



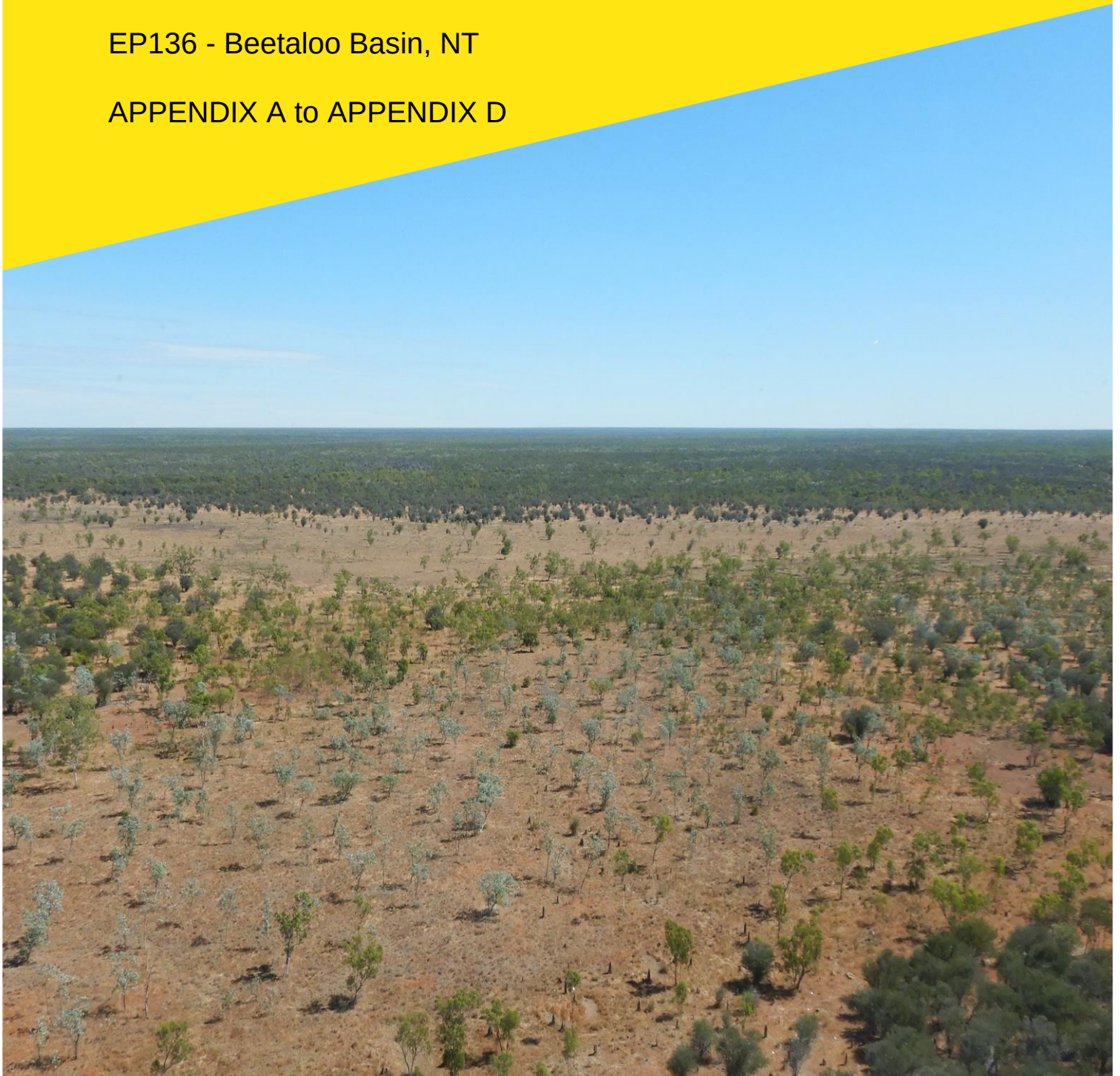
Petroleum Exploration Program
Sweetpea Petroleum Pty Ltd
16-Dec-2021

Unique Reference No. SWP2-3

Civil Construction and Water Bore Environment Management Plan

EP136 - Beetaloo Basin, NT

APPENDIX A to APPENDIX D



Civil Construction and Water Bore Environment Management Plan

EP136 - Beetaloo Basin, NT

APPENDIX A to APPENDIX D

Client: Sweetpea Petroleum Pty Ltd

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Cover Photo: View of EP136 vegetation community structure

Quality Information

Document Civil Construction and Water Bore Environment Management Plan – APPENDIX A to APPENDIX D

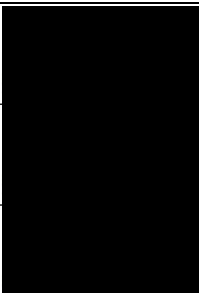
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Revision History

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 Assessment	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

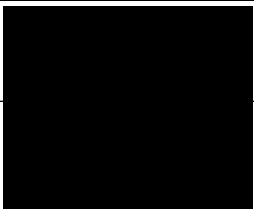
Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
3	16-Dec-2020	SWP2-3 Approved for Release	Gibson Porkime Northern Territory Operations Manager	
			David Close Vice President, Operations & External Affairs	

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Appendix A

Sweetpea's Legal Requirements

Appendix A Sweetpea's Legal Requirements

Table 33 summarises the legislative requirements associated with the civil construction, water bore associated activities. The following table references A.3 Surface activities mandatory requirements 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. Sweetpea intend to conduct all their activities in accordance with best environmental management practices as required under the current codes and guidelines.

Table 33 Summary of Legislative Requirement for Civil Construction and Associated Activities

Legislation and Administering Authority	Requirements	Applicability	How Met
Land Tenure and Access			
<i>Petroleum Act 1984</i> Department of Industry, Tourism and Trade (DITT)	s. 22 Term of exploration permit – Subject to s. 28(3), 30(3), 73 and 74, an exploration permit remains in force for 5 years commencing on the day on which it was granted or renewed. s. 18 Revision required at end of each 5-year period	A petroleum exploration permit is required to explore for oil and gas in the Northern Territory.	Sweetpea is the registered holder of a 100% interest in Petroleum Exploration Permit EP136. On 20 th August 2012, granted the exploration permit for period of 5 years and on 22 nd July 2020 the Minister for Primary Industry and Resources approved the minimum work program conditions for EP136 and EP143.
	s. 57A Access for the purposes of petroleum exploration may be provided by way of an access authority where another approval has been provided under earlier Commonwealth or NT legislation.	To undertake civil construction activities beyond borders of EP136 requires specific access authorities from DITT.	Access Authority application is currently with DITT access for track entry and camp outside the permit area.
	s. 67 Drilling and seismic surveys – notice	Access authority shall not commence operations for...a water bore drilling program unless notice in accordance with this section is given to the Minister and Minister approves.	The operator Sweetpea will issue a notice to the Minister at least 28 days before commencing operations in accordance with requirements of the Section (Section 8.8).

Legislation and Administering Authority	Requirements	Applicability	How Met
	Pastoral Land Access s. 65 Access s. 81 Compensation to owners s. 82 Compensation for right of access <i>Stakeholder Engagement Guidelines Land Access 2016</i>	Pastoral Land Access and Compensation Agreements (LACA) with the relevant pastoral stations are required before access to exploration sites for activities approved by DITT such as seismic surveys and drilling.	Sweetpea have considered the possible consequences of carrying out the planned exploration on the pastoral operations during the civil construction and water bore drilling program and have indicated a range of measures that will be implemented to minimise impacts. Sections 5.0 and 7.0.
		Reconnaissance activities, such as aerial and surface surveys, inspections and other activities that do not disturb the land of vegetation requires written notice to the landholder/manager with at least 14 days before any works can start.	Sweetpea has conducted baseline surveys in November 2019 and May 2020, as well as topographical survey in December 2020. 14 days' notice was provided to the landholder/manager prior to commencement of activities (refer Section 5.0 and Appendix J - Communication Register)
	s.15 Environmental consideration relating to certain parks and reserves as described by the <i>Territory Parks and Wildlife Conservation Act 1976</i>	Not applicable	EP136 is not in close proximity to any parks and reserves in the care of Parks, Wildlife and Heritage Division. Refer Section 4.3.2.
<i>Native Title Act 1993</i> Native title arises as a result of the recognition, under Australian common law, of pre-existing Indigenous rights and interests according to traditional laws and customs. Attorney-General's Department, Commonwealth Government	s. 25 Ensuring that the Right to Negotiate with native claimants and any Expedited procedure for consultation (s. 37 and s. 237) are complied with. s. 57F Notification to native title holders etc.	Two Native Title determinations (NTD27/2010 and NTD33/2012) have been finalised within the civil and water bore construction area. Native title interactions with petroleum projects, including exploration, is administered in NT through the approval processes (i.e. potential future acts) under the <i>Petroleum Act 1984</i> and the <i>Aboriginal Land Act 1978</i> . The primary responsibilities under the <i>Native Title Act 1993</i> is the deciding Minister for relevant NT application process.	Exploration Agreement between Sweetpea (on behalf of Sweetpea), Native Title Parties and the Northern Land Council (NLC) for Petroleum Exploration Permits 136 and 143 dated 18/07/2012; and with reference to Sweetpea's Title to EP136 granted on 28/08/2013 and current title instrument dated 30/08/2019 describing the minimum work program commitments. Work Program meetings were held in August 2020 and are again scheduled for early 2021.

Legislation and Administering Authority	Requirements	Applicability	How Met
Environment Management Plan			
Petroleum (Environment) Regulations 2016 Requires that petroleum activities are: - carried out in an ecologically sustainable manner; and - the environmental impacts and environmental risks of the regulated activities are identified and reduced to an ALARP and acceptable. Department of Environment, Parks and Water Security (DEPWS) and DITT	Reg 9 s. 1(a), s. 1(b) and s. 1(c) Approval criteria for plan	Sweetpea has a current plan for the regulated activity which includes all information by Schedule 1 and is appropriate to the nature and scale of the regulated activity.	Sweetpea submit this Plan for the proposed Regulated Activity as it relates to surface activities including civil and water bore construction and other associated activities. Refer to Section 1.3, Section 0 and Section 7.0.
	Reg 6 Submission of plan for approval Reg 18 Revision required at end of each 5-year period	Sweetpea has an interest in EP136, with regulated activity associated with this EMP planned to commence in April 2021.	The EMP is submitted for approval under Reg 6.
	Reg 4a The code of practice is the <i>Code of Practice: Onshore Petroleum Activities in the Northern Territory ...</i> Schedule 1 s. 10(2) legislative requirements include the requirement to comply with the code of practice	Sweetpea have a work program for exploration in EP136, which includes: - installation of access tracks and gravel pits - construction of well pads and tank pads - construction of accommodation camp - drilling of water bores - ancillary activities to conduct the above.	The EMP has been developed in accordance with the Code of Practice, including all mandatory requirements, applicable to the regulated activities. Sweetpea consider they have provided sufficient detail throughout the EMP to determine the nature and scale of activities and believe they are ALARP and acceptable (refer Section 6.0 and Appendix E).
	Reg 5A decisions subject to the principles of ecologically sustainable development	These are regulated activities.	The EMP considers the principles of ecological sustainable development.
	Schedule 1 s. 3(2b) must be of the cumulative effects of those impacts and risks when considered with each other and in conjunction with any other activities or events that occurred or may occur in or near the permit area for the regulated activity.	Need to consider the cumulative effects of those impacts and risks when considered with each other and in conjunction with any other activities or events that occurred or may occur in or near the permit area for the regulated activity.	Section 6.2 of the EMP has considered the Cumulative impacts of Sweetpea's current and future work programs on Water Use, Greenhouse Gases, Flora and Fauna, Traffic and Social and Community.

Legislation and Administering Authority	Requirements	Applicability	How Met
<i>Environmental Protection Act 2019</i> and Environmental Protection Regulations 2020 DEPWS/NT EPA	s. 28 Declaration of environmental objectives s. 29 Purpose and effect of referral triggers	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. Submission of EMP is considered NOI under the Petroleum (Environment) Regulations 2016.	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. The assessment was 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 <i>Environment Protection Act 2019</i> . Refer Section 4.0 and Appendix C.
<i>Environmental Protection and Biodiversity Conservation Act 1999</i> Department of Agriculture, Water and the Environment	The protection of matters of national environmental significance (MNES). Includes the potential need for approval for any activity that is likely to have significant impact on any matters of identified World Heritage (s.12), National Heritage (s.15B), wetlands of international importance (s.16), threatened species (s.18) and listed migratory species (s.20).	Protected Matters Search and Significance test to be undertaken to determine if activities have the potential to impact on MNES. Sweetpea identified that if MNES are triggered that they would require further assessment and consideration.	It is considered that the proposed activities will not adversely impact MNES; therefore, the project has not been referred for assessment nor approval under the EPBC Act. Refer Section 4.0 and Appendix C.

Legislation and Administering Authority	Requirements	Applicability	How Met
Site selection and planning			
Code of Practice: Onshore Petroleum Activities in the Northern Territory DEPWS and DITT	COP A.2 Scope and application – Part A applies to all activities that cause disturbances to the surface of the land, including activities such as the preparation of well pads, seismic surveys, access tracks and other infrastructure.	Sweetpea are intending to conduct a civil and water bore construction program within EP136 and associated activities including access tracks, establishment of well and tank pads and temporary camps to conduct the program	Sweetpea have conducted baseline studies (Appendix C) to make informed decisions on the planning, design and location of the proposed civil construction and water bore program footprint.
Noise			
Waste Management and Pollution Control Act 1998 (WMPC Act) NT EPA	s. 96 offence against WMPCA s. 12 general environmental duty s. 38 environmental harm and environmental nuisance	During conduct of the regulated activity, Sweetpea has an obligation to prevent noise pollution and not cause “environmental nuisance” by creating adverse effect on the amenity of an area.	Refer to Sweetpea’s Noise, Lighting and Vibration Management Plan (Section 7.7 of the EMP)
Code of Practice: Onshore Petroleum Activities in the Northern Territory DEPWS and DITT	A.3.3. Noise assessment, planning and management associated with petroleum activities shall comply with the Northern Territory Noise Management Framework Guidelines.		
Erosion and sediment control and hydrology			
Code of Practice: Onshore Petroleum Activities in the Northern Territory DEPWS and DIPL	A.3.4 An Erosion and Sediment Control Plan (ESCP) (being the Primary ESCP) must be developed....by a suitably qualified person.....	Erosion and Sediment Control Plans are required for clearing areas. Sweetpea’s civil and water bore construction activities will include clearing of access tracks, gravel pits and lease pad areas for the installation of infrastructure associated with the civil and water bore construction program. Upon completion of the program disturbance areas will be rehabilitated prior to onset of	Sweetpea have a ESCP (Appendix K) that provides the controls to minimise risk of erosion. The ESCP is currently under review of suitably qualified person. CPESC signoff is currently in progress.

Legislation and Administering Authority	Requirements	Applicability	How Met
		the wet season. Wet weather contingency plan is required.	
	A.3.4 I Land Clearing Guidelines as published by DEPWS must be complied with in relation to protection of natural waterways as a result of land disturbance....	Land clearing is subject to the provisions under the under the Petroleum (Environment) Regulations 2016. Sweetpea require vegetation clearing for lease pads, access tracks and gravel pits.	Refer to Sweetpea's Land Management Plan (Section 7.2) and Vegetation, Flora, Fauna and Habitat Management Plan (Section 7.9). At completion all disturbed areas will be reinstate following the Rehabilitation Plan (Section 9.0 and Appendix F).
<i>Water Act 1992</i> (NT), Water Legislation Amendment Act 2018 DEPWS – Water Resources Division	s.16 Prohibition of pollution s. 7(2) Section 16 does not apply to waste that comes into contact with water, or water that is polluted, if... the...pollution occurs in the course of carrying out...or petroleum activity; and...is confined within the ...petroleum site on which the activity is being carried out.	During conduct of the regulated activity, Sweetpea has an obligation to report pollution in the event a contaminant or waste leaves the regulated site and/or causes, or has the potential to cause, material or serious environmental harm. The beneficial use of petroleum activity includes another activity for a purpose ancillary to one of those activities. Therefore, the taking of water from a bore for employee use requires a water extraction licence for the beneficial use of petroleum.	Refer to Sweetpea's Waste Management Plan (Section 7.5) and Spill Prevention and Response Plan (Section 7.6) Monitoring (Section 8.5) and Reporting (Section 8.3). No extraction of water will occur without either a Water Extraction Licence or Exemption. The intended groundwater bores to be used are detailed in Section 3.3.4.
	s. 4 interpretation – “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.... “interfere with a waterway” and “waterway”.	If the civil construction activities result in any changes to bed and banks, permanently or intermittently interfere with a waterway, may require <i>permit to interfere</i> under the <i>Water Act 1992</i>. The definition to interfere with a waterway means:	Detailed creek crossing survey undertaken in May 2020 (Appendix C). One existing creek crossing on Eastern Access Track for Transit only. All other crossing proposed along the access track to gravel pits and lease pads will be formed bed level crossings and where required a stable rock base will be installed. The

Legislation and Administering Authority	Requirements	Applicability	How Met
	s. 40 interfering with waterway without authorisation s.41 grant of permit to interfere with waterway s.45 Licence to take water. s. 45A No licence to take water for petroleum activity.	• <i>cause a material change to the shape of a waterway</i> • <i>cause a material change to the volume, speed or direction of flow or likely flow of water in or into a waterway</i> • <i>cause an alteration to the stability of the bed or banks of a waterway, including by the removal of vegetation.</i> The controller must not grant licence under s. 45 if the proposed beneficial use of water under the licence is petroleum activity.	intention is to reinstate the original topography of the bed following completion of works. Refer Appendix K. Sweetpea has committed to minimising disturbance of riparian vegetation and plans for access tracks to use existing pastoral track creek crossings that will take the path that least impacts drainage features and avoids clearing mature trees and shrubs.
Land Clearing Guidelines 2019 Northern Territory Planning Scheme (NTPS)	s. 3.2.3 Land management buffers	Commitment to avoid disturbing riparian vegetation including the buffers recommended in the Land Clearing Guidelines to the maximum extent practicable around significant vegetation types or threatened species habitat, or other measures designed to minimise potential impacts.	
Land Clearing Guidelines 2019 Northern Territory Planning Scheme (NTPS)	The <i>Land Clearing Guidelines</i> identifies recommended buffers as follows: • Section 4.3.3 recommended minimum 200 m buffer of native vegetation along property boundaries >100 ha. • Section 4.3.5.1 Road buffers – where land proposed for clearing is adjacent to a public road reserve...retain minimum 50 m wide native vegetation buffer.	Commitment to avoid disturbance to vegetation buffers recommended in the <i>Land Clearing Guidelines</i> to the maximum extent practicable around significant vegetation types or threatened species habitat, or other measures designed to minimise potential impacts.	Access to the lease pads is required to allow safe access for the vehicles. It is not anticipated that civil construction and water bore drilling activities will cause any significant or long-term impact to the recommended vegetation buffers specified in the <i>Land Clearing Guidelines</i>. Specific measures have been identified when activities occur within property boundary, on road corridors and in sensitive

Legislation and Administering Authority	Requirements	Applicability	How Met
	Section 4.4.6 Sensitive or significant vegetation types retain 50 m buffer. Section 4.4.7 Riparian areas related to the stream order classification of the waterway.		or significant vegetation types, including riparian areas.
	Section 4.3.2.4 Timing and staging of works. In NT, vegetation clearing usually occurs either 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.	Timing and staging of works will be considered during the civil construction works.	Measures to manage impacts during vegetation clearing have been identified in the ESCP detailed in Section 7.2.3 and Appendix K. Soil exposure will be minimised by retaining felled vegetation and topsoils, utilising water cart to minimise dust production and stabilising exposed soils as soon as possible.
Biodiversity protection			
Code of Practice: Onshore Petroleum Activities in the Northern Territory DEPWS and DIPL	COP A.3.5 Surface activities must be undertaken in a manner that avoids and minimises environmental risks and environmental impacts to flora and fauna, critical habitat and important habitat to ALARP and acceptable in accordance the Land Clearing Guidelines.	An appropriate assessment of biodiversity values is required to ensure risks to these values are ALARP and acceptable. Records of the nature, location and extent of disturbance of flora and fauna including geospatial information depicting areas cleared to be provided to the Minister before and after clearing to demonstrate compliance with surface area clearing values provided in the EMP.	Sweetpea considers that the EMP provides an appropriate assessment of the biodiversity values within EP136. Refer to Section 7.9 and Appendix C. It is considered that the impacts and risks for civil and water bore construction and associated activities will have low impact on flora, fauna and ecosystems and that the measures adopted have resulted in risks being ALARP and considered acceptable. Refer Section 6.2.2, Section 7.9.1 and Appendix C. Spatial data has been provided that presents the clearing extent and land condition encountered during the base line
Petroleum (Environment) Regulations 2016 DEPWS	reg 9 1(c) demonstrates...activity will be conducted...which the environmental impacts and environmental risks are reduced...ALARP and acceptable.		
<i>Environmental Protection Act 2019</i>	s. 17 Principals of ecological sustainable development		

Legislation and Administering Authority	Requirements	Applicability	How Met
DEPWS	s. 19 Precautionary principle		survey. At completion of the activity spatial data after clearing to demonstrate compliance with surface area described in the EMP will be provided to DEPWS (Section 7.9.3).
<i>Territory Parks and Wildlife Conservation Act 1976</i> Land Clearing Guidelines 2019, Northern Territory Planning Scheme (NTPS) DEPWS – Flora and Fauna Division	s. 3.3 Biodiversity s. 10.3(2) An application for the clearing of native vegetation is to demonstrate consideration of...- Threatened wildlife; - Presence of sensitive vegetation communities, - Essential habitats etc....	Address NTPS performance criteria and ensure design of the proposed clearing footprint satisfactorily excludes 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.	Appendix C establishes baseline condition of the permit area where proposed civil construction and associated activities will occur. Refer to Section 7.9, Section 7.10 and Section 8.5.
Weed management			
<i>Weeds Management Act 2001</i> DEPWS – Weed Management Branch	COP A.3.6 A project specific weed management plan must be developed as part of the EMP which meets the requirements of the <i>NT Weed Management Planning Guide: Onshore Petroleum Projects</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.	A baseline weed survey was completed 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>Weed Management Planning Guide: Onshore Petroleum Projects 2019</i>	s. 3 Dedicated weed officer	To ensure the required weed management outcomes, the weed officer must have relevant skills and experience and availability to successfully manage weed related issues for the project	Section 8.3, Section 8.5 and Appendix H.
	s. 8 Notification procedure	48-hour notification timeframe upon discovery of a new weed species in the project area is incorporated into company policy, planning and procedure.	Project specific weed management plan (Section 7.3 and Appendix H)

Legislation and Administering Authority	Requirements	Applicability	How Met
Fire management			
<i>Bushfires Management Act 2016</i> DEPWS	s. 81 and s. 84 Property fire management plans	Bushfire management planning should be guided by <i>the Bushfire Management Act 2016</i> .	Project specific Bushfire management plan (Section 7.4 and Appendix I). 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).
Code of Practice: Onshore Petroleum Activities in the Northern Territory DEPWS and DIPL	A.3.7 A fire management plan at a project level must be developed as part of the EMP. Site specific analysis of bushfire risks.		
Bushfire Management Planning Guide: Onshore Petroleum Projects			
Containment of contaminants			
<i>Petroleum Act 1984</i> DITT	S 117AAC(1) A person must not, during the conduct of an operation authorised under this Act, intentionally do an act, or fail to do an act, that causes the release of a contaminant or waste material	During conduct of the regulated activity contaminants and waste will be generated, and some of these wastes will be listed waste.	Waste Management Plan (Section 7.5) Spill Prevention and Response Plan (Section 7.6) Emergency Response Plan (Appendix M) Risk Assessment (Section 6.0 and Appendix E) Reporting and Monitoring (Section 8.3 and Section 8.5)
Code of Practice: Onshore Petroleum Activities in the Northern Territory DEPWS and DIPL	A.3.8 Containment of contaminants: (a) Activities that involve wastewater or chemical storage must be carried out according to the wastewater management plan and spill management plan which are part of the EMP (which are further detailed in section C.7 of this Code).	Part C of the code mainly applies to well site water management; however sections of this code are included to ensure activities involving wastewater and chemical storage are considered in the EMP.	
	A.3.9 (f) If contamination is detected, remediation must commence immediately in accordance with the spill	During conduct of the civil construction program, Sweetpea must take all reasonable and practicable measures to	

Legislation and Administering Authority	Requirements	Applicability	How Met
Waste Management and Pollution Control Act 1998 (WMPC Act) NT EPA	management plan and/or emergency contingency plan	prevent or minimise pollution or environmental harm. 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. The WMPC Act is considered applicable due to the high amount of transport required to and from the site.	Spill Prevention and Response Plan (Section 7.6) Emergency Response Plan (Appendix M) Risk Assessment (Section 6.0 and Appendix E) Reporting and Monitoring (Section 8.3 and Section 8.5)
	s. 2A Listed Wastes		
	s. 12 General environmental duty		
Rehabilitation			
Petroleum Act 1984 DITT	57A 12(b)...the rehabilitation of the environment in the area to which the access authority applied and any other area that has been damaged by...operations authorised by the access authority.	Sweetpea are required to progressively reinstate disturbed land not required for ongoing conduct of petroleum activities. Land to be reinstated to pre-disturbed condition.	Section 7.0, Section 9.0 and Appendix F provides Rehabilitation of regulated activities and how Sweetpea intend to comply. Reporting and Monitoring (Section 8.3 and Section 8.5) is also required.
Code of Practice: Onshore Petroleum Activities in the Northern Territory DEPWS and DIPL	A.3.9(a) A Rehabilitation Plan must be included as part of an EMP.		
	A.3.9(b) Appropriate to scale and nature of activity.		
	A.3.9(c) Progressive rehabilitation of significantly disturbed land which is not required for the ongoing conduct of the petroleum activity(ies) or future activities, must commence as soon as practicable, but not longer than 12 months following the cessation of activities on the land.		
	A.3.9(d) All significantly disturbed land must be reinstated to its pre-disturbed		

Legislation and Administering Authority	Requirements	Applicability	How Met
	condition. For areas that previously contained native vegetation, native vegetation must be re-established such that the corridors become ecologically integrated into the surrounding landscape.		
	A.3.9(e) Regular maintenance and at least yearly monitoring of rehabilitated areas must take place to measure compliance with the Rehabilitation Plan.		Reporting and Monitoring (Section 8.3 and Section 8.5) is also required.
	A.3.9(f) If contamination is detected, remediation must commence immediately in accordance with the spill management plan and/or emergency contingency plan		Section 9.0 and Appendix F, as well as Spill Prevention and Response Plan (Section 7.6) and Emergency Response Plan (Appendix M)

Legislation and Administering Authority	Requirements	Applicability	How Met
Water			
<i>Waste Management and Pollution Control Act 1998</i> (NT) NT EPA	s 6(2) This Act does not apply in relation to a contaminant or waste: (a) that results from, ... the carrying out of: ... (ii) a petroleum exploration activity, or petroleum extraction activity ... on land on which the activity is authorised ... and (b) that is confined within the land on which the activity is being carried out. S 14 Duty to notify of incidents causing or threatening to cause pollution	When an activity 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. The WMPC Act should be considered due to required transport to and from the site. 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. Provide for the relevant activities and the environmental risks and environmental impacts that involve in Waste Management Plan (WMP) and a Spill Prevention and Response Plan (SPRP), as part of the EMP.	Sweetpea have considered the requirements of the WMPC Act as relates to conducting the Regulated activities and included the following plans to manage impacts: Waste Management Plan (Section 7.5) Spill Prevention and Response Plan (Section 7.6) Emergency Response Plan (Appendix M) Risk Assessment (Section 6.0 and Appendix E) Reporting and Monitoring (Section 8.3 and Section 8.5) It is noted that wastewater produced from proposed activities under this EMP are excluded from the term 'Wastewater' as defined in the Code of Practice.
<i>Code of Practice: Onshore Petroleum Activities in the Northern Territory</i>	C.2.1 Water and wastewater (b) "waste material" and material containing "contaminants" as defined in s 117AAB of the Act; (c) wastewater meeting the definition of waste under the <i>Waste Management and Pollution Control Act 1998</i> (NT); C.3.1 The waste hierarchy outlined in the National Waste Policy, 2018, must be implemented by interest holders when developing their WWMP	During conduct of the civil and water bore construction program, Sweetpea must take all reasonable and practicable measures to prevent or minimise pollution or environmental harm	Sweetpea have prepared the following plans: - Spill Prevention and Response Plan (Section 7.6) - Emergency Response Plan (Appendix M) Risk Assessment (Section 6.0 and Appendix E), Reporting and Monitoring (Section 8.3 and Section 8.5)

Legislation and Administering Authority	Requirements	Applicability	How Met
	C.5.1 (a) Monitoring programs must be described in the WWMP and SMP and must address the requirements in this section C.5 C.6.1 Water and wastewater tracking and reporting requirements (b) Wastewater tracking must be documented in an auditable chain of custody system. Wastewater tracking must be in accordance with other legislative requirements such as those imposed under the <i>Waste Management and Pollution Control Act 1998</i> (NT) and the <i>Radiation Protection Act 2004</i> (NT). (d) Wastewater tracking documentation must be reported to the Minister at least annually in accordance with the framework provided in the EMP.		Sweetpea will retain a register of all onsite and offsite water use and wastewater disposal from the civil construction and water bore operations. Water produced from proposed activities under this EMP are excluded from the term 'Wastewater' as defined in the Code of Practice. Refer to Section 8.3 and Section 8.5.
<i>Public and Environmental Health Act 2011</i> and Regulations Department of Health – Public Health Directorate	Reg 73 (1) On-site wastewater system Reg 82 wastewater works design approval	Wastewater systems installed outside building control areas. Applies to small scale on-site wastewater systems with a maximum design capacity of 8,000 litres per day Before starting work on any on-site wastewater systems with a maximum hydraulic flow of 2,000 litres or under per day, a licensed plumber must fill in a notification of installation of an on-site wastewater system.	Sweetpea is required to establish field camp with an on-site wastewater system with an estimated daily hydraulic flow of 5,000 to 6,000 L to service camps. Refer Section 3.3.1 and Section 7.5. The accommodation camps are outside a building control area.

Legislation and Administering Authority	Requirements	Applicability	How Met
Spill management plan			
<i>Code of Practice: Onshore Petroleum Activities in the Northern Territory</i> DEPWS and DIPL	COP C.7.2 (a) An EMP for a petroleum activity must include a Spill Management Plan (SMP). Monitor, manage and report in accordance with the WWMP and SMP	Sweetpea require a SMP to conduct regulated activity.	Sweetpea have prepared the following plans: - Spill Prevention and Response Plan (Section 7.6) - Emergency Response Plan (Appendix M) Risk Assessment (Section 6.0 and Appendix E), Reporting and Monitoring (Section 8.3 and Section 8.5.
Stakeholder Engagement			
Petroleum (Environment) Regulations 2016 DEPWS and DIPL	Reg 7(1) stakeholder engagement	Sweetpea is required to carry out stakeholder engagement in accordance with this regulation during the EMP preparation.	Sweetpea has carried out extensive consultation with landholders and stakeholders who may be directly affected by the environmental impacts or environmental risks associated with the proposed 2021-2024 work program activities (Reg7(3)a).
	Reg 7 s. 2(2a) information provided Reg 7 s. 2(2b) reasonable period	Sweetpea have to inform the stakeholders of the intended program over the course of the EMP development.	Stakeholder engagement section reflects the ongoing engagement for the development of the EMP and LACA. Refer to Section 5.0 and Appendix J for further details.
	Reg 7 s. 3(a) Definition of a stakeholder means a person or body whose rights or activities may be directly affected by the environmental impacts or risks of the regulated activity, or their agent/representative s. 36 Records to be kept	Sweetpea to identify the stakeholders who may be directly affected by the impacts or risks of the regulated activity.	Section 5.1 provides the stakeholders who will be directly affected by the proposed Work Program. Records have been maintained over the development of the EMP and will be ongoing over the course of Sweetpea's activities in EP136.

