Environmental Management Plan

Peak Helium Pty Ltd

EP134 Work Program

NT Exploration Permit (EP)

PKH2-3

Report Number: EMP PKH2-3 Peak Helium Pty Ltd EP134 Program

INGAUGE
Well Engineering & Project Management

Prepared for:

Peak Helium Pty Ltd

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Executive Summary

Introduction

Peak Helium proposes well pad and access construction, drilling, completions, and an Extended Production Testing (EPT) program in EP134 for helium production, commencing in Q1 of 2023.

This Environmental Management Plan (EMP) has been prepared with concern to the *Petroleum (Environment) Regulations 2016* (NT) [NT GOVERNMENT, 2016A] and the *Code of Practice: Petroleum Activities in the Northern Territory* [DENR, 2019]. This EMP seeks approval to conduct the program, including all ancillary activities required to complete the works.

This EMP outlines how the environmental risks will be reduced to a level that is as low as reasonably practicable (ALARP).

Description of the Activities

The activities to be carried out under this EMP are shown in **Table i** below:

Table i Description of Regulated Activities

Regulated Activity	Description	Units	Unit of Measure	Ha Cleared
Well Pads	• The construction of well pads, requiring the clearing of land, construction of lined pits (for drilling by-product and groundwater storage), drilling water production bores, and the establishment of erosion and sediment control devices. • The constructed well pads will be either a combination of single-well pads and multi-well pads, or a multi-well pad for the drilling of four wells.	3	each	21.04
Bunded Tank Pads	• The establishment of bunded tank pads and tanks fitted with leak detection on the above well pads.	3	each	N/A
Campsites	• The construction of campsites, requiring the clearing of land, and the establishment of erosion and sediment control devices.	3	each	3.00
Existing Access Track - Widening	• Where the existing pastoral tracks and repurposed seismic tracks require widening. o Existing pastoral tracks with a width less than 6m. o Seismic tracks with a width of 5m need to be widened to meet the 6m minimum criteria.	32.8	km	5.17
New Access Tracks	• Where existing pastoral access tracks and repurposed seismic tracks are not available, new access tracks will be constructed.	2.1	km	1.24
Contingency Access Tracks	• Possible access tracks if the well pad is relocated to the furthest point in the corridor. o Contingency Access Tracks will be repurposed seismic tracks that require widening. o Calculations assume that the well pad is moved to the furthest point in the corridor and represent a maximum potential disturbance area.	20.3	km	2.03

Regulated Activity	Description	Units	Unit of Measure	Ha Cleared
	○ Note: it is unlikely that the well pad will move significantly during ground-truthing; however, calculations are provided for completeness.			
Gravel Pits	• The construction and operation of gravel pits, requiring the clearing of land, and the establishment of erosion and sediment control devices.	4	each	4.60
Water Bores	• The construction of water bores on well pads or potential alternative locations. • The construction of production water bores located on well pads or adjacent to access tracks within the indicative well pad locations, requiring the widening of access tracks and/or the clearing of land.	3	each	1.00
Wells – Drilling	• The drilling of helium exploration wells that will be drilled vertical to the target formation and then plugged back and drilled horizontally. The drilling of gas exploration wells comprising vertical wells, horizontal wells that plug back and drill out of these vertical wells and dedicated new horizontal wells. • If a vertical well is plugged back and drilled out, it will not add to the number of wells under this EMP (e.g., a vertical well plugged back and drilled horizontally will count as one well as the plugged back vertical section will not be re-drilled).	4	each	N/A
Wells – Evaluation	• The evaluation, logging, testing, and coring of the above wells	4	each	N/A
Wells – Completion	• The completion, workover, and maintenance of the above wells.	4	each	N/A
Wells – Extended Production Testing	• The Extended Production Testing (EPT) of the above wells, with EPT for 365 days for each well.	4	each	N/A

Activity Location

EP134 is situated east of the Stuart Highway and the Alice Springs Tarcoola Railway in the Northern Territory (NT), encompassing the township of Kulgera. The southern boundary of EP 134 sits on the NT/South Australia (SA) border. The Project Area is situated in the north-western portion of EP134, close to the Alice Springs Tarcoola Railway and Horseshoe Bend Road. The project activities will be undertaken approximately 170km south of Alice Springs, over the pastoral leases of Horseshoe Bend, Idracowra, and Lilla Creek in the Kulgera area. There are numerous existing pastoral access tracks and fence lines through the tenements. **Figure i** displays the location of the tenement areas. The primary access within the tenement is Horseshoe Bend Road, a dirt road running east off the Stuart Highway, just north of the Erldunda Roadhouse.

Further detail is shown in the following figures:

- **Figure i** Location of the Project Area.
- **Figure ii** Proposed Location of Regulated Activities under this EMP and Sites of Conservation and Botanical Significance.

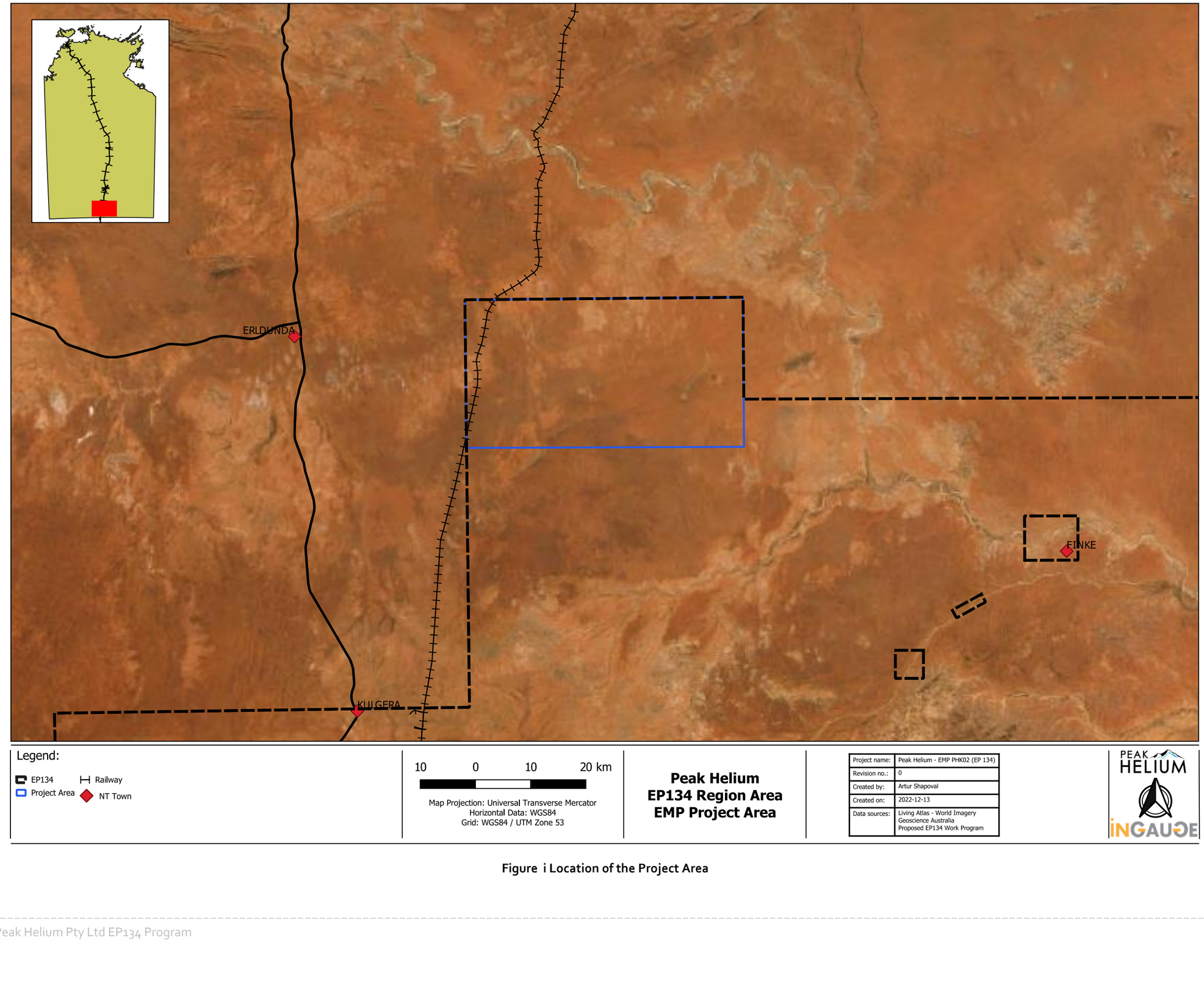
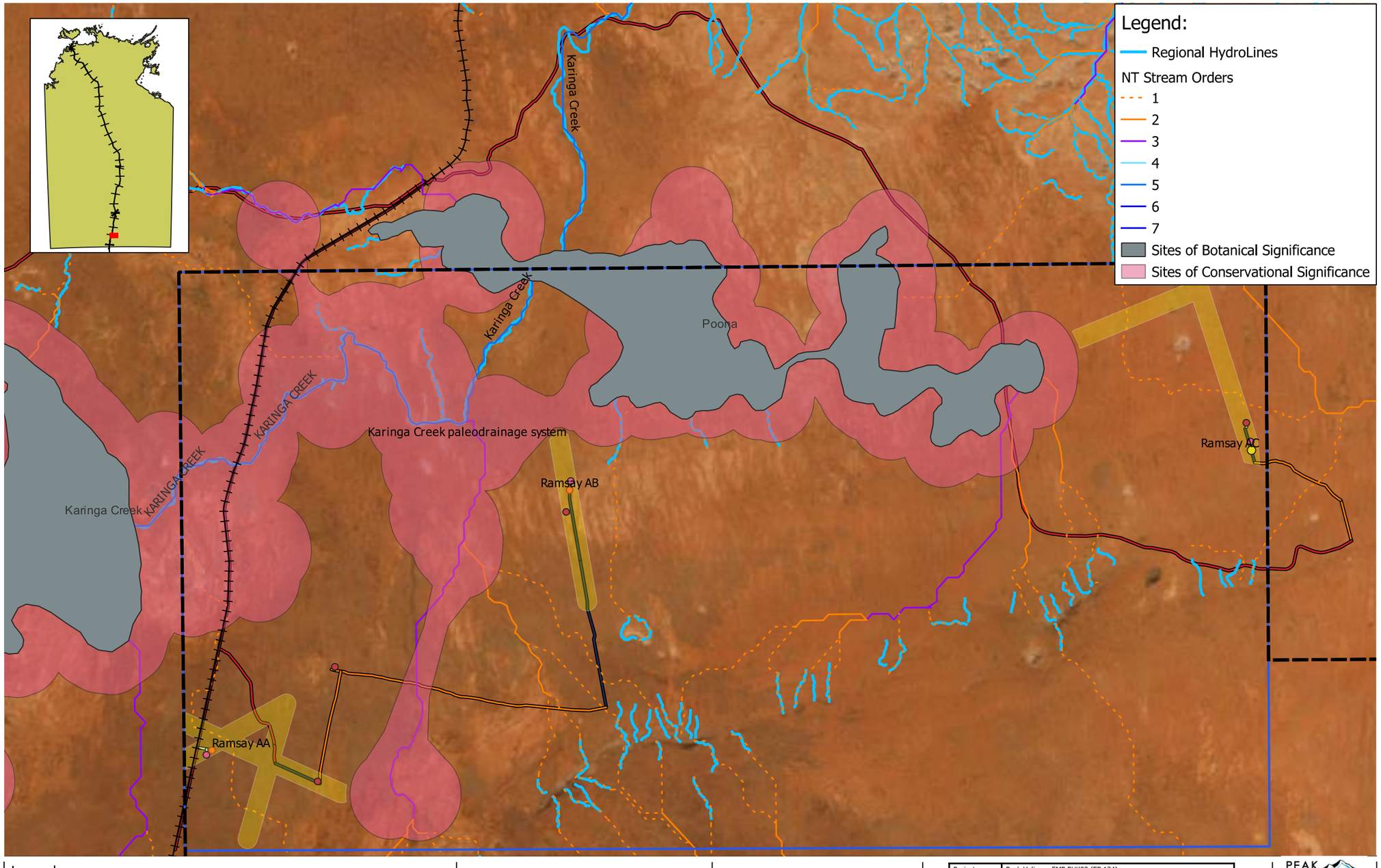


Figure i Location of the Project Area



Legend:
- EP134
- Project Area
- Railway
- Proposed well pad - Indicative location (Horseshoe Bend)
- Proposed well pad - Indicative location (Idracowra)
- Gravel pit - Indicative location
- Well camp - Indicative location

Access Tracks:
- Proposed
- Repurposed Seismic
- Existing (Requires Widening)
- Existing Pastoral Track
- Infrastructure Movement Buffer

2.5 0 2.5 5 km

Map Projection: Universal Transverse Mercator
Horizontal Data: WGS84
Grid: WGS84 / UTM Zone 53

Peak Helium EP134 Project Area Proposed Activities and Affected Areas

Project name:	Peak Helium - EMP PHK02 (EP 134)
Revision no.:	0
Created by:	Artur Shapoval
Created on:	2022-12-13
Data sources:	Living Atlas - World Imagery Geoscience Australia Proposed EP134 Work Program

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Figure ii Proposed Location of Regulated Activities under this EMP and Sites of Conservation and Botanical Significance

Existing Environment

The Location of the Regulated Activity is situated in the Finke interim bioregion, specifically, in the Tieyon interim bioregion – east of the Stuart Highway in the Northern Territory [DAWE, 2012]. Additional bioregions, as defined in the *Land Systems of the Southern part of the Northern Territory* database and associated publications, include the Tieyon, Tanami, Great Sandy Desert, Macdonnell Ranges, and the Simpson Strzelecki Dunefields [DEPWS, 2011] [C. S. CHRISTIAN et al., 1954]. The indicative locations of the well pads fall in the Tanami and Great Sandy Desert bioregions, which are characterised by featureless sand plains, small alluvial plains, and tree steppe, grading to shrub-steppe, respectively [DAWE, 2008; G. GRAHAM, 2001].

