamma logged and the screening interval of each monitoring bore will be determined in consultation with DEPWS Water Assessment Branch. Each bore will be surveyed to Australian Height Datum (AHD) with accuracy to ± 10 cm.

Groundwater monitoring events will be undertaken by suitably qualified and trained personnel as required by the Code of Practice and will follow standard industry practice including the draft *Preliminary Guideline: Groundwater Monitoring Bores for Petroleum Wells in the Beetaloo Basin*, the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC Guidelines) and *AS/NZ5667.1: 1998. Water Quality - Sampling Guidance on sampling of groundwaters*.

All water bore infrastructure will stay within the AAPA approved clearance buffer zones and there are no existing other or pastoral leaseholder bores within 1 km of the well locations (Figure 2).

Proposed Schedule

Civil construction activities, including water bore drilling activities are planned to commence in March 2022 and continue over a four-year period to 2025 (refer Section 3.1 for detailed schedule). It is noted that the schedule may be varied based on the interpretation of results from the seismic survey that will determine the preferred sequence of drilling on each lease pad.

This EMP activities indicative schedule is summarised below, however, the schedule could be impacted by factors such as Covid19, equipment availability, exploration activity results, and/or land access negotiations and timing of commencement of regulated activities. Note that up to 12 monitoring bores and associated water bore pads are covered by the existing approved Seismic EMP so are not included in the below schedule.

- 2022 Mar/Apr - December:
 - Establish an access junction at Carpentaria Highway and construct the access for entry to the Permit tracks.
 - Establish gravel pits to provide material for improving the stability of the access tracks and constructing well site pad areas.
 - Construct access track to Lease Pad 1, Lease Pad 3 and Lease Pad 4 to enable to the construction of well and water tank pads, and the main camp pad at primary option Lease Pad 1 Camp or re-occupy the Highway Camp (Figure 2).
 - Construct well and water tank pad at Lease Pad 1, Lease Pad 3 and Lease Pad 4.
 - Install water monitoring bores as required (prior to stimulation operations).
 - Construct, upgrade and maintain other access tracks as per Figure 2 to Lease Pad 2, which may include an access junction at the Carpentaria Highway and the EAT (which is an existing pastoral access track).
 - Construct well and water tank pad at Lease Pad 2.
- 2023 Mar/Apr - December:
 - Establish gravel pits to provide material for improving the stability of the access tracks.
 - Construct access tracks to Lease Pad 5 and Lease Pad 6 respectively to enable the construction of well and water tank pads.
 - Construct well and water tank pad each at Lease Pad 5 and Lease Pad 6.
 - Install water monitoring bores as required (prior to stimulation operations).
- 2024 Mar/Apr - December:
 - Construct access track to Lease Pad 7.
 - Install water monitoring bores as required.
 - Construct well and water tank pad at Lease Pad 7.
 - Install water impact monitoring bores as required (prior to stimulation operations).
- 2025 April - December:
 - Install water monitoring bores as required at Lease Pad 7 (prior to stimulation operations).

Past experience in the permit area indicates that extended rainfall events (i.e. monsoonal rains), that have the potential to limit access, usually don't start until mid-December. However, Sweetpea will implement their wet weather contingency plan as detailed in Section 7.2 should activities continue past 1 October each year.

Sacred Site Clearance Certificate

Sweetpea were issued an Aboriginal Areas Protection Authority (AAPA) Certificate for activities authorised by the *Petroleum Act 1984 (NT)* for petroleum exploration (reference RA2020/14-C2020/072 (AC2020/072)).

AC2020/072 was issued following AAPA completing research and conducting meetings in June and July 2020, engaging with senior people in Katherine, Mataranka, Minyerri, Marlinja and Elliott about Sacred Sites and the works proposed by Sweetpea. The AAPA researcher confirmed what Sacred Sites are in the area and who has knowledge about the Sacred Sites that may need protection.

On-country field surveys were also completed with knowledgeable people, using 4WD vehicles and a helicopter. The field survey focused on confirming where the Sacred Sites are and recording the wishes of senior people about how the sites can be protected.

AC2020/072 allows all civil construction and water bore activity proposed under this EMP except for minor works to the intersection of Newcastle Creek in restricted work area 2 (RWA2). AC2020/072 allows for 'transit only' across RWA2 at Newcastle Creek on the existing pastoral lease track. Sweetpea have been engaged with AAPA throughout 2021 to seek authority to undertake minor works at RWA2 crossing to ensure it is suitable for use during wet weather, however, due to Covid19 and other operational delays, AAPA have not been able to conduct custodian consultation and is now rescheduled to occur in early 2022. Sweetpea's contingency plan to the 'transit only' limitation is considered under this EMP, including provision of two access options, western access track (WAT) or the eastern access track (EAT). Sweetpea are committed to meeting the conditions specified in the AAPA certificate to ensure risks to sacred sites and the identified Restricted Work Area are managed.

Existing Environmental Factors

The northern exploration area is typically dominated by *Corymbia* and *Eucalyptus* woodlands and tall shrublands and woodlands of Bullwaddy (*Macropteranthes kekwickii*) and Lancewood (*Acacia shirleyi*) with open grassland understorey. On alluvial plains and in drainage areas *Eucalyptus chlorophylla*, *E. microtheca* and *E. pruinosa* low woodlands occur, while on the plains *Corymbia dichromophloia* and *C. terminalis* open woodlands are more dominant.

A search of the Department of Agriculture, Water and the Environment (DAWE) Protected Matters database on Matters of National Environmental Significance (MNES), the NT Government natural resource database, and records from the Atlas of Living Australia (ALA) was undertaken for the civil construction area with a 10 km buffer applied. No threatened vegetation communities are listed as likely to occur within the civil construction area.

A land condition assessment (LCA) and cultural heritage assessment were completed in November 2019 and again in May 2020 by AECOM Australia Pty Ltd (AECOM) scientist and heritage consultants. The LCA identified the ecological conditions and documented the exploration area prior to Sweetpea commencing construction and exploration activities. A copy of the Land Condition report is presented in Appendix C. The cultural heritage assessment is summarised in Section 4.3.

The information obtained during field surveys has provided a benchmark of land condition that at completion will be the target for rehabilitation success. The heritage assessment also identified the surface expression of Aboriginal archaeology and potential cultural heritage values within or near the proposed activity footprint that will require specific management measure and controls to minimise impacts.

Weeds were not detected within the civil construction area during the land condition assessment survey. A population of Hyptis (Class B – spread to be controlled) was identified to a creek system situated on the eastern side of the exploration area and does not occur within the civil construction area.

The anticipated environmental factors have been assessed through the course of the EMP preparation. The environmental risks associated with the civil construction and water bore drilling activities program have been identified in a thorough hazard identification and risk assessment process applied for the suite of exploration activities described above. The completion of the LCA and heritage survey informed the risk assessment process and mitigations required to manage risk to the environment.

The contingent access and main camp options presented under this EMP do not materially change the assessment of risks and the overall impacts of the proposed exploration activities to environmental, heritage and social factors, including Native Title Parties and the pastoral operations in the permit area is considered low due to the project controls specified in this EMP.

The environmental, heritage and social factors will be managed through the implementation of a range of tried and tested mitigation measures that reduce the risk of environmental harm and impacts to as low as reasonably practicable (ALARP) and are considered acceptable.

A summary of the existing environment encountered with the proposed exploration area is presented in Section 4.0 of this EMP, with detailed land condition description presented in Appendix C.

Environmental Impacts and Inherent Risks

The impact causing activities and their relative likelihood of occurrence are summarised in Table 2. The inherent risk assessment results are based on the proposed exploration activities and the timescale for land disturbance. The full risk assessment is presented in Section 6.0 of the EMP and Appendix E.

Table 2 Civil Construction and Water Bore Activity Inherent Risk Assessment Results

Activity	Environmental Factors									
	Disturbance						Pollution			
	Land / Waterways	Bushfire	Flora, Vegetation & Weeds	Fauna & Habitat	Heritage	People and Communities	Water	Soil	Air	Noise
Main Camp Construction	Low	Medium	Low	Low	Low	Medium	Low	Low	Low	Low
Main Camp Operation	Low	Medium	Low	Low	Low	Medium	Low	Low	Low	Low
Access Track Construction	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Low	Low
Lease Pad Construction	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Low	Low
Gravel Pit Development	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Low	Low
Groundwater extraction/use	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Groundwater Monitoring Bore Drilling	Medium	Low	Low	Low	Low	Medium	Low	Low	Low	Low
Wet Weather Activities	Medium	Low	Low	Low	Low	Low	Low	Low	Low	Low

Medium risks identified are consistent with standard project and pastoral activities completed across the NT, being the potential for the spread of weeds, risk of erosion and sedimentation and the ignition of bushfires from proposed activities. The assessment provided in Section 7.1 and Appendix E, demonstrates that the risks associated with civil construction and water bore drilling activities have been reduced to as low as reasonably practicable and are considered acceptable.

The activity that has the potential to be the greatest source of environmental impact is the clearing native vegetation and disturbance of soils for the construction of lease pads, access tracks and gravel pits. This is due to the associated loss of vegetation, loss of habitat and the possibility of soil destabilisation, creating erosion and sedimentation risks, the potential weed establishment areas and bushfire risk.

Sweetpea have designed the lease pads and access tracks to use, where possible, existing tracks and roads, including repurposing the seismic lines. It is noted that seismic lines to be retained for access to lease pads and gravel pits will be retained and formed as a class 5 pastoral 2 (type c) unsealed track in accordance with NTG standard drawing CS3003 *Typical of cross sections for urban and rural environments* (2017) and will be implemented in accordance with Appendix K.

The EMP also considers the annual onset of the wet season and have developed a wet weather contingency plan to minimise activities impact on the environment. Further details of wet weather contingencies have been considered in Section 7.2 and Appendix K.

The LCA and cultural heritage assessment have both identified sensitive habitats and no-go areas that will be avoided during the exploration activities. The construction vehicles and equipment will all be mounted with GPS to identify the civil construction footprint and any exclusion zones and associated buffers. The conditions of the AAPA Authority Certificate will be adhered to by Sweetpea and their contractors.

At the completion of exploration activities, the disturbance areas will be rehabilitated in accordance with the Rehabilitation Plan detailed in Section 9.0 and Appendix F.

Environmental Outcomes

Overall Sweetpea will manage impacts through a range of best practice measures as described in the *Schedule of Onshore Petroleum Exploration and Production Requirements 2021* and the *Code of Practice: Onshore Petroleum Activities in the Northern Territory (2019)*.

Under the *Environment Protection Act 2019*, proposed projects that may have a significant effect on the environment are to be referred to the Northern Territory Environment Protection Authority (NT EPA) for assessment. Sweetpea has conducted a self-assessment using the NT EPA *Draft Guideline, Referring a Proposal to the NT EPA*, dated 10 March 2020 which is provided in Appendix B. The assessment is based on consideration of the potential significant impacts of the activities on the indicative environmental values for each of the NT EPA's factors and objectives.

Based on the self-assessment, Sweetpea is of the view that the activities covered by this EMP do not trigger referral to the NT EPA under the *Environment Protection Act 2019*.

The Civil Construction and Water Bore EMP contains several issue-specific management plans that each provide:

- a summary of the potential impacts
- the management objectives
- site-specific information (where applicable)
- monitoring requirements (where applicable)
- management actions, including timing and responsibilities.

Issue-specific EMPs have been developed for the following risk factors:

- land management (includes soil, erosion and sediment control measures)
- weeds
- bushfire
- waste
- spill prevention
- noise, vibration and lighting emissions
- air quality and emissions
- vegetation, flora and fauna habitat
- feral animals and other pest species
- social environment and access

- cultural heritage and Sacred Sites.

An Implementation Strategy is included which integrates with Sweetpea's systems and policies, specifically its Health, Safety and Environment Management System (HSEMS). As such, this EMP integrates into this wider system, specifically related to the following extant Sweetpea procedures:

- weed management
- refuelling procedures
- procedures for avoidance of potential fauna habitat and any identified heritage sites
- process for rehabilitation.

In addition, induction requirements, reporting requirements, incident management, environmental monitoring, auditing and review procedures are presented in the Implementation Strategy.

Regulated Activity Stakeholders

Sweetpea commenced consultation in July 2019 with key stakeholders that will be directly affected by the environmental impacts or environmental risks associated with the proposed exploration work program activities. Sweetpea have informed stakeholders of the intended program over the course of the EMP development. The identified stakeholders specific to this EMP include:

- The perpetual pastoral lease owner and their delegates for Tanumbirini Station, on whose property the activities will be undertaken upon.
- The neighbouring perpetual pastoral lease owners and their delegates for Beetaloo Station.
- The Traditional Owners (TOs) and Aboriginal People facilitated through the Northern Land Council (NLC).
- Gas pipeline operator, OSD Pipelines, where Sweetpea will require works approval to allow civil construction equipment to cross over the underground pipeline.
- The neighbouring exploration permit operators including Origin Energy Pty Ltd to the west (EP76), and Santos Ltd to the north and east (EP161).
- Northern Territory Government (NTG) departments including the Transport and Civil Services Division of Department of Infrastructure Planning and Logistics (DIPL) for access to road corridor permits and if intend to extract from NTG road bores, Department of Industry, Tourism and Trade (DITT) for the access authority to the neighbouring permit currently under application to the west (EP(A)354) and Department of Environment, Parks and Water Security (DEPWS) Water Resource Division in relation to groundwater monitoring requirements and water extraction.

As Sweetpea's level of activities increase in the permit area over the coming years, further stakeholders may be identified and will be engaged with as required. Sweetpea have maintained records of all interactions and communications with relevant stakeholders and will continue to do so over the life of the proposed exploration activities.

Current and Future Stakeholder Engagement

Community and stakeholder engagement is a fundamental obligation of Sweetpea in relation to the proposed work programs within EP136. Sweetpea's stakeholder and community engagement for the exploration program commenced in mid-July 2019 with the pastoral leaseholders on who's land the activities occur (and their delegates) and the NLC, who represent the Traditional Owners and Aboriginal People on whom the activities may impact. This engagement has continued over the course of the EMP development, including arrangements with the station managers for the safe conduct of baseline investigations during November 2019, May 2019 and again in November 2020.

Sweetpea has endeavoured to clearly communicate to all interested parties via telephone calls, emails and face-to-face meetings wherever possible. The COVID-19 Pandemic did have some impact on the stakeholder engagement process which resulted in delays to the AAPA on-country consultation and surveys, as well as the work program meetings with Traditional Owners facilitated by the NLC in accordance with the exploration agreement for EP136. The following summarises AAPA and NLC consultations conducted for all of Sweetpea's intended exploration activities:

- AAPA Sacred Site Clearance:
 - Sweetpea applied for an AAPA Authority Certificate for EP136 in February 2020.
 - Minor modifications to activity and survey area following delays due to COVID-19 in May 2020.
 - AAPA Anthropologist conducted meetings in June 2020, speaking to senior people in Katherine, Mataranka, Minyerri, Marlinja and Elliott about Sacred Sites and the works proposed by Sweetpea. The AAPA researcher confirmed what Sacred Sites are in the area and who has knowledge about the Sacred Sites that may need protection.
 - In July 2020, AAPA followed up with an on-country field survey with knowledgeable people, using 4wd vehicles and a helicopter. The field survey focused on confirming where the Sacred Sites are and recording the wishes of senior people about how the sites can be protected.
 - Authority Certificate issued for Sweetpea to conduct planned activities (reference C2020/072).
 - In November 2020, Sweetpea engaged with AAPA in relation to the conditions specified in the Authority Certificate, in particular conditions that restricted the planned program of works. Sweetpea determined that further clarification was required where Sweetpea intended to utilise the existing pastoral track on Tanumbirini Station where it crosses Newcastle Creek. The condition in the AAPA certificate allowed for "transit only", and did not specifically mention ability to upgrade and maintain this crossing point to ensure it remains in good condition.
 - Sweetpea applied for a new AAPA Authority Certificate for the northern area of EP136 in February 2021 which aimed to expand the planned activities, as well as clarify conditions of the issued Certificate. On-Country consultation were scheduled for June/July 2021 which were put on hold due to access issues encountered by AAPA.
 - Further engagement with AAPA resulted in the February 2021 application to be withdrawn and a new application requested in August 2021. It is understood the works by AAPA researchers remained valid from the previous application and would be used for the development of conditions for the new application. AAPA on-country consultations for the new application, which was scheduled from 29 November 2021 to 6 December 2021, has again been delayed due to a COVID 19 outbreak in some communities in the greater Katherine area. AAPA have advised rescheduling early in 2022.
- Northern Land Council work program meetings:
 - Under the Exploration Agreement between Sweetpea and the host Traditional Owners and NLC, Sweetpea are required to undertake work program meetings for each year's proposed activities.
 - Sweetpea have completed two Work Program Meetings facilitated by the NLC in August 2020 and in October 2021.
 - The 2020/2021 Work Program Meeting was held between 10 August and 14 August 2020 at Tennant Creek, Elliott and Mataranka which covered Sweetpea's intended exploration program over the next 5 years. A focus of this meeting was on seismic program, but also covered water bore drilling and monitoring and future exploration drilling.
 - The 2021/2022 Work Program Meeting was held between 27 October and 29 October 2021 at Katherine, Elliott and Tennant Creek. A final meeting was scheduled for 17 November 2021 in Darwin, however, is currently on hold due to COVID 19 cases in the NT. The NLC intend to reschedule as soon as possible.
 - The NLC facilitate the work program meetings and make arrangements for the appropriate Traditional Owners to attend. During 2020, ~60 Traditional Owners were in attendance over the four days, with similar numbers in 2021.
 - Work program meetings will continue over the duration of Sweetpea's exploration program to provide update to the Traditional Owners.

Sweetpea is continuing the process of negotiating or resolving the Pastoral Land Access and Compensation Agreement (LACA) with the relevant pastoral station in accordance with sections 65, 81 and 82 of the *Petroleum Act 1984*. Sweetpea expects that a LACA may ultimately be determined through the Northern Territory Civil and Administrative Tribunal (NTCAT), as per the Act; however, Sweetpea always remain open to determining a LACA through negotiations. Sweetpea have considered the possible consequences of carrying out the planned exploration on the pastoral operations and have indicated a range of measures that will be implemented to minimise impacts.

Sweetpea will continue to engage with Stakeholders, in particular pastoral leaseholders and Traditional Owners in the lead up to the civil construction program and future exploration planning. It is anticipated that open lines of communications with Pastoralists will be maintained during the program.

Full details of the Stakeholder Engagement is presented in Section 5.0 and Appendix J of this EMP.

1.0 Introduction

1.1 Background

Sweetpea Petroleum Pty Ltd ("Sweetpea"), the Native Title Parties and the Northern Land Council ("NLC") are parties to the Exploration Agreement for Petroleum Exploration Permits 136 ("EP136") dated 18 July 2012 ("Exploration Agreement"). Sweetpea is the registered holder of a 100% interest in EP136 in the Beetaloo Sub-basin (Figure 5) and a fully owned subsidiary of Tamboran Resources Ltd (Tamboran), an ASX listed Australian exploration and production company.

Sweetpea was granted title to EP136 on 28 August 2012 and the Current Instrument setting out the permit term and minimum work program requirements is dated 30 November 2021. In current Permit Year 4 (ending 27 August 2022) Sweetpea is required to carry out at least the minimum of 60 km 2D seismic survey and drill one vertical exploration well. In Permit Year 5 (ending 27 August 2023) the minimum work program requires Tamboran to re-enter a vertical exploration well, side-track, drill a horizontal well, conduct hydraulic fracturing, complete and test; and an assessment of petroleum resource potential. Sweetpea will extend the work program period to 2025 either through an approved renewal of the permit, or suspension of work program conditions for Years 4 and 5 and extension of term.

Sweetpea's proposed 2022 to 2025 Exploration Work Program includes the civil construction of seven exploration lease pads and their associated access tracks, gravel pits (up to 10) and groundwater monitoring bores (up to two) in preparation for drilling, fracture-stimulation and testing activities within the northern part of EP136. The proposed seismic and gravity survey in the 2022 Work Program is covered under the approved Seismic EMP (unique identifier number SWP1-04). It is noted that the drilling and testing exploration activities proposed by Sweetpea will be subject to a separate Environment Management Plan (EMP) submission and are not covered in this Civil Construction and Water Bore Drilling Environment Management Plan (EMP).

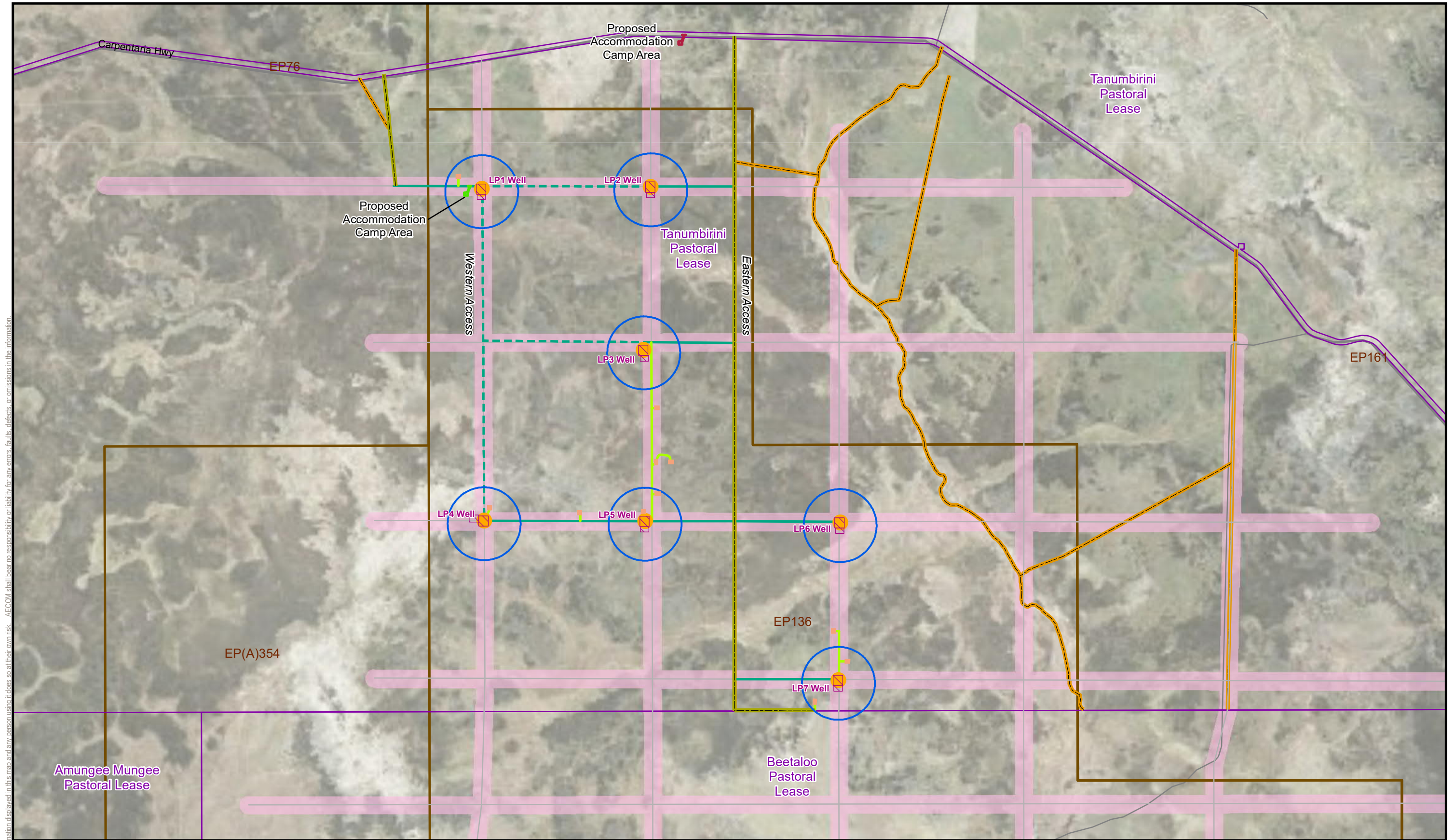
The location for civil construction and water bore activities planned for 2022 to 2025 is shown in Figure 6. These activities will be carried out on the Tanumbirini Station perpetual pastoral lease.

This Civil Construction and Water Bore Environment Management Plan (EMP) forms the basis of Sweetpea's application to the Northern Territory (NT) Minister for Environment for the proposed civil construction and water bore drilling program. The EMP has been prepared with reference to clauses in the Schedule of Onshore Petroleum Exploration and Production Requirements 2021, the Onshore Petroleum Activities in the NT Code of Practice (2019), Section 58 of the *NT Petroleum Act* (1984) and the Petroleum Environment Regulations (2016) and Exploration Agreements between Sweetpea, Native Title Holders and the Northern Land Council (NLC).

1.2 Project Proponent

The proponent for the project is Sweetpea Petroleum Pty Ltd (Sweetpea) as Title Holder and Operator of EP136. The contact details are provided below:

Company	Sweetpea Petroleum Pty Ltd
ABN	42 074 750 879
EMP Name	Civil Construction and Water Bore EMP, EP136 - Beetaloo Sub-basin, NT
Unique Identity No.	SWP2-3
Primary Contact	Gibson Porkime NT Operations Manager
Phone	+61 420 699 893
Email	Gibson.porkime@tamboran.com
Registered Postal Address	Tamboran Resources Limited GPO Box 4025 Darwin, NT 0801 Australia



AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.

Projection: GDA 1994 MGA Zone 53

2 1 0 2 km

1:100,000 (when printed at A3)

www.aecom.com

- Well Site
- Existing Access
- Gravel Pit Access
- Western Access Option Access
- Eastern Access Option Access
- Seismic Lines - progressively rehabilitated
- Pastoral Track
- Highway
- Roads

- 250 m buffer to Seismic Line
- Gravel Pit Footprints
- Well Lease Area
- 1 km Bore Buffer
- EP136 Proposed Accommodation Camp Option
- Highway Proposed Accommodation Camp Option
- Native Title Register
- Petroleum Exploration Permit

DARWIN

EP136

Data sources:
Imagery: Digital Globe
Permit, Cadastre, Places, Bores - NT Gov 2019.
Pastora Infrastructure - AECOM 2020

Sweetpea Petroleum Pty Ltd,
Civil, Construction & Water Bore EMP

Location of Lease Pads, Gravel Pits,
Camp Pads, Seismic Lines and
Access Tracks

PROJECT ID 60611666
CREATED BY prachi.kulkarni1
LAST MODIFIED 16-Dec-2021
VERSION 1

Figure 6

A3 size

1.3 Project Description

The regulated activities subject to this EMP include:

- land and vegetation clearing to allow construction of seven lease pads, access tracks, accommodation camp and gravel pits
- use, maintenance and upgrade (where required) of the existing pastoral access tracks for purpose of access into the permit area
- repurpose sections of seismic line 6, 7, 8, 9 and 10 for access tracks to the lease pads from either the eastern access track or the western access track.
- construction and operation of accommodation camp to support personnel undertaking construction works and future operations
- construction of seven (7) exploration lease pads, including drill pad and tank pad and access tracks to each exploration lease pad
- the installation of an additional two groundwater bores within the northern survey area of EP136 (noting that up to 8 groundwater bores are approved under the Seismic EMP activities on Tanumbirini Station, and another 4 groundwater bores on Beetaloo Station)
- water extraction at the exploration lease pads for civil construction operations and on-going camp operations (extraction under an approved water extraction licence under the NT *Water Act 1992*)
- routine and ongoing maintenance of any infrastructure and or services
- resource extraction of up to ten (10) gravel pits to support the construction of access tracks, exploration lease pads and the accommodation camp
- monitoring and work-over activity
- minor works ancillary to those mentioned above including routine ongoing monitoring and maintenance of infrastructure and or services.

The future exploration activities of well drilling, fracture-stimulation and well testing will be the subject of a separate EMP submission.

1.4 Project Location and Footprint

The location of the civil construction and water bore drilling program is located within Tanumbirini Station perpetual pastoral lease (PPL) (NT Portion (Por) 701) in the northern section of EP136 (Figure 5).

The footprint of the construction program is detailed in Table 3 and the location of the proposed access tracks, lease pad areas, accommodation camp options and up to 10 gravel pits is provided in Figure 6. The total construction footprint could be up between 129 ha to 148 ha (dependent on track options and final camp placement).

Table 3 Civil Construction Footprint

Infrastructure	Name	Location Lat/Long	Length (km)	Footprint Area (Ha)	Total Area of Vegetation Clearing (Ha)
Lease Pads					
Lease Pad 1	LP1	-16.517663°, 134.515147°	-	11.0	10.65*
Lease Pad 2	LP2	-16.517668°, 134.558468°		11.0	11.0
Lease Pad 3	LP3alt	-16.558253°, 134.556614°	-	11.0	10.65*
Lease Pad 4	LP4	-16.600557°, 134.515315°		11.0	11.0
Lease Pad 5	LP5new	-16.600649°, 134.556760°	-	11.0	11.0
Lease Pad 6	LP6	-16.600930°, 134.606624°	-	11.0	11.0

Infrastructure	Name	Location Lat/Long	Length (km)	Footprint Area (Ha)	Total Area of Vegetation Clearing (Ha)
Lease Pad 7	LP7	-16.639982°, 134.606535°	-	11.0	11.0
Main Camp Options	Highway Camp	-16.480922°, 134.565871°	-	1.3	0.0*
	LP1 Camp	-16.519364°, 134.510563°			1.3
Lease Pad Disturbance Total			-	78.30	77.60
Lease Pad Access Track Option 1 – Eastern Access, Plus access to Pad 1					
Access into EP136 from Carpentaria Highway	Eastern Access Track (EAT) (existing pastoral track, maintain 18 m class 5 pastoral 2 (type c)), with exception of 0.61 km at RWA2 which is for transit only. Length from Carpentaria Highway to Pad 7 turn-in.		17.65	30.65	0
Access to Lease Pad (LP) LP1	Ingress from the western Carpentaria Highway intersection to LP1 (existing pastoral track and repurposed seismic line 9, with only extra clearing up to 18 m class 5 pastoral 2 (type c))		5.52	9.94	2.43*
Access to LP2	Track off EAT to LP2 (repurposed seismic line 9, with only extra clearing for 18 m class 5 pastoral 2 (type c))		2.18	3.92	2.83*
Access to LP3	Track off EAT to LP3 (repurposed seismic line 8, with only extra clearing 18 m class 5 pastoral 2 (type c))		2.28	4.10	2.28*
Access Tracks to remaining LPs	LP4, LP5, LP6 and LP7 Access Tracks (repurposed seismic line 6 and 7, with only extra clearing for 18 m class 5 pastoral 2 (type c))		11.94	21.49	15.52*
LP Access Track Option 1 Disturbance Total			39.56	70.10	23.06
Access Track Option 2 – Western Access					
Access to Lease Pad (LP) LP1	Ingress from the western Carpentaria Highway intersection to LP1 (existing pastoral track and repurposed seismic line 9, with only extra clearing up to 18 m class 5 pastoral 2 (type c))		5.52	9.94	2.48*
Access to LP2	Track from LP1 to LP2 (repurposed seismic line 9, with only extra clearing for 18 m class 5 pastoral 2 (type c))		4.38	7.88	5.69*
North-South Access to LP3, LP4	Western Access Track (WAT) (existing Pastoral Track and repurpose of seismic line 10 between LP1 and LP4. 18 m class 5 pastoral 2 (type c))		9.18	16.52	11.93*
Access to LP3	Track off WAT to LP3 (repurposed seismic line 8, from intersection of WAT to LP3 to 18 m class 5 pastoral 2 (type c))		4.43	7.97	5.76*
Access Tracks to remaining LPs	LP4, LP5, LP6 and LP7 Access Tracks (repurposed seismic line 6 and 7, with only extra clearing for 18 m class 5 pastoral 2 (type c))		11.94	21.49	15.52*
LP Access Track Option 2 Disturbance Total			35.45	63.80	41.38

Infrastructure	Name	Location Lat/Long	Length (km)	Footprint Area (Ha)	Total Area of Vegetation Clearing (Ha)
Gravel Pit Options (Final Gravel Pit Footprint Centre Points)					
Gravel Pit 1	GP1	-16.515163°, 134.508993°	-	2.0	2.0
Gravel Pit 2	GP2	-16.572622°, 134.559877°	-	2.0	2.0
Gravel Pit 3	GP3	-16.586119°, 134.559696°	-	2.0	2.0
Gravel Pit 4	GP4	-16.586022°, 134.563468°	-	2.0	2.0
Gravel Pit 5	GP5	-16.593853°, 134.560048°	-	2.0	2.0
Gravel Pit 6	GP6	-16.597240°, 134.516823°		2.0	2.0
Gravel Pit 7	GP7	-16.598583°, 134.539951°	-	2.0	2.0
Gravel Pit 8	GP8	-16.598259°, 134.556367°	-	2.0	2.0
Gravel Pit 10	GP10	-16.628015°, 134.605151°	-	2.0	2.0
Gravel Pit 11	GP11	-16.635584°, 134.608731°	-	2.0	2.0
Gravel Pit 12	GP12	-16.644924°, 134.600328°	-	2.0	2.0
10 x Gravel Pit Disturbance Total			-	20.0	20.0
Gravel Pit Access					
Gravel Pit (GP) Access Track (8 m wide)	GP Access Track		7.80	6.24	6.24
Access Track Disturbance Total			7.80	6.24	6.24
Total Footprint Option 1 EAT			47.36	174.60	126.90
Total Footprint Option 2 WAT			43.25	168.34	145.22

*disturbance areas of Lease Pad 1, Lease Pad 3, Main Camp and Lease Pad Access Tracks have previously been approved under the Seismic EMP to 8 m. The disturbance area covered by the Seismic EMP will be **absorbed** into the overall Civil Construction and Water Bore EMP, but the total vegetation clearing only accounts for new clearing under this EMP.

1.5 Land Tenure and Access

1.5.1 Government Departments

Sweetpea requires Access Authority (AA 9) from the Department of Industry, Tourism and Trade (DITT) for conduct of regulated activities outside of the permit tenure. Sweetpea has applied for an AA 9 to access areas outside of EP136 for regulated activities associated with main accommodation camp just off the Carpentaria Highway. No activities will be undertaken beyond the borders of EP136 without an approved AA 9, other than maintaining access into the permit.

Sweetpea have engaged with the Northern Land Council (NLC) and NT Government on the required agreements with registered native title parties' body corporate, NLC and the NTG, prior to the AA 9 title being granted.

1.5.2 Pastoral Properties

The construction activities are entirely contained within the Tanumbirini Station PPL. Sweetpea has undertaken consultation with Tanumbirini Station to arrange access to undertake reconnaissance and scouting work on the property, including the baseline environmental and heritage assessments which informed this EMP.

Sweetpea provided a cover letter and a copy of the draft Civil and Water Bore EMP on 2 February 2021 to the owners of Tanumbirini Station (and neighbouring Beetaloo Station), informing them of civil construction and water bore activities (the regulated activity), anticipated environmental impacts and risks, environmental outcomes and consequences for the pastoralist's activities.

Sweetpea is continuing the process of negotiating or resolving the Pastoral Land Access and Compensation Agreement (LACA) with the relevant pastoral station in accordance with sections 65, 81 and 82 of the *Petroleum Act 1984*. Sweetpea expects that a LACA may ultimately be determined through the Northern Territory Civil and Administrative Tribunal (NTCAT), as per the Act; however, Sweetpea always remain open to determining a LACA through negotiations. Sweetpea have considered the possible consequences of carrying out the planned exploration on the pastoral operations and have indicated a range of measures that will be implemented to minimise impacts on the pastoral operations including:

- Implement measures of the EMP to minimise impact on the cattle and pastoral operations.
- Rehabilitate civil and water bore areas at completion of the exploration program and conduct rehabilitation monitoring to ensure areas are returned to original condition.
- Continue to engage and consult on the proposed activities.
- Report any incidents of damage to pastoralist's infrastructure and resolve.

1.5.3 Traditional Owners and Northern Land Council

Petroleum exploration in the Beetaloo Sub-basin is subject to agreement between the proponent and the NLC, which has provisions under the Commonwealth *Native Title Act 1993* for (amongst others):

- opportunity to comment on the EMP
- Indigenous employment opportunities
- Sacred Site clearance.

Sweetpea have an Exploration Agreement for EP136 and EP143 that was signed on 18 July 2012 between the Native Title Party, Northern Land Council (NLC) and Sweetpea Petroleum Pty Ltd. The Deed details how the project is to be undertaken that:

- Shows understanding and respect for the Native Title Party and their members and continues to keep them informed during the project as necessary with good communication.
- Minimises the deleterious impact on the Native Title Party and their members.
- Minimises the deleterious impact upon the environment.

The Exploration Agreements require Sweetpea to provide Annual Work Program to the NLC and hold Work Program Meetings with the Native Title Party. Sweetpea have just completed the 2021 Work Program meetings held with the NLC and Native Title Parties during October 2021. Sweetpea presented the planned exploration activities for Quarter 4 2021 (Q4 2021) and beyond.

1.5.4 Aboriginal Area Protection Authority

AAPA certificates for all exploration activities must be obtained prior to approval on an EMP. The Legislation establishes a procedure for the protection and registration of sacred sites, through:

- procedures for avoidance of sacred sites
- establishing an Authority for the purposes of the Act
- procedures for the review of decisions of the Authority by the Minister.

Sweetpea were issued an Aboriginal Areas Protection Authority (AAPA) Certificate for activities authorised by the *Petroleum Act 1984 (NT)* for petroleum exploration (reference AC2020/072).

AC2020/072 was issued following AAPA completing research and conducting meetings in June and July 2020, engaging with senior people in Katherine, Mataranka, Minyerri, Marlinja and Elliott about Sacred Sites and the works proposed by Sweetpea. The AAPA researcher confirmed what Sacred Sites are in the area and who has knowledge about the Sacred Sites that may need protection. On-country field survey were also completed with knowledgeable people, using 4WD vehicles and a helicopter. The field surveys and consultations focused on confirming where the Sacred Sites are and recording the wishes of senior people about how the sites can be protected.

AC2020/072 allows all civil construction and water bore activity proposed under this EMP with the exception of works to the intersection of Newcastle Creek in restricted work area 2 (RWA2).

AC2020/072 allows for 'transit only' across RWA2 at Newcastle Creek on the existing pastoral lease track.

Sweetpea have engaged further with AAPA throughout 2021 to seek authority to undertake minor works at RWA2 crossing to ensure it is suitable for use during wet weather, however, due to Covid19 and other operational delays, AAPA have not been able to conduct custodian consultation and is now rescheduled to occur in early 2022. Sweetpea's contingency plan to the 'transit only' limitation is considered under this EMP, including provision of two access options, western access track (WAT) or the eastern access track (EAT). Sweetpea are committed to meeting the conditions specified in the AAPA certificate to ensure risks to sacred sites and the identified Restricted Work Area are managed.

1.6 Objectives

The overall objective of this EMP is to provide comprehensive strategies to minimise environmental impacts and the risk of any inadvertent adverse outcomes resulting from Sweetpea's civil construction and water bore activities in the Beetaloo Sub-basin.

An EMP is a requirement of the Petroleum (Environment) Regulations 2016 (the Regulations) and is required to be approved by the NT Minister for Environment to form a statutory document that is enforceable through the NT legislation.

The objectives of the Petroleum (Environment) Regulations are to ensure that the onshore oil and gas activities are carried out in a manner consistent with the principles of ecologically sustainable development (ESD) and environmental impacts and risks associated with onshore oil and gas activities are reduced to a level that is as low as reasonably practicable (ALARP) and acceptable.

In line with Petroleum (Environment) Regulations 2016, this EMP aims to:

- provide a description of the exploration activities (regulated activity)
- provide a description of site-specific aspects of the existing environment (physical, biological, social, cultural)
- provide site-specific impact management strategies to minimise environment and heritage risks associated with its exploration activities – this includes ongoing monitoring and post-activity rehabilitation requirements as well as preventative measures
- be a practical and usable document, with environmental management principles that are accessible, implementable and effective
- align with the principles of Ecological Sustainable Development (ESD)
- ensure relevant regulatory requirements are addressed.

The EMP is an implementation and management tool for Sweetpea's civil construction and water bore activities and will be utilised by the Regulator to verify the environmental outcomes and environmental performance standards are being achieved (DENR, 2020).

2.0 Environmental Legislation and other Requirements

The following sections respond to the specific requirements of Schedule 1, clause 10 of the Petroleum (Environment) Regulations 2016, which requires the EMP to *specify any legislative requirements applicable to the regulated activity described in the plan that are relevant to the protection of the environment and demonstrate how those requirements will be met*. The follow section provides a summary of the range of NT relevant legislation, regulations, agreements, codes of practices and guidelines for specific controls and measures required to reduce the environmental impacts and environmental risks of the activity.

The full detailed assessment of the legislative requirements associated with the civil construction and water bore regulated activities is presented in Appendix A. This assessment references A.3 Surface activities mandatory requirements as presented in the Code of Practice: Onshore Petroleum Activities in the Northern Territory and the legislative requirements applicable to the activity described in this EMP. It is noted that Sweetpea intend to conduct all their activities in accordance with best environmental management practices as required under the current codes and guidelines.

2.1 Summary of Key Legislation

A summary of the Commonwealth and Northern Territory legislative requirements is provided in Table 4.

Table 4 Key Commonwealth and Northern Territory Legislation Consideration

Legislation	Purpose	Responsible Agency	Relevance to Project			Actions
			H	M	L	
Commonwealth						
Environment Protection and Biodiversity Conservation Act 1999	Referral of proposed action or environmental approval. Establishes an assessment and approval framework for activities that have the potential for significant environmental impacts and a permitting system for protected matters.	Department of Agriculture, Water and Environment (DAWE)	✓			Refer to Sweetpea’s Self-Assessment (Appendix B). Sweetpea have assessed its potential impact on MNES and considered unlikely to be significant for any options described in this EMP. Sweetpea do not intend to refer the regulated activity described in this EMP to the Federal Government for assessment.
Native Title Act 1993	Recognises native title in lands over which native title is not extinguished and persons able to establish native title.	Prime Minister and Cabinet	✓			Two Native Title determinations (NTD27/2010 and NTD33/2012) within the proposed civil and water bore exploration area. Sweetpea have existing Exploration Agreement with Native Title Parties and the Northern Land Council (NLC) for Petroleum Exploration.

Legislation	Purpose	Responsible Agency	Relevance to Project			Actions
			H	M	L	
<i>National Greenhouse and Energy Reporting Act 2007</i>	Reporting under National Greenhouse and Energy Reporting Scheme.	Australian Government - Clean Energy Regulator			✓	Sweetpea's activities under this EMP are unlikely to trigger the threshold for reporting greenhouse gas emissions, energy production and energy consumption data.
National Environment Protection (National Pollutant Inventory) Measure 1998	Reporting under the National Pollution Inventory (NPI).	DAWE (NPI)			✓	Sweetpea's regulated activities are unlikely to trigger the threshold for reporting. If any NPI thresholds are triggered, Sweetpea would report pollution data to NPI annually.
Territory Government						
General Environmental						
Petroleum (Environment) Regulations 2016	Approved EMP to conduct regulated activities.	Department of Environment, Parks, Water Security	✓			Sweetpea submit this Plan for the proposed regulated activity as it relates to surface activities including civil construction of access tracks, lease pads, water bore and other associated activities.
Code of Practice: Onshore Petroleum Activities in the Northern Territory (2019)	Activities to be performed under an EMP are to be consistent with the Code of Practice.		✓			The EMP has been developed in accordance with the Code of Practice and the Regulations, including all mandatory requirements, applicable to the regulated activities.
<i>Environmental Protection Act 2019</i> and Environmental Protection Regulations 2020	Referral of proposed action or environmental approval. Under the <i>Environment Protection Act 2019</i> , proposed projects that may have a significant effect on the environment are to be referred to the NT EPA for assessment.	NT Environment Protection Authority (NT EPA)		✓		Submission of this EMP is considered NOI under the Petroleum (Environment) Regulations 2016. Sweetpea's Self-Assessment is provided in Appendix B. Sweetpea's activities do not have a significant impact on the environment (or meet the referral trigger). A referral of activities under this EMP is not required.

Legislation	Purpose	Responsible Agency	Relevance to Project			Actions
			H	M	L	
<i>Petroleum Act 1984</i>	A petroleum exploration permit is required to explore for oil and gas in the NT.	Department of Industry, Tourism and Trade (DITT)	ü			Sweetpea is the registered holder of a 100% interest in Petroleum Exploration Permit EP136.
	Access Authority		✓			Access Authority application is currently with DITT access for track entry and camp outside the permit area.
	Land access and compensatory agreement		✓			Sweetpea intend to have Land Access and Compensatory Agreements, which cover the scope of activities under this EMP, in place prior to commencing activities under this EMP. Sweetpea is continuing the process of negotiating or resolving the Pastoral Land Access and Compensation Agreement (LACA) with the relevant pastoral station in accordance with sections 65, 81 and 82 of the <i>Petroleum Act 1984</i>. Sweetpea expects that a LACA may ultimately be determined through the Northern Territory Civil and Administrative Tribunal (NTCAT), as per the Act; however, Sweetpea always remain open to determining a LACA through negotiations.
Schedule of Onshore Petroleum Exploration and Production Requirements (2019)	Mandatory schedules for the exploration or development of petroleum activities in the NT.		✓			Sweetpea have developed a Safety Management Plan and Emergency Response Plan in accordance with minimum standards outlined in the Schedule (refer Appendix G and Appendix M).

Legislation	Purpose	Responsible Agency	Relevance to Project			Actions
			H	M	L	
<i>Control of Roads Act 1953</i>	A permit is required to do work within the Northern Territory (NT) Government road reserve. Road safety consideration for public using NT Roads, in particular where a heavy vehicle turn off the highway onto an unsealed road.	Department of Infrastructure, Planning and Logistics	✓			Sweetpea require access to civil and water bore construction locations via access tracks off the Carpentaria Highway. A Traffic Impact Statement will inform the development of a Traffic Management Plan (Appendix L). Consultation with DIPL Transport and Application for permit currently being finalised.
Cultural and Heritage Considerations						
<i>Northern Territory Aboriginal Sacred Sites Act 1989</i>	Under the Act, all Indigenous sacred sites are protected regardless of whether or not they are registered.	Aboriginal Areas Protection Authority (AAPA)	✓			Sweetpea have obtained an Authority Certificate to conduct regulated activities under this EMP. Under this EMP, Sweetpea intend to “transit only” RWA2 at the intersection of the existing Pastoral track and Newcastle Creek.
<i>Heritage Act 2011 and Heritage Regulation 2012</i>	This Act relates to the protection of tangible heritage (Indigenous, Historical and Macassan).	DEPWS - Heritage Branch		✓		A Cultural Heritage Assessment has been completed to inform the development of the EMP. Sweetpea intend to avoid all identified archaeological sites and to report any newly discovered sites to Heritage Branch and develop a proposed relocation protocol for artefacts with Traditional Owners. Specific measures have been developed to mitigate risks to heritage place or objects (refer Section 7.12 and Appendix D).
Water Quality, Biodiversity and Land Conservation						
<i>Water Act 1992 and Water Regulation 1992</i>	Prohibition of pollution and groundwater extraction licence to take groundwater.	DEPWS – Water Resource Division	✓			Sweetpea have obtained a water extraction licence to conduct activities under this EMP. The intended groundwater bores to be used will be located at each lease location.

Legislation	Purpose	Responsible Agency	Relevance to Project			Actions
			H	M	L	
						Sweetpea's Waste Management Plan (Section 7.5), Spill Prevention and Response Plan (Section 7.6) and the Monitoring (Section 8.5) and Reporting (Section 8.3) requirements will ensure the conduct of the regulated activity would be in way that will not cause material or serious harm to environment.
<i>Territory Parks and Wildlife Conservation Act 1976</i>	Address the NTPS performance criteria and design exploration activity to satisfactorily exclude areas which should not be cleared due to their ecological and environmental value by determining the presence, extent and value of the important flora, fauna and habitat features and seasonal timing.	DEPWS – Flora and Fauna Division		✓		Sweetpea have established baseline condition prior to commencement of activities (refer Appendix C). Specific measures developed to minimise impact to ALARP. Refer to Section 7.2, Section 7.3 and Section 7.9.
<i>Weeds Management Act 2001</i>	Ensure that the risk of weed introduction and spread resulting from activities associated with this project are mitigated to protect the economic, community, industry and environmental interests of the Territory.	DEPWS – Weed Management Branch	✓			Sweetpea conducted a baseline weed survey as part of the Land Condition Assessment (Appendix C). This informed the development of a project specific weed management plan (Section 7.3 and Appendix H).
<i>Bushfire Management Act 2016</i>	Bushfire management planning to be guided by the <i>Bushfire Management Act 2016</i> .	DEPWS – Bushfires NT		✓		Sweetpea has prepared a Bushfire Management Plan in accordance with the Act and the <i>Bushfire Management Planning Guide: Onshore Petroleum Projects</i> (refer Section 7.4 and Appendix I). Should permits to be required, Sweetpea would apply for a permit to burn if required.
<i>Soil Conservation and Land Utilisation Act 1969</i>	Makes provision for the prevention of soil erosion and for the conservation and reclamation of soil.	DEPWS – Soil Branch	✓			Sweetpea have developed and ESCP (Appendix K) that provides the controls to minimise risk of erosion during civil construction and water bore activities.

Legislation	Purpose	Responsible Agency	Relevance to Project			Actions
			H	M	L	
Air Quality, Noise and Waste Management						
Waste Management and Pollution Control Act 1998	When an activity that is authorised under the <i>Petroleum Act 1984</i> , the WMPC Act only applies if a contaminant or waste is not confined within the authorised lease boundary.	NT EPA		✓		Sweetpea will take all reasonable and practicable measures to prevent or minimise pollution or environmental harm.
	Transport of any listed waste (Schedule 2 of the Waste Management and Pollution Control (Administration) Regulations 1998) must be conducted by a person licensed under the WMPC Act to transport that waste and that waste must be transported to a facility that is licensed under the WMPC Act to accept that waste.	NT EPA	✓			Waste Management Plan (Section 7.5), Spill Prevention and Response Plan (Section 7.6) and the Monitoring (Section 8.5) and Reporting (Section 8.3) are applicable. Water produced from proposed activities under this EMP are excluded from the term ‘Wastewater’ as defined in the Code of Practice.
Dangerous Goods Act 1998 and Regulations	Provides for the safe storage, handling and transport of certain dangerous goods.	Department of the Attorney General and Justice		✓		All fuel storage facilities will be constructed in accordance with AS1940 and considers requirement of the WHS(NUL) Act and WMPC Act. Estimated quantities are provided in Table 10 in Section 3.3.1.
Public and Environmental Health Act 2011	Outlines requirements for camps, specifically waste and wastewater (sewage and greywater) management. Provides conditions preventing pollution of watercourses and water supplies in the Northern Territory. Wastewater treatment systems may be subject to requirements under the <i>Public and Environmental Health Act 2011</i> and regulations.	Department of Health		✓		Sweetpea will ensure that the contractor complies with the requirements of the <i>Public and Environmental Health Act 2011</i> and Regulations, in the provision of the project.

Legislation	Purpose	Responsible Agency	Relevance to Project			Actions
			H	M	L	
<i>Work Health and Safety (National Uniform Legislation) Act 2011</i>	Provides for a balanced and nationally consistent framework to secure the health and safety of workers and workplaces.	NT WorkSafe	✓			Construction activities will consider Work Health and Safety Legislation in development of works programs to ensure safety of workers.
<i>Transport of Dangerous Goods by Road and Rail (National Uniform Legislation) Act 2010 and Regulations</i>	Dangerous goods can only be transported by appropriately licensed personnel and within licensed vehicles	NT WorkSafe		✓		Sweetpea to ensure that any dangerous goods transportation that occurs above the trigger levels are done so by appropriately licensed transportation personnel (including vehicles).

2.2 Relevant Codes of Practice and Guidelines/Standards

Relevant codes of practice and guidelines/standards relevant to the regulated activities described in this EMP are summarised in Table 5.

Table 5 Code of Practice and Relevant Guidelines/Standards

Code of Practice and Relevant Guidelines
Code of Practice: Onshore Petroleum Activities in the Northern Territory (2019) Mandatory Code of Practice for the petroleum industry to ensure that petroleum activities in the Northern Territory are managed according to minimum acceptable standards to ensure that risks to the environment can be managed to a level that is as low as reasonably practicable (ALARP) and acceptable.
Code of Practice for On-site Wastewater Management (2014) - Provides guidance for the management of effluent. - Stipulates the approved sewage and sullage treatment devices and practices within the Northern Territory. Sewage and sullage produced and disposed of from the camps must be undertaken in accordance with the Code.
APPEA Code of Environmental Practice (2008) Provides an outline of environmental objectives which represent guidance on key aspects of good environmental practice in the petroleum industry
Best Practice Erosion and Sediment Control (International Erosion Control Association, 2008) - Facilitates the identification of those issues that should be considered when formulating and evaluating strategies for best practice erosion and sediment control. - Facilitates best practice stormwater management. - Facilitates active avoidance or minimisation of soil erosion resulting from construction activities. - Facilitate best practice soil and sediment control management on sites.
AS 1940: The storage and handling of flammable and combustible liquids, 2004 Provides guidance for the operation and handling of flammable and combustible liquids.
ISO 31000 Risk management- Principles and guidelines - This international standard provides a standardised to identify, assess and manage risk. - Assessment of risk in EMP's shall be undertaken in alignment with this guideline
ISO 19011: Guidelines for auditing management systems, 2018 Provides guidance on environmental auditing to a certifiable standard.
Guideline for the Preparation of an Environmental Management Plan (DENR, 2018) - Details the environmental protection measures to be included in Environmental Management Plans. - Includes changes emanating from the recommendations of the NT Hydraulic Fracturing inquiry.
Guideline for Groundwater Monitoring Bores for Exploration Petroleum Wells in the Beetaloo sub-basin (DENR 2018) - Technical guidance for the onshore gas industry establishing the minimum expectations in relation to groundwater monitoring requirements. - Requires the establishment of control and impact monitoring bores prior to undertaking stimulation activities.
Northern Territory Natural Resource Management Plan 2016-2020 (Territory Natural Resource Management, 2016) - Describes the management direction for the NT's natural resources for the five-year period and beyond. - Four regional plans provide an overview of the current land condition, use and threats, key areas to monitor and improve approaches, and the level of coordination that occurs across key organisations responsible for implementing actions.
Northern Territory Land Clearing Guidelines (DENR, 2019) Clearing must be carried out in accordance with Land Clearing Guidelines.
Northern Territory Noise Management Framework Guideline (NT EPA, 2018) Provides guidance to the community and industry about the noise regulatory framework as it applies in the NT.