Legislation and Administering Authority	Requirements	Applicability	How Met
			Records will be maintained, as shown Appendix J.
Sacred Site and Heritage Management			
<i>Northern Territory Aboriginal Sacred Sites Act 1989</i> and associated Regulations Aboriginal Areas Protection Authority	Part III Site protection procedures, Div. 1A Application for Authority Certificate s. 19B-19L, s. 22 Authority Certificate The Legislation establishes a procedure for the protection and registration of sacred sites, through: s. 33 providing entry onto sacred sites and the conditions to which such entry is subject s. 37 procedures for avoidance of sacred sites when developing and using land s. 22 establishing an Authority for the purposes of the Act s. 30 procedures for the review of decisions of the Authority by the Minister, and for related purposes.	AAPA is able to consider applications for, and if appropriate, issue an Authority Certificate setting out the conditions, if any, for the protection of sacred sites in respect of particular works. Sweetpea is required to obtain AAPA certificates for all civil and water bore construction activities. The Act also establishes a duty-of-care to notify AAPA of any potential disturbance to Aboriginal sacred sites.	An Authority Certificate has been received approving the regulated activities. Refer to Section 4.3 and 7.12 for measures to be implemented during the regulated activities. Sweetpea will engage two Cultural Monitors, facilitated by the NLC, on location for the duration of the civil and water bore construction program.
<i>Aboriginal Land Rights (Northern Territory) Act 1976</i> Commonwealth Department of Prime Minister and Cabinet Office of the Aboriginal Land Commissioner	s. 41(6) Application for consent to exploration licences.	Native title interactions with petroleum projects, including exploration, is administered in NT through the approval processes (i.e. potential future acts) under the <i>Petroleum Act 1984</i> and the <i>Aboriginal Land Act 1978</i> .	Sweetpea have an exploration agreement with NLC and Traditional Owners. Sweetpea will engage two Cultural Monitors, facilitated by the NLC, on location for the duration of the activities.
Petroleum (Environment) Regulations 2016 DEPWS and DIPL	Reg 9 s. 1(d) Approval criteria for plan Reg 7 stakeholder engagement	An Authority Certificate under the <i>Aboriginal Sacred Sites Act 1989</i> is to be issued for the regulated activity prior to approval by the Minister.	Sweetpea have obtained an AAPA Authority Certificate to commence regulated activities in the permit area.

Legislation and Administering Authority	Requirements	Applicability	How Met
			Refer Section 1.5.4. AAPA certificate includes the activities as described in this EMP (refer Section 0).
<i>Heritage Act 2011</i> and <i>Heritage Regulation 2012</i> Heritage Branch, Department of Tourism, Sport and Culture	Reg 3(c) exempt – the work does not detrimentally affect the heritage significance of the place or object Part 3.3 s. 76(2) Work approval for removal or damage of archaeological place or object	Avoid all identified archaeological sites, to report any newly discovered sites to Heritage Branch and to develop a proposed relocation protocol for artefacts with Traditional Owners.	A Cultural Heritage Assessment has been completed to inform the development of the EMP. Refer to Section 4.3 and 7.12 for measures to be implemented during the regulated activities to mitigate risks to heritage place or objects.
Social and Community			
<i>Control of Roads Act 1953</i> DIPL <i>Development Guidelines for Northern Territory Government Controlled Roads 2015</i>	Permit to Work Within the NTG Road Reserve	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.	Sweetpea require access to civil and water bore construction locations via an access road off the Carpentaria Highway. The Traffic Impact Statement will inform the development of the Traffic Management Plan (Appendix L). Consultation with DIPL Transport and Application for permit currently in progress.
<i>Work Health and Safety (National Uniform Legislation) Act 2011</i> and Regulations 2011 Department of the Attorney-General and Justice – NT Worksafe	Exploration activities are expected to comply with NT WorkSafe legislation throughout their entire construction and operation phases.	Safety Management Plan Provides for a balanced and nationally consistent framework to secure the health and safety of workers and workplaces. Provide a mandated level of protection to workers from exposures associated with chemical handling and storage.	Sweetpea will ensure that the civil construction and water bore contractors comply with the requirements of the <i>Work Health and Safety (National Uniform Legislation) Act 2011</i> and Regulations 2011, in the provision of the project.
<i>Schedule of Onshore Petroleum Exploration and Production Requirements 2021</i> DITT	Clause 220 - Reporting a potentially hazardous event	Where an event occurs, which is not in the normal or ordinary course of a particular operation and which is professionally considered to have been likely to cause	Sweetpea has included reporting requirements in the EMP (refer Section 8.3)

Legislation and Administering Authority	Requirements	Applicability	How Met
		injury to a person or serious damage to property: (1) a report of the event shall forthwith be made to an Inspector; and (2) a report in writing of the event shall be submitted to the Minister as soon as practicable specifying measures taken or to be taken to prevent a possible recurrence.	
<i>Dangerous Goods Act 1998</i> Department of the Attorney-General and Justice AS 1940:2004 (and amendments) Storage and handling of flammable and combustible liquids, 2004	The legislation sets out the requirements and allowances for licensing, packaging, storage, transportation and use of dangerous goods. s.9 Persons involved in handling dangerous goods	The person in charge of dangerous goods must act in accordance with any approved Safe handling of dangerous goods. Must do so safely as far as practicable. It is an offence to do otherwise. This includes handling all goods in a safe manner or having a system in place that ensures: i) safe management of goods ii) identification of hazards and risk controls iii) appropriate availability of information, training, instruction and supervision including for other people that may be affected.	Section 7.5 and Section 7.6 All fuel storage facilities will be constructed in accordance with AS1940 and considers requirement of the WHS(NUL) Act and WMPC Act.
<i>Public and Environmental Health Act 2011</i> and Regulations Department of Health – Public Health Directorate Including: - <i>Food Act 2004</i>	The construction and operation of camps must not create a public health nuisance.	Activities of Sweetpea should be managed so as not to cause a public health nuisance as defined under the Act.	Sweetpea will ensure that the contractors comply with the requirements of the <i>Public and Environmental Health Act 2011</i> and Regulations, in the provision of the project.

Legislation and Administering Authority	Requirements	Applicability	How Met
- Australian Drinking Water Guidelines (2011) - National Construction Code - Code of Practice for On-site Wastewater Management – July 2014			

Appendix B

Environment
Assessment Act Self-
Assessment

Appendix B Environment Assessment Act Self-Assessment

Table 34 Sweetpea's Self-Assessment under the NT Environment Protection Act

Theme	Environmental factor	Indicative environment values and sensitivities	Indicative information	Y / N / N/A	EMP Section or Comment
Land	1. Terrestrial flora and fauna	a. 'sensitive or significant' vegetation	- Desktop analysis of the likelihood of occurrence of terrestrial flora and fauna values, using available data and appropriate to the region of the activity. - Using appropriate and justified methods (e.g. targeted surveys), verify the presence or absence of flora and fauna values where available data is inadequate or indicates a high likelihood of significant values. - When determining the impacts to environmental values related to flora and fauna, the assessment should include analysis of key threatening processes (e.g. weeds, fire history) that may have occurred in the vicinity of the regulated activity.	Y	4.2.2 Vegetation communities No EPBC listed threatened ecological communities occur within the project footprint. Lancewood/Bullwaddy communities and their sensitivity to fire are described and noted avoidance where possible to minimise rehabilitation requirements of the slow growing vegetation community.
		b. vegetation that provides an important ecological function		Y	4.2.3 Native Flora Database searches reveal that no EPBC listed flora species occur within the project area. One species listed as 'Near threatened' and three species listed as 'Data Deficient' under the TPWC Act potentially occur. None of these species were recorded during the 2019/2020 field survey.
					4.2.5 Native Fauna Bullwaddy vegetation and its importance as a source of shelter for various native fauna is described.
					4.3.2 Land Use and Sensitive Receptors Lancewood/Bullwaddy vegetation and its importance as habitat to native fauna is described. Conservation areas including the Bullwaddy Conservation

Theme	Environmental factor	Indicative environment values and sensitivities	Indicative information	Y / N / N/A	EMP Section or Comment
					Reserve, which lies 20 km to the west of EP136 in and one wetland listed as Site of Conservation Significant by DEPWS, Lake Woods located 140 km south-west of the permit area (Refer <i>Section 4.8</i> of Appendix C).
		c. listed threatened species and their habitat (NT and Commonwealth)		Y	4.2.5 Native fauna Desktop assessment indicated that 21 fauna species listed as threatened under the EPBC Act and/or the TPWC Act may potentially occur in the area. A likelihood assessment of species occurrence was undertaken based on the availability of suitable habitat within the permit area, records in the vicinity and distributional data. Following this assessment, it has been determined that the following threatened species may occur within the project footprint: • Gouldian Finch <i>Erythrura gouldiae</i> (Endangered EPBC Act, Vulnerable TPWC Act) • Grey Falcon <i>Falco hypoleucos</i> (Vulnerable TPWC Act) • Crested Shrike-tit (northern) <i>Falcunculus frontatus whitei</i> (Vulnerable EPBC Act, Near Threatened TPWC Act) • Painted Honey Eater <i>Grantiella picta</i> (Vulnerable EPBC Act, Vulnerable TPWC Act) • Yellow-spotted Monitor <i>Varanus panoptes</i> (Vulnerable TPWC Act)

Theme	Environmental factor	Indicative environment values and sensitivities	Indicative information	Y / N / N/A	EMP Section or Comment
		d. listed migratory species and their habitat (Commonwealth)		Y	The DAWE Protected Matters database indicated the potential presence of 20 migratory species and their likelihood of occurrence are assessed in Section 4.5.2 of Appendix C.
		e. locally endemic or species with restricted habitat		Y	Section 4.2 provides description of the constraints associated with native species and Section 7.9 provides the measures to minimise impacts to native flora, fauna and habitat endemic to the region.
		f. 'iconic' or culturally important animals, plants and vegetation		Y	Section 4.2 provides description of the constraints associated with native species and Section 7.9 provides the measures to minimise impacts to native flora, fauna and habitat endemic to the region.
	2. Terrestrial environmental quality	a. characteristics of soils, including chemical, physical, biological and aesthetic qualities	1. Describe the quality and characteristics of soils in the region of the activity. Include an overview of historical land uses, including the extent and nature of previous land uses that may have contributed to any current soil contamination and degradation	Y	Section 4.1.5 Soils Lateritic plains encompass the civil construction area and comprise two main soil types: • Tertiary lateritic red earths (Red Kandosols) • Tertiary Lateritic Red Sands (Tenosols) Appendix C Land Condition Assessment - Provides a description of soils and their physical properties recorded during the November 2019 and May

Theme	Environmental factor	Indicative environment values and sensitivities	Indicative information	Y / N / N/A	EMP Section or Comment
					2020 field survey is provided in this report. Appendix K Erosion and Sediment Control Plan - Provides controls to minimise degradation or loss of soils as result of program.
	3. Landforms	a. distinctive features in the landscape, either geological or anthropogenic	1. Identify and describe any distinctive landforms that may occur in the area. These may be naturally occurring or anthropogenic structures (e.g. monuments) of significant cultural and/or public heritage.	Y	Section 4.1.2 Topography The proposed civil construction area occurs on flat laterite plains, which were formed by laterite capping Cretaceous aged sedimentary rocks Section 4.1.4 Geology A description is provided of the different rock formations that occur at depth beneath the project area Section 4.1.6 Hydrology A description of the surface water and drainage of the project area
		b. subterranean karstic terrain and faults		Y	Section 4.1.4 Geology and Section 4.1.7 Hydrogeology A description is provided of the different rock formations that occur at depth beneath the project area and groundwater aquifers
		c. craters, gorges, ranges, caves, massifs, escarpments, plateaus		Y	The existing environment section (Section 4.0) contains information on the environmental setting of the civil construction area that is relevant to the project. Section 4.3.2 and Section 4.3.6 provide information on monuments,
		d. monuments		Y	

Theme	Environmental factor	Indicative environment values and sensitivities	Indicative information	Y / N / N/A	EMP Section or Comment
		e. culturally important features		Y	culturally important features (i.e. Newcastle Creek). There are no tourism related landforms in close proximity to the activity area.
		f. tourism related to landforms		Y	
Water	1. Aquatic ecosystems	a. the health of the biota in inland waterways	Identify and describe any aquatic ecosystems of environmental value in the vicinity of the regulated activity.	Y	Section 4.1.6 Hydrology The civil construction area is located within the Wiso drainage basins. The location and extent of creek crossings (primarily the ephemeral Newcastle Creek and drainage lines) have been described in detail. Newcastle Creek provides habitat that supports lifecycle of aquatic biota and Sweetpea have acknowledged this by avoiding creation of new creek crossings to gain access to the lease pads (refer Section 7.2).
		b. the habitats that support the lifecycle of aquatic biota		Y	
		c. groundwater dependent ecosystems		Y	Section 4.1.7 Hydrogeology, Section 4.1.8 Groundwater Dependent Ecosystems and Section 4.3.6 Sacred Sites Sweetpea's program requires 6-month monitoring of groundwater prior to commencing drilling activities at the lease pads. The information obtained from this will inform any measures to protect groundwater dependent ecosystems. This is also a condition of the AAPA Authority Certificate. Known factors affecting the distribution of stygofauna include: Formation type: Stygofauna are predominantly found in aquifers with

Theme	Environmental factor	Indicative environment values and sensitivities	Indicative information	Y / N / N/A	EMP Section or Comment
					large (mm or greater) pore spaces, which are 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. 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.

Theme	Environmental factor	Indicative environment values and sensitivities	Indicative information	Y / N / N/A	EMP Section or Comment
	2. Inland water environmental quality	a. the quality of water in surface water features including rivers, lakes, wetlands, swamps, creeks, billabongs, intermittent streams, floodplains, mangroves and drainage lines	1. Identify and describe all surface water features in the vicinity of the activity, including ephemeral water features. 2. Identify and describe the quality of surface water and groundwater the vicinity of the regulated activity, particularly where such water has an existing or future use. 3. Identify and describe the uses and users of surface water and groundwater that may be impacted by the proposal. 4. When determining the impacts to environmental values related to water, identification of impacts (and controls) should reference baseline groundwater data, and take into consideration other users of the water source. 5. For exploration operations in the Beetaloo Basin, interest holders must refer to requirements prescribed in Preliminary Guideline: Groundwater Monitoring Bores for Exploration Petroleum Wells in the Beetaloo Sub basin (DENR, 2019).	Y	Section 4.1.6 Hydrology Descriptions are provided of the Wiso drainage basins that occurs within the project area. Descriptions of surface water bodies in the area are provided including Lake Woods, Newcastle Creek and Yaroo Creek. Creek crossings only occur along existing station tracks and are limited to two location along Newcastle Creek. Section 4.3.2 Land Use and Sensitive Receptors Lake Woods located 140 km south-west of the permit area.
		b. the quality of water in groundwater features including aquifers and water tables		Y	Section 4.1.7 Hydrogeology Groundwater resources within the permit area are associated with the Cambrian Limestone Aquifer (CLA) at a depth between 0 and 300 mbgl. This aquifer provides an important water resource for the pastoral industry and communities within the region. Section 6.2.1 Water Supply (Cumulative Impact) Summary of the civil construction water requirements provided and the cumulative impact of activities on the permit (pastoral) and other exploration in the broader region considered.

Theme	Environmental factor	Indicative environment values and sensitivities	Indicative information	Y / N / N/A	EMP Section or Comment
					Noted that it is not expected to impact on future domestic demands. Section 8.5 Monitoring Requires monitoring of groundwater 6 months prior to commencement of drilling activities. The water bore drilling and monitoring program will provide data on the availability of groundwater resources in the activity area.
		c. declared beneficial uses		Y	Section 4.1.7 Hydrogeology 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 294.7 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. See above Section 4.1.7 Hydrogeology Brief descriptions of the regional aquifers are provided.
		d. present and future uses and users of water		Y	
		e. current or potential water supplies, including regional scale aquifers		Y	
		f. culturally important water features		Y	Section 4.1.7 Hydrogeology and Section 4.3.6 Sacred Sites Sweetpea's program requires 6-month

Theme	Environmental factor	Indicative environment values and sensitivities	Indicative information	Y / N / N/A	EMP Section or Comment
					monitoring of groundwater prior to commencing drilling activities at the lease pads. The information obtained from this will inform any measures to protect groundwater dependent ecosystems. This is also a condition of the AAPA Authority Certificate.
		g. RAMSAR wetland status		Y	Appendix C Land Condition Assessment Matters of National Environmental Significance The protected matters search revealed that no nationally important wetlands occur within the activity area. Section 4.3.2 Land Use and Sensitive Receptors Lake Woods located 140 km south-west of the permit area.
	3. Hydrological processes	h. the supply and quantity of water in surface water features including rivers, lakes, wetlands, swamps, creeks billabongs, intermittent streams, floodplains, mangroves and drainage lines	1. Identify and describe the hydrological regimes and values, such as the occurrence, connectivity, movement and quantity of groundwater and surface water sources, in the vicinity of the regulated activity. 2. Identify other users of the groundwater sources that may be impacted by the proposal. 3. For activities that may interact with groundwater, provide baseline groundwater data including characterisation data of aquifers, saline water zones, and gas bearing zones in the formations intersected by drilling; and monitoring methods	Y	Section 4.1.7 Hydrogeology Brief descriptions of the regional aquifers are provided Descriptions of ephemeral surface water bodies in the area are provided including Lake Woods, Newcastle Creek and Yaroo Creek. Creek crossings only occur along existing station tracks and are limited to two location along Newcastle Creek.

Theme	Environmental factor	Indicative environment values and sensitivities	Indicative information	Y / N / N/A	EMP Section or Comment
		i. the supply and quantity of water in groundwater features including aquifers, aquitards and water tables	4. to be used to detect migration of methane along the outside of the casing. For exploration operations in the Beetaloo Basin, interest holders must refer to requirements prescribed in Preliminary Guideline: Groundwater Monitoring Bores for Exploration Petroleum Wells in the Beetaloo Sub basin (DENR, 2019).	Y	Section 4.1.7 Hydrogeology 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. See above Section 4.1.7 Hydrogeology Brief descriptions of the regional aquifers are provided. See above
		j. declared beneficial uses		Y	
		k. present and future uses, and users of water		Y	
		l. current or potential water supplies, including regional scale aquifers		Y	
		m. culturally important water features		Y	Section 4.1.7 Hydrogeology and Section 4.3.6 Sacred Sites Sweetpea's program requires 6-month monitoring of groundwater prior to commencing drilling activities at the lease pads. The information obtained from this will inform any measures to protect groundwater dependent ecosystems. This is also a condition of the AAPA Authority Certificate.

Theme	Environmental factor	Indicative environment values and sensitivities	Indicative information	Y / N / N/A	EMP Section or Comment
Air	1. Air quality and greenhouse gases	a. the chemical, physical and biological characteristics of air	1. A desktop assessment of the existing sources of emissions to air including dust and greenhouse gas emissions (GHG). 2. Quantify background (baseline) GHG (methane) emissions where relevant to the activity – e.g. hydraulic fracturing.	Y	Section 3.3.5 Greenhouse Gas Emissions A summary is provided of the source of greenhouse gas emissions associated with civil construction program including an estimation of total emissions estimate for program provided. Section 6.3 Cumulative Impacts, 6.3.3 Greenhouse Gas Emissions GHG emissions from civil construction and water bore activities at seven lease pads has been estimated based on four-year program - approximately 13,634.9 tCO ₂ -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.
		b. the biological processes that depend on the air quality		Y	The cumulative emissions from civil construction and water bore activity is considered minor and not thought to have a significant impact on biological processes.
		c. the climate, as it relates to air emissions		Y	The cumulative emissions from civil construction and water bore activity is considered minor and not thought to have a significant impact on regional climate processes.

Theme	Environmental factor	Indicative environment values and sensitivities	Indicative information	Y / N / N/A	EMP Section or Comment
People and Communities	1. Social, economic and cultural surroundings	a. communities, towns, private properties and dwellings where people reside	1. Where appropriate to the nature and scale of the activity, describe the existing socio-economic profile of the region and identify the social and economic values relating to regional employment, income, recreational and commercial fishing, tourism, agricultural and other land use and proximity of the proposed activities to towns and population centres. 2. Desktop analysis of the likelihood of occurrence of Aboriginal or European items or places of cultural heritage value, using available data and appropriate to the region of the activity. 3. Where there is the potential for cultural heritage items or places to be present and disturbed, a cultural heritage survey should be conducted by a qualified expert. 4. Details of Authority Certificate from AAPA.	Y	Section 4.3 Social and Cultural Environment Provides a summary of the socio-economic status of the Barkly region compared with the Northern Territory average. Land uses and sensitive receptors also identified. The civil construction area is largely remote from residences and public areas and direct impacts due to noise and light emissions are unlikely.
		b. aesthetics and recreation		Y	Section 4.3.7 Archaeology Assessment A summary of results is provided from the heritage assessment undertaken in the project area during November 2019 and May 2020 Section 4.3.8 Historic Heritage Describes European history within the region
		c. cultural heritage items and places		Y	Section 4.3 Social and Cultural Environment Provides details of the cultural heritage items and places within EP136. Detailed Cultural Heritage Assessment was completed for the Seismic EMP and summarised in this EMP.
		d. sacred sites		Y	Section 1.5.4 AAPA Sweetpea have obtained an AAPA Authority Certificate to conduct the regulated activity described in the EMP.

Theme	Environmental factor	Indicative environment values and sensitivities	Indicative information	Y / N / N/A	EMP Section or Comment
	2. Human health	a. Drinking water	1. Identify and describe the values that support human health, including recreational and drinking water quality, air quality, the functions of the environment that support human food cultivation, and social, cultural and beneficial uses.	Y	Section 3.3.1 Accommodation Camp The operation of the accommodation 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, including supply of drinking water.
		b. Recreational water		N	Section 4.1.6 Hydrology No specific recreational waters located in close proximity to the civil construction area. Distance to Lake Woods located 140 km south-west of the permit area.
		c. Air quality		Y	Section 7.7 Air Quality and Emissions Management Plan 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.
		d. Bush tucker		Y	Sweetpea are minimising disturbance to vegetation. The extent of activities is unlikely to impact on "Bushtucker" availability in the region.
		e. Radiological limits		N	Sweetpea requires that the civil construction contractor complies with the requirements of <i>Public and Environmental Health Act 2011</i> , in the provision of services to the project.

Appendix C

Land Condition Assessment

Appendix C Land Condition Assessment

Land Condition Assessment

EP136 - Beetaloo Sub-Basin, NT

Civil Construction and Water Bore EMP

Land Condition Assessment

EP136 - Beetaloo Sub-Basin, NT

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Quality Information

Document Land Condition Assessment

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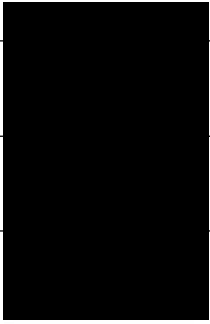
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Table of Acronyms

Acronym	Meaning
%	Percentage
°C	Degrees celcius
AAPA	Aboriginal Area Protection Authority
ABS	Australian Bureau of Statistics
AECOM	AECOM Australia Pty Ltd
AEP	Annual Exceedance Probability
ALA	Atlas of Living Australia
AS	Australian Standard
ASRIS	Australian Soil Resource Information System
Beetaloo GBA region	Beetaloo Geological and Bioregional Assessment Program
BoM	Bureau of Meteorology
CLA	Cambrian Limestone Aquifer
DAWE	Department of Agriculture, Water and the Environment (Commonwealth)
DEE	Department of the Environment and Energy (Commonwealth)
DENR	Department of Environment and Natural Resources (NT) previous department name for DEPWS
DEPWS	Department of Environment, Parks and Water Security (NT)
DLRM	Department of Land Resource Management (legacy NT Department)
DIPL	Department of Infrastructure Planning and Logistics
DITT	Department of Industry, Tourism and Trade (NT)
DIWA	Directory of Important Wetlands in Australia
DW	Daly Waters
E	Elliot
EP##	Exploration Permit (e.g. EP136)
EMP	Environment Management Plan
EPBC	Environment Protection and Biodiversity Conservation Act
GP	Gravel Pit
GPS	Global Positioning Device
ha	hectare
IBA	Important Bird Area
IBRA	Interim Biogeographic Regionalisation of Australia
IECA	International Erosion Control Association
Km	Kilometre
km2	Square Kilometres
km/hr	Kilometre per hour
LCA	Land Condition Assessment

Acronym	Meaning
LP	Lease Pad
Ma	Million years ago
m	metre
mAHD	Metres Australian Height Datum
ML	Megalitres
ML/y	Megalitres per year
mm	Millimetre
MNES	Matters of National Environmental Significance
NAFI	North Australia Fire Information
NR	Natural Resource
NT	Northern Territory
NTD	Native Title Determination
NVIS	National Vegetation Information System
NW	Newcastle Waters
PMST	Protected Matters Search Tool
POR	Portion
PPL	Perpetual Pastoral Lease
QUDM	Queensland Urban Drainage Manual
RWA	Restricted Work Area
SRTM	Shuttle Radar Topography Mission
Sweetpea	Sweetpea Petroleum Pty Ltd
TPWC Act	Territory Parks and Wildlife Conservation Act
WoNS	Weed of National Significance

1.0 Introduction

1.1 Purpose of Report

AECOM Australia Pty Ltd (AECOM) has been commissioned by Sweetpea Petroleum Pty Ltd (Sweetpea) to conduct a land condition assessment (LCA) to support Sweetpea's civil construction and water bore program within Exploration Permit 136 (EP136) in the Beetaloo Sub-Basin, Northern Territory (NT).

The primary aim of the LCA is to identify and document site condition prior to activities occurring in the civil construction and water bore program footprint area ("the Project Area") and guide the preparation of the Environment Management Plan (EMP).

A baseline field survey was undertaken in May 2020 to record baseline site conditions. This survey supplemented the initial LCA that was conducted in November 2019. The LCA report summaries the result of the surveys and documents baseline conditions of the land within the civil construction and water bore program.

1.2 Project Boundary

The location of the Project Area is situated within the Tanumbirini perpetual pastoral lease (PPL) (NT Portion (Por) 701) in the northern section of the EP136 (Figure 1). The proposed activities comprise the construction of seven well lease pads, installation of groundwater monitoring and extraction bores at each well lease pad, access tracks to lease pads, an accommodation camp and up to 10 gravel pits and associated access tracks. The Project Area footprint is detailed in Table 1 and the location of the proposed access tracks, lease pad areas, accommodation camp and gravel pits is provided in Figure 2. The total impact footprint associated with this program ranges from 126 ha to 146 ha depending on the access track options.

The geographical coordinates and disturbance area for the seven well lease pad, main field camp, access tracks and gravel pits are also provided in Table 1.

Table 1 Lease Pad, Gravel Pit and Access Track Footprints

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	11.0
Lease Pad 2	LP2	-16.517668°, 134.558468°	-	11.0	10.65*
<i>Lease Pad 3</i>	<i>LP3</i>	<i>-16.556358°, 134.558567°</i>	<i>Removed – Site Unsuitable</i>		
Lease Pad 3	LP3alt	-16.558253°, 134.556614°	-	11.0	10.65*
Lease Pad 4	LP4	-16.600557°, 134.515315°	-	11.0	11.0
<i>Lease Pad 5</i>	<i>LP5</i>	<i>-16.600743, 134.558551</i>	<i>Removed – Site Unsuitable</i>		
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 Total			-	78.3	77.6

Infrastructure	Name	Location Lat/Long	Length (km)	Footprint Area (Ha)	Total Area of Vegetation Clearing (Ha)
Gravel Pits (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 9	GP9	-16.600860°, 134.617443°	Removed – Site Unsuitable		
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
Gravel Pit Camp	GPCamp	-16.481617°, 134.565769°	Removed – outside EP136		
Gravel Pit Total			-	22.0	22.0
Access Tracks					
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
Lease Pad 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 Access					
Gravel Pit Access Track	GP Access Track (8 m wide)		7.80	6.24	6.24
Gravel Pit Access Track Total			26.7	7.80	6.24
Total Footprint Option 1 EAT			47.36	174.60	126.90
Total Footprint Option 2 WAT			43.25	168.34	145.22

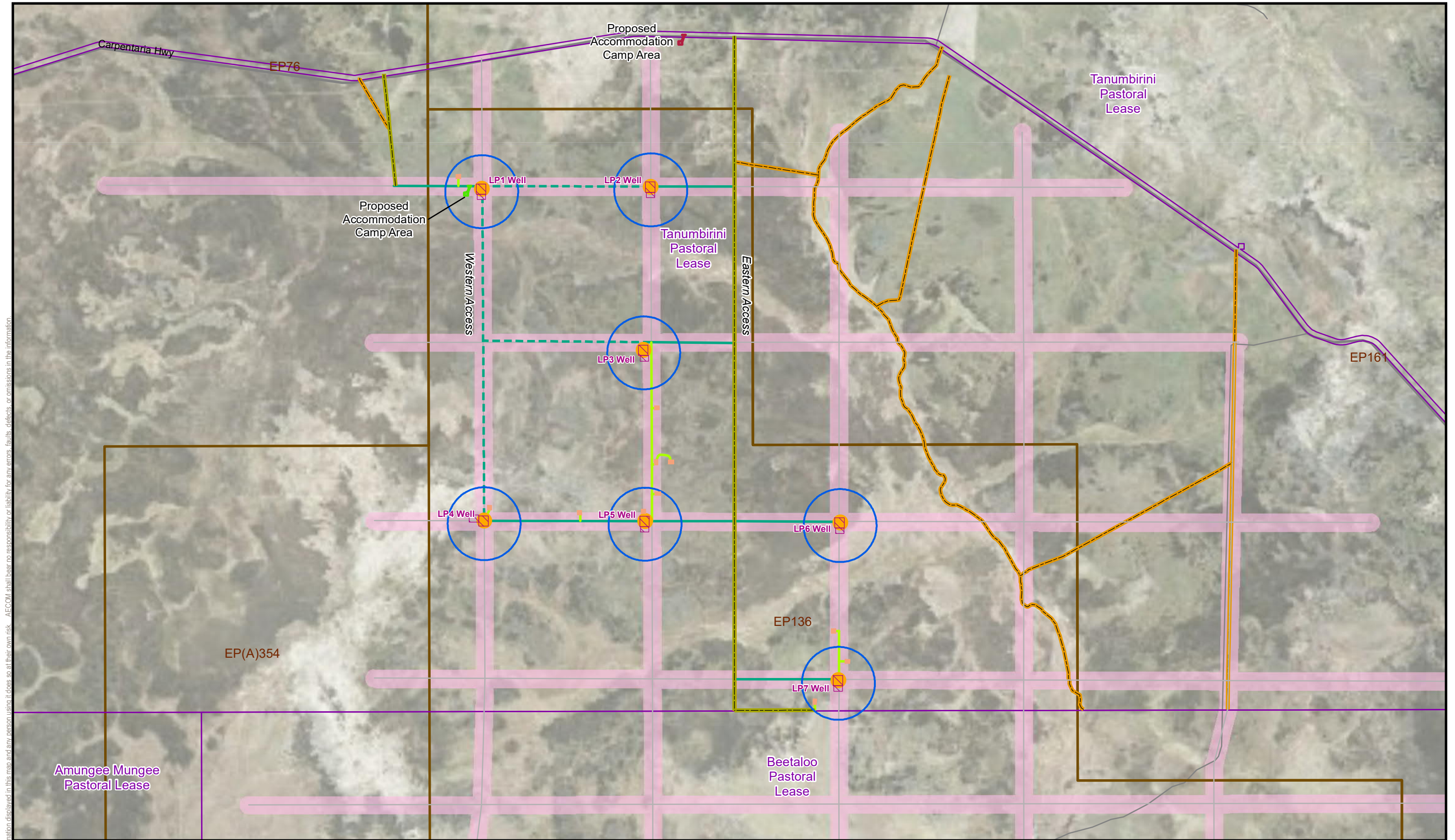
*disturbance areas of Lease Pad 1, Lease Pad 3, Main Camp and Lease Pad Access Tracks have previously been approved under the Seismic EMP to 8 m. The disturbance area covered by the Seismic EMP will be **absorbed** into the overall Civil Construction and Water Bore EMP, but the total vegetation clearing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

1.2.1 Site Selection

The seven lease pad sites have been located at strategic intersections of the seismic lines which forms a greater than 4 km spaced grid. This spacing complies with the minimum spacing of 2 km between well pads as outlined within the *Code of Practice: Onshore Petroleum Activities in the Northern Territory* (DENR/DPIR 2019). Further detail on the seismic exploration program is provide within the approved Seismic EMP (reference NTEPA2019/0124-007~0001).