The Project Area is located within the Diamantina-Georgina River Catchment and interspersed with watercourses of varying stream orders, including Karinga Creek. To the north of the Project Area is Nine Mile Creek. The Project Area intersects the Karinga Creek Paleodrainage System (KCPS) Site of Conservation Significance (SOCS) and the Poona Site of Botanical Significance (SOBS). These SOCS/SOBS support a myriad of threatened species and migratory shore birds. Peak Helium will ensure that there are minimal disturbances to the SOCS/SOBS and, therefore these species. Well pads constructed under this EMP will be outside of the buffer zones required for watercourses, as per the *Land Clearing Guidelines* [DEPWS, 2020, 2021]. No well pads, campsites, gravel/borrow pits or new access tracks will be constructed within SOCS or SOBS. To access well pads, campsite/s, and gravel pits, pre-existing pastoral, repurposed seismic and new access tracks will be utilised. No new access tracks will be constructed. or existing pastoral tracks widened within the SOCS/SOBS (with the exception of widening an existing pastoral track across a SOCS connecting corridor as identified in **Figure 3.5—8** and further detailed in **Section 3.6.2**).

The Project Area is situated within the arid zone. It has an average annual rainfall of between 100 to 550mm, which is lower than the average annual evaporation rate. All streams flow inland, with a flow of 0.2ML per hectare per year [NT GOVERNMENT, 2016B]. As defined by the *National Construction Code*, the Project Area experiences seasonal contrast between the wet and dry seasons, which has significant implications for surface water resources, and aquifers [NATIONAL CONSTRUCTION CODE, 2015]. The primary groundwater resources in the region are the Pacoota Sandstone, the Mereenie Sandstone, and the Hermannsburg Sandstone aquifers.

Based on a desktop review and field assessment conducted by EcOz (**Appendix 01.02**) and an additional review of the Project Area with the Protected Maters Search Tool (PMST) (**Appendix 01**) within a 50km radius, threatened species were identified to have the potential to occur near or within the Project Area. However, additional controls have been put in place to mitigate the potential impact, but there is a low likelihood of impact on these species. The results of the field assessment are in**Appendix 01.02** (Environmental Assessment Report), **Section 2.8**.

The Project Area is situated within the *Alice Springs Regional Weeds Strategy 2021-2026* (ASRWS) area and within several specific weed management zones (Athel Pine, Bellyache Bush, Brazilian Pepper, Gamba Grass, and Mimosa Management) [DEPWS, 2021A]. Buffel Grass, a category 2 weed as per the ASRWS, was recorded in Project Area during the 2021/2022 weed survey by EcOz. Weed introduction and spread risk mitigation measures will be implemented. See **Appendix 04** (Risk Assessment) and **Appendix 09** (Weed Management Plan) for full details.

Ellengowan Enterprises (**Appendix 01.01**), an approved NT archaeological consultant, conducted an archaeological survey. No recorded NT Heritage Items or Places, National Heritages Places or World Heritage Properties were found in the Project Area.

Environmental values and sensitivities that have the potential to occur in the vicinity of the Project Area are provided in **Table ii** below.

Table ii Summary of the Existing Environment

Area / Theme	Environmental Factors	Environmental Values and Sensitivities	Summary
Air	Air Quality and Atmospheric Processes	Air quality is conducive to suitability for the life, health and well-being of humans and ecosystems	• A Methane Emissions Management Plan is available in **Appendix 10**. Peak Helium is committed to undertaking a 6-monthly leak detection tests at the well pad as per Part D (5) of *the Code*.
People and Community	Community and Economy Culture and Heritage Human Health	Cultural heritage and sacred sites	• Peak Helium has received an AAPA Authority Certificate C2021/080, which has been provided to DEPWS. • An archaeological survey was conducted in June 2021 and amended in June 2022 by Ellengowan Enterprises, an approved NT archaeological consultant (**Appendix 01.01**).
		People and communities	• There are several pastoral properties with livestock and infrastructure near the tenement. • The Project Area spans a total of two pastoral properties.
Water	Inland Water Environmental Quality	Groundwater	• The Project Area lies within the Amadeus basin, supported by fractured and sandstone rock aquifers. These aquifers are primarily local, with low productivity. • EP134 is not within a water allocation plan area.
		Surface water	• The Project Area is within the Diamantina-Georgina Rivers catchment. • The main watercourses near the Project Area are Karinga Creek and Nine Mile Creek.
		Supply and quantity of water	• The Project Area overlies sandstone and fractured rock aquifers which are low yielding. • The area has a moderate to high level of groundwater salinity.
Land	Terrestrial Ecosystems Landforms Terrestrial Environmental Quality	Sensitive or significant vegetation	• The Project Area overlies SOCS and SOBS, but no well pads, campsites, gravel/borrow pits will be constructed within these areas and access to the infrastructure will only be via existing pastoral tracks.
		Groundwater Dependent Ecosystems (GDE)	• A search of the National Groundwater Dependent Ecosystems (GDEs) Atlas conducted in June 2022 identified a low potential of aquatic or subterranean GDEs occurring within the Project Area. There are terrestrial GDEs present in the Project Area, mainly in the Karinga Creek Paleodrainage System [BOM, 2022].
		Threatened species and their habitat	• Six threatened species have a high chance of occurring within the Project Area and the 50km buffer zone. Note that some of Peak Helium's estimates regarding the likelihood of occurrence within this search area are higher than the ecological report commissioned from EcOz, with controls put in place accordingly.
		Listed migratory species	• The PMST indicates that nine migratory species have potential to occur in the region. All these species are only expected to occur in salt lake habitat (when suitable conditions persist), which does not occur within the Project Area.
		Listed threatened flora species and ecological communities	• No Threatened Ecological Communities (TECs) are listed under the EPBC Act and/or TPWC Act known to occur within 50km of the Project Area.
		Soils	• The proposed activities are located in an area that predominantly comprises loamy depressions, clay pans, swales, and open and undulating plains. The Project Area has a high concentration of drainage lines and rocky rises.

Environmental Impacts and Risks of the Activity

The risks of environmental impacts from the project activities are to be reduced to a level that is As Low As Reasonably Practicable (ALARP). ALARP is achieved when the requirements of *the Code* and site-specific risk management controls are put in place to reduce the residual risk to an acceptable level.

An environmental risk assessment was undertaken for this EMP in **Appendix 03** and **04**. A summary of the environmental factors and key risks is listed in **Table iii**.

Table iii Summary of the Environmental Factors and Key Risks

Environmental Factor	Aspects of the Regulated Activities	Key Risks
Atmospheric Processes	• Access track, well pad, campsite/s, and gravel pit construction. • Drilling and completions operations. • Extended Production Testing.	• Increased greenhouse gas emissions. • Extended Production Testing flaring.
Community and Economy	• Movement of heavy and light vehicles and machinery on public and private roads. • Access track, well pad, campsite/s, and gravel pit construction. • Drilling and Completions operations. • Extended Production Testing.	• Damage to public and private roads. • Nuisance (noise, light and dust). • Spread of biosecurity risk material. • Completion of the project without input/involvement of local businesses or people. • Bushfire.
Culture and Heritage	• Disturbance to land from the construction of new infrastructure.	• Disturbance or damage to artefacts and/or cultural heritage sites.
Human Health	• Movement of heavy and light vehicles and machinery on public and private roads.	• Nuisance (dust). • Safety of the public.
Inland Water Environmental Quality	• Access track, well pad, campsite/s and gravel pit construction. • Drilling and Completions operations.	• Sediment release from cleared infrastructure. • Constructed infrastructure impedes natural surface water flow. • Loss of well circulation while drilling. • Loss of well control. • Overflow of drilling by-products storage pits. • Leak in drilling by-product storage pit liner. • Spills at fluid additive, chemical or fuel storage and handling points. • Spills of fluid additive, chemical or fuel during transport e.g., within KCPS SOCS/SOBS buffers • Use of groundwater for construction and drilling activities. • Horizontal well bore collision on a multi-well pad.
Landforms	• Access track, well pad, campsite/s and gravel pit construction. • Drilling pits.	• Change to previous landscape and visual amenity/aesthetics.
Terrestrial Ecosystems	• Access track, well pad, campsite/s and gravel pit construction. • Drilling and Completions operations.	• Impact on fauna movements from new infrastructure, noise, or light. • Entrapment of fauna or stock in drilling by-product storage pit.
Terrestrial Environmental Quality	• Access track, well pad, campsite/s and gravel pit construction. • Drilling and Completions operations.	• Change or degradation of habitat features. • Sediment release from cleared infrastructure. • Spread of biosecurity risk material. • Pooling of runoff of greywater and treated sewage effluent from irrigation areas.

Environmental Factor	Aspects of the Regulated Activities	Key Risks
		• Spills at fluid additive, chemical or fuel storage and handling points. • Spills of fluid additive, chemical or fuel during transport, e.g., within SOCS/SOBS buffers. • Bushfire. • Rehabilitating site to previous land use standards or an acceptable level for continued landowner use.

Environmental Outcomes

This EMP has been developed to manage environmental risks associated with the project activities to achieve Environmental Outcomes/Objectives.

The Environmental Outcomes of the regulated activities (adapted from NT EPA, 2021 [NT EPA, 2021a]) include:

- Protect air quality and minimise emissions and their impact so that environmental values are maintained.
- Enhance communities and the economy for the welfare, amenity, and benefit of current and future generations.
- Protect sacred sites, culture, and heritage.
- Protect the quality of groundwater and surface water so that environmental values, including ecological health, land uses, and the welfare and amenity of people, are maintained.
- Conserve the variety and integrity of distinctive physical landforms.
- Protect the quality and integrity of land and soils so that environmental values are supported and maintained.

Environmental Outcomes will be achieved when a regulated activity's environmental impacts and risks are reduced to a level that is ALARP and acceptable.

For a view of how Environmental Objectives are linked to Environmental Performance Measures and Performance Evidence, refer to **Section 8.7**.

Chemical Risk Assessment

As this EMP does not cover Hydraulic Fracturing (HF), a chemical risk assessment for HF chemicals has not been undertaken.

Stakeholder Engagement

Peak Helium has established and maintains mutually beneficial relationships with stakeholder groups. Peak Helium endeavours to generate positive economic and social benefits for and in partnership with communities.

The level of engagement with identified stakeholders varies, depending on their potential to be affected by the proposed activities. Nonetheless, relevant stakeholders' engagement processes involve 'Information, consultation, involvement, collaboration and empowerment' to achieve the best outcome for both parties [IAP2, 2018]. The key relevant stakeholder groups with whom Peak Helium has carried out engagements include:

- Traditional Owners.
- Landowners.
- Land Occupiers (Host Pastoralist within the Project Area).

Traditional Owners' stakeholder engagement carried out to date includes identifying all affected stakeholders and pursuing their engagement in compliance with the *Stakeholder Engagement and Consultation Guideline* [NT EPA, 2021B], the NT EPA guidance documents, and the *EP Act* [DEPWS, 2019].

The engagement process involved:

- Educating stakeholders on the proposed impacts of Peak Helium's operations.
- Building relationships.
- Sharing information.
- Bringing stakeholder voices into decisions in the ongoing planning and development of the proposed activities so that specific issues could be considered and addressed.

Peak Helium proactively undertakes future stakeholder engagement. For more information on stakeholder engagement carried out to date and future engagement, see **Appendix 11**.

Contents

Definitions

This section provides a guide for pertinent terms used throughout this EMP and its appendices.