Code of Practice and Relevant Guidelines
Weed Management Planning Guide - Onshore Shale Gas Development Projects (DENR, 2019) Provides guidance to the industry about the weed management planning required to undertake Onshore Shale Gas Developments in the NT.
Bushfire Management Planning Guide: Onshore Petroleum Project (2019) Guide to assist interest holders of onshore petroleum projects in the preparation of a Bushfire Management Plan as a component of an EMP under the Petroleum (Environment) Regulations 2016 and in accordance with the Code of Practice.
Stakeholder Engagement Guidelines Land Access (2016) Provides the framework for consistent stakeholder engagement to obtain land access for exploration activities.
Minimum Construction Requirements for Water Bores in Australia 4th Edition (2020) Provides the requirements for the construction of water bores.
Greenhouse Gas Emissions Management for New and Expanding Large Emitters - The NTG's recently released '<i>Greenhouse Gas Emissions Management for New and Expanding Large Emitters</i>' Policy identifies the minimum requirements for the management of greenhouse gas emissions from new or expanding industrial and land use development projects. It has been established in recognition of the Northern Territory's target of net zero greenhouse gas emissions by 2050. - Sweetpea are required to report under the Large Emitters Policy for scope 1 emissions of 100,000 tCO₂-e in any financial year over the life cycle of a project, not counting emissions generated from land clearing directly associated with the project. - Sweetpea have estimated the civil construction and water bore activities greenhouse gas emissions which will not require reporting as a large emitter.

2.3 Relevant Agreements and Operating Consent

Table 6 provides the relevant agreements and operating consents that Sweetpea will have in place prior to commencement of regulated activities.

Table 6 Relevant Agreements and Operating Consent

Agreements	Administered By:
Native Title Petroleum Exploration Agreement (between the Host Traditional Owners, NLC and Sweetpea Petroleum Pty Ltd) - Includes clauses for the protection of sacred sites, objects and sensitive areas related to Aboriginal activities in the area, including cultural, hunting and foraging activities. - Site clearance will occur prior to any on ground activities. - The Native Title Agreement also includes clauses for the protection of the environment and rehabilitation. - Require work program meetings annually to provide update on Sweetpea's exploration activities.	Northern Land Council
AAPA Certificate - The AAPA clearance certificate issued for the proposed Exploration Activities. - No activities will occur on the permit area without an approved AAPA certificate.	AAPA
Land Access and Compensation Agreement (LACA) - A negotiated access agreement formed between Sweetpea and a private pastoralist relating to the rights over 'access land'. - Sweetpea have engaged with Tanumbirini and Beetaloo Stations for a LACA.	Sweetpea and Land Holder
Apply for permit to work within a road reserve Approval to work within a road reserve would be required where access.	DIPL
DBYD Works Approval Form for Pipeline Crossings - Sweetpea require a works approval to allow civil construction equipment to cross over the underground pipeline located along Carpentaria Highway. - Specific conditions have been advised including:	PowerWater, administered by OSD Asset Services

Agreements	Administered By:
- A 25mm steel plate (3 m x 5 m) must be installed over the pipeline at locations where crossed by Sweetpea exploration activities. - Do not place the steel plates at locations where erosion is visible. - Report any issues found in the field to OSD Asset Services team. - Sweetpea shall notify OSD Asset Services one week prior to mobilisation. - An OSD technician to attend site to locate the pipeline and confirm the placement of the steel slabs. - All camps and office demountable shall be place at least 300 m from the pipeline centreline (outside the pipeline radiation contour). - The pipeline easement shall not be used a stockpiling, storage, laydown or parking area.	

3.0 Description of Regulated Activity

3.1 Proposed timetable

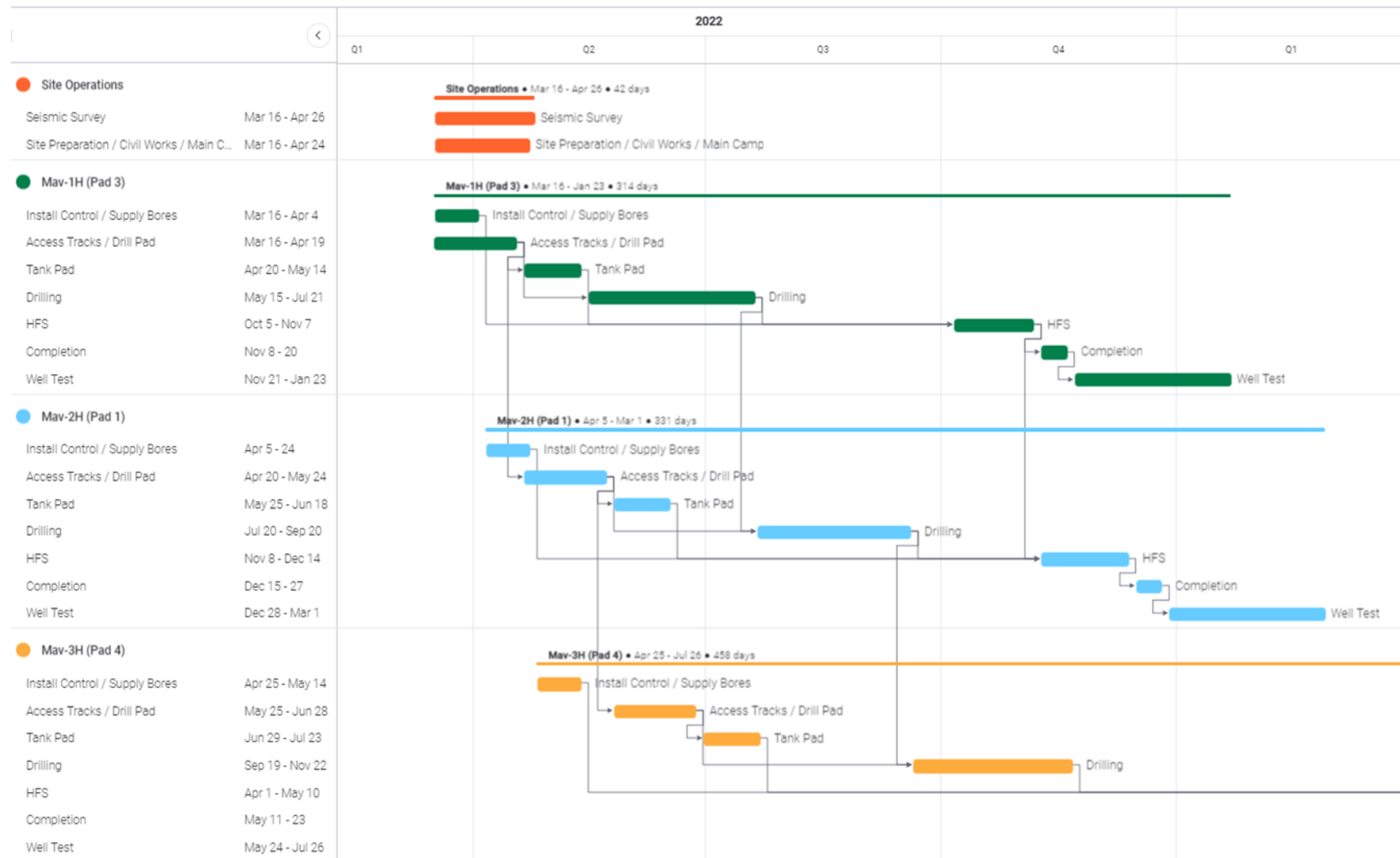
Civil construction activities, including water bore drilling activities are planned to commence in March 2022 and continue over a four-year period to 2025. It is noted that the schedule may be varied based on the interpretation of results from the seismic survey (schedule May/June 2021) that will determine the preferred sequence of drilling on each lease pad.

This EMP activities indicative schedule is summarised below, however, the schedule could be impacted by factors such as Covid19, equipment availability, exploration activity results, and/or land access negotiations and timing of commencement of regulated activities. Note that up to 12 monitoring bores and associated water bore pads are covered by the existing approved Seismic EMP so are not included in the below schedule.

- 2022 Mar/Apr - December:
 - Establish an access junction at Carpentaria Highway and construct the access for entry to the Permit tracks.
 - Establish gravel pits to provide material for improving the stability of the access tracks and constructing well site pad areas.
 - Construct access track to Lease Pad 1, Lease Pad 3 and Lease Pad 4 to enable to the construction of well and water tank pads, and the main camp pad at primary option Lease Pad 1 Camp or re-occupy the Highway Camp (Figure 2).
 - Construct well and water tank pad at Lease Pad 1, Lease Pad 3 and Lease Pad 4.
 - Install water monitoring bores as required (prior to stimulation operations).
 - Construct, upgrade and maintain other access tracks as per Figure 2 to Lease Pad 2, which may include an access junction at the Carpentaria Highway and the EAT (which is an existing pastoral access track).
 - Construct well and water tank pad at Lease Pad 2.
- 2023 Mar/Apr - December:
 - Establish gravel pits to provide material for improving the stability of the access tracks.
 - Construct access tracks to Lease Pad 5 and Lease Pad 6 respectively to enable the construction of well and water tank pads.
 - Construct well and water tank pad each at Lease Pad 5 and Lease Pad 6.
 - Install water monitoring bores as required (prior to stimulation operations).
- 2024 Mar/Apr - December:
 - Construct access track to Lease Pad 7.
 - Install water monitoring bores as required.
 - Construct well and water tank pad at Lease Pad 7.
 - Install water impact monitoring bores as required (prior to stimulation operations).
- 2025 April - December:
 - Install water monitoring bores as required at Lease Pad 7 (prior to stimulation operations).

Past experience in the permit area indicates that extended rainfall events (i.e. monsoonal rains), that have the potential to limit access, usually don't start until mid-December. However, Sweetpea will implement their wet weather contingency plan as detailed in Section 7.2 should activities continue past 1 October each year.

Rehabilitation will be progressive over the life of the exploration program. Rehabilitation would commence at completion of exploration activities and continued under a 5-year monitoring program.

Table 7 Gantt Chart of Civil Construction and Water Bore Schedule

3.2 Civil Construction Program

The exploration activities covered by this EMP comprises of civil construction activities for the establishment of access tracks, exploration lease pads and associated infrastructure including a central accommodation camp and water bores that will be required for subsequent drilling, fracture-stimulation and testing operations. This EMP does not seek approval for well drilling, hydraulic-fracture stimulation and well testing activities at the lease pads, as these activities will be the subject to a separate EMP.

3.2.1 Exploration Lease Pads

Sweetpea intend to construct seven exploration lease pads including a well pad and associated tank pad to support the exploration activities. The exploration lease pads have been sized to accommodate the placement of a drilling rig and provide an area for above ground water holding ponds or tanks when required. In total, the design of the exploration lease pad area has allowed for approximately 11 ha to be cleared for each lease area, including the provision of firebreaks to reduce the potential risk to infrastructure, as well as accommodate the groundwater monitoring bore pads (refer Section 3.2.4). It is noted that the previously approved disturbance areas under the Seismic EMP at Lease Pad 1 and Lease Pad 3 for the groundwater bore pads will be absorbed into the overall clearing area of 11 ha (refer Table 3).

Each of the well pad will include the following elements for future activities, which are not covered under this EMP:

- Cellar for wellhead equipment
- Flare pit
- Residual drilling fluid and cuttings storage pond (mud sump)
- Above ground water tanks
- Surface water drainage holding pond
- Workshop and office units
- Smoko shack
- Gen set and pump skid unit
- Toilet block and sewage treatment plant skid
- Mobile sleeper units (up to 8 key personnel to stay on site during well activities for 24 hr coverage)
- Parking for light vehicles, trucks and trailers
- Fuel and chemical storage areas.

Just off the well pad a water tank pad will be constructed to hold water in tanks used for the future drilling and stimulation activities and to return flowback fluids. Figure 7 shows a conceptual well pad and tank pad layout, noting the layout may vary to accommodate local factors and type of drilling rig used. The cleared area specific to the individual well pad is 280 m x 260 m (72,800 m²). This encompasses the well pad (nominal 180 m x 180 m), which will be compacted, and an external perimeter area of 20 m width to cater for soil stockpiling and a firebreak. An additional 20 m buffer of managed vegetation will be established as an asset protection zone.

The water tank pad construction requirements are largely similar to those for well pads without the requirement of a flare pit, cellar and sump. The cleared area dimensions will be 230 m x 160 m (36,800m²). This includes the tank pad area (130 m x 190 m), an external area of 20 m for soil stockpiling and a fire break around the perimeter and a 20 m managed vegetation zone. The cleared perimeter comprises an asset protection zone around the tank pad.

Native vegetation over the proposed well location will be cleared and stockpiled at a designated adjacent area. The topsoil will be scraped from the cleared area and stockpiled in low profile mounds (< 2 m high) away from natural drainage, levelled off and compacted to specifications required by the drilling contractor. Stockpiled topsoil and vegetation will be reused during rehabilitation once well operations are completed. The well pad and tank pad areas, that make up the exploration lease pad, will be surfaced with sheeting material sourced from gravel pits identified in Section 3.2.3.

Other details for the conceptual exploration lease pad layout include:

- Site access tracks constructed to allow for a one-way in-out traffic flow with up to a double trailer.
- Site drainage and erosion control.
 - Cleared topsoil will be used to construct a raised bund around the site perimeter to contain fluids on the compacted site and also prevent free flowing water on to the site, noting that this is subject to local topography and may not be required on all four sides of the site.
 - Site to be slightly graded towards the edges of the pad away from the rig hardstand area with a 1% fall, and some drainage channels or diversion berms may be placed to direct free surface fluids to flow into a surface water drainage pond.
 - In the event that stormwater is required for release from the constructed sediment basin, the stored water would be visually assessed (no visible oil, grease or other hydrocarbons) and physical parameters (pH, EC) taken to ensure the discharged water will not impact downgradient sensitive receiving environments. Appendix K ESCP provides the trigger action response plan (TARP) to be implemented under the Civil Construction and Water Bore EMP activities to demonstrate water quality indicators are met. Where water quality meets the site indicators, water may be beneficially used on-site (for dust suppression) or discharged offsite. Laboratory testing would only be required where a known contaminating event had occurred in the preceding 3 months that may influence stormwater quality, visual inspection indicate potential contamination or where there is a sensitive receiving water body within 200 m of the discharge point.
- Fencing – stock fencing will be installed around the external perimeter with cattle grids at the entrance/ exit points. A “hump” or “rise” will be installed at these entrance points to the pads to act as a barrier to water flow onto or off the pad in lieu of the perimeter bund.
- Mud sump – currently designed as a simple excavated rectangular pond with two compartments and compacted above ground bund of 0.3 m around the perimeter with the liner running up and over the bund. The size of the mud sump will give sufficient volume for drilling and account for freeboard and rain events of up to 1.3 m. The sump shape and layout may be modified to suit specific drilling rig requirements.
- Mud sump liner – the liners for the mud sump will meet the requirements of section C.4.1.2 of the *Code of Practice: Onshore Petroleum Activities in the NT (2019)*.
- Cellar design and specifications will be tailored to the selected drilling rig for each campaign of work but as a typical design it will consist of a steel plate walled cellar with a cement base and dimensions of 1.8 m deep x 3 m x 2.1 m. The ~6 mm steel plate walls of the cellar will be prefabricated with an access ladder on one corner of the cellar for use once installed. The cellar will have a nominal 20” conductor casing installed by a water drilling rig.
- Drilling (emergency) flare pit – the excavated earth is to be built up around the three sides of the flare pit away from the side where the flare line enters the pit (rig side) such that an earthen wall of ~2 m in height exists to contain the flare.
- Fire breaks / fire zone management – comprises a 10 m perimeter cleared around the lease pad, perimeter bund, fencing, a 10 m firebreak that encompasses a 4m fire trail, and a 20 m perimeter functioning as a managed vegetation zone. This area comprises an asset protection zone around infrastructure.

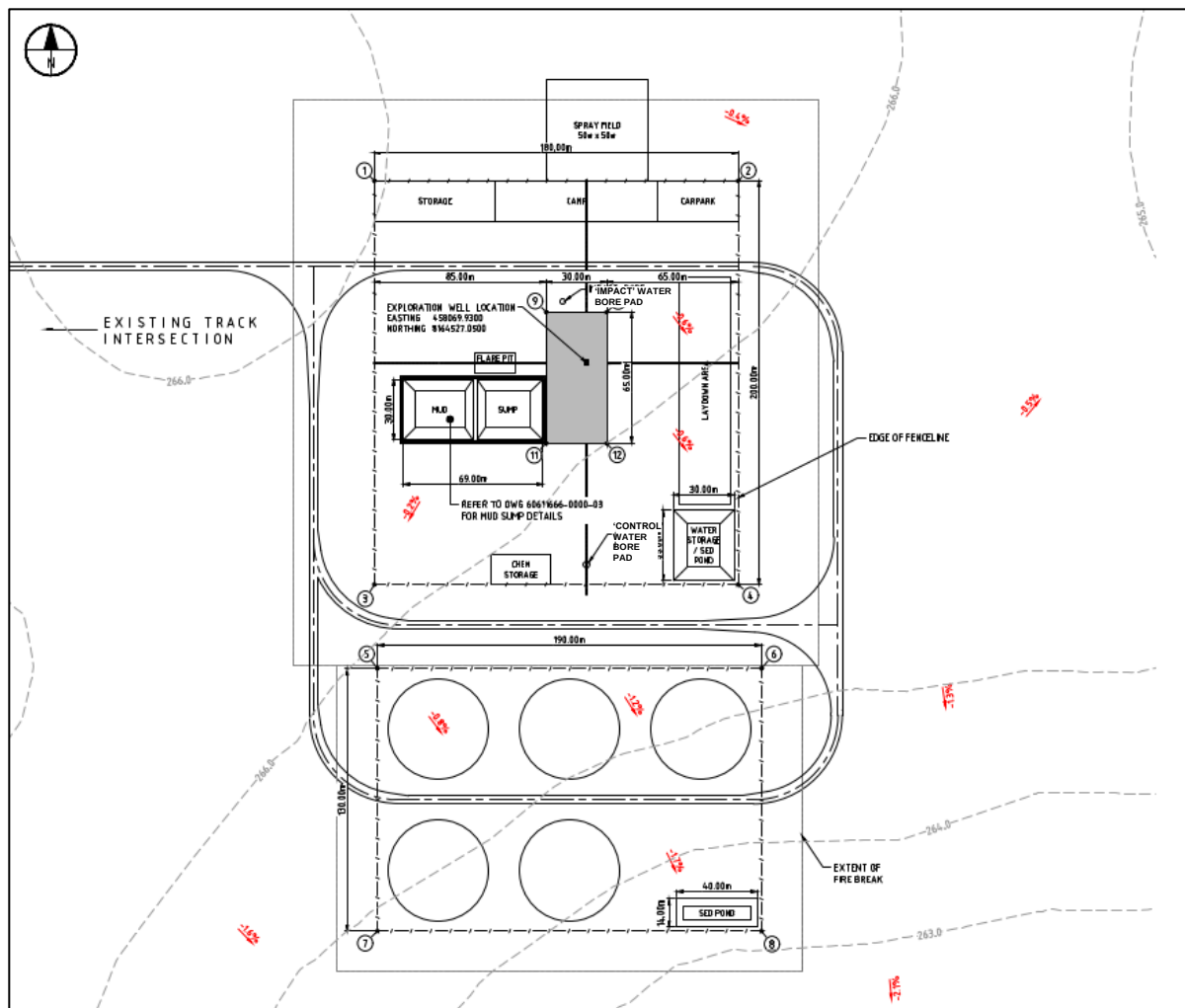


Figure 7 Conceptual well pad lay out

3.2.2 Access tracks

The civil exploration program proposes to use one of the two primary access options identified in this EMP as follows:

- Option 1 Eastern Access Track (EAT) – 39.56 km length x 18 m wide, including 17.65 km of existing pastoral track and 21.91 km of repurposed 2D seismic lines; or
- Option 2 Western Access Track (WAT) – 35.45 km length x 18 m wide, including 3.1 km of existing pastoral track and 32.35 km of repurposed 2D seismic lines.

Both options require access at two intersections off the Carpentaria Highway, one located on the western side of the permit to gain access to Pad 1 and the other in the centre. The access track options presented are clearly shown in Figure 8 (EAT) and Figure 9 (WAT).

The decision to utilise existing pastoral lease tracks instead of creating a dedicated exploration track was based on the need to minimise the number of vehicle crossings of Newcastle Creek. Newcastle Creek has been identified during the environmental and heritage assessments as a sensitive area from both a natural and cultural heritage perspective.

The tracks to access the lease pads and gravel pits will be repurpose sections of seismic lines 6, 7, 8, 9 and 10 to provide access for the construction of the exploration lease pads and for future exploration programs, including ongoing monitoring requirements of the water bores. This EMP requires that sections of seismic lines will be formed as class 5 pastoral 2 (type c) unsealed track in accordance with NTG standard drawing CS3003 *Typical cross sections for urban and rural environments* (2017) and will be implemented in accordance with the Erosion and Sediment Control Plan (Appendix K).

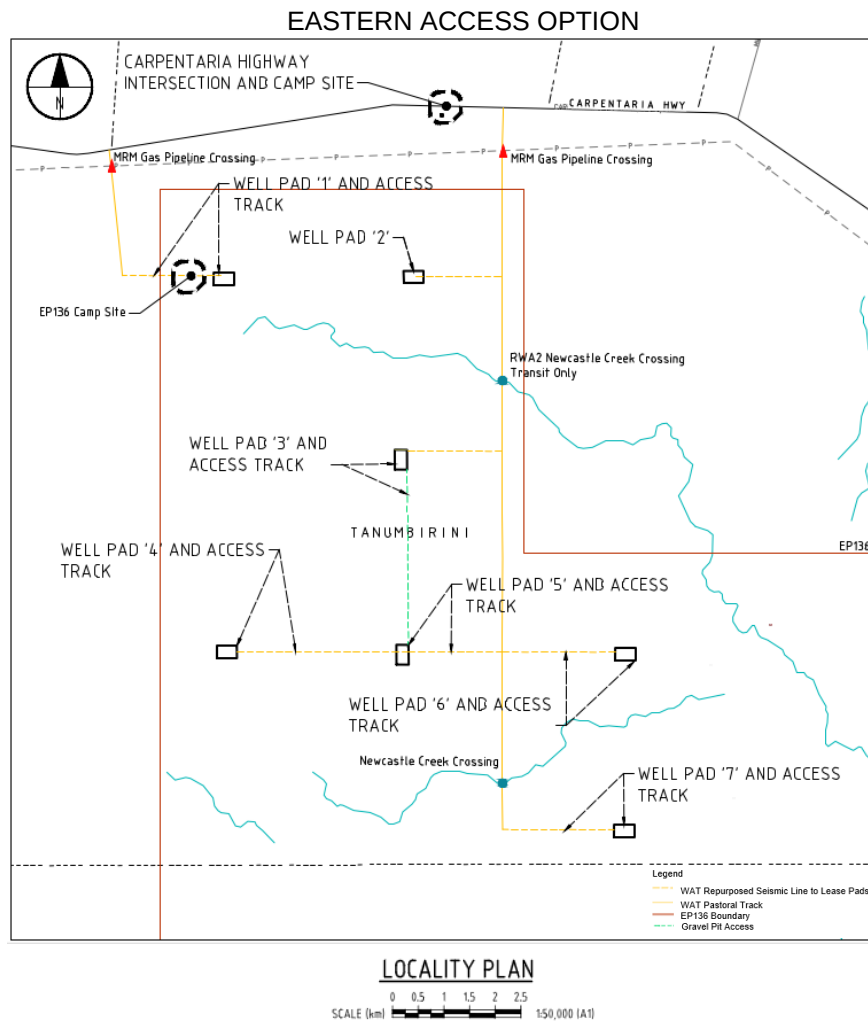


Figure 8 Eastern Access Track, showing existing and repurposed seismic lines

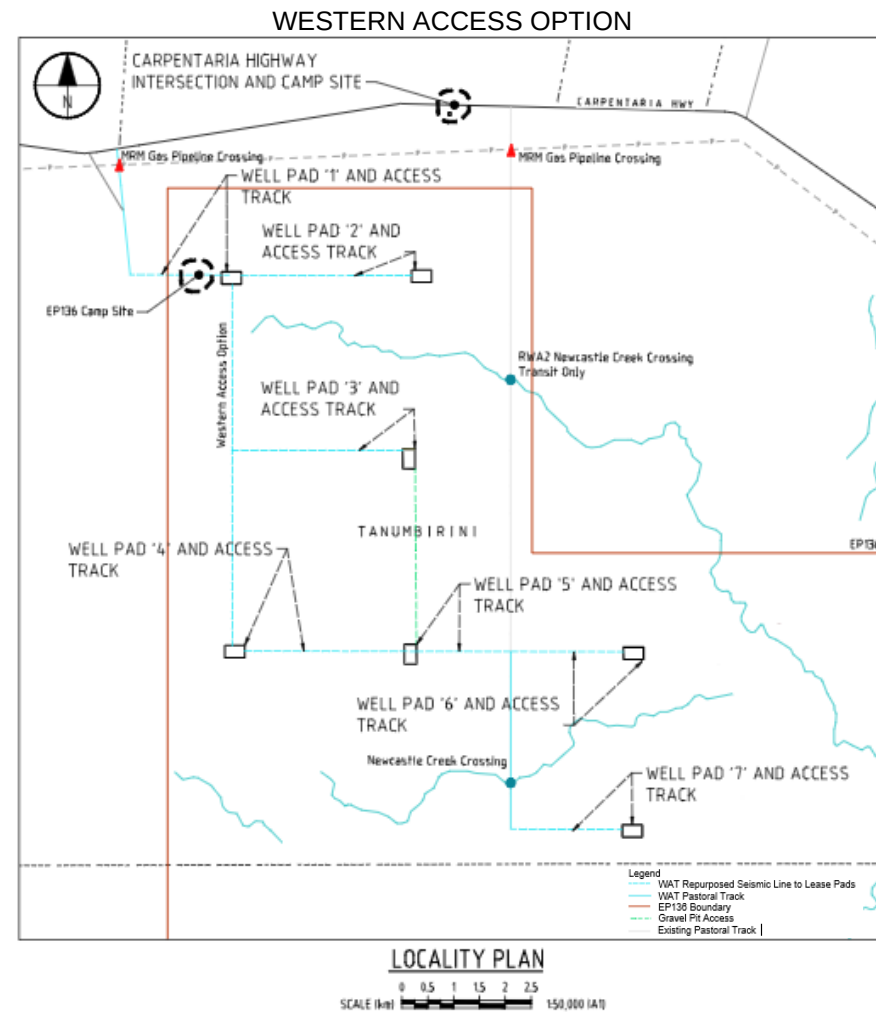


Figure 9 Western Access Track, showing existing and repurposed seismic lines

Under the Seismic EMP, the access tracks to Pad 1 and Pad 3 were approved to allow for installation of class 5 pastoral 1 (type c) unsealed track. These access tracks will be upgraded to a class 5 pastoral 2 (type c) in accordance with the NTG standard drawing to allow for future exploration activities. Gravel pits identified along Seismic Line 11 between Lease Pad 3 and Lease Pad 5 will require repurposing and will be constructed in accordance with class 5 pastoral 1 (type c) unsealed track.

Table 8 summarises the seismic survey lines that will be retained and repurposed for access track options to support the ongoing exploration activities in the Tanumbirini Station section of EP136.

Table 8 Seismic Survey Lines retained for Eastern or Western Access Tracks to Lease Pads and Gravel Pits

Area	Option	Seismic line	Distance to Lease Pad from nearest Pastoral Track (km)	Activity description
Pad 1	Eastern and Western Access	Line 9	2.43*	Access via existing western pastoral track off the Carpentaria Highway to Line 9, then travel east to Pad 1. Access track construction approved under Seismic EMP but will be upgraded to meet class 5 pastoral 2 (type c).
Pad 2	Eastern Access	Line 9	2.18	Access via existing main pastoral track to Line 9, then travel west to Pad 2. Access track to be constructed to meet class 5 pastoral 2 (type c).
Pad 2 (alt)	Western Access	Line 9	4.38	Alternate access option via the western access option between Pad 1 and Pad 2 along repurposed Seismic Line 9. Access track to be constructed to meet class 5 pastoral 2 (type c).
Pad 3	Eastern Access	Line 8	2.28*	Access via existing main pastoral track to Line 8, then travel west to Lease Pad 3. Access track construction approved under Seismic EMP but will be upgraded to meet class 5 pastoral 2 (type c).
Pad 3 (alt)	Western Access	Line 8	4.43	Alternate access option via the western access track option (below) then travels east via repurposed Seismic Line 8 to Pad 3. Access track to be constructed to meet class 5 pastoral 2 (type c).
Pad 4 (alt), plus all Pad's south of Newcastle Creek	Western Access	Line 10	9.18	Alternate main access option to divert around RWA2 to access lease pads south of Newcastle Creek. Access to Pad 4 is at intersection of the repurposed Line 10 and Line 7. Access track to be constructed to meet class 5 pastoral 2 (type c).
Pad 4	Eastern Access	Line 7	4.15	Access via eastern access track to Line 7, then travel west via Pad 5 to Pad 4. Access track to be constructed to meet class 5 pastoral 2 (type c).
Pad 5	Eastern or Western Access	Line 7	2.34	Access via either eastern or western access track options along repurposed seismic Line 7. Access track to be constructed to meet class 5 pastoral 2 (type c).
Pad 6	Eastern or Western Access	Line 7	2.75	Access via either eastern or western access track options along repurposed seismic Line 7, then travel west to Lease Pad 2. Access track to be constructed to meet class 5 pastoral 2 (type c).
Pad 7	Eastern or Western Access	Line 6	2.70	Access via either of the main pastoral track to Line 9, then travel west to Lease Pad 7. Access track to be constructed to meet class 5 pastoral 2 (type c).

Area	Option	Seismic line	Distance to Lease Pad from nearest Pastoral Track (km)	Activity description
Gravel Pit Access	Eastern or Western Access	Line 11	7.80	Access via Line 11 between Lease Pad 3 and Lease Pad 5. Access track to be constructed to meet class 5 pastoral 1 (type c).
Option 1 Eastern Access Track Total			26.63	
Option 2 Western Access Track Total			40.16	

* Access track from the eastern existing pastoral track to Pad 1 and Pad 3 are covered under the Seismic EMP approvals.

The constructed EAT or the WAT will be useable throughout the dry season, providing access for a range of exploration vehicles, including drill rigs and trucks (up to a double trailers) that will be delivering materials and equipment to the lease areas.

The EAT requires only the 'transit' of the existing Newcastle Creek crossing within RWA2. No further works that aren't sanctioned under a granted Sacred Site Clearance Certificate (SSCC) will be undertaken.

However, wet weather use of the EAT is assumed to require a new SSCC, this will only be necessary if the WAT option is not available due to delays with land access negotiations. If neither a new SSCC nor access to the WAT is available by Q4 2022 then Tamboran may have to stack equipment south of Newcastle Creek or move all equipment north of Newcastle Creek prior to the 2022-23 wet season and alter the drilling priority. This approach mitigates the risk of not being able to do works, other than transit, of the Newcastle Creek crossing(s) within restricted working areas.

Other than the RWA2 crossing, all other creek crossings and identified floodway's that are intersected by the access tracks may require rock protection to manage and minimise erosion. Crossings will be bed level crossings, constructed flush with the existing invert level of the specific watercourse. Crossings will incorporate a stable rock base, stabilised approaches (rock base or similar) and flow diversion berms (to shed road runoff), designed to be stable in large rainfall events.

Crossings are to be constructed in accordance with the following requirements:

- Temporary stockpiling of soil, equipment and materials within watercourses, or on adjacent banks and floodplains, is to be avoided (unless integral to drainage control requirements).
- Where possible, crossings should be constructed at right angles in locations where the stream is straight.

Access road runoff will be prevented from directly entering the watercourse by construction of flow diversion banks (rollovers) immediately upslope to divert flow.

Access off the Carpentaria Highway will require additional protection measures for the MRM gas pipeline. Sweetpea will obtain a works approval from PowerWater asset provider OSD Pipelines and implement the specific conditions, including:

- Installation of a 25 mm steel plate (3 m x 5 m) over the pipeline at locations where crossed by exploration vehicles.
- All camps and office demountables are to be placed at least 300 m from the pipeline centreline (outside the pipeline radiation contour).
- The pipeline easement shall not be used a stockpiling, storage, laydown or parking area.

Access tracks will be constructed as a 6 m gravelled useable running surface with additional approximate 2 m minimum shoulders cleared on either side. Mitre drains and flow control banks (whoa boys) will be installed, where required, to minimise erosion along access track table drains.

Factoring in drainage requirements, access track disturbance is estimated to average 18 m in width for tracks to the lease pads and 8 m in width for the tracks to the gravel pits.

Intervals of track with turning or bend sections (e.g. into or out of a well pad) will have a 30 m radius.

Highway intersection

The junctions from the Carpentaria Highway onto EP136 will be constructed (or the existing junction upgraded) to DIPL - Road Operations specifications applicable to the use and type of traffic anticipated.

It is anticipated that junctions to the Carpentaria Highway will be sealed at the junction area to minimise issues with loose gravel being kicked up from the access track onto the Highway.

A Traffic Impact Statement will inform the development of the Traffic Management Plan. The Traffic Impact Statement is provided in Appendix L.

3.2.3 Gravel pits

Proposed gravel pit sites to borrow gravel were assessed during the May 2020 land condition assessment and follow up topography survey in November/December 2020. Eleven (11) suitable locations have been identified near the proposed exploration lease pad locations and access tracks, and within the clearance zones submitted to AAPA (250 m either side of seismic lines/tracks and 3 km perimeter around each lease pad).

Of these identified gravel pits, extraction of gravels is planned at only 10 of the identified 11 under this EMP. The proposed gravel pit locations are provided below in Table 9.

Table 9 Proposed Gravel Pit Locations

Area	Location		Disturbance Area (ha)	Location description
	Latitude	Longitude		
Gravel pit 1	-16.515163°	134.508993°	2.00	Located 690 m west of Lease Pad 1
Gravel pit 2	-16.572622°	134.559877°	2.00	Located 1.8 km south of Lease Pad 3
Gravel pit 3	-16.586119°	134.559696°	2.00	Located 1.6 km north of Lease Pad 5
Gravel pit 4	-16.586022°	134.563468°	2.00	Located 250 m east of Gravel pit 3
Gravel pit 5	-16.593853°	134.560048	2.00	Located 700 m north of Lease Pad 5
Gravel pit 6	-16.597240°	134.516823°	2.00	Located 180 m north of Lease Pad 4
Gravel pit 7	-16.598583°	134.539951°	2.00	Located midway between Lease Pad 4 and Lease Pad 5
Gravel pit 8	-16.598259°	134.556367°	2.00	Located just north of Lease Pad 5
Gravel pit 10	-16.628015°	134.605151°	2.00	Located 1.2 km north of Lease Pad 7
Gravel pit 11	-16.635584°	134.608731°	2.00	Located 430 m north of Lease Pad 7
Gravel pit 12	-16.644924°	134.600328°	2.00	Located 630 m south west of Lease Pad 7
10 x Gravel Pit Total			20.00	

The gravel pits have been identified for use to support the construction of exploration lease pads, access tracks and accommodation camp. Gravel pits will be progressively cleared prior to taking borrow material, with vegetation and topsoil stockpiled separately for future revegetation.

Gravel volumes required to be extracted to construct each lease pad and associated tracks will vary however it is estimated approximately 20,500 m³ of gravel per lease will be required, with total gravel quantity for entire program estimated between 143,500 m³ to 150,000 m³.

Gravel pits are anticipated to be up to 3 m depth, with final depth dependent on the level of gravel present at each identified gravel site. Gravel pit rehabilitation would commence within 12 months once there is no viable gravel left within the site. If viable gravel remains within the pit, they would remain open for up to five years for future exploration activities. This will reduce the ultimate disturbance footprint as new clearing for future activities will be required.

A contour bank will be created to divert rainwater around the borrow pits, as required. Fencing will also be installed around gravel pits where the pit batters represent a potential hazard to livestock and wildlife.

Gravel pits will be recontoured back to a stable and safe form following completion of works, and once no useful gravel is available. Topsoil and subsoils will be reinstated and allowed to regenerate naturally and will be incorporated into the rehabilitation monitoring program.

3.2.4 Groundwater bore drilling and monitoring activity description

Under this EMP, Sweetpea plan to install an additional two (2) groundwater bores at either an exploration lease pad or accommodation camp within the northern survey area of EP136 (Figure 10). The location of the groundwater bores will be positioned greater than 1 km from any other water bore in the permit (both government and pastoral lease holder bores) and will be within the AAPA approved clearance buffer zones.

The groundwater bores would initially serve for groundwater monitoring to meet the mandatory requirements of section B.4.17 of the *Code of Practice: Onshore Petroleum Activities in the NT* (2019).

An application for a Bore Work Permit will be made pursuant to section 57 of the *Water Act 1992*. The groundwater bores will be constructed on two by 50 x 50 m groundwater monitoring bore pads within the overall exploration lease pad in accordance DEPWS requirements including the Code of Practice, the *Preliminary Guideline: Groundwater Monitoring Bores for Exploration Petroleum Wells in the Beetaloo Sub-basin* and the *Minimum Construction Requirements for Water Bores in Australia 4th Edition*, 2020 (<https://www.adia.com.au/documents/item/290>).

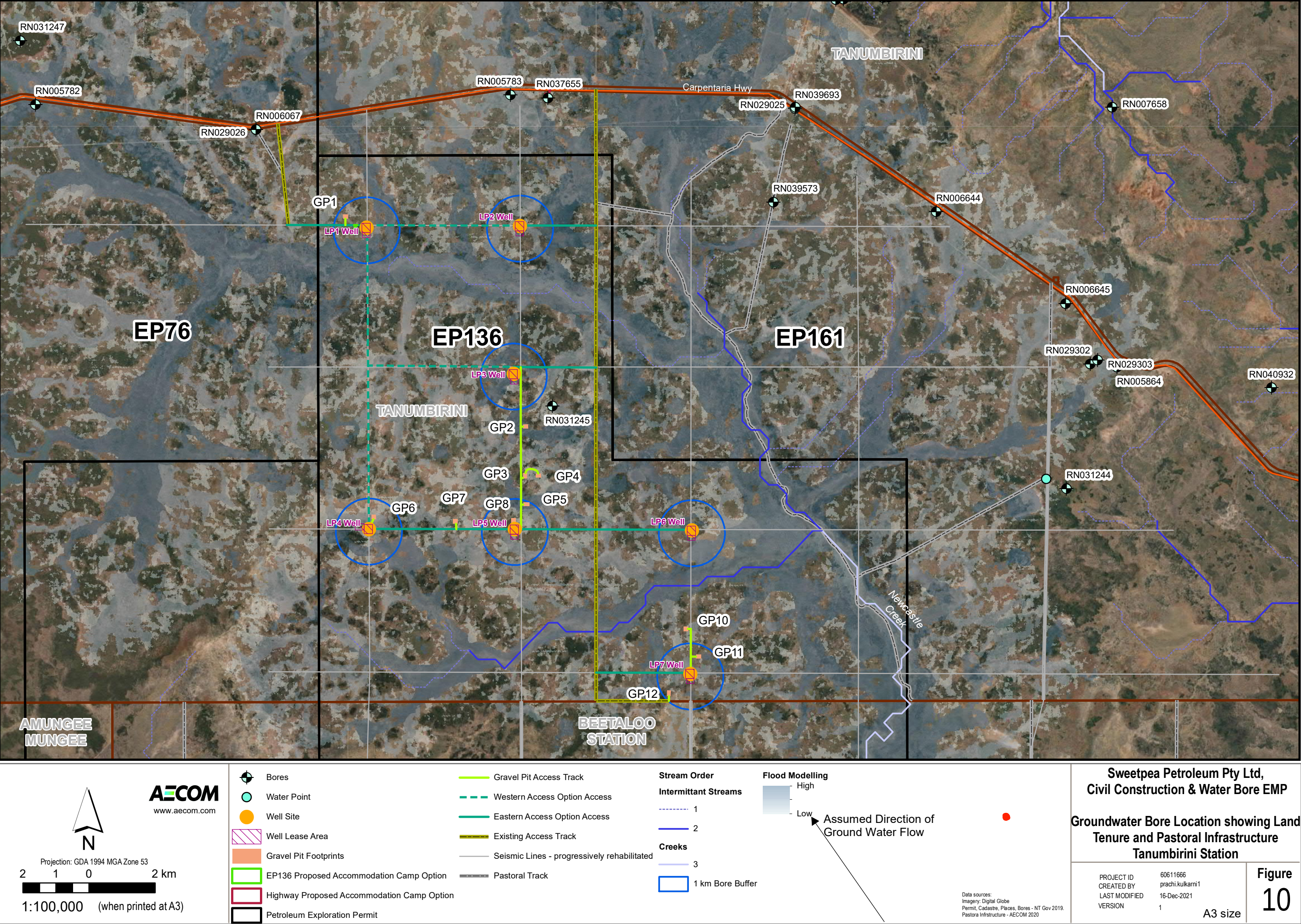
The Code of Practice requires that each discrete groundwater aquifer at the proposed exploration well location to be monitored. Based on information on the regional aquifers and other water bores in the permit area, it is expected that to comply with this requirement groundwater monitoring bores will be required at each exploration lease pad sites to monitor the aquifers typically found in the Cambrian Limestone Aquifer (CLA), the Gum Ridge and Anthony Lagoon Formations, with a depth of ~100 m to ~400 m BGL depth. Additional aquifers may also be within the area which may require additional groundwater bores to be installed, including a recently identified deeper aquifer in the Bukalara sandstone.

The groundwater monitoring bores designated the “control” bores at each exploration lease pad location are to be located ‘upstream’ of the regional groundwater flow which is generally in a south to north / north-west direction in the Beetaloo Basin with the additional “impact” monitoring bores located “downstream” of the groundwater flow (refer Figure 10).

The construction of the groundwater bores will require approximately 0.05 ML of water per bore installation, with the initial plan of four bores per exploration lease pad estimated to require 0.2 ML of water, or up to 0.3 ML of water if third aquifer is targeted. An application for a water extraction licence will be made to DEPWS Water Resource Division in accordance with the *Water Act 1992*. The water extraction licence will cover water bore installation, civil construction and future exploration activities in 2021-2024 as required. Potable water would either be carted to site from a commercially available water supply source or from the onsite groundwater bores (depending if meets potable drinking water quality guidelines).

Sweetpea have already obtained approval for 12 groundwater bores to be installed for its exploration program, with eight bores on Tanumbirini Station and a further four bores on Beetaloo Station under the Seismic EMP making a total of 14 groundwater monitoring bores proposed for Sweetpea’s exploration program, to meet the current AAPA certificate (CA2020/072). However, Sweetpea will require between 28 to 42 groundwater bores to be able to meet the requirements of section B.4.17, however these will be subject to additional regulatory approvals once new AAPA certificate is obtained.

AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.



**Sweetpea Petroleum Pty Ltd,
Civil Construction & Water Bore EMP**

**Groundwater Bore Location showing Land
Tenure and Pastoral Infrastructure
Tanumbirini Station**

PROJECT ID: 60611666
CREATED BY: prachi.kulkarni1
LAST MODIFIED: 16-Dec-2021
VERSION: 1

**Figure
10**

A3 size

Each aquifer intersected will be isolated from overlying aquifers with a cemented casing string. Drilling will be undertaken with air and foam. The proposed monitoring bore design for the Anthony Lagoon and Gum Ridge Formations are presented in Figure 11 and Figure 12. The final number of bores will be determined by the water bore drilling results, however, based on information on regional aquifers, and other water bores in the permit area of the Beetaloo Basin, it is anticipated that each lease pad will require four to six monitoring bores per lease pad, to a maximum of 42 monitoring bores for the current seven lease pad exploration program. The installation of a bore into the Bukalara Formation would be identical design as presented for the Gum Ridge Formation (Figure 12).

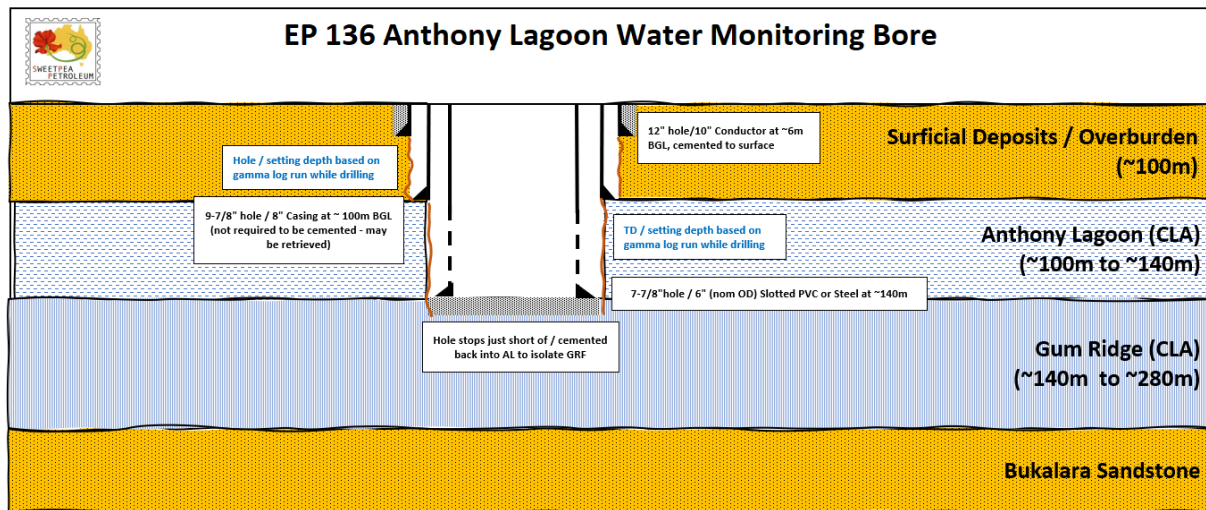


Figure 11 Proposed design for upper aquifer, Anthony Lagoon monitoring bore

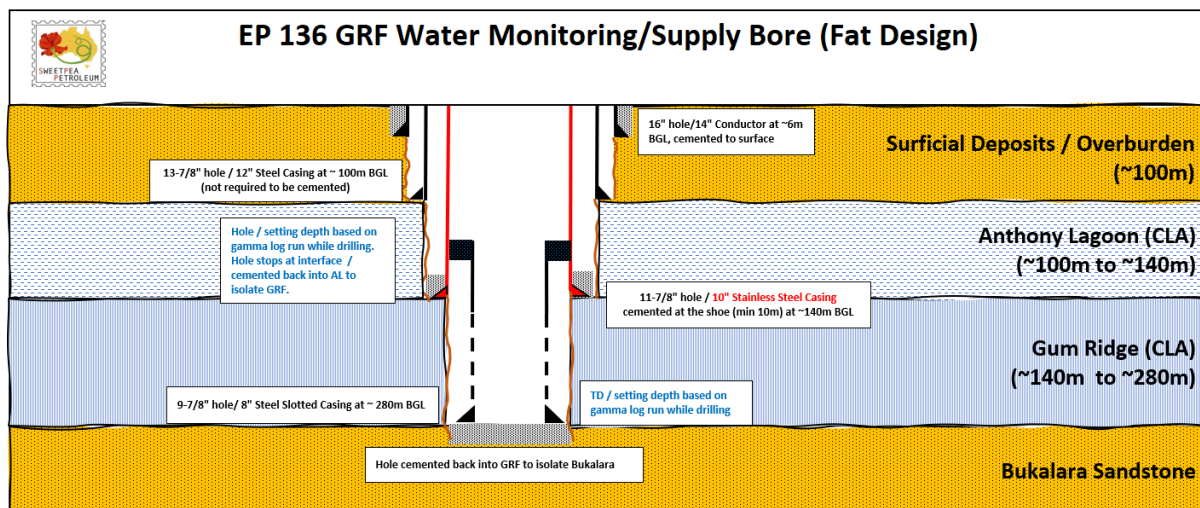


Figure 12 Proposed design for lower aquifer, Gum Ridge Formation monitoring bore

The bores will be gamma logged and the screening interval of each monitoring bore will be determined in consultation with DEPWS Water Assessment Branch. Each bore will be surveyed to Australian Height Datum (AHD) with accuracy to ± 10 cm.

Groundwater monitoring events will be undertaken by suitably qualified and trained personnel as required by the Code of Practice and will follow standard industry practice including the draft *Preliminary Guideline: Groundwater Monitoring Bores for Petroleum Wells in the Beetaloo Basin*, the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC Guidelines) and *AS/NZ5667.1: 1998. Water Quality - Sampling Guidance on sampling of groundwaters*. It is noted that National Association of Testing Authorities (NATA) accredited laboratories will be utilised for analysis of all samples, unless there are no NATA laboratories for a specific analyte/substance. In this instance, duplicate samples would be provided to two separate laboratories for independent testing in accordance with the Code of Practice.

3.3 Support Facilities for the Program

3.3.1 Accommodation camp

A central accommodation camp will be maintained for use by staff working on all aspects of the program (water bore, civil construction, drilling, stimulation and well testing) within the permit area. Camp services will be contracted as required for the relevant scope of work on an ongoing basis. The camp will not be used on a full-time basis, therefore the camp (or sections of it) will be demobilised between work periods. The setup and operations of the field camp will be in accordance with the *Requirements for mining camps and construction camps in the Northern Territory* provided by the Department of Health Environmental Health Branch.

Whilst the exact configuration is still to be determined, the camp will comprise accommodation units, kitchen and dining facilities, ablutions, site office, waste treatment and storage, potable water tanks, diesel storage and a diesel generator (Figure 13).

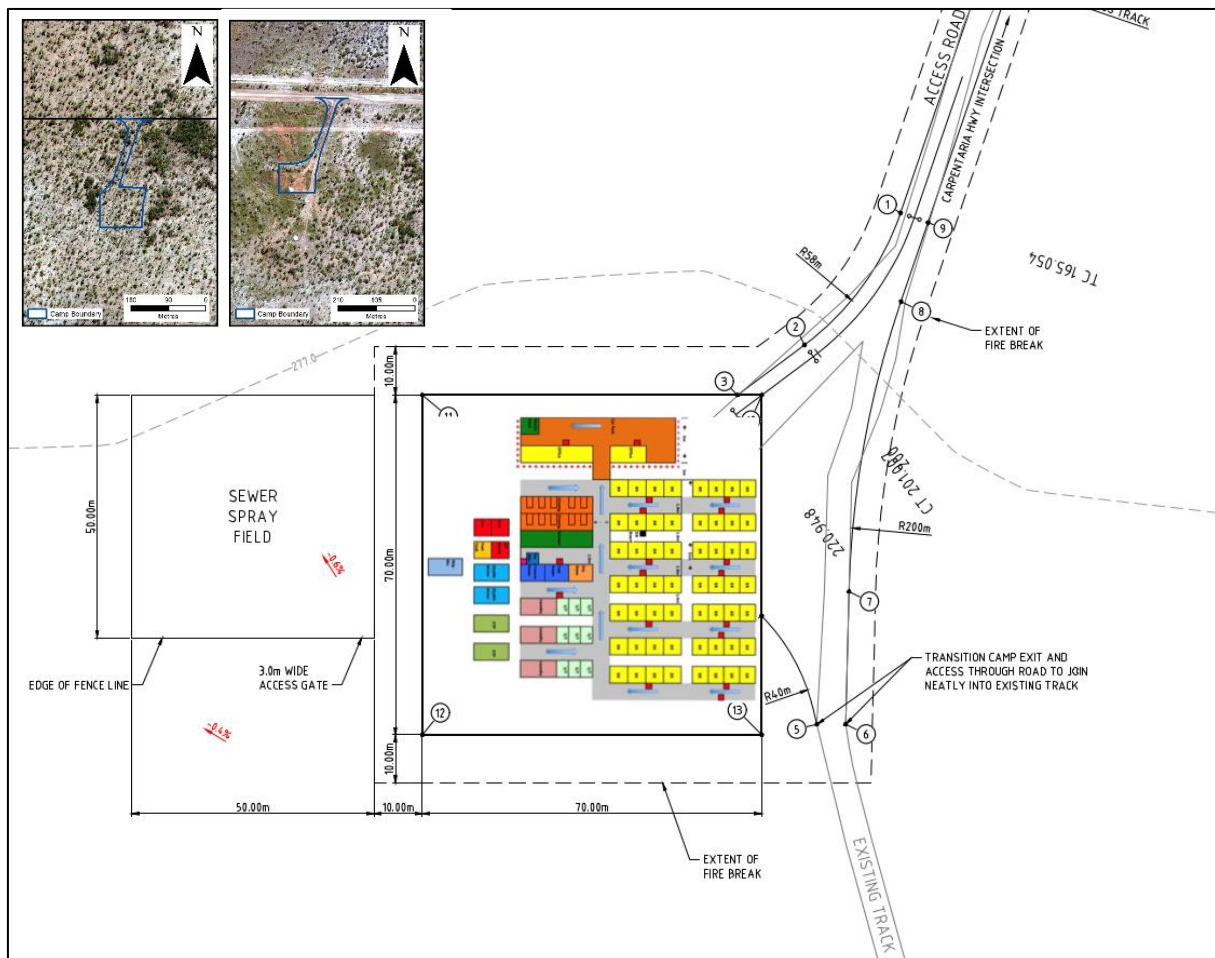


Figure 13 Generalised schematic of proposed field camp (refer Drawing 60611666-0008-02)

Two main accommodation camp options are proposed and decision on which camp will be used for the Civil and Water Bore EMP will be dependent on the final outcome of the LACA and AA 9 application. The options considered are:

- Option 1 – Highway Camp - located within a partially cleared area near the Carpentaria Highway to the north of Pad 2 and located close to the northern end of the planned central access track (Figure 6). This option does not need additional vegetation clearing under this EMP. The Highway Accommodation Camp has a water bore nearby that is suitable for potable water use. Extraction from this bore for potable supply will be under a Water Extraction Licence (Section 3.3.4) and with the bore owner's permission.
- Option 2 – Lease Pad 1 Camp – located west of Pad 1 which will require clearing of up to 1.3 ha of *Corymbia dichromophloia open woodlands* (Figure 6). The LP1 Camp will need a water extraction bore to be installed and will need to be assessed if suitable for potable water use. Extraction from the new bore will be under the existing Water Extraction Licence (Section 3.3.4).