The proposed activities comprise the construction of seven exploration lease pads, installation of groundwater monitoring and extraction bores at each exploration lease pads, five access tracks to the exploration lease pads, an accommodation camp and up to 12 gravel pits and associated access tracks. The total construction footprint is approximately 139.9 ha.

The civil works program aims to use two existing pastoral lease tracks that come off the Carpentaria Highway to minimise the need for additional vehicle crossings on Newcastle Creek, which is considered a sensitive area. The tracks to access the lease pads and gravel pits will be repurposed sections of the seismic lines to provide access for the construction of the lease pads and future programs, including ongoing monitoring requirements



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Projection: GDA 1994 MGA Zone 53

2 1 0 2 km

1:100,000 (when printed at A3)

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- 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
2

A3 size

Gravel pits will be established in areas of suitable substrate nearby to lease pads and the seismic lines. Gravel pit access tracks will be established on either existing tracks or along the seismic lines and the extracted material used to construct lease pads and access tracks where required. A minimal impact approach will be used to establish groundworks for civil construction infrastructure and only the minimum required fill material will be extracted from the proposed gravel pits. Gravel extraction will be restricted to as few gravel pits areas as necessary to provide the required fill material. Lease pad construction will be staged, and associated gravel pits and tracks will be constructed in each stage as required.

The location of seven lease pads (LP1 through LP7) and 10 gravel pits (GP1 through GP12) were proposed for the civil construction program. A scouting survey was undertaken in May 2020 to determine the suitability of the proposed locations and determine land condition prior to the civil construction program taking place. During the survey two of the proposed lease pad sites (LP3 and LP5) were found to support areas of wet indicator vegetation species and poorly drained soils. These sites are considered to be constrained due to inundation during the wet season. Alternative sites (LP3alt and LP5new) were located in areas of suitable land nearby to the original proposed lease pad locations.

Gravel pit footprints were situated either on top of or nearby to proposed gravel pit locations within the same land type. One gravel pit site (GP9) was found to be unsuitable as it was located too far away from proposed access tracks and was removed from the civil construction program. An existing gravel pit was also identified for use, located adjacent to the proposed camp site along-side the Carpentaria Highway.

1.3 Scope of Works

The scope of work for the LCA involved:

- a review of historical data and reports prepared during the previous Beetaloo onshore oil and gas exploration programs
- a search of the Commonwealth Department of Agriculture, Water and the Environment (DAWE) Protected Matters database (5 June 2020)
- a search of the NT Natural Resource Management InfoNet Database (flora and fauna database) (5 June 2020)
- a search of the NT Natural resource (NR) Maps web mapping tool (2020)
- a search of the Atlas of Living Australia (ALA) database for flora and fauna records (2020)
- completion of LCA field survey of the proposed exploration area for the civil construction program during May 2020.
- Preparation of this report.

2.0 Assessment Method

2.1 Desktop Review

Field data that had been collected between 2005 and 2020 for the permit areas was mapped based on image interpretation, with ground-truthing of the proposed exploration areas being completed during field assessments (refer Section 2.2.2). This information was reviewed prior to the field work to identify the following:

- terrestrial vegetation types and flora and fauna species occurring within the region and with potential to occur within the exploration area, using existing documents and aerial / satellite imagery.
- *Environment Protection and Biodiversity Conservation Act* (EPBC Act) and *Territory Parks and Wildlife Conservation Act* (TPWC Act) listed threatened species or communities identified within the region and with potential to occur within the exploration area.
- matters of national environmental significance or other matters protected by the EPBC Act that are likely to occur within the exploration area.
- weeds or feral animals listed under the EPBC Act or *Weeds Management Act* that potentially occur within the exploration area.

Table 2 provides a chronological list of reports previously compiled for the exploration permit area between 2004 and 2020, in relation to environmental approvals and management support for petroleum exploration activities in the Beetaloo Basin, NT.

The extent of work undertaken since 2004 has enabled a comprehensive understanding of the natural and cultural environment, which has been used in assessing the proposed exploration areas within the Permit Area.

Table 2 Summary of existing Environmental Assessments and reports for the Beetaloo Basin (2004 to 2020)

Date	Report
Sweetpea Petroleum	
Jul- Aug 2004	Baseline land condition assessment
	Site database established
Jul 2005	Exploration EMP finalised and approved
November 2019 to February 2020	Land Condition Assessment for EP136 (Seismic Program)
Oct 2020	Seismic Environmental Management Plan
Petrohunter Australia (Partner to Sweetpea)	
Dec 2006	Baseline vegetation assessment
Apr 2007	Drill site assessments
Apr 2007	Annual report
Jun 2007	Update of the existing EMP to include the new Exploration Permit areas
Jul 2007	Drill Site maps
Jul 2007	Supplemental Environmental Management Plan, Drilling Program 2007, Beetaloo Basin, NT
Jul 2007	Soil erosion assessment
Jul 2007	Groundwater quality
July 2007	Emergency Maps
Jul 2007	Environment & Heritage Induction Materials

Date	Report
Aug 2007	Site-based Drilling EMP
Paltar	
Apr 2015	Land Condition Assessment and Heritage Assessment of EP136 and EP143
Jun 2015	Environmental Management Plan for EP136 (did not proceed for approval)
Falcon Oil and Gas	
Dec 2010	Drill site condition assessments
Jan 2011	Archaeological survey
March 2011	Site-specific drilling EMP
2011	Falcon Shenandoah 1 Stimulation and Testing Groundwater Monitoring
2011/2012	Shenandoah 1 Re-Entry Environment Plan (EP)
July 2012	EP99 Archaeological Survey, Beetaloo Basin
2013	EP99 Seismic Exploration Environmental Management Plan
2013	Sweetpea 2006 Closeout Environmental Survey
Origin	
2015 and 2016	Beetaloo Basin Environmental and Heritage Assessment and preparation of Approval documentation.
October 2018	Land Condition Assessment and Heritage Assessment of Velkerri 76 S1-1, Velkerri 76, Velkerri 117, Velkerri 98, Kyalla 117 and Kyalla 98
July 2019	Weed Survey of Kyalla 117 N2-1 and access tracks
December 2019	Land Condition Assessment and Heritage Assessment of EP76, EP117 and EP98

2.2 Field assessment

The LCA field survey of the proposed civil construction and water bore drilling area was conducted by AECOM Senior Botanist David van den Hoek and Heritage Subconsultant Silvano Jung (Ellengowan Enterprises) from the 25 to 30 May 2020. The May 2020 survey provided the supplementary information captured during the November 2019 survey which was completed by Environmental Scientists William Riddell and Jace Emberg, and Heritage Consultant Perry Braithwaite

The LCA field surveys completed within EP136 used an aerial rapid condition assessment method similar to previous assessments carried out by AECOM for past exploration activities. The method allows for large areas to be surveyed over a relatively short period of time through the use of a helicopter platform to assess proposed Project Area, as well access remote locations for on-ground-truthing.

2.2.1 Aerial Survey

The LCA involved flying above the entire seismic route and civil construction lease sites at an average height of 45 m at approximately 60 to 80 km/hr (45 to 60 knots). During flight, digital images were captured within each mapped vegetation boundary along the route, and within each lease pad and proposed gravel pit area. Dashcam video footage was also captured along the entire seismic route. Observations on weed occurrence within the civil construction footprint were recorded during the aerial survey.

The captured video and still imagery were analysed to classify land condition along a 10 m wide strip centred on the seismic exploration line. Scores were applied to sections of the seismic line according to a five-part scale based on the presence of native vegetation, fire impact, weeds, extent of bare ground, and the presence of erosion (refer Table 3).

Table 3 Land Condition Assessment Scale

1	2	3	4	5
Very Poor	Poor	Disturbed	Good	Excellent
No native vegetation/ extreme erosion	Little native vegetation/ high erosion	Medium extent of native vegetation/ some erosion	High level of native vegetation/ limited erosion	Intact native vegetation/ no erosion
No native vegetation – all exotic plants/non local plants or almost completely bare ground/ eroded.	Clumps of native vegetation with extensive weeds or large patches of bare ground. Vegetation structure destroyed.	Native vegetation distributed throughout interspersed with significant patches of weeds or bare ground and/or some erosion. Vegetation structure damaged.	Mostly all native vegetation with some weedy patches or some damage to vegetation structure and/or limited erosion. Vegetation structure mostly intact.	Native vegetation with only minor, dispersed weed invasion or isolated disturbances and/or minimal evidence of a track.

The assessment of video and still imagery at georeferenced points provides a baseline for future assessment of land condition within the civil construction footprint areas. This approach enables better repeatability and verification of the results compared to assessment in the field.

2.2.2 Ground Survey

The on-ground based surveys undertaken by AECOM during May 2020 included the following:

- Assessment of land condition at lease pads (seven sites), including:
 - Vegetation descriptions
 - Canopy cover
 - Basal area
 - Soil descriptions
 - Land suitability.
- Assessment of land condition at one proposed gravel pit (GP11), including:
 - Vegetation description
 - Soil description.
- Ground photos were taken at one gravel pit (GP7), and aerial photos were taken at an additional nine sites proposed for gravel extraction.
- Heritage assessment was undertaken at each of the ground survey sites.

Vegetation and habitat assessments were based on a survey of 20 m x 20 m quadrats at seven lease pads and one gravel pit. The following data was collected to classify vegetation communities at NVIS level V:

- dominant growth form (tree, shrub, hummock grass, tussock grass, forb etc.)
- height range and average height within each strata
- dominant species within the three main strata (ground cover, mid-storey and upper-storey).

Results of the vegetation survey quadrats were extrapolated to cover the areas likely to be affected, using aerial photography and existing broad-scale vegetation maps.

Canopy cover transects

During the May 2020 field survey upper strata vegetation cover was recorded along transects at monitoring well sites to provide baseline data on vegetation structure for the site. This information will be used to guide the revegetation program. A total of four hundred canopy points were recorded using an optical tube at each metre along four 100 m transect lines. Survey transects were centred on the monitoring well location and directed to the north, east, south and west.

Basal sweep

A total of five basal sweeps were also conducted, one at the well centre point and one at the end of each vegetation transect line. Basal area of trees was recorded using a basal wedge sighted at arm's length. The following scoring system was applied to measure basal area:

- tree trunk measuring greater than the width of the basal wedge = 1
- tree trunk measuring equal to the width of the basal wedge = 0.5
- tree trunk measuring less than the width of the basal wedge = 0.

Soil

Soil was assessed at each of the vegetation assessment sites. Soil samples were dug to a depth of 100 mm and collected within ziplock bags for off-site assessment of texture, colour and percentage of coarse fragments (>2 mm). Observations on the percentage of surface gravel cover were made in the field.

Weeds

A record of weed occurrence was undertaken at each of the ground survey sites. Weed records were limited to those classified under the Northern Territory Weeds Act. Weed attributes required by the Northern Territory Weed Branch guidelines were collected during the May 2020 field survey and included the following:

- weed name
- patch size (5m, 20m, 50m or 100m)
- patch density (<1%, 1-10%, 11-50%, >50%)
- whether seed has dropped.

Fuel load, habitat and disturbance

Fuel load assessments at each vegetation and habitat survey site was undertaken to assess fire risk to inform fire-related mitigation actions in the EMP. This included assessment of the type of fuel present (grasses, shrubs, trees, perennial species vs. annual species, etc.), its stage of curing, its height, topography, weather patterns and values at risk (e.g. high conservation value area, pasture, fences and infrastructure).

Other site-based characteristics of the proposed lease pads recorded included:

- the presence of drainage lines and the direction of surface flows
- the distance to the nearest sensitive receptors (such as significant vegetation communities or fauna habitats)
- fauna habitat features, such as hollows, logs and burrows (the fauna habitat quality for each mapped vegetation community type would be assessed)
- incidental fauna sightings
- the presence of weeds animals (i.e. indication of scats, tracks, wallows, etc.)
- evidence of past fire.

Timing

The May 2020 land condition assessment was undertaken at the beginning of the dry season when rainfall had begun to cease. Fire was yet to occur within the exploration area and vegetation was mainly identifiable.

Heritage

A targeted heritage survey was undertaken for the civil construction area within Tanumbirini PPL. A detailed heritage survey report was been prepared in addition to this LCA report (AECOM, 2020).

2.2.3 Satellite Imagery Analysis

Satellite imagery captured on August 2019 was used to conduct various analyses to support the field-based land condition assessment, map vegetation and provide a regional landscape context to the results. The following analyses were carried out using unsupervised analysis techniques within a 1 km buffer each side of the proposed seismic lines:

1. Proportion of Bare Earth within 1 ha grid squares across the study area.
2. Vegetation structure classified into:
 - a. 'Bare Ground' corresponding to areas with very low vegetation biomass, typically associated with creek lines.
 - b. "Grass" corresponding with open country located in lower-lying parts of the landscape
 - c. "Dry Grass" corresponding with open country in more elevated parts of the landscape
 - d. "Shrub" corresponding to mid stata vegetation such as Bullwaddy and Lancewood forest
 - e. "Tree" corresponding to the dominant upper strata vegetation.
3. vegetation type – noting that only limited ground truthing was possible across an area of this size and should be treated with caution.

3.0 Physical Environment

3.1 Climate

The climate of the Project 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. October through to March are dominated by hot and wet conditions, while mild days and cool nights are experienced from May to August. 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).

Table 4 presents the climate averages for Bureau of Meteorology (BoM) weather stations located at Daly Waters, Newcastle Waters and Elliot. The average annual rainfall in the north of the permit area (Daly Waters) is 680 mm, becoming drier at the southern portion with an average annual rainfall of 608 mm at Elliott and 535 mm at Newcastle Waters.

The maximum temperature in the permit area exceeds 30°C from August to May. November is usually the hottest month, with maximum temperatures reaching 40°C (Table 4). Minimum monthly temperatures range from 11 to 24°C, with July being the coldest month.

Relative humidity and evaporation are highest during the summer months. The 9 am maximum average for relative humidity ranges from 68% to 73% and occurs during February across all three monitoring sites. The maximum mean daily evaporation level is 8.8 mm at Daly Waters, 9.6 mm at Newcastle Waters and 9.8 mm at Elliott. The evaporation rate is high because of the high temperatures, moderate humidity, wind and (indirectly) the high number of sunshine hours that are experienced in the area (Holt & Bertram, 1981). The prevailing wind in the permit area is from the south east; with wind velocities in the range of 6 to 9 km/hr.

3.2 Topography

The Project 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 Project Area and permit area fall 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.

Table 4 Average climate at Daly Waters, Newcastle Waters and Elliot

Month	Daily Maximum Temperature (°C)			Daily Minimum Temperature (°C)			Mean Monthly Rainfall (mm)			Relative Humidity (%) [#]			Mean Daily Evaporation (mm)			Wind Speed (km/hr) [#]			Wind Direction [#]		
	DW	NW	E	DW	NW	E	DW	NW	E	DW	NW	E	DW	NW	E	DW	NW	E	DW	NW	E
January	36.6	37.3	37.4	24.0	24.1	24.2	165.4	125.5	138.2	69	63	65	7.1	8.2	7.9	5.9	8.8	5.5	NW	NW	NW
February	35.5	35.6	36.6	23.4	23.7	23.8	165.4	130.9	154.8	73	68	70	6.0	7.0	7.3	4.8	9.4	5.8	NW	E,SE	W
March	34.6	34.7	35.8	22.4	22.6	22.4	120.1	93.7	81.0	70	62	64	5.9	6.3	7.3	4.5	11.0	6.9	SE	E,SE	E
April	33.7	33.3	34.5	19.3	19.4	19.7	23.6	24.6	20.9	53	54	50	6.2	6.4	7.5	6.7	14.0	9.2	SE	E,SE	SE
May	31.4	30.0	31.3	15.8	16.1	16.0	5.0	9.3	6.6	50	51	47	5.9	5.1	6.5	7.8	16.7	10.4	SE	E,SE	SE
June	28.7	27.7	28.4	12.9	12.7	12.6	5.6	5.3	4.6	50	51	46	5.5	4.4	5.6	7.5	15.2	11.6	SE	E,SE	E
July	28.9	27.5	28.4	11.8	11.3	11.3	1.5	3.4	2.9	47	47	42	5.6	4.6	5.7	7.8	15.0	10.8	SE	E,SE	SE
August	31.9	30.8	31.1	13.5	13.7	13.1	1.7	1.0	1.0	44	42	37	6.6	6.2	6.7	6.6	15.3	11.2	SE	E,SE	SE
September	35.0	34.1	35.4	17.2	17.4	17.4	4.9	5.4	5.6	43	41	36	8.4	8.2	8.4	7.8	14.2	11.4	SE	E,SE	E
October	37.7	37.1	38.0	21.1	21.2	20.9	22.5	20.9	20.9	45	42	41	8.8	9.1	9.4	7.8	14.5	11.2	SE	N	N
November	38.4	38.4	39.0	23.5	23.3	23.4	59.4	35.7	48.0	52	43	45	8.5	9.2	9.5	6.7	12.5	8.6	NW	N	NW
December	38.2	38.5	38.5	24.0	24.1	24.4	110.0	77.3	104.0	59	51	56	8.1	9.1	8.7	5.5	10.1	6.5	NW	N	N
Annual			34.5			19.1	680.5	535.4	596.6			50			7.5			9.1			
Minimum	28.7	27.5	28.4	11.8	11.3	11.3	1.5	1.0	1.0	43	41	36	5.5	4.4	5.6	4.5	8.8	5.5			
Maximum	38.4	38.5	39.0	24.0	24.1	24.4	165.4	130.9	154.8	73	68	70	8.8	9.2	9.5	7.8	16.7	11.6			
Average	34.2	33.8	34.5	19.1	19.1	19.1	57.1	44.4	49.0	54	51	50	6.9	7.0	7.5	6.6	13.1	9.1			
DW – Daly Waters, NW – Newcastle Waters, E – Elliott, # data recorded at 9am daily, - No data recorded. Data sourced from Bureau of Meteorology, <i>Climate Averages and Wind Frequency Analysis for Station 014618 Daly Waters recorded from 1873-2013, 015089 Newcastle Waters recorded from 1941-1980 and 015131 Elliott recorded from 1949-2019.</i>																					

3.3 Land Systems

Land systems are classified according to recurring patterns of geology, topography, soils and vegetation. Land systems mapped for the Project Area are shown in Figure 3. Land descriptions for the area are shown in Table 5 and referenced from the *Land Systems of the Northern Part of the Northern Territory*, which is based on 16 land system surveys, developed as part of the Australian Soil Resource Information System (ASRIS) national soils database at a scale of 1:250,000.

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

Table 5 Land Systems of the Project Area

Map Unit	Name	Description	Reference
BE	Beetaloo	Plains and rises associated with deeply weathered profiles (laterite) including sand sheets and other depositional products; sandy and earth soils. Lancewood Forest occurs in the north-west corner of the region.	Christian <i>et al.</i> , 1951

3.4 Geology

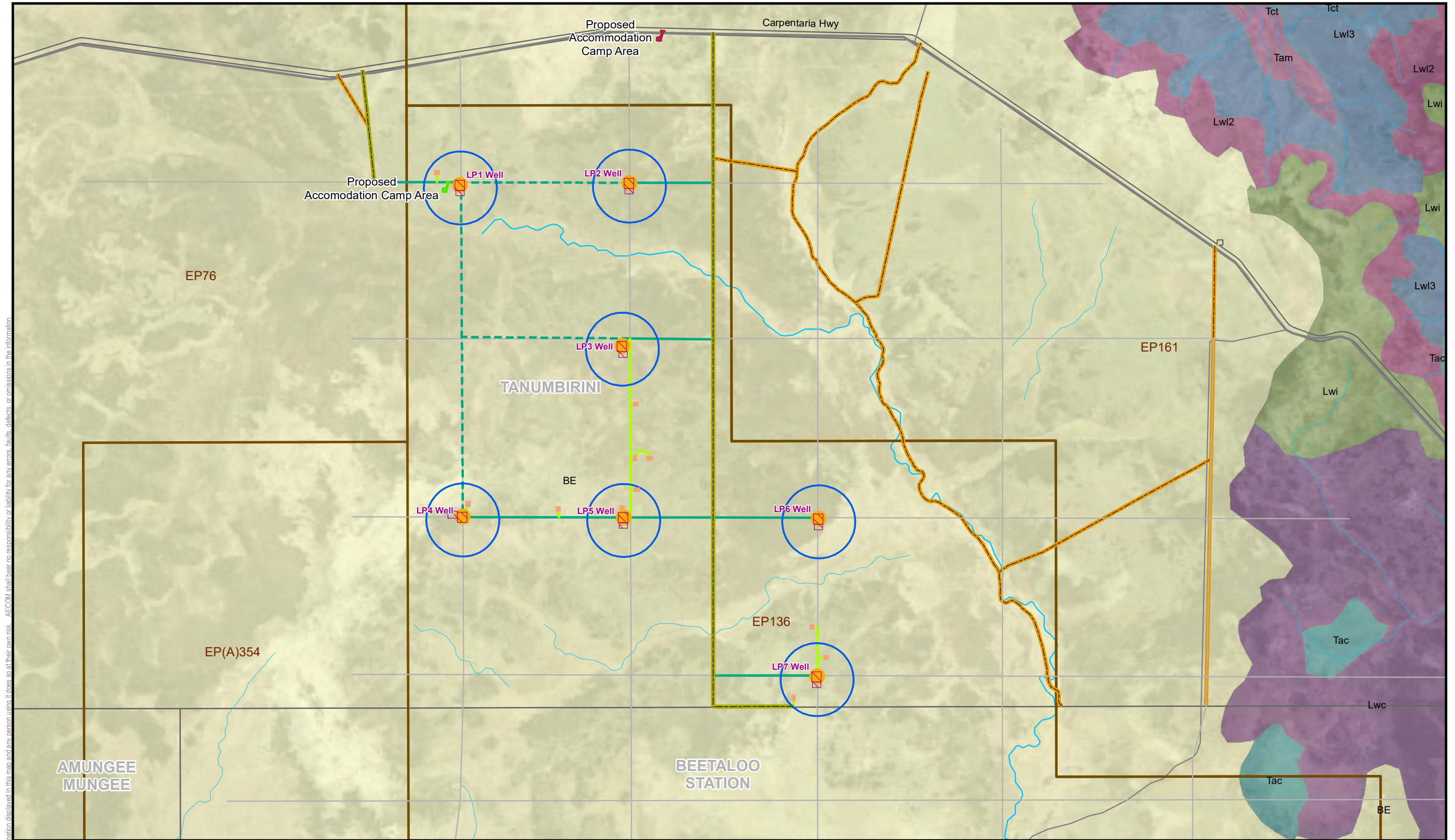
The Project Area occurs within the Western Gulf sub-basin, part of the larger Carpentaria Basin formed during the Jurassic and Cretaceous periods (Ahmed *et al.*, 2013). Soft clays and sandstone are the primary rock formation in the basin and overlay the older Pre-Cambrian and Cambrian rocks. Isolated 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 Project Area (refer Figure 4) 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 civil construction area, and are exposed only in the bedrock hills located to the north of the exploration area on Tanumbirini Station (Tickell, 2003).

Cambrian formations, comprising limestone, siltstone and sandstone, are expressed only in the south west region of the northern exploration area. 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).

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.



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2 1 0 2 km

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

 - 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, Bores - NT Gov 2019.
Pastora Infrastructure - AECOM 2020

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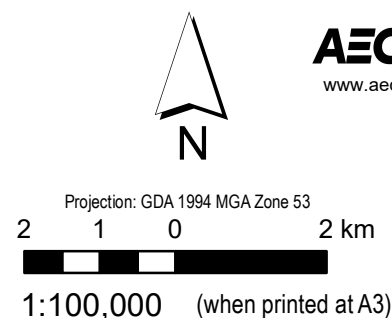
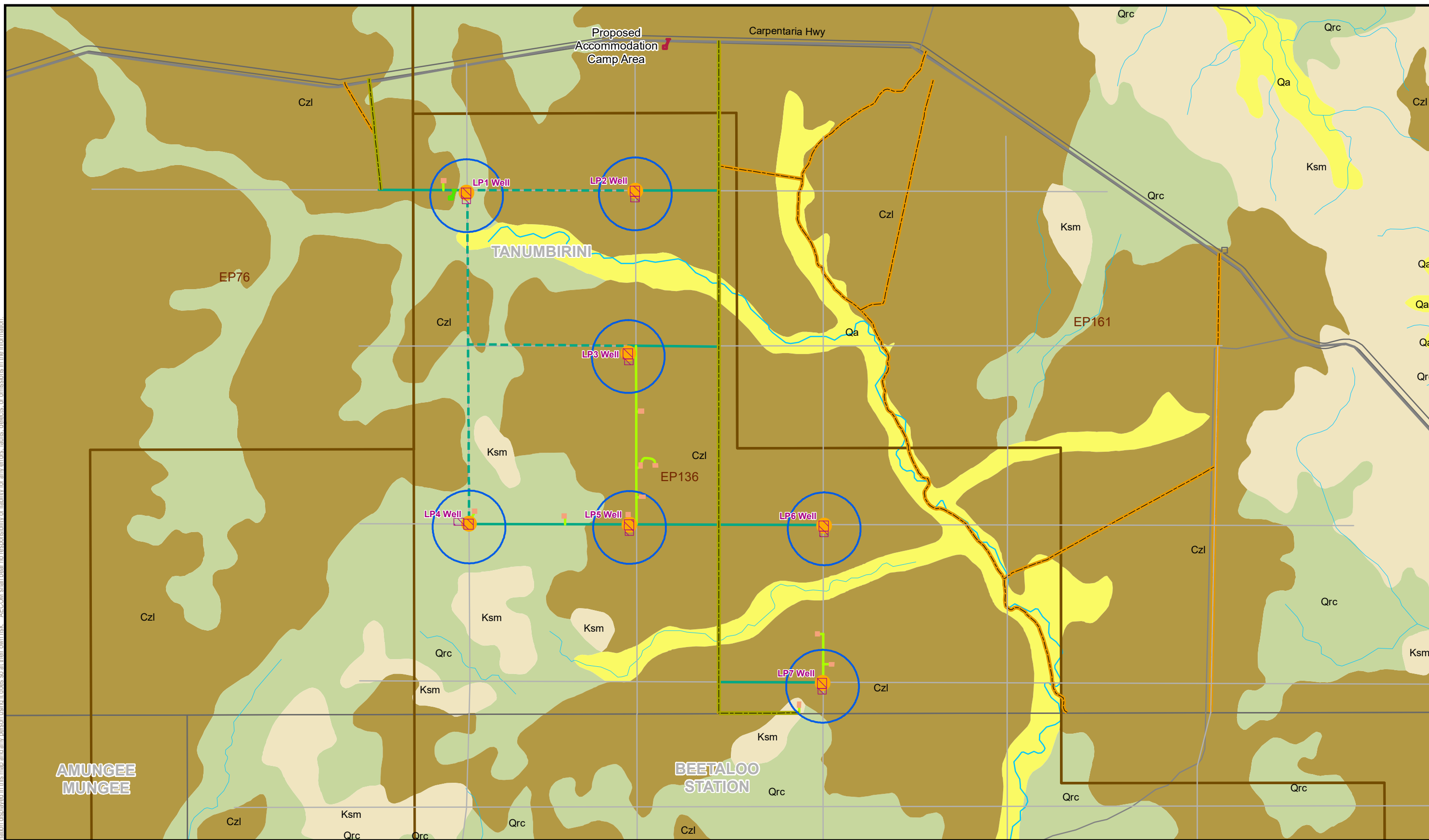
**Land Systems within
the Civil Construction Program**

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**Figure
3**

A3 size

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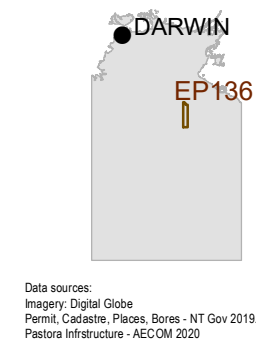


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Geology

- Czl-lateritic duricrust
- Ksm-sandstone
- Qa-alluvial sediment
- Qrc-sand, gravel



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

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**Figure
4**

A3 size

3.5 Soils

3.5.1 Soil types

The Project Area occurs within the Sturt Plateau, comprises 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 proposed civil construction area, are classed as very strongly leached soils of the Tertiary land surface. Two main soil types are located within this area, including:

- 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.

3.5.2 Erosion susceptibility

Soil erosion susceptibility varies throughout the permit 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 (Aldrick & Wilson, 1992).

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 location of proposed lease areas has been examined on the ground, to determine the risk of erosion occurring. Factors considered include the following.

- 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 during the exploration program. Both sites reported a soil type of red silty sand.
- Slope – usually the slope of the site will determine the risk of erosion during rainfall events, with steeply inclined areas a higher risk than small undulations in the landform. All the proposed lease sites were in very flat (low relief) with a slope of <1%. During the program, the crossings of the access track on the small ephemeral streams and Newcastle Creek will require additional controls.

- Aspect – the position of the access track and pads in relation to the direction of the contour should be considered and creation of tracks across (as opposed to parallel with) the contour should be avoided.
- Rainfall – Table 6 presents the erosion risk rating based on average monthly rainfall using the rating system provided in the IECA (2008) for Daly Waters. The construction activities for all exploration activities are proposed to commence following the wet season from May 2020 onwards. Most of the soil disturbance activities will be completed prior to the onset of the wet season in November 2020. As such, based on rainfall during the construction period, the overall risk of erosion is considered very low for the exploration area.

Table 6 Erosion risk rating based on average monthly rainfall at Daly Waters

	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall (mm)	165.4	165.4	120.1	23.6	5.0	5.6	1.5	1.7	4.9	22.5	59.4	110
Erosion Risk*	H	H	H	VL	VL	VL	VL	VL	VL	VL	M	H

*  = Extreme (>225 mm);  = High (100+ to 225 mm);  = Moderate (45+ to 100 mm);  = Low (30+ to 45 mm);  = Very Low (0 to 30 mm)

The main issues to be managed in relation to soils during civil construction activities in the Project Area includes the generation of dust at lease pads. Previous surveys have identified bull dust forming where the surface crust had been disturbed and then subjected to repeated disturbance (AECOM, 2015a). This was primarily in grassland areas and creek crossings.