Table 1.1—1 Definitions

Term	Definition
Camp Wastewater	Treated sewage effluent, and greywater from campsite/s and offices (e.g., laundry, showers, sink wastes).
the Code	*Code of Practice: Petroleum Activities in the Northern Territory 2019.*
Drilling	Process of constructing vertical and horizontal wells and includes well evaluation, logging, testing, coring, and cementing.
Drilling By-product (Waste)	Residual drilling fluids that contain some formation fluids, cuttings of the formation being drilled and cement returns.
Drilling Fluids	The mixture of water and additives for drilling purposes (e.g., lubricating the drill bit and removing cuttings).
Drilling Pit	Location of storage for drilling by-products. Also referred to as a Drilling Sump.
Drilling Sump	Location of storage for drilling by-products. Also referred to as a Drilling Pit.
Completions Fluid	Fluid used to control a well during the activity of well completion.
Borrow Pit	Location of suitable fill material for construction purposes (e.g., gravel or clay). Also referred to as a Gravel Pit.
Gravel Pit	Location of suitable fill material for construction purposes (e.g., gravel or clay). Also referred to as a Borrow Pit.
Land Holder	Holds the land currently.
Land Owner	Owns the land.
Non-operational	Any time when there is no manned activity occurring on the site. A non-operational site may have the following: • Storage of drill cuttings and drilling fluids. • Storage of wastewater. • The use of passive monitoring facilities.
Operational	Any time when there is manned activity occurring on the site. A short visit to the site for inspection does not constitute site activity.
Panel	Independent scientific panel.
Produced Fluid	Naturally occurring water extracted from the geological formation during EPT testing.
Project	Program of works.
Project Area	Location of regulated activity. See **Figures i – iv**.

Term	Definition
Subject Area	Proposed well pad corridors, well pads, campsite/s, gravel pits, as outlined in **Appendix 01.02** (Environmental Assessment Report) **Figure 1-1**.
Wastewater	Includes a combination of drilling by-products, produced fluid, completions fluid, camp wastewater, greywater and treated sewage effluent.
Well Pad	Location of the well and its works.

Abbreviations and Units

Table 1.1—2 Abbreviations and Units

Acronym / Abbreviation	Description
AAPA	Aboriginal Areas Protection Authority
AICS	Australian Inventory of Chemical Substances
ALARP	As Low As Reasonably Practicable
ALRA	Aboriginal Land Rights (Northern Territory) Act 1976
APPEA	Australian Petroleum Production and Exploration Association
BoM	Bureau of Meteorology
BOP	Blowout Preventer
CBL	Cement Bond Log
CEO	Chief Executive Officer
CLC	Central Land Council
CPESC	Certified Professional in Erosion and Sediment Control
D&C	Drilling and Completions
DAWE	Dept of Agriculture, Water, and the Environment
DD	Data Deficient
DDR	Daily Drilling Report
DIDO	Drive in Drive Out: A worker that drives into work and then drives out (typically a local worker)
DEPWS	Department of Environment, Parks and Water Security
DFIT	Diagnostic Fracture Injection Test
DITT	Department of Industry, Tourism and Trade
DLRM	Department of Land Resource Management
DoEE	Department of Environment and Energy
Drilling EMP	Environment Management Plan (EMP) For 2022 Drilling Program on NT Exploration Permit (EP) EP134
EC	Electrical Conductivity
EMP	Environment Management Plan
EP	Exploration Permit
EP Act	Environment Protection Act 2019
EPA	Environment Protection Authority (NT)

Acronym / Abbreviation	Description
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EPS	Environmental Performance Standards
ERA	Environmental Risk Assessment
ESD	Ecologically Sustainable Development
EVNT	Endangered, Vulnerable or Near Threatened
EWCRP	Emergency and Well Control Response Plan
FIFO	Fly in Fly Out: A worker that flies into work and then flies out (not typically a local worker)
FIT	Formation Integrity Test
GDE	Groundwater Dependent Ecosystems
GIS	Geographic Information System
GISERA	Gas Industry Social and Environmental Research Alliance
ha	Hectares
HSEMS	Health Safety Environment Management System
IADC	International Association of Drilling Contractors
IMP	Integrity Management Plan
kg	Kilograms
km	Kilometre
KOP	Kick-Off Point
L	Litres
LACA	Land Access and Compensation Agreement
LAG	Local Aboriginal Groups
LOT	Leak-off Test
LCP	Land Clearing Permit
LoR	Level of Reporting
LS	Land System
LWD	Logging While Drilling
m	Metres
MAASP	Maximum Allowable Annular Surface Pressure
MAOP	Maximum Allowable Operating Pressure
MD	Measured Depth
MESP	Maximum Expected Surface Pressure
mGL	Metres Ground Level

Acronym / Abbreviation	Description
ML	Megalitres (1,000,000 litres)
mm	Millimetres
MNES	Matters of National Environment Significance
MoC	Management of Change
mRT	Metres Rotary Table, referenced to the rotary table height of the original drilling rig, all wellbore geometry is measured in mRT
NAFI	North Australia Fire Information
NEPM	National Environment Protection Measure
NGERS	National Greenhouse Energy Reporting Scheme
NRM	Natural Resource Management
NORM	Natural Occurring Radioactive Material
NT	Northern Territory
NT EPA	Northern Territory Environment Protection Authority
NVIS	National Vegetation Information System
OEM	Original Equipment Manufacturer
PER	Petroleum (Environment) Regulations 2016
PL	Petroleum Lease
PM	Project Manager
PMST	Environment Protection and Biodiversity Conservation Act 1999 Protected Matters Search Tool
PPE	Personal Protection Equipment
PPL	Petroleum Pipeline License
RCCA	Root Cause Corrective Actions
RSWC	Rotary Sidewall Coring (Via wireline)
SC	Site Coordinator
SEAAOC	South-East Asia Australia Onshore Conference
Section 19	Section 19 of the Aboriginal Land Rights (Northern Territory) Act 1976
SHRR	Significant Hazard Risk Register
SSCC	Sacred Site Clearance Certificate
TD	Total Depth
TEC	Threatened Ecological Communities
the WOMP	Peak Helium Pty Ltd EP134 Well Operations Management Plan
TCSD	Transport Civil Services Division

Acronym / Abbreviation	Description
TO	Traditional Owners
TOC	Total Organic Content
TPWC Act	Territory Parks and Wildlife Conservation Act 2014
TVD	True Vertical Depth
TVDSS	True Vertical Depth referenced to sea level (Australian Height Datum)
WAC	Well Acceptance Criteria
WB	Wellbore
WBIV	Well Barrier Integrity Validation
WCBD	Well Control Bridging Document
WMP	Weed Management Plan
WOMP	Well Operations Management Plan
WoNS	Weed of National Significance
WWMP	Wastewater Management Plan
Vpd	Vehicles per day

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Appendices

The following Appendices support this EMP:

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    - Appendix 01.02 – Environmental Assessment Report
- **Appendix 02** - Project Activities
- **Appendix 03** - Environmental Risk Assessment Framework
- **Appendix 04** - Environmental Risk Assessment
- **Appendix 05** - Erosion and Sediment Control Plan
- **Appendix 06** - Waste and Wastewater Management Plan
    - Appendix 06.01 – Chemical Risk Assessment
- **Appendix 07** - Spill Management Plan
- **Appendix 08** - Fire Management Plan
- **Appendix 09** - Weed Management Plan
- **Appendix 10** - Methane Emissions Management Plan
- **Appendix 11** - Stakeholder Engagement
- **Appendix 12** - Rehabilitation Management Plan
- **Appendix 13** - Traffic Impact Assessment
- **Appendix 14** - Emergency Response Plan

1. Introduction

1.1 Background and Purpose

Peak Helium operates Exploration Permit (EP) EP134, located approximately 170km south of Alice Springs within the Amadeus Basin in the Northern Territory, as shown in **Figure 1.1—1**. The Project Area of EP134 is situated in the Finke bioregion east of the Stuart Highway, in the northwest portion of EP134. All the project activities will be conducted over the pastoral leases of Horseshoe Bend and Idracowra.

Peak Helium is proposing a continuation of its helium exploration program, including drilling, completion, evaluation, and Extended Production Test (EPT) program and ancillary operations in EP134 commencing in Q1 of 2023 covered by this EMP. Throughout this document and its appendices, this program of works is referred to as the Project, and the Location of the Regulated Activities is referred to as the Project Area.

Previous exploration activities undertaken in the Project Area include the acquisition of 120km 2D seismic in February 2021.

Building on the previous exploration work programs with encouraging results from these works, Peak Helium believes the proposed integrated exploration work program offers optimal flexibility to prove the potential of an economically exploitable helium resource in EP134. The objective is to drill, evaluate, and production test the minimum number of wells to provide a correct techno-commercial assessment of the entire program; this is the pilot appraisal stage. The pilot program is successful if it delivers accurate, positive or negative information, predicting the program's profitability. Only when these data sets are collected can we advance to field development planning (FDP). Because of the basin's geographical remoteness, multi-agency clearances and permissions required to undertake work programs, this interrelated EMP is the fit-for-purpose, cost-effective, environmentally responsible way to progress EP134's exploration and evaluation appraisal stage.

Peak Helium will seek approval before activities commence for any additional work not included in this EMP.

Peak Helium is committed to undertaking site activities in a manner that minimises and controls the impacts on the environment, including potential impacts on pastoralists and Traditional Owners (TO) of the Project Area.

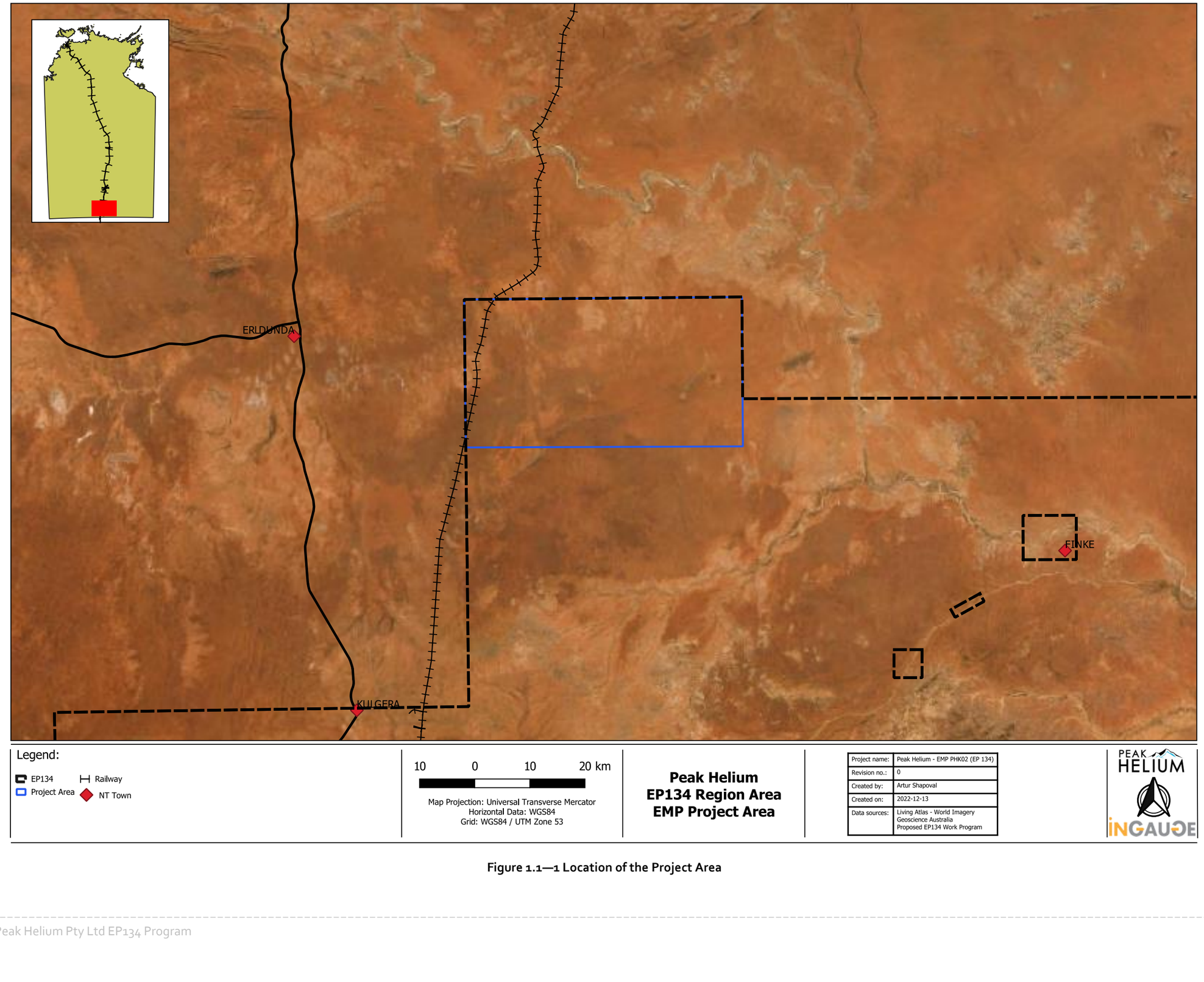


Figure 1.1—1 Location of the Project Area

1.2 Titleholder Details

Table 1.2—1 provides details of the permit titleholder and titleholder nominated liaison person.