The water supply bore for camp operations will be metered to track water usage during the program.

The camp cleared area for both options will be 100 m x 100 m, including the compacted camp pad (nominal 70 m x 70 m) that will be compacted along with an external perimeter area of 20 m width to cater for soil stockpiling and a fire break around the perimeter. An additional asset protection zone 20 m around the perimeter will also be established.

Less than 0.5 ha of native vegetation clearing will be required and will be stockpiled at a designated adjacent area. Topsoil will be scraped from the cleared area and stockpiled in low profile mounds (<2m high) away from natural drainage and the location levelled off and compacted to specifications required by the contractor. Stockpiled topsoil and vegetation will be reused for stabilisation and rehabilitation once activities at the camp are completed.

The camp pad will be surfaced with sheeting material sourced from the gravel pits identified in Section 3.2.3. The cleared camp pad location will be watered down and compacted to prevent surface erosion and to provide a firm foundation on which the camp buildings can be located.

Other details for the conceptual camp pad layout include:

- Site drainage and erosion control
 - Cleared topsoil will be used to construct a raised bund around the site perimeter as required to both contain fluids on the compacted site and also prevent free flowing water on to the site.
- Stock fencing
 - Stock fencing will be installed around the external perimeter with cattle grids at the entrance/exit points.
- Fire breaks / fire management zones
 - The accommodation camp layout includes:
 - An allowance of a 10 m perimeter area cleared around the compacted useable site area that includes area for soil/vegetation stockpiling, the perimeter bund and fencing.
 - An additional 10 m firebreak cleared, encompassing a 4 m fire access trail around the site perimeter.
 - A 20 m perimeter (not shown on schematics) to function as a managed vegetation zone whereby woody understorey vegetation is removed and maintain grass at less than 100 mm height. This achieves the required 40 m buffer for an asset protection zone (APZ) around infrastructure.

Further detail for the fire breaks/fire management zones are presented in Appendix I.

- Sewage Treatment System (STS) Reticulation Area
 - An area of approximately 65 m x 50 m that will comprise a chemical wastewater sewage treatment system (2 x OzziKleen SK25 Sewerage Processing Unit (SPU) and 20,000 L Water Tank Skid or similar) in accordance with Part 4 of the NTG Department of Health Code of Practice for Small On-site Sewage and Sullage Treatment Systems and the Disposal or Reuse of Sewage Effluent, 2014.
 - Prior to the instillation, a suitable area of land will be set aside for reticulation of grey water treated by the STS. Design of the reticulation area will follow requirements outlined in the NT Department of Health Code of Practice for Small On-site Sewage and Sullage Treatment Systems and the Disposal or Reuse of Sewage Effluent, 2014.

3.3.2 Waste Management

During the civil construction and water bore program, waste will be managed in accordance with the internationally accepted guide for prioritising waste management practices with the objective of achieving optimal environmental outcomes.

Waste will be managed in accordance with the following hierarchy principals:

1. Avoid: eliminate the generation of wastes through design modification.
2. Reduce: reduce unnecessary resource use or substitute a less resource intensive product or service.
3. Re-use: reuse a waste without further processing.
4. Recycle: recover resources from a waste.
5. Treatment: treat the waste to reduce the hazard of the waste prior to disposal.
6. Disposal: disposal of waste if there is no viable alternative.

The volume of waste produced for the construction of each of the seven-lease pad is likely to be small, in the order of less than a 5,000 kg. All wastes, specifically listed wastes (as described in Schedule 2 of the Waste Management and Pollution Control (Administration) Regulations (1998)) generated as part of the regulated activity will be removed from the proposed activity area, for disposal or recycling at a licensed facility authorised to receive those wastes (as summarised in the NT Listed Waste Company Summary spreadsheet).

Table 10 provides the waste management methods for the proposed civil construction and water bore program.

Table 10 Waste and Disposal Methods

Waste Source	Indicative volumes	Disposal Method
Camp Accommodation		
Sewage, grey and storm water	2,000 L per day of grey and sewerage wastewater	Treatment: Using a wastewater system approved by the NT Department of Health and in accordance with the <i>Code of Practice for On-site Wastewater Management</i>. Treated water will be dispersed to a dedicated area of land suitably landscaped for the disposal of reclaimed water by means of surface irrigation onto a suitable medium and plants capable of effecting a high rate of evapo- transpiration. Released to Grade: Lease pad will be designed to divert water around the lease pads through ESC measures. Where stormwater is captured on the disturbed areas, they will be directed through ESC measures detailed in Appendix K.

Waste Source	Indicative volumes	Disposal Method
Food waste, paper and plastic	10 kg/day	Disposal: Collected in dedicated waste bins for transport to an approved landfill.
Glass and cans	1 kg/day	Recycled: Collected in separate waste bins for recycling at an off-site facility.
General Industrial Waste		
Chemical bags and cardboard packaging materials	<100 kg in total	Recycled: Compacted and collected at the accommodation camp for transport to a licenced recycling centre.
Scrap metals	<1 tonne total	Recycled: Collected in designated skip for recycling at an approved location.
Used chemical and fuel drums	<0.5 tonnes total	Recycled: Collected in designated skip for recycling at an approved location.
Chemical wastes	<100 kg total	Re-use/disposal: Collected in approved containers for disposal at approved landfill or returned to supplier or recycled.
Timber pallets	<1 tonne total	Recycled: Recycled at an approved facility.
Vehicle tyres	<1 tonne total	Disposal: Disposed of at an approved landfill.
Oily rags, oil contaminated material, filters and other hydrocarbon material	<100 kg total	Recycled/ Disposal: Oil from machinery will be collected in suitable containers for disposal at approved landfill.
Groundwater Bore Drilling Activity Waste		
Minor cuttings and fluids from groundwater bore drilling only	~25m ³ for each pair of shallow and deep monitoring bores	All cuttings and drilling mud used for construction of groundwater bores will be disposed of on site in accordance with the Minimum Construction Requirements for Water Bores in Australia for water bore drilling practices.

Waste from the accommodation camp will be disposed of into sealed bins set up adjacent to the camp area. The sealed bins will be transported regularly for disposal of waste to a licensed landfill. Waste transfer certificates will be retained and provided to DEPWS upon completion of the project.

Sewage and grey wastewater will be treated in an OzziKleen SK25 Sewerage Processing Unit or similar and disposed of onsite within a designated wastewater irrigation area in accordance with the *Code of Practice for On-site Wastewater Management*.

3.3.3 Spill Management

All chemicals will be stored in designated lined chemical storage areas and have all reasonable and practicable measures in place to prevent or minimise pollution or environmental harm; and reduce waste (refer to Section 7.6). The chemical storage areas will be routinely inspected and kept free of spilled material and stormwater. This reduces the risk of contamination under the liner, if a liner was punctured or began to leak.

Refuelling and field servicing will have dedicated spill containment.

Double-lined diesel storage tanks to be used as per AS 1940:2004 *The storage and handling of flammable and combustible liquids*.

3.3.4 Water Supply and Use

An application for a water extraction licence will be made to DEPWS Water Resource Division in accordance with the *Water Act 1992*. The water extraction licence will cover water bore installation, civil construction and future exploration activities during 2022 to 2025 as required. Potable water during the initial period would be carted to site from a commercially available water supply source or from the nearby water bore identified for use in the Seismic EMP (depending if meets potable drinking water quality guidelines).

Water supply for the civil construction activities conducted later in the program will be provided from licensed established bores on the existing established exploration lease pads. This will be achieved by installing a pipeline along the access tracks between the lease pad sites. The pipeline will be buried on installation to protect from bushfire and vehicles. Water supply pipelines will avoid crossing creeks and other major drainage features. Where pipelines are required to cross, pipelines will be installed on the downstream side of the crossing and stabilised into bed level rock protection. Upon completion of the program water supply pipelines will be decommissioned and the site rehabilitated in conjunction with access tracks as outlined in Section 3.2.2 and Section 3.3.6.

Extracted groundwater will be recorded using an approved flow meter with records reported to DEPWS in accordance with the requirements of the water extraction licence.

Natural surface water features will not be used for any activities proposed in this EMP.

Table 11 presents the total estimated water usage for the civil construction and water bore program associated with seven exploration lease pads and the two additional groundwater monitoring bores. It is noted that 12 monitoring bores and associated water bore pads are covered by the existing approved Seismic EMP so are not included in the below water usage table.

Table 11 EP136 Estimated Water Usage for Civil Construction

Activity	Period	2022 Program		2023 Program		2024 Program		2025 Program	
	Description	No. of Items	Water Use (ML)	No. of Items	Water Use (ML)	No. of Items	Water Use (ML)	No. of Items	Water Use (ML)
Monitoring bore – construct*		2	0.1	-	-	-	-	-	-
Monitoring bore pad – construct		2	1.8	-	-	-	-	-	-
Construct main camp		1	7.0	-	-	-	-	-	-
Construct well pad		4	60.0	2	30.0	1	15.0	-	-
Construct tank pad		4	60.0	2	30.0	1	15.0	-	-
Construct access track		15	15.0	19	19.0	4	1.0	-	-
Track / pad maintenance		1	6.0	3	18.0	3	18.0	2	12.0
Camp Operations (est. 180 days/year for year 1 and 2 and 240 days/year for year 2 and 3)		1	2.1	1	2.7	1	2.7	1	2.1
Estimated Total Annual Water Use for Civil Construction		152.0		99.7		51.7		14.1	
Total Estimate for Civil Construction Water Use		317.5							

It is estimated that approximately 1,000 L per day of potable water use will be required for camp kitchen operations and drinking water supply for the field crew. This is based on approximately 200 L/per person/per day over the duration of the program. Potable water will be required to meet the *Australian Drinking Water Guidelines 2011*. In addition, non-potable water used for camp (showering), dust suppression and track maintenance are estimated at 5,000 L/day, plus 40,000 L required to fill the camp wastewater treatment plant. Therefore, based on assumed 180-day in year 1 and 4 and 240-days of camp operation in year 2 and 3, it is estimated that the total groundwater use for camp operations during the civil and water bore construction program ranges from 2.1 to 2.6 ML per year.

The construction of the water bores under this EMP will require approximately 0.05 megalitres (ML) of water per bore installation.

The civil construction activities, including construction of monitoring bore pad, main camp, lease pads and access tracks over the four-year program is estimated to require approximately 317.5 ML.

3.3.5 Greenhouse Gas Emissions

The greenhouse gas (GHG) emissions estimates for the civil construction and water bore program is presented in Table 12. Vegetation clearing, fuel consumption and emissions resulting from the civil construction and water bore drilling program have been included in the GHG estimate. Given that few materials are to be transported, and machinery sourced locally where available, GHG emissions have been based solely on fuel consumption related to civil construction activities as described in Section 3.2 and Section 3.3 of this EMP.

The majority of emissions associated with the civil construction and water bore program are related to the land clearing aspects of the project. This is based on maximum GHG emissions under a worst-case scenario. It is noted that to determine assumed diesel consumption for the civil construction activities presented in Table 12, a review of existing approved petroleum exploration EMPs have been conducted to calculate the estimated diesel consumption for the civil construction activities (Central Petroleum, 2020).

Table 12 Estimated Greenhouse Gas Emissions for Civil and Water Bore Program

Source of GHG Emissions	Assumption	Fuel Consumption (kL)	GHG Emissions (tCO ₂ -e)
Civil Construction Activities	Civil construction, including vegetation clearing is carried out by a dozer and grader equipped with 175-kW engine. Fuel consumption averages 80L/hr ($\frac{3}{4}$ load average) over a 12-hour day. Civil construction for each lease pad, including development of camp, gravel pits and access tracks will be carried out over maximum of 420 days (10 weeks or 60 days per lease pad).	960	1,097.2 [^]
Water bore drilling	Water bore drilling using a 550-kW engine. Fuel consumption averages 200 L/hr over a 10-hr day over 15 days per bore. As such, 2 bores equate to maximum 30 days.	60	163.0 [^]
Camp Operations (est. 180 days per year for Year 1 and 4 and 240 days/year for Year 2 and 3)	Camp operations using 200 kVA at $\frac{1}{4}$ load average. Fuel consumption averages 15 L/hr. Generator running 24 hours per day. Camp operations carried out over a maximum of 840 days (assumed maximum per year of 240 days).	302.4	2,468.8 [^]
Vegetation Clearing - Lease Pads	Calculated based on 77 ha of shrubs and trees to be cleared for lease pad construction, inclusive of water bore pads.	-	5,875.1 [*]
Vegetation Clearing – Highway Camp Option	No clearing estimate required as vegetation cleared under Seismic EMP.	-	0 [*]
Vegetation Clearing – LP1 Camp Option	Calculated based on 1.3 ha of shrubs and trees to be cleared for LP1 Camp option.	-	100.1
Vegetation Clearing – Eastern Access Track Option	Calculated based on 29.3 ha of shrubs and trees to be cleared for lease pad construction.	-	2,256.1 [*]
Vegetation Clearing – Western Access Track Option	Calculated based on 47.6 ha of shrubs and trees to be cleared for lease pad construction.	-	3,665.2

Source of GHG Emissions	Assumption	Fuel Consumption (kL)	GHG Emissions (tCO ₂ -e)
Vegetation Clearing – Gravel Pits	Calculated based on 27.3 ha of shrubs and trees to be cleared for gravel pit establishment.	-	1,540.0*
Total Civil Construction and Water Bore Program GHG Emissions Range		1,322.4	13,400.2 to 14,909.4
Estimated Total GHG Emissions per Lease Pad		188.9	1,914.3 to 2,129.9

* Clearing emissions were calculated using the Transport Authorities Greenhouse Group (TAGG) GHG Assessment Workbook for Road Projects (2013). The Workbook includes a methodology for estimating the loss of 'carbon sequestration potential' associated with the removal of vegetation to be undertaken as part of land clearing activities. The methodology, provided in Appendix E of the TAGG Workbook, was developed by GHD (2012) and is in line with the methodology used by the Australian Government Department of the Environment to estimate Australia's national GHG emissions for reporting under the United Nations Framework Convention on Climate Change (UNFCCC). Using the vegetation community description in Section 4.2.2 of the EMP, Sweetpea have conservatively assumed all vegetation types are vegetation class D (Open Woodlands - Eucalypt Open Woodland or Low woodlands to tall shrublands dominated by wattle (Acacia) species).

^ GHG emissions calculations have adopted the formula specified in the *National Greenhouse Accounts Factors* (DEE, 2017). i.e. $E_{ij} = (Q_i \times EC_i \times EF_{ij,oxec}) \div 1,000$. As such, GHG emissions related to diesel fuel consumption is $E_{ij} = (\text{kilolitres diesel} \times 38.6 \times 70.2) \div 1,000$. Note assumed based on worst case scenario of diesel fuel consumption/days of operation.

3.3.6 Rehabilitation

Rehabilitation at the completion of the exploration program will be undertaken in accordance with the rehabilitation management plans presented in Section 9.0 and Appendix F. Sweetpea have designed the civil construction and water bore program, to preferentially use previously disturbed areas as much as possible, including using the existing pastoral access tracks to access the permit area, as well as the repurposing of sections of the seismic lines (Seismic lines 6, 7, 8, 9, 10 and 11) to provide access for the construction of the lease pads and gravel pits, and for future exploration programs, including ongoing monitoring requirements of the water bores.

At the completion of activities and before the commencement of decommissioning activities, Sweetpea will discuss any possible residual beneficial use of the assets with the landowner. Assets may include the well pads, tank pads, access tracks, accommodation camps, gravel pits and water infrastructure. If the landholder does request for infrastructure to remain in place, the proposed infrastructure will have ownership transferred following approval by DEPWS and the Pastoral Land Board.

Where assets cannot be beneficially used, the site will be rehabilitated using assisted natural regeneration back to a safe, stable landform consistent with surrounding land use. Once Sweetpea identifies the completion of activities within an area of the permit, rehabilitation will commence within that 12-month period.

4.0 Summary of Existing Environment

The following section presents a summary of the existing environment of the area proposed for the civil construction and water bore program ("the Area"). A more detailed description of the physical, biological and social environments are provided in the accompanying Land Condition Assessment report Appendix C and the Cultural Heritage Assessment report, previously included in the Seismic EMP and summarised below in Section 4.3 as it relates to this program.

The Land Condition Assessment and the Cultural Heritage Assessments both provide a baseline condition assessment of the area to be disturbed by the regulated activity and informed the measures to be implemented by Sweetpea to minimise impacts from the activity.

4.1 Physical Environment

4.1.1 Climate

The climate of the Area is arid to semi-arid, with rainfall decreasing in frequency and quantity from north to south. The climate is monsoon-influenced, with a distinctive wet and dry season experienced through the year. Approximately 90% of the rainfall occurs during the wet season, and annual totals show moderate variability from year to year. November through to March are dominated by hot and wet conditions, while mild days and cool nights are experienced from May to August (Holt & Bertram, 1981). April and September are transitional months, with occasional rainfall. Drought conditions are known to occur in the region once every ten years (Holt & Bertram, 1981).

4.1.2 Topography

The Area is predominantly situated on flat laterite plains, which were formed by laterite capping Cretaceous-aged sedimentary rocks (Tickell, 2003). The laterite plains are approximately 250 m to 280 m above sea level and located along the drainage divide that separates inland drainage from the north flowing streams (Nutwood Downs), which lead into the Gulf of Carpentaria. From there, the land gently slopes towards the south and south west.

The Area lies south of this drainage divide with surface water flow draining in a south westerly direction and discharging into Lake Woods (Tickell, 2003) located approximately 140 km south-west of the permit area.

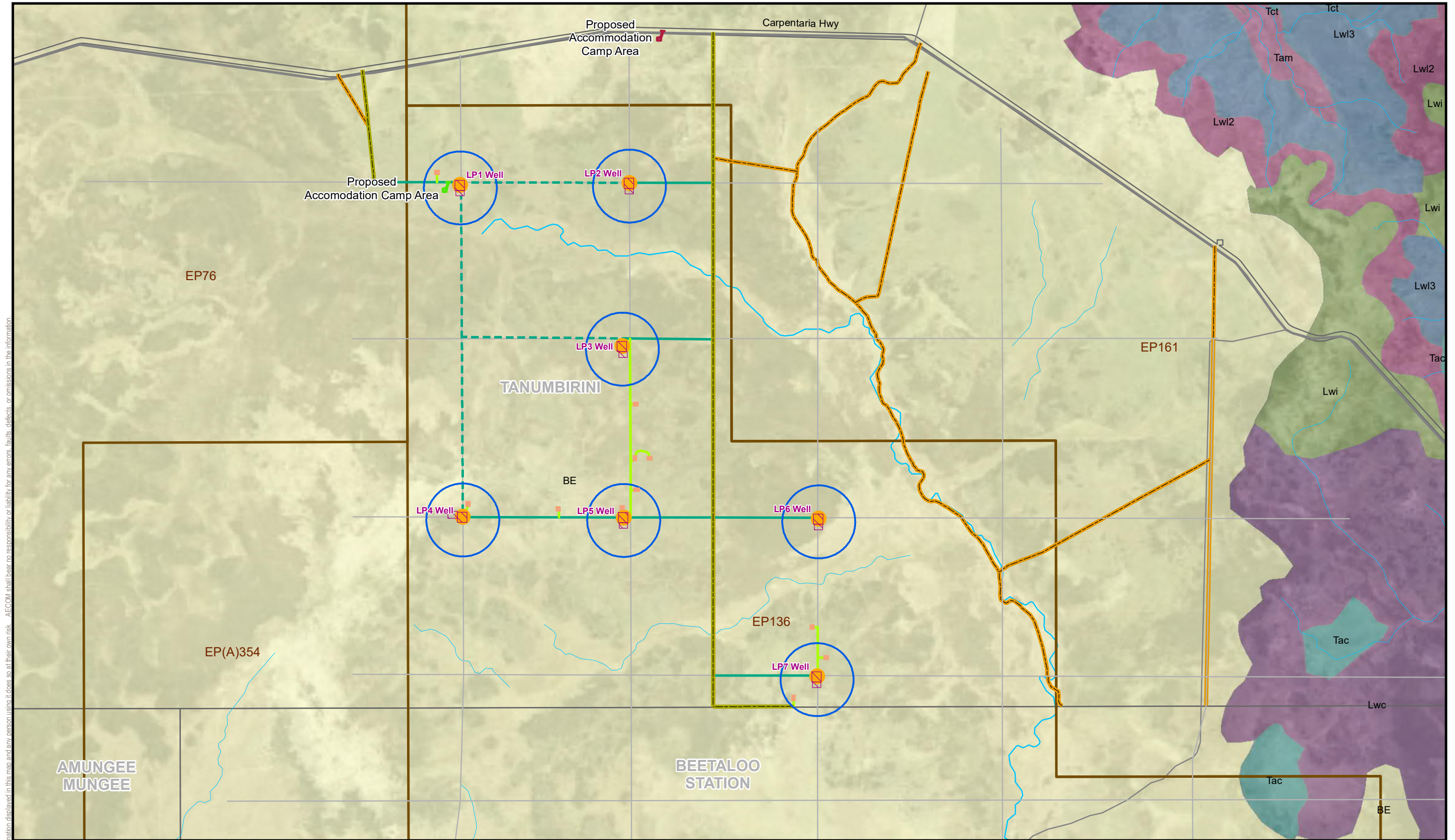
4.1.3 Land Systems

The Area is situated within the Beetaloo Land System (see Figure 14), which is characterised by gently undulating lateritic plains and rises of lateritic red earths and podzolic soils dominated by *Acacia shirleyi* (Lancewood) forest.

4.1.4 Geology

The Area occurs within the Western Gulf Sub-basin, part of the larger Carpentaria Basin formed during the Jurassic and Cretaceous periods (Ahmed et al., 2013). Soft clays and sandstone are the primary rock formation in the basin and overlay the older Pre-Cambrian and Cambrian rocks. Isolated freshwater lakes were formed during the Miocene Period (15 million years ago) when erosion and the gradual sinking of some areas produced small and patchy occurrences of freshwater limestone accumulations (Tickell, 2003).

The geology of the Area was primarily formed over three main periods –the Precambrian (> 550 million years ago), the Cambrian (500 million years ago) and the Cretaceous (100 million years ago). Pre-Cambrian rock formations, known as the Roper Group, are generally located at depth beneath the younger formations across the proposed program area, and are exposed only in the bedrock hills located to the north of the program area on Tanumbirini Station (Tickell, 2003). Cambrian formations, comprising limestone, siltstone and sandstone, only have surface expressions south-west of the Area, within Beetaloo Station. The rock formation is near flat, rarely cut by faults and forms distinct layers. The Cambrian sediments are characterised by sub-artesian water storage, pedocalcic soils, Cambrian dolomite, limestone, and tertiary alluvium (Tickell, 2003).



AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.

Projection: GDA 1994 MGA Zone 53

2 1 0 2 km

1:100,000 (when printed at A3)

www.aecom.com

- | | | |
|---|---|--|
| <ul style="list-style-type: none"> ● Well Site ■ Gravel Pit Footprints Well Lease 1 km Bore Buffer EP136 Proposed Accommodation Camp Option Highway Proposed Accommodation Camp Option Petroleum Exploration Permit | <ul style="list-style-type: none"> Existing Access Gravel Pit Access Western Access Option Access Track Eastern Access Option Access Track Seismic Lines - progressively rehabilitated Pastoral Track Roads Cadastre | <p>Land Systems</p> <ul style="list-style-type: none"> Beetaloo (BE) Coolibah (Tac) Cresswell (Lwc) Inacumba (Lwi) Lancewood 2 (Lwl2) Lancewood 3 (Lwl3) McArthur (Tam) Tanumbirini (Tct) |
|---|---|--|

DARWIN

EP136

Data sources:
Imagery: Digital Globe
Permit, Cadastre, Places, Bore - NT Gov 2019.
Pastora Infrastructure - AECOM 2020

**Sweetpea Petroleum Pty Ltd,
Civil Construction & Water Bore EMP**

**Land Systems within
the Civil Construction Program**

PROJECT ID	60611666
CREATED BY	prachi.kulkarni1
LAST MODIFIED	16-Dec-2021
VERSION	1

A3 size

Figure
14

Following the deposition of Cretaceous sediments, a period of geomorphic activity occurred during the Tertiary period. This resulted in the area, being gently folded and warped, which exposed it to a long period of erosion (Christian et al., 1951). The resultant landscape of the Area was dominated by undulating plains that contained extensive swampland and lakes, such as Lake Tarrabool to the south east of the southern exploration area. Following a period of lateritisation during the end of the Tertiary period, rivers were at grade and erosion was reduced to a low level that allowed deep stable soil profiles to be established and be preserved (Christian et al., 1951), resulting in the 'black' soil clay plains and the lateritic rises that occur to the south of the program area (Randal, 1967).

With the onset of a more arid climate during the post-Miocene period, the lakes and swamps dried up, resulting in high concentrations of lime and silica deposits that were leached from the lateritic soils into the ground and surface waters, which in turn formed a number of Tertiary limestone outcrops within the permit area. During the Quaternary period (less than 2 million years ago), the minor alluvial and lake deposits throughout the region were formed.

4.1.5 Soils

The Area falls within the Sturt Plateau bioregion which comprises of undulating plains on sandstones, with mostly neutral sandy red (Tenosol) and yellow earth (Kandosol) soils. Cracking clay soils (Vertosols) occur in the southeast of the bioregion (ANRA, 2008). The soils within the Sturt Plateau have been derived from ancient rock formations and ancestral soils that were formed during earlier weathering cycles.

The soils have been deeply weathered, leached and are relatively infertile because they have not been enriched by any recent geological events (Orr & Holmes, 1984). The soil types located within the plateau range from the very strongly leached lateritic soils of the Tertiary land surface to the calcareous desert soils and desert loams in the southern drier areas.

The lateritic plains, which encompass the Area, are classed as very strongly leached soils of the Tertiary land surface. Two main soil types are:

- Tertiary Lateritic Red Earths (Red Kandosols), which occur on the gently undulating topography
- Tertiary Lateritic Red Sands (Red Tenosols), which occur on gently undulating to undulating topography of the Tertiary Lateritic Plain, formed from sandstones and complex parent materials of the deep sandy soils.

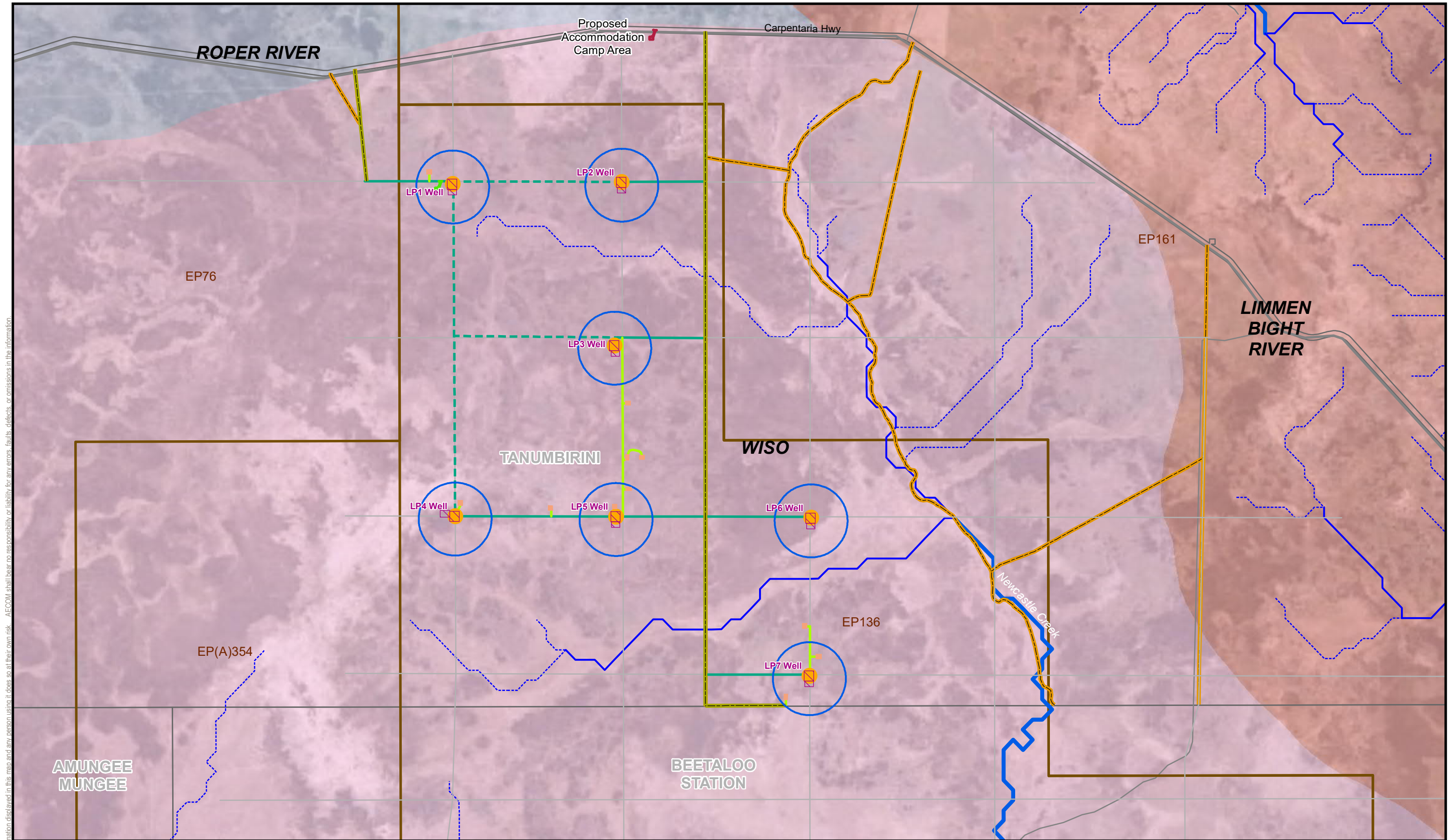
In summary, the soils across the permit area can be described as:

- poorly drained clay (Vertosol) soils and brown earths (Kandosol), frequently with ironstone gravels
- generally, slightly acidic to neutral, with soil pH ranging from 5 to 7
- erosion risk primarily related to soil type (clays result in higher risk) and rainfall (higher risk)
- bulldust formation is the erosion pathway for most areas, higher where repeated disturbance (usually grasslands) occurs
- erosion risk at creek crossings
- the majority of the Area has a proportion of bare ground cover of 0%-20%, indicating healthy vegetation cover.

4.1.6 Hydrology

The Area is located within the Wiso Basin which is drained by the Georgina River and its major tributaries (Ranken, James, Buckley and Woodroffe Rivers).

Newcastle Creek and several small ephemeral creeks are located within the Area. Access tracks have been designed to utilise a main existing station track which crosses Newcastle Creek twice at two existing crossings. The secondary station track to access Lease Pad 1 and all other tracks to access the lease pads do not propose to cross any creek or drainage lines within the Area (refer Figure 15).



AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.



Projection: GDA 1994 MGA Zone 53

2 1 0 2 km

1:100,000 (when printed at A3)

AECOM
www.aecom.com

- Well Site
- Gravel Pit Footprints
- Well Lease Area
- 1 km Bore Buffer
- EP136 Proposed Accommodation Camp Option
- Highway Proposed Accommodation Camp Option
- Petroleum Exploration Permit
- Cadastre
- Existing Access
- Gravel Pit Access
- Western Access Option Access Track
- Eastern Access Option Access Track
- Seismic Lines - progressively rehabilitated
- Pastoral Track
- Roads

Stream Order

Intermittant Streams

- 1
- 2
- 3

Creeks

- 3

River basins

- Limmen Bight River
- Roper River
- Wiso



DARWIN

EP136

**Sweetpea Petroleum Pty Ltd,
Civil Construction & Water Bore EMP**

**Location of Proposed Access
Track Creek Crossings within
the Civil Construction Program**

PROJECT ID	60611666
CREATED BY	prachi.kulkarni1
LAST MODIFIED	16-Dec-2021
VERSION	1

**Figure
15**

A3 size

Data sources: Imagery: Digital Globe; Permit, Cadastre, Places, Bores - NT Gov 2019; Pastora Infrastructure - AECOM 2020

Filename: \\aume11fp003.au.aecomnet.com\GIS\Projects\2019\Sweetpea_GIS\02_MXD\Civil, Drilling and Stimulation EMP\2021\12\Civil_Construction_WaterBore_EMP\Figure12_A3L_Creek.mxd

Newcastle Creek and the small drainage depressions only flow for short periods during the wet season, with waterholes forming at the beginning of the dry season. The Area drains via Newcastle Creek towards Lake Woods, which is located 140 km south-west near Newcastle Waters Station. The area of Lake Woods is approximately 50,000 ha in normal rainfall years, extending to 80,000 ha in exceptionally wet years, after which it can retain water for several years (HLA, 2005). Lake Woods is described as a major quasi-permanent surface water body in the region, although some semi-permanent and many ephemeral waterholes are located across the exploration area (HLA, 2006a).

The extent of inundation within the Area depends on the severity of the wet season and can range from remaining completely dry to widespread flooding. A preliminary assessment of the 1% Annual Exceedance Probability (AEP) flood levels was completed for the seven proposed lease pads (Figure 16). A full description of the flood modelling, including assumptions is presented in *Section 3.6* of the Land Condition Assessment (refer Appendix C).

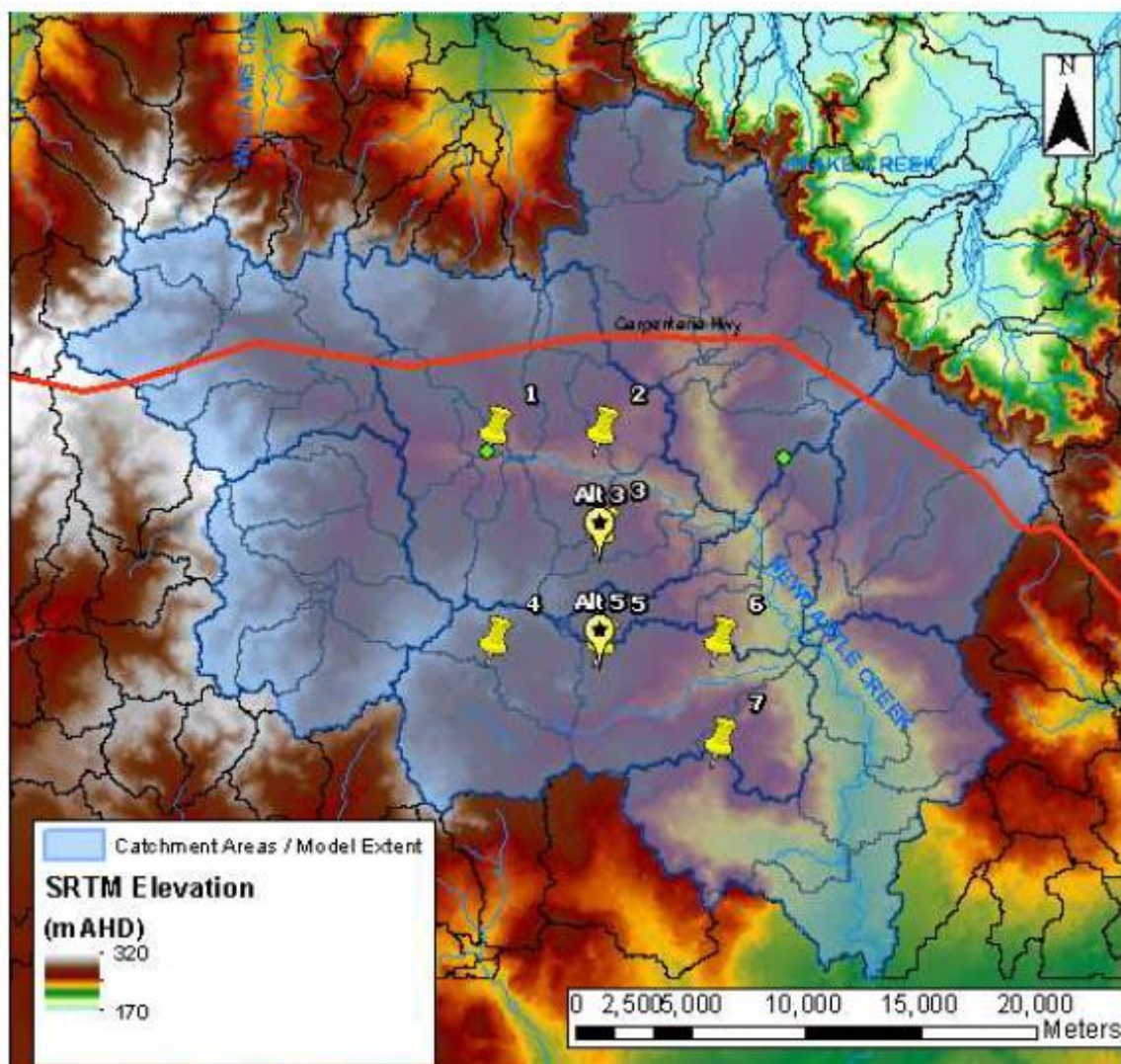


Figure 16 1% AEP Model Extent

The method used in the assessment of the flood levels at the lease pad locations involved:

- Catchment delineation using available aerial photography and Shuttle Radar Topography Mission (SRTM) ~1s (30 m) topographic data (refer Figure 16).
- Development of a 30 m grid 2D TUFLOW model with direct rainfall-on-grid applied.
- Determination of the 1% AEP rainfall inputs to the 2D TUFLOW model based on ARR 2019 guidelines, including adoption of 10 temporal patterns and 2016 Bureau of Meteorology.

- Intensity-Frequency-Duration inputs.
- Simulation of all storm durations and temporal patterns at the 1% AEP.
- Verification of the 1% AEP peak catchment discharge using the rational method based on guidance given in the Queensland Urban Drainage Manual (QUDM) 2017.
- Model sensitivity analysis varying Manning's 'n' roughness assumptions and reduced catchment infiltration losses.
- 2D Mapping of maximum flood depth, flood elevation and flood hazard for the 1% AEP flood event.
- A high-level topographic assessment of ground levels at the drill site and in the flood plain to assess the likelihood that the drill pad may be flooded during regional flood events.

The assessment approach considered the magnitude of flood events from regional flooding (defined as a large event over many catchments, possibly with rainfall at a great distance from the site) as well as local flooding (rainfall immediately over the area draining to each site).

The results from the mapped outputs of the maximum flood extent for the 1% AEP flood event are presented in Figure 17 and presented in Table 13. For the purpose of the assessment, the flood extent results were filtered to remove all water depths below 0.1 m depth. To assess the likelihood that each drill pad may be flooded during a 1% AEP flood event, ground levels were taken from the SRTM topographic data at the lease pad locations and compared with maximum water depths and the nearest creek 'channelised' water surface elevation from the hydraulic model.

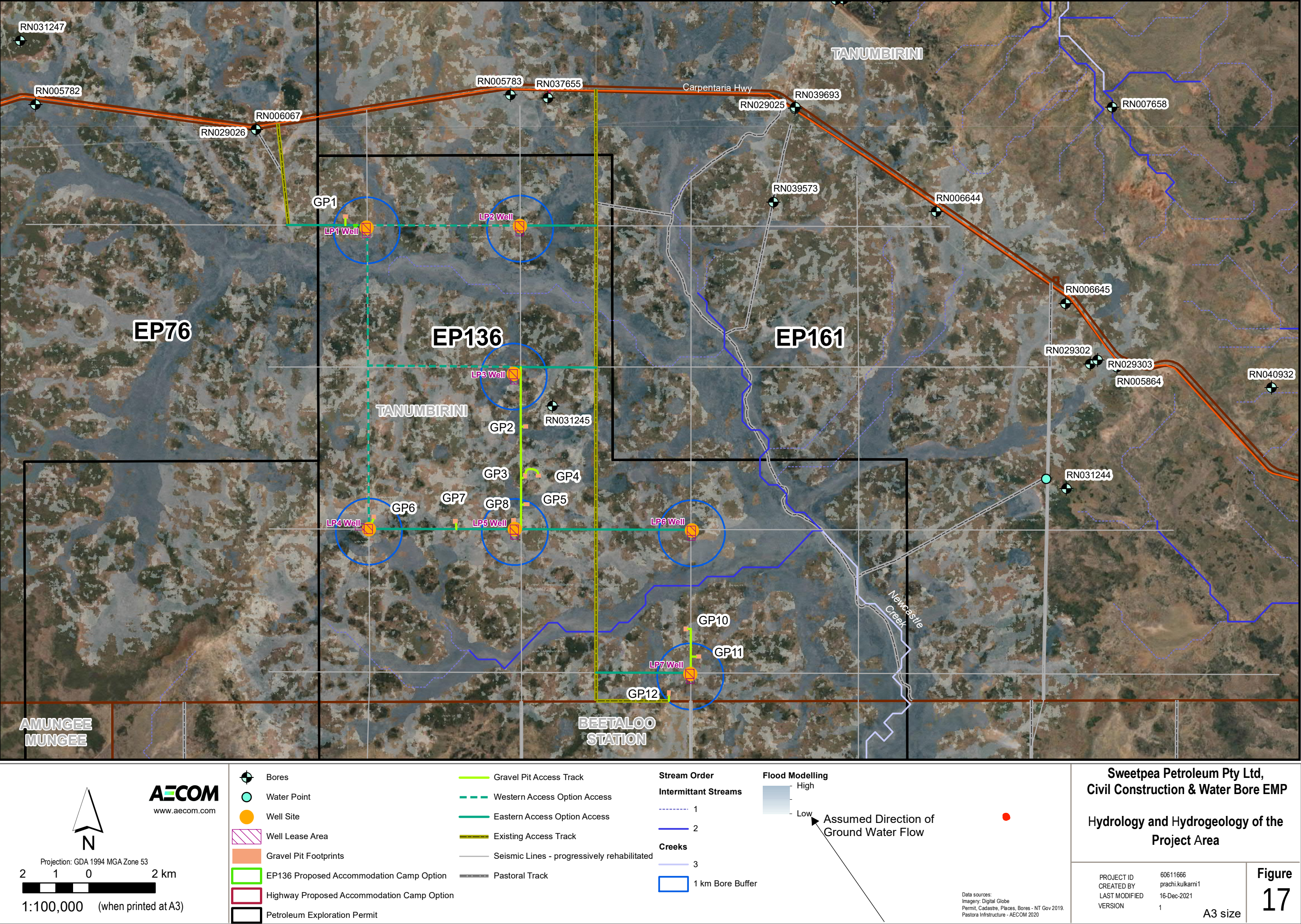
Table 13 1% AEP Results for each Lease Pad

Lease Pad	SRTM Ground Elevation (m AHD)	Maximum Water Depth (m)	Maximum Elevation at Nearest Channel (m AHD)
Lease Pad 1	271.2	<0.1	268.2
Lease Pad 2	269.5	<0.1	269.2
Lease Pad 3	277.7	<0.1	277.4
Lease Pad 4	285.2	<0.1	284.1
Lease Pad 5	282.2	<0.1	282.2
Lease Pad 6	266.3	0.15	266.5
Lease Pad 7	273.4	<0.1	273.4

Except for Lease Pad 6, all other lease pads had a maximum water depth of below 0.1 m. This means that the local catchment sheet flow is likely to predominate over concentrated (channelised) flow.

Therefore, overland sheet-flow is the dominate mechanism of flooding for the identified lease pad areas. It is considered unlikely that the seven lease pad areas will be subject to inundation from regional flooding from Newcastle Creek. The local catchment runoff from major storm events will be the considering factor for the establishment of lease pad finish levels and the lease pad designs have taken this into consideration for the final placement in the landscape (refer Appendix K).

AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.



**Sweetpea Petroleum Pty Ltd,
Civil Construction & Water Bore EMP**

**Hydrology and Hydrogeology of the
Project Area**

PROJECT ID: 60611666
CREATED BY: prachi.kulkarni1
LAST MODIFIED: 16-Dec-2021
VERSION: 1

**Figure
17**

A3 size

Data sources:
Imagery: Digital Globe
Permit, Cadastre, Places, Bores - NT Gov 2019.
Pastora Infrastructure - AECOM 2020

4.1.7 Hydrogeology

EP136 falls within the Georgina groundwater province, as described by the Australian Water Resources Assessment (Land and Water Australia, 2004). The other ground water provinces that occur in the region include McArthur to the north-east, Wiso to the west and Tennant Creek to the south near Elliot.

Within the Georgina Province there are two main aquifer rock types – fractured rock and both fractured and cavernous rock. The latter is the most extensive and occurs in limestone areas and generally can yield moderately large quantities of water. The fractured rock aquifers tend to be localised to specific areas and generally have a low yield. These occur in the siltstone and sandstone areas and in older rock areas such as the Ashburton Ranges (Tickell, 2003).

A review of the Northern Australian Land and Water Task Force findings (NALWTF, 2009) identified the sustainable groundwater yield of the Georgina Basin is expected to be high yielding with up to 100 gigalitres per annum. The review also indicated that the Wiso and Georgina groundwater provinces are large, underlying multiple surface catchment boundaries extending from near Mataranka, south east of Katherine, well south and east across the Barkly Tablelands almost to Mt Isa, and south well beyond the northern boundary of the Tanami desert (NALWTF, 2009).

The primary groundwater resources within the permit area are associated with the Gum Ridge Formation and Anthony Lagoon Formation at a depth between 0 and 300 mbgl. These aquifers, which are part of the Cambrian Limestone Aquifer (CLA), provide an important water resource for the pastoral industry and local communities within the region. Although the Gum Ridge Formation is recognised to have the best potential for water production due to the higher yields (Tickell, *et al.*, 2019), Sweetpea will evaluate the results from its groundwater monitoring program within the activity area to determine which aquifer will be used for water extraction under licence. A third aquifer, the Bukalara Sandstone Formation may also be present in some areas of the permit underlying the Gum Ridge Formation.

An extract from the recently completed *Geological and environmental baseline assessment for the Beetaloo GBA region* as part of the *Geological and Bioregional Assessment Program: Stage 2* conducted by Department of the Environment and Energy, Bureau of Meteorology, CSIRO and Geoscience Australia, provides a summary of the licensed water allocations in the Beetaloo GBA region and Beetaloo extended GBA Region and is presented in Table 14.

Table 14 Summary of Licensed Water Allocations in the Beetaloo GBA Region

Authorised purpose	Number of licensed bores in Beetaloo GBA extended region	Total entitlement volume for Beetaloo GBA extended region (ML/y)	Number of licensed bores in Beetaloo GBA region	Total entitlement volume for Beetaloo GBA region (ML/y)
Agriculture	26	27,446	1	1,650
Industry	11	309	0	0
Public Water Supply	6	275	0	0
Stock and domestic ^a	Various bores ^b	2,108	Various bores ^b	540
Total volume (ML/y)	-	30,138	-	2,190

^a volumes as reported in water allocation plans

^b There are 1153 and 343 stock and domestic bores located within the Beetaloo GBA extended region and the Beetaloo GBA region, respectively; however, the actual number of bores used for extraction is unknown.

Extract from Huddleston-Holmes et al. 2020 (*Data from Department of Environment and Natural Resources (2019b)*)

Based on the region's groundwater allocation plan data, it is anticipated that the estimated maximum annual water use for Sweetpea's planned activities (inclusive future activities) is 299 ML/y (~12% increase) which is well within the sustainable yield of the Beetaloo GBA region available aquifers (Tickell et al, 2017). Groundwater use for the civil construction and water bore activities is not expected to impact on other current and future water users due to the remote location and the future domestic demand is unlikely to change significantly.

Table 15 and Figure 17 present the only operational water bores located near the proposed activity area on Tanumbirini Station. No existing groundwater bores are located within 1 km of the proposed lease areas. It is noted that there is only a small amount of groundwater data available for the area and as such, the groundwater bore drilling and monitoring program associated with the civil construction and water bore drilling activities will provide valuable information on the aquifers in relation to groundwater quality, yield, direction and depth that will inform future exploration activities in the area.

Table 15 Existing Water Bores in Proposed Activity Area

Registered Number	Proximity to Lease Pads	Owner	Date Installed	Purpose	Depth (mTOC)	Water Level (mTOC)	Yield (L/s)	Physical Parameters
RN037655 53 453725E; 8177606N	8 km west of Station Turnoff	Tanumbirini Station	28/05/2012	Stock Bore	155	126	6	pH 6.8 EC 1,432 µS/cm
RN031245 53 453860E; 8168289N	>1 km from Lease Area 3	Tanumbirini Station	12/11/2007	Stock Bore	144	115	2	pH 6.5 EC 1,376 µS/cm

Based on the available information for the permit area, the groundwater flow is anticipated to be in a north-westerly direction, as presented by the potentiometric surface map (Figure 18) provided in the Beetaloo GBA (Huddleston-Holmes et al. 2020). However, it is noted that a characteristic of the CLA is the presence of karst features (sinkholes, caves and solution cavities) which may cause local groundwater flow paths to substantially deviate from the regional flow direction. Early monitoring of the groundwater data obtained during the civil construction and water bore program will inform decisions for each lease pad to determine the placement of control and impact bores.

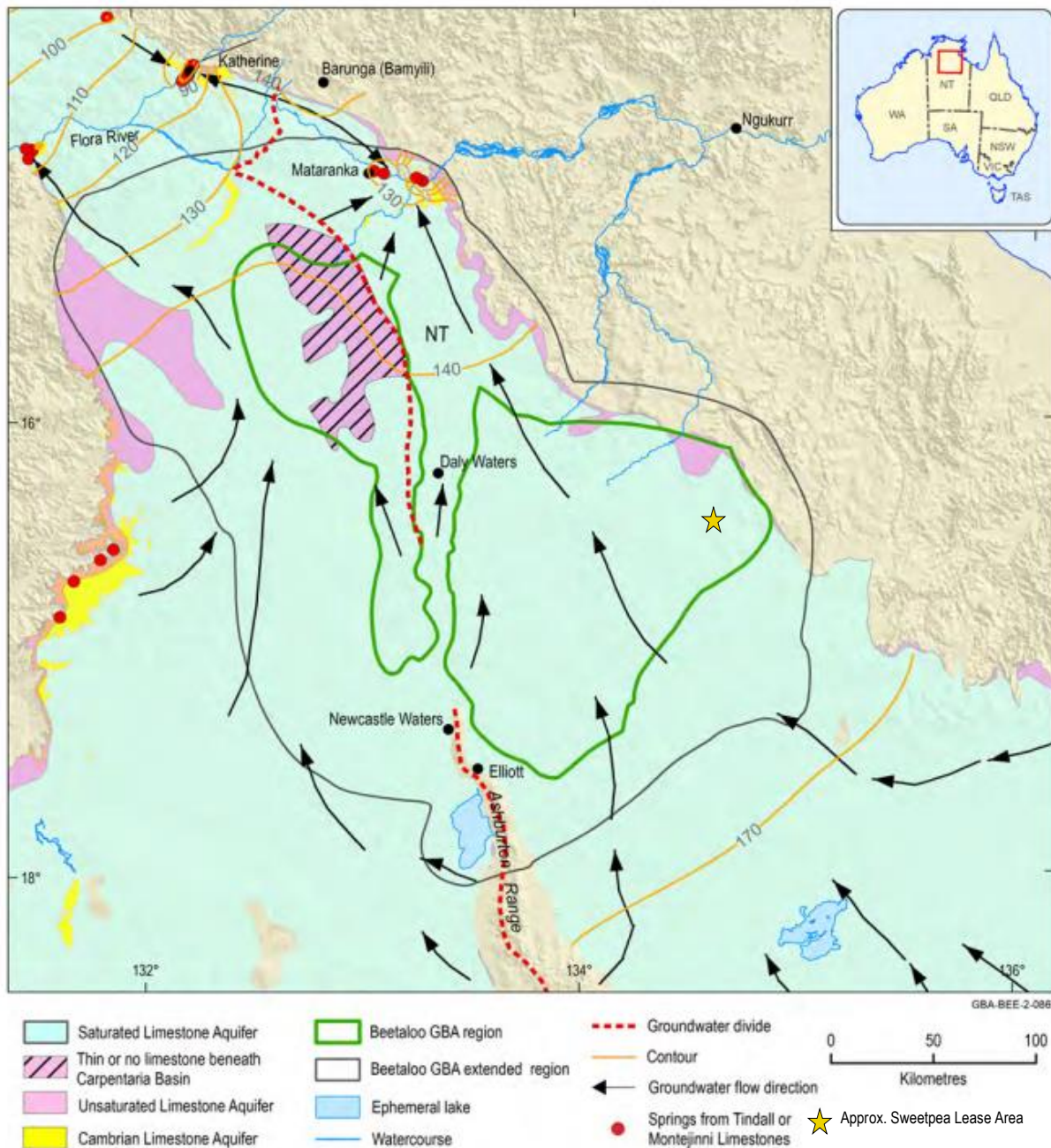


Figure 18 Regional groundwater flow in the CLA System (extract Huddleston-Holmes et al. 2020)

4.1.8 Groundwater Dependent Ecosystems

A search of the National Groundwater Dependent Ecosystems (GDE) Atlas was conducted in February 2021. The dataset expresses the potential for groundwater interaction/use for river/spring/wetland ecosystems across Australia. It shows the ecosystems that rely on groundwater that has been discharged to the surface, such as baseflow or spring flow.