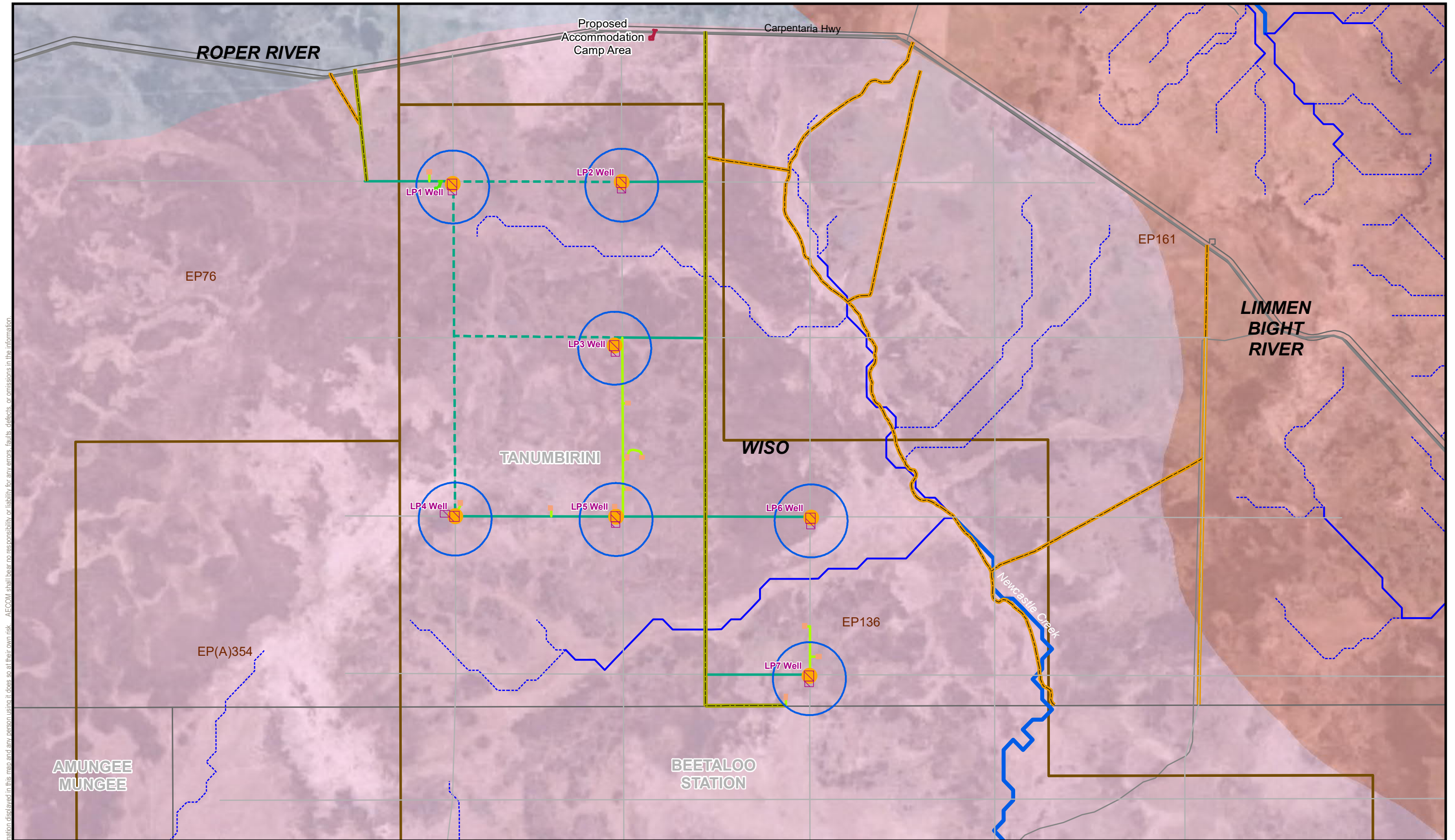
3.6 Hydrology

3.6.1 Surface water

The Project Area is located within the Wiso drainage basins. The Wiso Basin 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 Project Area. Access tracks have been designed to utilise the existing main station track which crosses Newcastle Creek twice. The secondary station access track to access LP1 and all other tracks to access the lease pads do not cross any creeks or draining lines within the Project Area (refer Figure 5). The creeks flow for only short periods during the wet season, with waterholes forming at the beginning of the dry season. The extent of inundation depends on the severity of the wet season and can range from remaining completely dry to widespread flooding.

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).



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Stream Order

Intermittant Streams

- 1
- 2

Creeks

- 3

River basins

- Limmen Bight River
- Roper River
- Wiso

DARWIN

EP136

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

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Figure 5

A3 size

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 6).

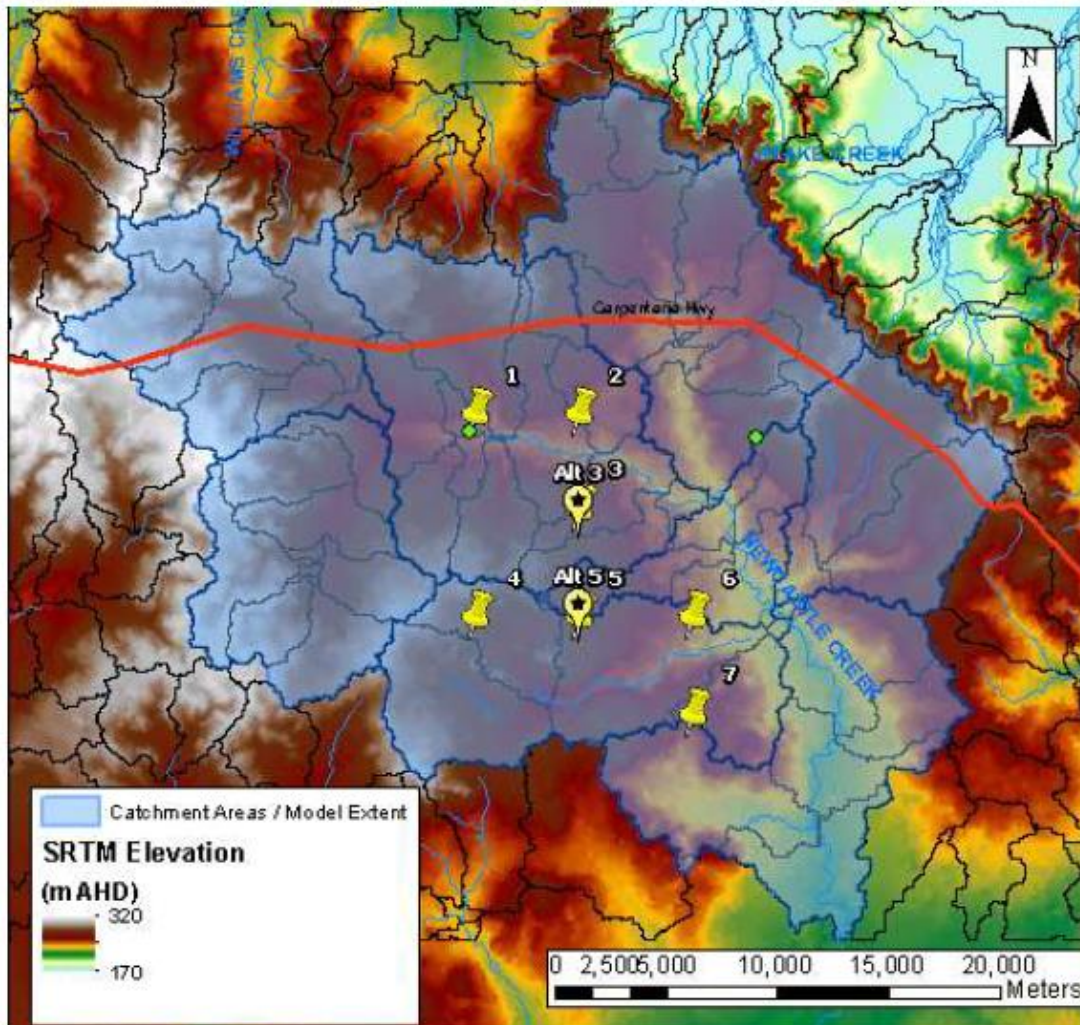


Figure 6 1% AEP Model Extent

The following methodology was used in the assessment of the flood levels at the proposed drill pad locations:

- Catchment delineation using available aerial photography and Shuttle Radar Topography Mission SRTM ~1s (30 m) topographic data (refer Figure 6).
- Development of a 30 m grid 2D TUFLOW model with direct rainfall-on-grid applied (refer Table 7).
- 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.

Table 7 TUFLOW Model Description

Model Feature	Status	Notes
Global		
Current Model Status	Unverified and uncalibrated	No calibration data available
Coordinate Reference System	GDA1994 MGA 53	
Software Platform	TUFLOW HPC GPU	No 1D elements
Version	2020-AB	
Model Extent	Whole catchment to ~15 km upstream of Newcastle Creek junction with Yaroo Creek	Refer catchment extent shaded blue on Figure 6
Events Simulated	1% AEP, all durations and TPs	9 hTP10 and 24 h TP02 critical for sites of interest
Model Calibration	No data available	
Model Verification	Verify catchment outflow vs rational method	For critical duration only
Hydrologic Model		
Hydrologic Model	Rain on mesh, RORB for verification	ARR 2019. Median pre-burst
Infiltration model	Initial = 10 mm Continuing = 5 mm/hr	Chosen values are slightly lower than ARR 2019 recommended values based on experience. Sensitivity analysis (zero losses) undertaken.
Hydraulic Model		
Overland Flow		
Topographic representation	1s (~30m) grid hydrologically enforced SRTM data	No zsh enforcement. Carpentaria Highway not well refined in DEM to allow this.
Hydraulic Roughness	Global value of $n=0.06$. Sensitivity to $n=0.035$ tested for critical duration.	
Downstream Model Boundary	HQ	Ponding occurs at some locations but does not impact focus sites.
Cut-off Depth	0.1 m for depth map outputs	
Map Outputs	d_Max, H_max, V_Max, Hazard.	Reference hazard table AEMI 2014 H1-H6.
Constructed Drainage Features		
Pipe Representation	No data available	Unlikely significant or be key at 1% AEP.
Structures	No data available	

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 7 and presented in Table 8. 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 lease 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 8 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.

It is noted that the flood model DEM is derived from the SRTM 1s (30 m) horizontal resolution data. The vertical accuracy of SRTM data varies from 5 to 10 m and therefore the vertical accuracy of the flood levels in the study should be expected to have a similar order of accuracy. Further detailed surveys have conducted of the lease pads to provides more detail for the design.

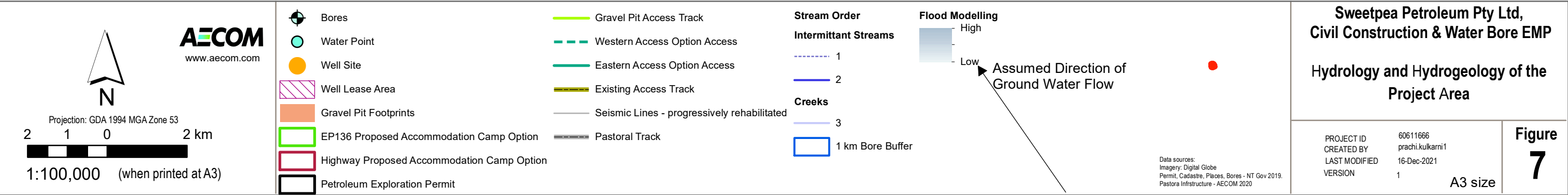
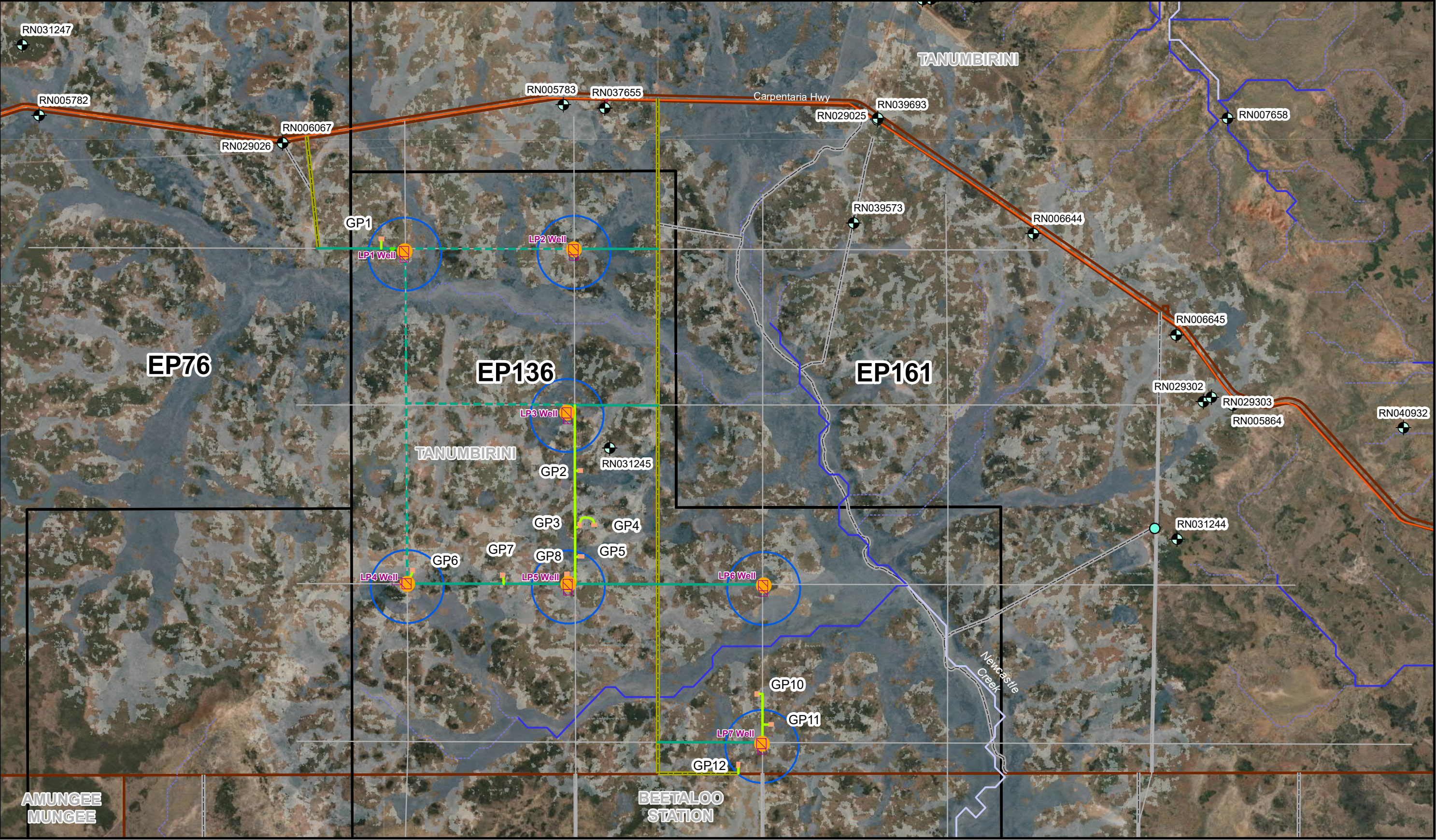
3.7 Hydrogeology

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).

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The Beetaloo Sub-basin, as shown by the hydrostratigraphy in Table 9 comprises a thick sequence of flat-lying mudstone and sandstone formations (Roper Group) that were deposited between 1,500 and 1,430 million years ago (Ma). The Roper Group is estimated to reach 5 km in thickness at the centre of the basin, with the north and eastern margins occurring at an average depth of about 500 m. The Roper Group is overlain by the Georgina Basin (630 – 497 Ma), which includes widespread basalts and a thick limestone sequence that forms the Cambrian Limestone Aquifer (CLA), which provides an important water resource for the pastoral industry and communities within the region. The Georgina Basin is capped by Cretaceous mudstone and sandstone (145 – 66 Ma) and recent alluvial and laterite deposits (CloudGMS, 2015).

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 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.

Table 9 Summary of Beetaloo Sub-basin hydrostratigraphy

Province	Period/Age	Formation		Aquifer Status	Thickness (m)	Yield (L/s)	Ave EC (µs/cm)
Carpentaria Basin	Cretaceous 145 – 66 Ma	Undifferentiated		Local aquifer	0 - 130	0.3 - 4	1,800
Georgina Basin	Cambrian 497-630 Ma	Cambrian Limestone Aquifer (CLA)	Anthony Lagoon Beds	Regional aquifer	0 - 200	1 – 10	1,600
			Gum Ridge Formation	Regional aquifer	0 - 300	0.3- >20	1,400
		Antrim Plateau Volcanics		Regional aquitard	0 - 440	0.3 – 5	900
		Bukalara Sandstone		Local Aquifer (not regionally connected)	0 - 75	0.3- 5	1,000
Beetaloo Sub-basin (Roper group)	Not known	Hayfield Mudstone		Regional aquitard	0 - 450	-	32,000
		Jamison Sandstone		Local Aquifer (not regionally connected)	0 - 150	-	138,000
	Meso-Proterozoic 1,430-1,500 Ma	Kyalla Formation		Regional aquitard	0 - 800	-	-
		Moorak Formation		Local Aquifer (not regionally connected)	0 - 500	0.5 – 5	131,000
		Velkerri Formation		Regional aquitard	700 - 900	-	-
		Bessie Ck Sandstone		Local Aquifer (not regionally connected)	450	0.5 - 5	-

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 10.

Table 10 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 294.7 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 11 and Figure 7 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 11 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 8) 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.

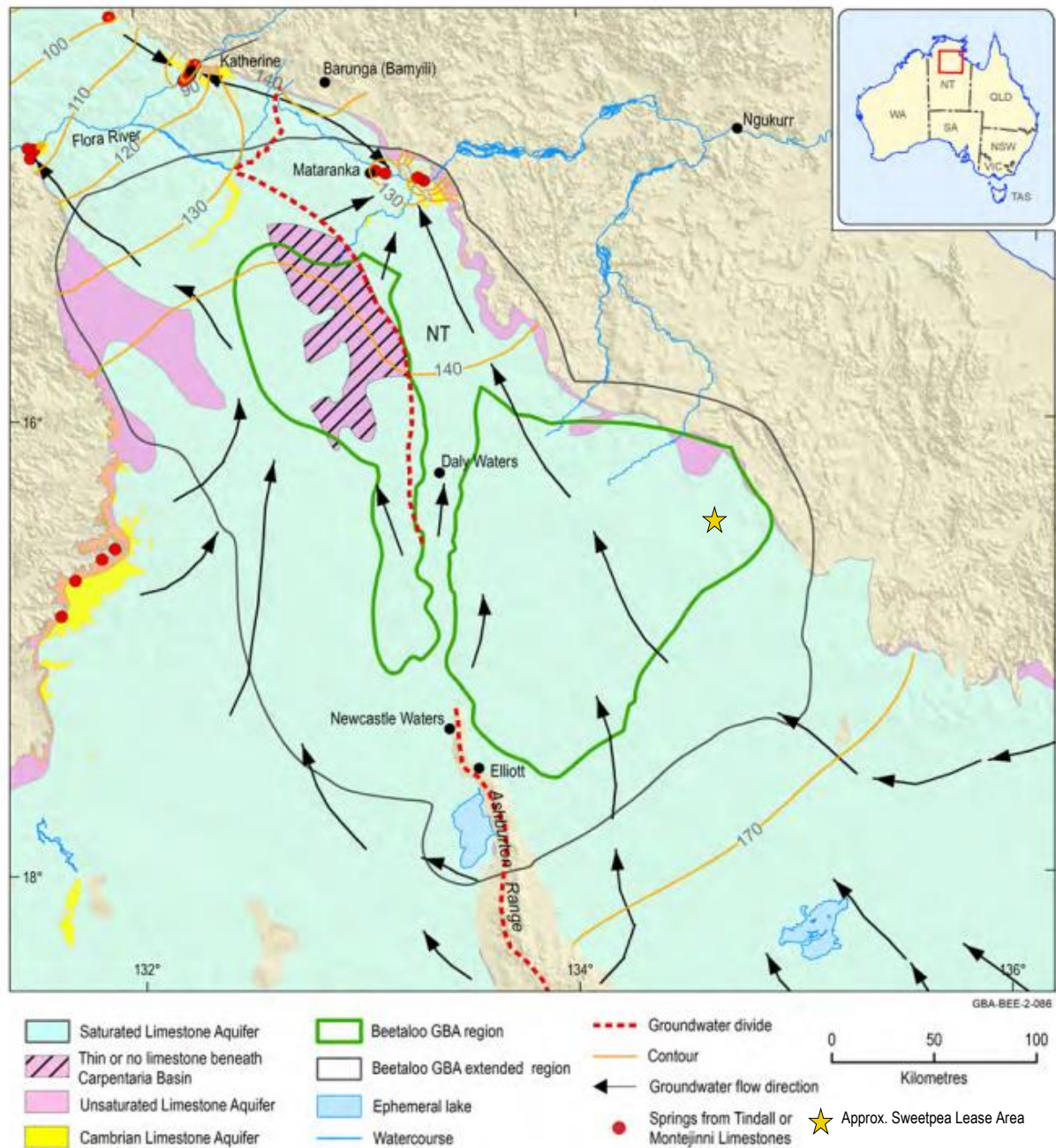


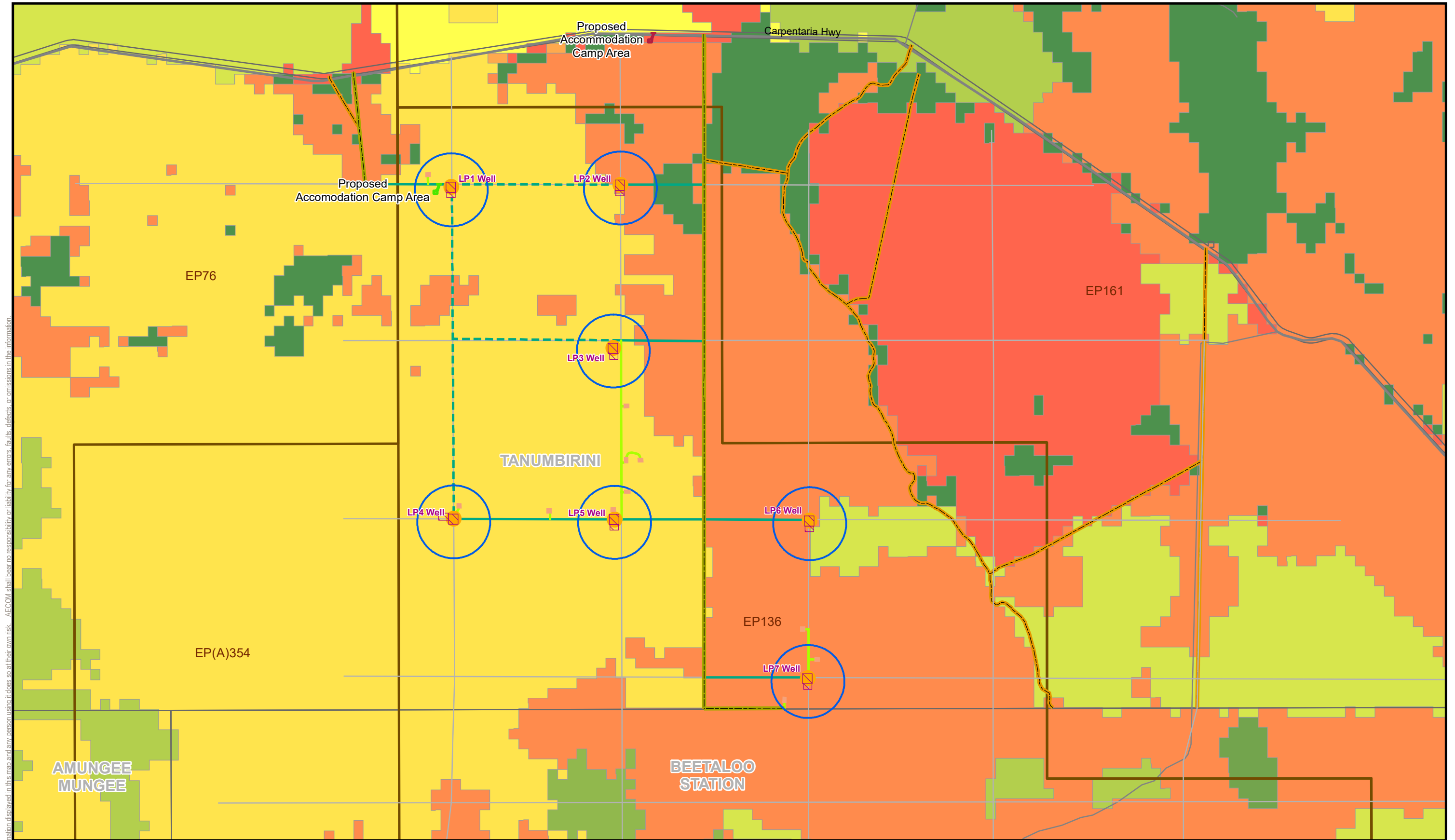
Figure 8 Regional groundwater flow in the CLA System (extract Huddleston-Holmes et al. 2020)

3.8 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 permit 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 permit area. Field investigations indicate that fire disturbance varies throughout the Project Area, with most sites showing evidence of fire occurring more than two years ago. 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 of the sites suggesting that higher intensity fires do sometimes occur.

some trees and shrubs had been killed by fire at four sites suggesting that high intensity fires do sometimes occur (NAFI, 2020). Figure 9 shows the fire frequency within the exploration area over the past 11 years (2009 to 2020). The majority of the exploration area has been burnt between one and two times since 2009.



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

Number of Years Burnt since 2011

0	1	2	3	4	5	6	8	9	10
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EP136

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

**Fire Frequency within
EP136 Exploration Area**

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

Figure 9

A3 size

4.0 Natural Environment

4.1 Bioregions

The Interim Biogeographic Regionalisation of Australia (IBRA) is a nationally recognised ecosystem classification system (Thackway & Creswell, 1995). Bioregions are large, geographically distinct ecosystems that are distinguished by broad physical and biological characteristics, which can be further classified into Subregions. These regions and subregions are used as the basis for regional comparisons and conservation of flora and floristic communities. Of the 85 bioregions mapped nationally, 20 occur within the Northern Territory.

The Project Area occurs within the Sturt Plateau bioregion. The following provides the description of the bioregions based on the biodiversity audit carried out by Parks and Wildlife Services (Baker et al, 2005):

- Sturt Plateau Bioregion - comprises undulating plains on sandstone, with predominantly neutral sandy red and yellow earth soils. Dominant vegetation is eucalypt woodland (dominated by 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.

4.2 Vegetation Communities

The Project Area is typically dominated by *Corymbia* and *Eucalyptus* 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 *C. terminalis* open 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.

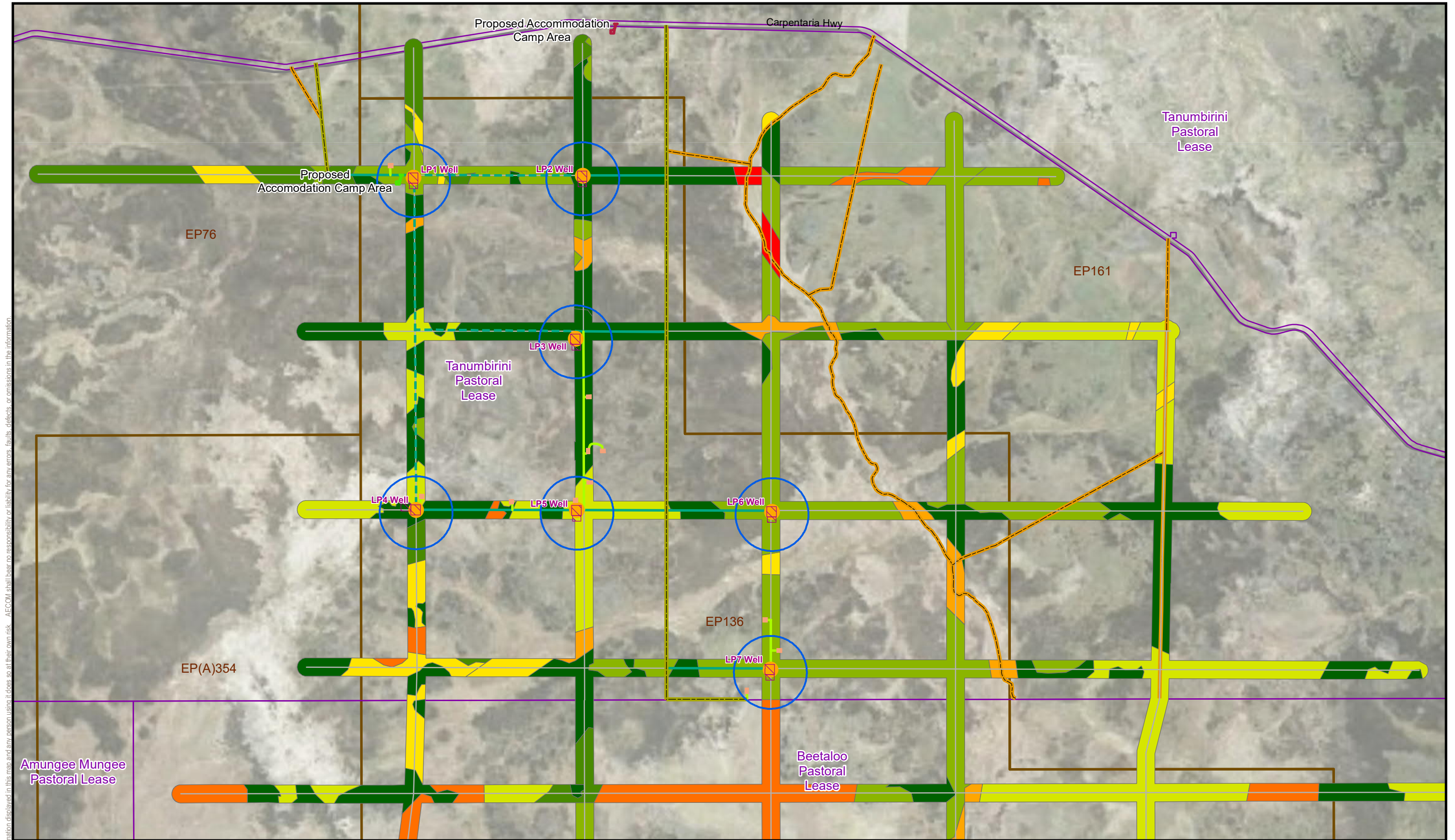
AECOM has conducted vegetation baseline assessments within the Beetaloo Sub-basin in 2004, 2006, 2010, 2014 and 2016. Most recently, a survey was undertaken along seismic lines during November 2019, and surveys of lease pads were undertaken in May 2020 and vegetation was mapped at 1:50k scale.

The 2019 and 2020 field assessment confirmed that the main vegetation communities within the civil construction footprint are woodlands, typically dominated by either *Corymbia dichromophloia* or *Eucalyptus leucophloia* and tall shrublands and woodlands of Bullwaddy (*Macropteranthes kekwickii*) and Lancewood (*Acacia shirleyi*) with open grassland understorey.

During the May 2020 survey three vegetation communities were identified within the proposed civil construction area. These communities are described below in Table 12. A 1:50k map of the entire exploration area is provided in Figure 10 and shows the location of survey sites in relation to the broad scale vegetation community boundaries. Due to the fine scale patchy distribution of vegetation community boundaries on ground, a number of vegetation communities recorded at ground survey sites do not align with broad vegetation boundaries mapped at a scale representative of the entire seismic exploration area.