Peak Helium will notify and provide updated details to the Department of Industry, Tourism and Trade (DITT) and the Department of Environment, Parks and Water Security (DEPWS) if there is a change in the contact details for the titleholder or liaison person.

Table 1.2—1 Details of Titleholder and Nominated Liaison Person

Titleholder Details	Liaison Contact Person
Name: Peak Helium Pty Ltd	**Name:** Art Malone
Address: Suite 2 Level 6, 12 Creek Street, Brisbane, QLD 4000 Australia	**Position:** Managing Director
Email: enquiries@peakhelium.com	**Company:** Peak Helium Pty Ltd
ACN: 96 644 092 320	**Address:** Suite 2 Level 6, 12 Creek Street, Brisbane, QLD 4000 Australia
	Telephone:
	Email: enquiries@peakhelium.com

2. Environmental Legislation and Other Requirements

2.1 Legislation Requirements

A summary of legislation requirements and associated project environmental approvals and Peak Helium's actions and intent for each are provided in the table (**Table 2.1—1**) below.

Table 2.1—1 Summary of Legislation Requirements

Legislation	Requirements	How Peak Helium Meets the Requirements	Administrator
Northern Territory			
Petroleum Act 2016 (NT)	• Petroleum exploration permit is required for where the regulated activities are proposed.	• Exploration permit EP 134 obtained.	Department of Industry, Tourism and Trade (DITT)
	• Compensation to be paid to native title holders and owners/ occupiers of land where petroleum activities are proposed.	• Exploration Agreements obtained with Traditional Owners. • Compensation paid to owners and occupiers for all activities proposed under this EMP.	
	• The NT Schedule of Onshore Petroleum Exploration and Production Requirements covers key regulatory requirements for the operational management of well activities in conjunction with the *NT Code of Practice* for Petroleum Activities.	• Requirements addressed in the WOMP.	
Petroleum Regulations 2020 (NT)	• Requiring a land access agreement before conducting regulated petroleum operations.	• Land access agreements in place before operations are undertaken. • Stakeholder Engagement in **Section 9** presents further detail regarding land access agreements.	DITT
Petroleum (Environment) Regulations 2016 (NT)	• Ensuring all regulated activities have an approved EMP.	• This EMP has been developed to satisfy this requirement.	Department of Environment, Parks and Water Security (DEPWS)
	• **Reg 18** Revisions are required at the end of each five years. • **Reg 17** Revisions are required for increased or new environmental impact risk.	• EMP is revised every five years or if there is an increased environmental impact risk.	
	• **s 10(2).** Legislative requirements include the requirement to comply with *the Code.* • **s 4A.** The code of practice is the Code of Practice: Onshore Petroleum Activities in the Northern Territory.	• The EMP has been developed following *the Code*, including all mandatory requirements applicable to the regulated activities. • Specific cross-references to the clauses in *the Code* are included in the EMP as relevant.	
Code of Practice: Onshore Petroleum Activities in the Northern Territory	• *The Code* applies to all conventional and unconventional oil and gas exploration, appraisal, development and production and ancillary activities in the Northern Territory.	• This EMP and appendices have been prepared following the requirements presented in *the Code.*	DEPWS
Bushfires Management Act 2016 and Associated Regulations	• Compliance with fire bans and fire permits.	• Peak Helium will not undertake flaring or the lighting of fires during periods of fire bans and will obtain a permit where flaring occurs during declared fire danger periods.	Bushfires NT
	• Requirements for occupiers to prevent and control fires.	• Annual fire mapping to monitor changes in fire frequency. • Addressed through Peak Helium's Bushfire Management Plan (**Appendix 08**), including bushfire preventative and response measures.	
• **Environment Protection Act 2019 (NT)** • **Environmental Protection Regulations 2020 (NT)**	• **Clause 6a** proponent is required to provide a referral to the NT EPA of the proposed action that may potentially impact the environment.	• A self-assessment of the potential environmental impacts was completed using the pre-referral screening tool (**Section 2.4.1**). Peak Helium has determined that the proposed activities will not significantly impact the environment and is not required to be referred to the NT EPA.	Northern Territory Environment Protection Act (NT EPA) DEPWS

Legislation	Requirements	How Peak Helium Meets the Requirements	Administrator
Territory Parks and Wildlife Conservation Act 1976 (NT)	• Prohibits impacts on protected places and impacts to threatened flora and fauna and interference with protected wildlife.	• **Appendix 01** Description of the Existing Environment. • **Section 6** Environmental Risk Assessment. • **Section 8.5.4** Monitoring.	DEPWS
Waste Management and Pollution Control Act 1998 (NT)	Requirements covering: • General environmental duty. • Waste management (including waste management hierarchy). • Waste transportation and waste disposal • Requirements.	• **Appendix 06** Waste and Wastewater Management Plan. • **Appendix 07** Spill Management Plan.	DEPWS
	• **S12** General environmental duty applies to activities outside of the lease area, or if a spill or leak occurs that leaves the lease area, or 1km from the centreline of a flowline.	• **Appendix 06** Waste and Wastewater Management Plan. • **Appendix 07** Spill Management Plan. • **Appendix 12** Rehabilitation Management Plan.	
	• **S14** Duty to notify of incidents causing or threatening to cause pollution: applies if an incident occurs outside of the lease area, or if a spill or leak occurs that leaves the lease area, or 1km from the centreline of a flowline, that causes or threatens to cause material or serious environmental harm.	• **Section 8.6** of this EMP.	
Food Act 2004 (NT)	• Health requirements for mining and construction camps	• Camp kitchens will be registered as food businesses. • Potable water supplied to camps will be routinely analysed to make sure it is safe and where a camp kitchen is a registered food business, demonstration will be made to the Department of Health that they have a potable water supply.	Department of Health Environmental Health Branch
Weed Management Act 2001 (NT)	Requires the occupier of the land (Peak Helium) to: • Take all reasonable measures to prevent the land from being infested with a declared weed. • Take all reasonable measures to prevent a declared weed or potential weed on the land from spreading to other land. • Notify the weeds officer of the presence of the declared weed. • Comply with any declared weed management plans.	• Peak Helium will comply with the requirement of this Act through the implementation of weed prevention, detection, and eradication controls through its approved weed management plan (**Appendix 09**).	Weed Management Branch, DEPWS
Water Act and Water Regulations 1992 (NT)	• The Act requires a licence to take groundwater.	• Peak Helium will apply and be approved for a groundwater extraction licence to cover the estimated water usage required to complete the activities.	Water Resources Division, DEPWS
	• The Act requires a permit to be issued prior to doing bore work (including drilling water bores).	• The Interest Holder will only conduct bore work under an appropriate bore work permit.	
	• The Act requires a permit to be applied for to change a waterway's shape, volume, speed or direction of water flow, bed or bank stability, if not exempt.	• Waterway crossings are likely to be required to access well pads in the Project Area, which will be verified during ground truthing. Based on initial surveys permits to construct or alter works under the Act to cross these waterways are not required. • Waterway crossings will be constructed in line with the controls listed in the Erosion and Sediment Control Plan (**Appendix 05**).	
	• The Act limits the amount of ground water for hydraulic fracturing within 1km of a designated bore.	• No hydraulic fracturing is proposed in this EMP or is anticipated to be proposed.	

Legislation	Requirements	How Peak Helium Meets the Requirements	Administrator
	• The take of surface water for petroleum activities is prohibited.	• No surface water take is proposed under this activity.	
	• Prohibits wastewater releases to surface water bodies or reinjection.	• No wastewater release to surface water is proposed.	
NT Planning Scheme Land Clearing Guidelines	The *NT Planning Scheme Land Clearing Guidelines* identify the following recommendations: Buffers are recommended as follows: **Section 4.3.3 Property Boundary Buffers:** • 25m for <8ha • 50m for 8 to 20ha • 100m for 20 to 100ha • 200m for >100ha **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. • The clearing and future use of the land shall not prevent or impede the drainage of the public road. **Section 4.4.6 Sensitive or Significant Vegetation Value Types Retain:** • Low – 50m • Medium – 100m • High – 250m **Section 4.4.7 Riparian Areas Buffers Related to the Stream Order Classification of the Waterway:** • Drainage depression – 25m • 1st Order – 25m • 2nd Order – 50m • 3rd and • 4th Order – 100m • ≥5th Order – 250m • Acceptability of erosion risk associated with clearing works based on slope gradient.	• It is not anticipated that the proposed activities will cause any significant or long-term impact on the recommended vegetation buffers. • An ecologist will be on-site before or during clearing operations to undertake ground-truthing for ground-disturbing activities before any ground disturbance. This is to ensure that the actual riparian zones and the buffers for drainage depressions, stream orders 1 to 4, and the location and density of hollow-bearing trees and their buffers are checked, and that regulated activities are avoided within riparian buffers or in sensitive areas. Decision trees are to be implemented prior to the clearing of larger trees. • Some minor disturbance of the grass and shrub cover may occur, but progressive rehabilitation is anticipated to see the impact to be only short-term. • Install riparian buffer zones and distances into on-site tablets so machine operators have a visual alert when reaching buffer distances. • Infrastructure (well pad, gravel pit, camps site, new access tracks) placement to avoid areas of >2% slope. Where these areas are unavoidable, the control measures in the **Appendix 05** (Erosion and Sediment Control Plan) will be implemented. • **Section 7.3** and **Appendix 12** (Rehabilitation Management Plan). • **Appendix 05** (Erosion and Sediment Control Plan) includes the erosion risk associated with clearing works based on slope gradient.	DEPWS
• **Work Health and Safety (National Uniform Legislation) Act 2011 (NT) (WHS Act)**	• Requires workers and workplaces to implement the national health and safety framework. This includes hazardous chemical assessments, a hazardous chemical register, access to safety data sheets (SDS), labelling, and the use, handling,	• Peak Helium has a Safety Management System outlining how the Act's requirements are achieved. This includes the management of chemical storage dossiers, safety data sheets (SDS) and appropriate procedures and controls to prevent worker exposure to hazards.	NT WorkSafe, Department of the Attorney-General and Justice

Legislation	Requirements	How Peak Helium Meets the Requirements	Administrator
• **Work Health and Safety (National Uniform Legislation) Regulations 2011 (NT)**	generation, and storage of hazardous chemicals at a workplace. • **S17** Duties imposed under the WHS Act require elimination or minimisation of health and safety risks, as far as is reasonably practicable.	• Peak Helium will notify NT Worksafe if required under the legislation. • **Appendix 14** (Emergency Response Plan)	
Radiation Protection Act 2004 (NT)	• Manage radiation from the protection of people and the environment.	• Analysis of drilling by-products prior to on-site or off-site disposal in accordance with the Monitoring Program **Table 8.5—2**. • Assessment of the potential accumulation of NORM in well equipment at time of well suspension in accordance with the Monitoring Program (**Table 8.5—2**).	Department of Health
Transport of Dangerous Goods by Road and Rail (National Uniform Legislation) Regulations 2011	• Requires implementing all required signage, spill management, reporting and licencing requirements for chemical transportation during drilling activities.	• Any dangerous good transported and stored for exploration activities will comply with these requirements. • **Appendix 07** (Spill Management Plan).	NT Worksafe, Department of the Attorney General and Justice
• **Heritage Act 2011 (NT)** • **Heritage Regulations 2012 (NT)**	• Requires the avoidance of impacts on heritage places and objects. • **S72** Work approval is required to carry out works on a heritage place of object.	• Peak Helium completed desktop studies and field scouts to confirm the presence/absence of heritage places and objects within the vicinity of the proposed activities.	Heritage Branch, Department of Tourism and Culture
Northern Territory Aboriginal Sacred Sites Act 1989	• For Peak Helium to attain an AAPA certificate.	• AAPA has issued an Authority Certificate (C2021/080).	Aboriginal Areas Protection Authority (AAPA)
Public and Environmental Health Act 2016 (NT)	• Wastewater treatment systems are subject to the requirements of the Act.	• Peak Helium aligns its operations to ensure that the Wastewater treatment systems meet the requirements of the Act and that the sewerage plants meet the *NT Code of Practice for Small Onsite Sewage and Sullage Treatment Systems and the Disposal or Reuse of Sewage Effluent*.	Department of Health (DoH)
Commonwealth			
National Greenhouse and Energy Reporting Act 2007	• An Act that requires operators who generate emissions over a threshold to report information related to greenhouse gas emissions, greenhouse gas projects, energy consumption and energy production of corporations.	• **Appendix 10** Methane Emissions Management Plan.	Department of Industry, Science, Energy and Resources
Native Title Act 1993	• The legislation provides ways in which future dealings affecting native title may proceed and the recognition and protection of native title.	• Exploration agreement obtained Traditional Owners.	Prime Minister and Cabinet
Environmental Protection and Biodiversity Conservation Act 1999	• For Peak Helium to follow the legal framework the EPBC Act outlines.	• Peak Helium has followed the self-assessment referral process see **Section 2.4**.	Department of Agriculture, Water and Environment
Dangerous Goods Act 2012 (NT)	• Dangerous goods licences are held when required.	• If applicable, Peak Helium will ensure that Peak Helium or a contractor holds dangerous goods licence/s.	NT WorkSafe

2.2 Relevant Agreements and Operating Consents

Peak Helium will ensure that all necessary consents and approvals are in place before the commencement of any activity proposed under this EMP. All works will be undertaken according to the terms and conditions stipulated in the Land Access Agreements.