The Atlas identifies two aquatic GDEs within the civil construction and water bore area, consisting of Newcastle Creek and Yaroo Creek. It is not anticipated that the civil construction and water bore water extraction activities associated with this EMP will significantly impact on these units.

Subterranean GDEs (e.g. stygofauna) are likely to be present in the karstic systems such as the Gum Ridge Formation aquifer where water level is less than 100 m below ground level (Imperial, 2020). Stygofauna are a form of GDE that inhabit the interstitial spaces of the cavities of alluvial, sedimentary and karstic aquifers. Recent studies by the Gas Industry Social and Environment Research Alliance (GISERA) program have identified and characterised stygofauna assemblages in the CLA units of the Beetaloo Sub-basin. Data is available that can provide an indication of the likelihood of stygofauna presence, with Hose, GC., *et al* (2015) outlining the following factors affecting the distribution of stygofauna:

- Formation type: Stygofauna are predominantly found in aquifers with large (mm or greater) pore spaces, which is more common for alluvial, karstic and some fractured rock aquifers.
- Depth below ground level: The abundance and diversity of stygofauna typically decreases with depth below ground, with fauna rarely found more than 100 m below ground level (Hose, GC *et al* 2015).
- Proximity of exchange and recharge: Stygofauna are more abundant in areas of surface water-groundwater exchange, compared to deeper areas or those further along the groundwater flow path remote from areas of exchange or recharge.

(Origin, 2021)

Based upon the above information, the presence of significant assemblages of stygofauna in the exploration area for the Civil Construction and Water Bore activities is considered limited and impacts considered unlikely.

Further understanding of the GDE will be confirmed as part of the groundwater monitoring program which is subject to this EMP. The monitoring program will inform baseline conditions of the permit area and identify specific measures required for future EMPs, including drilling and stimulation EMP.

4.1.9 Bushfire

Fire is an intrinsic part of the Australian environment and has shaped the evolution of most natural ecosystems within it, however since European settlement, fire regimes have changed leading to corresponding changes in vegetation structure, composition and flammability.

Bullwaddy and Lancewood communities, which occur throughout the civil construction program area are fire sensitive and vulnerable to frequent or high intensity fires. High intensity fires can also reduce habitat quality for a variety of flora and fauna species, with research suggesting that fauna diversity may be adversely impacted by high intensity fires, particularly diurnal reptiles (Legge *et al.*, 2008).

Historically, most higher intensity fires have occurred to the north of the program area. Field investigations indicated that fire disturbance varies throughout the region, with most sites showing evidence of fire occurring within the last 1-3 years. Fire scars were usually less than 1 m, and occasionally 1-4 m, indicating low to moderate fire intensity. However, some trees and shrubs had been killed by fire at four sites suggesting that higher intensity fires do sometimes occur.

4.2 Natural Environment

4.2.1 Bioregions

The Area is situated in the Sturt Plateau bioregion which comprises undulating plains on sandstone, with predominantly neutral sandy red and yellow earth soils. The dominant vegetation is eucalypt woodland (mainly variable-barked bloodwood *Eucalyptus dichromophloia*) with spinifex understorey, as well as extensive areas of Lancewood (*Acacia shirleyi*) -Bullwaddy (*Macropteranthes kekwickii*) vegetation association and associated fauna, including the Spectacled Hare-Wallaby (*Lagorchestes conspicillatus*). Land condition in the bioregion is moderate to good but is threatened by impacts from weeds, feral animals, pastoralism and changed fire regimes (Baker *et al*, 2005).

4.2.2 Vegetation Communities

The Area is typically dominated by *Corymbia* spp. and *Eucalyptus* spp. open woodlands and tall shrublands and woodlands of Bullwaddy and Lancewood with open grassland understorey. On alluvial plains and in drainage areas, *Eucalyptus chlorophylla*, *E. microtheca* and *E. pruinosa* low woodlands predominate, while on the plains *Corymbia dichromophloia* and *E. leucophloia* woodlands are more dominant.

Lancewood forests are the most extensive acacia-dominated communities across northern NT. The Lancewood/Bullwaddy communities typically have a dense shady shrub layer, including vines and creepers, and a sparse grass understorey. This compares to the sparse canopy and tall grass understorey of other tall dense grasslands (PWCNT, 2005). Lancewood/Bullwaddy communities are fire sensitive and inappropriate fire regimes may result in a change from Bullwaddy-dominated vegetation through Lancewood to a Eucalypt dominated open woodland (PWCNT, 2005). This process may be accelerated by the invasion of exotic pasture grasses such as Buffel Grass (*Cenchrus ciliaris*) which increases the flammability of the vegetation and hence the frequency and severity of fires.

No threatened vegetation communities are listed as likely to occur within the Area.

4.2.3 Native Flora

Database searches found that no Commonwealth-listed threatened plant species have been identified as potentially occurring within the Area. *Ipomoea argillicola*, listed as Near Threatened under the *Territory Parks and Wildlife Conservation Act 1976* (TPWC Act), could potentially occur within the Area as it has previously been recorded within the Bullwaddy Conservation Reserve and at locations surrounding the Area.

4.2.4 Weeds

Database searches identified 17 regional weed species known or likely to occur within EP136, including four Weeds of National Significance (WoNS) and six species declared under the *NT Weeds Management Act 2001*.

No weeds were encountered within the civil construction and water bore area during the November 2019 or May 2020 field surveys, however the surveys have identified weeds nearby to the activity area. Hyptis (Class B and Class C weed under the *Weeds Management Act 2001*) was recorded within the seismic exploration area east of the program area during the May 2020 survey. Additional regional weed records were collected during a survey undertaken in 2019 at Hayfield Station to the west of the program area. This survey identified weeds in low abundance including three listed species, *Parkinsonia aculeata* (Parkinsonia), *Hyptis suaveolens* (Hyptis) and *Calotropis procera* (Rubber Bush). Parkinsonia is considered a Weed of National Significance (WoNS), which are weed species that are the focus of national management programs for restricting their spread and/or eradicating them from parts of Australia.

4.2.5 Native Fauna

Previous surveys and database searches indicate that the Area supports a diverse array of fauna. Database searches (NR Maps) provide records for 69 species of birds, 21 species of reptiles, six species of mammal and one amphibian.

The following of which are listed under the *Territory Parks and Wildlife Conservation Act 1976* (TPWC Act):

- Australian Bustard (*Ardeotis australis*)
- Mulga Snake (*Pseudechis australis*)
- Speckled Hare-wallaby (*Lagorchestes conspicillatus*)
- Northern Nailtail Wallaby (*Onychogalea unguifera*)

Two species were listed as data deficient:

- Common Blue-tongue (*Tiliqua scincoides*)
- Spotted Tree Monitor (*Varanus scalaris*)

A total of 21 listed fauna species under either the EPBC Act or TPWC Act may potentially occur in the Area. These include ten birds, eight mammals and three reptiles. The likelihood assessment of species occurrence based on the availability of suitable habitat within the permit area was conducted as part of the Land Condition Assessment (refer *Section 4.5.1*, Appendix C). The following species were identified as 'possibly' occurring in the Area and are known to occur in the wider landscape of EP136:

- Gouldian Finch *Erythrura gouldiae* (Endangered EPBC Act, Vulnerable TPWC Act)
- Grey Falcon *Falco hypoleucos* (Vulnerable TPWC Act)
- Crested Shrike-tit (northern) *Falcunculus frontatus whitei* (Vulnerable EPBC Act, Near Threatened TPWC Act)
- Painted Honey Eater *Grantiella picta* (Vulnerable EPBC Act, Vulnerable TPWC Act)
- Yellow-spotted Monitor *Varanus panoptes* (Vulnerable TPWC Act)

The DAWE Protected Matters database indicated the potential presence of 20 Migratory and Marine listed species within the permit area.

4.2.6 Feral Animals

Feral animals likely to occur within the region include (PWCNT, 2005; ANRA, 2008):

- Domestic Cattle (*Bos Taurus*)
- Water Buffalo (*Bubalus bubalis*)
- Cane Toad (*Bufo marinus*)
- Wild Dog (*Canis lupus familiaris*)
- Donkey (*Equus asinus*)
- Horse (*Equus caballus*)
- Feral Cat (*Felis catus*)
- House Sparrow (*Passer domesticus*)
- Black Rat (*Rattus rattus*)
- Pig (*Sus scrofa*).

Unsurprisingly, surveys undertaken in November 2019 found evidence of cattle grazing within the past year, or previous 1-2 years was observed at the majority of assessment sites. The only exceptions were at one very rocky site (NL18) and one Corymbia woodland site (NL6). Spinifex grass (*Triodia* sp.) was the dominant grass at both these sites, which is generally not favoured by cattle for food. At sites that were damaged approximately 5-25% of ground cover was impacted by cattle at nine sites, while damage was less than 5% at seven sites. Cattle showed a preference for grazing on *Chrysopogon fallax* (Golden Beard Grass).

The Cane Toad is known to be present in the permit area and the Commonwealth DAWE recognises this species as a 'key threatening process' related to their impacts on biodiversity through predation, competition, land degradation and poisoning. In the Northern Territory, the Cane Toad has been implicated in the decline of several species including several reptiles such as the King Brown Snake and water monitors (Smith & Phillips, 2006).

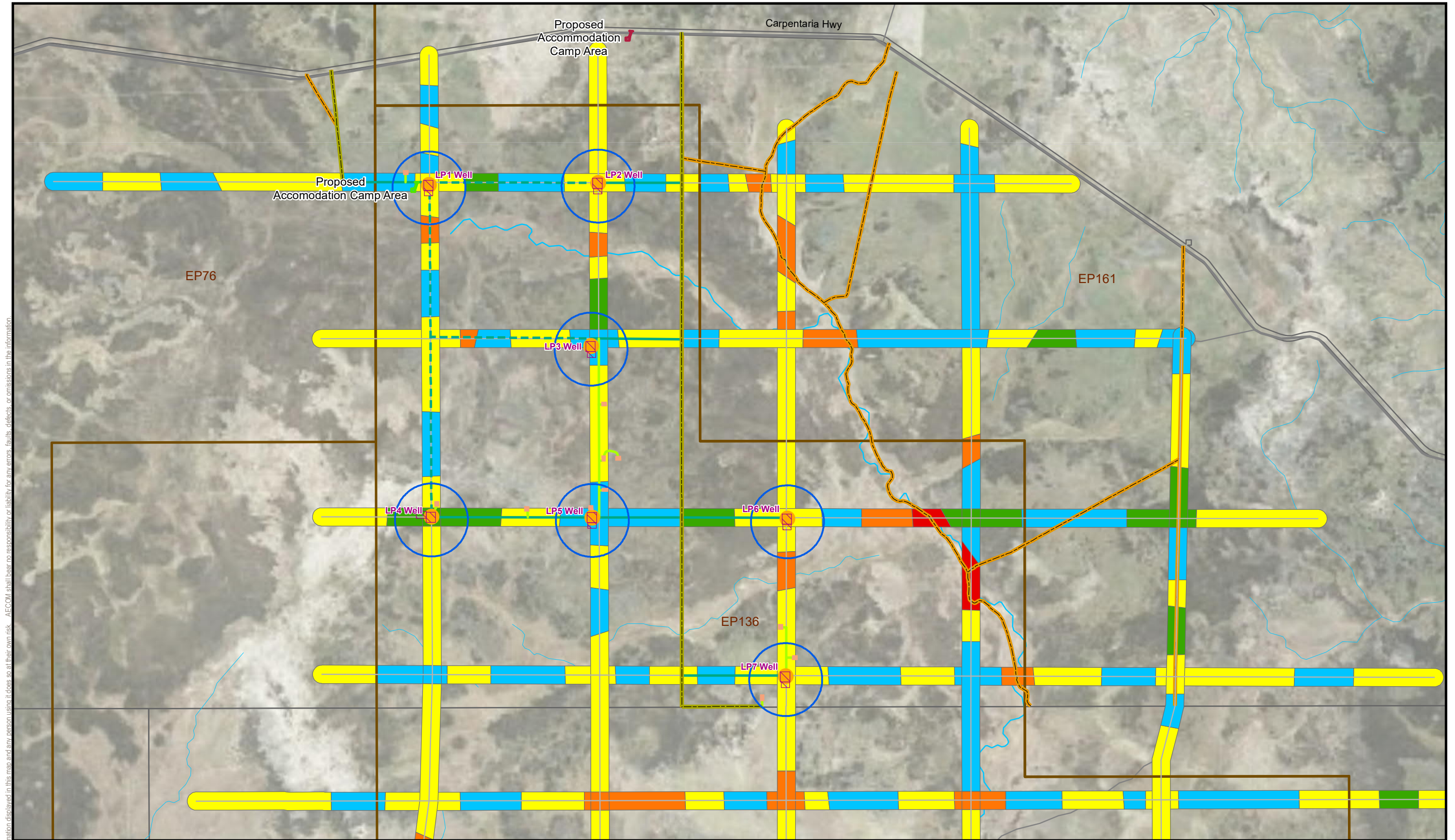
Pest predators such as the Cat are most likely common although their abundance is difficult to assess due to their cryptic nature. Introduced predators such as Cats can impact many vertebrates (Dickman, 2009 & 1996). One of the primary concerns of introduced predators in the site is the impact on EPBC listed species such as reptiles, and ground-dwelling birds. Feral cats are believed to be one of factors that have led to the decline of threatened ground-dwelling bird the Partridge Pigeon (Woinarski, 2006).

4.2.7 Land Condition

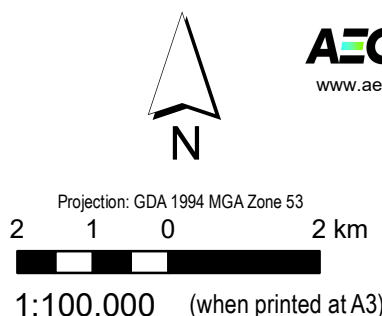
Land Condition Assessments were undertaken for the Area, including gravel pits and access tracks, during November 2019 and May 2020 field surveys. The land condition scores were determined from aerial dashcam footage and are mapped and presented in Figure 19.

Land condition nearby to creeks and cattle watering points within the Area were generally classed as Poor or Disturbed due to evidence of erosion, bare soils and vegetation impacts. Areas displaying obvious fire impacts to vegetation structure and condition were also considered to be Disturbed. Areas of intact land and vegetation were scored either Good or Excellent. Large patches of Lancewood (*Acacia shirleyi*) were classed as Excellent in the northern exploration area.

Land condition assessment sites were also recorded in the field and the location of land assessment sites are presented on Figure 19. Detailed land condition description and photographs are presented in Section 6 of Appendix C. A land condition overview for exploration lease pads, gravel pits and main accommodation camp site is presented in Table 16.



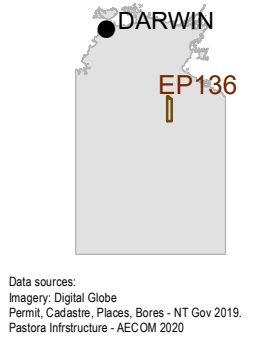
AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.



- Well Site
- Gravel Pit Footprints
- Well Lease Area
- 1 km Bore Buffer
- EP136 Proposed Accommodation Camp Option
- Highway Proposed Accommodation Camp Option
- Petroleum Exploration Permit

- Existing Access Track
- Gravel Pit Access Track
- Western Access Option Access
- Eastern Access Option Access
- Seismic Lines - progressively rehabilitated
- Pastoral Track
- Roads
- Cadastre

- Land Condition Assessment**
- Very Poor
 - Poor
 - Disturbed
 - Good
 - Excellent



**Sweetpea Petroleum Pty Ltd,
Civil Construction & Water Bore EMP**

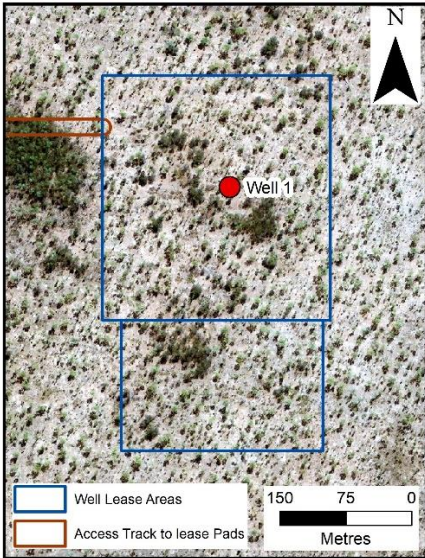
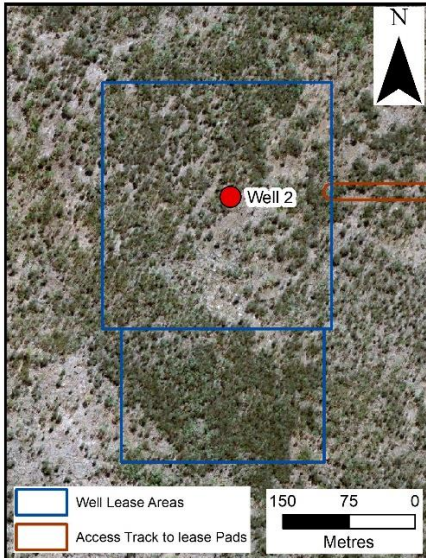
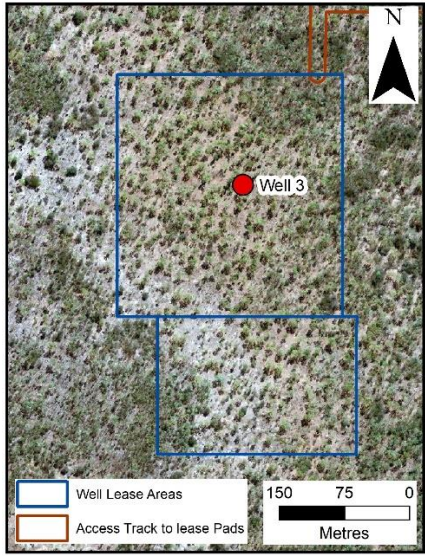
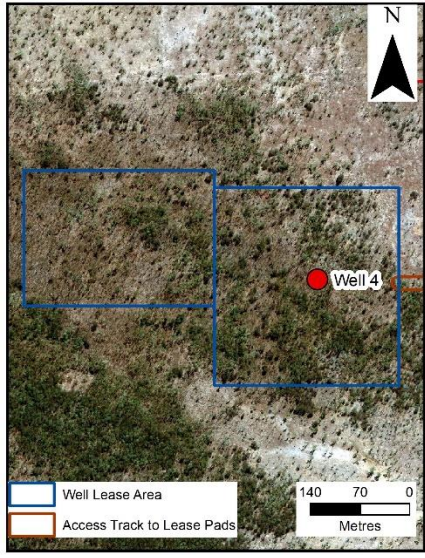
**Land Condition Assessment within
the Civil Construction Program**

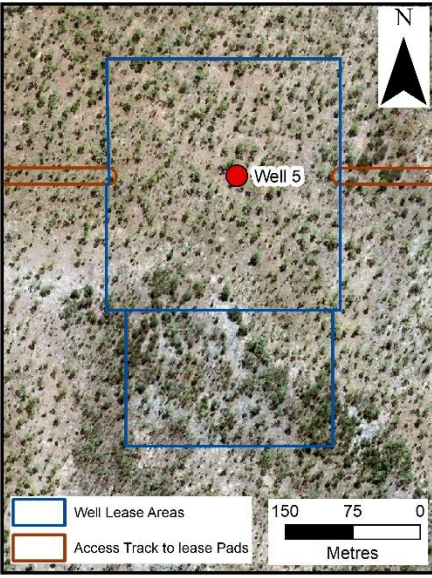
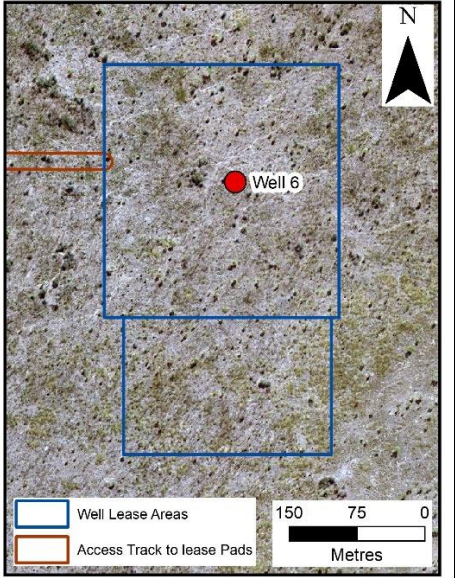
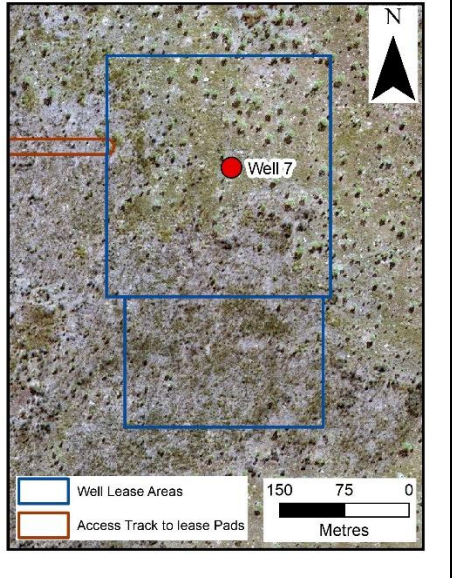
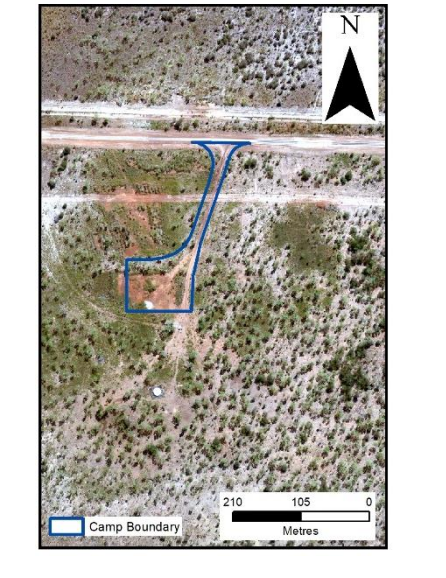
PROJECT ID 60611666
CREATED BY prachi.kulkarni1
LAST MODIFIED 16-Dec-2021
VERSION 1

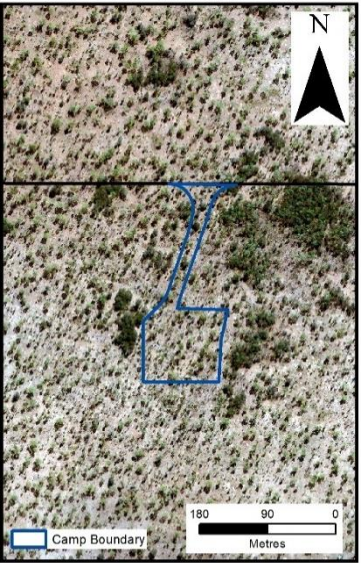
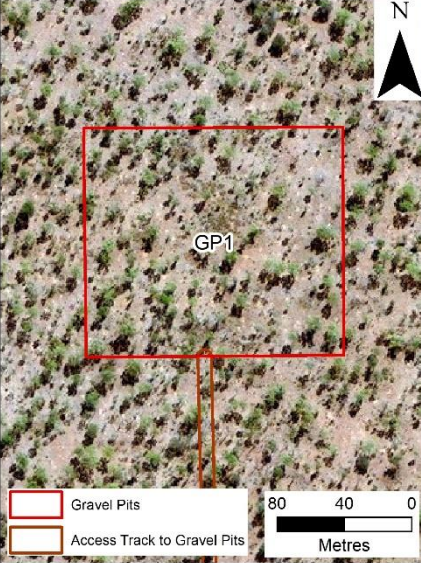
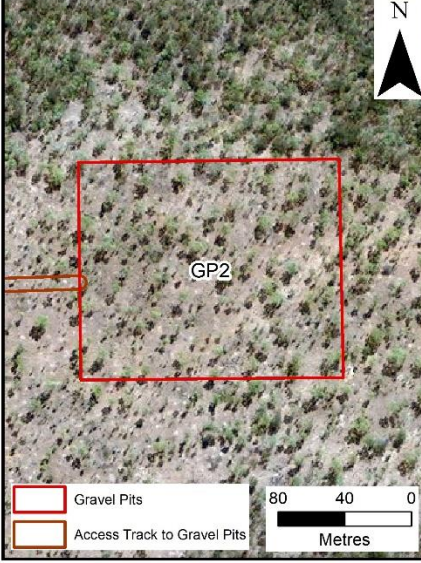
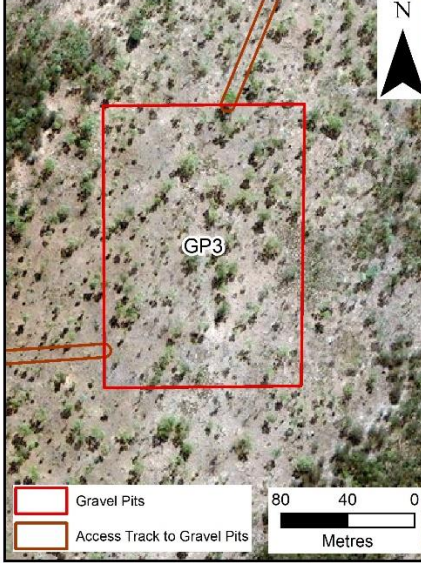
A3 size

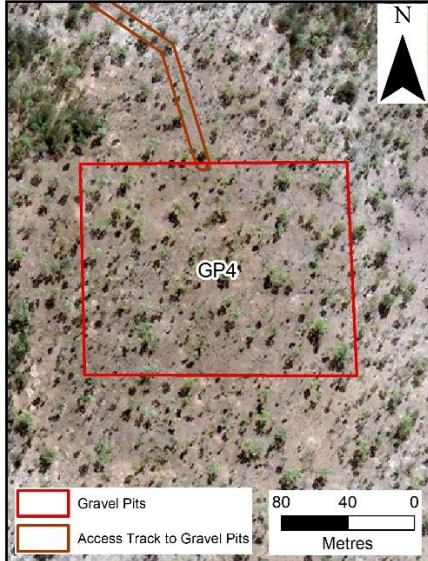
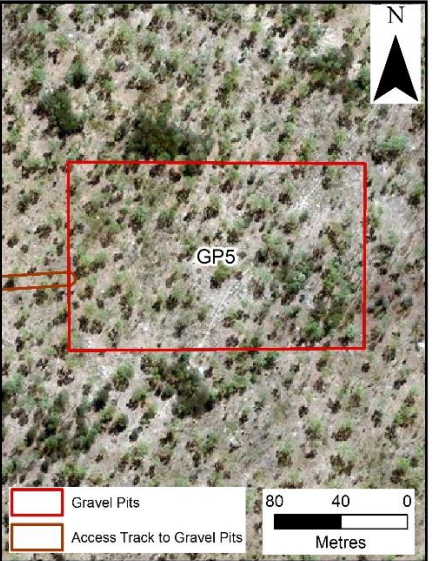
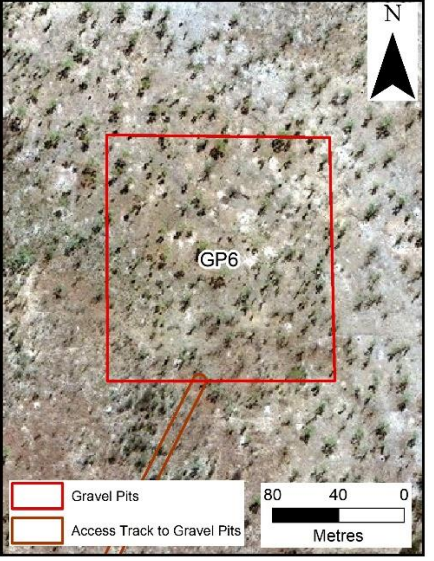
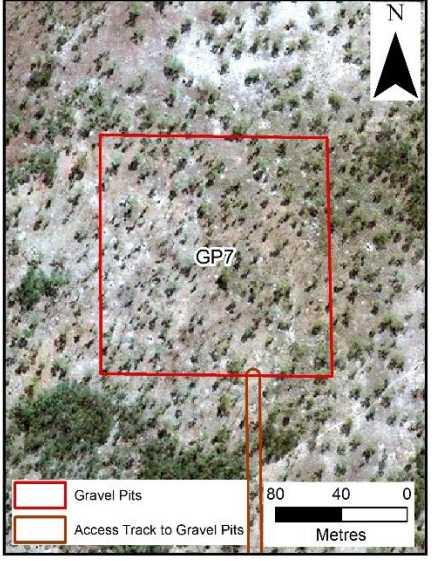
**Figure
19**

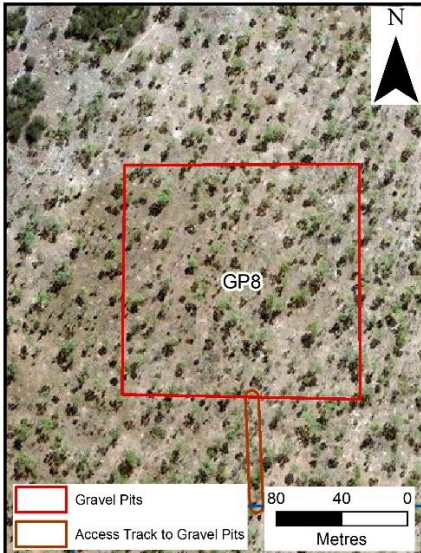
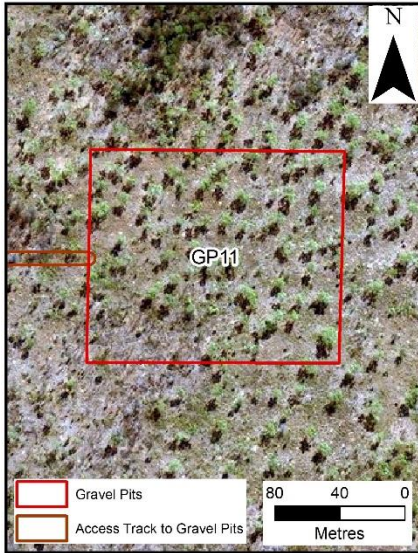
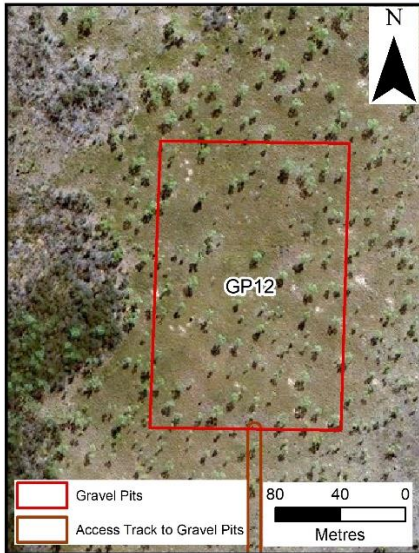
Table 16 Land Condition Assessment for Lease Pad Areas, Main Accommodation Camp Options and Gravel Pits

Lease Pad 1 Location (GDA94, z53): 448242E, 8173682N	Lease Pad 2 Location (GDA94, z53): 452878E, 8173732N	Lease Pad 3 Location (GDA94, z53): 452685E, 8169262N	Lease Pad 4 Location (GDA94, z53): 448309E, 8164578N
			
Vegetation Type: <i>Corymbia dichromophloia</i> open woodland Land Type: Plains, slopes 0 to 1%, well drained gravelly sandy loam kandosol soils Land Condition: Disturbed Land Capability Rating: 2 (Suitable) Area Cleared: 10.65 ha	Vegetation Type: <i>Acacia shirleyi</i> open forest Land Type: Plains, slopes 0 to 1%, moderately well drained sandy loam kandosol soils Land Condition: Disturbed Land Capability Rating: 2 (Suitable) Area Cleared: 11 ha	Vegetation Type: <i>Corymbia dichromophloia</i> open woodland Land Type: Plains, slopes 0 to 1%, well drained gravelly sandy loam kandosol soils Land Condition: Good Land Capability Rating: 2 (Suitable) Area Cleared: 10.65 ha	Vegetation Type: <i>Acacia shirleyi</i> open forest Land Type: Plains, slopes 0 to 1%, moderately well drained sandy loam kandosol soils Land Condition: Excellent Land Capability Rating: 2 (Suitable) Area Cleared: 11 ha

Lease Pad 5 Location (GDA94, z53): 452721E, 8164565N	Lease Pad 6 Location (GDA94, z53): 458069E, 8164527N	Lease Pad 7 Location (GDA94, z53): 458023E, 8160200N	Highway Accommodation Camp Option Location (GDA94, z53): 453692E, 8177674N
			
Vegetation Type: <i>Corymbia dichromophloia</i> open woodland and <i>Macropteranthes kekwickii</i> shrubland / open woodland (southern sections) Land Type: Plains, slopes 0 to 1%, well drained gravelly sandy loam kandosol soils Land Condition: Good Land Capability Rating: 2 (Suitable) Area Cleared: 11 ha	Vegetation Type: <i>Acacia shirleyi</i> open forest Land Type: Plains, slopes 0 to 1%, moderately well drained sandy loam kandosol soils Land Condition: Disturbed Land Capability Rating: 2 (Suitable) Area Cleared: 11 ha	Vegetation Type: <i>Corymbia dichromophloia</i> open woodland Land Type: Plains, slopes 0 to 1%, well drained gravelly sandy loam kandosol soils Land Condition: Disturbed Land Capability Rating: 2 (Suitable) Area Cleared: 11 ha	Vegetation Type: <i>Corymbia dichromophloia</i> open woodland Land Type: Plains, slopes 0 to 1%, well drained gravelly sandy loam kandosol soils Land Condition: Very Poor (existing clearing) Land Capability Rating: 2 (Suitable) Area Cleared: 0.0 ha (area cleared under Seismic EMP approval)

LP1 Camp Option Location (GDA94, z53): 447602E, 8174016N	Gravel Pit 1 Location (GDA94, z53): 447602E, 8174016N	Gravel Pit 2 Location (GDA94, z53): 453041E, 8167671N	Gravel Pit 3 Location (GDA94, z53): 453030E, 8166185N
			
Vegetation Type: <i>Corymbia dichromophloia</i> open woodland Land Type: Plains, slopes 0 to 1%, well drained gravelly sandy loam kandosol soils Land Condition: Good Land Capability Rating: 2 (Suitable) Area Cleared: 1.3 ha	Vegetation Type: <i>Corymbia dichromophloia</i> / <i>Eucalyptus leucophloia</i> open woodland Land Type: Plains, slopes 0 to 1%, well drained gravelly sandy loam kandosol soils Land Condition: Good Land Capability Rating: 2 (Suitable) Area Cleared: 2 ha	Vegetation Type: <i>Corymbia dichromophloia</i> / <i>Eucalyptus leucophloia</i> open woodland Land Type: Plains, slopes 0 to 1%, well drained gravelly sandy loam kandosol soils Land Condition: Disturbed Land Capability Rating: 2 (Suitable) Area Cleared: 2 ha	Vegetation Type: <i>Corymbia dichromophloia</i> / <i>Eucalyptus leucophloia</i> open woodland Land Type: Plains, slopes 0 to 1%, well drained gravelly sandy loam kandosol soils Land Condition: Disturbed Land Capability Rating: 2 (Suitable) Area Cleared: 2 ha

Gravel Pit 4 Location (GDA94, z53): 453422E, 8166188N	Gravel Pit 5 Location (GDA94, z53): 453069E, 8165321N	Gravel Pit 6 Location (GDA94, z53): 448458E, 8164929N	Gravel Pit 7 Location (GDA94, z53): 450928E, 8164796N
			
Vegetation Type: <i>Corymbia dichromophloia</i> / <i>Eucalyptus leucophloia</i> open woodland Land Type: Plains, slopes 0 to 1%, well drained gravelly sandy loam kandosol soils Land Condition: Disturbed Land Capability Rating: (Suitable) Area Cleared: 2 ha	Vegetation Type: <i>Corymbia dichromophloia</i> / <i>Eucalyptus leucophloia</i> open woodland Land Type: Plains, slopes 0 to 1%, well drained gravelly sandy loam kandosol soils Land Condition: Good Land Capability Rating: 2 (Suitable) Area Cleared: 2 ha	Vegetation Type: <i>Eucalyptus leucophloia</i> open woodland Land Type: Plains, slopes 0 to 1%, well drained gravelly sandy loam kandosol soils Land Condition: Disturbed Land Capability Rating: 2 (Suitable) Area Cleared: 2 ha	Vegetation Type: <i>Eucalyptus leucophloia</i> open woodland Land Type: Plains, slopes 0 to 1%, well drained gravelly sandy loam kandosol soils Land Condition: Disturbed Land Capability Rating: 2 (Suitable) Area Cleared: 2 ha

Gravel Pit 8 Location (GDA94, z53): 452679E, 8,164,837N	Gravel Pit 10 Location (GDA94, z53): 457881E, 8161551N	Gravel Pit 11 Location (GDA94, z53): 458273E, 8160719N	Gravel Pit 12 Location (GDA94, z53): 457378E, 8159682N
			
Vegetation Type: <i>Corymbia dichromophloia</i> / <i>Eucalyptus leucophloia</i> open woodland Land Type: Plains, slopes 0 to 1%, well drained gravelly sandy loam kandosol soils Land Condition: Good Land Capability Rating: 2 (Suitable) Area Cleared: 2 ha	Vegetation Type: <i>Corymbia dichromophloia</i> / <i>Erythrophleum chlorostachys</i> open woodland Land Type: Plains, slopes 0 to 1%, well drained gravelly sandy loam kandosol soils Land Condition: Disturbed Land Capability Rating: 2 (Suitable) Area Cleared: 2 ha	Vegetation Type: <i>Corymbia dichromophloia</i> / <i>Eucalyptus leucophloia</i> open woodland Land Type: Plains, slopes 0 to 1%, well drained gravelly sandy loam kandosol soils Land Condition: Disturbed (Suitable) Land Capability Rating: 2 Area Cleared: 2 ha	Vegetation Type: <i>Eucalyptus leucophloia</i> open woodland Land Type: Plains, slopes 0 to 1%, well drained gravelly sandy loam kandosol soils Land Condition: Disturbed (Suitable) Land Capability Rating: 2 Area Cleared: 2 ha

4.3 Social and Cultural Environment

4.3.1 Socio economic summary

Sweetpea's civil construction and water bore activities occur within the Barkly Regional Council Area. The Council covers an area of 323,500 km² and has a total residential population of over 8,500 (Barkly Regional Council, 2015; ABS, 2016).

The major townships in the vicinity of the exploration area are Tennant Creek, Elliott, Daly Waters, Newcastle Waters, Mayfield and Dunmarra. The region also contains various pastoral stations and Aboriginal communities.

Analysis of the 2016 Australian Bureau of Statistics (ABS) census suggest that the statistical subdivision of Barkly (extending from Ampilatwatja in the south to Dunmarra in the north) has high unemployment, low levels of income and a very low score on the Index of Relative Socio-Economic Advantage/Disadvantage.

The area primarily supports pastoral operations. There are no other major industries within EP136, however it is surrounded by other petroleum exploration permits. EP136 is considered remote and there are no known tourism operators in the vicinity of the proposed program of works.

4.3.2 Land use and sensitive receptors

A range of land-uses and sensitive receptors exists in the proposed program area as shown in Figure 20. A summary is provided below:

- Perpetual Pastoral leases, including the Tanumbirini directly impacted and neighbouring leases including Beetaloo Station and Amungee Mungee Station (refer Section 1.5.2).
- Homestead and Indigenous community outstations.
- Oil and gas exploration in surrounding permit areas (refer Section 4.3.4).
- Other resource extraction operations.
- Road and track networks including the Carpentaria Highway. In addition, there are numerous internal gravel roads, tracks, fence lines and fire breaks.
- Water production bores that supply water for surrounding pastoral activities and towns.
- The Carpentaria Gas Pipeline which runs parallel to the Carpentaria Highway and will be crossed by the civil construction vehicles during the works program.
- The Alice Springs to Darwin Railway line which runs to the west of the Stuart Highway, and does not affect EP136.
- The townships of Daly Waters and Dunmarra are closest to EP136. Daly Waters is located approximately 123 km west and Dunmarra is approximately 180 km south-west from the permit area access located on the Carpentaria Highway.
- Conservation areas including the Bullwaddy Conservation Reserve, which lies 20 km to the west of the civil construction and water bore area (Refer *Section 4.8* of Appendix C).
- Historic and Aboriginal Heritage Sites (Section 4.3.6).

4.3.3 Pastoral Activity

The Area is located within the Tanumbirini perpetual pastoral lease (PPL). Pastoralism is a major economic driver in the Northern Territory, and it is estimated the cattle industry generates more than 85% of the NT's primary production value (NTCA, 2020).

Tanumbirini Station (NT Por 701 Tanumbirini PPL) is 5,001 km² in size with a carrying capacity of approximately 35,000 cattle. The station was established prior to 1908. The Carpentaria Highway passes through the southern section of the property. It was recently purchased by Rallen Australia along with the nearby Forrest Hill Station.

4.3.4 Oil and Gas Exploration History of the Beetaloo Sub-Basin

Sweetpea has a long history of oil and gas exploration within the Beetaloo Sub-basin. Sweetpea was formed by the Bayless Group in 1996 to explore the Beetaloo Sub-basin after recognising the potential of this vast underexplored area, with superb source rocks. In 2005 Sweetpea became the first acreage holder in the Beetaloo having been granted EP's 76, 98, 99 and 117.

In 2006, Petrohunter acquired Sweetpea and carried out a 600 km 2D seismic survey and drilled the first unconventional exploration well, the Shenandoah-1 vertical well. In 2007, Falcon Oil & Gas acquired EP's 76, 98, 99 and 117 from Petrohunter and deepened the Shenandoah-1 well. In 2011, Hess farmed into all the EP's and carried out a further 3,490 km 2D seismic survey, which to date is the largest onshore 2D seismic program in Australia (Falcon Oil and Gas, 2020). Hess withdrew from the permit area in 2013, which resulted in Origin farming into Falcon's EP's 76, 98, 99 and 117 in 2014.

Origin is now the operator of the EP's as part of the Beetaloo Joint Venture (JV), and has drilled several exploration wells, including Amungee NW-1H, the first horizontal well in the basin. Based on a discovery in EP98 in 2017, Origin announced material gas resource in the Velkerri B Shale following a fracture-stimulation test. These EP's are on the western side of Sweetpea's current permit area EP136.

To the north of EP136, Santos operates EP161 completing a 1,000 km 2D seismic survey and in 2014 drilled the Tanumbirini-1 exploration well which was subsequently hydraulically fractured and tested in November 2019.

The Beetaloo Basin is still in the early stages of exploration with several exploration wells planned over the next couple of years by Origin, Santos, Empire and Sweetpea.

4.3.5 Native Title

A Native Title determination (NTD33/2012 Tanumbirini PPL) has been finalised for the Area. This determination grants native title rights to the Kinbininggu and Bamarngganja groups

4.3.6 Sacred Sites and Restricted Work Areas

On 23 October 2020, Sweetpea received an Aboriginal Areas Protection Authority (AAPA) Certificate (reference RA2020/14-AC2020/72 (AC2020/072)) which provides the conditions for petroleum exploration to occur. Three recorded Aboriginal Area Protection Authority (AAPA) sacred sites occur within close proximity to the Area. The AAPA sacred sites relate to:

- AAPA sacred site 5864-1 associated with a waterhole and lancewood trees.
- AAPA sacred site 5864-34 associated with waterway (being the entire length of Newcastle Creek)
- AAPA 5864-32 associated with a waterhole.

All the recorded sacred sites identified within the civil construction and water bore activity area are associated with Newcastle Creek. Sweetpea can conduct activities to avoid the sacred sites and meet the conditions stipulated for Restricted Work Area (RWA) 1 and RWA2 (Newcastle Creek). The only interaction of Sweetpea activities will be on RWA 2 which is associated with one existing Newcastle Creek crossings that are required to access the lease pads south of the creek. Sweetpea's contingency plan to the 'transit only' limitation is considered under this EMP, including provision of two access options, western access track (WAT) or the eastern access track. Sweetpea are committed to meeting the conditions specified in the AAPA certificate to ensure risks to sacred sites and the identified Restricted Work Area are managed.

4.3.7 Archaeological Assessment

An archaeological assessment, comprising searches of the NT Heritage Register and Australia Heritage Database, review of archaeological survey reports, and a targeted field inspection using predictive modelling for the permit area, was carried out by AECOM heritage specialist, Perri Braithwaite between 5 and 7 November 2019. A follow up survey was conducted by Dr. Silvano Jung between 26 and 30 May 2020.

Most previous archaeological investigations near the permit area have been associated with either linear infrastructure in the vicinity of the Carpentaria Highway, or other exploration activities. No other assessments have been conducted within the boundaries of the current proposed impact areas.

AECOM's predictive archaeological model confirms that evidence of Aboriginal archaeological cultural heritage is typically associated with the identified sensitive landforms including:

- Non-flood prone areas adjacent to established watercourses.
- Areas with distinctive vegetation patterning, such as those areas associated with *Macropteranthes kekwickii* (bullwaddy)
- Adjacent to flood plains where a noticeable change in vegetation is identified.
- On the periphery of lagoons and 'chain of ponds' features.

A total of 25 areas were inspected during the field programs. Of these 20 target areas associated with culturally sensitive landforms were inspected, with 14 containing evidence of Aboriginal archaeological sites (80%). No expressions of Aboriginal cultural heritage were identified at the additional four inspection areas that were not associated with any form of sensitive landforms.

Twenty-five Aboriginal archaeological sites were located during the survey at targeted inspection sites within or immediately adjacent to the seismic lines and lease pad areas. Of these sites, only one site was determined to be of high significance (BT-19-AS7 – artefact scatter), two sites were determined to be moderate significance (BT-19-AS16 – artefact scatter and BT-20-AS02 – artefact scatter), with the remaining sites determined to be of low significance. All three sites are located away from the activity area associated with the civil construction and water bore program (refer Figure 21).

The archaeological finds associated with the investigations are predominantly artefact scatters composed of raw material commonly found in the immediate area (quartz, silcrete and quartzite). One stone arrangement has also been recorded (HLA, 2007b).

Only minor maintenance and upgrade of the existing access track will be conducted to cross Newcastle Creek. Sweetpea will avoid the recorded Aboriginal archaeological sites and will have cultural monitors present during the activities. It is anticipated that the works on the creek crossings will make substantial improvements to the existing crossing, minimising risk of erosion and disturbance to the creek bed and bank.

4.3.8 Historic Heritage

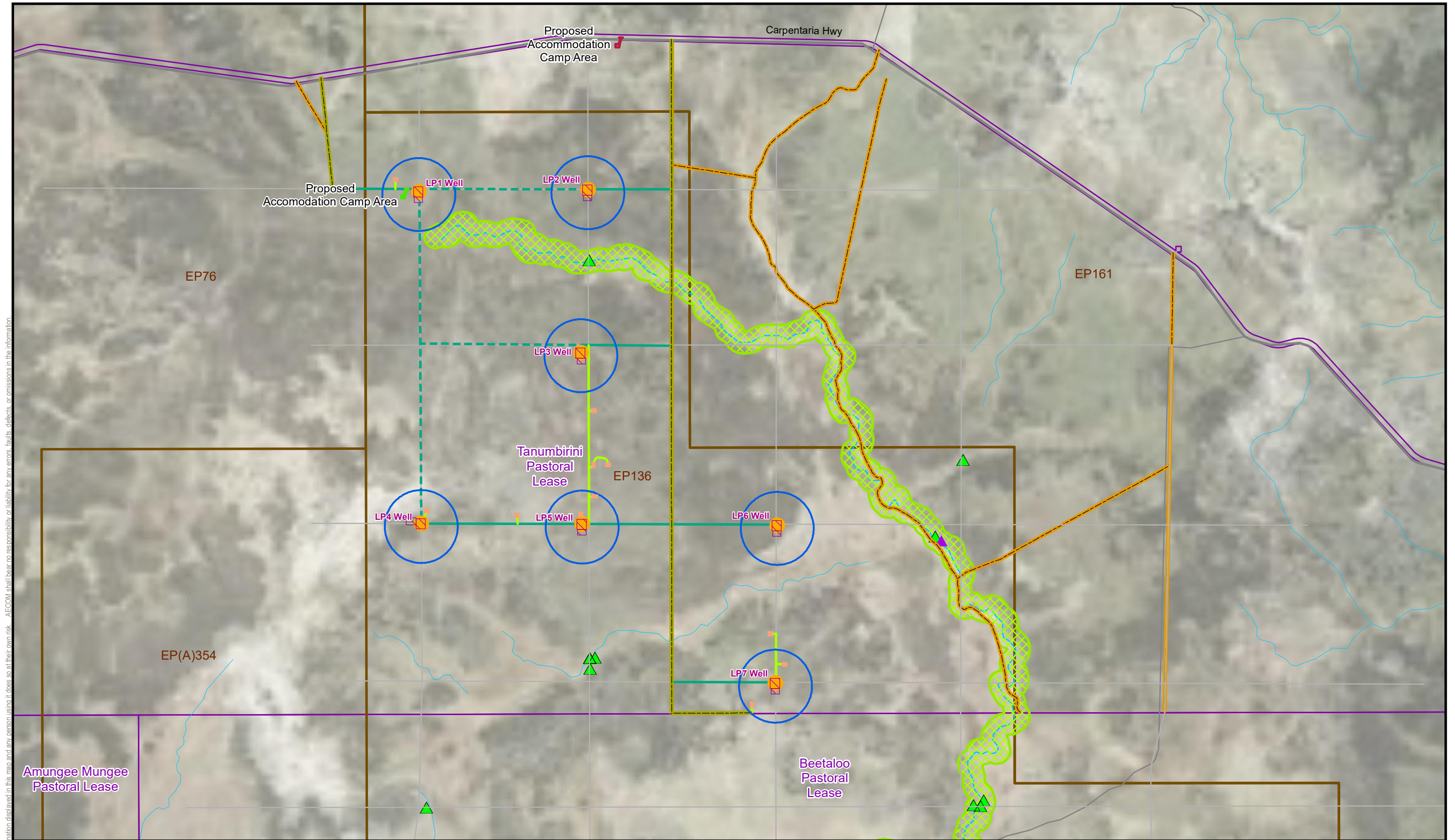
Explorer John McDougall Stuart was the first European to penetrate the NT interior area in 1860. The first written descriptions of the area come from Stuart during his second attempt to cross the continent from south to north (HLA, 2005). Pastoral development began in the area following the completion of the Overland Telegraph Line in 1873, although these early attempts were largely unsuccessful due to the density of the Lancewood-Bullwaddy vegetation and lack of surface water.

Daly Waters was recognised as one of the last watering stops on the Murrniji Stock Route. It wasn't until the 1930s to 1950s, that the area saw regional economic growth with Daly Waters becoming a significant hub of air and mail services into the Territory.

The wartime years saw this role increase with Daly Waters again playing a major role in cross country transport and communication. This role continued until the early 1970s when the airport was closed to commercial traffic.

In recent years oil and gas exploration and tourism has supplemented the primarily pastoral economy.

A search of the Australia Heritage Database (125 km x 125 km search area) did not identify any listed heritage places within EP136 or statutory listed heritage places. The NT Heritage Register identified 18 Aboriginal archaeological sites and no historic heritage sites within the Project Area.



AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.