Table 12 Vegetation communities

Vegetation Community	Description	Survey Sites	Photo ref
<i>Corymbia dichromophloia</i> open woodland	<i>Corymbia dichromophloia</i> +/- <i>Erythrophleum chlorostachys</i> mid-high open woodland with +/- <i>Terminalia canescens</i> mid-storey over <i>Triodia bitextura</i> hummock grassland or <i>Chrysopogon sp.</i> and <i>Schizachyrium fragile</i> tussock grassland	LP1, LP3alt, LP5new, LP7, GP11	
<i>Eucalyptus leucophloia</i> open woodland	<i>Eucalyptus leucophloia</i> and <i>Erythrophleum chlorostachys</i> mid-high open woodland over <i>Eulalia aurea</i> and <i>Sorghum timorense</i> tussock grassland	LP5, GP7	
<i>Acacia shirleyi</i> open woodland/shrubland	<i>Acacia shirleyi</i> open woodland with <i>Macropteranthes kekwickii</i> mid-storey over <i>Chrysopogon fallax</i> (mixed) tussock grassland	LP2, LP4, LP6	



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● Well Site	— Existing Access
■ Gravel Pit Footprints	— Gravel Pit Access
▨ Well Lease Area	— Western Access Option Access
□ 1 km Bore Buffer	— Eastern Access Option Access
□ EP136 Proposed Accommodation Camp Option	— Seismic Lines - progressively rehabilitated
▨ Highway Proposed Accommodation Camp Option	— Pastoral Track
▨ Native Title Register	— Highway
▨ Petroleum Exploration Permit	

Vegetation Type

- Acacia shirleyi forest / open woodland
- Macropteranthes kekwickii shrubland / open woodland
- Corymbia dichromophloia open woodland
- Eucalyptus leucophloia open woodland
- Eucalyptus chlorophylla low open woodland
- Eucalyptus microtheca woodland / isolated trees
- Eucalyptus pruinosa open woodland
- Eucalyptus camaldulensis isolated trees



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EP136

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

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Vegetation Type Mapping within
EP136 Exploration Area

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Figure
10

4.3 Native Flora

A search of the DAWE Protected Matters database of nationally significant fauna (PMST), the NT Government fauna database, and records from the Atlas of Living Australia (ALA) was undertaken for the exploration area with a 1 km buffer applied. No threatened vegetation communities are listed as likely to occur within the proposed civil construction area.

During the field surveys undertaken during November 2019 and May 2020 a total of 44 native flora species were recorded within the project area (Table 13). These surveys focused on recording dominant species within vegetation communities rather than a comprehensive floristic assessment.

Table 13 Flora species recorded during the November 2019 and May 2020 field surveys

Family	Genus	Species
APOCYNACEAE	<i>Carissa</i>	<i>lanceolata</i>
BORAGINACEAE	<i>Ehretia</i>	<i>saligna</i>
COMBRETACEAE	<i>Terminalia</i>	<i>canescens</i>
	<i>Terminalia</i>	<i>volucris</i>
	<i>Macropteranthes</i>	<i>kekwickii</i>
EUPHORBIACEAE	<i>Petalostigma</i>	<i>banksii</i>
		<i>pubescens</i>
FABACEAE	<i>Acacia</i>	<i>hammondii</i>
		<i>holosericea</i>
		<i>lysiphloia</i>
		<i>nuperrima</i>
		<i>shirleyi</i>
		<i>wickhamii</i>
	<i>Cullen</i>	<i>plumosum</i>
	<i>Erythrophleum</i>	<i>chlorostachys</i>
	<i>Sesbania</i>	<i>muelleri</i>
MALVACEAE	<i>Grewia</i>	<i>retusifolia</i>
	<i>Waltheria</i>	<i>indica</i>
MYRTACEAE	<i>Corymbia</i>	<i>dichromophloia</i> var. <i>obtusa</i>
		<i>ferruginea</i>
		<i>polycarpa</i>
		<i>terminalis</i>
	<i>Eucalyptus</i>	<i>camaldulensis</i>
		<i>chlorophylla</i>
		<i>leucophloia</i> subsp. <i>euroa</i>
		<i>microtheca</i>
		<i>pruinosa</i>
		<i>tectifera</i>
	<i>Melaleuca</i>	<i>citrolens</i>

Family	Genus	Species
		<i>nervosa</i>
		<i>viridiflora</i>
PHYLLANTHACEAE	<i>Flueggea</i>	<i>virosa</i>
POACEAE	<i>Aristida</i>	<i>inaequiglumis</i>
	<i>Chrysopogon</i>	<i>fallax</i>
	<i>Chrysopogon</i>	<i>pallidus</i>
	<i>Dichanthium</i>	<i>fecundum</i>
	<i>Eragrostis</i>	<i>cumingii</i>
	<i>Eriachne</i>	<i>armitii</i>
	<i>Eulalia</i>	<i>aurea</i>
	<i>Iseilema</i>	<i>vaginiflorum</i>
	<i>Mnesithea</i>	<i>formosa</i>
	<i>Panicum</i>	<i>effusum</i>
	<i>Paspalidium</i>	<i>rarum</i>
	<i>Schizachyrium</i>	<i>fragile</i>
	<i>Sorghum</i>	<i>timorense</i>
	<i>Triodia</i>	<i>bitextura</i>
PROTEACEAE	<i>Grevillea</i>	<i>pyramidalis</i>
	<i>Hakea</i>	<i>arborescens</i>
RHAMNACEAE	<i>Ventilago</i>	<i>viminalis</i>
SAPINDACEAE	<i>Atalaya</i>	<i>hemiglauca</i>
	<i>Dodonaea</i>	<i>coriacea</i>

4.3.1 Threatened flora species

The PMST and ALA database searches found that no Commonwealth-listed threatened plant species have been identified as potentially occurring within the exploration area. *Ipomoea argillicola*, listed as Near Threatened under the TPWC Act, could potentially occur within the exploration area as it has previously been recorded from the Bullwaddy Conservation Reserve and at locations surrounding the area (ALA 2019; NTG, 2013).

Three species recorded within the permit area are listed as being 'Data Deficient' under the TPWC Act. Data Deficient species are known only from a few locations and there is currently insufficient information on population sizes, trends and threats for accurate classification. The recorded species are:

- *Acrachne racemosa* (an annual grass)
- *Paspalidium gracile* (an annual grass)
- *Isotoma* sp. "Tanumbirini" (a forb)

The region supports fragmented stands of Bullwaddy, which is listed under the TPWC Act as 'Least Concern', which refers to species that are either widespread or common and cannot be categorised as Critically Endangered, Endangered, Vulnerable, Near Threatened or Data Deficient. However, Bullwaddy is significant in terms of the habitat it provides for the Spectacled Hare-Wallaby

(*Lagorchestes conspicillatus leichardti*), which is listed as 'Near Threatened' in the NT. Records surrounding the survey area and a scat collected in the vicinity of the Beetaloo sites during the August 2014 survey confirmed the presence of this species. Additional species associated with the habitat type include Bush-stone Curlew (*Burhinus grallarius*) and the Northern Nailtail Wallaby (*Onychogalea unguifera*) both listed as Near Threatened by the NT Government.

4.4 Weeds

Database searches identified 17 weed species known or likely to occur within the proposed civil construction area that are declared weeds under the NT *Weeds Management Act*, 2013. Four of these weeds are also Weeds of National Significance (WoNS). These weeds are listed below in Table 14. The location of weeds recorded within EP136 are shown in Figure 11.

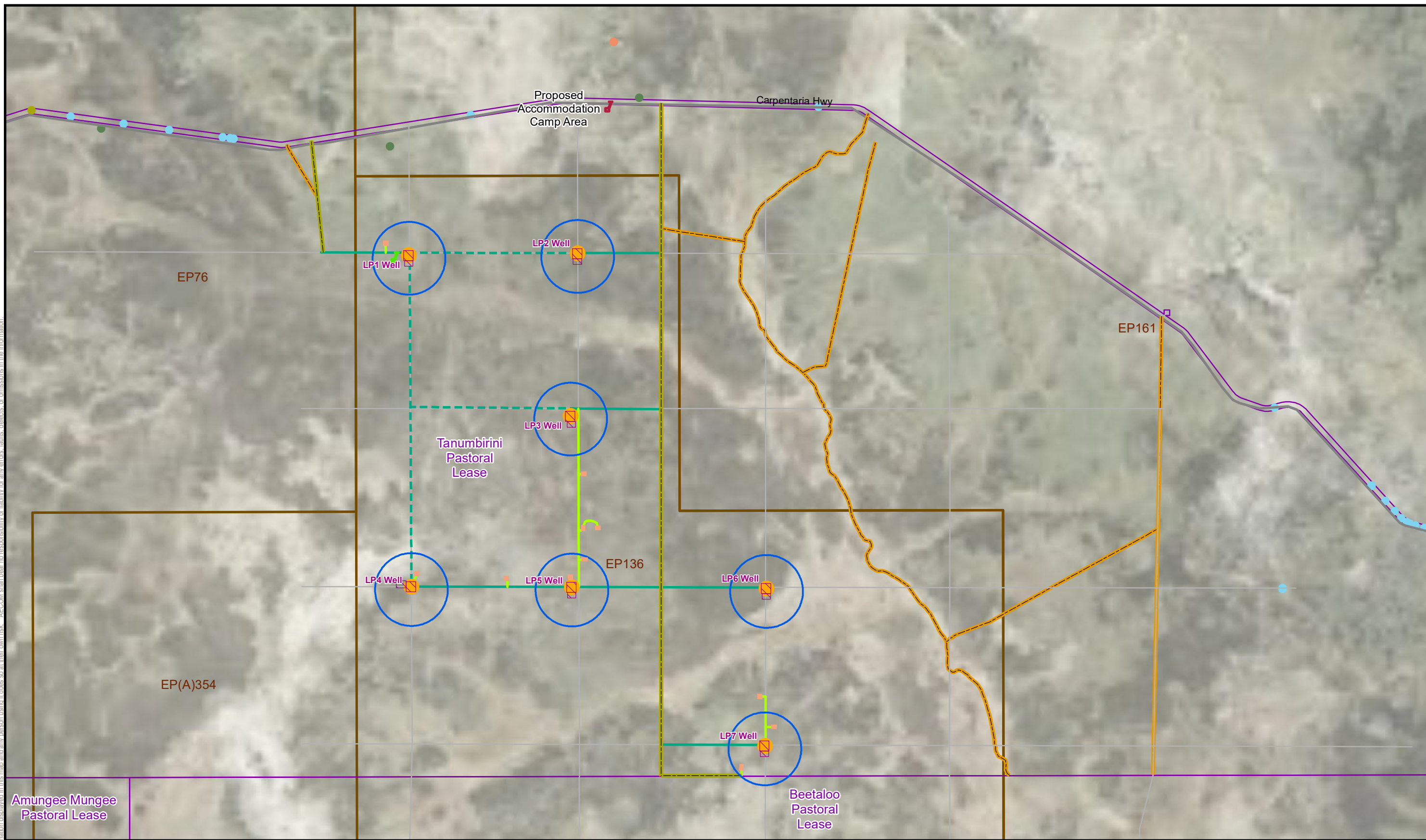
Table 14 Weeds recorded within EP136

Scientific Name	Common Name	Status
<i>Alternanthera pungens</i>	Khaki Weed	Class B and C
<i>Andropogon gayanus</i>	Gamba Grass	Class A and C, WoNS
<i>Azadirachta indica</i>	Neem	Class B and C
<i>Calotropis procera</i>	Rubber Bush	Class B and C
<i>Cenchrus echinatus</i>	Mossman River Grass	Class B and C
<i>Datura ferox</i>	Fierce Thornapple	Class A and C
<i>Echium plantagineum</i>	Paterson's Curse	Class A and C
<i>Hyptis suaveolens</i>	Hyptis	Class B and C
<i>Parkinsonia aculeata</i>	Parkinsonia	WoNS / Class B and C
<i>Prosopis</i> spp.	Mesquites	WoNS / Class A and C
<i>Sida cordifolia</i>	Flannel Weed	Class B and C
<i>Sida rhombifolia</i>	Paddy's Lucerne	Class B and C
<i>Tamarix aphylla</i>	Athel Pine	WoNS / Class A, B and C
<i>Themeda quadrivalvis</i>	Grader Grass	Class B and C, WoNS
<i>Tribulus terrestris</i>	Caltrop	Class B and C
<i>Vachellia nilotica</i> (syn. <i>Acacia nilotica</i> ssp. <i>indica</i>)	Prickly Acacia	WoNS / Class A and C
<i>Xanthium occidentale</i>	Noogoora Burr	Class B and C

Two patches of Hyptis (*Hyptis suaveolens* – Class B and C under the *Weeds Management Act*) were recorded outside of the civil construction footprint at a creek crossing on the eastern side of the project area during the May 2020 survey.

No weeds were recorded at proposed lease pads, gravel pits or access tracks assessed during the May 2020 survey.

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

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

Weed Name

- Buffel grass
- Hyptis
- Lovegrass - amabilis
- Sesame
- Urochloa - Sabi grass

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EP136

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

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Regional Weed data within
the Civil Construction Program

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Figure
11

A3 size

4.5 Native Fauna

Previous surveys and database searches indicate that the proposed civil construction area supports a diverse array of fauna. The NT Fauna database provides records for 64 species of bird, 12 reptiles and seven mammals.

4.5.1 Threatened fauna species

The PMST and ALA database searches indicate that 21 fauna species listed as threatened under the EPBC Act and/or the TPWC Act may potentially occur in the area. These comprise ten birds, eight mammals and three reptiles. The likelihood of each of these species occurring has been assessed and the outcomes included in Table 15 below.

The likelihood assessment of species occurrence is based on the availability of suitable habitat within the permit area, records in the vicinity and distributional data. Therefore, many of the threatened and migratory fauna species indicated in databases as 'occurring' or 'likely to occur' have been assessed as unlikely to occur within the proposed exploration areas. As some areas in the exploration sites have not been subject to intensive survey and some species are very cryptic, a conservative approach has been taken to assess species presence.

A full description of each species, their distribution and habitat associations are provided in Table 15 below. No core habitat for threatened fauna was identified within the civil construction areas. However, some species may possibly occur and are known to occur in the wider landscape within EP136. Threatened species that may occur include:

- 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 region also supports fragmented stands of Bullwaddy, which provides potential habitat for the Spectacled Hare-Wallaby (*Lagorchestes conspicillatus leichardtii*), listed as 'Near Threatened' under the TPWC Act. Records surrounding the survey area and a scat collected during the August 2014 survey confirmed the presence of this species in the area. Additional species associated with the habitat type include Bush-stone Curlew (*Burhinus grallarius*) and the Northern Nailtail Wallaby (*Onychogalea unguifera*) both listed as Near Threatened by the NT Government.

Table 15 EPBC and TPWC listed threatened species and likelihood of occurrence

Species	Conservation Status		Distribution	Habitat	Likelihood of Occurrence
	EPBC	NT			
Birds					
<i>Calidris ferruginea</i> Curlew Sandpiper	Marine Migratory	VU	In the NT this species occurs around Darwin, north to Melville Island and Cobourg Peninsula, and east and south-east to Gove. It has been recorded inland from Victoria River Downs and around Alice Springs (Higgins & Davies 1996).	Coastal habitats, inland it has been found around lakes, dams and ephemeral/permanent waterholes (Higgins & Davies 1996).	Unlikely (suitable habitat not present at survey sites but potential sporadic in wider landscape)
<i>Erythrotriorchis radiatus</i> Red Goshawk	VU	-	Found across most of Northern Australia, in the NT most records are from the Top End but there are records from central Australia (Pizzey & Knight, 2012).	Red Goshawks occupy a range of habitats, often at ecotones, including coastal and sub-coastal tall open forest, tropical savannahs crossed by wooded or forested watercourses. In the NT, it inhabits tall open forest/woodland as well as tall riparian woodland (Aumann & Baker-Gabb, 1991).	Unlikely (no records and core habitat absent)
<i>Erythrura gouldiae</i> Gouldian Finch	E	VU	Formerly widespread across northern Australia. In the NT they are found in the Top End south past Daly Waters (Palmer et al., 2012).	Gouldian Finches occupy different habitat types in the breeding and non-breeding season. Breeding habitat consist of hillsides with suitable nesting trees. Outside of the breeding season they are found in lowland drainages to feed on suitable perennial grasses (Dostine & Franklin, 2002).	Possible (sporadic, foraging only, no recent records)

Species	Conservation Status		Distribution	Habitat	Likelihood of Occurrence
	EPBC	NT			
<i>Falcunculus frontatus whitei</i> Crested Shrike-tit (northern)	VU	NT	This species has a very patchy distribution with records from the Victoria River District to Maningrida. Only one record near Borrooloola (1930) (Woinarski & Ward, 2012a).	Occupies wet and semi-arid melaleuca and eucalypt open woodlands. May be associated with bloodwoods with flaky bark and ironwood (Ward, 2008).	Possible (no records in vicinity although suitable habitat is present it is very rare)
<i>Falco hypoleucos</i> Grey Falcon	-	VU	This species has a widespread distribution and records for this species exist throughout the NT. However, most records are from arid and semi-arid regions (Pizzey & Knight, 2012).	Grey Falcons inhabit lightly treed inland plains, gibber desserts, sandridges, pastoral lands, timbered watercourses and, occasionally, the driest deserts. Also found also in association with inland drainage systems (Debus, 2012).	Likely (in floodplains across the exploration area)
<i>Geophaps smithii</i> Partridge Pigeon	VU	VU	Occurs across the Top End of the NT, declined/disappeared from lower rainfall areas (Woinarski, 2006).	Found predominantly in open eucalypt forest and woodland with grassy understories (Woinarski, 2006).	Unlikely (no records, occurs north of the permit area although some habitat present)
<i>Grantiella picta</i> Painted Honey Eater	VU	VU	This species is found throughout eastern Australia, but breeding is known from south-eastern Australia (Pizzey & Knight, 2012). This species is rare.	This species specialises on the fruit of mistletoes although it may also forage on nectar and insects (Garnett et al., 2011).	Possible (records from Barkly Tablelands but none in close vicinity, habitat present, foraging only)
<i>Polytelis alexandrae</i> Princess Parrot	VU	VU	Occupies arid lands in Australia where it is patchily distributed (Pavey 2006a).	Found in sand dune habitat, spinifex with Eucalypts, and shrubs such as Acacias, Hakeas, and Eremophilas (Pizzey & Knight, 2012; Pavey, 2006a).	Unlikely (most records from southern arid region, not primary habitat)

Species	Conservation Status		Distribution	Habitat	Likelihood of Occurrence
	EPBC	NT			
<i>Rostratula australis</i> Australian Painted Snipe	CE	VU	In the NT, probably occurs in central and southern area although it also possible occurs in the northern portion of the area (Woinarski et al, 2007).	These birds prefer a habitat of recently flooded temporary vegetated wetlands during the non-breeding period and brackish temporary freshwater wetlands with minimum vegetation during breeding periods. Birds usually forage in thick, low vegetated areas during the day (Curtis et al, 2012).	Unlikely* (one record, no suitable habitat at drill sites but may be present in the wider landscape during the wet season)
<i>Tyto novaehollandiae kimberli</i> Masked Owl (northern)	VU	VU	Distributed in Northern Australia although not well known. In the NT, occurs from Cobourg south to Katherine and the VRD and east to the McArthur River (DE, 2014b).	This species inhabits tall open eucalypt forest in the NT, especially those associated with <i>E. Miniata</i> and <i>E. tetradonta</i> (Woinarski, 2007). Also found in riparian and monsoonal forest and rainforest (DoE, 2014b).	Unlikely (primary habitat absent)
Mammals					
<i>Dasyurus hallucatus</i> Northern Quoll	E	CE	Found throughout most of Northern Australia although now restricted to six main areas (Menkhorst & Knight, 2011). In the NT it is found in the Top End as far southeast as Boroloola (DE, 2014a). One previous record from Shenandoah Pastoral Lease (unknown date).	Northern Quolls do not have highly specific habitat requirements although the most suitable appear to be rocky habitats. They occur in a variety of habitats across their range, including open forest and woodland. Daytime den sites provide important shelter. Shelter sites include rocky outcrops, tree hollows, hollow logs, termite mounds, goanna burrows and human dwellings (Woinarski et al, 2007).	Unlikely (no recent records, no core habitat)

Species	Conservation Status		Distribution	Habitat	Likelihood of Occurrence
	EPBC	NT			
<i>Pseudantechinus mimulus</i> Carpentarian Antechinus	—	VU	Found in QLD and the NT. In the NT it has been reported from the Sir Edward Pellew Island group, and Pungalina reserve near Borrooloola (Woinarski & Ward, 2012b).	This species is distributed in rocky habitat including sandstone boulders and outcrops with hummock grasses (Woinarski, 2004). In QLD, this species has been recorded on rocky ridges and hill-slopes (Lloyd et al., 2013).	Unlikely (one record but no suitable habitat)
<i>Isoodon auratus</i> Golden Bandicoot	V	E	This species used to be found across northern, central and western Australia but decline after European settlement (Woinarski, 2007). Now only found on Marchinbar Island in the NT and small area of the NW Kimberley (Fisher & Woinarski, 1994; Woinarski, 2007).	Previously inhabiting a range of arid and semi-arid habitats, in the NT it occupies heathland and shrubland and hummock grasslands on sandstone, vine thickets and grassy woodlands (Menkhorst & Knight, 2011; Woinarski, 2007).	Unlikely (only persists in NE Arnhem Land)
<i>Macroderma gigas</i> Ghost Bat	VU	NT	The species' current range in northern Australia ranges from relatively arid conditions in the Pilbara region of Western Australia to humid rainforests of northern Queensland. A large colony occurs in a series of gold mine workings at Pine Creek, NT. This species has also been recorded throughout the mainland Top End north of approximately 17° latitude (Ward & Milne, 2016).	The distribution of this species is influenced by the availability of suitable caves and mines for roost sites (Ward & Milne, 2016).	Unlikely (no recent records, no suitable cave located near proposed sites)
<i>Macrotis lagotis</i> Greater Bilby	VU	VU	This species occurs in south-western Queensland and in arid north-western Australia (Western Australia and Northern Territory). This species was previously widespread in arid and semi-arid Australia (Pavey, 2006b). The most northern records	In the NT, this species is found on sandy soils dominated by spinifex. Low shrubs such as Acacias and Melaleucas are also common in this habitat. Also hummock grassland associated	Unlikely (no recent records, primary habitat limited in permit area)

Species	Conservation Status		Distribution	Habitat	Likelihood of Occurrence
	EPBC	NT			
			are from Newcastle Waters and Wave Hill (Southgate & Paltridge, 1998).	with low lying drainage systems and alluvial areas (Pavey, 2006c).	
<i>Saccolaimus saccolaimus nudiclunatus</i> Bare-rumped Sheath-Tailed Bat	CE	DD	Wide distribution from India through south-eastern Asia to the Solomon Islands, including north-eastern Queensland and the NT. The north-eastern Australian populations are described as the subspecies <i>S. s. nudiclunatus</i> , although it is not clear whether this should be applied to the NT population (Duncan <i>et al.</i> , 1999). There have been very few (<5 confirmed) records since (McKean <i>et al.</i> 1981; Thomson 1991). All confirmed records have been from the Kakadu lowlands.	Previous specimens have been collected from Open Pandanus woodland fringing the sedgeland of the South Alligator River in Kakadu National Park (Friend & Braithwaite, 1986). In the NT, it has also been recorded from eucalypt tall open forests (Churchill, 2008)	Unlikely (no records and primary habitat not present)
<i>Trichosurus vulpecula vulpecula</i> Common Brushtail Possum	—	E	Previously widespread in the NT, this species is now found in isolated locations in the southern NT (Woinarski <i>et al.</i> , 2007).	This species occupies riparian habitat in the vicinity of rocky outcrops or slopes (Kerle <i>et al.</i> , 1992).	Unlikely (no records in the vicinity of the lease area and no suitable habitat)
<i>Rattus tunneyi</i> Pale Field-rat	—	V	Inhabiting higher rainfall area including the Top End of the NT (Menkhorst & Knight, 2011).	This species favours dense vegetation found along rivers where it occupies burrows in loose colonies (Cole & Woinarski, 2002). However, this species can be found in a variety of habitats including woodlands if a dense understorey of grasses is present (Menkhorst & Knight, 2011).	Unlikely (one record from 1999 in greater area, primary habitat absent)

Species	Conservation Status		Distribution	Habitat	Likelihood of Occurrence
	EPBC	NT			
Reptiles					
<i>Acanthopis hawkei</i> Plains Death Adder	VU	VU	In the NT this species is found in the floodplains of the Adelaide, Mary and Alligator Rivers and the Barkly Tablelands (Ward & Phillips, 2012).	Found on flat cracking soils in treeless floodplains where it forages on frogs, reptiles and rats (Ward & Phillips, 2012).	Unlikely (no records or suitable habitat)
<i>Varanus mertensi</i> Mertens Water Monitor	—	VU	Distributed throughout coastal and inland waters in northern Australia. In the NT found throughout most of the Top End. Decrease in NT population attributed to Cane Toads (Mayes, 2006).	Semi-aquatic species that inhabits vegetation associated with water such as Pandanus and paperbark. Seldom found far away from water (Mayes, 2006).	Unlikely*(<u>was confirmed</u> during previous surveys along Newcastle Creek, habitat unsuitable at proposed exploration lease sites)
<i>Varanus panoptes</i> Yellow-spotted Monitor	—	VU	Occurs across a broad geographic range across northern Australia. In the NT most records are from the Top End but occurs as far south as Renner Springs (Ward <i>et al.</i> , 2012).	Occupies a variety of habitats including coastal beaches, floodplains, grasslands and woodlands (Ward <i>et al.</i> , 2012).	Possible (records from Barkly Tablelands)

4.5.2 Migratory and Marine species

The EPBC Protected Matters database (Appendix C2) indicated the potential presence of 20 Migratory and Marine listed species within the exploration area (Table 16). Of these species, four are considered likely to occur, ten possibly occur and six are unlikely to occur within the exploration area.

Table 16 Migratory listed species that potentially occur within the civil construction areas

Scientific Name	Common Name	EPBC Act	Likelihood of Occurrence
<i>Actitis hypoleucos</i>	Common Sandpiper	Migratory, Marine	Possible
<i>Anseranas semipalmata</i>	Magpie Goose	Marine	Possible
<i>Apus pacificus</i>	Fork-tailed Swift	Migratory, Marine	Likely
<i>Ardea alba</i>	Great Egret	Marine	Likely
<i>Ardea ibis</i>	Cattle Egret	Marine	Likely
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Migratory, Marine	Possible
<i>Calidris ferruginea</i>	Curlew Sandpiper	Migratory, Marine	Possible
<i>Calidris melanotos</i>	Pectoral Sandpiper	Migratory, Marine	Possible
<i>Cecropis daurica</i>	Red-rumped Swallow	Migratory	Unlikely
<i>Charadrius veredus</i>	Oriental Plover	Migratory, Marine	Possible
<i>Chrysococcyx osculans</i>	Black-eared Cuckoo	Marine	Possible
<i>Crocodylus johnstoni</i>	Freshwater Crocodile	Marine	Unlikely
<i>Cuculus optatus</i>	Oriental Cuckoo	Migratory	Possible
<i>Glareola maldivarum</i>	Oriental Pratincole	Migratory, Marine	Possible
<i>Hirundo daurica</i>	Red-rumped Swallow	Marine	Unlikely
<i>Hirundo rustica</i>	Barn Swallow	Migratory, Marine	Unlikely
<i>Merops ornatus</i>	Rainbow Bee-eater	Marine	Likely
<i>Motacilla cinerea</i>	Grey Wagtail	Migratory, Marine	Unlikely
<i>Motacilla flava</i>	Yellow Wagtail	Migratory, Marine	Unlikely
<i>Rostratula benghalensis</i> (sensu lato)	Australian Painted Snipe	Migratory, Marine	Possible

4.6 Feral Animals

Feral animals likely to occur within the region include (DAWE, 2020; PWCNT, 2005; ANRA, 2008):

- Domestic Cattle (*Bos Taurus*)
- Water Buffalo (*Bubalus bubalis*)
- Cane Toad (*Bufo marinus*)
- Feral Camel (*Camelus dromedarius*)
- 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*)

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 (e.g. 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 et al. 2007).

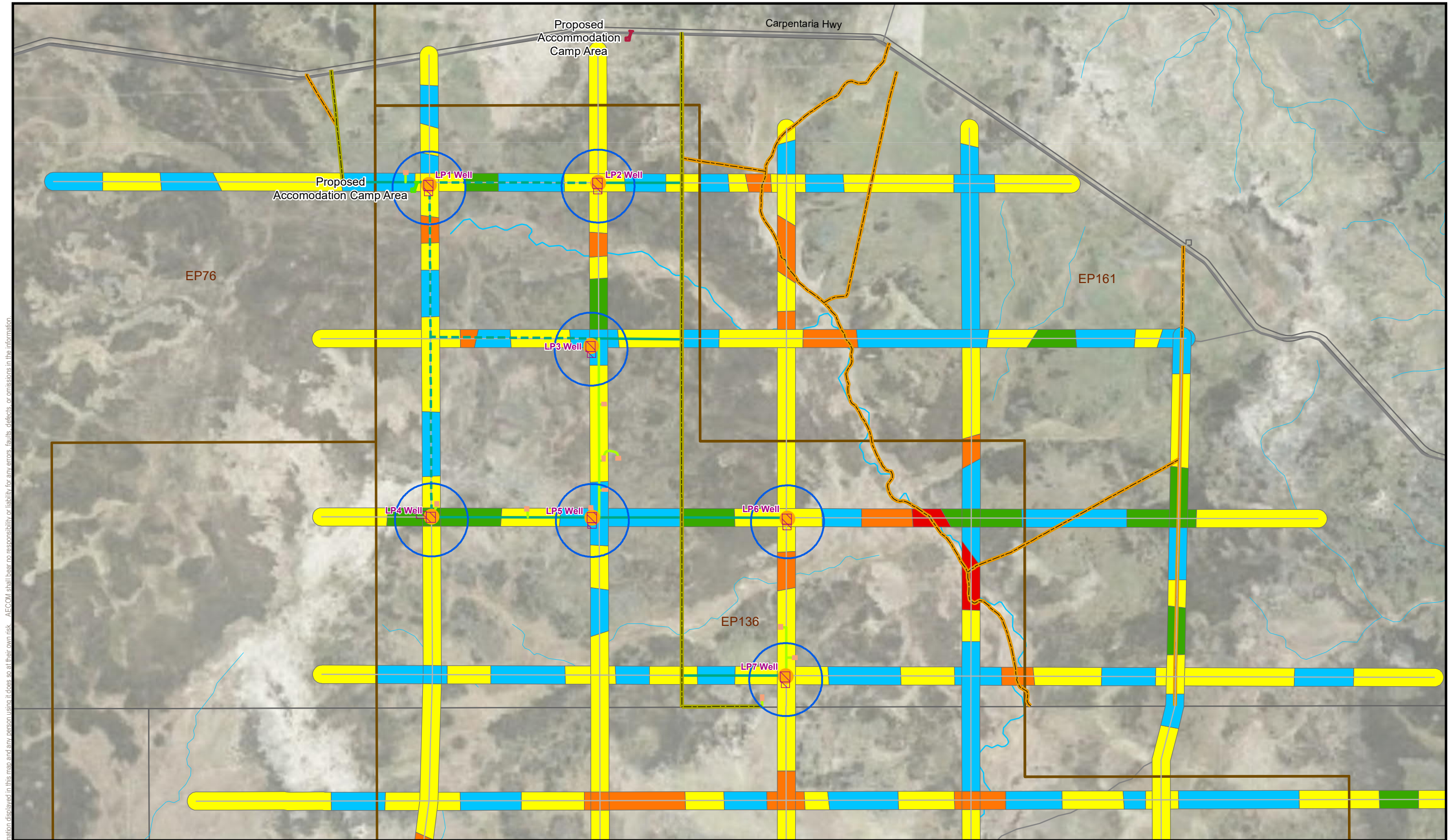
During the May 2020 survey cattle grazing was evident throughout the Project Area being located on a pastoral lease area.