2.3 Code of Practice: Petroleum Activities in the Northern Territory 2019 and Relevant Guidelines

The Code of Practice: Petroleum Activities in the Northern Territory 2019 (*the Code*) applies to all activities involved in conventional and unconventional oil and gas exploration, appraisal, development and production and ancillary activities in the Northern Territory. *The Code* covers all petroleum activities, including all petroleum well types, exploration, assessment, development, monitoring, injection, and production wells.

In addition to compliance with *the Code*, contractors undertaking activities will be required to comply with the following environmental standards, guidelines, and codes of practice:

- The Peak Helium Oil and Gas Ltd Health Safety Environment Management System (HSEMS).
- *Australian Petroleum Production and Exploration Association (*APPEA*) Code of Conduct and Environmental Practice 2008* [APPE, 2008].
- NT EPA Environmental Factors and Objectives [NT EPA, 2019].
- *Code of Practice: Petroleum Activities in the Northern Territory 2019* [DEPWS et al., 2019].
- *Vegetation Retention Technical Note No. 12 Erosion and Sediment Control Guidelines* [DLRM].
- *Clearing Methodology Technical Note No. 18 Erosion and Sediment Control Guidelines* [DLRM].

2.4 Referral under NT and Commonwealth Legislation

2.4.1 Referral under the Environment Protection Act 2019 (EP Act)

Peak Helium has assessed the regulated activity using the pre-referral screening tool in the NT EPA's Referring a proposal to the NT EPA: Environmental impact assessment guidance for proponents (2021). And determined the Activities under this EMP are unlikely to have a significant impact on the environment and therefore are not required to be referred to the NT EPA under the EP Act.

The self-assessment took into consideration:

- The anticipated impact on the landscape from cleaning and the controls to mitigate.
- The use of an ecologist to aid in site selection and the ability to adjust infrastructure to mitigate impact on identified species or habitats.
- The preferential use of pre-existing access tracks and seismic lines.
- The controls in place to limit impact to surface and ground water.
- The management of waste.
- The limited duration of the activity.
- Stakeholder engagement activities.
- The AAPA certificate.
- The distance to the nearest sensitive receptors.

2.4.2 EPBC Act Self-Assessment

The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) provides a national scheme of environment and heritage protection and biodiversity conservation [AUSTRALIAN GOVERNMENT, 1999]. The EPBC Act objectives are to protect the environment, especially matters of national environmental significance, conserve Australian biodiversity, and enhance the protection and management of significant natural and cultural places, etc. Referral of the project to the Department of Climate Change, Energy, the Environment and Water is required if the proposed action will have or is likely to have, a significant impact on a matter of national environmental significance or the environment of Commonwealth land.

To assess the potential impacts, data was collected from the NT Flora and Fauna Atlas, paired with findings from the Protected Matters Search Tool (PMST), a field assessment was completed by a Third Party (EcOz), and the Matters of National Environmental Significance (MNES), *Significant Impact Guidelines 1.1,* was utilised.

The EPBC PMST and desktop-data search identified threatened species with the potential to occur within the Project Area (Appendix 1 and 1.02). However, given the mitigation measures as listed in this **EMP, Appendix 01, 1.02, 02** and **04,** it was determined that it is unlikely that the proposed program will significantly impact these species or their habitat. Therefore the proposed activity is not

considered to require referral under the EPBC Act for a decision on whether the activity is a controlled action.

3. Description of the Regulated Activity

A detailed description of the regulated activities to be carried out under this EMP can be found in **Appendix 02**.

Works described in this EMP will only be conducted where they are not limited by conditions on the relevant AAPA Authority Certificate C2021/080.

3.1 Overview of the Activities Proposed

Table 3.1—1 below shows the regulated activities to be carried out under this EMP.

Table 3.1—2 below shows the main key components of the regulated activity to be carried out under this EMP.

The only regulated activities carried out in EP134 since 2014 is the 2022 2D seismic acquisition program; these works have been included in the cumulative impact assessment for this EMP. Cumulative impacts for this and future work programs will be included in the EMPs relevant to those future works.

Table 3.1—1 Description of the Regulated Activities Under this EMP

Regulated Activity	Description	Units	Unit of Measure	Ha Cleared
Well Pads	• The construction of well pads, requiring the clearing of land, construction of lined pits (for drilling by-product and groundwater storage), drilling water production bores, and the establishment of erosion and sediment control devices. • The constructed well pads will be either a combination of single-well pads and multi-well pads, or a multi-well pad for the drilling of four wells.	3	each	21.04
Bunded Tank Pads	• The establishment of bunded tank pads and tanks fitted with leak detection on the above well pads.	3	each	N/A
Campsites	• The construction of campsites, requiring the clearing of land, and the establishment of erosion and sediment control devices.	3	each	3.00

Existing Access Track - Widening	• Where the existing pastoral tracks and repurposed seismic tracks require widening.
	  ○ Existing pastoral tracks with a width less than 6m.
	  ○ Seismic tracks with a width of 5m need to be widened to meet the 6m minimum criteria.
		32.8	km	5.17

New Access Tracks	• Where existing pastoral access tracks and repurposed seismic tracks are not available, new access tracks will be constructed.	2.1	km	1.24

Contingency Access Tracks	• Possible access tracks if the well pad is relocated to the furthest point in the corridor.
	  ○ Contingency Access Tracks will be repurposed seismic tracks that require widening.
	  ○ Calculations assume that the well pad is moved to the furthest point in the corridor and represent a maximum potential disturbance area.
	  ○ Note: it is unlikely that the well pad will move significantly during ground-truthing, however calculations are provided for completeness.
		20.3	km	2.03

Gravel Pits	• The construction and operation of gravel pits, requiring the clearing of land, and the establishment of erosion and sediment control devices.	4	each	4.60

Regulated Activity	Description	Units	Unit of Measure	Ha Cleared
Water Bores	• The construction of water bores on well pads or potential alternative locations. • The construction of production water bores located on well pads or adjacent to access tracks within the indicative well pad locations, requiring the widening of access tracks and/or the clearing of land.	3	each	1.00
Wells – Drilling	• The drilling of helium exploration wells that will be drilled vertical to the target formation and then plugged back and drilled horizontally. The drilling of gas exploration wells comprising vertical wells, horizontal wells that plug back and drill out of these vertical wells and dedicated new horizontal wells. • If a vertical well is plugged back and drilled out, it will not add to the number of wells under this EMP (e.g., a vertical well plugged back and drilled horizontally will count as one well as the plugged back vertical section will not be re-drilled).	4	each	N/A
Wells – Evaluation	• The evaluation, logging, testing, and coring of the above wells	4	each	N/A
Wells – Completion	• The completion, workover, and maintenance of the above wells.	4	each	N/A
Wells – Extended Production Testing	• The Extended Production Testing (EPT) of the above wells, with EPT for 365 days for each well.	4	each	N/A

Table 3.1—2 Key Components of Regulated Activities Under this EMP

Overview	Units	Unit of Measure
AAPA Authority Certificate:	C2021/080	
Exploration Permit/s under this EMP:	EP134	
Total Area of EP/s:	15,233	km²
Total area of disturbance under this EMP:	38.08	Ha
Total number of new exploration wells under this EMP:	4	Each
Groundwater		
Extraction Licence #:	TBA	
Extraction licence volume per year:	25	ML
Number of bores for extraction:	3	Each
Estimated total groundwater usage:	13.4	ML
Estimated total area of potential disturbance:	1	Ha
Potable Water		
Source of potable water:	Off-site source TBA	
Estimated usage at campsite:	200	L/Person/Day
Schedule		
Activity Duration:	1,708	Days
Civil construction duration (cumulative):	90	Days
Drilling operations duration (cumulative):	154	Days
Extended Production Testing (EPT) duration (cumulative):	1,460	Days
Personnel		
Civil construction workforce (primarily DIDO):	10	People
Drilling operations workforce (primarily FIFO):	40	People
Extended Production Testing (EPT) workforce (Primarily FIFO):	4	People
Traffic Movement	**LVs**	**Trucks**
Peak movements for all activities:	59	25
Average movements for the first three months per well:	14	0
Average movements for the duration of the project:	6	0
Truck load-out (wastewater transport):	0	0
Tanks		

Overview	Units		Unit of Measure
Above-ground enclosed storage / open topped treatment tank per well pad:	Up to:	1	Tank
Size of the largest storage tank:	Up to:	2	ML
Drilling			
Residual fluid, cuttings, and cement returns:	3.160		ML
Completions fluids:	0.080		ML
Emissions			
tCO2-e Emissions:	221,089		tCO2-e

3.1.1 Cumulative Impact of Regulated Activities for EP134

The only regulated activities carried out in EP134 since 2014 is the 2022 2D seismic acquisition program; these works have been included in the cumulative impact assessment for this EMP. Cumulative impacts for this and future work programs will be included in the EMPs relevant to those future works.

Cumulative impacts for this and future work programs will be included in the EMPs relevant to those future works. The total impact of this EMP can be seen in **Section 3.1.2** (Cumulative Impacts in Conjunction With Other Activities Near the EP).

Table 3.1—3 Cumulative Impacts of Regulated Activities for EP EP134

Activity/Aspect	Seismic EMP	Drilling EMP (this EMP)	Total
Vegetation Clearing	• Cleared 8 hectares for seismic.	• 38.08 ha of clearing for the project activities.	46.08 Ha
Water Extraction	• Water source/s, demand (estimate with breakdown for dust suppression, construction, and amenities), volumes of on-site water storages, discharges. • Approximately 0.1 ML from station bores.	• Estimated water use is as follows: ○ 0.33 ML per well pad for construction ○ 2.5 ML per well for drilling ○ Well completion 0.6 per well ○ Operational activities (e.g., site maintenance and vehicle wash downs) have been included in construction and drilling totals.	13.5 ML
Campsite/s	• No campsite was required.	• Temporary campsite/s will be located within 100m distance from each well pad. • Estimated 40 people per campsite. • Campsite water will be brought in from outside of site as groundwater is non-potable. 200L/day per person on site.	3 campsites
Produced Fluid	• Not applicable.	• Estimated 1 ML of produced fluid, per well. • Requires establishment of above-ground enclosed storage tanks, and bunded tanks pads.	Estimated 4 ML
Above-ground Enclosed Storage Tanks	• Not applicable.	• Will establish up to 3 above- ground enclosed storage tanks, 1 per well pad. • Will manage with 0.5m freeboard when open (prior to significant rain events).	Up to 3 tanks
Drilling Pit/s	• Not applicable.	• Will establish up to two drilling pits per well pad with constructed with up to 4,500 m^3 capacity each.	Up to 6 pits

Activity/Aspect	Seismic EMP	Drilling EMP (this EMP)	Total
		• One pit will be for groundwater storage and the other for drilling by-products. • Freeboard to be managed in the pit that contains drilling by-products according to the season, with 0.5m of freeboard during the wet season and 0.5m of freeboard during the dry season.	
Gravel/Borrow Pits	• Not applicable	• Up to four gravel pits to be established. They will be approximately 100m by 100m for an estimated 15,000m^3 of fill from each.	Up to 4 pits
Chemical Storage	• Establish a dedicated chemical store, bunded to 110% of the largest volume. OR • Double skinned tanks used, earthen bund around well pad.	• Hazardous chemicals are to be stored within secondary containment with sufficient capacity to hold 110% of the liquid volume of the largest container stored or with a double-lined/walled storage tank.	Per well pad

3.1.2 Cumulative Impacts in Conjunction with other Activities near the Permit Area

Peak Helium has determined the cumulative effects of the activities under this EMP. These cumulative impacts are presented in **Table 3.1—4**.

Table 3.1—4 Cumulative Impacts in Conjunction with Other Activities near the Permit Area

Activity	Cumulative Impact	Unit of Measure
Vegetation Clearing	46.08	Hectare
Water Extraction	13.5	ML
CO2 Emissions	221,089	tCO_2-e

During seismic activities, 8ha of vegetation was cleared, and a further 38.08 ha is expected to be cleared under this EMP. As such, the cumulative vegetation clearing for this EMP and the previous seismic EMP is 46.08 ha, representing 0.00027% of the Amadeus Sub-basin. Even though this is a minimal proportional impact, it is overstated.