Projection: GDA 1994 MGA Zone 53

2 1 0 2 km

1:100,000 (when printed at A3)



www.aecom.com

- Well Site
- Gravel Pit Footprints
- Well Lease Area
- 1 km Bore Buffer
- EP136 Proposed Accommodation Camp
- Highway Proposed Accommodation Camp
- Petroleum Exploration Permit
- Existing Access
- Gravel Pit Access
- Western Access Option Access
- Eastern Access Option Access
- Seismic Lines - progressively rehabilitated
- Pastoral Track
- Restricted Work Areas
- Roads
- Cadastre

Aboriginal Archaeological Sites

- ▲ Moderate Significance
- ▲ Low Significance



DARWIN

EP136

**Sweetpea Petroleum Pty Ltd,
Civil Construction & Water Bore EMP**

**Areas of Cultural Heritage within
the Civil Construction Program**

PROJECT ID	60611666
CREATED BY	prachi.kulkarni1
LAST MODIFIED	16-Dec-2021
VERSION	1

A3 size

**Figure
21**

5.0 Stakeholder Engagement

Community and stakeholder engagement is a fundamental obligation in relation to the proposed work programs within EP136. The Petroleum (Environment) Regulations 2016 Reg 7(1) requires stakeholder engagement is required to be carried out during the preparation of the EMP.

Sweetpea has carried out extensive consultation with landholders and Stakeholders who may be directly affected by its proposed seismic exploration, civil construction and water bore drilling program (Reg7(3)a. Sweetpea have informed the stakeholders of the intended program over the course of the EMP development (Reg 7(1) and (2)).

Sweetpea's stakeholder and community engagement for the civil and water bore construction program commenced in July 2019 with the Northern Land Council (NLC) who represent the Traditional Owners and Aboriginal People on whom the activities may impact and in August 2019 with the pastoralists on who's land the activities occur (and their delegates). This engagement has continued over the course of the EMP development, including arrangements with the Station Managers for the safe conduct of baseline investigations during November 2019 and again in May 2020.

The following section presents Sweetpea's stakeholder engagement to address the requirements of the EMP and Appendix J presents the evidence of the information presented to the stakeholders, written responses from Sweetpea and the stakeholders and a communications log of the emails, meetings and telephone conversations held throughout the preparation of the EMP.

5.1 Identified Stakeholders

The identified stakeholders, as defined by *Reg 7(3)(a) definition of a stakeholder*, specific to the proposed 2020 civil and water bore construction program activities include:

- The perpetual pastoral lease owner and their delegates for Tanumbirini Station, on whose property the activities will be undertaken upon.
- The neighbouring perpetual pastoral lease owners and their delegates for Beetaloo Station.
- The Traditional Owners and Aboriginal People who represent the area on which the regulated activities will occur. The consultation was facilitated through the Northern Land Council (NLC).
- Gas pipeline operators, OSD Pipelines, where Sweetpea will require works approval to allow civil construction and water bore drilling equipment to cross over the underground pipeline.
- The neighbouring exploration permit operators including Origin Energy Pty Ltd to the west (EP76), and Santos Ltd to the north and east (EP161). Also DITT for the exploration permit currently under application to the west (EP(A)354).
- Northern Territory Government departments including:
 - Transport and Civil Services Division of DIPL for access to road corridor permits and if intend to extract from NTG road bores.
 - DITT for access authority to areas outside the permit, specifically to allow access to the accommodation camp, access tracks and ingress of seismic lines.
 - Water Resources Division of DEPWS as relates to water extraction licence.
 - Soil Branch of DEPWS as relates to requirements for erosion and sediment controls.

As Sweetpea's presence in the permit area increase over the coming years, further stakeholders may be identified and will be engaged with as required. Sweetpea have maintained records of all interactions and communications with relevant stakeholders and will continue to do so over the life of the proposed exploration activities.

5.2 Summary of Engagement and Consultation Undertaken

Sweetpea has endeavoured to clearly communicate to all interested parties via telephone calls, emails and face-to face meetings wherever possible during all stages of exploration within EP136. Sweetpea will request feedback from stakeholders on draft EMPs and comments will be considered and where appropriate incorporated into the planning activities.

The following sections provides a summary of the identified stakeholders. A list of the key stakeholders and their contact details are provided in Appendix J.

5.2.1 Pastoral Leaseholders

The civil construction and water bore drilling activities will be undertaken on the Tanumbirini pastoral lease.

During August 2019 Sweetpea met with the owners of Tanumbirini Station in London to discuss the proposed exploration activities to be undertaken on the station over the next two years, including the seismic exploration program and future exploration drilling, fracture stimulation and testing programs, and associated civil works. The owners outlined plans for installation of cattle watering infrastructure on the area of EP136. Arrangements were made for accessing the station during the planned environmental surveys that were to be conducted between October/November 2019.

In September 2019 Sweetpea met with both the Beetaloo and Tanumbirini station managers, introducing Sweetpea; presenting an outline of the exploration activities proposed on EP136 over the next 2 years; discuss the baseline environmental and heritage surveys required to develop an Environmental Management Plan for the proposed work programs; to discuss access arrangements to the permit area to undertake the baseline surveys. Formal letters were then sent to the station managers detailing the area that will be covered and the communication protocols to be implemented.

During the environmental and heritage surveys in November 2019, station managers were kept informed daily on when the field teams were entering and exiting the property boundaries.

In March 2020, Sweetpea provided an updated summary of the proposed exploration activities to the pastoral stations with copies of the previous draft Seismic EMP. In addition, Sweetpea requested access on 7-9 March 2020, for the prospective seismic contractor to scout the proposed survey area. Tanumbirini Station provided their approval, however Beetaloo Station indicated that ground conditions were too wet and would not provide access. Following this correspondence, Sweetpea delayed the scouting work by the contractors with the intention for the LCA and CHA (which were scheduled for the following week) would be able to capture the information for the contractors.

COVID-19 restrictions caused postponement in the additional baseline LCA and CHA to be conducted in March. All stakeholders were informed of this postponement while Sweetpea worked through how activities would be managed under COVID-19 conditions.

In May 2020, Sweetpea had a COVID-19 management plan in place and informed its pastoral leaseholders of the plan to recommence the baseline surveys. Further information was provided on the baseline surveys and 2020 work program activities with a copy the draft Seismic EMP for consultation and review.

Sweetpea responded to a range of comments and queries from Tanumbirini Station and their delegates, with the baseline scouting work being completed between 26 to 30 May 2020.

At the end of June 2020 feedback on the draft Seismic EMP were received from all the pastoral leaseholders. Sweetpea provided a copy of the draft Civil Construction and Water Bore EMP on 2 February 2021 to Tanumbirini Station and Beetaloo Station for information and comment.

At the beginning of January 2021, Sweetpea provided a proposed Work Program schedule for 2021 to all the EP136 Pastoral Leaseholders.

Sweetpea is continuing the process of negotiating or resolving the Pastoral Land Access and Compensation Agreement (LACA) with the relevant pastoral station in accordance with sections 65, 81 and 82 of the *Petroleum Act 1984*, and in accordance with the Petroleum Regulations 2020. Sweetpea expects that a LACA may ultimately be determined through the Northern Territory Civil and Administrative Tribunal (NTCAT), as per the Act; however, Sweetpea always remain open to determining a LACA through negotiations.

Sweetpea have considered the possible consequences of carrying out the proposed civils works and water bore drilling on the pastoral operations and have indicated a range of measures that will be implemented to minimise impacts in Section 7.11.3.

5.2.2 Traditional Owners and Aboriginal People

The NLC is the Native Title representative body for the Traditional Owners of the land covered by EP136. Under the Exploration Agreement for EP136 with the NLC and Native Title Party, Sweetpea is required to present an annual Work Program to the NLC and consult with the TO's on any works proposed on the permit, principally via on-country Work Program Meetings.

Two rounds of Work Program Meetings have been held for the proposed exploration activities as follows:

- The 2020/2021 Work Program Meeting was held between 10 August and 14 August 2020 at Tennant Creek, Elliott and Mataranka which covered Sweetpea's intended exploration program over the next 5 years. A focus of this meeting was on seismic program, but also covered water bore drilling and monitoring and future exploration drilling.
- The 2021/2022 Work Program Meeting was held between 27 October and 29 October 2021 at Katherine, Elliott and Tennant Creek. A final meeting was scheduled for 17 November 2021 in Darwin, however, is currently on hold due to COVID 19 cases in the NT. The NLC intend to reschedule as soon as possible.

The NLC organised and facilitated all the work program meetings and coordinated with the Native Title Parties with TO's to attend and consult with.

The following provides a summary of the two work program meetings:

- Background and objectives:
 - Four (4) work program meetings were held with Native Title Parties in three community locations in 2020 and another three (3) meetings were held in 2021 in three community locations.
 - Representatives of all Native Title Parties attended the meetings ~ 60 Traditional Owners present over the three days of meetings.
 - Meeting objective was to provide information, listen, consult, engage and answer any questions the Native Title Parties and Individuals may have on the proposed exploration activities and future activities.
- What was presented:
 - History of Sweetpea and introduction of Tamboran and the vision and future exploration activities.
 - 2020/2021 work program of seismic surveys and water monitoring bore installation.
 - 2021/2022 civil construction and exploration drilling and testing.
 - Environmental management and protection plans and rehabilitation plans.
 - Sacred site and cultural heritage management and protection.
 - Employment and contracting opportunities.
- Key issues, concerns and outcomes:
 - Disturbance of land, animals and birds; contamination (gas) of water (aquifers) via cracks from drilling/testing, earthquakes; rehabilitation/restoring the land and wildlife; working in the wet season; soil and sediment erosion; and creek crossings.
 - Sweetpea was well received, "with good clear honest information", appreciation of video-link to company management and experts. NLC advised Sweetpea that the meetings were good meetings given COVID-19 restrictions.
 - The Traditional Owners want job opportunities.

- The NLC received several nominations for cultural monitors and cultural inductions for the seismic surveys.

The 2021 and 2022 Work Programs have been provided to the NLC, along with a copies of the Civil Construction and Water Bore EMP. Work program meetings will continue over the duration of Sweetpea's exploration program to provide update to the Traditional Owners.

5.2.3 Gas Pipeline Operator

A gas pipeline runs across the northern extent of the exploration activity area between the boundary of EP136 and the Carpentaria Highway on Tanumbirini Station. Access into the civil and water bore construction program area requires crossing at one location along the gas pipeline. Sweetpea has engaged with ODS Pipelines, the operator of the gas pipeline in regard to crossing the line.

It is noted that based on the current assumptions, the following conditions were stipulated by OSD pipelines:

- A 25 mm steel plate (3 m x 5 m) must be installed over the pipeline at locations where the trucks wish to cross.
- Do not place the steel plates at locations where erosion is visible.
- Only the vehicle specified by Sweetpea has permission to cross the MRM pipeline.
- Report any issues found in the field to OSD Asset Services team.
- Sweetpea shall notify OSD Asset Services one week prior to mobilisation.
- An OSD technician must mobilise to site to locate the pipeline and confirm the placement of the steel slabs. The cost of this mobilisation must be paid for by Sweetpea.
- All camps & office demountable shall be placed at least 300m from the pipeline centreline (outside the pipeline radiation contour).
- The pipeline easement shall not be used as a stockpiling, storage, laydown or parking area.

Sweetpea will comply with the conditions specified by OSD. Ongoing communication will be required with OSD prior to activities commencing. Where relevant these conditions will be left in place or reapplied.

5.2.4 Neighbouring Exploration Permit Holders/Operators

Engagement with the neighbouring exploration permit holders/operators for access/ingress permissions including:

- EP161 Santos Ltd to the north and east
- EP76 Origin Energy Pty Ltd to the west
- EP(A)354 DITT to the west.

Ongoing engagement will continue as Sweetpea activities in the permit area begin to ramp up.

5.2.5 Northern Territory Government Departments

Sweetpea have engaged with the relevant NTG departments for specific permits, approvals and advice as relates to the following:

- Transport and Civil Services Division of DIPL for access to road corridor permits and if intend to extract from NTG road bores.
- DITT for access authority to areas outside the permit, specifically to allow access to the accommodation camp and access tracks (Access Authority 9 application in progress).
- Water Resources Division of DEPWS as relates to water extraction licencing.
- Soil Branch of DEPWS as relates to requirements for erosion and sediment controls.
- AAPA as relates to the approved Authority Certificate.

5.3 Assessment of Merit of Stakeholder Claims and Objections

An assessment of merit of stakeholder concerns, claims and objections, along with a stakeholder communications log, was submitted with the Seismic EMP. These communications received by the pastoral station and their delegates followed a review of Sweetpea's 2020/2021 proposed work plan, which included intention of establishing exploration lease pads in Tanumbirini Station, and review of the draft Seismic EMP.

Sweetpea have provided copies of the draft Civil Construction and Water Bore EMP to Tanumbirini Station and Beetaloo Station representatives for information and comment on 2 February 2021. At the time of formal submission of this EMP, no claims and objections have been received specifically to the Civil and Water Bore EMP.

Table 17 provides an assessment of merit of stakeholder comments, claims and objections and how Sweetpea have responded or intends to respond.

Table 17 Assessment of Merit of Stakeholder Comments, Claims and Objections

Tanumbirini Station – Rallen Australia Pty Ltd		Date of Engagement – 09 August 2019 to current
Comments, Claims and Objections (29 June 2020)	Assessment and Response (20 August 2020)	
We are instructed that Rallen Australia emphatically opposes any unconventional gas activities on its pastoral leases. At Tanumbirini Station Rallen prides itself on the calm temperament of its herd. Many hours are spent educating the livestock to ensure a calm quiet herd. Most mustering is done on horseback to minimize the stress on the herd. Stock agents seek Rallen cattle due to their calm temperament making them easier to manage, load, muster and are willing to pay a higher price for Rallen cattle. Bulldozing 109 kms or 185kms [it is unclear] of native vegetation, creating a 5km grid of 5m seismic lines across the pastoral lease will terrorise the cattle unless they are removed a significant distance from the noise and vibration and require decades to rehabilitate and change our client's cattle management practises for many years until the area is fully rehabilitated. How does Sweetpea propose to undertake these activities without interfering with the stock on Tanumbirini? Sweetpea must have an agreed plan in place on how it intends to minimize stock disturbance from vibration, noise and lighting and compensate Rallen for drops in herd weigh and any loss of sales due to Sweetpea's activities. We point out that the pastoralists activities on Tanumbirini take precedence and this area is used for cattle grazing.	We are very willing to work closely with the station manager and station personnel to monitor any potential (but unlikely) disturbance to cattle and jointly arrive at reasonable solutions to mitigate any observed effects. Sweetpea will have a company representative on location throughout the seismic surveys to liaise with the station managers and staff on a daily basis; and could consider having a professional stockperson(s) on location as part of any cattle monitoring solution. Based on the experience of conducting hundreds of thousands of kilometres of seismic surveys across pastoral Australia, it is highly unlikely that vibration from the vibrators (which are less intense than a cattle truck crossing a cattle grid, noise or lighting from a seismic crew) would lead to drops in herd weight and hence loss of sales. During 10,000 km of line preparation in the Beetaloo Basin over the last 30years, or hundreds of thousands of seismic kilometres in Australia's pastoral country over the years, we have never heard of incidents of cattle being "terrorised" by one bulldozer and support vehicle working on a line preparation traversed at distances of 5 km or more from other activity.	
Comments, Claims and Objections (15 and 23 September 2020)	Assessment and Response (25 September 2020)	
We are instructed Rallen objects to Sweetpea's proposed activities on Tanumbirini on the bases set out in the attached letter dated 29 June 2020, including the grant of an access authority for activities outside EP136. Please note there is no access arrangement in place between Sweetpea and Rallen for access to Tanumbirini station and Rallen has not been provided with a copy of the Sweetpea application for an access authority. Rallen requests it be provided with a copy of the application for the access authority (Application) as a matter of priority in order to properly consider and comment on the Application. Subject to consideration of the Application, Rallen makes the following preliminary comments, if the access authority were to be granted that: the activities not be commenced and be subject to an access arrangement between the parties.	At the outset, we note that substantive dialogue has occurred and continues to occur with Rallen and its representatives. Sweetpea has provided Rallen with a copy of its submitted Seismic Environmental Management Plan (EMP), which described in detail the activities to be undertaken, the location of those activities, and the estimated time frames to carry out those activities. Sweetpea has committed in writing to present a land access and compensation agreement (LACA) to Rallen that comports with the requirements of the <i>Petroleum Regulations</i> 2020 (new Regulations) expected to come into effect later this year. Sweetpea has also confirmed that it will pay Rallen's reasonable legal and accounting costs incurred by in connection with its participation in negotiation for a LACA to the extent required by the new Regulations and any reasonable costs necessarily incurred in connection with engaging a suitably qualified person or persons to provide advice or reports on any relevant matter to the extent required by the new Regulations. With regard to Rallen's concerns about the impacts on Tanumbirini of any potential dispute between the activities of neighbouring petroleum permit holders and activities to be undertaken by Sweetpea	

2. the access authority terms be limited in time and space to the actual activities sought to be undertaken to minimise the impact on our client's pastoral lease activities. For example, Sweetpea have informed our client that the time required to carry out all the seismic activities (inside EP136 and outside on EP161 and EP78) is 65 days and the activities are limited to the seismic lines. 3. the conditions of the access authority require compliance with any environment management plan approval. 4. some mechanism in relation to priority of tenement be put in the access authority which ensures our client, and its use of the pastoral lease is not unduly burdened or interfered with as a consequence of: a. any dispute between the respective neighbouring petroleum permit holders EP161 and EP 78 with exclusive rights to explore and Sweetpea and its access authority seeking to undertake exploration activities, seismic surveying, in their "exclusive" tenement areas. For example, by EP161 interfering or hindering Sweetpea's seismic activities delaying rehabilitation; and b. petroleum interest holders undertaking exploratory activities for petroleum over the same area within the Tanumbirini pastoral lease. For example: it would be onerous to our client if, after Sweetpea had completed its seismic surveying of the area outside its EP136, the EP161 holder decided to also carry out seismic surveying over the same area. We refer to our correspondence last week and attach to this email a summary of scientific studies undertaken by a NSW vet done on the impact of mining exploration activities on sheep. We say that these impacts would be similar in cattle, and possibly even more pronounced where vegetation is being ripped out of the ground by bulldozers in the creation of the seismic lines, in addition to the ground vibrations from the seismic activities. We say this information should be carefully considered and could be the basis for refusing the proposed significant vegetative impact of the proposed seismic survey on Tanumbirini. We look forward to your consideration of this material. Should an approval be given, we look forward to references to the scientific information justifying minimal impact on cattle by the creation of the seismic lines and the seismic activities.	in accordance with AA 9, we note that Santos QNT Pty Ltd and Origin have consented to the access authority over its relevant exploration permit area. The assertion that Sweetpea's activities would interfere with Tanumbirini's stock was first made in the correspondence of 15 September 2020. In the correspondence of 23 September 2020, counsel for Rallen added to the allegation by providing what she claims is "a summary of scientific studies undertaken by a NSW vet done on the impact of mining exploration activities on sheep" and extrapolated it to cattle. We reject its characterisation as a summary of scientific studies, and we reject its application to cattle. The impacts identified in the summary are all tied to a single claim – that the mere presence of a single individual will trigger flight response. This claim is neither verified nor peer reviewed. It is based on a single anecdote from the mid-1980s, assuming a causal relationship between the presence of a single individual and flight. A second anecdote, apparently also from the same time period, posits a causal relationship between drilling activity and flight. We note, however, that no exploratory drilling is proposed as part of the EMP to which AA 9 relates. Even if the impact to sheep is correct, we reject the comparison of merino sheep to cattle. In contrast to that provided by Rallen, the first two paragraphs of this section provide what in effect is 30 years of observational data on the lack of impact on cattle from seismic survey activity. Nevertheless, to allay Rallen's concerns, Sweetpea has expressed its willingness to work closely with the Station Manager and station personnel to monitor any potential (but unlikely) disturbance to cattle and jointly arrive at reasonable solutions to mitigate any observed effects. Sweetpea has also committed to having a company representative on location throughout the seismic surveys to liaise daily with the Station Managers and staff. The proposed camp location was suggested by the Tanumbirini Station Manager as it is had previously been used for laydown and camp operations by road construction companies, with a station water bore near the site that could be used for water extraction.
---	---

Comments, Claims and Objections (17 February 2021)	Assessment and Response (25 February 2021)
Land condition assessment: accessing EP136 on Tanumbirini Station to undertake, clearing for a 2D seismic survey, construction of access tracks and well pads and any other proposed vegetation clearing within EP136 on Tanumbirini Station and for access tracks to EP136. Claims that there are inconsistencies and omissions in Sweetpea's land condition reporting over a period from Feb 2020 to Jan 2021, providing examples. As a result, Rallen will be engaging a land condition specialist at Sweetpea's cost, to collect both Tier 1 and Tier 2 data of the land condition of Tanumbirini within EP136 on Tanumbirini Station and any areas where access tracks are proposed, to give Rallen some confidence in the setting of a clear baseline of the land condition on Tanumbirini within EP136 before any Sweetpea activities commence.	Intent to engage a land condition specialist at Sweetpea's cost is not reasonable under the regulation 17 of the Petroleum Regulations 2020. Sweetpea is under no obligation to compensate for any additional land condition assessments conducted by Rallen. Viewed in light of previous comments, Sweetpea considers your correspondence and the delay the actions would occasion to be evidence of Rallen's refusal to negotiate in good faith. Sweetpea engaged independent environmental consultants to conduct and prepare the land condition assessment reports which have been reviewed by Government agencies and other entities. Land condition assessments have included satellite image analysis, aerial surveys via helicopter and ground truthing. Also note the LCA reports include 15 years of Barkly Region data. Assertion that October 2020 LCA report does not mention actual scores of "healthy native vegetation that will need to be cleared" is not correct. The Jan 2021 LCA again described land in good condition with low evidence of weeds and erosion.
Comments, Claims and Objections (26 February 2021)	Assessment and Response (5 March 2021)
Land Condition Report Paragraph 1 At no point in our email dated 17 February 2021 (Email) did we state that the obtaining of a land condition report by Rallen was a precondition to continuation of the negotiation of the LACA. It is however Rallen's firm position that the taking of the baseline land condition will be a precondition to the commencing of any work on Tanumbirini. As stated in our Email, the land condition report which Rallen will undertake and for which it will require reimbursement from Sweetpea, will be of all the land which is to be impacted by Sweetpea's proposed activity, not only the access tracks. Paragraph 2 Land condition before the commencement of work, particularly where the vegetation is to be bulldozed, is an essential requirement to ensure proper rehabilitation and compliance with the terms of the approved EMP. For example, we note Sweetpea, at paragraph 3.3.2 of the EMP, undertakes to avoid "mature vegetation". We note that the EMP does not contain any detailed report of the actual mature vegetation on Tanumbirini. This is a significant omission. In order to ensure this undertaking is complied with, Rallen will ensure that a land condition report marks both with a physical marker and by GPS location all mature trees and other mature vegetation in the proposed seismic lines, well	In response to complaint that the failure of the Seismic EMP to contain a detailed report on the actual mature vegetation on Tanumbirini Station is a significant omission is not well taken. We note that the EMP meets the relevant requirements of the Petroleum (Environment) Regulations and was approved by the Minister on 2nd November 2020. The EMP identification and assessment of the environmental impacts and risks is comprehensive, based on 2 field surveys and desktop assessments. More specific to your complaint, "mature trees" as used in paragraph 3.3.2 of the EMP is used to describe the larger, long-lived trees and shrubs that occur in the proposed activity area. Additional sentences and paragraphs throughout the Land Condition Assessment and the EMP reference mature trees, including Corymbia and Eucalypt species, as well as the stands of Bullwaddy and Lancewood. In addition, Section 7 of the EMP commits to avoid wherever possible the removal of larger trees, including Corymbia and Eucalypt species, with a trunk diameter greater than 25cm at 1.3m height. It is unrealistic to consider all mature trees will be retained, however; it is Sweetpea's commitment to retain mature trees as reasonably practicable to allow safe conduct of its activities. The focus of the land condition assessment is on the specific alignment of the intended activity – an area the length of each line in km x 5m wide – and the report only covers those areas intended to be disturbed by the seismic program.

pad areas and new access track areas. We consider such a report a relevant matter to ensure compliance with this undertaking in the EMP. Rallen must undertake its own due diligence in relation to the impact of the proposed work program on Tanumbirini. That requires it to assess and be satisfied with the land condition reports. That assessment requires it to engage a land condition specialist. Rallen rejects any assertion that it must rely on the land condition reports of Sweetpea. Any assertion by Sweetpea that Rallen must rely on Sweetpea reports is founded in a fundamental conflict of interest. Further, despite Rallen having requested that Sweetpea separate out the impacts of the seismic EMP on the separate pastoral leases of Beetaloo and Tanumbirini, Sweetpea has failed to respond to Rallen's request. We say making this request and undertaking an assessment of the land condition is a clear indication of Rallen acting in good faith. But for Sweetpea's proposed activities, Rallen would not have to undertake such an exercise. We say it is a reasonable cost, necessarily incurred to advise Rallen on the relevant matter of the land condition on Tanumbirini in the areas proposed to be bulldozed by Sweetpea. A land condition report of Tanumbirini is also required by Rallen as Sweetpea's EMP conflates the impact on Tanumbirini and Beetaloo. Beetaloo already has the cleared seismic lines and therefore 95% of the impact is on Tanumbirini. Given the lack of detail, the conflation, the Pastoral Land Act obligations on Rallen, the conflict of interest and the significance of the impact, our client must undertake its own land condition report and will expect that to be reimbursed by Sweetpea. Paragraph (iii) The acceptability of the Sweetpea land condition reports to government agencies is of little relevance to Rallen and the protection of Rallen's interests. The NT Government has not undertaken to indemnify Rallen for any loss occasioned if the reports are inaccurate, inadequate, misleading or have omissions. Rallen has no cause of action for compensation against the government for any loss in the event that the Sweetpea reports have these failings. Rallen must undertake its own due diligence. Paragraph (iv) Rallen does not agree with the percentages provided in Table 17 figure 9. Rallen has not been stocking these paddocks at normal levels as they contain underdeveloped water infrastructure. Rallen notes the percentages do not add to 100%. That they provide no actual indication of the land condition, they are vague and general. That the table provides only 15% is good or excellent, contrary to Mr Riddle's comment in his email that	A misinterpret the information presented as meaning 62% of existing tracks on Tanumbirini Station. The 62% represents the area of seismic lines that will only require blade up line preparation. These are areas of bare earth, grass plains and open woodland areas where line preparation will avoid the clearing of trees and shrubs. Potential impacts and management measures in section 7 of the EMP describe the line preparation activities that will be undertaken to minimise the impacts to as low as reasonably practicable.
--	---

"the land condition is still considered good or excellent". Rallen instructs us that the reference to existing track as 62% is misleading insofar as Tanumbirini is concerned. These aspects give Rallen no confidence in the accuracy of the Sweetpea land condition reports. Rallen will engage a specialist to undertake a land condition report for the reasons stated above and it will require Sweetpea to reimburse it for the cost of that report.	
--	--

5.4 Future Stakeholder Engagement

Sweetpea is committed to continuing to engage with stakeholders regarding the civil and water bore construction activities in EP136 and any associated environmental outcomes prior to, during and after the completion of the regulated activity.

Sweetpea is continuing the process of negotiating or resolving the Pastoral Land Access and Compensation Agreements (LACA) with the relevant pastoral stations in accordance with sections 65, 81 and 82 of the *Petroleum Act 1984*. Sweetpea have considered the possible consequences of carrying out the planned exploration on the pastoral operations during the civil construction and water bore activities and have indicated a range of measures that will be implemented to minimise impacts.

Sweetpea will continue to engage with Stakeholders, in particular pastoral lease holders in the lead up to the civil and water bore construction program and will continue communication on a daily basis while in the permit area. Further community and stakeholder engagement is now commencing as Sweetpea's future exploration plans are progressed.

Sweetpea recognises the growing community interest in ensuring onshore natural gas development takes place in a safe and environmentally sound way and are committed to delivering operational excellence (which encapsulates health, safety and environmental performance standards).

Sweetpea has further committed to ongoing engagement with the relevant Traditional Owners, including annual work plan meetings and provision of draft work programmes for future years of activity.

6.0 Environmental Risk Assessment

Several potential risks have been identified as part of the civil construction and water bore activities. The relative likelihood and consequence of these risks, their associated mitigation, monitoring measures and residual risk rating are presented in Section 7.0 and Appendix E. An assessment of potential and routine environmental effects and the risks arising from the civil construction and water bore activities was conducted.

In accordance with AS/ISO 31000, a team of multi-disciplinary professionals conducted and reviewed the risk assessment to ensure the controls adopted follow the hierarchy of controls. The primary contributors to the risk assessment included:

- Andrew Logan – Sweetpea Representative
- Gibson Porkime – Tamboran Northern Territory Operations Manager
- David Close – Tamboran Vice President, Operations & External Affairs
- Alana Court – Associate Director – Environment
- James Jentz – Civil Engineer
- David van den Hoek – Senior Botanist
- William Riddell – Senior Ecologist
- Mark Jenkins – Drilling Engineer
- Tim Anderson, Principal Scientist/CEPSC

The environmental risk assessment methodology is presented in the following sections.

6.1 Methodology

A formal assessment of the risk of potential environmental and safety impacts and issues was carried out based upon a standard risk management approach.

This process involved was two-fold:

1. Identifying the latent risk of the activities associated with civil construction and water bore activities prior to allocating risk mitigation management and monitoring strategies involved the following stages:
 - Identification of the key activities and considerations.
 - Ascertaining the potential hazards associated with these activities including the potential impacts associated with them.
 - Determination of the environmental, engineering, cost and reputational aspects associated with the hazard.
 - Assigning a consequence severity rating.
 - Assigning a likelihood/frequency rating.
 - Determining the resultant level of risk for each potential impact.
2. Once each hazard aspect was rated, the residual risk rating was determined by:
 - Evaluating the current known body of information available to inform the management and mitigation of the identified hazard.
 - Generating management mitigation and monitoring measure to incorporate into the management planning.
 - Assigning a consequence severity rating.
 - Assigning a likelihood/frequency rating.
 - Determining the residual level of risk for each potential impact.

The management practices identified are designed to keep risks as low as reasonable possible (ALARP) and environmentally acceptable (Section 6.1.1). Taking these management practices into consideration the risk levels are assessed. The Impact Consequence Severity Rating Matrix is shown in the Risk Treatment Criteria in Table 18 and Table 19, and the final Qualitative Risk Analysis Matrix based on likelihood and severity in Table 20.

Table 18 Environmental and safety impact consequence severity rating matrix

Consequences	Category				
	Safety	Environmental and community	Cost	Stakeholder perception	Law, regulation and civil action
5 Severe	One or more fatalities or illness or total permanent disability to a large exposed group	Major and long-term damage extending beyond exploration area. Extensive loss of community livelihood.	>\$50M	Multiple stakeholder groups mobilising and encouraging others to take action as reflected in media channels with significant reach and influence	Criminal charges against director, senior executive or senior manager not involving jail or loss of right to manage the company. Prolonged major litigation – exposure to significant damages. Suspension/ restriction to operate asset.
4 Massive	Injury or illness to one or more persons, resulting in permanent partial disability	Major and long-term damage within exploration area; or Significant but reversible damage extending beyond exploration area. Significant impacts to community cost of living, business viability or social wellbeing.	>\$5M - \$50M AUD	More than one stakeholder groups opinion or view influencing other stakeholders, reported through media channels with some reach and influence	Criminal charges against any employee (not described above) Major litigation – exposure to damages.
3 Major	Serious injury or illness to one or more persons resulting in hospitalisation and lost time	Significant damage confined to exploration area. Moderate impacts to community cost of living, business viability or social wellbeing.	>\$100K - \$5M AUD	More than one stakeholder group offering an opinion or view, reported through media channels with some reach and influence	Non-compliance with conditions of license to operate an asset or to conduct an activity. Litigation – exposure to damages.
2 Moderate	Injury or illness resulting in medical treatment and first aid injuries and lost time	Minor short-term damage confined to exploration area. Small scale impacts to community cost of living, business viability or social wellbeing.	>\$5K - \$100K AUD	A single stakeholder group drawing attention to an incident, issue or approach, conveyed through media channels with potential reach and influence.	Moderate non-compliance with external mandatory obligations or breach of contractual or other legal obligations.
1 Minor	Minor illness or injury requiring first aid	Minor environmental or community impact – readily dealt with.	Up to \$5K	A person or organisation within stakeholder group signalling an interest in an incident, event or approach, using channels with limited reach or influence.	Minor non-compliance with external mandatory obligations or breach of contractual or other legal obligations.

Table 19 Qualitative measures of likelihood/frequency

Likelihood of occurrence (in any given year)		
5	Highly likely	Has a >90% chance of occurring if the risk is not mitigated.
4	Likely	Has a 60-90% chance of occurring if the risk is not mitigated.
3	Possible	Has a 40-60% chance of occurring if the risk is not mitigated.
2	Unlikely	Has a 10-40% chance of occurring if the risk is not mitigated.
1	Rare	May occur in exceptional circumstances, i.e. less than 10% chance of occurring if risk is not mitigated.

Table 20 Qualitative risk analysis matrix level of risk based on likelihood/severity

		Likelihood				
		5. Almost Certain	4 Likely	3 Possible/ Occasionally	2 Unlikely	1 Rare. Remote
Consequence	5 Severe	Extreme	Extreme	High	High	Medium
	4 Massive	Extreme	High	High	Medium	Low
	3 Major	High	High	Medium	Medium	Low
	2 Moderate	High	Medium	Medium	Low	Low
	1 Minor	Medium	Low	Low	Low	Low
Risk level		Risk treatment criteria				
Low		Some mitigation may be required - no detailed assessment of factors and aspects required but addressed in EMP as routine controls				
Moderate		Substantial mitigation required - assessment required of factors and aspects				
High		Major mitigation (including offsets) may be required - assessment required of factors and aspects				
Extreme		Potentially unacceptable, modification of proposal required				

6.1.1 ALARP and Risk Assessment

Section 7.0 considers the outcome of the risk assessment process and the hierarchy of controls (eliminate, substitute, engineering, administrative, personal protective equipment) to determine if all reasonably practicable control measures have been identified and implemented and that the risk to environmental factors/aspects has been reduced to ALARP as result of the proposed activities.

6.1.2 Scientific Uncertainty

The risk assessment prepared for the exploration activities has considered the scientific uncertainty in relation to the information available to assess the risk. The scientific uncertainty has been qualitatively assessed in Section 7.0 using the following scoring system:

- **LOW (1)** – Existing controls and mitigate on measures exist and demonstrated as effective in previous activities and other industries. Decision tool includes Legislation, codes and standards exist to regulate the activity and good industry practice.
- **MODERATE (2)** – Existing controls and mitigate on measures exist and demonstrated as effective in previous activities and other industries, although information used is dated or information gaps. Decision tool uses a risk-based assessment tool to assess (i.e. modelling, quantitative risk assessment and cost benefit analysis).
- **HIGH (3)** – Limited or no data available to support risk assessment, including no guidance material. The precautionary approach is taken to management the risk.

6.2 Cumulative Impacts

Cumulative impacts relate to potential cumulative effects of other projects as well as increased impacts to an environmental aspect as a result of different components of the regulated activities. The following section considers environmental factors such as water supply, flora and fauna, greenhouse gas emissions, traffic and social and community that are applicable to Sweetpea's exploration activities.

6.2.1 Water Supply

Water will be required during the civil construction and water bore program for camp operations, access track installation and maintenance, lease pad construction, water bore drilling and monitoring and rehabilitation activities. Potable water during the initial period would be carted to site from a commercially available water supply source or from the nearby water bore identified for use in the Seismic EMP (depending if meets potable drinking water quality guidelines).

Water is proposed to be extracted (with a water extraction licence from Water Resource Division) from water bores installed as part of the seismic EMP or under this civil construction and water bore EMP. Potable water will be sourced locally from the water supply bores onsite, subject to meeting the *Australian Drinking Water Quality Guidelines*.

Although the Gum Ridge Formation is recognised regionally to have the best potential for water production due to the higher yields (Tickell, et al., 2019), Sweetpea have made an application for a groundwater extraction licence for both the Gum Ridge Formation and Anthony Lagoon Formation aquifers and will evaluate the results from its groundwater monitoring program to determine which aquifer and licence will be used for groundwater extraction. The other groundwater extraction licence will be surrendered.

The cumulative water use, including seismic program estimates is provided in Table 21.

Table 21 Cumulative Water Use

Program	Estimated Usage
Seismic Exploration and Water Bore, including September 2021 Modification Water Bores	0.9 ML
Civil Construction and Water Bore	317.5 ML
Cumulative Water Use	318.4 ML

Based on the region's groundwater allocation plan data, it is anticipated that the maximum annual water use over a four-year petroleum exploration activity period of 299 ML/year will be well within the sustainable yield of the Beetaloo GBA region available aquifers. It is not expected to impact on other current and future water users due to the remote location and that the future domestic demand is unlikely to change significantly.

6.2.2 Flora and Fauna

Sweetpea has designed the civil construction and water bore program to maximise where possible the use of existing roads and pastoral tracks to establish their lease pads, accommodation camp and gravel pits. In addition, the placement of the lease pads has endeavoured to avoid heavily wooded areas and trees (including *Corymbia* and *Eucalyptus* species), as well as other sensitive habitats including riparian habitats along Newcastle Creek.

Impacts from the potential introduction of weeds to the permit area will be managed through the project specific Weed Management Plan (Appendix H). It is understood that all other petroleum operators and pastoral leaseholders also require to have a weed management plan, which is evident by the low incident of weeds across the permit area. To access pastoral properties, all visitors must sign a Weed Declaration which certifies the equipment and machinery are weed free.

On completion of exploration activities within the permit area, Sweetpea intend to progressively rehabilitate disturbed areas back to original state and consistent with the vegetation communities identified in the baseline assessments (refer to the Land Condition Assessment in Section 4.2.7 and detailed in Appendix C).

6.2.3 Greenhouse Gas Emissions

GHG emissions from the civil construction and water bore program have been based on estimated fuel consumption related to civil construction, water bore drilling and camp operations (refer to Table 12, Section 3.3.5).

The GHG emissions from land clearing was calculated using the Transport Authorities Greenhouse Group (TAGG) GHG Assessment Workbook for Road Projects (2013). Approximately 137.3 ha are proposed to be cleared over the four-year civil construction program to establish exploration lease pads and access tracks that provide a safe working environment for Sweetpea, and the associated Pastoralists. At completion of the exploration activities, Sweetpea intend to progressively rehabilitated disturbed areas to their previous state resulting in minimal long-term reduction in carbon sequestration.

Total greenhouse gas (GHG) emissions generated over the entire four-year program for all civil construction and water bore activities is anticipated to range from approximately 13,400.2 to 14,909.4 tCO₂-e (tonnes of Carbon Dioxide equivalent). The anticipated Sweetpea GHG emission for each lease pad is less than 0.015% of the total annual GHG emissions reported for the NT by the Commonwealth *State Greenhouse Gas Inventory* (inventory year 2018) of 16,034,660 tonnes CO₂-e (Department of Industry, Science, Energy and Resources, 2018).

6.2.4 Traffic

A Traffic Impact Statement (TIS) has been conducted for the civil construction and water bore activities is presented in (Appendix L). The TIS determined that the average daily traffic flows, according to traffic counts undertaken from the DIPL Annual Traffic Report 2018, including a peaking factor of 50% are approximately 118 to 177 vehicles per day for the Carpentaria Highway.

The peak additional traffic generated from mobilisation of the vehicles relating to the construction of bore works and camp site establishment will be approximately 56 vehicles per day. The peak additional traffic generated from Santos and Imperial works will be approximately 67 and 56 vehicles per day respectively. Cumulatively, this causes the Carpentaria Highway to experience 356 vehicles per day when factoring existing daily flows. These anticipated values are well below the AUSROADS *Guide to Traffic Management Part 3 (AGTM03-20)*.

It is concluded that with the low traffic volumes and management practices that will be implemented during the civil construction and water bore program, will have minor cumulative impact on existing traffic movements, with no reduction in level of service of the Carpentaria Highway.

6.2.5 Social and Community

The civil construction and water bore activities proposed are remote and located on a private Pastoral lease, Tanumbirini Station. The cumulative impact of the activities on the local community and social aspects are considered minor based on the following:

- The civil construction and water bore activities are located on private property and personnel will be accommodated in self-sufficient exploration camp for the duration of the activities.
- The civil construction and water bore activities will occur over the next four years contributing to the economy of the region. The number of personnel required to deliver civil construction and water bore activities will be relatively small operations (maximum of up to 55 personnel).
- There are no other major industries within the area of EP136, other than pastoral operations.
- The waste stream from the civil construction and water bore operations, as well as camp operations are not expected to create large volumes and will be primarily associated with minor vehicle and truck maintenance activities and camp operations. All waste produced during construction activities will be removed from the permit area to a licensed landfill or reuse facility.

- EP136 is surrounded by other petroleum exploration permits including Origin and Santos where seismic and well drilling and testing exploration activities have been undertaken in recent years. Drilling and testing activities are also proposed for the future. The distance and extent of exploration permit areas relative to the density and footprint of exploration activities will not result in any loss of visual amenity or tourism value.
- The traffic impact statement has considered road safety for visitors travelling along government roads, in particular where a heavy vehicle is turning off the highway onto an unsealed road (off Carpentaria Highway).
- The civil construction and water bore program requires specific skill sets and capabilities, therefore the risks associated with increased competition for labour from exploration activities, including other petroleum operators, is considered low and within the capacity of existing service providers.

Given the footprint of the civil construction program area, the small and temporary nature of the project and the level of activities in surrounding areas, cumulative impacts of this nature are expected to be negligible.

Sweetpea has a stated preference to use local contractors and services to support the proposed civil construction program including for land management services (weed surveys and treatment, fencing, civil construction, water bore drilling etc.), engagement of NLC cultural monitors throughout the surveys and supporting local service providers such as fuel retailers and accommodation providers during recreational breaks. This would result in a positive economic activity and gain for the region.

7.0 Potential Impacts and Management

The assessment of potential impacts and management of risks aims to avoid and or minimise environmental impacts during the civil construction program. The Australian Petroleum Production and Exploration Association Limited (APPEA) Code of Environmental Practice (APPEA, 2008) and a range of State/Territory Government Exploration Guidelines have been used to develop the management strategies for each of the identified impacts associated with the project.

The activities associated with this EMP are as follows:

- civil construction of accommodation camp, lease pads, gravel pits and access tracks
- groundwater bore drilling and monitoring
- water extraction
- establishment and operation of accommodation camp
- post-activity rehabilitation and remediation.

Environmental risks associated with the civil construction and water bore activities have been identified through a thorough impact and risk assessment process applied to the suite of civil construction activities (refer Section 3.0). The environmental risk assessment was conducted by Sweetpea personnel, experienced engineers and scientist and with industry input. The purpose of the analysis was to identify potential impacts, assess the associated risk of these impacts and develop measures for preventing or mitigating impacts that reduce the risks.

A risk register is provided in Appendix E which presents the outcome of the risk assessment process. The inherent risk assessment results are based on the proposed exploration activities and the timescale that they will occur. The residual risk assessment results are based on the implementation of the management tasks detailed throughout this section and aim to minimise the impact of the exploration activities to as low as reasonably practicable and considered acceptable.

7.1 Risk Assessment Summary

An assessment of potential and routine environmental effects and the risks arising from the proposed civil construction and water bore activities was conducted and a copy of the environmental risk assessment is presented in Appendix E.

A summary of the number of risks and risk levels is tabulated in Table 22.

Table 22 Risk assessment summary

Activity	Number of risks				Total
	Low	Moderate	High	Extreme	
Number of risks for civil construction and water bore program prior to mitigation measures	21	22	0	0	43
Number of risks for civil construction and water bore program including mitigation measures.	43	0	0	0	

Sweetpea maintains a Health, Safety and Environment Management System (HSEMS) underpinned by its Health, Safety and Environment Policy (see *Appendix G1* and *Appendix G2* of Appendix G). Management of potential impacts associated with the project aligns with Sweetpea's HSEMS.

Sweetpea has committed to ensuring that the Civil Construction and Water Bore EMP activities are conducted in a manner that minimises impacts to the environment. Sweetpea's performance against its environmental goals and objectives is measured by setting environmental outcomes and environmental performance standards.

Under the Petroleum (Environment) Regulations, the EMP must include environmental outcomes (EOs) that address the identified environmental risks. The EOs must address legislative and other controls that manage the environmental aspects of the activity.

The environmental outcomes, environmental performance standards and measurement criteria for the planned civil construction and water bore activities are outlined in the issue specific EMPs. The issue specific EMPs have been developed based on the results of the risk assessment as follows:

- land management (includes waterways, soil, erosion and sediment control measures) (Section 7.2)
- weeds (Section 7.3)
- bushfire (Section 7.4)
- waste (Section 7.5)
- spill prevention (Section 7.6)
- noise, vibration and lighting emissions (Section 7.7)
- air quality and emissions (Section 7.8)
- vegetation, flora, fauna and habitat (Section 7.9)
- feral animals and other pest species (Section 7.10)
- social environment and access (Section 7.11)
- cultural heritage and Sacred Sites (Section 7.12).

Overall roles and responsibilities for implementation of the civil construction and water bore EMP are outlined below in Table 23.

Table 23 Roles and responsibilities

Role	Responsibility
Operations Manager	Sweetpea employee responsible for the overall operations of the civil construction and water bore activities
Project Manager	Sweetpea employee/consultant that oversees the planning and execution of the civil construction and water bore activities and is ultimately responsible for ensuring all other parties are working within the HSE guidelines. Sweetpea employee/consultant responsible for the technical aspects of the civil construction and water bore.
Onsite Company Representative, Quality Control (QC) and Health Safety and Environment (HSE) Representative	Sweetpea employee/consultant responsible for ensuring all areas of operations are carried out in accordance with this EMP and Sweetpea HSE Policy and civil construction and water bore quality controls. Also provides guidance and advice to site personnel on the day-to-day management of the environment and implementation of this EMP.
Water Bore Drilling Contractor Project Manager	Water bore drilling contractor responsible for contractor's equipment and personnel, as well as adherence to industry practices and this EMP.
Civil Construction Contractor Project Manager	Civil construction contractor responsible for contractor's equipment and personnel, as well as adherence to industry practices and this EMP.
Field Crew	Contractor and subcontractors' personnel involved in the day to day delivery of the civil construction and water bore activities.
Cultural Monitors	NLC representatives to provide cultural clearances during clearing and grubbing activities to ensure activities are conducted to avoid areas of cultural significance.

7.2 Land Management Plan

7.2.1 Potential impacts

Erosion susceptibility varies throughout the Sweetpea project area, dependent upon the soil types, slope and extent of ground disturbance. Apart from the erosive impact of climatic conditions, soil erosion is influenced mainly by the inherent properties of the soils and the processes which occurred during the formation of the landscapes.

Erosion will occur in the permit area if the land is used beyond its capacity, as is seen if land is overstocked or vehicle movements not controlled, for example. The locations of the proposed lease pads, gravel pits and access tracks have been examined in the field to determine the risk of erosion occurring from Sweetpea activities.

Factors considered include the following:

- **Season** – The timing of the civil construction and water bore program is scheduled to occur wherever possible during the dry season when chance of rainfall is very low. Where the program may result in activities pushing into the wet season, which is considered generally between November through to March in the permit area, additional mitigation will be required for wet season contingency. Based on the average rainfall the timing of the program will occur during very low risk factor periods, increasing to moderate risk factor in November and high-risk factor if extends into December (refer to *Section 3.5.2* of Appendix C). It is noted that the Code of Practice nominates the wet season for the months of October to April inclusive.
- **Soil type** – Soils with higher clay content are prone to generation of bulldust and are easily eroded by wind and water. Gravelly soils tend to be more robust to disturbance on the scale expected for Sweetpea civil construction and water bore activities. The primary soil type encountered during the baseline investigations for the 2021 project area can be described as silty SAND, SM with some gravel. These soils are considered to have a low to medium erodibility potential when the soils are disturbed.
- **Slope length** – The slope length within the project work area is low risk, with respect to the slope being below 2%. The area with slope >2% is generally small (<200 m) across the activity area.
- **Slope** – The slope of a site has a great influence on the impacts of erosion during rainfall events, where steeply inclined areas posing a greater risk than small undulations in landform. A slight undulation is consistent throughout the region which constitutes a gradient less than 2% which poses no risk from erosion generated from the slope of the project area. Areas with slope >2% will be avoided where possible from the proposed clearing and development footprint area. However, treatments are defined for sections less than 2% and greater than 2%. The relevant treatment will be implemented on a case by case basis on site.
- **Groundcover** – Clearing will be conducted to construct access tracks, establish gravel pits and earthworks relating to the construction of the lease pads. The clearing method used will consist of a dozer to initially clear vegetation and then dozer or grader to strip topsoil, ensuring that rootstock is topsoil is retained in the stockpiled topsoil. Expected machinery includes grader, 4W loader, tip truck, water truck, water tanks, excavators and compactors.
- **Creek and drainage line crossings** – No new waterway crossings will be established in the construction of the gravel pits and access tracks. Existing waterway crossings stem from existing pastoral tracks where the use of existing waterway crossings will require treatment to retain its existing profile in accordance to drawing Typical Road Invert Crossing Detail found in Appendix K3 of the ESCP, with exception of creek crossing which is 'transit only'. Where material is used in the treatment at a creek crossing, these will be removed once the waterway crossings are no longer required.

The potential impacts related to erosion and sedimentation are:

- loss of soil and land stability
- damage to road and track infrastructure
- damage to creek bed
- dust generation.

While increased turbidity is commonly an additional impact of erosion and sedimentation, creeks in this area are intermittent and likely to be naturally subject to high sediment load during periods of inundation.

7.2.2 Objectives

The objective of this Land Management Plan is to avoid, or minimise and control, soil erosion and discharge of sediment or soil into waterways or established drainage systems which may result from soil disturbance activities including land clearing, installation of access tracks, civil infrastructure and camp establishment.

A standalone Erosion and Sediment Control Management Plan (ESCP) has been prepared for the civil construction and water bore activities and is provided in Appendix K.

7.2.3 Land management tasks and responsibilities	
Environmental Values	- Suitability and stability of land for existing uses (erosion and sediment controls implemented) - Stability of land to preserve existing water quality, landscapes and ecosystems
Environmental Risks (Appendix E)	- Soil erosion and sedimentation resulting from ground disturbance activities (i.e. slopes >2%) (Risk Reference 1) - Dust generation during civil construction and water bore activities (Risk Reference 2) - Loss of topsoil and land suitability and capability (Risk Reference 3) - Soil compaction as result of civil construction activities (Risk Reference 4) - Soil contamination from hazardous substance spills (Risk Reference 9 and 17) - Damage to road and track infrastructure (Risk Reference 1) - Damage to creek bed at crossing points (Risk Reference 6, 7 and 9) - Scars on the landscape from civil construction and water bore activities (Risk Reference 5)
Environmental Outcomes	No significant long-term impacts to the ecological function and productivity of soils at the exploration lease pads, gravel pits and accommodation as result of Sweetpea's exploration activities.
Activities	Management Tasks
Project Management	Planning, Consultation and Logistics - Use existing road and tracks where practicable and designed to suit intended purpose and volume of traffic for the civil construction and water bore activities. - Civil construction timing to be during the dry season wherever possible and wet weather contingencies to be implemented if activities continue into the wet season (October to April inclusive) (refer Section 8.5). - Only 'transit' of Newcastle Creek Crossing on the Eastern Access Track in accordance with AAPA Certificate conditions on RWA2. - Site environmental inductions for all site personnel and contractors in relation to land management tasks.
Access Track and Lease Pad Preparation, Gravel Pits, Water Bore Drilling, Camp Operations	Vegetation Clearing - Undertake selective clearing (only necessary clearing areas), using lighter machinery such as graders or smaller bulldozers, taking care, not to overwork tracks or pads. Overworking the site can lead to the loss of topsoil, compaction, the formation of windrows and wheel rutting. Refer to <i>Section 4.1.1 ESC Treatment Options for specific situations</i> in Appendix K. - Ground surface to be stabilised before the nominated wet season (October to April), and only where an alternative route is unavoidable. - Take all reasonable and practicable measures to minimise the removal of, or disturbance to, trees, shrubs and ground covers (organic or inorganic) that are to be retained. - All land clearing must be in accordance with the Federal, Territory and local government vegetation clearing requirements and <i>IECA Table 4.4.7 Best practice land clearing and rehabilitation requirements</i>.