4.7 Land Condition Assessment

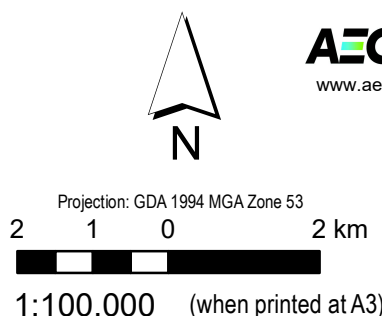
Land Condition Assessments were undertaken for the Project Area, including gravel pits and access tracks, during November 2019 and May 2020 field surveys. The land condition scores were determined from aerial dashcam footage and are mapped and presented in Figure 12.

Land condition nearby to creeks and cattle watering points within the Project Area were generally classed as Poor or Disturbed due to evidence of erosion, bare soils and vegetation impacts (Figure 13). 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 12. Detailed land condition description and photographs are presented in Section 6.0. A land condition overview for lease pads, gravel pits and main accommodation camp site is presented in Table 17.



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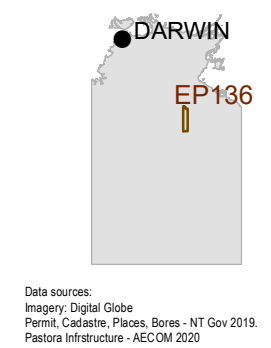


AECOM
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- Well Site
- Gravel Pit Footprints
- Well Lease Area
- 1 km Bore Buffer
- EP136 Proposed Accommodation Camp Option
- Highway Proposed Accommodation Camp Option
- Petroleum Exploration Permit

- 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



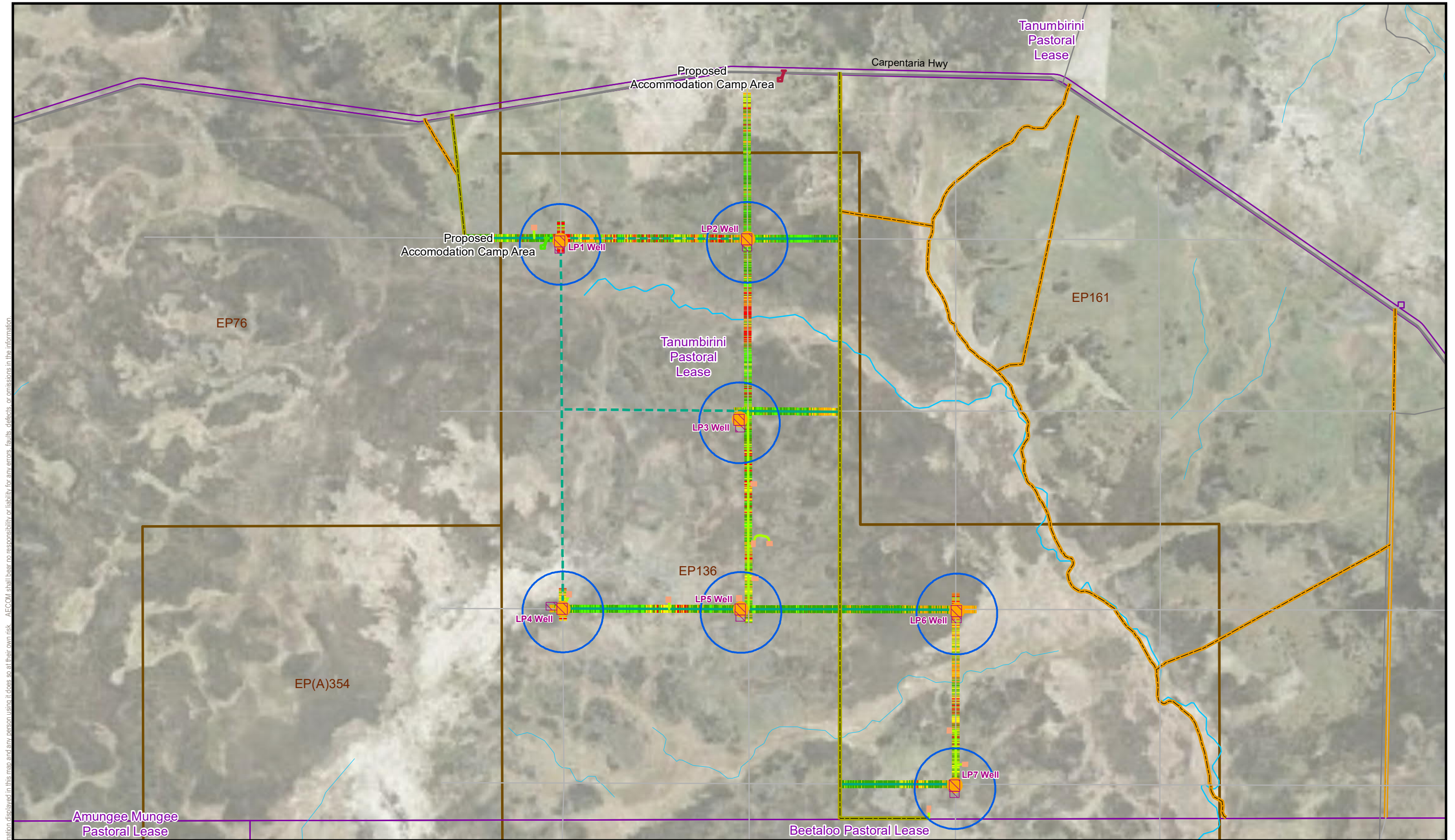
**Sweetpea Petroleum Pty Ltd,
Civil, Construction & Water Bore EMP**

**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
12**



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Projection: GDA 1994 MGA Zone 53

2 1 0 2 km

1:90,388 (when printed at A3)

AECOM
www.aecom.com

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

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

Class Type

- Trees
- Shrubland
- Grassland
- Dry Grassland
- Bare Earth

DARWIN

EP136

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

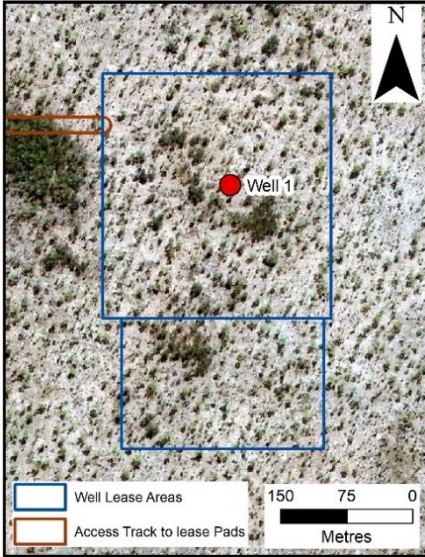
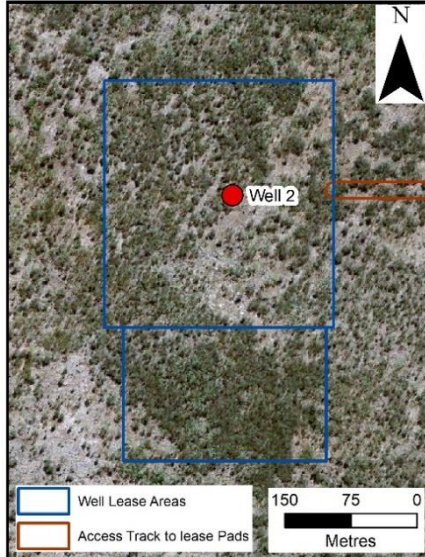
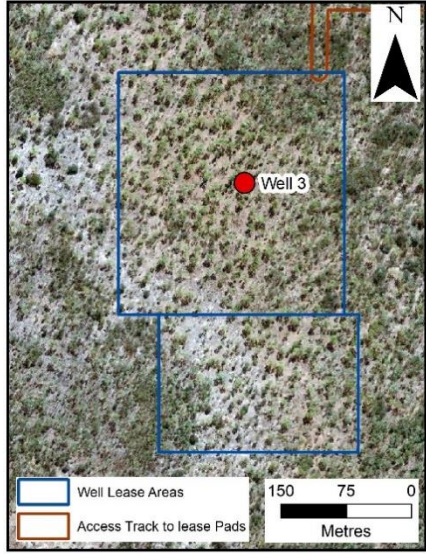
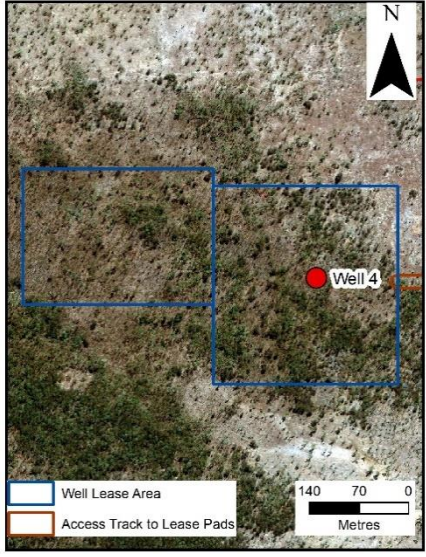
**Bare Earth Overview within
the Civil Construction Program**

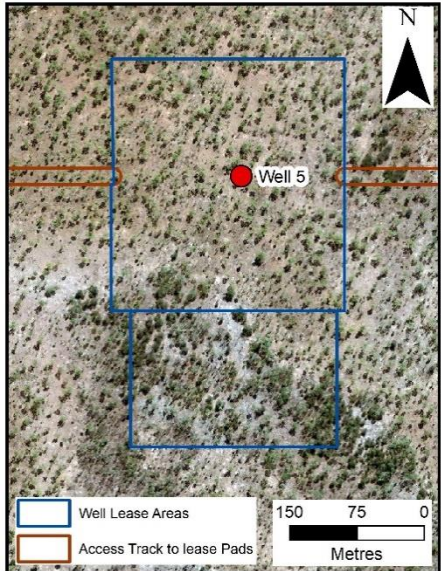
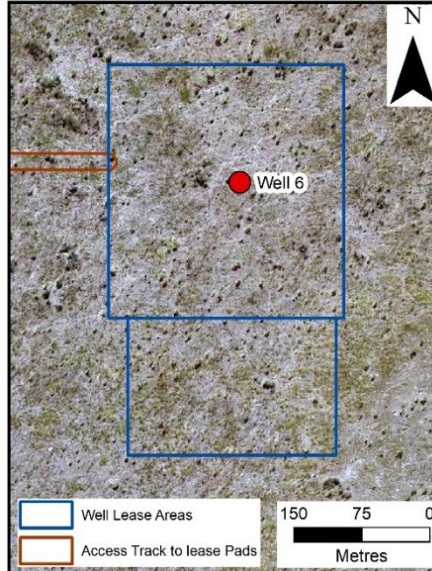
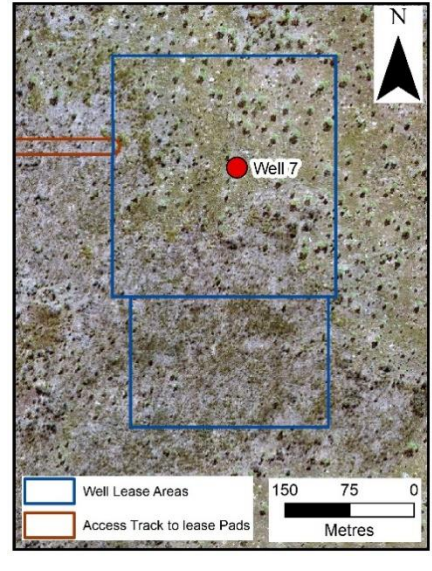
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CREATED BY	prachi.kulkarni1
LAST MODIFIED	16-Dec-2021
VERSION	1

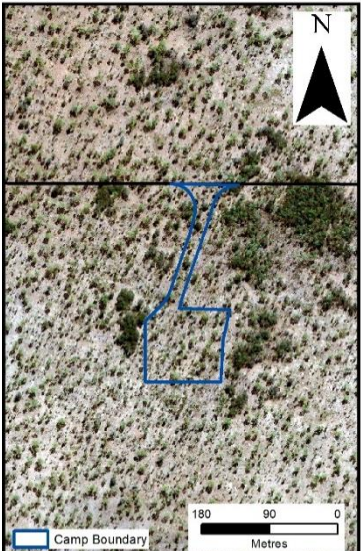
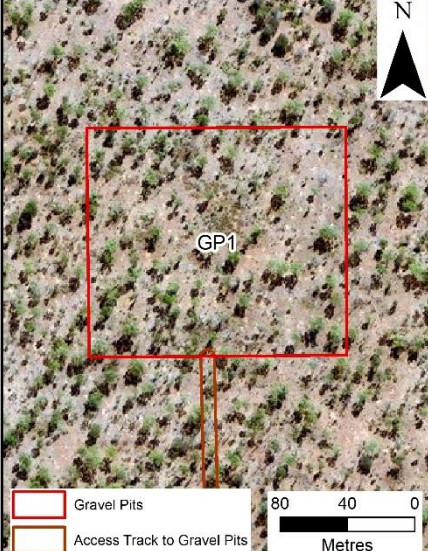
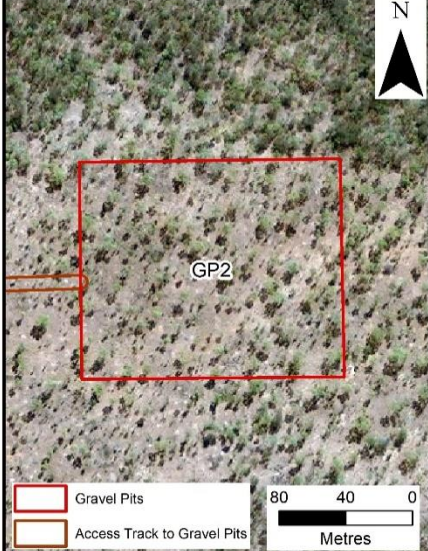
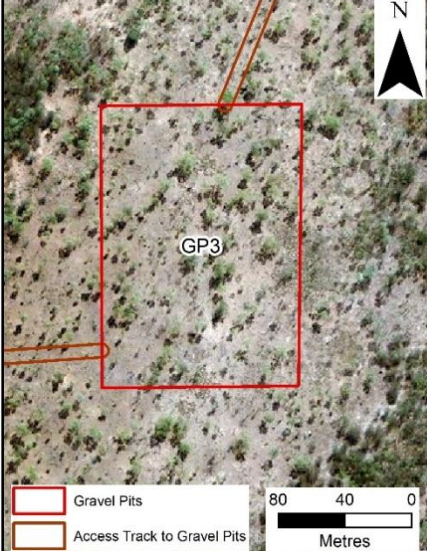
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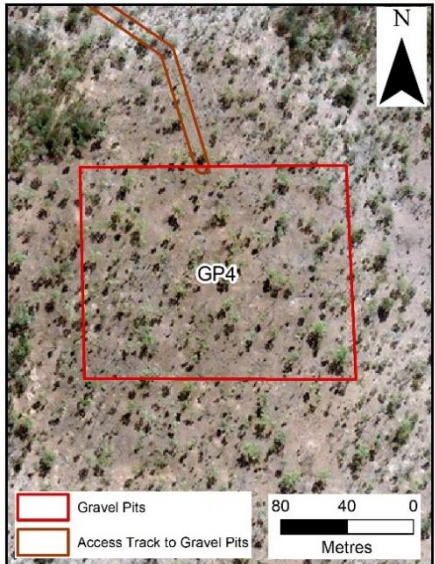
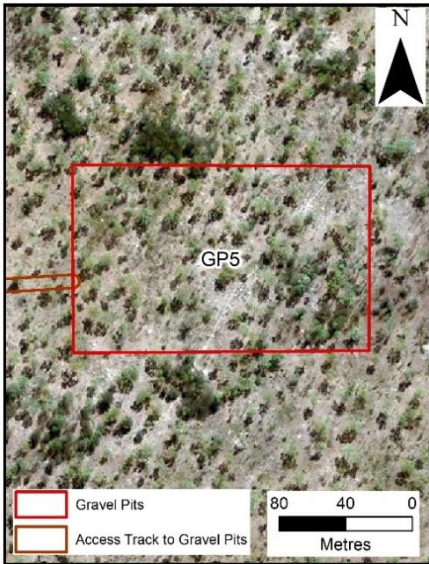
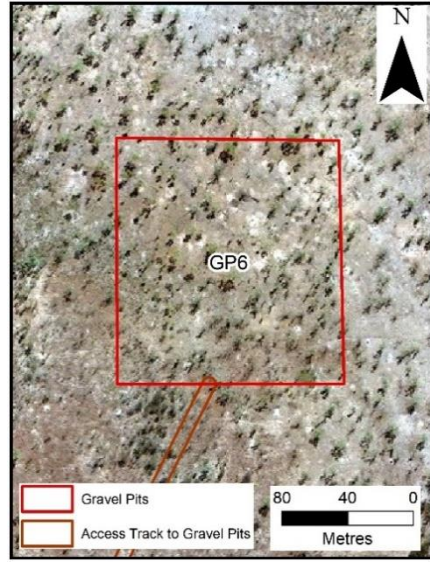
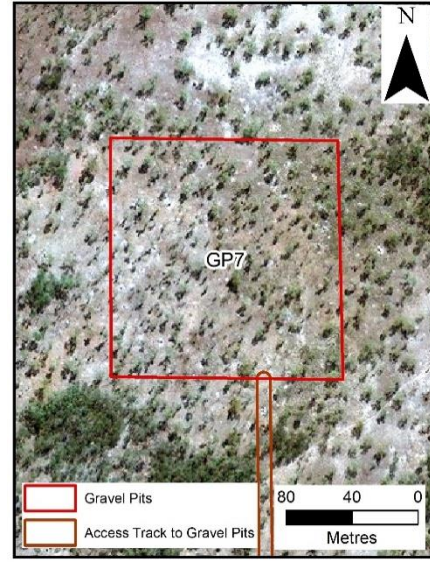
**Figure
13**

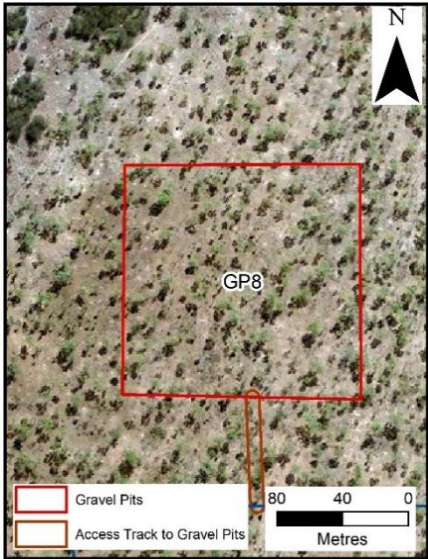
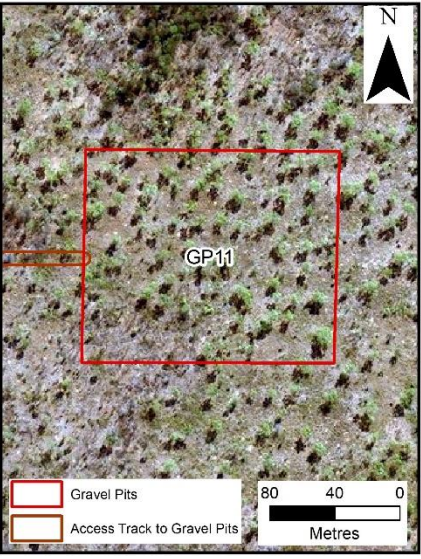
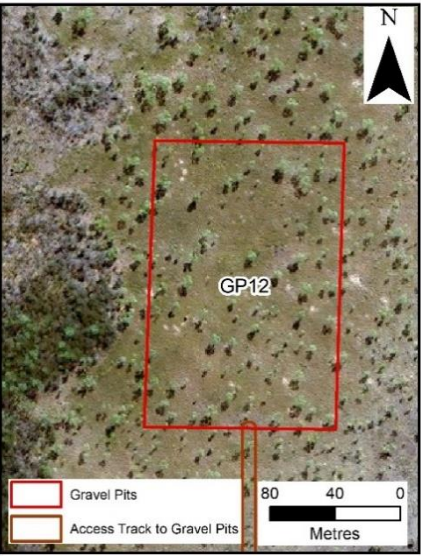
Table 17 Land Condition Assessment for Lease Pad Areas, Main Accommodation Camp and Gravel Pits

Well Lease Pad 1 Location (GDA94, z53): 448242E, 8173682N	Well Lease Pad 2 Location (GDA94, z53): 452878E, 8173732N	Well Lease Pad 3 Location (GDA94, z53): 452685E, 8169262N	Well 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: 10.96 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: 10.96 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: 10.96 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: 10.96 ha

Well Lease Pad 5 Location (GDA94, z53): 452721E, 8164565N	Well Lease Pad 6 Location (GDA94, z53): 458069E, 8164527N	Well 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: 10.96 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: 10.96 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: 10.96 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: 1.3 ha

LP1 Camp Option Location (GDA94, z53): 453883E, 8177734N	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

4.8 Conservation Areas

There are no national or world heritage places, Commonwealth land or heritage places or reserves or critical habitat areas listed under the EPBC Act are located within or adjacent to the Project Area.

The Bullwaddy Conservation Reserve lies immediately east of the Project Area (see Figure 1). The Reserve was declared in 2000 and is approximately 115 km² in area. It represents the only declared conservation area within the Sturt Plateau region to protect the Lancewood/Bullwaddy vegetation community. Less than 3% of this vegetation community is reserved nationally (PWCNT, 2005). The most significant values of the reserve are the flora and the associated fauna for which it provides habitat. This includes the Spectacled Hare-Wallaby (*Lagorchestes conspicillatus leichardtii*), the Northern Nailtail Wallaby (*Onychogalea unguifera*) and the Giant Frog (*Cyclorana australis*). It is also a valuable area for research on the ecology of Bullwaddy, particularly the effects of fire (PWCNT, 2005).

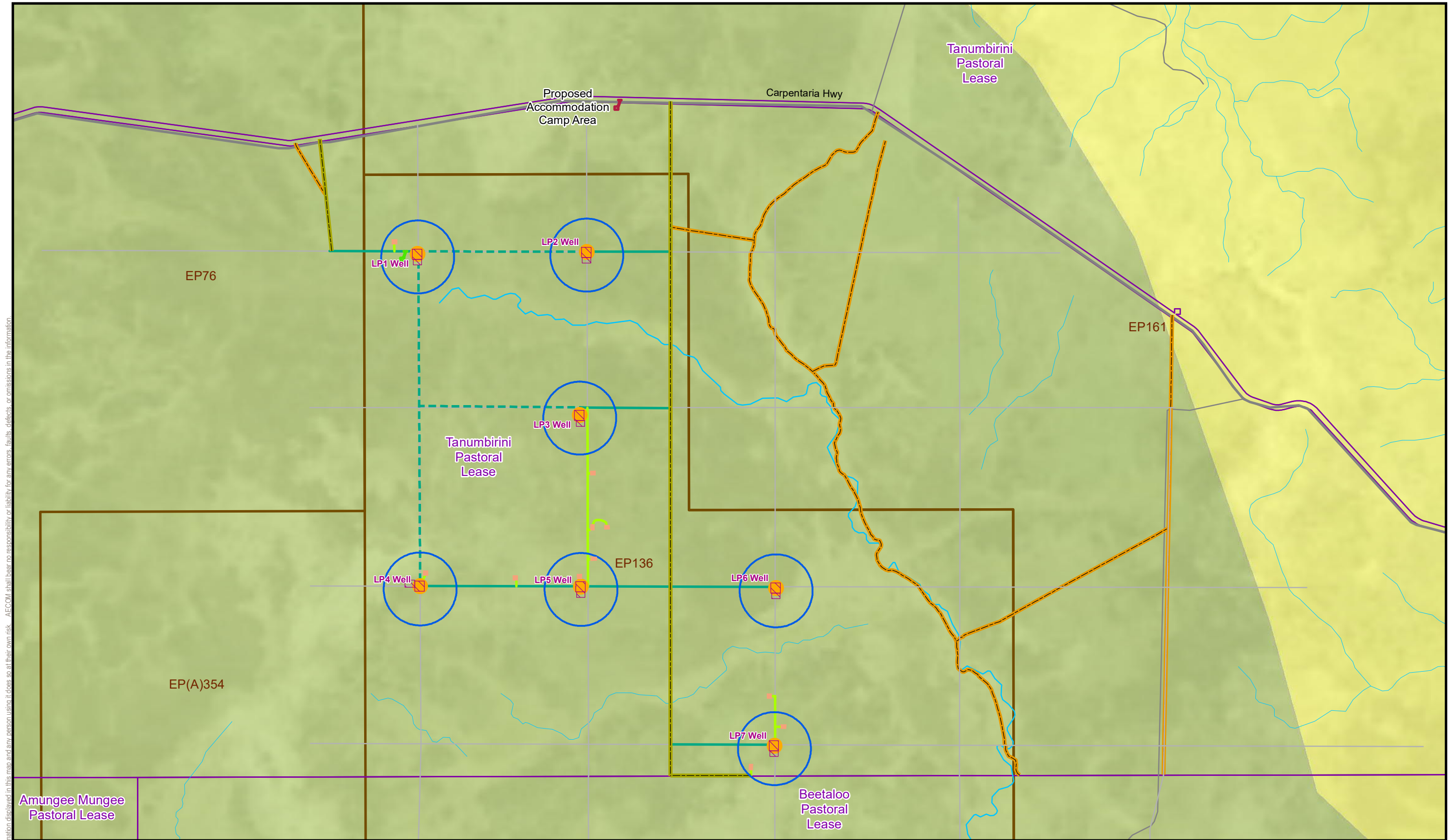
Lake Woods is located approximately 170 km south-east of the civil construction area on Newcastle Waters Station. This wetland is listed as a Site of Conservation Significance by the Department of Land Resource Management and is listed in the Directory of Important Wetlands in Australia (DIWA: NT013 Lake Woods). The site meets criteria 1, 2, 3, 4, 5 and includes DIWA wetland types: B1, B6, B10, B13 and B14. Although Lake Woods is located outside of the exploration area, it is fed principally by surface inflow of Newcastle Creek, itself originating more than 160 km north-east on Amungee Mungee Station. During the period of inundation, Lake Woods supports over 100,000 waterbirds including internationally significant numbers of Plumed Whistling-Duck (*Dendrocygna eytoni*). Numerous bird species nest and feed in the diverse wetland habitat, and the conservation group 'Birdlife International' nominated Lake Woods as an 'Important Bird Area' (IBA). The lake also includes the largest area of lignum swamp dominated by tree vegetation, in the Northern Territory and in tropical Australia (NRETAS, 2010).

4.9 Ecological Integrity

A study of Australian landscape health was undertaken by the Commonwealth government (Department of the Environment and Heritage and the National Land and Water Resources Audit, supported by State and Territory agencies), to assess regional landscape health from the perspective of biodiversity and natural ecosystems. As part of this assessment, attributes indicative of landscape condition and trend were analysed. These attributes included:

- Native vegetation extent
- Fragmentation and clearing rates
- Land use
- Current extent and trend of dryland salinity
- Changed hydrological conditions
- Current extent and trend of weeds and feral animals
- The distribution of threatened species and ecosystems.

This resulted in the development of Landscape Health Database 2001, which provides spatial representation of the results. Figure 14 shows an assessment of grazing pressure in the Project Area. Most of the exploration area has low grazing pressure (70–90% of the area has low grazing pressure).



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

Grazing Pressure

- 70 - 90% of sub-region has low grazing pressure
- 50 - 70% of sub-region has low grazing pressure



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

**Sweetpea Petroleum Pty Ltd,
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**Grazing Pressure within
the Civil Construction Program**

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VERSION	1

**Figure
14**

A3 size

4.10 Matters of National Environmental Significance

4.10.1 Potential EPBC Act controlling provisions

When an action is proposed, such as Sweetpea's proposed exploration program, approval by the Commonwealth Minister for the Environment under the EPBC Act may be required. This will only be the case if the action is likely to result in any significant impacts on Matters of National Environmental Significance (MNES) or if the action will have or is likely to have a significant impact on the environment.

Potential triggers under the EPBC Act include a significant impact on:

- The world heritage values of a declared World Heritage property
- The national heritage values of a listed National Heritage Place
- The ecological character of a declared Ramsar wetland
- A listed Threatened Ecological Community, or its habitat
- The members of a listed threatened species
- The members of a listed migratory species or their habitat
- A water resource, in relation to coal seam gas development and large coal mining development.

4.10.2 Matters of National Environmental Significance

On 25 July 2019 the EPBC Protected Matters Search Tool was used to generate a report (refer to Appendix C2) to identify whether MNES or other matters protected by the EPBC Act are likely to occur on or in the near vicinity of the Project Area. The results of these searches are provided below in Table 18.

Table 18 Summary of EPBC aspects for the Project Area

Aspect	Project Area
Matters of National Environmental significance	
World Heritage Properties	None
National Heritage Places	None
Wetlands of International Significance	None
Great Barrier Marine Park	None
Commonwealth Marine Area	None
Listed Threatened Ecological communities	None
Listed Threatened Species	10
Listed Migratory Species	12
Other Matters Protected by the EPBC Act	
Commonwealth Land	None
Commonwealth Heritage Places	None
Listed Marine Species	19
Whales and other Cetaceans	None
Critical Habitat	None
Commonwealth Reserves Terrestrial	None
Commonwealth Reserves Marine	None

Aspect	Project Area
Extra Information (Information that may also be relevant to the Exploration sites)	
Places on the Register for National Estate	None
State and Territory Reserves	None
Regional Forest Agreement	None
Invasive Species	11
Nationally Important Wetlands	None
Key Ecological Features (Marine)	None

Sections 4.2, 4.3 and 4.5 provide details on any listed ecological communities, threatened flora, fauna and migratory species that have potential to occur within the civil construction area. While there are threatened and migratory species that have the potential to occur within the proximity of the exploration area, these are unlikely to be significantly impacted by the civil construction and water bore activities.

5.0 Social and Cultural Environment

5.1 Socio economic summary

Sweetpea's Project Area is 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 (Table 19).

Table 19 Socio-economic status of Barkly Region compared to the NT

Characteristics	Barkly	NT
Population (no.)	8,563	228,836
Median age (years)	29	32
Labour Force (no.)	2,965	110,390
Unemployed (no.)	378	7,685
Unemployed as percentage of those in the labour force (%)	12.7	7.0
Median individual income per week (\$/week)	1,281	1,983
Median weekly rental payment (\$)	75	97
Average household size (no.)	3.3	2.9

Source: ABS 2016 Census

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.

5.2 Land use and sensitive receptors

A range of land-uses and sensitive receptors exists in the proposed program area as shown in Figure 15. 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 5.2.1).
- Homestead and Indigenous community outstations.
- Oil and gas exploration in surrounding permit areas (refer Section 5.2.2).
- 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).
- Historic and Aboriginal Heritage Sites (Section 5.4.2).