Current groundwater extraction on EP134 is for pastoral activities; there are no current petroleum or mining activities within close proximity to EP134 that extract significant volumes of water or produce significant emissions. Therefore, there are no cumulative impacts beyond the seismic activities (0.1 ML), this EMP (13.4 ML) and current pastoral usage. **Section 4.1** calculates the impact of groundwater extraction from the project and current pastoral uses. These calculations show that the percentage reduction in storage volume of the target aquifer is 0.6 % over 100 years of continuous pumping.

3.2 Timing and Personnel Requirements of the Regulated Activities

Figure 3.2—1 below shows an indicative project schedule, including estimated start dates and durations of regulated activities.

Figure 3.2—2 shows the estimated personnel numbers for regulated activities under this EMP.

PHK02 - Input Schedule

ID	Task Name	Start	Duration	Finish
1	Ramsay - WP-A; Civil construction - Drill water bores	Mon 6/03/23	15 days	Mon 20/03/23
2	Ramsay - WP-A; Civil construction - wellpad and access	Mon 6/03/23	30 days	Tue 4/04/23
3	Ramsay - 1; Drilling - Rig Mobilisation	Mon 10/04/23	10 days	Wed 19/04/23
4	Ramsay - 1; Drilling - Drill Vertical & Horizontal	Mon 24/04/23	44 days	Tue 6/06/23
5	Ramsay - 1; Drilling - Rig Demobilisation	Wed 7/06/23	4 days	Sat 10/06/23
6	Ramsay - 1; Completion - Rig Mobilisation	Sun 11/06/23	5 days	Thu 15/06/23
7	Ramsay - 1; Complete	Fri 16/06/23	5 days	Tue 20/06/23
8	Ramsay - 1; Completion - Rig Demobilisation	Wed 21/06/23	5 days	Sun 25/06/23
9	Ramsay - 1; Extended Production Test	Wed 21/06/23	365 days	Wed 19/06/24
10	Ramsay - WP-B; Civil construction - Drill water bores	Wed 6/03/24	15 days	Wed 20/03/24
11	Ramsay - WP-B; Civil construction - wellpad and access	Wed 6/03/24	30 days	Thu 4/04/24
12	Ramsay - 2; Drilling - Rig Mobilisation	Mon 15/04/24	10 days	Wed 24/04/24
13	Ramsay - 2; Drilling - Drill Vertical & Horizontal	Mon 29/04/24	44 days	Tue 11/06/24
14	Ramsay -2&3; Completion - Rig Mobilisation	Wed 12/06/24	5 days	Sun 16/06/24
15	Ramsay - 2; Complete	Wed 12/06/24	5 days	Sun 16/06/24
16	Ramsay - 2; Extended Production Test	Mon 17/06/24	365 days	Mon 16/06/25
17	Ramsay - WP-C; Civil construction - Drill water bores	Thu 29/08/24	15 days	Thu 12/09/24
18	Ramsay - WP-C; Civil construction - wellpad and access	Thu 29/08/24	30 days	Fri 27/09/24
19	Ramsay- 3; Drilling - Rig Shift	Tue 8/10/24	7 days	Mon 14/10/24
20	Ramsay- 3; Drilling - Drill Vertical and Horizontal	Sat 19/10/24	44 days	Sun 1/12/24
21	Ramsay- 3; Completion - Rig Shift	Mon 2/12/24	5 days	Fri 6/12/24
22	Ramsay- 3; Complete	Sat 7/12/24	5 days	Wed 11/12/24
23	Ramsay- 2&3; Completion - Rig Demobilisation	Thu 12/12/24	5 days	Mon 16/12/24
24	Ramsay- 3; Extended Production Test	Thu 12/12/24	365 days	Thu 11/12/25
25	Ramsay - 4; Drilling - Rig Mobilisation	Wed 4/06/25	10 days	Fri 13/06/25
26	Ramsay- 4; Drilling- Drill Horizontal	Sat 14/06/25	22 days	Sat 5/07/25
27	Ramsay - 4; Drilling - Rig Demobilisation	Sun 6/07/25	4 days	Wed 9/07/25
28	Ramsay- 4; Completion - Rig Mobilisation	Thu 10/07/25	5 days	Mon 14/07/25
29	Ramsay- 4; Complete	Tue 15/07/25	5 days	Sat 19/07/25
30	Ramsay- 4; Extended Production Test	Sun 20/07/25	365 days	Sun 19/07/26

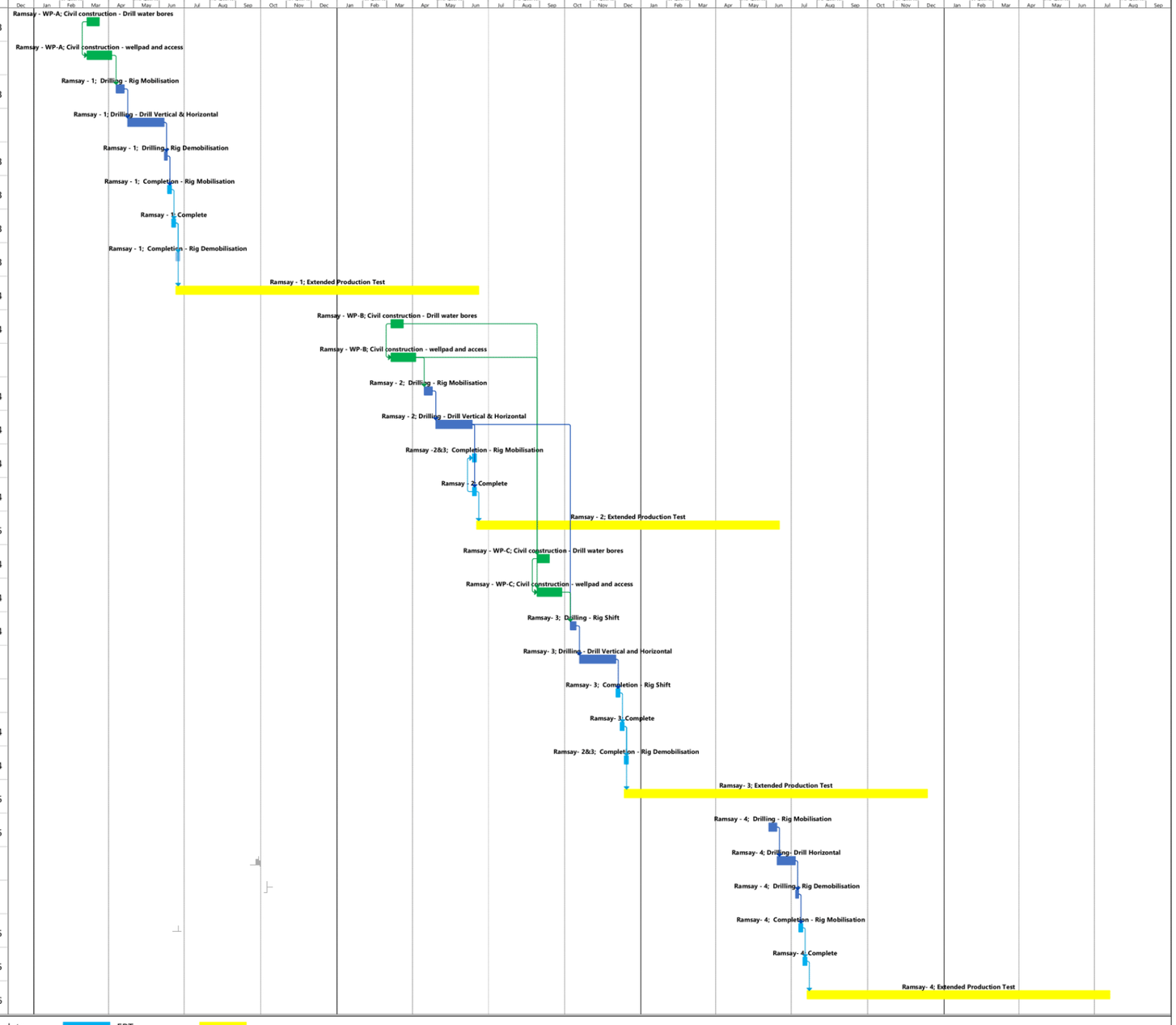


Figure 3.2—1 Planned Project Schedule for Regulated Activities under this EMP

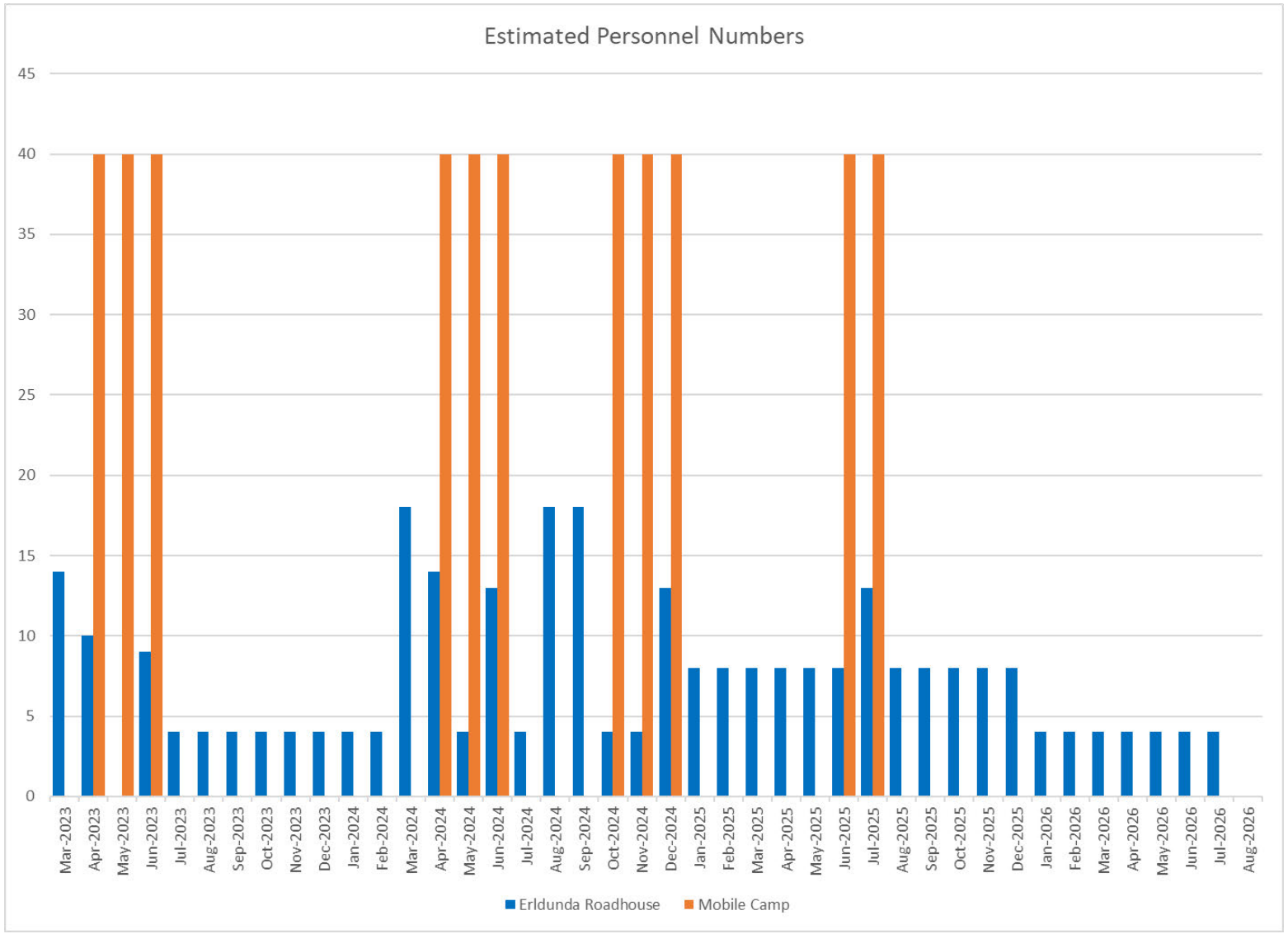


Figure 3.2—2 Estimated Personnel Numbers

3.3 Vehicle Movements and Traffic

The 2022 *EP 134 Access Review Horseshoe Bend, Ghan Northern Territory: Traffic Impact Assessment* has been conducted in line with *Guide to Traffic Management – Part 12: Integrated Transport Assessments for Developments*. The review has found that '[proposed movements] will readily be accommodated at the access points and on the adjacent road network' [AUSTROADS, 2020; CIRQA, 2022].

The equipment will likely be sourced locally for the initial civil operations so that the traffic impact will be minimised.

There will be approximately 30 truck movements for drilling operations to mobilise the drilling rig to the site for each mobilisation, plus a further 20 truck movements to mobilise drilling fluids, casing, cement, fuel, etc., per well for drilling operations. These truck movements consist primarily of road trains arriving at the start of the drilling operations and again at the end of operations during demobilisation. After the drilling campaign, there will be a further 30 truck movements to demobilise the rig.