	• All reasonable and practicable steps to be taken to apply best practice erosion control measures following earthworks and site stabilised prior to anticipated rainfall. Disturbed areas will be stabilised in accordance with the rehabilitation plan. Reference should be made to Appendix F Rehabilitation Plan for the lease pads, access tracks and gravel pits. • Where possible, i.e. gravel pits, vegetation clearing should be in small units over time, keeping the disturbed areas small and exposure time short, in conjunction with progressive re-vegetation (assisted natural regeneration using available topsoil and removed vegetation). • ESC treatments are defined for sections less than 2% and greater than 2% in Appendix K. The relevant treatment will be implemented on a case by case basis on site. In particular, the final positioning of Gravel Pits 11 and 12 will take into account the local slope and avoid the high to very high-risk areas (slopes >2%). • Minimise impact to vegetation and soils within the 200 m native vegetation buffers along pastoral property boundaries and 50 m buffer for land adjoining NTG road reserves. Access Track Preparation • Align access tracks, lease pads and camp site to avoid sensitive areas, such as slopes >2% and drainage lines. The tracks will follow the natural grade and avoid works that will impact on the slope stability. • Use where possible previously disturbed areas including repurpose seismic lines and existing pastoral access tracks. It is noted existing pastoral station tracks will be used to access construction sites wherever practicable, or will minimise the removal of the vegetation, leaving as much intact as possible. • Vehicles (Surveyors/Water Bore Monitors with 4WD) that enter and exit the site will be constrained in such a manner to prevent dropping or tracking material on the Highway in accordance with the Road Agency Approval. Refer treatment in Appendix K2 to be used during construction phase • Access tracks are designed to allow for off-road drainage. • Minimise vegetation clearance, where possible and retain vegetation buffers surrounding streams and creeks, as outlined in the NTG <i>Land Clearing Guidelines 2010</i>. • All vehicle movements to be within designated access roads and tracks. • Allow disturbed areas to be stabilised and natural regeneration of the native grasses to occur. • Monitor Carpentaria Highway during operation. Where tracked material on the road pavement becomes a potential safety issue, Sweetpea and principal contractors will sweep and clean material off the road. If Carpentaria Highway Turn-in results in dust, dirt creating a hazard to road users, additional ESC will be considered including installation of shaker grid or rock pad. Stockpile – soil/topsoil/vegetation • Stockpile existing topsoil, where available, so that it can be reused on the site for ESC and future rehabilitation at project completion. • Stockpiles of erodible material that has the potential to cause environmental harm if displaced, must be: i. Appropriately protected from wind, rain, concentrated surface flow and excessive up-slope stormwater surface flows. ii. Located at least 2m away from any retained vegetation.
--	--

	iii. Located up-slope of an appropriate sediment control system. iv. Provided with an appropriate protective, impervious cover (synthetic or vegetative) if the materials are likely to be stockpiled for more than 28 days. v. Provided with an appropriate protective, impervious cover (synthetic or vegetative) if the materials are likely to be stockpiled for more than 10 days during those months that have an erosion risk rating higher than medium. • A suitable flow diversion system must be established immediately up-slope of a stockpile of erodible material that has the potential to cause environmental harm if displaced if the up-slope catchment area draining to the stockpile exceeds 1,500 m². • Avoid creating windrows. Do not create windrows across creeks, use rollers when putting in tracks in preference to dozers, or walk the dozer with the blade raised off the ground. Erosion and Sediment Control • Avoid, minimise and control soil erosion and discharge of sediment or soil into waterways or established drainage systems. • Erosion and Sediment Controls to be implemented in accordance with the ESCP (Appendix K). • Rehabilitation work should begin as soon as possible after the completion of works, including removal of any windrows. • All reasonable and practicable steps to be taken to apply best practice erosion control measures following earthworks and site stabilised prior to anticipated rainfall. Disturbed areas will be stabilised in accordance with the rehabilitation plan (Appendix F).
Accommodation Camp and Lease Pad Construction	• The positioning of the lease pads will require level pads and will be constructed to reduce impact on areas of high to very high risk (i.e. slopes >2%). • Pad construction to be in accordance with the typical ESCP: - Use topsoil berms to divert upstream runoff from undisturbed areas ('clean' water) around and away from disturbed areas, and back to the environment. - Use topsoil/mulch berms to contain/manage runoff from disturbed construction areas ('dirty' water) and prevent release to the environment without treatment. - Treat runoff from construction areas through suitable sediment controls (e.g. sediment traps). - Configure berms so that upstream runoff does not mix with construction area runoff prior to treatment of construction area runoff. • Where topsoil stripping is required, the stripping depth would be in accordance with Technical Instruction (NT-2050-15-TI-0001) and amelioration rates agreed with the Construction Supervisor, engineers and by a suitably qualified ESC practitioner. It is noted that the expected nominal depth of topsoil across the lease pads at all locations will range from <100 mm to 150 mm. Final strip depth will be confirmed in the field. Any changes to the adopted ESCs will be reflected in the ESCP and to satisfaction of DEPWS. • Stockpiled felled trees nearby for future use in rehabilitation. • Maintenance is undertaken by an appropriately qualified person i.e. approved contractor / Sweetpea.

	Following the completion of activities and within 2 years after the surrender of a lease, the land surrounding or affected by the exploration wells shall be restored per the site-specific rehabilitation plan and final determination of asset (i.e. if transferring asset ownership to landholder).																								
Creek and Drainage Line Crossings	- Creeks and drainage lines (also referred to as intermittent streams) will only be crossed whilst using the pastoral track to gain access for the civil construction and water bore works. No new creek crossings within RWA2 will be made for the civil construction and water bore activities. - Crossings will be located at stable and level crossing points. - The civil construction crew will need to engage with the TOs and the NLC wherever the access track cross Newcastle Creek, because of its known cultural sensitivities (RWA2 requirements). Only 'Transit' crossing where Eastern Access Track meets Newcastle Creek in RWA2. - All large shrubs and trees will be avoided along creeks and drainage lines during access track construction. - Where ramps are required for improving the crossing, they will be aligned perpendicular to creek bed or drainage line, as much as possible using local materials. - Any rock protection must be restricted to what is necessary to provide safe passage and be placed at bed level. - The retention of vegetation buffers (as outlined in the NTG Land Clearing Guidelines 2019) as they relate to stream order will need to be considered for the improvements to the existing crossing points. - Disturbance in the riparian buffers in accordance with the stream order of the encountered drainage lines will be in accordance with the buffers provided below: <table><tr><th>Riparian class</th><th>Stream order</th><th>Minimum buffer width</th><th>Measured from</th></tr><tr><td>Drainage depression</td><td>Not applicable</td><td>25</td><td>The outer edge of the drainage depression, which is the extent of the associated poorly drained soils and associated vegetation</td></tr><tr><td>Intermittent streams</td><td>First</td><td>25</td><td>The outer edge of the riparian vegetation or levee (whichever is greater). If braided channels are present, the edge of the outer most stream channel</td></tr><tr><td>Intermittent streams</td><td>Second</td><td>50</td><td>As above</td></tr><tr><td>Creeks</td><td>Third and fourth</td><td>100</td><td>As above</td></tr><tr><td>Rivers</td><td>Fifth or higher</td><td>250</td><td>As above</td></tr></table> - Wet weather contingency procedures will be implemented from 1 October to 31 March. - The activities are to be completed in a manner that does not cause material change to the shape of a waterway, the volume, speed or direction of flow or likely flow of water in or into a waterway, or alteration to the stability of the bed or banks of a waterway, including by removal of vegetation.	Riparian class	Stream order	Minimum buffer width	Measured from	Drainage depression	Not applicable	25	The outer edge of the drainage depression, which is the extent of the associated poorly drained soils and associated vegetation	Intermittent streams	First	25	The outer edge of the riparian vegetation or levee (whichever is greater). If braided channels are present, the edge of the outer most stream channel	Intermittent streams	Second	50	As above	Creeks	Third and fourth	100	As above	Rivers	Fifth or higher	250	As above
Riparian class	Stream order	Minimum buffer width	Measured from																						
Drainage depression	Not applicable	25	The outer edge of the drainage depression, which is the extent of the associated poorly drained soils and associated vegetation																						
Intermittent streams	First	25	The outer edge of the riparian vegetation or levee (whichever is greater). If braided channels are present, the edge of the outer most stream channel																						
Intermittent streams	Second	50	As above																						
Creeks	Third and fourth	100	As above																						
Rivers	Fifth or higher	250	As above																						

	• Ongoing monitoring of creek and drainage crossing condition prior to, during and at completion of rehabilitation will be required. • The original topography of the creek or drainage bed will be reinstated following practical completion of the exploration program.
Site Management	• All plant and equipment brought to the site are to be certified as “free” of weeds, soil pathogens and pests (Section 7.3.3 and Section 7.10.3). • All disturbed areas identified as very low, low, medium or high erosion risk must be suitably stabilised before anticipated rainfall, from the day that soil disturbances on the area have been finalised- IECA Table 4.4.7 (Appendix K). • Tracks to be regularly inspected for early signs of compaction, erosion and soil degradation (generation of bulldust). Ongoing maintenance and repair work should be implemented as required on tracks. • Monitor road conditions to ensure deterioration does not occur. Assist in the maintenance and repair work on roads and tracks used. • No off-lease or off-road driving. • Land-disturbing activities must: - allow stormwater to pass through the site in a controlled manner and at non-erosive flow velocities. Preferably, stormwater runoff must be diverted around the site. - minimise soil erosion resulting from rain, water flow and/or wind. - minimise adverse effects of sediment runoff, including safety issues. - prevent, or at least minimise, environmental harm resulting from work-related soil erosion and sediment runoff. - ensure that the value and use of land/properties adjacent to the site (including access roads) are not diminished as a result of the adopted ESC measures. • Additional and/or alternative ESC measures must be implemented if unacceptable off-site sedimentation is occurring as a result of the work activities. • Sediment deposited off the site as a direct result of on-site activity must be collected and the area appropriately rehabilitated as soon as reasonable and practicable, and in a manner that considers the safety and environmental risks associated with the sediment deposition. • At completion of the activities related to the civil works, the disturbed areas to be restored and/or rehabilitated to original pre-disturbed condition consistent with surround land use.
Wet Weather Contingency	• 7-day forecast from the Bureau of Meteorology (BOM) to be monitored and the civil construction and water bore activities planned around the forecasts. • Where forecasts indicate rainfall is likely to result in an event that has potential to limit access to the work area, the civil construction contractor will stabilise the current work areas and go into standby mode until such time they can assess the track condition after an event to recommence activities. • Emergency response – a post-rainfall/flood damage reconnaissance and assessment will be completed once area is accessible. Any damage observed would be repaired as soon as practicable after the event.

	A trigger action response plan is presented in <i>Section 5.4</i> of Appendix K.		
Site Rehabilitation	- At the completion of activities and before the commencement of decommissioning activities, Sweetpea will discuss any possible residual beneficial use of the assets with the landowner. Assets may include the well pads, tank pads, access tracks, accommodation camps, gravel pits and water infrastructure. If the landholder does request for infrastructure to remain in place, the proposed infrastructure will have ownership transferred following approval by DEPWS and the Pastoral Land Board. - Where assets cannot be beneficially used, the site will be rehabilitated using assisted natural regeneration back to a safe, stable landform consistent with surrounding land use. Once Sweetpea identifies the completion of activities within an area of the permit, rehabilitation will commence within that 12-month period. - Rehabilitation of disturbed areas will occur as soon as practicable following completion of works in accordance with Section 9.0 and Appendix F to reduce exposed soils and minimise runoff from first flush events. - All compacted areas will be ripped and scarified to promote regeneration of vegetation. - All disturbed areas will be allowed to naturally regenerate or be revegetated on completion of use. - At completion of activities, establish vegetation to the standard of that registered in the pre-assessment, or better. - All disturbed areas identified as very low, low, medium or high erosion risk must be suitably stabilised prior to anticipated rainfall, from the day that soil disturbances on the area have been finalised- IECA Table 4.4.7 (Appendix K). - Stabilise disturbed areas quickly to reduce the potential for erosion. - Previously removed vegetation and topsoil will be uniformly re-spread over disturbed area to assist with rehabilitation process through agencies of increased infiltration and return of seed-bearing topsoil. If required, additional native seed mix from the area could be respread to speed up rehabilitation process. This will be confirmed during rehabilitation monitoring activities. - Windrows to be removed as soon as practicable and all debris will be moved away from the fence line at least 5 m. - The type of ground cover applied to completed earthworks is compatible with the anticipated long-term land use, environmental risk, and site rehabilitation measures. - Ensure there is no material change to the shape of a waterway, including the volume, speed or direction of flow or likely flow of water in or into a waterway. - Ensure that stability of a waterway bed or bank is maintained. - Monitoring following rehabilitation (refer Section 8.5).		
Implementation			
Environmental performance standards	Measurement criteria	Records	
7.2.3-1 The planned disturbance footprint is within the parameters established for the exploration lease pads, gravel pits and associated access tracks (refer to Table 3).	Spatial data before and after to be used to confirm program stayed within the vegetation clearing parameters.	Records maintained during and post construction through a quality review of actual disturbance.	

7.2.3-2 Erosion and sediment controls in place and working as designed.	- Records show the erosion and sediment control plan implemented prior to the commencement of the activity - Records show all active work sites inspected for evidence of erosion and sedimentation, including after significant rain events, and that where erosion/sedimentation is identified, remedial actions are taken - The incident management system shows no incidents relating to the failure of ESCP controls (within the design parameters) - No evidence of active erosion within 12 months of civil construction completion.	- Any instances of erosion will be documented by georeferenced photographs and maintained on a register (Section 8.5). - All creek crossings documented by georeferenced photographs and maintained on a register (refer Appendix C, Appendix F and Appendix K)
7.2.3-3 No releases of contaminants (chemicals, hydrocarbons) outside Sweetpea's exploration areas	- Records show all spills remediated immediately on discovery, and where necessary contamination assessment undertaken. - The incident management system indicates no releases of contaminant incidents related to wet weather operations - Records show emergency response plan implemented in the event of a spill or leak	- Records of weekly inspections of petroleum and waste storage and transfer areas (refer Section 7.5 and Section 7.6). - Any spills to be cleaned up and reported as an incident (refer Section 7.6). - All environmental incidents are to be recorded in a field log that must remain accessible to all relevant regulatory authorities as detailed in Section 8.3.
7.2.3-4 Following conduct of the regulated activity, land not required for operational activities will progressively be returned to pre-disturbance conditions	Topography to be reinstated to the nearest standard based off pre-recorded photographs (refer Appendix F).	Monitoring of rehabilitated sites will be undertaken annually until final rehabilitation success criteria has been achieved (Section 9.0 and Appendix F).
Monitoring	Monitoring for soil erosion and related issues is undertaken at the following key stages: - Assessment of existing erosion during siting of access track, exploration lease pads and field camp. - Following completion of key phase of activity – e.g. inspected for early signs of compaction, erosion and soil degradation (generation of bulldust) following completion of the civil construction program. - If the 7-day forecast indicates greater than 50% chance of rain. - After more than 20 mm of rainfall has fallen in a 24-hr period. - Vegetation recovery monitoring (refer below). Additional, routine inspections are to be conducted monthly to assess that:	

	- Erosion and sediment controls employed on site are in place and in working order. - There are no wind erosion scalds, especially along the access tracks, exploration lease pads and camp areas. - No water erosion gullies forming along access tracks and exploration lease pads or around the field camp. - Erosion along the extent of the access tracks would be assessed and compared to the results from the land condition assessment detailed in Appendix C.		
Maintenance	- While the work is scheduled to cease before the onset of the wet season, if work extends into the wet season, erosion and sediment control structures must be implemented to minimise the risk of erosion and sedimentation. All temporary erosion and sediment control measures, including drainage control measures, must always be fully operational and maintained in proper working order during the program (refer Appendix K). - When undertaking vegetation clearing and preparation, erosion and sediment control measures must be inspected within 18 hours of a rainfall event of sufficient intensity and duration to cause runoff on-site or greater than 20 mm in 24 hours. - During the wet season, weekly inspections of drainage and erosion control structures must be carried out in areas where track access is maintained. Any sediment removed from sediment traps around lease pads, the camp and other places of sediment deposition must be disposed of in a lawful manner that does not cause ongoing soil erosion or environmental harm. Prior to the completion of activities on the ground, the access tracks, lease pads and field camp will be stabilised to the satisfaction of Sweetpea's company representative and HSE manager.		
Overall Residual Risk	Consequence – Moderate (2)	Likelihood – Unlikely (2)	Residual Risk – Low
Scientific Uncertainty	Baseline data is current to assess land condition (refer Appendix C). The measures to be implemented to manage risk to the land (erosion, sediment, soil and waterways) are well understood and established within industry to ensure risk effectively controlled.		Low (1)
ALARP Statement	The highest risk to land is predominantly from soil erosion during the wet season activities. The residual risk was assessed as a 'low', with a 'minor' consequence (minor environmental or community impact) and 'unlikely' likelihood when environmental controls detailed in the management tasks are implemented. The management tasks have considered the 'hierarchy of control' to demonstrate all reasonably practicable control measures have been identified and implemented to reduce the risk to an acceptable level. Appendix E presents the ALARP evaluation for the activities to be conducted during the civil construction and water bore activities.		
	Eliminate	- Avoid clearing vegetation by using existing pastoral tracks and disturbance areas (camp location, repurpose seismic lines). - Avoid clearing of riparian vegetation along waterways. - No works within intersection of Newcastle Creek and Eastern Access Track at RWA2. Transit only.	

	Substitute	Where forecasts indicate rainfall is likely to result in an event that has potential to limit access to the work area, the civil construction contractor will stabilise the current work areas and go into standby mode until such time they can assess the track condition after an event to recommence activities.
	Engineering	- ESCP typical treatments for lease pad and access tracks (refer Appendix K). - Stabilisation of ground surface to commence within 5 days of the activities being completed on any part of the site, and disturbed areas are to be restored and/or rehabilitated.
	Administrative	- Site environmental inductions. - Monitoring and Auditing (refer Section 8.5 and Section 8.6). - Spatial data before and after to confirm stayed within survey parameters.
	Personal Protective Equipment	Not applicable.
Acceptable	Based on the controls to be implemented, the residual risk cannot be reduced any further. The risk mitigation measures outlined in the EMP and ESCP (Appendix K) meet the industry best practice requirements of the environmental performance standards (IECA, 2008) and Sweetpea's environmental policies that make up this EMP. Controls above best practice are unlikely to reduce the risk to land (soil, erosion and waterways) further.	

7.3 Weed Management Plan

7.3.1 Potential impacts

AECOM has previously undertaken weed surveys in the Beetaloo Sub-basin approximately 80 – 100 km east and north-east of the civil construction area. Surveys carried out in August 2018, indicated that weed abundance was low overall. *Hyptis suaveolens* (Hyptis), was identified along the access tracks. *Parkinsonia aculeata* (Parkinsonia) and *Calotropis procera* (Rubber Bush) have been previously identified along the Beetaloo access track to the south-west of the EP136. Parkinsonia is listed as a Weed of National Significance (WONS).

Weed surveys have been undertaken in November 2019 and May 2020 to inform the baseline condition of the seismic survey area and the civil construction area. No weeds were encountered during either survey within the civil construction and water bore program area.

A patch of Hyptis was recorded within a creek line on the eastern side of the seismic exploration area. This section of the seismic line was subsequently removed from the proposed survey to prevent the spread of Hyptis throughout the exploration area.

Gamba Grass (*Andropogon gayanus*) is known to be in the Beetaloo region and is used by some Pastoralists for wet season pasture. The pastoral properties using Gamba would be required to control the growth and spread to neighbouring areas (NTG, 2000). Gamba Grass is a listed WONS and as such the Commonwealth DAWE have developed a *Threat abatement plan to reduce the impacts on northern Australia's biodiversity by the five listed grasses* (2012), inclusive of Gamba Grass. The plan has been developed to address ecosystem degradation, habitat loss and species decline due to the invasion of introduced grasses and is listed under the EPBC Act 1999 (DAWE, 2021).

Weeds that potentially occur within the exploration area are outlined in Appendix C and Appendix H.

The movement of vehicles, machinery and other materials to, from and within the permit area may result in weeds being imported or spread.

The potential impacts of weeds being spread or introduced include:

- loss or degradation of native vegetation communities and native fauna habitat
- loss of pasture area, quality and potential stock poisoning (through introduction of toxic weeds)
- increased control costs for leaseholders, particularly for declared weeds
- increased flammability and fire risk.

7.3.2 Objectives

The focus of this Weed Management Plan is to ensure that existing infestations that may be spread prior to civil construction works commencing are controlled, and that vehicle hygiene requirements are implemented to minimise the risk of importing weeds. The specific objectives of the WMP are:

- No exotic species and plant diseases being imported into or exported from the civil construction program area
- No further spreading weeds within the program area
- No introduction or spread of declared weeds resulting from Sweetpea's activities
- Six-monthly weed inspections completed on all activity areas including camp area, gravel pits and access tracks.

7.3.3 Weed management tasks and responsibilities	
Environmental Values	Maintain the integrity of significant ecosystems and agricultural productivity.
Environmental Risks (Appendix E)	- Introduction and Spread of Weeds can have a range of deleterious impacts including: - altering fire regimes (Risk Reference 35) - displacing native flora (Risk Reference 28 and 29) - poisoning of stock (Risk Reference 30). - Increase cost for control for pastoral leaseholders (Risk Reference 40)
Environmental Outcomes	No introduction of new or spread of existing Weeds of National Environmental Significance (WoNS) or weeds listed under NT legislation or locally significant weed species.
Activities	Management Tasks
Project Management	- Source machinery locally if available. - Ensure contractual requirements specify vehicle hygiene requirements, specifically that all equipment is cleaned and to have valid weed hygiene declaration prior to accessing pastoral properties. - Allow enough time and budget for weed survey, monitoring and control activities during and on completion of the civil construction and water bore program.
Access Track and Lease Pad Preparation, Civil Construction Program, Camp Operations	- Weed surveys are to be conducted in all activity areas to establish a baseline, inform weed control activities and compare post-activity vegetation with the baseline (refer Appendix C and Appendix H). - Ensure machinery is clean and free from mud and plant material prior to entering or leaving the civil construction area. Site inductions are to ensure that all personnel are aware of vehicle weed hygiene requirements and staying on designated access tracks. - As there are currently no vehicle wash-down facilities in the region, the most appropriate and applicable cleaning procedure is visual inspection and dry removal. This will reveal vegetative material caught in the underbody, moving parts of machinery or any other part of the vehicle or machine and the materials located could be manually removed or removed with the assistance of compressed air. With this method, there is no requirement to be able to distinguish between weed and native species, as all vegetative matter should be removed. It is noted that a weed washdown facility is currently being constructed near Highway Inn, Daly Waters. - If an outbreak of a declared weed occurs during exploration activities weed treatment is to be undertaken as soon as possible to control and eradicate the infestation, with treatment undertaken according to guidelines on the DEPWS website. The Northern Territory Weed Control Handbook (DENR, 2018) will also serve as a reference (Appendix H). - All plant and machine operators to monitoring for weeds while conducting activities, including routine checks along access tracks and around lease pads and gravel pits. - All vehicles, plant and equipment to be checked and cleaned prior to demobilisation from exploration area to avoid the spread of weeds off the EP.

Rehabilitation	- Ongoing monitoring of rehabilitated areas in accordance with the Broad Rehabilitation Strategy to ensure declared weed species become established interfering with the rehabilitation success (refer Section 9.0 and Appendix F). - A post-construction weed control program is to be undertaken within the civil construction area if NT <i>Weeds Management Act</i> 2001 declared weed is identified.		
Implementation			
Environmental performance standards	Measurement criteria	Records	
7.3.3-1 No introduction of new or spread of existing Weeds of National Environmental Significance, weeds listed under NT legislation or locally significant weed species.	- No declared weeds imported into or exported from the civil construction area - No introduction or spread of declared weeds resulting from Sweetpea's activities - Six-monthly weed inspections completed on all activity areas including camp area, access tracks and lease pads. - Weed free certifications are provided for all vehicles, equipment and machinery moving from known areas of WoNS, weeds listed under NT legislation or locally significant weed infestation prior to attending a well location - Personnel inductions include specific requirements around weed hygiene	- Records of observed presence, with identification of weed if possible, will be maintained within Sweetpea's GIS and provided to the NT Government's Onshore Petroleum Weed Management Officer. - All weed outbreak incidents will be reported in Sweetpea's incident management system and corrective action initiated. - Include annual reporting on the performance of weed management against NT - Records of weed inspections will be maintained.	
Monitoring	- As part of the Annual Weed Management Action Plan (refer Appendix H), Sweetpea will undertake weed survey and mapping of the areas that will be impacted by the civil construction and water bore activities and where required undertake weed control. - Weed monitoring is to be carried out in all disturbance areas to determine the extent of existing weed infestations within the program area, inform weed control requirements and assess any changes in the number, size and species of weed infestations as a result of the project following its completion. - All plant and machine operators to monitoring for weeds while conducting activities including routine checks along access track, lease pads and gravel pits.		
Notification Requirements	- The Northern Territory Government Onshore Petroleum Weed Management Officer at the Weed Management Branch of DEPWS should be notified within 48 hours of the discovery of a new weed species in the area. - Initial notification may be verbal, with follow-up written notification provided within seven working days. The notification should include a preliminary species identification and location information. The Onshore Petroleum Weed Management Officer will advise what further action is required.		

	It is noted that some species spread rapidly, so immediate action may be required to control spread. For example, as stated in Appendix H Parthenium (<i>Parthenium hysterophorus</i>) is a Class A (to be eradicated) and Class C (not to be introduced) weed in the Northern Territory as well as being classified as a Weed of National Significance. Early detection is crucial in not allowing this species to spread in the Northern Territory (DPIR, 2016). The <i>Weeds Management Act 2001</i> requires: <i>'The owner and occupier of land must... within 14 days after becoming aware of a declared weed that has not previously been, or known to have been, present on the land, notify an officer of the presence of the declared weed'.</i> All weed outbreak incidents will be reported in Sweetpea's incident reporting system and corrective action initiated.		
Overall Residual Risk	Consequence – Moderate (2)	Likelihood – Rare (1)	Residual Risk – Low
Scientific Uncertainty	Baseline data is current to assess land condition (refer Appendix C) and manage weeds during the program (Appendix H). The measures to be implemented to manage risk of introduction and spread of weeds in the exploration permit can be implemented easily to ensure the risk effectively controlled.		Low (1)
ALARP Statement	The introduction and/or spread of weeds during exploration activities was assessed as a 'low', with a 'moderate' consequence (minor short-term damage confined to exploration area) and 'rare' likelihood when environmental controls detailed in the management tasks are implemented. The management tasks have considered the 'hierarchy of control' to demonstrate all reasonably practicable control measures have been identified and implemented to reduce the risk to an acceptable level. Appendix E presents the ALARP evaluation for the activities to be conducted during the civil construction and water bore activities.		
	Eliminate	Corrective action initiated immediately where weed outbreaks are reported.	
	Substitute	Source machinery locally if available to avoid importation of exotic weeds.	
	Engineering	All plant and machine operators to monitoring for weeds while conducting activities including routine checks along access track, lease pads and gravel pits.	
	Administrative	- Site environmental inductions, including trained in weed identification and reporting. - Monitoring and Auditing (refer Section 8.5 and Section 8.6). - Spatial data before and after to confirm stayed within survey parameters.	
	Personal Protective Equipment	Not applicable.	

Acceptable

Weed survey in October 2019 and May 2020 (Appendix C and Appendix H) indicated a low concentration of weeds across the exploration area. Based on the controls to be implemented, the residual risk is assessed as acceptable. Controls above best practice are unlikely to reduce the risk of the introduction and spread of weeds into the permit area any further.

7.4 Bushfire Management Plan

7.4.1 Potential impacts

Historical records of fire in the area show that fire frequency within the exploration area over the past 11 years (2008 to 2019) are low, ranging between one and two times in an 11-year period, as shown in *Figure 6 of Section 2.7 of Appendix C Land Condition Assessment*.

AECOM has undertaken a preliminary assessment of the risk of bushfire in the civil construction area. The risk of bushfires causing damage to the natural environment was determined to be a medium risk prior to the implementation of mitigation methods. Provided this Bushfire Management Plan is effectively implemented, the risk profile for potential bushfires to the environment will be low.

Sweetpea's civil construction program does not require burning of the vegetation prior to carrying out the program. The project is therefore unlikely to impact the bushfire management strategies of the pastoral stations. The program is consistent with the Savanna Regional Bushfires Management Plan 2018 and the fire management objectives for petroleum exploration.

The civil construction area encompasses one of the five designated bushfire management zones in the Northern Territory; the Barkly Fire Management Zone.

Increased incident and intensity of bushfires can lead to vegetation degradation and habitat modification. Fire can travel over large areas therefore its impact can occur outside of the project site. As discussed in Section 4.2.2 and in Appendix C, Bullwaddy and Lancewood communities are fire sensitive and hot fires can reduce habitat quality for both flora and fauna species.

Research suggests that fauna diversity may be impacted by a hot fire, particularly for diurnal reptiles (e.g. Legge *et al.*, 2008).

The potential impacts from bushfires include:

- Loss of life and property
- Death of fauna and loss of fauna habitat
- Death of stock and loss of fodder
- Increased erosion risk
- Reduced stock carrying capacity
- Damage to or loss of culturally significant sites
- Damage to or loss of public infrastructure, private infrastructure and equipment or community lands.

7.4.2 Objectives

The focus of this Bushfire Management Plan is to ensure that the risk of bushfires resulting from activities associated with Sweetpea's civil construction program are mitigated to protect public and private infrastructure and equipment, environmental and cultural values of the exploration area, and ensure the health and safety of operational personnel.

Specific objectives of this Fire Management Plan are:

- minimise the risk of fire resulting from Sweetpea operations
- minimise the risk to its operations from bushfires which may occur from elsewhere in the region.

The specific Bushfire Management Plan for use in the field is presented in Appendix I.

7.4.3 Bushfire management tasks and responsibilities	
Environmental Values	• Maintain a natural fire regime of the region. • Protection of public, private infrastructure and equipment.
Environmental Risks (Appendix E)	• Vegetation degradation and habitat modification (Risk Reference 25 and 35). • Damage to or loss of infrastructure (Risk Reference 36). • Damage to culturally significant sites (Risk Reference 37). • Delay to rehabilitation success as result of bushfire (Risk Reference 25).
Environmental Outcomes	• Bushfires are not started as a result of conduct of the regulated activity and exploration lease pads are protected from fires started outside of the work area.
Activities	Management Tasks
Project Management and design	• Fire breaks (minimum of 4 m) to be incorporated into lease pad and temporary camp layout. • Liaise with pastoralists to coordinate activities cognisant of fire management activities, including timing for any planned burns. • Ensure adequate firefighting equipment is available and sufficient training and familiarisation carried out by personnel. • Firefighting equipment will always be carried during civil construction and water bore activities, due to increased risk of ignition. • An emergency response plan that includes actions to be carried out in the event of a bushfire is presented in Appendix M. • All staff to be trained in bushfire awareness and emergency response procedures. • Smoking only allowed in designated smoking areas.
Access Track and Lease Pad Preparation, Civil Construction Program, Camp Operations	• Monitor NAFI to identify any severe, extreme and catastrophic Fire Danger Index (FDI) days and assess risk of conducting activities on such days and if additional controls are required to conduct the day's activities. • Fire extinguishers to be fitted to all vehicles and key locations at camp. In accordance with section 275 of the <i>NT Schedule of Onshore Petroleum Exploration and Production Requirement 2012</i>, fire precautions including at least four 9 L and one 68 L dry-chemical type extinguishers (or their equivalent) shall be kept at strategic locations on or around active civil construction vehicles and equipment. • A hazardous area diagram for the civil construction vehicles and equipment is to be clearly displayed and communicated during inductions. • Fire-fighting equipment will be kept on hand during clearing activities as this is the highest risk period of fire ignition. • Site inductions are to ensure that all personnel are aware of risk of smoking and other site activities that may cause fire. • Drive on designated access roads only. Driving through long dry grass is to be avoided. • Ensure that vehicles and equipment are fitted with spark arrestors.

	• Ensure appropriate storage of fuel and other flammable and combustible liquids in accordance with AS1940:2004 <i>The storage and handling of flammable and combustible liquids</i> (refer Section 7.6). • In case of natural fires in the vicinity of operational areas an attempt should be made to put them out if safe to do so. • Any rubbish, debris or oil refuse that could constitute a fire hazard shall be removed to a safe distance away from camp facilities, existing water bores and other infrastructure.		
Implementation			
Environmental performance standards	Measurement criteria		Records
7.4.3-1 No uncontrolled fires occurring as a result of civil construction and water bore activities.	• The incident management system shows no fires started as a result of Sweetpea's activities. • Records shows annual fire scar mapping, annual fire load estimates and maintenance of firebreaks are undertaken. • Records show emergency response plan implemented in the event of a fire.		• All incidents of fire to be recorded in the Sweetpea incident reporting tool.
Emergency response	• In the event of a bushfire the designated Fire Officer (in the civil and water bore construction team) will coordinate response efforts in accordance with the Emergency Response Plan (Appendix M). • Sweetpea has the primary responsibility for fire response in the exploration lease but at times may be required to take direction from a fire warden or fire control officer. • Consultation and engagement with Bushfires NT and the Landholders will also be required during a bushfire emergency. • Sweetpea is obliged to inform neighbouring Landholders of fire events as they occur in the exploration area, or with potential to effect adjoining properties. All notifications and communication should be undertaken by or at the direction of the Fire Officer.		
Overall Residual Risk	Consequence – Major (3)	Likelihood – Unlikely (2)	Residual Risk – Low
Scientific Uncertainty	Historical records of fire in the area show that fire frequency within the exploration area over the past 11 years (2008 to 2019) are low, ranging between one and five times in an 11-year period (NAFI, 2020) (refer Appendix C). Consideration of Barkly Regional Bushfires Management Plan 2018 and the measures to be implemented to manage risk of fire can be implemented easily to ensure the risk of uncontrolled bushfire is effectively controlled. Additional controls have been included as the result of lessons learnt from the Imperial seismic program (Imperial, 2019).		Low (1)
ALARP Statement	The inherent risk of bushfire as result of the exploration activities was ranked as 'moderate' in the northern area of EP136.		

	With the implementation of the controls and the specific Bushfire Management Plan (Appendix I) the residual risks were assessed as a 'low', with a 'major' consequence (significant damage confined to exploration area) but was considered 'unlikely' likelihood. The Bushfire Management Plan and the specific controls incorporated into the plan have considered previous industry experience for similar activities in the Beetaloo Basin (Imperial Energy Incident Report available on DEPWS Recordable incident report website). The management tasks have considered the 'hierarchy of control' to demonstrate all reasonably practicable control measures have been identified and implemented to reduce the risk to an acceptable level, including considering the lessons learnt from the Imperial seismic survey in 2019. Appendix E presents the ALARP evaluation for the activities to be conducted during the seismic and water bore activities.	
	Eliminate	- Hot works not permitted on total Fire Ban Days. - Line preparation in grassed areas will be flattened to reduce the build-up of fuel within the vehicle's engine bays. - Regular inspections of vehicle's engine bay and remove any build-up of vegetated matter.
	Substitute	Not applicable.
	Engineering	4 m fire access trail around camp site and water bore pad. - Monitor NAFI to identify any severe, extreme and catastrophic Fire Danger Index (FDI) days and assess risk of conducting activities on such days and if additional controls are required to conduct the day's activities. - Fire-fighting equipment will be kept on hand during clearing activities as this is the highest risk period of fire ignition.
	Administrative	- Bushfire Management Plan (Appendix I), including engaging with Bushfires NT and pastoral leaseholders in the area. - Site environmental inductions, including trained on emergency response procedure (Appendix M) in event of fire. - Monitoring and Auditing (refer Section 8.5 and Section 8.6).
	Personal Protective Equipment	- Fire extinguishers to be fitted to all vehicles. - Water cart to be available at all times during civil construction.
Acceptable	Based on the understanding of bushfire risk in the area and the additional controls to be implemented during the exploration activity, the risk of Bushfire is considered to be as low as reasonably practicable (ALARP) and acceptable. Controls above best practice are unlikely to reduce the risk any further and are consistent with other land management activities in the permit area.	

7.5 Waste Management Plan

7.5.1 Potential impacts

The relevant activities that will generate waste for the duration of the civil construction and water bore program include the following:

- Domestic activity:
 - Putrescible and municipal waste
 - Recyclables (glass and cans)
 - Grey water (laundry, showers, sink waste, etc.)
 - Toilet waste
 - Treated sewage effluent
- Civil construction activities:
 - Used fuel drums and oil containers
 - Timber pallets
 - Scrap metal
 - Vehicle tyres
 - Oily rags, filters.

Table 24 below outlines the civil construction and water bore drilling waste that may be produced, with predicted amounts and the disposal methods to be used.

Table 24 Construction activities waste production

Waste Source	Indicative volumes	Disposal Method
Camp Accommodation		
Sewage, grey and storm water	2,000 L per day of grey and sewerage wastewater	Treatment: Using a wastewater system approved by the NT Department of Health and in accordance with the <i>Code of Practice for On-site Wastewater Management</i> . Treated water will be dispersed to a dedicated area of land suitably landscaped for the disposal of reclaimed water by means of surface irrigation onto a suitable medium and plants capable of effecting a high rate of evapo-transpiration. Released to Grade: Lease pad will be designed to divert water around the lease pads through ESC measures. Where stormwater is captured on the disturbed areas, they will be directed through ESC measures detailed in Appendix K.
Food waste, paper and plastic	10 kg/day	Disposal: Collected in dedicated waste bins for transport to an approved landfill.
Glass and cans	1 kg/day	Recycled: Collected in separate waste bins for recycling at an off-site facility.
General Industrial Waste		
Chemical bags and cardboard packaging materials	<100 kg in total	Recycled: Compacted and collected at the accommodation camp for transport to a licenced recycling centre.
Scrap metals	<1 tonne total	Recycled: Collected in designated skip for recycling at an approved location.

Waste Source	Indicative volumes	Disposal Method
Camp Accommodation		
Used chemical and fuel drums	<0.5 tonnes total	Recycled: Collected in designated skip for recycling at an approved location.
Chemical wastes	<100 kg total	Re-use/disposal: Collected in approved containers for disposal at approved landfill or returned to supplier or recycled.
Timber pallets	<1 tonne total	Recycled: Recycled at an approved facility.
Vehicle tyres	<1 tonne total	Disposal: Disposed of at an approved landfill.
Oily rags, oil contaminated material, filters and other hydrocarbon material	<100 kg total	Recycled/ Disposal: Oil from machinery will be collected in suitable containers for disposal at approved landfill.
Groundwater Bore Drilling Activity Waste		
Drilling cuttings and fluids (cuttings mixed with drilling fluids)	~25m ³ for each pair of shallow and deep monitoring bores	All cuttings and drilling mud will be disposed of on site in accordance with the Minimum Construction Requirements for Water Bores in Australia for water bore drilling practices.

The following measures are required for waste management:

- All waste material introduced to site will be removed from the lease area and disposed of, e.g. discarded drilling equipment, oil drums, machinery, engine debris, food and drink packaging etc.
- All sample bags, waste materials and contaminants must be removed from site and disposed of in an appropriate manner, following the completion of the civil construction and water bore drilling program.
- Waste will be appropriately segregated and packaged to ensure that no spillage can occur during the transferal process.
- Spill contingency steps and plans are in place with consideration to each individual waste transfer.
- Grey water from kitchen and showering facilities will be managed in accordance with Part 6 of the DoH *Code of Practice for Small On-site Sewage and Sullage Treatment Systems and the Disposal or Reuse of Sewage Effluent*, 2014.

The proposed sewage system is a chemical wastewater treatment system (2 x OzziKleen SK10 Sewerage Processing Unit (SPU) and 40,000 L Water Tank Skid or similar) in accordance with Part 4 of the *Code of Practice for On-site Wastewater Management 2014*. For chemical systems, the contents are proposed to be irrigated. An application for irrigation of recycled water sourced from an approved recycled water system will be submitted to the DoH Environmental Health unit prior to commencing on site (note DoH generally provide approval of applications within 2 weeks of submission). The irrigated system risk to the environment is considered low based on the small volume of wastewater that will be produced from the civil construction and water bore activities. The onsite arrange will result in no ponding or spray drift that travels beyond the irrigation area. Sufficient storage capacity will be provided in case of an early onset to wet weather.

Domestic refuse to be disposed of in accordance with NT waste guidelines. No incineration of wastes will be carried out on site. The nearest waste transfer facility is in Katherine, approximately 400 km (by road) from the permit area. A record of waste manifests will be stored, outlining a full description of waste types. These records will be retained and made accessible, along with waste storage locations. Waste must only be transported with licenced waste transporters and, transported to a licensed waste facility (with capacity to accept the waste).

The civil and water bore program is planned to occur prior to the onset of the wet season, during which time runoff from camp operations is not expected to occur.

The potential impacts of waste associated with the civil construction and water bore activities are:

- release of detergents into natural systems which may negatively affect some fauna
- pollution of water through release of chemicals into nearby creeks
- contamination of soil through inappropriate waste management
- attracting pest species due to inappropriate organic waste management.

7.5.2 Objectives

The objective of the WMP is to:

- maintain water quality in nearby creeks and streams
- prevent contamination of soil
- manage waste appropriately

During the civil construction and water bore program, waste will be managed in accordance with the internationally accepted guide for prioritising waste management practices with the objective of achieving optimal environmental outcomes (NT EPA, 2015). Waste will be managed in accordance with the following hierarchy principals:

- Avoid: eliminate the generation of wastes through design modification.
- Reduce: reduce unnecessary resource use or substitute a less resource intensive product or service.
- Re-use: reuse a waste without further processing.
- Recycle: recover resources from a waste.
- Treatment: treat the waste to reduce the hazard of the waste prior to disposal.
- Disposal: disposal of waste if there is no viable alternative.

7.5.3 Waste management tasks and responsibilities	
Environmental Values	• Maintain the integrity of ecosystems and agricultural productivity. • Minimise the amount of waste generated on-site and disposed of off-site.
Environmental Risks (Appendix E)	• Release of detergents into natural systems negatively impacting the ecosystem (Risk Reference 10 and 17). • Pollution of water through release of chemicals into nearby creeks (Risk Reference 17). • Contamination of soil through inappropriate waste management (Risk Reference 9 and 17). • Attraction of pest species due to inappropriate organic waste management (Risk Reference 18).
Environmental Outcomes	• No long-term adverse impacts on soil, surface water, groundwater, sensitive habitats and air quality as result of Sweetpea's waste generation.
Activities	Management Tasks
Project Management	• Designated waste storage and handling area to be planned for and provided onsite at well pads and the construction camp. • Ensure provision for appropriate vermin-proof waste storage containers at the camp. • All waste should be removed from site following completion of civil construction and water bore activities. • Ensure contractual requirement to remove all waste and dispose of in licenced facility are met. • Removal and disposal of hazardous wastes to be in accordance with NT hazardous waste disposal requirements. • The site assessment criteria provided in the DoH Code of Practice (2014) (Section 7.2) should be followed when planning and constructing effluent disposal systems (refer to DoH Environmental Health – <i>Guidelines for Land Capability Assessment for On-site Waste Management</i> (2014)).
Access Track and Lease Pad Preparation, Civil Construction Program, Camp Operations	• Ensure site environmental inductions for all site personnel and contractors include the safe storage and segregation of wastes; and disposal of wastes in appropriate containers. • Segregate and safely store and label chemical packaging, oils, batteries, tyres, maintenance and other industrial waste for proper disposal to recycling and approved landfill facilities. • Ensure Safety Data Sheets (SDS) and handling procedures for hazardous chemicals are accessible on site and widely promulgated. • Undertake inspection of waste storage areas regularly, or after significant rainfall event (greater than 20 mm in 24-hour period). • All recyclable materials, including glass and cans, are to be separated from general waste and stored for later disposal at a recycling facility or a recycling bin.
Rehabilitation	• At completion of civil construction and water bore program, all evidence of waste will be removed from the permit area. • Refer to Section 9.0 and Appendix F.

Implementation			
Environmental performance standards		Measurement criteria	Records
7.5.3-1 Designated waste storage and handling delivered in accordance with this plan.		- All waste volumes tracked whilst on-site and in transport. - Waste transport certificates available for all wastes generated. - No off-site releases of waste products. - No instances of putrescible waste found to be accessible by animals.	Waste disposal records (tracking and disposal certificates) to be maintained and kept for audit purposes.
7.5.3-2 Irrigation of treated effluent does not adversely impact soil, surface water, groundwater, sensitive habitats and air quality		- Records show effluent irrigation area designed in accordance with Department of Health, Code of Practice for On-site Wastewater Management (2014) - Inspection records show plant and effluent irrigation area are in working order.	- Record of approval from Department of Health for the use of the small sewage system. - Records of inspections.
Monitoring requirements	- Visual inspections of the waste management systems should be undertaken regularly or if an unseasonal significant rainfall event occurs (i.e. greater than 20 mm in a 24-hour period). - An indicative waste register is provided below in Table 25. Weekly running sheets for waste volumes per waste stream will be recorded.		
	Table 25 Waste register		
	Waste Stream	Disposal Method	Disposal End Point
	Waste oil and oily rags	Disposal	Waste oil and oily rags generated from civil construction activities and machinery maintenance to be collected by a licensed waste contractor and disposed of at a licenced disposal centre. Receipts forwarded to Sweetpea Project Manager.
	Sewage	Treatment and disposal	Reticulated collection, on-site treatment and disposal via irrigation. DOH permit to be obtained to irrigate recycled water sourced from an approved recycled water system.
Paper, cardboard, steel	Recycled	To be collected by a licensed waste contractor for offsite recycling at a licenced recycling centre or waste transfer station. Receipts forwarded to Sweetpea Project Manager.	

	General / domestic waste	Disposal	Licenced landfill in accordance with NT waste guidelines. Receipts forwarded to Sweetpea Project Manager.
Incident Notification	- NT EPA will be notified of any incident that occurs that is causing or threatens to cause environmental and/or material harm. - Notification will occur within 24 hours of the incident first being made aware to Sweetpea management. - The notification will contain information relevant to the incident causing the pollution: - the location - the time and date - the circumstances leading to the occurrence of the incident - any attempts made to prevent, reduce, control, clean up or rectify the incident - environmental harm that has occurred - the identity of the notifying person. - The notification is to occur as per the <i>Waste Management and Pollution Control Act 1998</i> where an incident occurs without the bounds of the petroleum exploration permit, but as a result of Sweetpea waste management. If an incident occurs within the civil construction and water bore area, then routine reporting is to be undertaken as per Section 8.3 of the EMP.		
Overall Residual Risk	Consequence – Moderate (2)	Likelihood – Unlikely (2)	Residual Risk – Low
Scientific Uncertainty	Waste will be managed in accordance waste management hierarchy principals. There are a range of legislation, codes and standards available to ensure risk of waste management effectively mitigates the risk to the environment.		Low (1)
ALARP Statement	The risk from waste is ranked as a 'low'. The risk was assessed as being a 'minor' consequence, 'unlikely' likelihood event. The risk mitigation measures outlined in the EMP meet the industry best practice requirements of the NT Petroleum Codes of Practice and NT <i>Waste Management and Pollution Control Act 1998</i> and have considered the 'hierarchy of control'. Controls above best practice are unlikely to further reduce the risk associated with waste management. Based upon the risk being ranked as a 'low', the risk is determined to be ALARP.		
	Eliminate	Elimination not applicable as waste are a by-product of the activities being undertaken.	
	Substitute	Were able, alternative chemicals can be used that are biodegradable and environmentally sensitive (i.e. detergent choice for camp cleaning).	
	Engineering	- Storage of waste reduce risk of release (i.e. bunded, secured) - Use existing approved wastewater treatment plants already approved by Department of Health.	
	Administrative	- Waste register maintained. - Monitoring and Auditing (refer Section 8.5 and Section 8.6).	

	Personal Protective Equipment	• Not applicable.
Acceptable	Based on waste requirements during the exploration activities primarily to support camp operations, the risk is considered to be as low as reasonably practicable (ALARP) and acceptable. Controls are easily implemented, and no further input is required to reduce the risk any further.	

7.6 Spill Prevention and Response Plan

7.6.1 Potential impacts

Hazardous chemicals

Hydraulic fluid and fuel drums are stored within portable bunding and bulk fuel is stored within tankers equipped with safety features such as double skins (or temporary bunding), safety cut-off valves, top accessing etc. Spill leak and drip trays will be used to address the risk of minor drips and spills associated with re-fuelling operations.

The civil construction and water bore programs maintenance truck will be fitted with required spill prevention equipment.

Spill scenarios

Spills that occur during oil and gas exploration are primarily caused by equipment failure or human error (US EPA, 2016). During the civil bore construction program, leaks and spills would most likely result from:

- loss of containment of fuels from storage area
- spill during refuelling or fuel transfer
- hydraulic oil leaks from construction vehicles.

Transport and dispatch of hazardous liquids (i.e. fuels, oils and hydraulic fluids) are activities that pose a risk of spillage if not managed well. In addition, consideration of seasonal conditions must be provided when transporting waste, in particular the wet season.

The potential impacts associated with the civil construction and water bore activities may include:

- Groundwater:
Oil and hydrocarbon spills have the potential to leach into aquifers and pollute the groundwater. Pollution of aquifers by fuels, oils and hydraulic fluids is associated with low dissolved oxygen concentration, increased biological oxygen demand, increased water temperature, presence of organic impurities and increased acidity of groundwater (Ugwoha & Omenogor, 2017). The quantity of oils and hydrocarbons is unlikely to result in an impact on groundwater resources on the permit area.
- Surface water:
Spills have the potential to migrate to local surface waters, such as ephemeral watercourses that are sparsely distributed in the Beetaloo Sub-Basin. This can deleteriously effect surface water quality and the ecological values of the receiving habitat.
- Soil:
Impacts of hazardous spills to soil includes salinization and consequent degrading of soil textures and deep erosion, and stress or death to surrounding vegetation.

7.6.2 Objectives

The focus of this spill prevention and response plan is to provide strategies to prevent spills of hazardous liquids and facilitate a rapid and effective response to minimise the impacts of a spill.

The objectives of the SMP are:

- prevent the spill/ leakage of hazardous liquids, including fuel, oils and sewerage, into the environment
- facilitate the rapid and effective response to any spills of hazardous liquids.
- facilitate the effective remediation or removal and safe disposal of contaminated soil to prevent ongoing environmental impacts.

7.6.3 Spill prevention and response management tasks and responsibilities	
Environmental Values	• Maintain the integrity of ecosystems and agricultural productivity. • Minimise the amount of waste generated on-site and disposed of off-site.
Environmental Risks (Appendix E)	• Spills into natural systems negatively impacting the ecosystem (Risk Reference 11). • Pollution of water through spill of hydrocarbon and/or chemicals into nearby creeks and groundwater (Risk Reference 11 and 12). • Contamination of soil through hydrocarbon or chemical spills (Risk Reference 9).
Environmental Outcomes	• No long-term adverse impacts to soil, surface water, groundwater, sensitive habitats and air quality in event of a spill.
Activities	Management Tasks
Project Management	• Ensure the Emergency Response Plan (Appendix M) summarises spill response actions and follow-up actions. • Plan logistics to minimise the quantity of fuel stored on site. • Plan for designated waste storage and handling areas located away from creeks or flammable vegetation. • Hydraulic fluid and fuel drums are to be stored within portable bunding (portable storage bunds create permanent or temporary relocatable watertight bunds that we can manufacture to size required and meet Australian Standards) (refer Section 3.3.3). • Plan for removal and disposal of hazardous wastes to be in accordance with NT hazardous waste disposal requirements. • Include provisions for fuel management, spill response equipment and waste disposal in contracts. • Ensure procurement and transport of spill response equipment is provided for. • Ensure tankers have all safety and response equipment in place.
Access Track and Lease Pad Preparation, Civil Construction Program, Camp Operations	• Construct designated hardstand areas for hazardous liquids storage in the accommodation camp. • All secondary containments will be impermeable and suitable to contain the intended materials or waste stored until they can be removed or treated. • The secondary containments installed will be resistant to physical, chemical and other failure during handling, installation and use. • The construction for the lease pad and accommodation camp will provide the separation of clean and dirty water as detailed in Section 7.2.3 and Appendix K by utilising topsoil/mulch berms to contain/manage runoff from disturbed construction areas ('dirty' water) and prevent release to the environment without treatment. • Hydraulic fluid, oil and fuel drums will be stored within portable bunding. Bulk fuel will be stored within tankers equipped with safety features such as temporary skins and safety cut-off valves. Spill leak and drip trays will be used to mitigate the risk of spills during re-fuelling operations. • Ensure the availability of spill clean-up equipment for operations.

	• All loading, unloading, transfer and refuelling operations are to be undertaken in designated areas, with portable bunding and away from any sensitive receptors. • Ensure internal tracks used for transporting fuel are adequate and safe. All transport of fuel to be carried out during daylight hours. • Ensure that personnel are familiar with the spill prevention and response plan and site environmental inductions cover transport, storage, refuelling, response and clean-up activities. • Spill response to be conducted as per Section 7.6.7 to Section 7.6.8 and based on the size and scale of the spill incident. • In an event a spill requires emergency response, refer to Appendix M.	
Contingency: Wet Season	• Transport of chemicals during the wet season must be undertaken with close observation and assessment of weather impact from increased rainfall. • Undertake a risk assessment no greater than 1 week before an intended transport of waste to adequately assess environmental conditions prior to transporting during wet season. • Regular assessment of unsealed road undertaken to ensure the quality of the road is suitable for transport during wet season. • Ensure internal tracks used for transporting fuel are adequate and safe. All transport of fuel to be carried out during daylight hours. • Ensure that personnel are familiar with the spill prevention and response plan and site environmental inductions cover transport, storage, refuelling, response and clean-up activities. • Ensure tankers have all safety and response equipment in place.	
Rehabilitation	• Upon completion of project all hazardous liquids and containers are to be removed from the permit area and disposed of in a licenced facility. • Identify and remediate the affected area where applicable in accordance with the National Environmental Protection Measure (NEPM) requirements. • Any contaminated soil removed is to be disposed of appropriately in a licenced facility. If contractors are used, evidence of disposal is to be provided to the Project Manager.	
Implementation		
Environmental performance standards	Measurement criteria	Records
7.6.3-1 No releases of contaminants (wastes, chemicals or hydrocarbons) resulting in long-term contamination of the soil, surface water, groundwater, sensitive habitats and air quality.	• No off-site releases of chemicals or hydrocarbons • No accidental on-site release of chemicals or hydrocarbons • Incident report indicate <10L of chemical spills	• All chemical and hydrocarbon volumes tracked whilst on-site and in transport • Waste disposal records (tracking and disposal certificated) to be maintained and kept for audit purposes and provided to DITT/DEPWS.