5.2.1 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.

5.2.2 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.

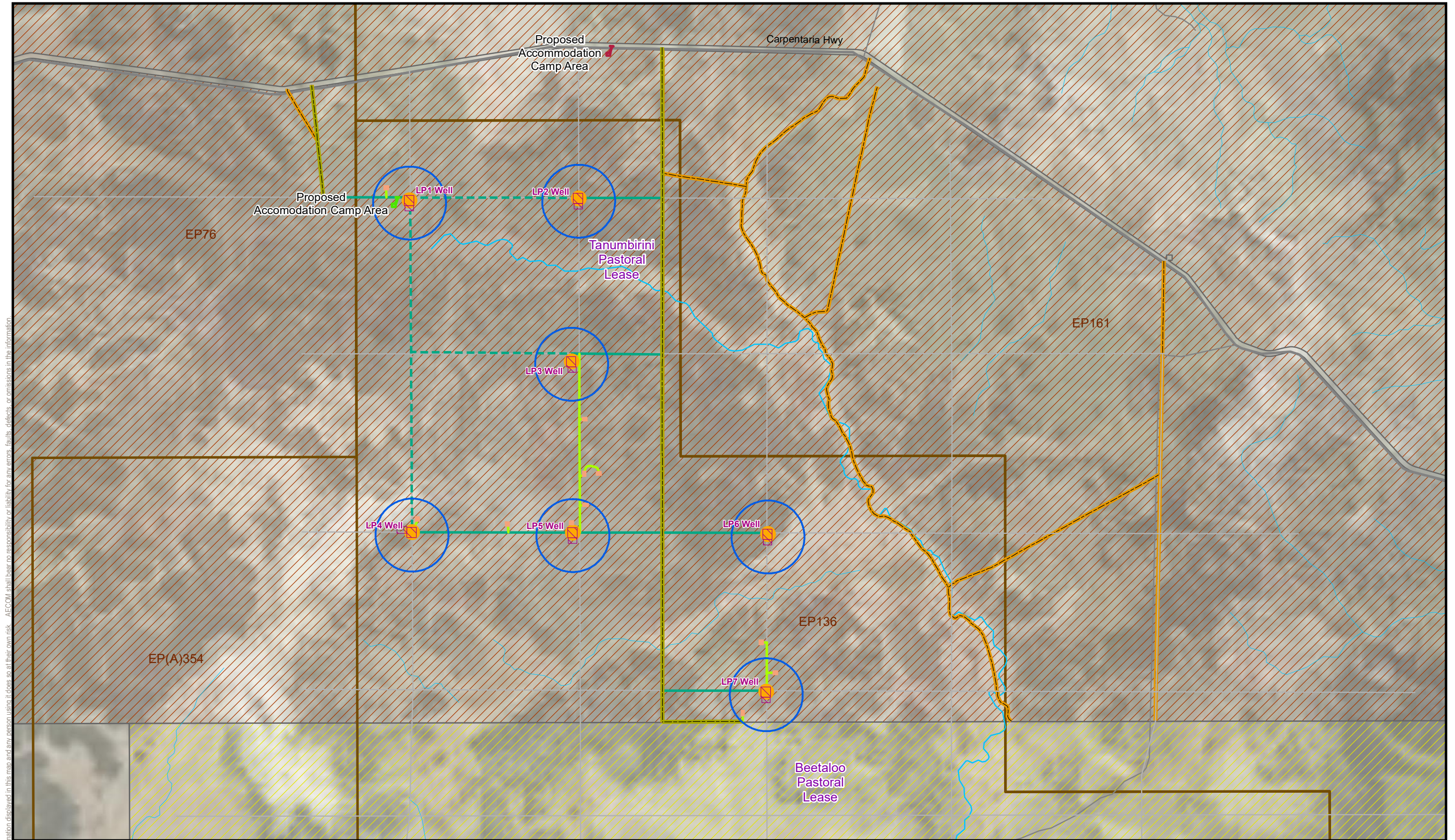
To the north of EP136, Santos operates EP161 completing a 1,000 km 2D seismic survey and in 2014 drilled the Tanumbirini-1 exploration well which was subsequently hydraulically fractured and tested in November 2019.

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.

5.3 Native Title

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

Figure 16 shows the boundaries of the areas of Native Title in relation to pastoral properties, the permit area and the Project Area.



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Projection: GDA 1994 MGA Zone 53

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- Well Site
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- Roads
- Cadastre

- Native Title Claim**
- NTD27/2010
 - NTD33/2012

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

Sweetpea Petroleum Pty Ltd,
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Native Title within
EP136 Exploration Area

PROJECT ID 60611666 CREATED BY prachi.kulkarni1 LAST MODIFIED 16-Dec-2021 VERSION 1	Figure 16 A3 size
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5.4 Aboriginal Heritage

5.4.1 Archaeological Heritage 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 17).

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.

5.4.2 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.

5.5 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 Murrarji 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.

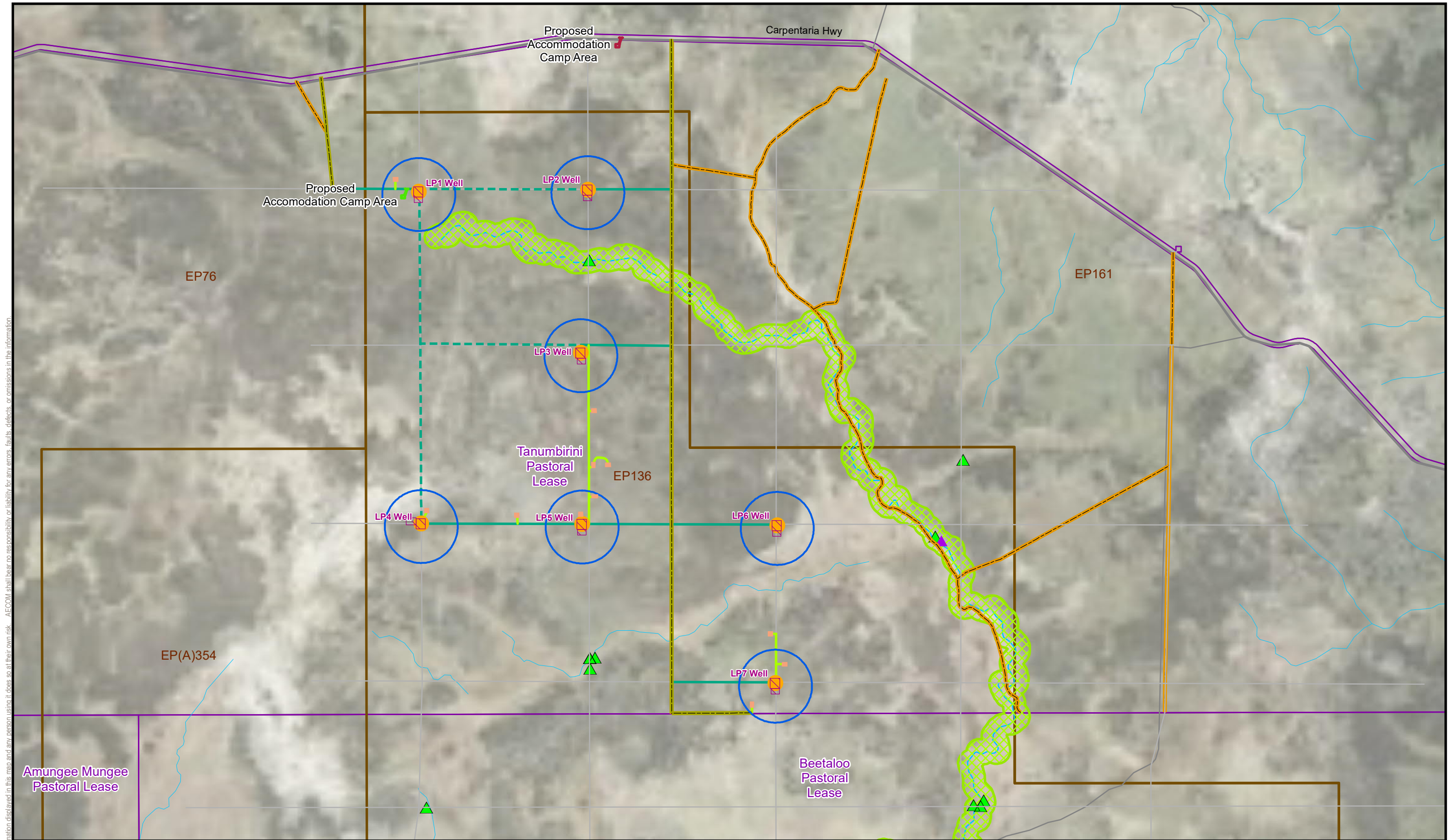
5.5.1 Historic heritage assessment

Australia Heritage Database

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. An additional search also revealed no statutory listed heritage places.

NT Heritage Database

The NT Heritage Register identified 18 Aboriginal archaeological sites and no historic heritage sites within a 50 x 50 km area that encompassed the Project Area.



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- Eastern Access Option Access
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- Pastoral Track
- Restricted Work Areas
- Roads
- Cadastre

Aboriginal Archaeological Sites

- ▲ Moderate Significance
- ▲ Low Significance



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**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
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VERSION	1

Figure 17

A3 size

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

6.0 Land Condition Summary

Detailed land condition description and photographs of the seven lease pad areas and gravel pits assessed in May 2020 are provided in Table 20 to Table 30.

The aim of the LCA was to identify and document site condition prior to the proposed activities occurring in the Project Area and inform the preparation of an Environment Management Plan (EMP). The proposed civil construction and water bore program is estimated to have a total disturbance area range of 126.9 to 145.2 ha including 77.6 ha at the seven lease pads, 20 ha for the construction of ten gravel pits and the construction of associated access tracks.

The LCA has identified the ecological conditions and documented the site condition prior to Sweetpea commencing exploration activities. Information obtained during field surveys will set a benchmark of land condition to aim for when undertaking rehabilitation of the site once activities have been completed.

The desktop review and field survey assisted in identifying the potential environmental risks and impacts to the environment based on the conditions identified on site and has allowed the development of mitigation measures to minimise Sweetpea and its contractors impacts on the environment and heritage.

During the field survey areas within the Project Area were considered generally in good condition with no to low evidence of weeds and erosion. Disturbance from cattle was evident across the area; however, the level of disturbance to ground vegetation was less than 25% at the majority of sites assessed.

No EPBC listed threatened ecological communities or threatened species are likely to be significantly impacted from the proposed exploration program activities.

Overall, the impacts of the vegetation clearing for the proposed access tracks are considered minor from a landscape perspective. This will be facilitated by using existing pastoral access tracks that have already been cleared of vegetation. Surrounding habitat is extensive and most species are mobile and will be able to access surrounding habitat.

Specific controls will be implemented for the ephemeral creek crossings and drainage lines to minimise disturbance. The civil construction program is scheduled for the 2021 dry season when the creeks and drainage lines will be dry.

Mitigation measures are presented in the Civil Construction and Water Bore EMP and will assist in minimising the impacts from Sweetpea's activities on the natural environment and EPBC listed species that may occur within the Project Area.

Table 20 Lease Pad 1 (LP1) LCA				
Location	-16.517640°, 134.515232°	Vegetation community	Corymbia dichromophloia, open woodland	
Vegetation description	Corymbia dichromophloia and Erythrophleum chlorostachys mid high open woodland, over Terminalia canescens mid high open shrubland and Triodia bitextura and Schizachyrium fragile mid high open hummock grassland			
Vegetation transect	No canopy 84%, Macropteranthes kekwickii 4%, Corymbia dichromophloia 3%, Erythrophleum chlorostachys 3%, Terminalia canescens 2%, Eucalyptus leucophloia 2%, Acacia shirleyi 2%, Petalostigma pubescens 1%			
Basal area (5 sweeps)	11.5 (Corymbia dichromophloia 4, Terminalia canescens 4, Macropteranthes kekwickii 2.5, Erythrophleum chlorostachys 1)		Stand basal area (average)	2.5 m²/ha
Landform				
Plain				
Habitat				
Scattered tree hollows and common fallen logs.				
Slope				
<1%				
Disturbance				
No fire or feral animal impacts evident.				
Vegetation Structure	Upper storey: 6-10 m	Corymbia dichromophloia (7%), Erythrophleum chlorostachys (3%)		
	Mid-storey: 1-4 m	Terminalia canescens (8%), Flueggea virosa (1%), Carissa lanceolata (1%)		
	Understorey: 0-0.5 m	Triodia bitextura (5%), Schizachyrium fragile (5%), Eragrostis cumingii (2%)		
Soil texture	Loamy sand			
Soil drainage	Moderately well drained			
Soil colour	7.5YR 3/2 dark brown			
Soil pH	7.0			
Termite mounds	Common			
Ground cover	Vegetation 15%, litter 5%, bare soil 75%, gravel 5%			

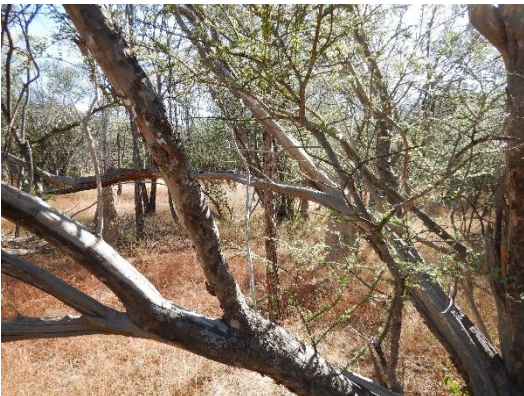
Table 21 Lease Pad 2 (LP2) LCA				
Location	-16.517765°, 134.558417°	Vegetation community	Acacia shirleyi open woodland	
Vegetation description	Acacia shirleyi mid high open woodland, over Macropteranthes kekwickii mid high shrubland and Schizachyrium fragile and Eriachne armitii open grassland			
Vegetation transect	No canopy 51%, Acacia shirleyi 25%, Macropteranthes kekwickii (22%), Terminalia volucris (1%), Terminalia canescens (1%)			
Basal area (5 sweeps)	35.5 (dead trees 24.5, Macropteranthes kekwickii 11, Acacia shirleyi 9.5)		Stand basal area (average)	7.1 m ² /ha
Landform				
Plain				
Habitat				
Tree hollows and fallen logs common. Mistletoe, flowering plants and leaf litter absent.				
Slope				
<1%				
Disturbance				
No fire, weeds or feral animal disturbance evident				
Vegetation Structure	Upper storey: 10-14 m	Acacia shirleyi (8%)		
	Mid-storey: 1-6 m	Macropteranthes kekwickii (32%), Terminalia volucris (2%)		
	Understorey: 0-0.5 m	Schizachyrium fragile (5%), Eriachne armitii (5%), Panicum effusum (3%)		
Soil texture	Sandy loam			
Soil drainage	Moderately well drained			
Soil colour	10YR 3/2 very dark greyish brown			
Soil pH	7.0			
Termite mounds	Common			
Ground cover	Vegetation 15%, litter 5%, bare soil 78%, gravel 2%			

Table 22 Lease Pad 3 (Alternate) (LP3alt) LCA				
Location	-16.558240°, 134.556585°	Vegetation community	Corymbia dichromophloia open woodland	
Vegetation description	Corymbia dichromophloia and Erythrophleum chlorostachys mid high open woodland, over Terminalia canescens mid high open shrubland and Chrysopogon pallidus mid high open tussock grassland			
Vegetation transect	No canopy 68%, Corymbia dichromophloia 17%, Erythrophleum chlorostachys 12%, Erythrophleum chlorostachys 3%, Terminalia canescens 2%, Grevillea pyramidalis 1%			
Basal area (5 sweeps)	26 (Corymbia dichromophloia 21.5, Erythrophleum chlorostachys 2.5, Terminalia canescens 2)		Stand basal area (average)	5.2 m²/ha
Landform				
Plain				
Habitat				
Tree hollows and fallen logs common. Mistletoe, flowering plants and leaf litter absent.				
Slope				
<1%				
Disturbance				
Minor fire scars on most trees/shrubs.				
Vegetation Structure	Upper storey: 8-12 m	Corymbia dichromophloia (12%), Erythrophleum chlorostachys (5%)		
	Mid-storey: 1-7 m	Terminalia canescens (10%), Grevillea pyramidalis (2%), Acacia wickhamii (1%)		
	Understorey: 0-1 m	Chrysopogon pallidus (8%), Aristida inaequiglumis (1%)		
Soil texture	Sandy loam, 10% sub-rounded ironstone fragments, 2-5 mm			
Soil drainage	Rapidly drained			
Soil colour	10YR 4/1 dark grey			
Soil pH	6.0			
Termite mounds	Common			
Ground cover	Vegetation 10%, litter 15%, bare soil 70%, gravel 5%			

Table 23 Lease Pad 4 (LP4) LCA

Location	-16.596054°, 134.518888°	Vegetation community	<i>Acacia shirleyi</i> woodland
Vegetation description	<i>Acacia shirleyi</i> mid high woodland, over <i>Macropteranthes kekwickii</i> mid high open shrubland and <i>Macropteranthes kekwickii</i> mid high open shrubland and <i>Eulalia aurea</i> and <i>Chrysopogon fallax</i> mid high open tussock grassland		
Vegetation transect	No canopy 57%, <i>Acacia shirleyi</i> 29%, <i>Macropteranthes kekwickii</i> 6%, <i>Terminalia volucris</i> 6%, <i>Eucalyptus pruinosa</i> 2%		
Basal area (5 sweeps)	46 (dead tree 32, <i>Acacia shirleyi</i> 12, <i>Macropteranthes kekwickii</i> 1, <i>Eucalyptus leucophloia</i> 1)	Stand basal area (average)	9.2 m ² /ha
Landform			
Alluvial plain			
Habitat			
Fallen logs common. Tree hollows, mistletoe, flowering plants and leaf litter absent.			
Slope			
<1%			
Disturbance			
Some tree/shrubs killed by fire, fire impacts <2 years ago.			
Vegetation Structure	Upper storey: 10-12 m	<i>Acacia shirleyi</i> (25%)	
	Mid-storey: 1-7 m	<i>Macropteranthes kekwickii</i> (10%), <i>Eucalyptus pruinosa</i> (2%), <i>Acacia shirleyi</i> (1%)	
	Understorey: 0-1 m	<i>Eulalia aurea</i> (20%), <i>Chrysopogon fallax</i> (5%), <i>Schizachyrium fragile</i> (3%)	
Soil texture	Silty clay loam		
Soil drainage	Moderately well drained		
Soil colour	10YR 4/2 dark greyish brown		
Soil pH	6.5		
Termite mounds	Common		
Ground cover	Vegetation 30%, litter 15%, bare soil 55%		

Table 24 Lease Pad 5 (LP5) LCA				
Location	-16.600707°, 134.558580°	Vegetation community	<i>Eucalyptus leucophloia</i> and <i>E. chlorophylla</i> open woodland	
Vegetation description	<i>Eucalyptus leucophloia</i> and <i>Eucalyptus chlorophylla</i> mid high open woodland, over <i>Macropteranthes kekwickii</i> and <i>Acacia hammondii</i> mid high open shrubland and <i>Eulalia aurea</i> and <i>Sorghum timorense</i> mid high tussock grassland			
Vegetation transect	No canopy 69%, <i>Macropteranthes kekwickii</i> 16%, <i>Eucalyptus leucophloia</i> 8%, <i>Eucalyptus chlorophylla</i> 6%, <i>Acacia shirleyi</i> 1%, <i>Terminalia canescens</i> 1%			
Basal area (5 sweeps)	18.5 (<i>Macropteranthes kekwickii</i> 6, <i>Eucalyptus leucophloia</i> 4, dead tree 3, <i>Eucalyptus chlorophylla</i> 2, <i>Corymbia dichromophloia</i> 1.5, <i>Acacia shirleyi</i> 1, <i>Terminalia canescens</i> 1)		Stand basal area (average)	3.7 m ² /ha
Landform				
Plain				
Habitat				
Tree hollows and fallen logs common. Mistletoe, flowering plants and leaf litter absent.				
Slope				
<1%				
Disturbance				
Minor fire scars on some tree/shrubs. Fire impact <2 years ago				
Vegetation Structure	Upper storey: 7-10 m	<i>Eucalyptus leucophloia</i> (8%) and <i>Eucalyptus chlorophylla</i> (4%)		
	Mid-storey: 1-7 m	<i>Macropteranthes kekwickii</i> (10%), <i>Acacia hammondii</i> (3%), <i>Terminalia canescens</i> (1%)		
	Understorey: 0-1 m	<i>Eulalia aurea</i> (20%), <i>Sorghum timorense</i> (20%), <i>Mnesithea formosa</i> (5%)		
Soil texture	Silty clay loam			
Soil drainage	Poorly drained			
Soil colour	7.5YR 3/1 very dark grey			
Soil pH	7.0			
Termite mounds	Common			
Ground cover	Vegetation 40%, litter 20%, bare soil 40%			

Table 25 Lease Pad 5 (Alternate) (LP5alt) LCA

Location	-16.596685°, 134.557943°	Vegetation community	<i>Corymbia dichromophloia</i> and <i>Erythrophleum chlorostachys</i> open woodland
Vegetation description	<i>Corymbia dichromophloia</i> and <i>Erythrophleum chlorostachys</i> mid high open woodland, over <i>Acacia wickhamii</i> and <i>Terminalia canescens</i> mid high open shrubland and <i>Triodia bitextura</i> and <i>Schizachyrium fragile</i> open hummock grassland		
Vegetation transect	Not recorded		
Basal area (5 sweeps)	Not recorded		Stand basal area (average) Not recorded
Landform			
Plain			
Habitat			
Scattered fallen logs and tree hollows. Mistletoe, flowering plants and leaf litter absent.			
Slope			
<1%			
Disturbance			
No fire, weeds or feral animal disturbance evident.			
Vegetation Structure	Upper storey: 8-12 m	<i>Corymbia dichromophloia</i> (12%), <i>Erythrophleum chlorostachys</i> (4%)	
	Mid-storey: 1-6 m	<i>Acacia wickhamii</i> (15%), <i>Terminalia canescens</i> (2%), <i>Corymbia ferruginea</i> (2%)	
	Understorey: 0-1 m	<i>Triodia bitextura</i> (23%), <i>Schizachyrium fragile</i> (5%)	
Soil texture	Loamy sand		
Soil drainage	Moderately well drained		
Soil colour	7.5YR 3/1 very dark grey		
Soil pH	7.0		
Termite mounds	Sparse		
Ground cover	Vegetation 30%, litter 15%, bare soil 55%		

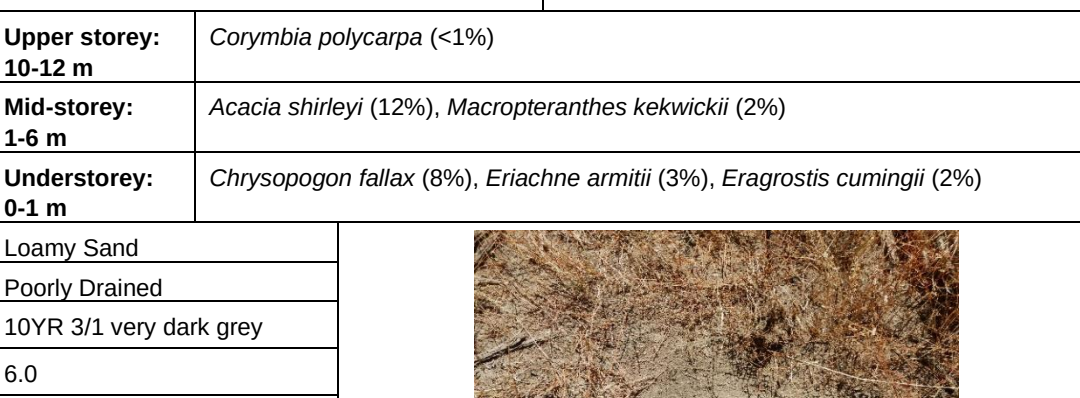
Table 26 Lease Pad 6 (LP6) LCA				
Location	-16.600863°, 134.606763°	Vegetation community	Corymbia polycarpa isolated trees over Acacia shirleyi shrubland	
Vegetation description	Corymbia polycarpa mid high isolated trees, over Acacia shirleyi and Macropteranthes kekwickii mid high open shrubland and Chrysopogon fallax and Eriachne armitii mid high open tussock grassland			
Vegetation transect	No canopy 92%, Acacia shirleyi 7%, Macropteranthes kekwickii 1%			
Basal area (5 sweeps)	13.5 (dead tree 12, Corymbia polycarpa 1.5)		Stand basal area (average)	2.7 m²/ha
Landform				
Alluvial Plain				
Habitat				
Abundant fallen logs. Tree hollows, mistletoe, flowering plants and leaf litter absent.				
Slope				
<1%				
Disturbance				
Some trees/shrubs killed by fire. Fire impacts more than 2 years ago.				
Vegetation Structure	Upper storey: 10-12 m	Corymbia polycarpa (<1%)		
	Mid-storey: 1-6 m	Acacia shirleyi (12%), Macropteranthes kekwickii (2%)		
	Understorey: 0-1 m	Chrysopogon fallax (8%), Eriachne armitii (3%), Eragrostis cumingii (2%)		
Soil texture	Loamy Sand			
Soil drainage	Poorly Drained			
Soil colour	10YR 3/1 very dark grey			
Soil pH	6.0			
Termite mounds	Common			
Ground cover	Vegetation 30%, litter 5%, bare soil 65%			

Table 27 Lease Pad 6 (LP6) LCA			
Location	-16.600863°, 134.606763°	Vegetation community	<i>Corymbia polycarpa</i> isolated trees over <i>Acacia shirleyi</i> shrubland
Vegetation description	<i>Corymbia polycarpa</i> mid high isolated trees, over <i>Acacia shirleyi</i> and <i>Macropteranthes keckwickii</i> mid high open shrubland and <i>Chrysopogon fallax</i> and <i>Eriachne armitii</i> mid high open tussock grassland		
Vegetation transect	No canopy 92%, <i>Acacia shirleyi</i> 7%, <i>Macropteranthes keckwickii</i> 1%		
Basal area (5 sweeps)	13.5 (dead tree 12, <i>Corymbia polycarpa</i> 1.5)		Stand basal area (average) 2.7 m ² /ha
Landform			
Alluvial Plain			
Habitat			
Abundant fallen logs. Tree hollows, mistletoe, flowering plants and leaf litter absent.			
Slope			
<1%			
Disturbance			
Some trees/shrubs killed by fire. Fire impacts more than 2 years ago.			
Vegetation Structure	Upper storey: 10-12 m	<i>Corymbia polycarpa</i> (<1%)	
	Mid-storey: 1-6 m	<i>Acacia shirleyi</i> (12%), <i>Macropteranthes keckwickii</i> (2%)	
	Understorey: 0-1 m	<i>Chrysopogon fallax</i> (8%), <i>Eriachne armitii</i> (3%), <i>Eragrostis cumingii</i> (2%)	
Soil texture	Loamy Sand		
Soil drainage	Poorly Drained		
Soil colour	10YR 3/1 very dark grey		
Soil pH	6.0		
Termite mounds	Common		
Ground cover	Vegetation 30%, litter 5%, bare soil 65%		

Table 28 Gravel Pit 7 (GP7) LCA			
Location	-16.598863°, 134.539259°	Vegetation community	<i>Eucalyptus leucophloia</i> open woodland
Landform			
Plain			
Soil texture			
Sandy loam, 15 %sub-angular sandstone fragments 5-10 mm			
Soil colour			
10YR 3/1 very dark grey			
Soil pH			
6.0			

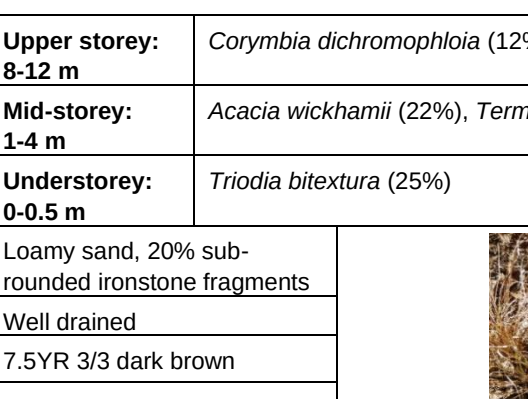
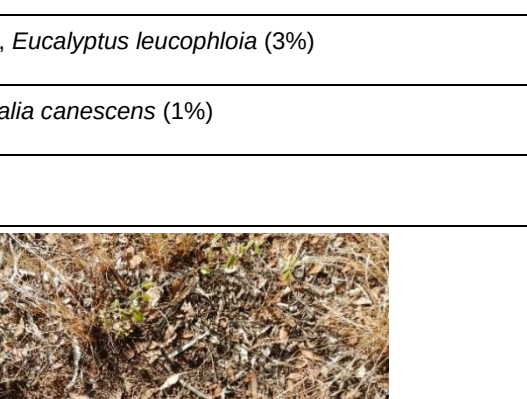
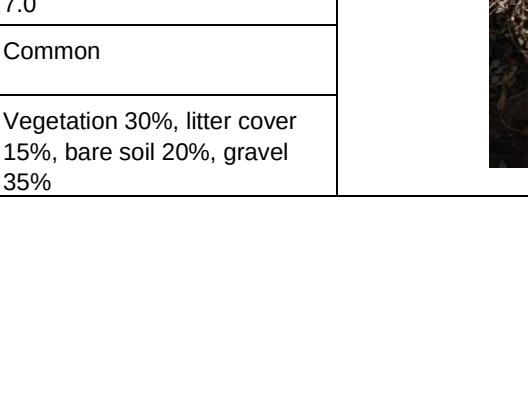
Table 29 Gravel Pit 11 (GP11) LCA			
Location	-16.635382°, 134.608702°	Vegetation community	<i>Corymbia dichromophloia</i> / <i>Eucalyptus leucophloia</i> open woodland
Vegetation description	<i>Corymbia dichromophloia</i> and <i>Eucalyptus leucophloia</i> mid high open woodland, over <i>Acacia wickhamii</i> low open shrubland and <i>Triodia bitextura</i> mid high open tussock grassland		
Landform	 		
Plain			
Habitat	 		
Scattered tree hollows, fallen logs and leaf litter. Mistletoe and flowering plants absent.			
Slope	 		
<1%			
Disturbance	 		
Minor scars on most trees/shrubs. Fire impacts more than 2 years ago.			
Vegetation Structure	Upper storey: 8-12 m	<i>Corymbia dichromophloia</i> (12%), <i>Eucalyptus leucophloia</i> (3%)	
	Mid-storey: 1-4 m	<i>Acacia wickhamii</i> (22%), <i>Terminalia canescens</i> (1%)	
	Understorey: 0-0.5 m	<i>Triodia bitextura</i> (25%)	
Soil texture	Loamy sand, 20% sub-rounded ironstone fragments		
Soil drainage	Well drained		
Soil colour	7.5YR 3/3 dark brown		
Soil pH	7.0		
Termite mounds	Common		
Ground cover	Vegetation 30%, litter cover 15%, bare soil 20%, gravel 35%		

Table 30 Aerial LCA Assessment of Remaining Gravel Pits

Gravel Pit	Location		Vegetation community	Photo
	Latitude	Longitude		
GP1	-16.515742°	134.509783°	<i>Corymbia dichromophloia</i> / <i>Eucalyptus leucophloia</i> open woodland	
GP2	-16.574146°	134.557179°	<i>Corymbia dichromophloia</i> / <i>Eucalyptus leucophloia</i> open woodland	
GP3	-16.586508°	134.558105°	<i>Corymbia dichromophloia</i> / <i>Eucalyptus leucophloia</i> open woodland	
GP4	-16.586834°	134.562379°	<i>Corymbia dichromophloia</i> / <i>Erythrophleum chlorostachys</i> open woodland	

Gravel Pit	Location		Vegetation community	Photo
	Latitude	Longitude		
GP5	-16.593908°	134.559020°	<i>Corymbia dichromophloia</i> / <i>Eucalyptus leucophloia</i> open woodland	
GP6	-16.596138°	134.515992°	<i>Eucalyptus leucophloia</i> open woodland	
GP7	-16.598863°	134.539259°	<i>Eucalyptus leucophloia</i> open woodland	
GP8	-16.599821°	134.555937°	<i>Corymbia dichromophloia</i> / <i>Eucalyptus leucophloia</i> open woodland	
GP9	-16.593329°	134.617464°	Not assessed - the site was considered to be located too far away from the proposed construction footprint and therefore disregarded as an option, to minimise the construction of additional access tracks.	