There will be a daily commute by 4WD to mobilise and demobilise Civil Construction and EPT crews from Erldunda to the Project Area for the duration of those operations. There will be a twice-daily commute by 4WD to mobilise and demobilize crews from the camp to the drilling operations for the duration of those operations.

Peak Helium has engaged an independent traffic assessment based on a very optimistic schedule to give a 'worst-case' scenario for traffic impacts. This Traffic Impact Assessment is attached as **Appendix 13**. In summary, this report finds that:

> *"The additional number of movements associated with the exploration program is forecast to be very low. Based upon expected existing traffic volumes (derived based on location and nearby traffic data) and operational information provided by InGauge Energy, daily traffic volumes along Horseshoe Bend are forecast to be less than 75 vpd throughout the duration of the exploration program. Accordingly, volumes are expected to remain well below the 150 vpd 'limit' associated with low-volume rural roads as identified in the relevant Austroads' Guide. As such, the traffic volumes associated with the proposed exploration program will be readily accommodated."*

Upgrades to intersections are not anticipated to be required given recent upgrades in the area; this will be confirmed by Peak Helium's Site Supervisor prior to construction. If upgrades have not occurred prior to upgrade – design documents must be submitted to the Corridor Management Design Team of the Department of Industry Planning and Logistics – Transport and Civil Services Division 'For Road Agency Approval'. In addition, any upgrade work shall be carried out by Peak Helium at Peak Helium's cost.

A summary chart showing the weekly vehicle movements throughout the project duration is shown in **Figure 3.3—1**. The highest potential truck movement will occur in phases seven and eight of the drilling program when these phases overlap (by one week at the end of construction and the beginning of the drilling phase). This peak is modelled at 25 truck movements in a week. For the rest of the drilling program, there will be eight weekly truck movements on average.

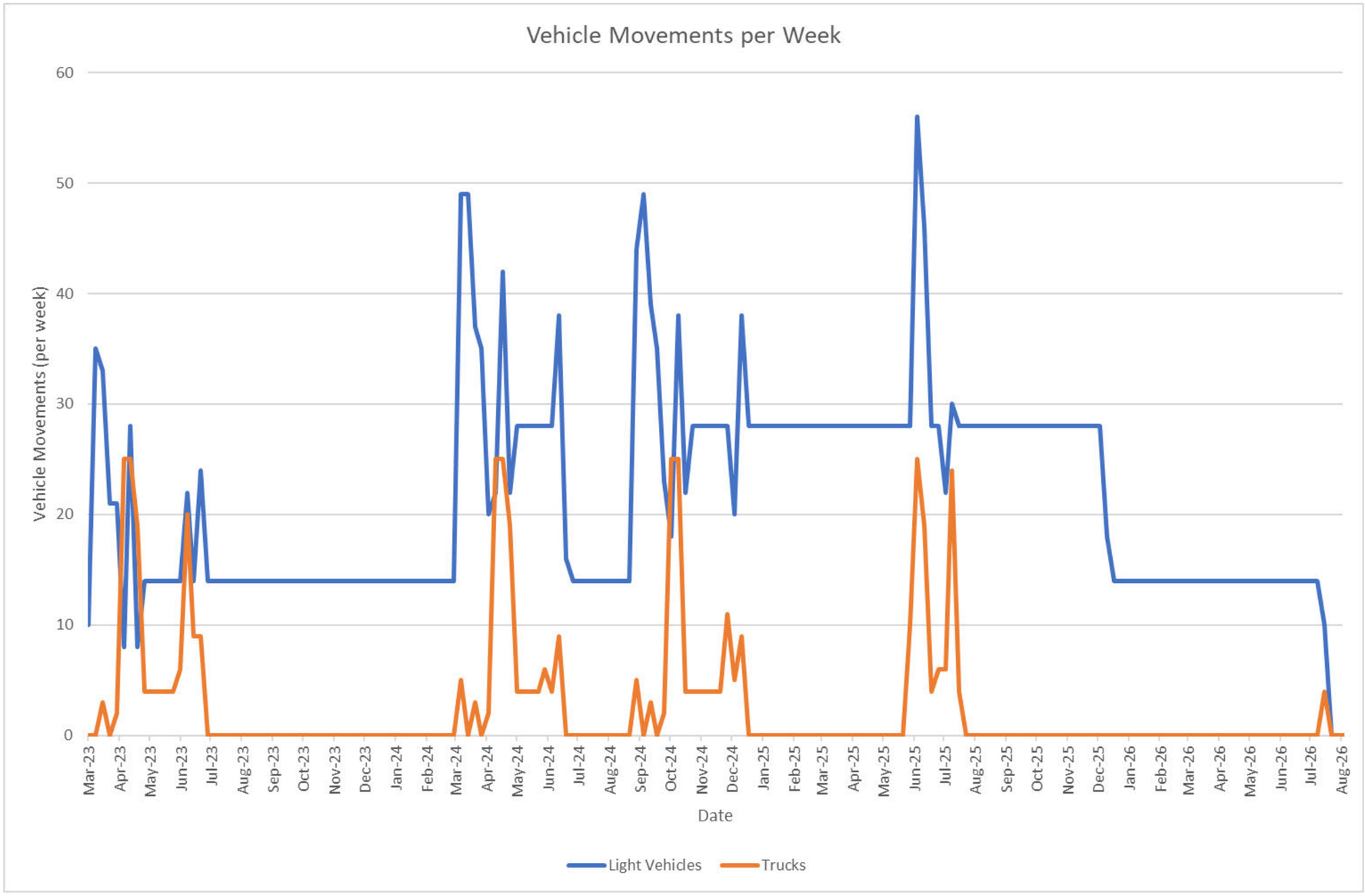


Figure 3.3—1 Vehicle Movements per Week

3.4 Equipment and Service Mobilisation

The potential traffic-related impacts of the regulated activities carried out under this EMP, including civil construction, drilling, well testing, and ongoing operations, are not considered significant as supported by the Traffic Impact Assessment carried out for the project.

Traffic associated with exploration activities has some higher peaks during mobilisation of equipment but is generally small and of short duration. The access to the Project Area is via the Horseshoe Bend, approximately 70km east of the Stuart Highway intersection, which is 13km north of Erldunda. Horseshoe Bend Road is unsealed and supports large seasonal volumes of stock movement. Most of the equipment and materials to be used for the regulated activities carried out under this EMP will be mobilised 25 to the site from Queensland or South Australia. All equipment and materials will travel via the Stuart Highway and Horseshoe Bend Road.

The peak weekly traffic generation will occur when phases seven and eight of the drilling program overlap (by one week at the end of construction and the beginning of the drilling phase). This peak traffic movement will comprise 25 truck movements and 45 light vehicles per week. This equates to an average of up to eight trucks and 13 light vehicle movements per day during this peak week.

The average number of traffic movements for the project's duration will be less than nine truck movements and 33 light vehicle movements per week. Peak Helium will utilise existing pastoral tracks, and re-purposed seismic tracks so that equipment and personnel in field movements avoid using public roads as much as the quality and location of the in-field roads allow [CIRQA, 2022].

3.5 Site Selection

The planning, design, and location of petroleum infrastructure to be constructed and operated under this EMP have been carried out in line with *Land Clearing Guidelines* as published on the Department of Environment Parks and Water Security (DEPWS) website [DEPWS, 2020, 2021].

All well pads, campsites, and gravel pits have a setback distance of at least 2km from habitable dwellings.

Peak Helium has carried out a Baseline Ecological Assessment of the proposed infrastructure locations, and this assessment has guided site selection; see **Appendix 01.02** for the assessment report. The Baseline Ecological Assessment allows Peak Helium to undertake specific considerations for biodiversity protection.

Peak Helium has carried out flood modelling to show the impacts in a 1 in 100-year flood event; non-linear infrastructure, including well pads, has been located to avoid flooding, sheet flow, high slope areas, and proximity to watercourses. Well pads constructed under this EMP will be outside of the buffer zones required for watercourses, as per the Land Clearing Guidelines.

Route selection for linear disturbances has been carried out to utilise existing pastoral tracks as much as practicable. Steep slopes (>2%) and alignments requiring large cut and fills have been avoided where possible.

Upon desktop review of satellite imagery and NR Maps datasets, it appears that there is likely only one new watercourse crossing required under this EMP. However, as explained in **Section 3.6.2**, if contingency tracks are required to be constructed to the maximum extent at each well pad corridor, up to four new watercourse crossings could be required. Although, during ground-truthing, these watercourse crossings may be found to not exist, or conversely, more watercourse crossings may be identified. Nevertheless, the controls listed in the Erosion and Sediment Control Plan (**Appendix 05**) will be implemented for watercourse crossings. This includes the maintenance of the pre-existing tracks, re-establishing seismic tracks or constructing new tracks that cross natural channels in which water flows, whether or not the flow is continuous. New watercourse crossings will be oriented close to perpendicular to the creek's flow direction to minimise the crossing's impact and be constructed as a bed level crossing.

Gravel/borrow pits will be located within the Land Type B zones, as shown in **Figure 3.5—2**, using the same site selection criteria as well pads.

Due to the above site selection, erosion and sediment impacts will be minimised; please refer to **Section 7.4** for Erosion and Sediment Control information.

Due to the design and site layout of the narrow clearing corridor of linear infrastructure and the non-linear infrastructure's isolation, the impact on wildlife movement will be minimal.

A wide corridor has been identified to carry out construction activities, allowing the actual disturbance to be avoided to avoid environmental and cultural areas identified during construction activities.

The area of vegetation to be cleared for infrastructure development has been minimized through the use of existing pastoral tracks and re-purposed seismic tracks.

- New access tracks have been routed in a way that utilises existing disturbances where practicable.
- Site and layout selection have been carried out to:
    - Ensure potential environmental nuisance has been avoided and minimized.
    - Reduce impacts on existing landscape amenity to a level that is as low as reasonably practicable (ALARP) and acceptable by:
        - Minimising the surface footprint of all aspects of development.
        - Ensuring that infrastructure close to a major public road or locations with high existing amenity value is designed and located to minimise long-term amenity impact.

3.5.1 Site Selection – Land Types and Infrastructure Movement Corridors

Peak Helium has selected a proposed location for the activities under this EMP and has added an infrastructure movement corridor to allow the movement of well pads, campsites, and access tracks and aid in minimising on-ground impacts/disturbance.

The preferred locations for well pads have been chosen to reduce on-ground impacts while giving a good understanding of the resources of EP134. Well pad locations will be verified using seismic data analysis interpretation. Well pads will be moved within the indicative infrastructure movement corridors if the seismic requires, whilst maintaining a low environmental impact.

The following figures show indicative locations for regulated activities under this EMP that are located within the AAPA Land Types.

Figure 3.5—1 Peak Helium EP134 Project Area – AAPA

- **AAPA Land Type A for Regulated Activities this EMP Comprising**
    - Ground disturbance area.
    - Seismic acquisition (including access tracks up to 6m wide vegetation clearing and drilling for the appraisal and production of helium and other gases).
    - The production, storage and treatment of water and wastes.
    - Up to four well pads with each well pad having a vertical helium well to a depth of 2,800m and lateral helium well to a length of 3,000m.
    - Up to twelve water bores for monitoring and production.
    - Drilling sumps.
    - Water extraction, treatment, and storage facilities.
    - Camp facilities.
    - Helium production and storage facilities.
    - Gravel extraction from up to 4 gravel pits.
    - All activities associated with the plugging, abandonment, decommissioning and/or remediation of wells after testing, monitoring and production have been completed.
    - All works ancillary to the above-mentioned works, including routine and ongoing maintenance of any infrastructure and or services.
- **AAPA Land Type B for Regulated Activities this EMP**
    - Covers – Use and maintenance of existing tracks, including required ground disturbance and vegetation removal, including at waterway crossings.
    - All works ancillary to the above-mentioned works, including routine and ongoing maintenance of any infrastructure and or services.

- **AAPA Land Type C for Regulated Activities this EMP**
    - Covers – Up to a total of four lateral helium wellbores at a depth of between 1,200m and 2,200m below the surface. All works ancillary to the above-mentioned works, including routine and ongoing maintenance of any infrastructure and or services.

Figure 3.5—2 **Peak Helium EP 134 Project Area AAPA and Regulated Activities**

- This map shows how the Project Activities fall within the AAPA Land Types and how they relate to the restricted work areas.

Figure 3.5—3 Location of Regulated Activities under this EMP – Indicative Locations

- Indicative proposed locations for regulated activities under this EMP.

Figure 3.5—4 Location of Regulated Activities under this EMP – Proposed Well Pads – Indicative Locations

- Indicative proposed well pad locations under this EMP, including infrastructure movement corridors.

Figure 3.5—5 Location of Regulated Activities under this EMP – Proposed Access Tracks – Indicative Locations

- Indicative alignments for the proposed access tracks under this EMP, including which sections are new disturbances and which sections are on existing disturbances.