	- Incident reports indicate <20L of hydrocarbon spills 100% of spills cleaned up immediately on discovery. - Incident reports indicative of effective remediation or removal and safe disposal of contaminated material/soil. - Incident reporting to DEPWS is to comply with the requirements in Regs 33 and 35 – reportable and recordable incidents.	- Inspection reports and maintenance records of secondary containment shall be kept for audit purposes and provided to DITT/DEPWS. - Accidental release, leaks and spills of chemicals and hydrocarbons to be maintained on the incident register.	
Monitoring Requirements	Regular inspection of fuel and chemical storage areas will be undertaken during line preparation and civil construction and water bore activities. Areas that should be regularly inspected and maintained as required include: - work areas - containment areas and structures - secondary containment areas - containers (e.g. fuel drums) - spill kits - designated refuelling areas and maintenance areas. Monitoring should include a daily inspection of taps and valves, soils within the work area for staining and the hazardous liquids storage area and secondary containment areas. A weekly inspection of spill clean-up kits, MSDSs and labelling of hazardous wastes and materials is also to be carried out.		
Incident Notification	- Incident notification must comply with the requirements outlined in regs 33, 34 and 35, subject to the nature, scale and impact of the incident (refer Section 8.4). - In event of an offsite incident (i.e. fuel spill on transit to EP) must notify NT EPA. - Other OH&S notifications that would be required if the incident occurs offsite – e.g. hydrocarbon spill on the way out to site.		
Overall Residual Risk	Consequence – Moderate (2)	Likelihood – Unlikely (2)	Residual Risk – Low
Scientific Uncertainty	Spill prevention and response as detailed in management tasks is based on standard operating procedures. There are a range of legislation, codes and standards available to ensure risk of spills as result of activities can be effectively mitigate the risk to the environment. In addition, the distance of sensitive receptors surrounding the exploration lease pads will likely result in lower risk.		Low (1)

ALARP Statement	The risk mitigation measures outlined in the EMP meet the required environmental performance standards for management spill events including Appendix M Emergency Response Plan. Controls above best practice are unlikely to reduce the risk to soils further. Based upon the risk being ranked as a 'low', the risk is determined to be ALARP. Appendix E presents the ALARP evaluation for the activities to be conducted during the civil construction and water bore activities.	
	Eliminate	Not applicable
	Substitute	Not applicable.
	Engineering	- Hydraulic fluid and fuel facilities/tanks are to be stored within portable bunding and placed away from any drainage lines or sensitive receptors (refer Section 3.3.3). - All loading, unloading, transfer and refuelling operations are to be undertaken in designated areas, with portable bunding and away from any sensitive receptors. - Spill response kits appropriate for types of spill at each facility and within each vehicle.
	Administrative	- Minimise the quantity of fuel and hydraulic oils stored on site to what is necessary to conduct activities. - SDS available for each chemical/fuel onsite and in vehicles (as required). - Personnel familiar with this spill prevention and response plan and site environmental inductions cover transport, storage, refuelling, response and clean-up activities. - Assess road and weather conditions prior to mobilising. - Emergency response plan in event of spill event (refer Section 7.6.4 and Appendix M). - Monitoring and Auditing (refer Section 8.5 and Section 8.6).
	Personal Protective Equipment	Spill response kits appropriate for types of spill at each facility and within each vehicle.
Acceptable	Controls to prevent the accidental release, leak or spill of chemicals (primarily associated with fuel and hydraulic oils) are easily implemented, and no further input is required to reduce the risk any further.	

7.6.4 Spill response

Spills can range from large scale, which can trigger an emergency response plan, to small scale spills and leaks that can be readily dealt with by on-site personnel. Spills can be classified according to the following criteria:

- Tier 1: Spills that can be contained within the project site and can be cleaned up by site personnel without involvement of external organisations.
- Tier 2: Spills that cannot be totally contained within the site boundary and/or may require the involvement of external organisations
- Tier 3: Severe spill that cannot be contained by the operator and requires substantial additional resources to manage the spill.

The spill response procedure that will be adhered to for the project is outlined in Figure 22.

7.6.5 Spill assessment

When a spill occurs the Operating Company Representative or delegate on site is required to make a site assessment to determine the type and location of emergency assistance required. This assessment shall include the following:

- Determine weather conditions particularly wind direction and strength
- Determine safety hazard to response personnel, local population and fauna
- Evaluate the properties of the spill as they influence movement, recovery and environmental efforts. If the properties of the spill are not known, then an assessment should be made, and the oil categorised according to the following descriptions:
 - Class A - light volatile (highly fluid, spread rapidly, penetrates porous substrate)
 - Class B - non sticky (high viscosity, low substrate penetration)
 - Class C - heavy-sticky (high viscosity, low substrate penetration)
 - Class D - Non fluid (tarry or waxy: largely non spreading)
- Determine spill movement and areas of contamination. The movement of a spill over land depends primarily on the physical and chemical properties of the spill, local topography, soil permeability and vegetation cover. The local topography will determine the shape of overland flow and consequently the area of the spill.
- Determine approximate spill size / flow rate. Spill volume based on surface coverage is difficult to estimate accurately due to surface irregularities and absorption into soils. Rough estimates can be generated by multiplying a real coverage by average thickness.
- Identify threatened sensitive areas.

Once the site assessment has been completed response priorities must be established considering prevailing meteorological conditions, properties of the spill, access to threatened areas and logistics considerations.

7.6.6 Spill emergency response plan

The Spill Emergency Response Plan will be practiced as a drill early in the project to ensure field personnel are familiar with the plan. Following this drill, the plan can be updated by incorporating lessons learned via feedback from personnel.

The Spill Emergency Response Plan will include the following information:

- Location of spill clean-up equipment
- Size and extent of spill to trigger emergency response
- Personal Protective Equipment (PPE) required for spill clean-up

Spill clean-up procedure.

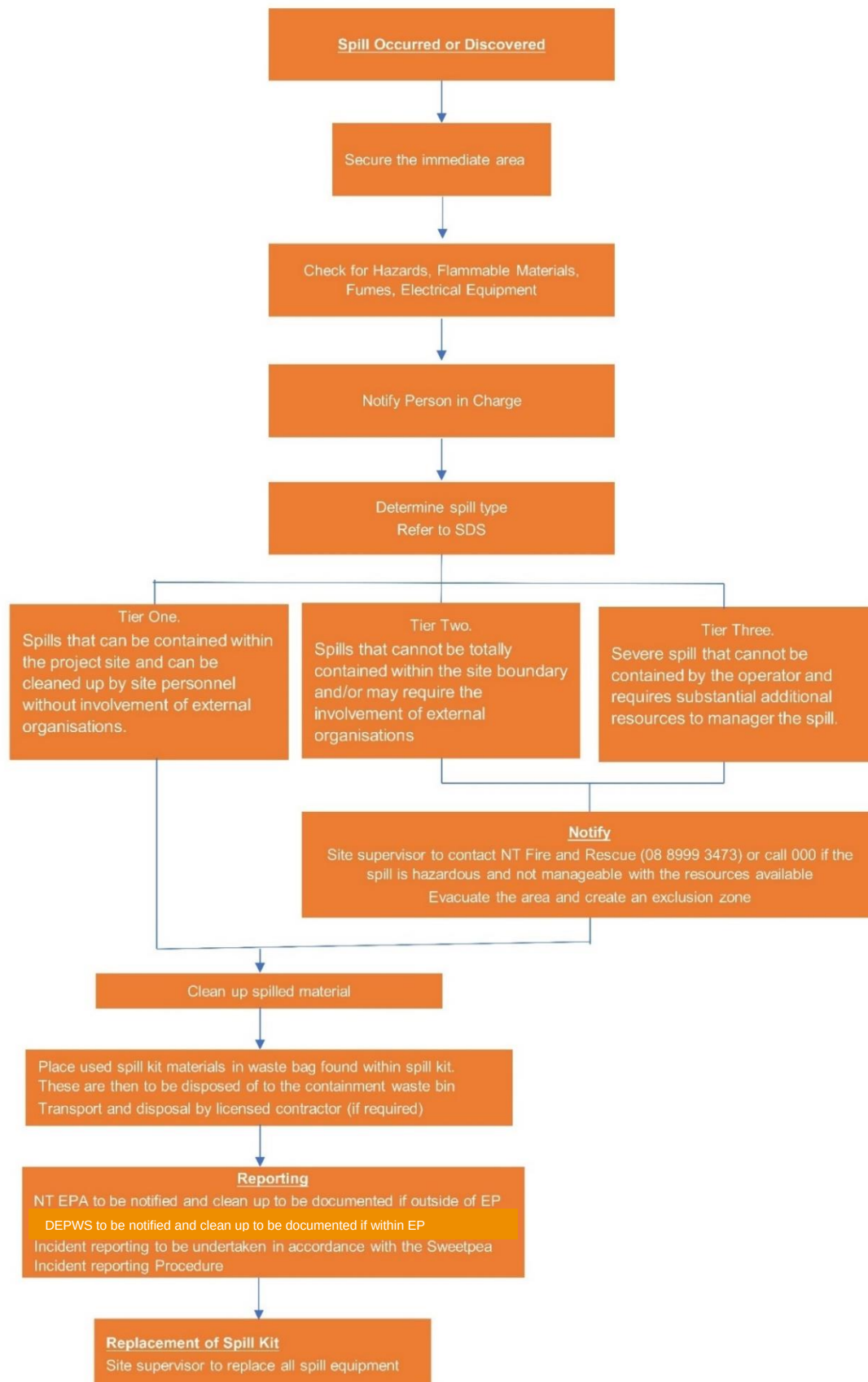


Figure 22 Spill Response Strategy

7.6.7 Spill clean up

In any incident where fuel or oils are spilled, safety is the prime consideration and all the appropriate safety measures must be taken.

If a spill has contaminated the ground surface, treatment should begin as soon as the source of contamination has been stopped.

Treatment

Maximum penetration of an oil spill will occur where pools of oil are formed on the surface. These provide a pressure head and encourage penetration of the spill. Attempts should be made to increase the spread of the spill on the surface to prevent deep penetration of oil as a result of over saturation. If possible do not allow vehicles to drive over oil-saturated areas as this increases the absorption rate.

Remove any puddles of freestanding spill. Increase the absorption capacity of the surface layers by spreading absorbents.

Removal

- Use bulldozer to scrape the obviously contaminated topsoil into piles for the backhoe to load into trucks. The piles should not be allowed to stand for any period of time. Attempt to bulldoze the contaminated soil in one pass leaving clean soil behind the blade.
- Conduct an inspection to determine the extent of contaminated material that will require treatment or removal
- If pools of pollutant are small, cover them with absorbent granules
- Put oil, oily debris, oiled absorbents into plastic bags or leak proof skips and containers and seal for removal and disposal.
- Use a back-hoe to scrape the contaminated top road surface and put directly into trucks.
- Avoid driving through contaminated areas if possible.

Access road

- Conduct an inspection to determine the extent of contaminated material that will require treatment or removal
- If pools of pollutant are small, cover them with absorbent granules
- Put oil, oily debris, oiled absorbents into plastic bags or leak proof skips and containers and seal for removal and disposal.
- Use a backhoe to scrape the contaminated top road surface and put directly into trucks.
- Avoid driving through contaminated areas if possible

Spill equipment requirements

Spill equipment requirements are outlined in Table 26. Additional specialist equipment may be necessary depending on the nature of the event.

Table 26 Spill clean-up application

Material	Application	Situation
Tier 1 Spill		
Granules / Particulate	Use absorbent granules to soak up spilled liquid	Quick and absorbent, suitable for large spills
Lay down pads or pillows	Reduce the size of the spill / leak by gently pushing the booms towards the centre of the spill	Pillows are best for thickly spread liquids Pads are best for thinly spread liquids

Material	Application	Situation
Tier 1 Spill		
Sorbents	Sorbents are materials that soak up the spill. Once the absorbent material has been applied	Used in water way spills where spill material will float on the water
Manual recovery	Manual recovery can be implemented for areas with a high concentration of oil and/or fuel	Buckets and shovels used to remove the oil, or soil containing the oil
Tier 2 and Tier 3 Spills		
Bulldozer, backhoe, trucks	Used to scrape up spills into piles and load onto trucks.	Used to remove contaminated topsoil.

7.6.8 Waste disposal

During a spill clean-up, the disposal of waste material must not pose any threat to the environment. All waste is to be classified in accordance with NT EPA guidelines and disposed of appropriately. Any Prescribed waste is to be transported by an approved waste transporter to an appropriately licensed facility.

Waste reports/ transport certificates are to be obtained from the waste contractor and all dockets / receipts for waste disposal / transport kept for auditable trail and reporting purposes.

7.7 Noise, Vibration and Lighting Emissions Management Plan

7.7.1 Potential impacts

The potential impacts associated with civil construction and water bore activities may include:

- occupational health and safety issues due to long-term exposure to noise sources through use of mechanical equipment
- nuisance noise impacts on surrounding communities or exploration workers through use of mechanical equipment
- disrupting or altering fauna feeding, breeding or other activities through noise, vibration and lighting from use of mechanical equipment
- disturbance to stock (cattle) and native fauna.

7.7.2 Objectives

The focus of noise, vibration and lighting emission management is to minimise potential impacts on the environment, surrounding community, Sweetpea personnel and contractors from noise, vibrations and lighting. Specific objectives are to:

- manage activities in accordance with occupational health and safety guidelines for noise, vibration and light exposure
- minimise nuisance noise and vibration impact on nearby communities, Sweetpea personnel and contractors
- minimise disruption to native fauna and stock

7.7.3 Noise, vibrations and lighting emissions management tasks and responsibilities		
Environmental Values	A rural acoustic, lighting, vibration and visual amenity environment conducive to the wellbeing of the community, including its social and economic amenity, and an individual, including the opportunity to have sleep, relaxation and conversation without unreasonable interference from Sweetpea's activities	
Environmental Risks (Appendix E)	- Noise impacts on surrounding communities (Risk Reference 14). - Disruption to wildlife through noise, vibration and lighting from mechanical equipment (Risk Reference 15). - Disturbance to stock through noise, vibration and lighting from mechanical equipment (Risk Reference 16).	
Environmental Outcomes	Manage activities in accordance with occupational health and safety guidelines for noise, vibration and light exposure and minimise nuisance noise and vibration impacts on surrounding communities, including fauna and stock.	
Activities	Management Tasks	
Project Management	- Ensure operating hours for the civil construction and water bore program are established and communicated to personnel and contractors. The operating hours proposed for the program are over 12-hours during daylight hours (6 am to 6 pm). - Consult with leaseholders prior to scheduling of program activities to take into consideration stock movements. - Provide at least two weeks notification to households and businesses if operations are to be conducted within 10 km of their premises. - All nuisance-related complaints from sensitive receptors investigated and reported upon.	
Access Track and Lease Pad Preparation, Civil Construction Program, Camp Operations	- Ensure site environmental inductions for all site personnel and contractors include noise, vibration and light emissions requirements. - Ensure vehicles, machinery and equipment is maintained in good working order. - Slow down vehicles when passing cattle and other wildlife.	
	Daily and ongoing consultation with station managers and station personnel.	
Implementation		
Environmental performance standards	Measurement criteria	Records
7.7.3-1 No significant impact to rural acoustic, lighting, vibration and visual amenity environment as a result of the civil construction and water bore program.	- Nuisance-related complaints investigated immediately. - Corrective action(s) recorded and taken where appropriate.	All complaints and subsequent actions are to be recorded in the Sweetpea's incident management system.

Overall Residual Risk	Consequence – Minor (1)	Likelihood – Rare (1)	Residual Risk – Low
Scientific Uncertainty	EP136 is considered remote and there are no known tourism operators in the vicinity of the proposed project works. Activities are located away from populate areas. Timing of activities will be restricted to daytime hours where possible.		Low (1)
ALARP Statement	The civil construction and water bore activities are within discreet locations, with a centralised accommodation camp. The permit is remote from sensitive receptors. The risk was assessed as having a ‘low’ inherent and residual risk (a ‘minor’ consequence, ‘rare’ likelihood). The management tasks have considered the ‘hierarchy of control’ to demonstrate all reasonably practicable control measures have been identified and implemented to reduce the risk to an acceptable level. Appendix E presents the ALARP evaluation for the activities to be conducted during the civil construction and water bore activities.		
	Eliminate	• Remote location.	
	Substitute	• Not applicable.	
	Engineering	• Vehicles, machinery and equipment is maintained in good working order.	
	Administrative	• Operating hours of 12-hours during daylight hours. • Monitoring and Auditing (refer Section 8.5 and Section 8.6). • Notice to pastoral lease holders and immediate response to nuisance-related complaints. • Daily and ongoing consultation with station managers and station personnel.	
	Personal Protective Equipment	• Not applicable.	
Acceptable	The residual risk is considered acceptable for noise, vibration and lighting emissions. The remote location of the activity area and the measures to be implemented during survey do not warrant further risk reduction.		

7.8 Air Quality and Emissions Management Plan

7.8.1 Potential impacts

The potential impact associated with the civil construction and water bore program is an increase in dust during site preparation (clearing of access tracks, lease pads and camp areas) and resulting from vehicular traffic during operations.

The current sources of air emissions within the permit areas are associated with dust primarily occur from dust during dry conditions and smoke from prescribed burning activities and wildfires.

Dust

Roads and tracks within the permit area are unsealed apart from the Carpentaria Highway, and dust is generated as a result of vehicle movements upon these roads during the dry season.

Smoke

Prescribed burning for vegetation and bushfire management occurs annually within the permit area, during the dry season. Bushfires are common throughout the region during the late dry season each year. There is no intention for the proponent to undertake any prescribed burning activities.

7.8.2 Objectives

The air quality objective is to minimise dust as a result of operations.

7.8.3 Air quality and emissions management tasks and responsibilities		
Environmental Values	Rural air environment with qualities conducive to suitability for the life, health and wellbeing of humans, stock and wildlife.	
Environmental Risks (Appendix E)	Increase in dust during site preparation (clearing of access tracks, lease pads, gravel pits and camp area) and resulting from vehicular traffic during the civil and water bore construction program (Risk Reference 19, 20 and 21).	
Environmental Outcomes	- Minimise environmental nuisance at sensitive receptors. - Minimise greenhouse gas emissions.	
Activities	Management Tasks	
Project Management	Ensure dust minimisation and suppression requirements are communicated to personnel including contractors.	
Civil Construction Program, Camp Operations	- Ensure site environmental inductions for all site personnel and contractors include protective measures to minimise dust evolution. - All vehicles and equipment used on site will be well maintained to minimise emissions. - If dust levels are high, particularly in the vicinity of public areas (e.g. Carpentaria Highway), use a water truck to manage dust emissions. - Minimise vehicle movements to those necessary in the camp area. - Implement controls as detailed in the Land Management Plan (refer Section 7.2)	
Rehabilitation	- Rehabilitate and/or stabilise the ground surface as soon as practicable following completion of disturbance. - Uniformly re-spread previously removed vegetation and topsoil over disturbed area to assist with rehabilitation process through agencies of increased infiltration and return of seed-bearing topsoil.	
Implementation		
Environmental performance standards	Measurement criteria	Records
7.8.3-1 No significant impact to air quality at sensitive receptors as a result of the civil construction and water bore program.	- No nuisance-related complaints regarding dust / air quality resulting from exploration activities. - All complaints responded to and, where appropriate, corrective action taken immediately.	All complaints and subsequent actions are to be recorded in the Sweetpea incident management system
7.8.3-2 Greenhouse gas emissions are minimised during the civil construction and water bore program.		
Implementation		
Monitoring	Monitor road conditions to ensure deterioration with possible increase in dust creation, does not occur and undertake road rehabilitation if required.	

	- Visual monitoring will be carried out in the vicinity of the public roads (i.e. Carpentaria Highway) to ensure that visibility for motorists is not obscured. In this event, water carts will need to be applied to reduce dust. - Visual monitoring of the vegetation along the access track to be ensure vegetation is not being impacted by dust. - The National Pollutant Inventory (NPI) Emission estimation technique manual for Oil and Gas Extraction and Production (2013) associated with a civil construction program is not considered reportable.		
Overall Residual Risk	Consequence – Minor (1)	Likelihood – Possible (3)	Residual Risk – Low
Scientific Uncertainty	Activities on EP136 are not within close proximity to sensitive receptors, such as high conservation areas, communities or homesteads, roads. Management tasks detailed below will mitigate any risk to further increase dust and emissions in the region.		Low (1)
ALARP Statement	The risk from dust and equipment emissions on air quality in the region is ranked as ‘low’ (minor consequence and possible likelihood). The risk mitigation measures outlined in the EMP meet the industry best practice requirements of the <i>Code of Practice</i> ; with site selection being the primary control. The management tasks have considered the ‘hierarchy of control’ to demonstrate all reasonably practicable control measures have been identified and implemented to reduce the risk to an acceptable level. Appendix E presents the ALARP evaluation for the activities to be conducted during the civil construction and water bore activities.		
	Eliminate	All vehicles and equipment used on site will be well maintained to minimise emissions.	
	Substitute	Not applicable.	
	Engineering	- Implement dust control measures including use of water cart. - On completion of disturbance activities areas to be stabilised and or rehabilitated. - Stay within clearing boundaries and to designated speed limits.	
	Administrative	- Site environmental inductions, including protective measures to minimise dust evolution. - Monitoring and Auditing (refer Section 8.5 and Section 8.6).	
	Personal Protective Equipment	Not applicable.	
Acceptable	The residual risk is considered acceptable for dust and emissions. The remote location of the activity area and the measures to be implemented during the activity do not warrant further risk reduction.		

7.9 Vegetation, Flora, Fauna and Habitat Management Plan

7.9.1 Potential impacts

Site information related to flora, vegetation and fauna is summarised Section 4.2 and Appendix C. Disturbance to vegetation will primarily occur due to vegetation clearing for the camp, lease pads and water bores, gravel pits and associated access tracks.

The potential impacts to vegetation, flora and fauna habitat include:

- disturbance to environmentally sensitive areas and/or flora and fauna species
- loss or endangerment of threatened species
- loss or reduction of habitat and native vegetation extent (approximately 137.3 ha) is expected to varying degrees as a result of clearing for access tracks, lease pads and gravel pits.
- Removal of important or sensitive habitat and flora (i.e. Bullwaddy/Lancewood communities which are considered sensitive vegetation communities).
- vehicle collision with fauna – fauna mortality.

7.9.2 Objectives

The focus of vegetation, flora and fauna habitat management is to minimise the disturbance and removal of flora, vegetation and fauna habitat elements. Specific objectives are to:

- minimise requirements to clear native vegetation to the extent practicable
- avoid clearing riparian vegetation along Newcastle Creek and other waterways across the permit
- minimise disruption and to native fauna and cattle, including vehicle strike
- provide optimum conditions for rapid recovery of native vegetation.

7.9.3 Vegetation, flora, fauna and habitat management tasks and responsibilities	
Environmental Values	• Maintain the integrity of significant ecosystems. • Maintain habitat elements for native flora and fauna, including species protected by EPBC Act and TPWC Act. • Avoid impacts on high value habitat.
Environmental Risks (Appendix E)	• Disturbance to native vegetation and flora and potential to change of vegetation structure (Risk Reference 22). • Removal of threatened fauna habitat (Risk Reference 25). • Risk of injury or death to native fauna and livestock (Risk Reference 22 and 24). • Disturbance to and loss of habitat and native vegetation extent (approximately 137.3 ha) (Risk Reference 25). • Loss or endangerment of threatened species (Risk Reference 26).
Environmental Outcomes	• No significant impact to threatened fauna, their habitat and sites of conservation significance during the civil construction and water bore program.
Activities	Management Tasks
Project Management	• Minimise vegetation clearance by utilising existing access tracks as much as possible. • Clearing activities associated with works are, as far as is practicable, timed to avoid the preferred breeding times for threatened bird species potentially occurring within the development footprint (October to March), or additional monitoring and management controls be implemented as part of the pre-clearance activities. • Where practicable, align access tracks, lease pads and camp to avoid clearing mature trees and Lancewood / Bullwaddy areas which require longer to regenerate follow rehabilitation. • Ensure site environmental inductions for all site personnel and contractors include the management of onsite vegetation and flora, including site personnel to stay within designated access roads and work areas.
Vegetation Clearing Protocols for Lease Pads and Gravel Pits	Pre-clearance Activities: • Delineation and clear demarcation of the construction footprint by a suitably qualified and experienced surveyor. • Ecologically sensitive areas (e.g. denser vegetation) should be mapped using GPS coordinates. Smaller areas can also be marked using flagging tape or if dealing with a larger area borders can be marked to help identification during clearing activities. • Pre-clearance survey of the construction footprint to identify and mark sensitive habitat and habitat trees – Orange tape = Fauna Habitat Tree and Pink = Potential Habitat Tree • Habitat trees that are identified as being likely to be fauna roost/den sites should be uniquely marked with two separate colours of flagging tape and GPS. • All personnel should be informed of the sensitive areas and procedures for minimising ecological impacts through site inductions and toolbox meetings. • Ensure a buffer area between construction works and habitat patches is maintained to ensure minimal disturbance.

	• The final placement of Gravel Pit 12 will meet the <i>NT Land Clearing Guidelines</i> Section 4.3.3 recommendation to maintain a 210 m property boundary buffer. • Provide protective fencing and/or signage for sensitive habitat areas in proximity to works areas (if any). Vegetation Clearing Activities: • A suitably experienced Spotter/Catcher to be on site at all times during vegetation clearing works for the lease pad and gravel pits. It is recommended that for each clearing machine one Spotter/Catcher is allocated. • It is anticipated that spotter/catchers will only be required in areas of clearing vegetation greater than 1 ha in one location (i.e. Lease Pads or Gravel Pits). • It is unlikely that spotter/catchers for linear clearing activities (i.e. access tracks) will be required due to the methods employed that avoid wherever possible the removal of larger trees (including <i>Corymbia</i> and <i>Eucalypt</i> species) with a trunk diameter greater than 25 cm at 1.3 m. • Spotter/Catcher to work closely with Civil Construction Contractor and Machine Operator. • A staged approach to vegetation clearing should be taken to allow animals to relocate on their own accord. Clearing should work towards adjoining habitat and away from construction works and/or roads. • Vegetation clearing machinery should be equipped with a GPS unit that contains clearing boundaries. • Avoid clearing any vegetation outside of the clearing boundary. • Positive radio contact between the machine operator and Spotter/Catcher should be maintained throughout the clearing works. • Spotter/Catchers never to approach heavy machinery unless the machinery is grounded and the engine switched off. • Spotter catchers should remain a safe distance from active machinery. A minimum distance of two times the height of the tallest tree in the clearing vicinity. • Habitat trees should be tapped three times by the clearing machinery and left for a minimum of 24 hrs to encourage resident fauna to leave. • Habitat trees that are identified as being likely to be fauna roost/den sites should be felled last. • Habitat trees, once felled, should be thoroughly checked by the Spotter/Catcher to ensure no wildlife is trapped. • If fauna is located during clearing works, all work should cease until the animal can be safely removed from the site. • Injured fauna that is deemed to be salvageable should be transported to the closest veterinary care, for treatment, rehabilitation, and eventual release back within close proximity to the area it came from. Fauna that is injured and cannot be rehabilitated should be euthanized humanely to avoid any prolonged suffering.
Access Track and Lease Pad Preparation, Civil Construction Program, Camp Operations	• Only clear as much vegetation at lease pads and the camp as is required for safe operations. • Larger trees (including <i>Corymbia</i> and <i>Eucalypt</i> species) with a trunk diameter greater than 25 cm at 1.3 m above the ground must be avoided during clearing for access tracks. • Minimise the impact and disturbance on riparian vegetation where identified, incorporating a buffer area of 1 km to the maximum extent practicable. • Strip and stockpile topsoil and surface material at camp area for use in regeneration or revegetation.

	- Minimise vehicle movements during dawn and dusk to minimise risk of fauna strikes. - Restrict vehicle movement to existing or specifically designated access roads and impose suitable speed limits. Vehicle speed restrictions apply when travelling in permit (60 km/hr on unsealed roads in proximity (<200 m) to sensitive receptors) or drive to condition.	
Rehabilitation	- Retain topsoil, scrub and vegetation cleared to facilitate rehabilitation. - Rehabilitate the ground surface to near-natural condition. - Uniformly re-spread previously removed vegetation and topsoil over disturbed area to assist with rehabilitation process through agencies of increased infiltration and return of seed-bearing topsoil. - Refer to Section 9.0 and Appendix F.	
Implementation		
Environmental performance standards	Measurement criteria	Records
7.9.3-1 No unauthorised clearing of vegetation as detailed in Table 3.	- No riparian trees impacted when stabilising access tracks to creek and stream crossings. - Gravel Pit 12 clearing extent does not encroach on the 210 m property boundary buffer in accordance with Section 4.3.3 of the LCG. - Meet Rehabilitation success criteria as detailed in Appendix F.	- Record of pre-disturbance condition (refer to Appendix C Land Condition Assessment) - Records of observed presence, with identification of weeds and pests, as well as native fauna encountered, maintained within Sweetpea's GIS and if required provided to DEPWS. - All weeds and pest outbreak incidents will be reported in Sweetpea's incident management system and corrective action initiated. - Rehabilitation monitoring and weed monitoring reports to establish condition upon completion of the program.
7.9.3-2 Injury to fauna and stock during the conduct of the activity will be minimised.	- The incident management system indicates no recorded incidents involving vehicles traveling above site speed limits - The incident management system indicates no recorded incidents of fauna trapped in open excavations - Personnel inductions include specific requirements around protection of fauna,	Record any fauna deaths as result of the civil construction and water bore program

	flora and their habitat and compulsory reporting of fauna interactions.		
Overall Residual Risk	Consequence – Moderate (2)	Likelihood – Possible (3)	Residual Risk – Low
Scientific Uncertainty	The estimate of vegetation clearing is approximately 137.3 ha. This has been determined from GIS analysis of high-resolution satellite imagery (captured August 2019) combined with aerial photographic and aerial video imaging of the disturbance areas captured during the baseline land condition assessment survey (refer Appendix C). The design of the survey has considered the impact from clearing of vegetation and has a range of measures to minimise extent of disturbance by using where possible existing access tracks, fence lines and clearings (camp). In addition, placement of the lease pad where possible to avoid clearing (where possible).		Low (1)
ALARP Statement	Based on the design of the civil construction and water bore program and the management tasks described above, the risk to vegetation, flora, fauna and habitat was ranked as 'low'. The risk mitigation measures outlined in the EMP meet the industry best practice requirements of the NT Petroleum Codes of Practice and NT Land Clearing Guidelines and industry experience. It is noted that in accordance with the NT Land Clearing Guidelines 2019 the timing and staging of works proposed is within the preferred timing for vegetation clearing to occur. In the NT it is usual for vegetation clearing to occur either the start of the wet season after the first intense storms have ceased and before the monsoon arrives; or at the end of the wet season, after the monsoon has passed. Controls above best practice are unlikely to further reduce the risk to flora, fauna and habitat. Based upon the risk being ranked as a 'low', the risk is determined to be ALARP. Appendix E presents the ALARP evaluation for the activities to be conducted during the civil construction and water bore activities.		
	Eliminate	Minimise vegetation clearance by using existing access tracks and disturbed areas as much as possible.	
	Substitute	Use a Spotter/Catcher during clearing of lease pads and gravel pits to minimise impact on native fauna species.	
	Engineering	- Align access tracks and lease pads wherever possible to avoid mature trees and Lancewood / Bullwaddy areas which require longer to regenerate follow rehabilitation. - Strip and stockpile topsoil and surface material at camp area for use in regeneration or revegetation if possible. - Ongoing maintenance of access tracks and lease pads.	
	Administrative	- Implement Rehabilitation Plan (Appendix F). - Site environmental inductions for all site personnel and contractors include the management of onsite vegetation and flora, including site personnel to stay within designated access roads and work areas.	

		Monitoring and Auditing (refer Section 8.5 and Section 8.6).
	Personal Protective Equipment	Not applicable.
Acceptable	Based on the understanding of the land condition of the survey area, time of year and the additional controls to be implemented during the exploration activity, the risk of impacts to flora and fauna, vegetation and habitat is considered to be as low as reasonably practicable (ALARP) and acceptable. Controls above best practice are unlikely to reduce the risk any further and are consistent with similar activities conducted in the region. Spotter/catchers have been identified for the clearing of vegetation associated with the lease pad and gravel pits because some large trees and denser vegetation types will require clearing. The methods identified in the Vegetation Clearing Protocol aim to minimise impact on native fauna.	

7.10 Feral Animals and Pest species Management

7.10.1 Potential impacts

Feral animals threaten populations of native wildlife in two main ways: direct predation (e.g. cats, dogs) or competition for limited resources (e.g. bird species, rabbits, rodents, cane toads, pigs). Feral species are more likely to penetrate areas of habitat that have been disturbed. Hence, habitats that have been disturbed or are suffering the impacts of edge effects will often be associated with a population of feral species. An increase in pest species, such as rats (*Rattus rattus*), due to uncontrolled rubbish in the construction and operational phases, can lead to an increase in predation and nesting failure of avian species.

The potential impacts include:

- impacts to native fauna through predation or competition
- damage to vegetation, habitat, pasture and creek lines through feral animal activity
- introduction of diseases associated with feral and pest species may impact upon existing habitats, vegetation, native fauna and livestock
- health and safety risks due to pest species around camp.

7.10.2 Objectives

Objective for feral animal and other pest species is to prevent introduction or spread of feral animals and pest species.

7.10.3 Feral animal and other pest species management tasks and responsibilities		
Environmental Values	• Maintain habitat elements for native flora and fauna, including species protected by EPBC Act and TPWC Act. • Avoid impacts on high value habitat. • Maintain the integrity of significant ecosystems and agricultural productivity.	
Environmental Risks (Appendix E)	• Impacts to native fauna through predation or competition (Risk Reference 31). • Damage to vegetation, habitat, pasture and creek lines through feral animal activity (Risk Reference 33). • Introduction of diseases associated with feral and pest species may impact upon existing habitats, vegetation, native fauna and livestock (Risk Reference 32). • Health and safety risks due to feral animal and pest species around camp (Risk Reference 34).	
Environmental Outcomes	• No introduction or spread of feral animal and pest species as result of activity.	
Activities	Management Tasks	
Project Management	• Ensure contracts specify that no animals may be brought onto site.	
Access Track and Lease Pad Preparation, Civil Construction Program, Camp Operations	• No rubbish (<i>i.e.</i> food packaging) to be left on site. • All waste contaminant will be covered or contained within dedicated waste disposal bins that can't be tampered with or opened by fauna, to reduce attraction of the site from feral animal and pest species (refer Section7.5).	
Rehabilitation	• Rehabilitation efforts can be hindered by cattle and pest species accessing the rehabilitated areas. • Ensure that the spreading of topsoil and vegetation matter is sufficient to avoid cattle and pest species impacting on the recently disturbed area. Fencing off the area may be required.	
Implementation		
Environmental performance standards	Measurement criteria	Records
7.10.3-1 All pest and feral animal records will be maintained.	• No introduction of pest species detected. • No observed pest presence (live or dead individuals, scat traces, nesting sites) • No instances of putrescible waste found to be accessible by animals. • Rehabilitation efforts not hindered by feral animal or pest species using disturbance areas for access.	• Records of observed presence, with identification of pest if possible, will be maintained within Sweetpea's GIS and if required provided to DEPWS • All pest outbreak incidents will be reported in Sweetpea's incident management system and corrective action initiated (where required).

Overall Residual Risk	Consequence – Minor (1)	Likelihood – Rare (1)	Residual Risk – Low
Scientific Uncertainty	Baseline data is current to assess land condition (refer Appendix C) and manage impacts from feral animal and pest species. The aim of the feral animal and pest species management is to ensure the activities do not increase presence within the permit area impacting on native fauna and pastoral activities.		Low (1)
ALARP Statement	The risk of feral animal and pest species from civil construction and water bore activities is ranked as a ‘low’, with a ‘minor’ consequence, ‘rare’ likelihood event. The risk mitigation measures outlined in the EMP meet the industry best practice requirements of the <i>NT Petroleum Codes of Practice</i> and <i>NT Land Clearing Guidelines</i> . Controls above best practice are unlikely to further reduce the risk for the introduction of feral animal and pest species. Based upon the risk being ranked as a ‘low’, the risk is determined to be ALARP. Appendix C presents the ALARP evaluation for the activities to be conducted during the civil construction and water bore activities.		
	Eliminate	• Not applicable.	
	Substitute	• Not applicable.	
	Engineering	• Ensure waste is managed correctly to prevent attracting pest fauna. • Rehabilitation efforts post data recording can be hindered by feral animal and pest species accessing the areas.	
	Administrative	• Monitoring and Auditing (refer Section 8.5 and Section 8.6).	
	Personal Protective Equipment	• Not applicable.	
Acceptable	The residual risk is considered acceptable for feral animal and pest species. The primary aim of the feral animal and other pest species plan is to reduce potential for interaction during activities and avoid attracting to the operational site.		

7.11 Social Environment and Access

7.11.1 Potential impacts

The civil construction and water bore program is largely remote from residences and public areas and direct impacts due to noise and light emissions are unlikely (refer Section 7.7). In an economic context, the civil construction and water bore program may be expected to result in positive economic benefits resulting from the creation of employment opportunities within the region, higher earnings and general increased economic activity. This positive economic activity is likely to extend to local service providers, such as fuel and food retailers, as well as accommodation providers.

The number of Sweetpea personnel and contractors will be up to 50-60 personnel over the four-year period, however this may add to cumulative pressure on services in the region during peak tourist times or with other developments occurring in the region (e.g. accommodation, fuel, traffic and medical services). Overall, the effect on the social environment of the exploration works is likely to be positive.

It is anticipated that the majority of the services delivered for the Civil Construction and Water Bore program will be by local contractors established in the NT and using personnel from NT and otherwise opportunities being provided for locals as far as is practicable.

Table 27 provides an indicative breakdown of the planned workforce required to deliver the program.

Table 27 Civil Construction and Water Bore Program Planned Workforce

Activity	Workforce	Composition (DIDO/FIFO/Local)	Timing
Project Management	5	3 FIFO, 2 DIDO	Duration of Program, 2 weeks rotation
Water Bore Installation	12	12 DIDO	During water bore installation
Civil Construction	40	20-30 DIDO, 10-20 Local	During civil construction
Camp Operations	5	5 DIDO	Duration of program
Environmental Monitoring	6	2 DIDO, 4 Local	6 monthly or more
Cultural Monitoring	2	2 DIDO/Local	Duration of civil and water bore program, rotation

Land access is by negotiation with pastoral leaseholders, Native Title Party and the NLC. The latter is formalised through the Exploration Agreement between Sweetpea, the Native Title Party and the NLC (July, 2012). It is noted that land access for petroleum activities is now subject to the requirements of the Petroleum Regulations 2020 administered by DITT.

Impacts related to access are:

- restriction of access to pastoral leaseholders and Traditional Owners during the activities
- poor relations with pastoral leaseholders and other stakeholders
- disruption of station operations during the activities (i.e. interference with fence lines, cattle and water points etc.)
- cumulative pressure on services in the region or with other developments occurring in the region
- cumulative pressure on groundwater resources in region
- unwanted facilitation of public access (trespass) to pastoral properties or exploration permit areas through the creation, improvement or use of access tracks.

7.11.2 Objectives

Specific social impact objectives are to:

- ensure ongoing stakeholder and other regional engagement indicate no concerns regarding access to pastoral properties or impact on pastoral leaseholders' activities, or negative impacts on local businesses, resulting from the regulated activity
- Aboriginal employment records show commitments made to the NLC for Aboriginal employment have been met
- work closely with station manager and station personnel to minimise disruption to station operations
- no reports of trespass as a result of the works
- no excess take of groundwater.

7.11.3 Social environment and access management tasks and responsibilities	
Environmental Values	• Maintain and enhance the livelihood and well-being of local communities and towns. • Maintain the level of amenity and experience for tourists and local community members. • Allow pastoral operations to continue.
Environmental Risks (Appendix E)	• Restriction of access to pastoral operations and Traditional Owners during the works (Risk Reference 40). • Poor relations with pastoral leaseholders and other stakeholders (Risk Reference 41) • Negatively impact on existing road infrastructure and increased traffic (Risk Reference 42). • Unwanted facilitation of public access (trespass) to lease areas through the creation, improvement or use of access tracks (Risk Reference 43). • Pastoral groundwater bores suffer reduced groundwater yields (Risk Reference 13).
Environmental Outcomes	• No significant adverse impacts to the community as a result of conduct of the regulated activity.
Activities	Management Tasks
Project Management, Access Track and Lease Pad Preparation, Civil Construction Program, Camp Operations	• Site inductions are to ensure that all personnel are aware of and understand social constraints of working with in the permit area, including conditions specified in the Land Access Agreement with the host pastoral leaseholder. • All workers will be required to attend cultural awareness training and Sweetpea's code of conduct. • Work instruction to be issued to all contractors relating to access constraints (Work Instruction – Access). • NLC is consulted through the ministerial office and agreements in place. • Consult with other relevant land users and public interest groups, such as landholders, Aboriginal communities, natural resource managers, conservation groups, tourism operators and other affected parties, to exchange information and facilitate good working relationships as required. • Seek advice from the NLC on appropriate persons to fulfil the role of Aboriginal Liaison Officers, who are able to speak for certain areas and on behalf of certain groups. • Provide a Work Program for each year's proposed activities to the NLC and other regulatory bodies, which includes site-specific environmental and cultural issues, likely impacts and their mitigation. • Prior to commencement onsite, communicate with leaseholders for access permission. Provide detail of the time and dates proposed to be on site, and the location, in advance of works commencing according to the regulations. • LACA to be in place with each station prior to commencement of the regulated activity in the permit area. • Daily engagement with station manager and station personnel during activities to monitor potential disturbances to cattle and jointly arrive at reasonable solutions to mitigate any observed negative effects • Local businesses to be assessed and utilised where possible to deliver the civil construction and water bore program. • A community contact number will be provided in communications correspondence.

Rehabilitation	- Rehabilitation at the completion of the exploration program will be undertaken in accordance with the rehabilitation management plans presented in Section 9.0 and Appendix F. - At the completion of activities and before the commencement of decommissioning activities, Sweetpea will discuss any possible residual beneficial use of the assets with the landowner. Assets may include the well pads, tank pads, access tracks, accommodation camps, gravel pits and water infrastructure. If the landholder does request for infrastructure to remain in place, the proposed infrastructure will have ownership transferred following approval by DEPWS and the Pastoral Land Board. - Where assets cannot be beneficially used, the site will be rehabilitated using assisted natural regeneration back to a safe, stable landform consistent with surrounding land use. Once Sweetpea identifies the completion of activities within an area of the permit, rehabilitation will commence within that 12-month period. - Engage with leaseholders on the rehabilitation areas to determine potential interaction with pastoral operations with the rehabilitation success.	
Implementation		
Environmental performance standards	Measurement criteria	Records
7.11.3-1 No complaints from identified stakeholders during conduct of the regulated activity	- Records show stakeholder consultation (i.e. communication log) ongoing during the activity. - Stakeholder communication log shows any complaints made in relation to conduct of the regulated activity are addressed - Personnel inductions show requirements about activities authorised during conduct of the regulated activity in accordance with land access agreements.	- Record of consultation with NLC regarding Aboriginal Employment opportunities. - Record of consultation with landholders and other stakeholders. - Record of opportunities for local employment and training reflect attendance of local community members. - Record of feedback pertaining to the usage and the capacity of road infrastructure has

7.11.3-2 No complaints from the wider community in regard to traffic management during conduct of the regulated activity	- Records show transportation of over-width or over-dimension loads under approved NT Department of Transport permit - Records show DIPL approved traffic management plan implemented at each access to permit area or exploration lease pad location - The incident management system shows no evidence of incidents involving personnel driving on roads under the influence - Records of Sweetpea’s approved journey management plans.	not been negatively impacted by maintaining the level of surface usage for public roads in the vicinity of activities. - Record of groundwater take in litres/megalitres. - Land Access Agreements closed out at completion. - All complaints recorded in the Sweetpea incident reporting tool.	
7.11.3-3 All contractors informed of regulatory obligations in relation to the regulated activity in tendering information.	- Sweetpea contracting strategies include requirements for contractors to understand regulatory permits required relevant to the contracted activities - Sweetpea due diligence checks performed to demonstrate contractors have the appropriate licenses, permits or approvals prior to commencing works under the contract.		
7.11.3-4 No complaints from the wider community in regard to visual amenity, noise or nuisance during conduct of the regulated activity.	- Entry to exploration area and lease pads area clearly sign-posted - The incident management system shows no evidence of incidents involving unauthorised third-party access		
Overall Residual Risk	Consequence – Minor (1)	Likelihood – Rare (1)	Residual Risk – Low
Scientific Uncertainty	Land Access Agreement and Native Title Exploration Agreements will be in place prior to commencing regulated activity.		Low (1)
ALARP Statement	The risk to community from the activity is ranked as ‘low’. The risk is assessed as being a ‘major’ consequence, ‘rare’ likelihood for the event. This risk is reflected by the scale of the activity, remote location and the risk mitigation measures outlined in the EMP. Due to the limited nature of the activity and the additional controls further reduce the risk to community.		

	Groundwater supply bores will be required to conduct civil construction activities. The cumulative impact of groundwater extraction for all Sweetpea's proposed regulated activities assumes a maximum usage of 294.74 ML per annum (inclusive of future water use). This groundwater extraction requirements associated with the regulated activities under this Civil and Water Bore EMP is estimated at 329.6 ML over the 4-year program (Section 6.2.1). Water is proposed to be extracted under a water extraction licence issued by DEPWS Water Resources Branch and extraction will be metered. Provided Sweetpea adheres to the terms of the granted water extraction license, environmental impacts to groundwater will be unlikely to occur and minor in consequence. Based upon the risk being ranked as 'low' and consistent with standard small-scale surface activities (regardless of industry), the risk is determined to be ALARP. Appendix E presents the ALARP evaluation for the activities to be conducted during the civil construction and water bore activities.	
	Eliminate	Not applicable.
	Substitute	Not applicable.
	Engineering	Not applicable.
	Administrative	- Land Access Agreements - Native Title Exploration Agreement - Site inductions are to ensure that all personnel are aware of and understand social constraints of working with in the permit area, including conditions specified in the Land Access Agreement with the host pastoral leaseholder, as well as Cultural constraints (refer Section 7.12). - Daily engagement with station manager and station personnel during activities to monitor potential disturbances to cattle and jointly arrive at reasonable solutions to mitigate any observed effects. - Monitoring and Auditing (refer Section 8.5 and Section 8.6).
	Personal Protective Equipment	Not applicable.
Acceptable	Risk to the community from the regulated activity is considered 'acceptable'. No further risk reduction warranted. Land Access and Compensatory Agreement will be in place with the host pastoral property. All groundwater take will be metered during operations.	

7.12 Cultural Heritage and Sacred Site Management Plan

7.12.1 Potential impacts

Aboriginal heritage sites in the Northern Territory are protected by three different sets of legislation – the *Heritage Act 2011*, the *Aboriginal Land Rights (Northern Territory) Act 1976* and the Northern Territory *Aboriginal Sacred Sites Act 1989* (and associated Regulations). The *Heritage Act 2011* serves to protect archaeological sites which the Act defines as ‘prescribed archaeological places’. These include sites such as campsites, shell middens, rock art sites and burials. Under this Act:

- Aboriginal archaeological sites must be reported to the Heritage Branch as soon as possible after their discovery. Failure to do so attracts a maximum fine of \$1,000.
- Registered archaeological sites are protected and can be damaged only with the consent of the Minister. Failure to obtain such permission can attract a fine of up to \$200,000, with an additional \$20,000 per day for every day that the offence continues following conviction.
- Where a registered archaeological site is also a sacred site, the Minister must refer any proposals for work in relation to the site to the Aboriginal Areas Protection Authority under the Northern Territory *Aboriginal Sacred Sites Act 1989*.

Under the Northern Territory *Aboriginal Sacred Sites Act 1989*, an ‘Authority Certificate’ is required to be issued, prior to commencing any disturbance activities within the permit boundaries. This requirement is reiterated within the Exploration Agreement between the NLC and Sweetpea and will be facilitated during the Site Clearance process. Sweetpea have an approved AAPA Authority Certificate to conduct proposed activities of this EMP.

Potential impacts related to Cultural Heritage are:

- Damage to or loss of culturally significant artefacts, areas or species.
- Inappropriate access to sacred sites or culturally significant places.

7.12.2 Objectives

The specific objectives of the Cultural Heritage and Sacred Site Management Plan are:

- No disturbance of, or damage to Aboriginal or cultural heritage artefacts or Sacred Sites
- No unauthorised access to sacred sites or culturally significant places.

7.12.3 Cultural Heritage and Sacred Site management tasks and responsibilities	
Environmental Values	Maintain both Indigenous and non-Indigenous cultural heritage values of the region.
Environmental Risks (Appendix E)	- Damage to or loss of culturally significant artefacts, areas or species (Risk Reference 38) - Inappropriate access to sacred sites or culturally significant places (Risk Reference 39).
Environmental Outcomes	No significant impact to Indigenous and non-Indigenous artefacts, Aboriginal Sacred Sites, and non-Indigenous heritage sites.
Activities	Management Tasks
Project Management	- Provide a Work Program for each year's proposed activities to the NLC and other regulatory bodies, which includes site-specific environmental and cultural issues, likely impacts and their mitigation. - Prior to the commencement of any on-ground activities, an Authority Certificate is to be obtained from the Aboriginal Areas Protection Authority (AAPA) and conditions adhered to. - The Site Clearance process should include explanation of the proposed activities and the location and timing of all proposed activities. Opportunity should be allowed for representatives of Native Title claimants or their representative and Traditional Owners to comment on the location of proposed activities, in relation to the presence of culturally sensitive sites or archaeological sites. - Details of the proposed sites of disturbance, including sites that will be impacted upon through the civil construction and water bore activities, as well as all sites not scheduled to be impacted that are vulnerable to disturbance through site activities, will be provided to the NT Heritage Branch prior to on-ground activities, along with specific mitigation and management strategies for all sites identified. - Identify location of culturally sensitive areas and ensure planning and design avoids these areas.
Access Track and Lease Pad Preparation, Civil Construction Program, Camp Operations	- Site inductions are to ensure that all personnel are aware of cultural awareness obligations, such as: - regulations applying to the area, including specific conditions on the exploration permits and agreements with the NLC - awareness of the conditions outlined in the AAPA Certificate - ensure all site personnel and contractors are aware of any potential Restricted Work Areas (RWAs) and conditions outlined in the AAPA Certificates - brief personnel on the rules and regulations and disciplinary measures for breaches of the RWAs - considerations and special procedures to be used for protection of archaeological and cultural sites in the defined work areas - ensure that site personnel and contractors report all new discoveries of archaeological or cultural artefacts, as per Sweetpea's Aboriginal Cultural Heritage Find Protocol (Appendix D) - cease work and effect practical protection measures until the area can be assessed by a Heritage specialist.

	• Avoid disturbance of the Restricted Work Areas (RWAs), unless granted permission to do so (as detailed in the conditions of the AAPA certificate). • Implement the Cultural Heritage Find Protocol (Appendix D). • Two cultural monitors, facilitated by the NLC, to be on location for the duration of the clearing and land disturbance activities.	
Rehabilitation	• On practical completion of activities, areas will be rehabilitated in accordance with the Rehabilitation Plan (Appendix F) and monitoring instigated to ensure successful restoration of the activity areas (Section 9.0).	
Implementation		
Environmental performance standards	Measurement criteria	Records
7.12.3-1 No unauthorised activities within or access to a Restricted Work Area or Sacred Site.	• Records show all activities undertaken in accordance with the conditions of the relevant AAPA certificates and NLC agreements • The incident management system shows no recorded incidents involving damage to Aboriginal sacred sites • Personnel inductions show requirements about location of known cultural and heritage sites, exclusion areas and process for unexpected finds (Appendix D)	• Updated data will be supplied to relevant agencies as required by law and/or agreement. • A project register will be kept of all occurrences of archaeological sites identified during the Project. Updated data will be supplied to relevant agencies as required by law and or agreement.
7.12.3-2 No unapproved impact to known archaeological sites.	• A project register will be kept of all occurrences of archaeological sites identified during the Project. • All site personnel and contractors report all new discoveries of archaeological or cultural artefacts. All work must cease, and protection measures implemented until the area can be assessed by heritage specialist. • Records show chance find procedure implemented if artefacts located during clearing activities • No removal of artefacts in situ without prior approval from Heritage Branch NT.	