Gravel Pit	Location		Vegetation community	Photo
	Latitude	Longitude		
GP10	-16.628703°	134.604123°	<i>Corymbia dichromophloia</i> / <i>Erythrophleum chlorostachys</i> open woodland	
GP11	-16.635501°	134.608648°	<i>Corymbia dichromophloia</i> / <i>Eucalyptus leucophloia</i> open woodland	
GP12	-16.646469°	134.600180°	<i>Eucalyptus leucophloia</i> open woodland	

7.0 References

- AECOM Australia Pty Ltd. 2011. *Archaeological Assessment – Drill Sites and Access Roads*. Unpublished report for Falcon Oil and Gas Australia.
- AECOM Australia Pty Ltd. 2012a. *EP99 Archaeological Survey, Beetaloo Basin*. Unpublished report for Falcon Oil and Gas Australia.
- AECOM Australia Pty Ltd. 2012b. *Interim Report Archaeological Surveys 2011*. Unpublished report for Hess Australia (Beetaloo) Pty 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. 2015a. *Exploration Environmental Plan, Beetaloo Basin, NT*. Unpublished report for Origin Energy Resources Limited, Darwin, NT.
- AECOM Australia Pty Ltd. 2015c. *Paltar Petroleum Limited: Aboriginal & Historic Heritage Assessment*. Unpublished report to Paltar Petroleum Limited.
- AECOM Australia Pty Ltd. 2020. Seismic Environment Management Plan. Published by DEPWS Approved Environment Management Plans website. 2 November 2020.
<https://depws.nt.gov.au/onshore-gas/environment-management-plan/approved-emps>
- Ahmed, M., Dunster, J.N and Munson, T.J. 2013. Chapter 15: McArthur Basin: in Ahmad M and Munson TJ (compilers). *'Geology and mineral resources of the Northern Territory'*. Northern Territory Geological Survey, Special Publication 5.
- 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.
- Atlas of Living Australia (ALA). 2019. Spatial Database. <https://spatial.ala.org.au/>. Site accessed 25 November 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). 2016. *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. *National Land and Water Resources*. Australian Resources online.
- Baker, B., Price, O., Woinarski, J, Gold, S., Connors., G, Fisher, A. and Hempel, C. 2005. *Northern Territory Bioregions: assessment of key biodiversity values and threats*. Department of Natural Resources, Environment and the Arts, Northern Territory Government.
- Barkly Regional Council. 2015. *The Region: Demographics*. Available from: <https://www.barkly.nt.gov.au/region/demographics>.
- Bureau of Meteorology (BoM). 2020. Climate Data Online. <http://www.bom.gov.au/climate/data/?ref=ftr>. Site accessed 4 June 2020.
- 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.
- 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 5 June 2020.

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 5 June 2020.

Department of Environment and Natural Resources and Department of Primary Industry and Resources (DENR & DPIR). 2019. Code of Practice: Onshore Petroleum Activities in the Northern Territory. Available from: <https://denr.nt.gov.au/onshore-gas/onshore-gas-in-the-northern-territory/code-of-practice-onshore-petroleum-activities-in-the-nt>. Accessed 23 July 2020.

Department of Natural Resources, Environment, The Arts and Sport (NRETAS). 2010. *Sites of Conservation Significance: Lake Woods*. Northern Territory Government. Available from: https://www.territorystories.nt.gov.au/jspui/bitstream/10070/254286/1/39_lakewoods.pdf.

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.

Fisher A. 2001. *Biogeography and Conservation of Mitchell Grasslands in Northern Australia*, PhD Thesis, Faculty of Science, Information Technology and Education, Northern Territory University, Darwin, NT.

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

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.

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. 2005. *Environmental Management Plan, Onshore Petroleum Exploration, Beetaloo Basin, NT*. Prepared for Sweetpea Corporation, NT.

HLA-Envirosciences Pty Ltd (HLA). 2006a. *Sweetpea Petroleum Environment Program 2006 Baseline Vegetation Assessment*, Prepared for Sweetpea Petroleum Pty Ltd, NT.

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). 2007. *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.

Huddlestone-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

- Imperial Oil and Gas Pty Ltd. 2019. *Recordable Incidents Summary Report: Environmental Management Plan (EMP) – NT Exploration Permit 187 Beetaloo Sub-Basin 2019 Seismic Program. 2019-20 Quarter 2: October to December 2019*. Published on the Department of Environment and Natural Resources recordable incident reports website <https://denr.nt.gov.au/onshore-gas/onshoregas-in-the-northern-territory/industry-compliance-and-reporting/recordable-incidents>. Date access 25 August 2020.
- 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 Australia and Rangelands Fire Information (NAFI), 2020, *Fire History 2011-20*. Charles Darwin University. Accessed December 2020 <https://firenorth.org.au/nafi3/>.
- 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: 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.
- 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, M. A. 1986. An Investigation of Possible Pleistocene Occupation at Lake Woods, Northern Territory. *Australian Archaeology*. Volume 22, pp. 60–74.
- 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.
- 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.

- Thackway, R. and Creswell, I.D. 1995. *An Interim Biogeographic Regionalisation for Australia: A framework for setting priorities in the national reserves system cooperative program*. Australian Nature Conservation Agency. Australian Government.
- Thomson, B. 1991. *A Field Guide to Bats of the Northern Territory*. Conservation Commission of the Northern Territory, Darwin.
- Tickell, S. J, 2003. *Water Resources Mapping of the Barkly Tablelands*. Department of Infrastructure, Planning and Environment, 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., 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. and Milne, D. 2016. *Threatened Species of the Northern Territory: Ghost Bat *Megaderma gigas**. 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.
- 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.

Appendix C1

Flora and Fauna within Project Area

(ALA and NR Maps, 2020)

Appendix C1 Flora and Fauna within Project Area

Table 31 Flora Species within the Project Area (ALA, NR Maps 2020)

Family	Genus	Species
ACANTHACEAE	<i>Brunoniella</i>	<i>australis</i>
	<i>Hypoestes</i>	<i>floribunda</i>
AMARANTHACEAE	<i>Gomphrena</i>	<i>flaccida</i>
	<i>Ptilotus</i>	<i>fusiformis</i>
	<i>Ptilotus</i>	<i>nobilis</i> subsp. <i>nobilis</i>
APOCYNACEAE	<i>Carissa</i>	<i>spinarum</i>
	<i>Cynanchum</i>	<i>viminale</i>
	<i>Marsdenia</i>	<i>australis</i>
	<i>Marsdenia</i>	<i>geminata</i>
	<i>Secamone</i>	<i>elliptica</i>
	<i>Tylophora</i>	<i>flexuosa</i>
ASTERACEAE	<i>Blumea</i>	<i>saxatilis</i>
	<i>Pterocaulon</i>	<i>serrulatum</i>
BORAGINACEAE	<i>Ehretia</i>	<i>saligna</i>
CAMPANULACEAE	<i>Isotoma</i>	sp. <i>tanumbirini</i>
CAPPARACEAE	<i>Capparis</i>	<i>lasiantha</i>
	<i>Capparis</i>	<i>umbonata</i>
CELASTRACEAE	<i>Denhamia</i>	<i>obscura</i>
COMBRETACEAE	<i>Macropteranthes</i>	<i>kekwickii</i>
	<i>Terminalia</i>	<i>canescens</i>
	<i>Terminalia</i>	<i>volucris</i>
COMMELINACEAE	<i>Commelina</i>	<i>agrostophylla</i>
	<i>Murdannia</i>	<i>graminea</i>
	<i>Murdannia</i>	<i>vaginata</i>
CONVOLVULACEAE	<i>Bonamia</i>	<i>brevifolia</i>
	<i>Evolvulus</i>	<i>alsinoides</i>
	<i>Ipomoea</i>	<i>plebeia</i>
	<i>Ipomoea</i>	<i>polymorpha</i>
	<i>Merremia</i>	<i>incisa</i>
	<i>Operculina</i>	<i>aequisepala</i>
CUCURBITACEAE	<i>Cucumis</i>	<i>melo</i>
CYPERACEAE	<i>Cyperus</i>	<i>concinus</i>
	<i>Cyperus</i>	<i>cristulatus</i>
	<i>Cyperus</i>	<i>oxycarpus</i>

Family	Genus	Species
CYPERACEAE	<i>Cyperus</i>	<i>polystachyos</i>
	<i>Fimbristylis</i>	<i>microcarya</i>
	<i>Rhynchospora</i>	<i>longisetis</i>
DROSERACEAE	<i>Drosera</i>	<i>indica</i>
EBENACEAE	<i>Diospyros</i>	<i>humilis</i>
	<i>Diospyros</i>	<i>rugosula</i>
ERIOCAULACEAE	<i>Eriocaulon</i>	<i>cinereum</i>
EUPHORBIACEAE	<i>Euphorbia</i>	<i>schultzei</i>
	<i>Euphorbia</i>	<i>thelephora</i> var. <i>thelephora</i>
FABACEAE	<i>Acacia</i>	<i>calligera</i>
	<i>Acacia</i>	<i>galioides</i>
	<i>Acacia</i>	<i>gonoclada</i>
	<i>Acacia</i>	<i>hammondii</i>
	<i>Acacia</i>	<i>plectocarpa</i>
	<i>Acacia</i>	<i>shirleyi</i>
	<i>Acacia</i>	<i>torulosa</i>
	<i>Acacia</i>	<i>wickhamii</i> subsp. <i>wickhamii</i>
	<i>Bauhinia</i>	<i>cunninghamii</i>
	<i>Chamaecrista</i>	<i>absus</i> var. <i>absus</i>
	<i>Crotalaria</i>	<i>medicaginea</i>
	<i>Crotalaria</i>	<i>montana</i>
	<i>Desmodium</i>	<i>muelleri</i>
	<i>Erythrophleum</i>	<i>chlorostachys</i>
	<i>Rhynchosia</i>	<i>minima</i>
	<i>Tephrosia</i>	<i>remotiflora</i>
	<i>Uraria</i>	<i>lagopodioides</i>
	<i>Vigna</i>	<i>lanceolata</i>
	<i>Zornia</i>	<i>muriculata</i>
GOODENIACEAE	<i>Goodenia</i>	<i>leiosperma</i>
LAMIACEAE	<i>Mesosphaerum</i>	<i>suaveolens</i>
	<i>Premna</i>	<i>acuminata</i>
LAURACEAE	<i>Cassytha</i>	<i>filiformis</i>
LINDERNIACEAE	<i>Striga</i>	<i>curviflora</i>
LORANTHACEAE	<i>Amyema</i>	<i>maidenii</i> subsp. <i>maidenii</i>
	<i>Lysiana</i>	<i>spathulata</i> subsp. <i>spathulata</i>
MALVACEAE	<i>Abutilon</i>	<i>hannii</i>

Family	Genus	Species
	<i>Gossypium</i>	<i>australe</i>
	<i>Grewia</i>	<i>mesomischa</i>
	<i>Grewia</i>	<i>retusifolia</i>
	<i>Herissantia</i>	<i>crispa</i>
	<i>Hibiscus</i>	<i>meraukensis</i>
	<i>Hibiscus</i>	<i>sturtii</i>
	<i>Melhania</i>	<i>oblongifolia</i>
	<i>Melochia</i>	<i>corchorifolia</i>
	<i>Sida</i>	<i>brachypoda</i>
	<i>Sida</i>	<i>rohlena</i> subsp. <i>rohlena</i>
	<i>Sida</i>	<i>spinosa</i>
	<i>Triumfetta</i>	<i>plumigera</i>
	<i>Waltheria</i>	<i>indica</i>
MENISPERMACEAE	<i>Tinospora</i>	<i>smilacina</i>
MENYANTHACEAE	<i>Nymphoides</i>	<i>crenata</i>
MOLLUGINACEAE	<i>Glinus</i>	<i>lotoides</i>
MYRTACEAE	<i>Corymbia</i>	<i>dichromophloia</i>
	<i>Corymbia</i>	<i>grandifolia</i> subsp. <i>grandifolia</i>
	<i>Corymbia</i>	<i>polycarpa</i>
	<i>Eucalyptus</i>	<i>leucophloia</i> subsp. <i>euroa</i>
	<i>Eucalyptus</i>	<i>pruinosa</i>
	<i>Eucalyptus</i>	<i>tectifolia</i>
	<i>Lophostemon</i>	<i>grandiflorus</i>
	<i>Melaleuca</i>	<i>acacioides</i>
	<i>Melaleuca</i>	<i>citrolens</i>
	<i>Melaleuca</i>	<i>viridiflora</i>
OPILACEAE	<i>Jasminum</i>	<i>molle</i>
	<i>Opilia</i>	<i>amentacea</i>
PEDALIACEAE	<i>Sesamum</i>	<i>indicum</i>
PHYLLANTHACEAE	<i>Flueggea</i>	<i>virosa</i> subsp. <i>melanthesoides</i>
	<i>Phyllanthus</i>	<i>exilis</i>
	<i>Phyllanthus</i>	<i>minutiflorus</i>
	<i>Synostemon</i>	<i>rhytidospermus</i>
PICRODENDRACEAE	<i>Petalostigma</i>	<i>pubescens</i>
POACEAE	<i>Acrachne</i>	<i>racemosa</i>
	<i>Aristida</i>	<i>queenslandica</i>
	<i>Brachyachne</i>	<i>convergens</i>

Family	Genus	Species
POACEAE	<i>Chrysopogon</i>	<i>fallax</i>
	<i>Digitaria</i>	<i>brownii</i>
	<i>Digitaria</i>	<i>gibbosa</i>
	<i>Ectrosia</i>	<i>agrostoides</i>
	<i>Ectrosia</i>	<i>leporina</i>
	<i>Enneapogon</i>	<i>lindleyanus</i>
	<i>Eragrostis</i>	<i>amabilis</i> var. <i>amabilis</i>
	<i>Eragrostis</i>	<i>cumingii</i>
	<i>Eragrostis</i>	<i>fallax</i>
	<i>Eragrostis</i>	<i>tenellula</i>
	<i>Eriachne</i>	<i>armittii</i>
	<i>Eriachne</i>	<i>obtusa</i>
	<i>Mnesithea</i>	<i>formosa</i>
	<i>Panicum</i>	<i>decompositum</i>
	<i>Panicum</i>	<i>effusum</i>
	<i>Panicum</i>	<i>mindanaense</i>
	<i>Paspalidium</i>	<i>rarum</i>
	<i>Paspalidium</i>	<i>retiglume</i>
	<i>Perotis</i>	<i>rara</i>
	<i>Pseudopogonatherum</i>	<i>contortum</i>
	<i>Schizachyrium</i>	<i>fragile</i>
	<i>Setaria</i>	<i>surgens</i>
	<i>Sorghum</i>	<i>plumosum</i>
	<i>Triodia</i>	<i>bitextura</i>
	<i>Tripogonella</i>	<i>loliiformis</i>
	<i>Urochloa</i>	<i>holosericea</i>
POLYGALACEAE	<i>Polygala</i>	<i>orbicularis</i>
PONTEDERIACEAE	<i>Monochoria</i>	<i>cyanea</i>
	<i>Pontederia</i>	<i>cyanea</i>
PORTULACACEAE	<i>Calandrinia</i>	<i>quadrivalvis</i>
PROTEACEAE	<i>Grevillea</i>	<i>pteridifolia</i>
PTERIDACEAE	<i>Cheilanthes</i>	<i>tenuifolia</i>
RHAMNACEAE	<i>Alphitonia</i>	<i>excelsa</i>
RUBIACEAE	<i>Oldenlandia</i>	<i>mitrasacmoides</i> subsp. <i>mitrasacmoides</i>
	<i>Spermacoce</i>	<i>stenophylla</i>
SANTALACEAE	<i>Santalum</i>	<i>lanceolatum</i>
SAPINDACEAE	<i>Atalaya</i>	<i>hemiglauca</i>

Family	Genus	Species
	<i>Dodonaea</i>	<i>physocarpa</i>
	<i>Dodonaea</i>	<i>stenophylla</i>
SOLANACEAE	<i>Solanum</i>	<i>lucani</i>
VIOLACEAE	<i>Hybanthus</i>	<i>enneaspermus</i>
VITACEAE	<i>Cayratia</i>	<i>trifolia</i>

Table 32 Fauna species recorded in the Permit Area (ALA, NR Maps 2020)

Common Name	Scientific Name
Birds	
Brown Goshawk	<i>Accipiter fasciatus</i>
Australian Owlet-nightjar	<i>Aegotheles cristatus</i>
Pacific Black Duck	<i>Anas superciliosa</i>
Australasian Darter	<i>Anhinga novaehollandiae</i>
Red-winged Parrot	<i>Aprosmictus erythropterus</i>
White-necked Heron	<i>Ardea pacifica</i>
Australian Bustard	<i>Ardeotis australis</i>
Black-faced Woodswallow	<i>Artamus cinereus</i>
Little Woodswallow	<i>Artamus minor</i>
Bush Stone-curlew	<i>Burhinus grallarius</i>
Red-tailed Black Cockatoo	<i>Calyptorhynchus banksii</i>
Australian Wood Duck	<i>Chenonetta jubata</i>
Great Bowerbird	<i>Chlamydera nuchalis</i>
Spotted Harrier	<i>Circus assimilis</i>
Black-tailed Treecreeper	<i>Climacteris melanurus</i>
Ground Cuckoo-shrike	<i>Coracina maxima</i>
Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>
White-bellied Cuckoo-shrike	<i>Coracina papuensis</i>
Torresian Crow	<i>Corvus orru</i>
Pied Butcherbird	<i>Cracticus nigrogularis</i>
White-faced Heron	<i>Egretta novaehollandiae</i>
Black-fronted Dotterel	<i>Elsayornis melanops</i>
Galah	<i>Eolophus roseicapilla</i>
Brown Falcon	<i>Falco berigora</i>
Diamond Dove	<i>Geopelia cuneata</i>
Bar-shouldered Dove	<i>Geopelia humeralis</i>
Peaceful Dove	<i>Geopelia striata</i>
White-throated Gerygone	<i>Gerygone olivacea</i>

Common Name	Scientific Name
Magpie-lark	<i>Grallina cyanoleuca</i>
Brolga	<i>Grus rubicunda</i>
Australian Magpie	<i>Gymnorhina tibicen</i>
Whistling Kite	<i>Haliastur sphenurus</i>
Pictorella Mannikin	<i>Heteromunia pectoralis</i>
Grey-fronted Honeyeater	<i>Lichenostomus plumulus</i>
Brown Honeyeater	<i>Lichmera indistincta</i>
Variegated Fairy-wren	<i>Malurus lamberti</i>
Red-backed Fairy-wren	<i>Malurus melanocephalus</i>
Budgerigar	<i>Melopsittacus undulatus</i>
Rainbow Bee-eater	<i>Merops ornatus</i>
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>
Jacky Winter	<i>Microeca fascians</i>
Black Kite	<i>Milvus migrans</i>
Cockatiel	<i>Nymphicus hollandicus</i>
Crested Pigeon	<i>Ocyphaps lophotes</i>
Rufous Whistler	<i>Pachycephala rufiventris</i>
Striated Pardalote	<i>Pardalotus striatus</i>
Australian Pelican	<i>Pelecanus conspicillatus</i>
Common Bronzewing	<i>Phaps chalcoptera</i>
Little Friarbird	<i>Philemon citreogularis</i>
Yellow-billed Spoonbill	<i>Platalea flavipes</i>
Royal Spoonbill	<i>Platalea regia</i>
Tawny Frogmouth	<i>Podargus strigoides</i>
Long-tailed Finch	<i>Poephila acuticauda</i>
Hooded Parrot	<i>Psephotus dissimilis</i>
Great Bowerbird	<i>Ptilonorhynchus nuchalis</i>
Willie Wagtail	<i>Rhipidura leucophrys</i>
Weebill	<i>Smicrornis brevirostris</i>
Apostlebird	<i>Struthidea cinerea</i>
Double-barred Finch	<i>Taeniopygia bichenovii</i>
Zebra Finch	<i>Taeniopygia guttata</i>
Red-backed Kingfisher	<i>Todiramphus pyrrhopygius</i>
Red-chested Button-quail	<i>Turnix pyrrhothorax</i>
Masked Lapwing	<i>Vanellus miles</i>
Mammals	
Dingo	<i>Canis familiaris dingo</i>

Common Name	Scientific Name
Agile Wallaby	<i>Macropus agilis</i>
Common Wallaroo	<i>Macropus robustus</i>
Red Kangaroo	<i>Macropus rufus</i>
Northern Nailtail Wallaby	<i>Onychogalea unguifera</i>
Little Red Flying-fox	<i>Pteropus scapulatus</i>
Yellow-bellied Sheath-tailed Bat	<i>Saccolaimus flaviventris</i>
Reptiles	
Children's Python	<i>Antaresia childreni</i>
Central Netted Dragon	<i>Ctenophorus nuchalis</i>
Leopard Ctenotus	<i>Ctenotus pantherinus</i>
Pretty Ctenotus	<i>Ctenotus pulchellus</i>
Burton's Legless Lizard	<i>Lialis burtonis</i>
Gilbert's Dragon	<i>Lophognathus gilberti</i>
Crowned Gecko	<i>Lucasium stenodactylum</i>
Northern Hooded Scaly-foot	<i>Pygopus steelescotti</i>
Spiny-tailed Gecko	<i>Strophurus ciliaris</i>
Centralian Bluetongue	<i>Tiliqua multifasciata</i>
Mertens' Water Monitor	<i>Varanus mertensi</i>
Yellow-spotted Monitor	<i>Varanus panoptes</i>

Appendix C2

**EPBC Protected Matters
Search Tool Results**

Appendix C2 EPBC Protected Matters Search Tool Results



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

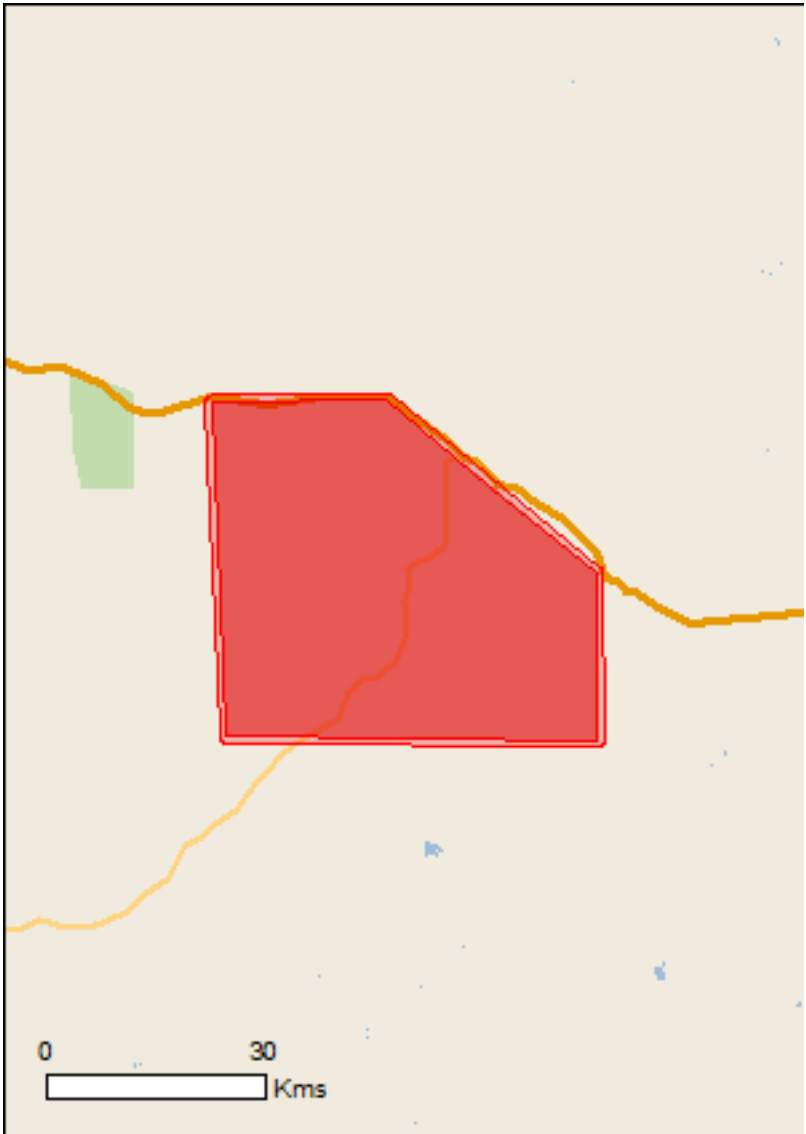
Report created: 05/06/20 14:10:03

- [Summary](#)
- [Details](#)

[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)
- [Caveat](#)
- [Acknowledgements](#)



This map may contain data which are
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[Coordinates](#)

Buffer: 1.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	10
Listed Migratory Species:	12

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	19
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	11
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat known to occur within area
Falcunculus frontatus whitei Crested Shrike-tit (northern), Northern Shrike-tit [26013]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat may occur within area
Mammals		
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat may occur within area
Saccolaimus saccolaimus nudicluniatus Bare-rumped Sheath-tailed Bat, Bare-rumped Sheathtail Bat [66889]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Elseya lavarackorum Gulf Snapping Turtle [67197]	Endangered	Species or species habitat may occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species

Name	Threatened	Type of Presence
		habitat likely to occur within area
Migratory Terrestrial Species		
Cecropis daurica Red-rumped Swallow [80610]		Species or species habitat may occur within area
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area

Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Ardea alba Great Egret, White Egret [59541]	Critically Endangered	Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]		Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat may occur within area
Hirundo daurica Red-rumped Swallow [59480]		Species or species habitat may occur within area
Hirundo rustica Barn Swallow [662]	Endangered*	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]		Species or species habitat may occur within area
Reptiles		
Crocodylus johnstoni Freshwater Crocodile, Johnston's Crocodile, Johnston's River Crocodile [1773]		Species or species habitat may occur within area

Extra Information

Invasive Species

[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Bubalus bubalis Water Buffalo, Swamp Buffalo [1]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Equus asinus Donkey, Ass [4]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Plants		
Acacia nilotica subsp. indica Prickly Acacia [6196]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-16.488041 134.41722,-16.485408 134.631453,-16.68941 134.891005,-16.886624 134.893065,-16.882681 134.435759,-16.488039 134.417217,-16.488039 134.417217,-16.488041 134.41722

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

Appendix D

Cultural Heritage Finds Protocol

Appendix D Cultural Heritage Finds Protocol

Cultural Heritage Finds Protocol

EP136 - Beetaloo Sub-Basin, NT

Cultural Heritage Finds Protocol

EP136 - Beetaloo Sub-Basin, NT

Client: Sweetpea Petroleum Pty Ltd

ABN: 20 093 864 925

Prepared by

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Quality Information

Document Cultural Heritage Finds Protocol

Ref 60611666

Date 11-Mar-2021

Prepared by Perri Braithwaite

Reviewed by Alana Court and Luke Kirkwood

Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
0	04 Jan 2021	Draft	Luke Kirkwood Principal Heritage Specialist	
1	11-Mar-2021	Final	Alana Court Association Director - Environment	

1.0 Cultural Heritage Finds Protocol

The following management measures are recommended for unexpected Aboriginal heritage finds and to be included as part of daily toolbox discussions.

Aboriginal Cultural Heritage

Aboriginal finds can include the following:

- **Stone artefacts** (sharp edged rocks that have identifiable features demonstrating evidence of human modification. See attached information sheet)
- **Scarred Trees** (trees with symmetrical scars that might demonstrate evidence of removal of bark for use in coolamons, shields and huts. See attached information sheet)
- **Grindstones** (Large sandstone items (either fixed in bedrock or mobile) that have manmade grooves in them demonstrating use. See attached information sheet)
- **Stone Axes** (heavy hatchet head like stone items, typically with the leading edge sharpened. See attached information sheet)
- **Bone, Shell and Charcoal** (potential historical food waste dumps (also known as Middens). See attached information sheet)

Geotechnical subsurface works are typically likely to encounter shell, charcoal and bone which will appear as lens from a centimetre to several metres in depth.

Prior to surface works, geotechnical team should also be aware of potential for surface finds of artefacts and avoid impacts to scarred trees.

Aboriginal Cultural Heritage Procedure

If an object of potential Aboriginal cultural heritage value is uncovered:

1. All work to cease within 10 metres of the suspected find, and the area to be cordoned off using temporary fencing.
2. Site Supervisor is to be immediately notified who will then engage a qualified Heritage Advisor to assess the find and recommend any necessary management measures.
3. If the find is determined to be Aboriginal heritage, the Site Supervisor or Heritage Advisor to notify the relevant Heritage Department
4. Work is not to recommence in the vicinity of the find until direction is provided by the Heritage Department.

Historical Cultural Heritage

Historic finds can include the following:

- **Glass** (Coloured glass, bottles (complete or fragmentary etc.)
- **Metal** (identifiable metallic objects such as cutlery, buckles, farming equipment, woodworking and metal equipment etc.)
- **Ceramic** (Plates, cups, ink wells, pipes, etc.)
- **Wood** (identifiable human manufactured wooden items)
- **Stone** (identifiable human manufactured stone items)
- **Bone, Shell and Charcoal** (potential historical food waste dumps)

Historical Heritage Procedure

The following management measures are recommended for unexpected historic finds.

1. All work to cease within 10 metres of the suspected find, and the area to be cordoned off using temporary fencing.
2. Site Supervisor to be notified who will then engage with a qualified Heritage Advisor to assess the find and recommend any necessary management measures.
3. If the find is determined to be of heritage importance, work is not to recommence in the vicinity of the find until direction is provided from the relevant Heritage Department
4. If the find is determined to be historical heritage, the Site Supervisor or Heritage Advisor to notify Heritage Department
5. Work is not to recommence in the vicinity of the find until direction is provided by the Heritage Department.

Discovery of Human Remains

If any suspected human remains are discovered during any activity works, they must be initially assumed under the provisions of the relevant Coroners Act to be a crime scene and treated accordingly. The following procedure is to be applied:

1. All activity in the vicinity must cease and the Site Supervisor to be notified immediately.
2. The Police **must be notified immediately** of the discovery by the Site Supervisor or appointed supervisor in charge of the works area.
3. The remains must be **left in place** and protected from harm or damage with a minimum of at least a 50m buffer. It is important to use best judgement and restrict all movement in the immediate vicinity around the discovery until directed otherwise by the Police as this could contaminate a potential crime scene. Likewise do not set up temporary fencing unless directed by the Police.
4. If the appointed expert investigating the find under the relevant Coroners Act believes that there is reasonable grounds to believe the remains to be:
 - **a crime scene**, the Police will provide direction on the management of the discovery
 - **Aboriginal ancestral remains**, the relevant Aboriginal Heritage Department is to be contacted
 - **historical remains**, the relevant Historic Heritage Department is to be contacted