Overall Residual Risk	Consequence – Minor (1)	Likelihood – Rare (1)	Residual Risk – Low
Scientific Uncertainty	The baseline cultural heritage assessment as detailed in Section 4.3 and adhering to the conditions of the AAPA certificate will guide the implementation of the activities and minimise impact on Cultural Heritage.		Low (1)
ALARP Statement	The risk to cultural heritage, including Sacred Sites, from the regulated activity is ranked as 'low'. The risk is assessed as having a 'minor' consequence, 'rare' likelihood event. This is due to the completion of the Cultural Heritage Assessment Report (previously provided in the Seismic EMP and summarised in Section 4.3) which provides a detailed description of the cultural heritage constraints across the exploration area and the commitment to avoid all identified archaeological sites, report any newly discovered sites to Heritage Branch and to develop a proposed relocation protocol for artefacts with Traditional Owners. In addition, Sweetpea and their contractors aim to comply with the conditions detailed in the Exploration Agreement between the host TOs and the NLC, as well as the conditions detailed in the AAPA certificate. The management tasks have considered the 'hierarchy of control' to demonstrate all reasonably practicable control measures have been identified and implemented to reduce the risk to an acceptable level. Appendix E presents the ALARP evaluation for the activities to be conducted during the civil construction and water bore activities.		
	Eliminate	- Avoid areas of cultural heritage and significance (i.e. Restricted Work Areas and Sacred Sites detailed in AAPA certificate). - No works within intersection of Newcastle Creek and Eastern Access Track at RWA2. Transit only. - Design access to lease pads to have the minimal impact on Newcastle Creek by using existing crossing.	
	Substitute	Not applicable.	
	Engineering	Not applicable.	
	Administrative	- Cultural Heritage Finds Protocol (Appendix D). - Two cultural monitors, facilitated by the NLC, to be on location for the duration of the clearing and land disturbance activities. - Site inductions are to ensure that all personnel are aware of cultural awareness obligations. - Ongoing consultation with TO's and NLC. - Monitoring and Auditing (refer Section 8.5 and Section 8.6).	
	Personal Protective Equipment	Not applicable.	

Acceptable	The risk to cultural heritage, including Sacred Sites from the regulated activity is 'acceptable'. No further risk reduction warranted considering program will have an AAPA clearance certificate for the activities and cultural monitors as part of the survey team.
-------------------	---

8.0 Systems and Policies

Sweetpea has a comprehensive Health, Safety and Environment Management System (HSEMS) aligned with its Health, Safety and Environment Management Policy. The key project HSE documents for the civil construction and water bore activities are:

- the HSEMP (Appendix G)
- this Civil Construction and Water Bore EMP including the Spill Prevention and Response Plan (Section 7.6)
- Project ERP and the Emergency Response Interface Plan (Appendix M)
- Subcontractors Quality Health Safety Environment Management Plan
- Subcontractors Site-specific ERP
- Bushfire Management Plan (Appendix I).

8.1 HSE Objectives and Key Performance Indicators

The civil construction and water bore project has the following HSE objectives:

- everybody returns home safe
- the impact to the environment of our activities is minimised
- senior management demonstrate proactive HSE leadership and commitment which supports a strong safety culture
- all personnel, by means of their actions and attitudes, demonstrate safety leadership
- all HSE risks are reduced to as low as reasonably practicable and the effectiveness of controls is monitored
- effective consultation and communication take place with contractors and other interested parties
- resources are available to ensure that work is carried out safely
- all incidents and near misses are reported.

To achieve these objectives the following KPIs are to be implemented (Table 28).

Table 28 HSE KPIs

Performance Indicator	Measure	Target
Personnel on site to undergo project and site inductions	Induction records	100%
Corrective actions closed out by due date	Due date	90%
Incidents reported in timely manner and in accordance with Section 8.3.2	Incident reports	100%
Weekly safety meetings are held over course of activity	Minutes of meetings held and attendance register	100%
Emergency response drills	Records of drills performed	100%
HSE performance is tracked over course of activity	Weekly HSE scorecard issued to project team by HSE advisor	100%

8.2 HSEMS Induction

In addition, the Sweetpea HSEMS has a requirement for environmental and safety inductions to be delivered to all personnel prior to beginning work on the project (refer Appendix G). The environment and safety induction package that will be developed for the program will include:

- Regulatory requirements, for the area, including specific conditions on the exploration permits and agreements with the NLC.
- Pastoral Leaseholder and Aboriginal Traditional Owner requirements.
- Environmental considerations and special procedures to be used for environment protection, as well as, protection of archaeological and cultural sites within the permit areas, including the discovery of unrecorded artefacts.
- HSE in remote area operations, including procedures on the safe use of vehicles, equipment and explosives, as well as first aid
- Training in safe storage and handling of flammable and combustible liquids.

The competency of contractors will be assessed as part of the contracting qualification audit during the prestart. Competencies assessed during the contracting process include:

- Quality of EHS systems
- EHS Performance
- Internal training and auditing processes
- Existing procedures and training, including:
 - SWP-01 Weed identification and management
 - SWP-02 Refuelling procedures
 - SWP-03 Procedures for seismic line preparation
 - SWP-04 Hazardous material and waste management procedures
 - SWP-05 Incident notification and management processes.

8.3 Reporting

Reports on performance standards will be carried out by the Sweetpea authorised representative and distributed to Sweetpea management, the DEPWS Petroleum Operations and DITT Petroleum Operations (where relevant) for compliance as detailed in Table 29.

Table 29 Reporting Frequency

Report	Internally Recorded	External Submission
Annual Environment Performance Report	Daily, Weekly and Monthly as per Table 30	Annually
Reportable Incident Report	As per HSEP (Appendix G)	• 2 hours after the incident first occurred - or • If incident not detected at time it first occurred, then within 2 hours becoming aware of the reportable incident - then • Interim report no later than 3 days after the reportable incident first occurs

Report	Internally Recorded	External Submission
		Final report no later than 30 days after the clean up or rehabilitation of the area affected by the reportable incident is complete
Quarterly Recordable Incident Report	As per HSEP (Appendix G)	Quarterly

8.3.1 Annual Environment Performance Report

Sweetpea will prepare an annual environment performance report (AEPR) and submit to DEPWS annually to show that Sweetpea's activities are meeting the environmental outcomes and environmental performance standards committed to in their EMP.

The contents of the AEPR will include:

1. A summary of activities conducted
2. An evaluation of Sweetpea's compliance with the Ministerial approval conditions of the EMP.
3. An evaluation of each environmental outcome and environmental performance standard within the approved EMP.
4. An evaluation of reporting requirements in accordance with the Code and Regulations.
5. Provision of all recordable and reportable incidents, including root cause analysis and related corrective actions to prevent re-occurrence.
6. Findings of all regulatory inspections and audits and related action to address the findings.

8.3.2 Incident Reporting

Reporting on incidents will be based on Table 18 (Section 6.1) where an assessment of the rating matrix and the degree of impact will determine whether the event is reportable or recordable.

Reportable incident

In accordance with the Petroleum (Environment) Regulations 2016, Sweetpea must give the Minister notice of a reportable incident. A reportable incident is defined as an incident, arising from a regulated activity, that has caused or has the potential to cause material environmental harm or serious environmental harm.

In the event of a reportable incident, Sweetpea will notify the Minister in writing or oral as soon as practicable but no later than 2 hours after the incident first occurred or if the incident was not detected at the time it first occurred, then within 2 hours (if orally notified a written notification must be provided within 24 hours).

The notification report must outline the following:

- the contact details of the interest holder
- all material facts and circumstances
- information about any action taken to avoid or mitigate material environmental harm or serious environmental harm
- information about the corrective action that has been taken or is proposed to be taken.

Once confirmed it is a reportable incident, a written report must be provided to the Minister within three days after the reportable incident first occurs. The reportable incident report will contain:

- the results of any assessment or investigation of the incident that caused or contributed to the occurrence, including an assessment of the effectiveness of the designs, equipment, procedures and management systems that were in place to prevent the occurrence of an incident of that nature

- the nature and extent of the material environmental harm or serious environmental harm
- details of any actions taken, or proposed to be taken, to clean up or rehabilitate an area affected
- detail any actions taken, or proposed to be taken, to prevent a recurrence of an incident of a similar nature, including a root cause analysis.

A final report is to be provided within 30 days after the clean up or rehabilitation of the area affected by the reportable incident. Progress or interim reports are to be provided to the Minister no greater than every 90 days while clean up and rehabilitation activities are conducted.

Recordable incident

A recordable incident is a breach of an Environmental Objective or Environmental Performance Standard as outlined in this EMP. A report about recordable incidents must be reported to DEPWS within 15 days after the end of the reporting period (90 days unless otherwise advised by the Minister) and must relate to each reporting period for the regulated activity.

The recordable incident report will include:

- a record of all recordable incidents that occurred during the reporting period; and
- all material facts and circumstances concerning the recordable incidents that the operator knows or is able, by reasonable search or enquiry, to find out; and
- any action taken to avoid or mitigate any adverse environment impacts of the recordable incidents; and
- the corrective action that has been taken, or is proposed to be taken, to prevent similar recordable incidents.

Record keeping

Record keeping is required for 5 years following the period during which the activity is in force and 15 years after the record comes into existence.

The environmental records are to be maintained as detailed in Section 7.0 management tasks and responsibility tables.

8.4 Incident Management

The Spill Prevention and Response Plan (Section 7.6) integrates with the project Health, Safety and Environment Plan (Appendix G) and the Emergency Response Plan (Appendix M).

These plans provide the details required for emergency response and preparedness during the civil construction and water bore activities, including responsibilities and reporting arrangements; and the interaction between Sweetpea, the civil contractors/water bore contractors and key third parties (i.e. pastoral properties or regulators).

Incident reporting and investigation provides the mechanism to prevent a recurrence. Personnel are required to proactively report all reportable and recordable incidents, near-misses and identification of potential hazards.

Sweetpea uses an incident management and reporting system. Any environmental incident, near miss or observation is reported through the incident reporting system. All personnel are encouraged to report minor events to act as an alert to environmental risks and to maintain a program of continual improvement.

At the conclusion of the activities Sweetpea will provide a summary of the environmental incidents that occurred over the course of the regulated activity to DEPWS.

8.5 Environmental Monitoring

The project manager, operating company representative and the civil construction/water bore contractor's operation manager shall ensure each element of the activities are monitored and that the appropriate environmental protection/procedures are in place. Monitoring requirements for each environmental factor as outlined in the aspect-specific EMPs above (Section 7.0).

The HSE manager shall also undertake random site inspections and direct such action as may be considered necessary to protect, minimise or rectify any environmental concerns.

Table 30 provides a summary of the environmental monitoring program to be followed for the civil construction and water bore drilling program.

Table 30 Summary of environmental monitoring program

Monitoring Requirements	Frequency	Personnel Responsible	EMP Section
General requirements			
Monitoring local weather, bushfire and climate information	Daily	Construction Operations Manager or delegate	Section 7.2.3 Section 7.4.3 Appendix I Appendix K
Monitoring of the 7-day forecast to determine the works program around the forecasts	Weekly	Construction Operations Manager or delegate	
Erosion and sediment control			
Visual inspection and monitoring of access tracks (including creek crossings), civil construction and exploration lease pads.	During siting of access tracks, civil construction and lease pad areas (baseline assessment). After completion of a key phase of activity. After the wet season to look for signs of erosion as part of the 6-monthly monitoring program during operations.	HSE Representative Operating Company Representative	Appendix C Appendix K Section 7.2.3
Routine visual inspections of the creek and drainage line crossings and the wastewater containment system at the camp	After more than 20 mm of rainfall in a 24-hour period. Any damage observed would be repaired as soon as practicable after the event.	Construction Operations Manager or delegate	
Inspection of all ESC devices across the worksite and physical water quality testing (physical parameters only) at the lease pad sediment basin should be conducted prior to discharge of water offsite.	Weekly or following a rainfall event (i.e. greater than 20 mm in 24 hours). If water quality conditions meet discharge indicators, beneficial reuse of water may be considered for construction activities External laboratory analysis only required for following triggers: • Work area has a known existing	HSE Representative	

Monitoring Requirements	Frequency	Personnel Responsible	EMP Section
	contaminating event in the preceding 3-months that could influence stormwater discharge quality (refer to Spill Prevention and Response Plan – Section 7.6). - The visual inspection and physical water quality testing indicated potential contamination. - Where there is a sensitive receiving water body within 200 m of the discharge point.		
Calibration of monitoring equipment to assess the performance and accuracy of the equipment used.	Daily on use and in accordance with manufacturers calibration requirements (Annually)	HSE Representative	Appendix C Appendix K Section 7.2.3 Section 7.6.3
Rehabilitation Monitoring (including provision of spatial data to DEPWS)	Before disturbance, after disturbance and at completion of construction to ensure site stabilised. At practical completion of activities in the area rehabilitation monitoring to commence within 6 months, 1 year and 2 years, up to 5 years.	Operating Company Representative	Appendix C Appendix F Appendix K Section 7.2.3 Section 9.0
Weeds			
Visual survey of weed and pest species on site and areas used/disturbed throughout Sweetpea activities.	Baseline, pre and post wet season, then 6-monthly for the first 12 months following completion of rehabilitation activities; then once annually over 5-year period.	Project Manager Operating Company Representative	Section 7.3.3 Appendix H
Bushfire			
The Fire Officer is to monitor ground conditions from the NAFI site and scan the surrounding area during civil construction.	Daily	Fire Officer	Section 7.4.3 Appendix I
Monitor Bushfire Alerts and Warnings issued by Secure NT and act according to the advice			

Monitoring Requirements	Frequency	Personnel Responsible	EMP Section
All incidents of fire should be recorded in an incident register.	As required.	Contractors Operations Manager or delegate	
Waste management			
Inspect waste storage containment systems.	Weekly, or after significant rainfall event (greater than 20 mm in 24-hour period).	HSE Representative	Section 7.5.3
Maintain waste register, including receipts to verify waste has been properly disposed of.	As occurs and record in the waste registers and waste disposal records	HSE Representative Project Manager	
Spill prevention and response			
Regular inspection of fuel and chemical storage areas, including containment and secondary containment areas and structures, containers and spill kits.	Daily	HSE Representative	Section 7.6.3 Appendix M
Routine emergency response drills	At least once during operations, or quarterly	HSE Representative	Section 7.6.3 Appendix M
Noise, vibration and lighting emissions			
Complaints reported to Sweetpea and followed up.	Immediately on receipt of complaint	Project Manager	Section 7.7.3
Air quality and emissions			
Visual monitoring will be carried out in the vicinity of the public roads (i.e. Carpentaria Highway) to ensure that visibility for motorists is not obscured. In this event, water carts will need to be applied to reduce dust.	Daily	HSE Representative	Section 7.8.3 Appendix L
Visual monitoring of the vegetation along the access track ensure not being impacted by dust.	Duration of works	Operating Company Representative	
Complaints reported to Sweetpea and followed up.	Immediately on receipt of complaint	Project Manager	
Vegetation, flora and fauna habitat			
Record of pre-disturbance condition (refer to Appendix C Land Condition Assessment)	Prior to commencement of regulated activity. Then 1 year following completion of rehabilitation activities	Operating Company Representative	Appendix C Appendix F Section 7.9.3 Section 9.3
Record of post-disturbance condition to validation of land clearing	At completion of regulated activity	Operating Company Representative	

Monitoring Requirements	Frequency	Personnel Responsible	EMP Section
(including provision of spatial data to DEPWS)			
Record any fauna encounters, injuries or death as result of regulated activity on fauna register	Duration of works	Spotter Catcher Contractors Operations Manager or delegate	
Rehabilitation success to be monitored in accordance with Rehabilitation Plan	Within 6 to 9 months post rehabilitation (February to June), then annual monitoring after the wet season (February to June) for a period of five years. The cover of native grasses, forbs, shrubs and trees will be recorded from monitoring plots in both rehabilitated and nearby representative undisturbed areas (control sites). Rehabilitation success will be determined by previously disturbed areas exhibiting a similar proportion of species and cover to control sites (refer Section 9.3 and Appendix F.	Operating Company Representative	
Photo-monitoring to record rehabilitation success			
Feral animals and other pest species			
Records of observed presence with identification of feral animal or pest (if possible) will be maintained within Sweetpea's GIS	Duration of works	HSE Representative Project Manager	Section 7.10.3
Social environment and access			
Record and respond to any public or pastoral leaseholder complaints and forwarded to the Project Manager	Immediately over duration of works	HSE Representative Project Manager	Section 7.11.3
Communication log with station manager and station personnel to monitor any potential (but unlikely) disturbance to cattle and jointly arrive at reasonable solutions to mitigate any observed effects	Daily for duration of works	Operating Company Representative	
Photo-monitoring before disturbance, at	Before disturbance, after disturbance, and then at	Operating Company Representative	

Monitoring Requirements	Frequency	Personnel Responsible	EMP Section
completion of construction and within 6 months to demonstrate site stabilisation	intervals such as 6 months, 1 year and 2 years.		
Record groundwater take using an approved flow meter.	Weekly	Operating Company Representative	Section 7.11.3
Cultural heritage and sacred sites			
Heritage register maintained	Duration of works	HSE Representative Project Manager	Section 7.12.3
Cultural Finds Procedure	Duration of works	HSE Representative Project Manager	Section 7.12.3 Appendix D
No entry to identified RWA's	Duration of works	HSE Representative Project Manager	Section 7.12.3 Appendix D
Water Quality Monitoring			
Water Quality testing of installed Water Bores by NATA accredited laboratory or by two separate laboratories for independent testing or evaluation where required	6 months prior to drilling, and preferably to include both wet season and dry season samples. In circumstances, which lie outside of the control of the operator, where six months monitoring data from the control bore is not achievable before drilling, it must at minimum provide six months of data prior to hydraulic fracturing activities	HSE Representative Project Manager	Section 3.2.4
Health Safety and Environment			
Non-compliance reporting	Non-conformances reported as soon as possible, but within 24 hours at a minimum	HSE Representative Project Manager	Appendix G
Site Inductions	All new staff and visitors to site Annual	HSE Representative Project Manager	
Job hazard analysis	New tasks	All personnel	

All regulated activity undertaken that results in a disturbance to environmental factors will be monitored with photographic records (including georeferenced photographs) and impact assessments.

GIS data will be provided outlining the nature, extent and location of disturbances on vegetation areas, with marked presence of weeds (if any) in order to provide a monitoring system. Significant locations for animal habitat (i.e. tree hollow) will be documented and georeferenced. These assessments will be used to determine that environmental outcomes and performance standards are being met.

The geospatial data used in the development of the EMP, including the baseline land condition assessment and cultural heritage assessment will be provided to DEPWS on submission of the EMP. This information provides the pre-disturbance condition of the activity area and will be the guide for rehabilitation at completion. In addition, spatial data files will also be provided to DEPWS in line with the environmental monitoring requirement (Table 30).

8.6 Environmental Auditing

In addition to regular monitoring as set out in this document, EMP audits will be regularly undertaken by a suitably qualified person. System deficiencies, adverse or potentially adverse environmental conditions arising from site activities may be subject to the issue of Environmental Non-conformances or Corrective Action Requests.

Sweetpea will also comply with any auditing regime set by relevant external Authorities. Table 31 presents the current Audit Schedule for the 2021 to 2024 activities.

Table 31 EP audit schedule

Frequency	Audit
Pre-start	- Pre-start checks are undertaken prior to the commencement of all activities. - Pre-start/Toolbox/Safety briefings (review of input and administration of).
Daily	- Permit to Work audits commensurate with the volume of permits issued. It is not anticipated that there will be a requirement for this on a daily basis. - Regular behavioural and health observations undertaken by Sweetpea and civil construction and water bore contractor personnel i.e. HSE, Sweetpea representative. - Site safety inspections: weekly and others as required or identified (joint walk around). - Major hazard work / tasks. - Safety critical equipment (i.e. fire extinguisher, communication Devices and vehicles). - Daily reports. - Safety and regulatory equipment, procedures and requirements. - Commissioning. - Site set up inspections – including impact of inclement weather considerations (e.g. cyclones and securing of facilities, flooding.).
Weekly	- Weekly audit of procedural compliance – the topic shall be selected by the Sweetpea Representative. - Site inspections: daily, weekly and others as required or identified of controls detailed in Section 7.0 management tasks and responsibilities including but not limited to dust, noise, Sacred Sites and cultural heritage sensitive areas, vehicle speed limits, complaints, fauna encounter. - Camp, secondary containment and chemical storage area inspections. - Food safety and hygiene inspections.
Monthly	Site inspections: daily, weekly and others as required or identified.
End of project	- End of project report summary and analysis. - End of activity aggregated analysis of performance as a means of continuous improvement.
Mobilisation	- Post mobilisation audit of contractors. - Pre-move surveys.
Trigger reviews	- Changes in safety codes, standards. - An event or incident on site or via a shared learning (Bulletin/Alert). - Performance / output. - Incidents.
Emergency drill	Monthly at times to be agreed at site.
Competencies	Ongoing performance of personnel on site – assuring their competencies.
HSEMP audit	Review of EMP performance and environmental approval compliance: Prior to commencement of activities.

Frequency	Audit
	At least one audit per annum, and preferably undertaken within one month of commencement of activities.

8.7 EMP Management of Change Process

A management of change process will be implemented should the EMP need to be revised (regulation 17) or there is a modification to the regulated activity (regulation 22) or where there is an identified change to the existing environment (regulation 23). The *Changes to Onshore Petroleum Environment Management Plans Guideline* (DEPWS, 2021) provides key questions to determining the applicable change process (Figure 20).

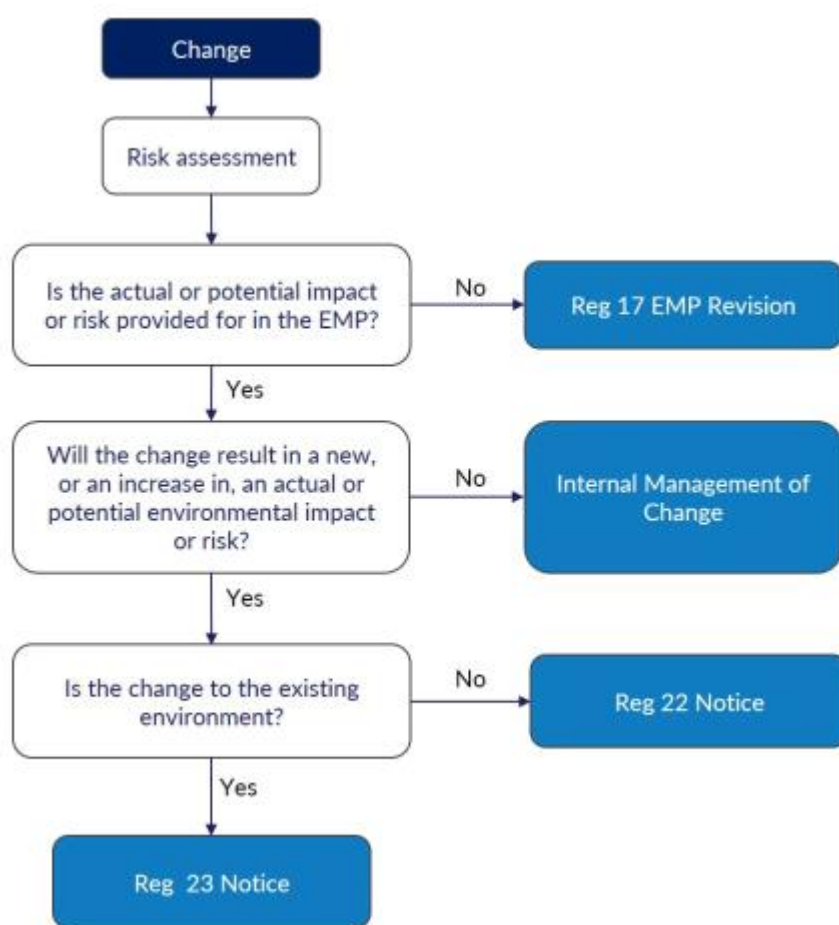


Figure 23 Key questions for determining the applicable change process (DEPWS, 2021)

Sweetpea management shall review the EMP and its activities as required to ensure that they meet operational requirements and relevant environmental legislation and standards. The EMP will be routinely reviewed during the delivery of each work program and any deviation from what is described will be managed internally where the change does not result in an increase in or new impact or risk and those impacts and risks are already provided for in an approved EMP.

Internal management reviews of the EMP may occur as a result of the following:

- identification of opportunities for improvement
- following recommendations from audits
- changes to operations or activities within the permit areas
- changes to legislation.

Implementation of the EMP will be continually monitored and the EMP reviewed with regards to monitoring and audit results, complaints, employee and stakeholder feedback and change to the program. A formal internal management review will be undertaken annually.

An EMP change register would be maintained to demonstrate that such changes were supported by a risk assessment in advance of the change and documented.

Changes to the EMP that require revisions under regulation 17, or notices under regulation 22 and 23 will be managed as follows:

- **Revision to the EMP** - A revision to an approved EMP will only be required if the change results in an increase in, or new, impacts and risks and that these are not already considered in the EMP. For example, this could be the inclusion of a new exploration lease pad in addition to those already approved under the EMP.

Revision of the EMP under regulation 17 would be required to be resubmitted under regulation 6 for approval.

- **Modification of the regulated activity** - If there is any deviation or change to the manner in which a regulated activity will be conducted or managed, for which environmental impacts and risks have already been described then a modification notice would be required. Example of a modification to a regulated activity include:
 - A deviation that may change the location and/or extent of land clearing in the same habitat type or landform when environmental impacts have already been considered for clearing of the same habitat type.
 - Modify how the regulated activity is to be conducted, while maintaining compliance with mandatory requirements and maintaining an ability to achieve the stated environmental outcome
 - Material modification when regulated activity is to be conducted or commenced so that stated in the EMP such as delay to rehabilitation commencement.

Sweetpea must give the Minister notice that specifies details of the proposed modification within 30-days of the modified activity occurring.

- **Change to the existing environment** – If there is a change in the existing environment that is described in a current EMP and the change will not require a revision of the plan, Sweetpea must give the Minister notice that specifies details of the change. Example of change to the existing environment is the identification of a new groundwater aquifer determined by Water Resources Division or where pastoral activities have included a new access track or fire break where previously was vegetated.

Sweetpea must give the Minister notice within 30-days of becoming aware of the change to the environment.

8.8 Notice of Commencement

Sweetpea will notify the Minister and the key Stakeholders (owners and occupiers of pastoral property within EP136, Traditional Owners, Gas Pipeline Operator and neighbouring EP holders) of the proposed date of commencement of civil construction and water bore activities through the submission of a letter. The timing of the submission will be in accordance with the Code of Practice.

A notice of commencement to the DITT will be issued to the petroleum operations team prior to commencement of civil construction activities being undertaken. This will be delivered through the department email under: petroleum.operations@nt.gov.au.

9.0 Rehabilitation Approach

The proposed rehabilitation approach is assisted natural regeneration in areas that have been cleared for civil construction and water bore activities. Once an area has been completed with, Sweetpea would commence rehabilitation within 12 months of practical completion and commence rehabilitation monitoring.

Appendix F presents the site-specific rehabilitation plan, including a high-resolution drone image of each of the proposed disturbance area, lease pad, gravel pit and accommodation camp, to establish a photo-reference of the site prior to disturbance. Drone imagery in future monitoring programs may be used to determine success of rehabilitation efforts.

9.1 Natural regeneration

Previous weed and erosion aerial assessments have found that natural regeneration rates in communities with a grassland understorey is high after the following wet season, whereas woodlands (mainly Lancewood and Bullwaddy) show low levels of natural regeneration over the same period (HLA, 2007). Anecdotal evidence from old seismic lines cleared in the Beetaloo Sub-basin suggests that additional management of clearing may be necessary in more wooded vegetation communities and/or assisted natural regeneration may be required.

Where clearing is required (e.g. within dense vegetation, development of access tracks and camp area), topsoil and cleared vegetation will be stockpiled to be respread following the works. The topsoil will contain a natural seedbank. Spreading of waste vegetative matter over disturbed areas provides micro-habitats and slows run-off during rainfall events, thus enhancing infiltration. This is proposed to be implemented progressively at the end of the civil construction and water bore drilling activities for each site.

9.2 Assisted natural regeneration

Assisted natural regeneration combines natural regeneration with soil preparation and weed control. If monitoring demonstrates that natural regeneration is unsuccessful, additional soil preparation (importing topsoil) combined with reseeding using local provenance seed shall be carried out. Monitoring programs should be flexible enough to take into consideration variables affecting rate of recovery, such as rainfall.

Areas with a hardened or compacted soil surface, such as heavily used roads and camp sites, must be either ripped or pitted (using a raised tyne) to break up the hardened surface, increase infiltration of water and provide a roughened surface where windblown seeds, rainwater and topsoil can accumulate. Pitting is best used on gentle slopes and ripping is best used on more sloping land, parallel to the contours. The depth of ripping depends on the degree of compaction and the soil type; heavily compacted sites or clay soils will need ripping to at least 50 cm depth. Ripping should be carried out on dry soil, rather than moist soil.

For areas where vegetation clearing is essential, collection of local seed will be required, if it is not available from local suppliers. If seed is to be purchased, it should originate from the local area to maintain local genetic diversity.

Seeding operations can be undertaken from the back of a vehicle, either by hand or using a seed disperser. The seed mixture should be representative of the diversity of species in the area and in similar proportions.

Broadcasting of seed should occur just prior to the beginning of seasonal rainfall to enhance germination success.

Wherever practicable, advice on and assistance from local landcare groups should be sought. For example, the Barkly Landcare Group has an ongoing grassland seed collection program and has experience in revegetating disturbed areas in the region.

For hydrocarbon impacted land (associated with civil construction), biological rehabilitation (landfarming, by thinly spreading the contaminated soil) can be undertaken. Areas of impacted soil should be excavated and removed to a designated area for landfarming. By spreading contaminated

soil as widely and thinly as possible soil-oil-moisture contact is maximised, thereby enhancing the natural decomposition of hydrocarbons.

Every few weeks, the soil is cultivated or turned, to provide aeration for increasing microbial activity. Once physical evidence of the contamination can no longer be observed, and soil testing shows that hydrocarbons are at minimum detectable limits, the impacted area can be validated as remediated. The site can then be ripped and seeded.

9.3 Rehabilitation Monitoring

Upon completion of the civil construction and water bore drilling program rehabilitation success will be monitored annually. This annual assessment should occur after the wet season for a period of five years (Table 32).

Table 32 Rehabilitation Monitoring Schedule

Rehabilitation Stage	Timing
Preliminary Assessment	6 to 9 Months post rehabilitation, end of wet season survey (February to June).
Early Rehabilitation	Years 1, 2 and 3 post rehabilitation, end of wet season survey (February to June).
Long-Term Rehabilitation	Annually until final success criteria has been met, end of wet season survey (February to June).

The cover of native grasses, forbs, shrubs and trees should be recorded from monitoring plots in both rehabilitated and nearby representative undisturbed areas (control sites). Rehabilitation success will be determined by previously disturbed areas exhibiting a similar proportion of species and cover to control sites.

If the rehabilitation monitoring indicates the need for additional inputs to the natural regeneration approach, supplementary direct seeding may be required. The trigger value for implementing supplementary direct seeding is outlined within the Appendix F, and summarised below:

- Canopy cover (%): a minimum 10-20% cover 12 – 18 months following rainfall.
- Ground Cover (%): a minimum 20% ground foliage cover and 30% diversity to be achieved within the first 12 months and maintained for 3 years.

9.4 Vegetation clearance considerations

The following provides additional considerations when clearing different vegetation communities to increase rehabilitation success.

Open woodlands and mixed grasslands

Open woodlands and mixed grassland are generally a more resilient soil and consist of fast-growing annual grasses making it a suitable candidate for “blade-up” clearing. Potential areas of bulldust may occur as result of the vehicle movements and should be gravelled as they appear, or the topsoil scraped back and stockpiled for respreading, to preserve the soil structure.

Lancewood and Bulwaddy

The fragile high clay soils and slow rates of regrowth suggest that these communities should be cleared by scraping back and stockpiling topsoil for later respreading. Lacking a detailed soil profile, it is recommended that the first 150 mm of topsoil should be removed and stockpiled. This should leave a gravel base more suitable to vehicle traffic and operational use of the area. At the conclusion of activities, or as part of progressive rehabilitation, topsoil should be respread at a thickness of 150 mm and ripped into the soil surface. This method is also recommended for high impact areas such as main access tracks, laydown yards, drill pads and camps.

If the removal of topsoil is not practicable cleared areas in Lancewood and Bulwaddy vegetation communities should be continually assessed for the areas of potential bulldust, and either a suitable layer of gravel is to be applied to keep the dust down, or topsoil should be scraped back.

Seasonally inundated areas

High clay content soils (vertisols) are found in seasonally inundated areas. Unlike the wooded areas these clays continue at depth, making the scraping back of topsoil less effective in keeping bulldust down and preserving soil structure. The recommendation in these locations is that topsoil should be scraped back to a smaller depth of 100 mm, to preserve the seed bank, and stockpiled for later resspreading. A gravel base should then be applied to these areas to keep bulldust down and raise the level of the site as needed. At the conclusion of activities, or as part of progressive rehabilitation, landforms should be levelled and/ or stabilised, and topsoil should be resspread at a thickness of 100 mm and contour ripped into the soil surface.

If this method is not practicable cleared areas in these locations should be covered with a gravel base to prevent bulldust formation. Following completion of activities, the site should then be re-contoured and ripped to below the original ground level to expose the remnant seed bank.

10.0 References

- AECOM Australia Pty Ltd. 2011a. *Drilling Environmental Management Plan 2011-2012*. Unpublished report for Falcon Oil and Gas Australia Limited.
- AECOM Australia Pty Ltd. 2011b. *Archaeological Assessment – Drill Sites and Access Roads*. Unpublished report for Falcon Oil and Gas Australia.
- AECOM Australia Pty Ltd. 2012a. Post fire Site Restoration Assessment, Beetaloo Basin, NT, Memorandum dated 23 October 2012 prepared for Hess Australia (Beetaloo) Pty Ltd, NT.
- AECOM Australia Pty Ltd. 2012b. *EP99 Archaeological Survey, Beetaloo Basin*. Unpublished report for Falcon Oil and Gas Australia.
- AECOM Australia Pty Ltd. 2012c. *Interim Report Archaeological Surveys 2011*. Unpublished report for Hess Australia (Beetaloo) Pty Limited.
- AECOM Australia Pty Ltd. 2013a. Onshore 2013 Civil Works Environmental Management Plan, Beetaloo, NT. Unpublished report for Hess Australia Pty Limited.
- AECOM Australia Pty Ltd. 2013b. Environmental Closeout Survey, Sweetpea Seismic Survey 2006, Prepared by AECOM for submission to DME, Darwin, NT.
- AECOM Australia Pty Ltd. 2015a. Environmental Management Plan: Newcastle Waters #1 & Newcastle Water #2 EP143 Beetaloo Sub basin, NT. Unpublished report for Paltar Petroleum limited.
- AECOM Australia Pty Ltd. 2015b. Environmental Management Plan: Beetaloo #1 & Tanumbirini #2 EP136 - Beetaloo Sub-Basin, NT. Unpublished report for Paltar Petroleum limited.
- AECOM Australia Pty Ltd. 2015c. *Paltar Petroleum Limited: Aboriginal & Historic Heritage Assessment*. Unpublished report to Paltar Petroleum Limited.
- AECOM Australia Pty Ltd. 2016. Exploration Environmental Management Plan, Beetaloo Basin Northern territory. Unpublished report for Origin Energy Resources Limited.
- ANZECC. 2000. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, Published by ANZECC/ARMCANZ, Canberra, ACT.
- Aldrick JM and Wilson PL. 1990. *Land systems of the Southern Gulf Region, Northern Territory*, Technical Report No. 42, Conservation Commission of the Northern Territory, Palmerston, NT.
- Australian Natural Resources Atlas (ANRA), 2008. *Rangelands 2008 Taking the Pulse- Sturt Plateau Bioregion*. Commonwealth Government of Australia.
- Atlas of Living Australia (ALA). 2019. Spatial Portal. <https://spatial.ala.org.au/>. Accessed 30 July 2019.
- Aumann, T. and Baker-Gabb D. 1991. RAOU Report 75. *A Management Plan for the Red Goshawk*. RAOU. Royal Australasian Ornithologists Union, Melbourne.
- Australian Bureau of Statistics (ABS). 2019. *2016 Census QuickStats: Barkly*. Available from: https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/LGA70420.
- Australian Natural Resources Atlas (ANRA), 2008. *Rangelands 2008 Taking the Pulse- Sturt Plateau Bioregion*.
- Australian Petroleum Production and Exploration Association Limited (APPEA). 2008. *Code of Environmental Practice*, Canberra, ACT.
- Barkly Regional Council. 2019. *The Region: Demographics*. Available from: <https://www.barkly.nt.gov.au/region/demographics>.
- Bubb, A. 2004. *Pastoral Industry Survey 2004*. Department of Primary Industry, Fisheries and Mines, Northern Territory Government, Tennant Creek.
- Christian CS, Noakes LC, Perry RA, Slatyer RO, Stewart GA and Traves DM. 1951. *Survey of the Barkly Region, Northern Territory and Queensland, 1947-48*, Land Research Series No. 3, CSIRO, Melbourne, SA.

- Churchill, S. 2008. *Australian Bats*. Second edition. Jacana Books, Crow's Nest.
- CloudGMS, 2015. *Beetaloo Basin Hydrogeological Assessment*. Prepared by S. Fulton and A. Knapton, February 2015.
- Cole, J. and Woinarski, J. 2002. *Field Guide to the Rodents and Dasyurids of the Northern Territory*. Surrey Beatty and Sons, Chipping Norton, NSW.
- Cofinas M and Creighton C, 2001. *Australian Native Vegetation Assessment 2001*. Land and Water Australia, Canberra, ACT.
- Curtis, Lee K., A. J. Dennis, K. R. McDonald, P. M. Kyne, and Debus S.J.S., Eds. 2012. *Queensland's Threatened Animals*. CSIRO Publishing, Collingswood.
- Debus, S. 2012. *Birds of prey of Australia*, 2nd edition. CSIRO Publishing, Collingwood.
- Department of the Environment and Energy (DEE). 2014a. *Dasyurus hallucatus in Species Profile and Threats Database*, Commonwealth Government, Canberra. Available from: <http://www.environment.gov.au/sprat>. Accessed 25 July 2019.
- Department of the Environment and Energy (DEE). 2014b. *Tyto novaehollandiae kimberli in Species Profile and Threats Database*, Commonwealth Government, Canberra. Available from: <http://www.environment.gov.au/sprat>. Accessed 25 July 2019.
- Department of the Environment and Energy. 2015. *Erythrura gouldiae in Species Profile and Threats Database*, Commonwealth Government, Canberra. Available from: https://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=413
- Department of the Environment and Energy. 2017. *National Greenhouse Accounts Factors*. DEE, 2017. <https://www.environment.gov.au/system/files/resources/5a169bfb-f417-4b00-9b70-6ba328ea8671/files/national-greenhouse-accounts-factors-july-2017.pdf>
- Department of Environment, Parks and Water Security, 2021 *Changes to Onshore Petroleum Environment Management Plans Guideline*. Approved for industry consultation on 3 February 2021.
- Department of Environment and Natural Resources (DENR) (NT). 2017. *Review Report: Weed Management Plans for Gamba Grass, Mimosa and Bellyache Bush*. Northern Territory Government. Available from: https://nt.gov.au/_data/assets/pdf_file/0008/451394/WMP-Bellyache-Mimosa-Gamba-FA.pdf.
- Department of Environment and Natural Resources (DENR) (NT). 2018. *Northern Territory Weed Management Handbook*. Northern Territory Government, Weed Management Branch, Palmerston, NT.
- Department of Environment and Natural Resources (DENR). 2019. *Land Clearing Guidelines*, Northern Territory Government (dated February 2019), Palmerston, NT.
- Department of Environment and Natural Resources (DENR) (NT). 2019. *Parthenium weed eradication continues in the Katherine Region*. Northern Territory Government. Available from: <https://denr.nt.gov.au/news/2019/parthenium-weed-eradication-continues-in-the-katherine-region>
- Department of Environment and Natural Resources (DENR) (NT). 2020. *Environment Management Plan*. Available from: <https://denr.nt.gov.au/onshore-gas/environment-management-plan>
- Department of Industry, Science, Energy and Resources, 2018, *State Greenhouse Gas Inventory – Northern Territory*, accessed 23 December 2020 from: [State Greenhouse Gas Inventory \(climatechange.gov.au\)](https://climatechange.gov.au)
- Dickman C.R. 2009. House cats as predators in the Australian environment: impacts and management. *Human-Wildlife Conflicts*. Volume 3, pp 41-48.
- Dickman, C. R. 1996. Impact of exotic generalist predators on the native fauna of Australia. *Wildlife Biology*. Volume 2(3), pp 185-195.
- Department of Health (DoH) (NT). 2014. *Code of Practice for Small on-Site Sewage and Sullage Treatment Systems and The Disposal or Reuse of Sewage Effluent*. Darwin, NT.

Dostine, P.L., and Franklin, D.C. 2002. A comparison of the diet of three finch species in the Yinberrie Hills area, Northern Territory. *Emu*. Volume 102, pp 159-164.

Duncan, A., G.B. Baker and N. Montgomery. 1999. *The Action Plan for Australian Bats*. Canberra: Environment Australia. Available from: <http://www.environment.gov.au/biodiversity/threatened/publications/action/bats/index.html> Falcon Oil and Gas, 2020, Beetaloo Sub-Basin, Australia, website <https://falconoilandgas.com/beetaloo-australia/>, accessed 02 January 2020.

Fisher, A. and Woinarski, J. 1994. *Golden Bandicoot*. *Australian Natural History*. Volume 26, pp 20-21.

Fleming MR, Johnson KA, Latz PK and McKean JR. 1983. *A Biological Survey of Junction Stock Reserve and Newcastle Waters Pastoral Lease on The Barkly Tablelands*, Wildlife Research Section, Conservation Commission of the NT.

Friend, G.R. and Braithwaite, R. W. 1986. Bat fauna of Kakadu National Park, Northern Territory. *Australian Mammalogy*. Volume 9, pp. 43-52.

Garnett, S., J. Szabo & G. Dutson. 2011. *The Action Plan for Australian Birds 2010*. CSIRO Publishing.

Heritage Surveys. 1999. *Additional archaeological assessments, Daly Waters to McArthur River Gas Pipeline, Northern Territory*. Unpublished report to Northern Territory Power and Water Authority.

Hermes, M. 1986. *Amadeus Basin to Darwin Natural Gas Pipeline - Spread 2: Internal report on archaeological findings*. Unpublished report to the NT Museums and Art Galleries.

Higgins, P.J. and Davies, S.J.J.F. 1996. *Handbook of Australian, New Zealand and Antarctic Birds, Volume 3, Snipe to Pigeons*. Oxford University Press, Melbourne.

HLA-Envirosciences Pty Ltd, 2005. *Environmental Management Plan: Onshore Petroleum Exploration Beetaloo Basin, NT*. Report prepared for Sweetpea Petroleum Pty Ltd.

HLA-Envirosciences Pty Ltd (HLA). 2006a. *An Analysis of Available Water Quality Data and Gap Analysis for Beetaloo Basin, Northern Territory*. Report prepared for Sweetpea Petroleum Pty Ltd.

HLA-Envirosciences Pty Ltd (HLA). 2006b. *Beetaloo Basin: Cooee Hill and 80 Metre Tower Archaeological Assessment*. Unpublished report for Sweetpea Petroleum Pty Ltd.

HLA-Envirosciences Pty Ltd (HLA). 2006c. *Beetaloo Basin: Newcastle Creek Archaeological Assessment*. Unpublished report for Sweetpea Petroleum Pty Ltd.

HLA-Envirosciences Pty Ltd (HLA). 2006d. *Beetaloo Basin: Yaroo, South Martyr's Tree and Dunmarra Archaeological Assessment*. Unpublished report for Sweetpea Petroleum Pty Ltd.

HLA-Envirosciences Pty Limited (HLA). 2007a. *Supplemental Environmental Management Plan, Drilling Program 2007, Beetaloo Basin, NT*. Unpublished report for Sweetpea Petroleum Pty Ltd.

HLA-Envirosciences Pty Ltd (HLA). 2007b. *Beetaloo Basin: Newcastle Creek (Seismic Line 13A) Archaeological Assessment*. Unpublished report for Sweetpea Petroleum Pty Ltd.

HLA-Envirosciences Pty Ltd (HLA). 2007c. *2007 Environmental Works Progress Report 1 (March to May 2007)*. Letter to Sweetpea Petroleum dated 28 May 2007.

HLA-Envirosciences Pty Ltd (HLA). 2007d. *Beetaloo Basin: Newcastle Creek (Seismic Line 13A) Archaeological Assessment*. Unpublished report for Sweetpea Petroleum Pty Ltd.

Holt, R.M. and Bertram, J.D. 1981. *The Barkly Tableland Beef Industry 1980*. NT Department of. Primary Production. Technical Bulletin No. 41.

Hose GC, J Sreekanth, Barron O, Pollino C (2015) *Stygofauna in Australian Groundwater Systems: Extent of knowledge*. CSIRO, Australia.

Huddleston-Holmes CR, Frery E, Wilkes P, Bailey AHE, Bernadel G, Brandon C, Buchanan S, Cook SB, Crosbie RS, Evans T, Golding L, Gonzalez Dda, Gunning ME, Hall LS, Henderson B, Herr A, Holland K, Jarrett A, Kear J, Kirby J, Lech M, Lewis S, Macfarlane C, Martinez J, Northover S, Murray J, O'Grady A, Orr ML, Owens R, Pavey C, Post D, Sundaram B, Rachakonda P, Raiber M, Ransley T,

- Tetreault-Campbell S and Wang L. 2020. *Geological and environmental baseline assessment for the Beetaloo GBA region. Geological and Bioregional Assessment Program: Stage 2*. Department of the Environment and Energy, Bureau of Meteorology, CSIRO and Geoscience Australia, Australia
- International Erosion Control Association (IECA). 2008. *Best Practice Erosion and Sediment Control – for building and construction sites*. Picton, NSW: International Erosion Control Association (Australasia).
- Kerle, J.A., Foulkes, J.N., Kimber, R.G., and Papenfus, D. 1992. The decline of the brushtail possum, *Trichosurus vulpecula* (Kerr 1798), in arid Australia. *Rangelands Journal*. Volume 14, pp. 107-127.
- Legge, S., Murphy, S. and Heathcote, J. 2008. The Short-term Effects of an Extensive and High-intensity Fire on Vertebrates in the Tropical Savannas of the Central Kimberley, Northern Australia. *Wildlife Research*, Volume. 35, pp. 33-43.
- Lloyd P., M. Sanders, T. Reis and A. Abbott. 2013. Targeted trapping surveys shed new light on the distribution and habitat characteristics of the Carpentarian pseudantechinus (*Pseudantechinus mimulus*), a threatened dasyurid marsupial. *Australian Mammalogy*. Volume 35, pp. 220-223.
- Mayes, P. J. 2006. *The ecology and behaviour of Varanus mertensi (Reptilia: Varanidae)*. PhD Thesis. Edith Cowan University. Retrieved from <http://ro.ecu.edu.au/theses/42>.
- McKean, J.L., G. Friend & A.L. Hertog. 1981. Occurrence of the Sheath-tailed Bat *Taphozous saccolaimus* in the Northern Territory. *Northern Territory Naturalist*. Volume 4, p. 20.
- Menkhorst, P. and Knight F. 2011. *A Field Guide to the Mammals of Australia*. Oxford University Press, Sydney.
- Northern Territory Government. 2013. *Ipomoea argillicola*. Northern Territory Flora Online. Available at: <http://eflora.nt.gov.au/factsheet?genus=Ipomoea&species=argillicola>.
- Northern Territory Government. 2017. *Northern Territory Weed ID Deck*. Weed Management Branch. Available from: https://denr.nt.gov.au/data/assets/pdf_file/0012/257988/Weed-Deck_2018_LR.pdf
- Orr, DM. and Holmes, WE. 1984. Mitchell Grasslands. In G.N. Harrington, A.D. Wilson and M.D. Young (eds) *Management of Australia's Rangelands*, Australia, CSIRO, pp. 241-254.
- Palmer, C., Woinarski J., and Ward S. 2012. *Threatened Species of the Northern Territory: Gouldian Finch Erythrura gouldiae*. Department of Land Resource Management, Northern Territory Government.
- Parks and Wildlife Commission of the NT. 2005. *Bullwaddy Conservation Reserve Plan of Management*, Parks and Wildlife Commission of the NT, Darwin.
- Pavey, C. 2006b. *National Recovery Plan for the Greater Bilby Macrotis lagotis*. Northern Territory Department of Natural Resources, Environment and the Arts. Alice Springs, NT.
- Pavey, C. 2006a. *Threatened Species of the Northern Territory: Princess Parrot Polytelis alexandrae*. Northern Territory Department of Natural Resources, Environment and the Arts. Alice Springs, NT.
- Pizzey, G. and Knight, F. 2012. *The Field Guide to Australian Birds*. HarperCollins Publishers, Sydney.
- Quaternary Archaeological Surveys. 1998. *Archaeological survey of the Stuart Highway to Mataranka Homestead Optic Fibre Cable Corridor, Northern Territory*. Unpublished report for Telstra.
- Randal MA. 1967. *Groundwater in the Barkly Tableland*, NT, Bulletin 91, Bureau of Mineral Resources, Geology and Geophysics, Canberra, ACT.
- Schlanger, N. 1992. Recognising Persistent Places in Anasazi Settlement Systems. In J. Rossignol & L. Wandsnider (Eds.), *Space, Time and Archaeological Landscapes*. pp. 91–112. Plenum Press, New York.
- Smith, J.G., and Phillips, B.L. 2006. Toxic tucker: the potential impact of cane toads on Australian reptiles. *Pacific Conservation Biology*. Volume 12, pp. 40-49.
- Smith, M. A. 1986. An Investigation of Possible Pleistocene Occupation at Lake Woods, Northern Territory. *Australian Archaeology*. Volume 22, pp. 60–74.

- Southgate, R. I. & Paltridge, R. 1998. *Recovery of the Greater Bilby Macrotis lagotis*. Final Report for Project Number 185, Nature Australia, Biodiversity Group, Endangered Species Program and Feral Pests Program.
- Thomson, B. 1991. *A Field Guide to Bats of the Northern Territory*. Conservation Commission of the Northern Territory, Darwin.
- Tickell SJ. 2003. *Water Resource Mapping Barkly Tablelands*, Unpublished draft report prepared by the Department of Infrastructure Planning and Environment, Darwin, NT.
- Ugwoha, E. and Omenogor, B.E. 2017. Effect of Oil Spillage on Groundwater quality. *Journal of Environmental Studies*. Volume 3, Issue 1.
- U.S. EPA (United States Environmental Protection Agency). 2016. *Hydraulic Fracturing for Oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States*. Executive Summary. Office of Research and Development, Washington, DC. EPA/600/R-16/236ES.
- Velseis. 2019. *The Seismic Method*. Unpublished document prepared by Velseis Pty Ltd for Sweetpea Petroleum, Queensland, Australia.
- Ward, S. and Milne, D. 2016. *Threatened Species of the Northern Territory: Ghost Bat Megaderma gigas*. Department of Land Resource Management, Northern Territory Government.
- Ward, S. 2012. *Threatened Species of the Northern Territory: Grey Falcon Falco hypoleucos*. Department of Land Resource Management, Northern Territory Government.
- Ward, S. and Phillips, B. 2012. *Threatened Species of the Northern Territory: Plains Death Adder Acanthopsis hawkei*. Department of Land Resource Management, Northern Territory Government.
- Ward, S., Woinarski, J., Griffiths, T. and McKay, L. 2012. *Threatened Species of the Northern Territory: Yellow-spotted Monitor, Northern Sand Goanna, Floodplain Monitor Varanus panoptes*. Department of Land Resource Management, Northern Territory Government.
- Ward, S.J. 2008. *Habitat-use, foraging and breeding ecology of the northern shrike-tit Falcunculus frontatus whitei*. Department of Natural Resources, Environment, the Arts and Sport, Darwin.
- Ward, S.J., Berghout, M. and Baker, B. 2009. Notes on the form and habitat of nests of the northern shrike-tit. *Northern Territory Naturalist*. Volume 21, pp. 54-60.
- Weed Management Branch, Northern Territory Government. 2015. *Northern Territory Weed Data Collection Manual* - Northern Territory Government of Australia, Darwin.
- Woinarski, J.C.Z. 2004. *National Multi-species Recovery Plan for the Partridge Pigeon Geophaps smithii smithii, Crested Shrike-tit, Falcunculus frontatus whitei, Masked Owl Tyto novaehollandiae kimberli and Masked Owl Tiwi Islands Tyto novaehollandiae melvillensis 2004-2009*. Northern Territory Department of Infrastructure Planning and Environment. Available at: <http://www.environment.gov.au/biodiversity/threatened/publications/recovery/smithii-whitei-kimberli-melvillensis/index.html>.
- Woinarski, J. 2006. *Threatened Species of the Northern Territory: Partridge Pigeon (Eastern) Geophaps smithii smithii*. Department of Land Resource Management, Northern Territory Government, Darwin, NT.
- Woinarski J.C.Z., Pavey C., Kerrigan R., Cowie I. and Ward S. 2007. *Lost from our Landscape: Threatened Species of the Northern Territory*. Palmerston: Department of Natural Resources, Environment and the Arts.
- Woinarski, J.C.Z and Ward, S. 2012b. *Threatened Species of the Northern Territory: Carpentarian Antechinus Pseudantechinus mimulus*. Department of Land Resource Management, Northern Territory Government, Darwin, NT.
- Woinarski, J.C.Z and Ward, S. 2012a. *Threatened Species of the Northern Territory: Crested Shrike-tit Falcunculus (frontatus) whitei*. Department of Land Resource Management, Northern Territory Government, Darwin, NT.