Figure 3.5—6 Land Clearing Practices for the Proposed Access Tracks

- Infrastructure movement corridors and the associated land-clearing practices for the proposed access tracks under this EMP.

Figure 3.5—7 Land Access Clearing and Affected

- Indicative locations of regulated activities, infrastructure movement corridors in relation to SOCS, SOBS, and water courses

Shapefile polygons of the proposed activities and their relevant buffers are provided to DEPWS as part of this EMP.

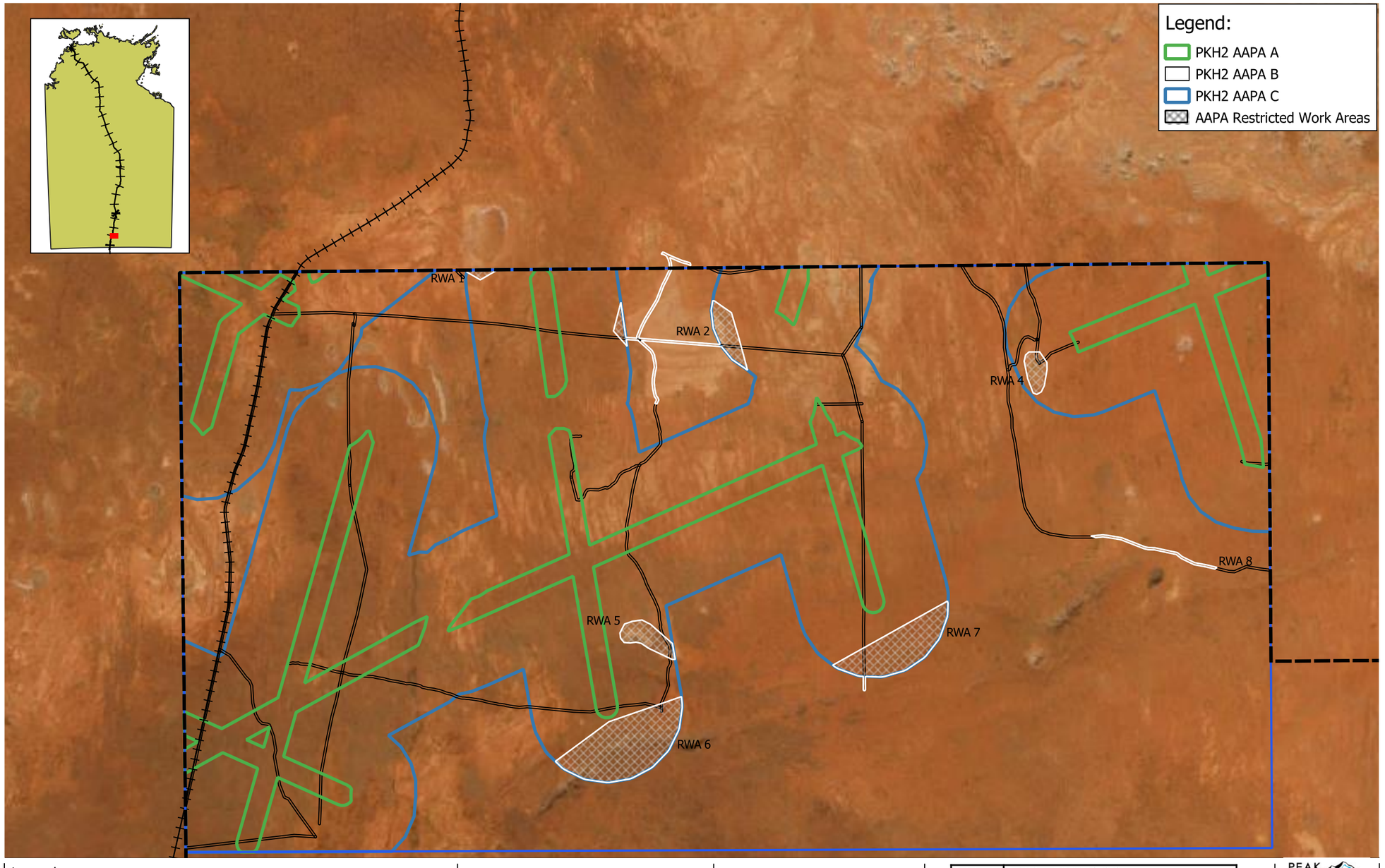
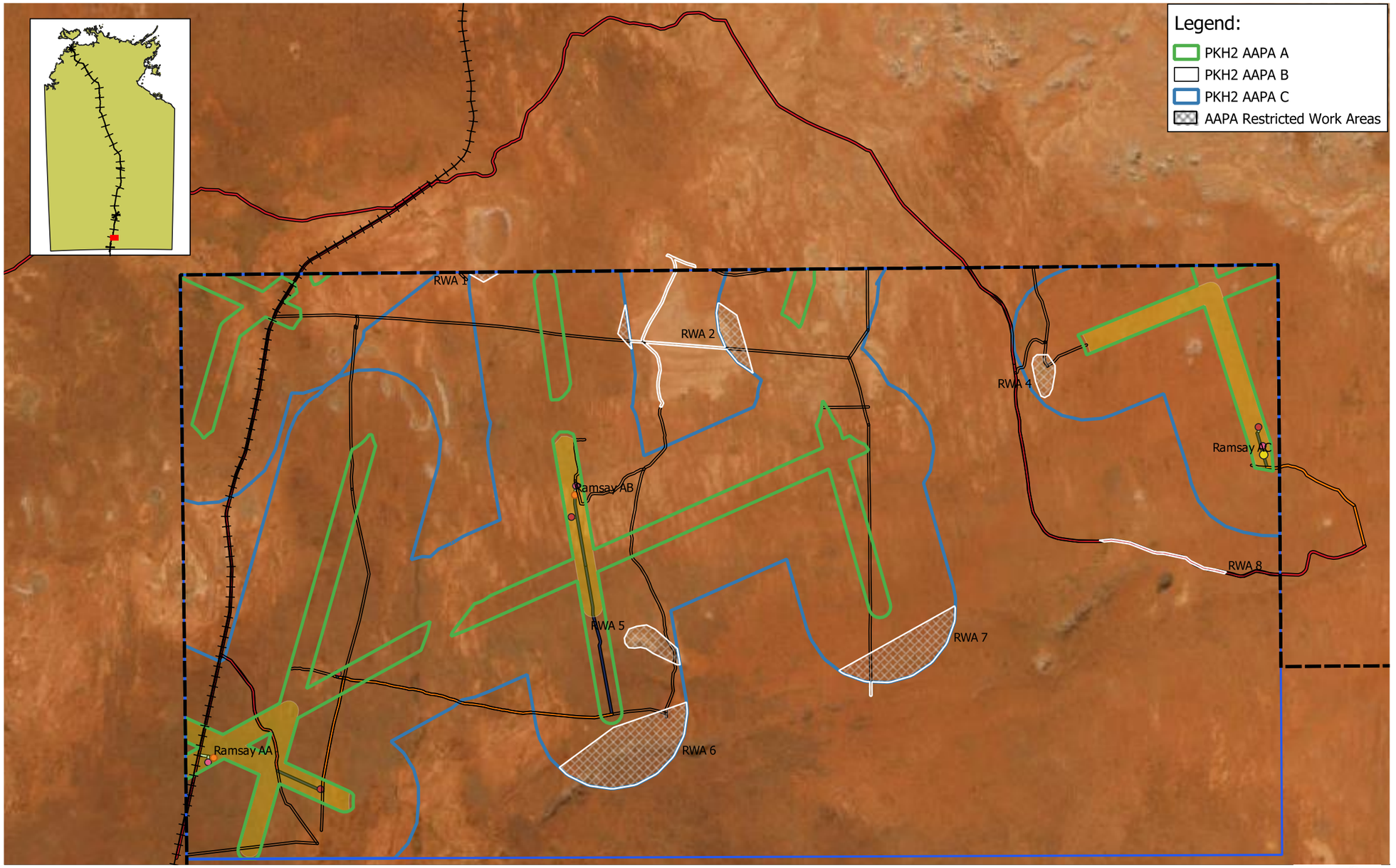


Figure 3.5—1 Peak Helium EP134 Project Area – AAPA



Legend:
- EP134
- Project Area
- Railway
- Proposed well pad - Indicative location (Horseshoe Bend)
- Proposed well pad - Indicative location (Idracowra)
- Gravel pit - Indicative location
- Well camp - Indicative location

Access Tracks:
- Proposed
- Repurposed Seismic
- Existing (Requires Widening)
- Existing Pastoral Track
- Infrastructure Movement Buffer

2.5 0 2.5 5 km

Map Projection: Universal Transverse Mercator
Horizontal Data: WGS84
Grid: WGS84 / UTM Zone 53

Peak Helium EP134 Project Area AAPA and Regulated Activities

Project name:	Peak Helium - EMP PHK02 (EP 134)
Revision no.:	0
Created by:	Artur Shapoval
Created on:	2022-12-13
Data sources:	Living Atlas - World Imagery Geoscience Australia Proposed EP134 Work Program

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Figure 3.5—2 AAPA and Indicative Location of Regulated Activities

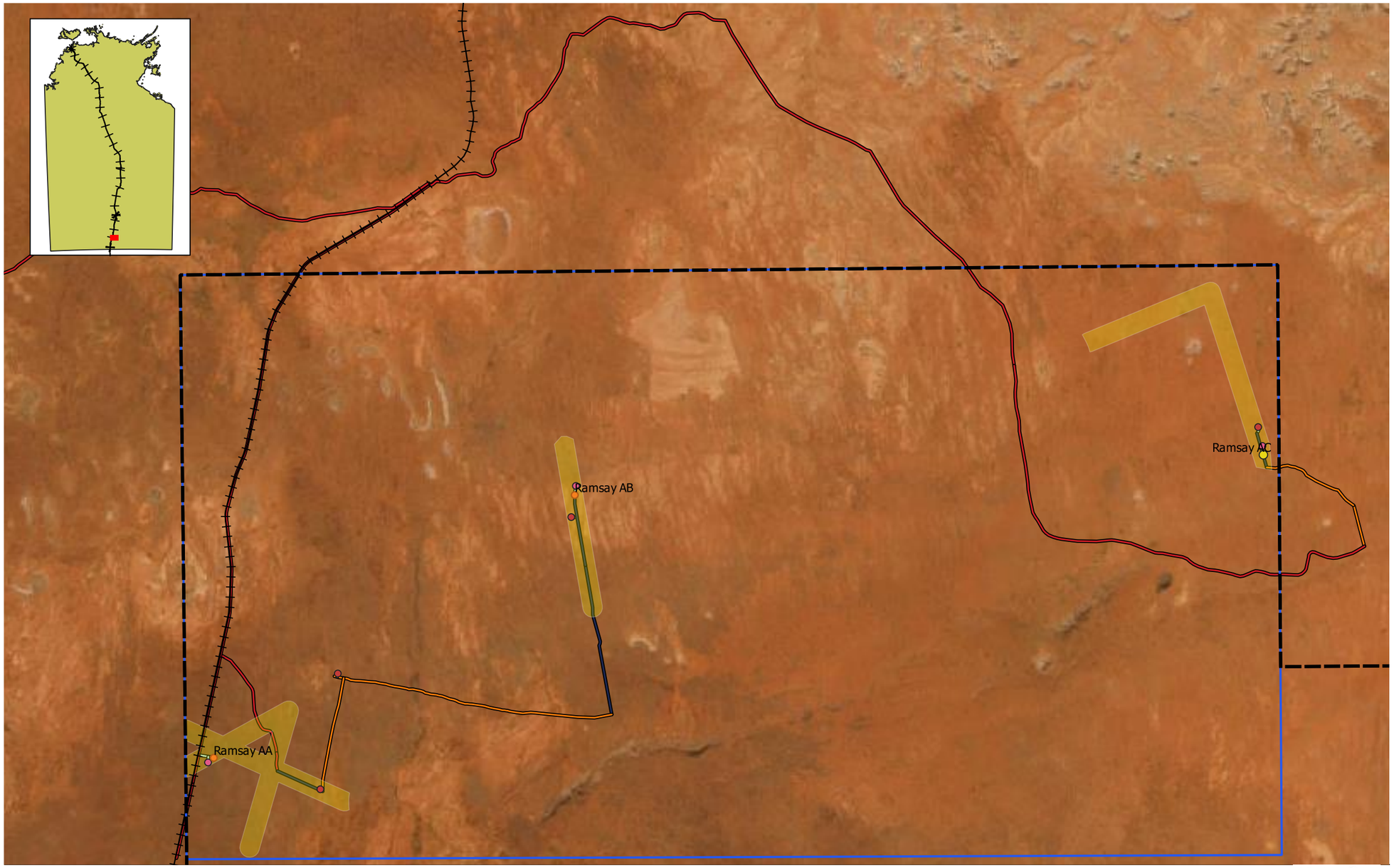


Figure 3.5—3 Location of Regulated Activities under this EMP – Indicative Locations

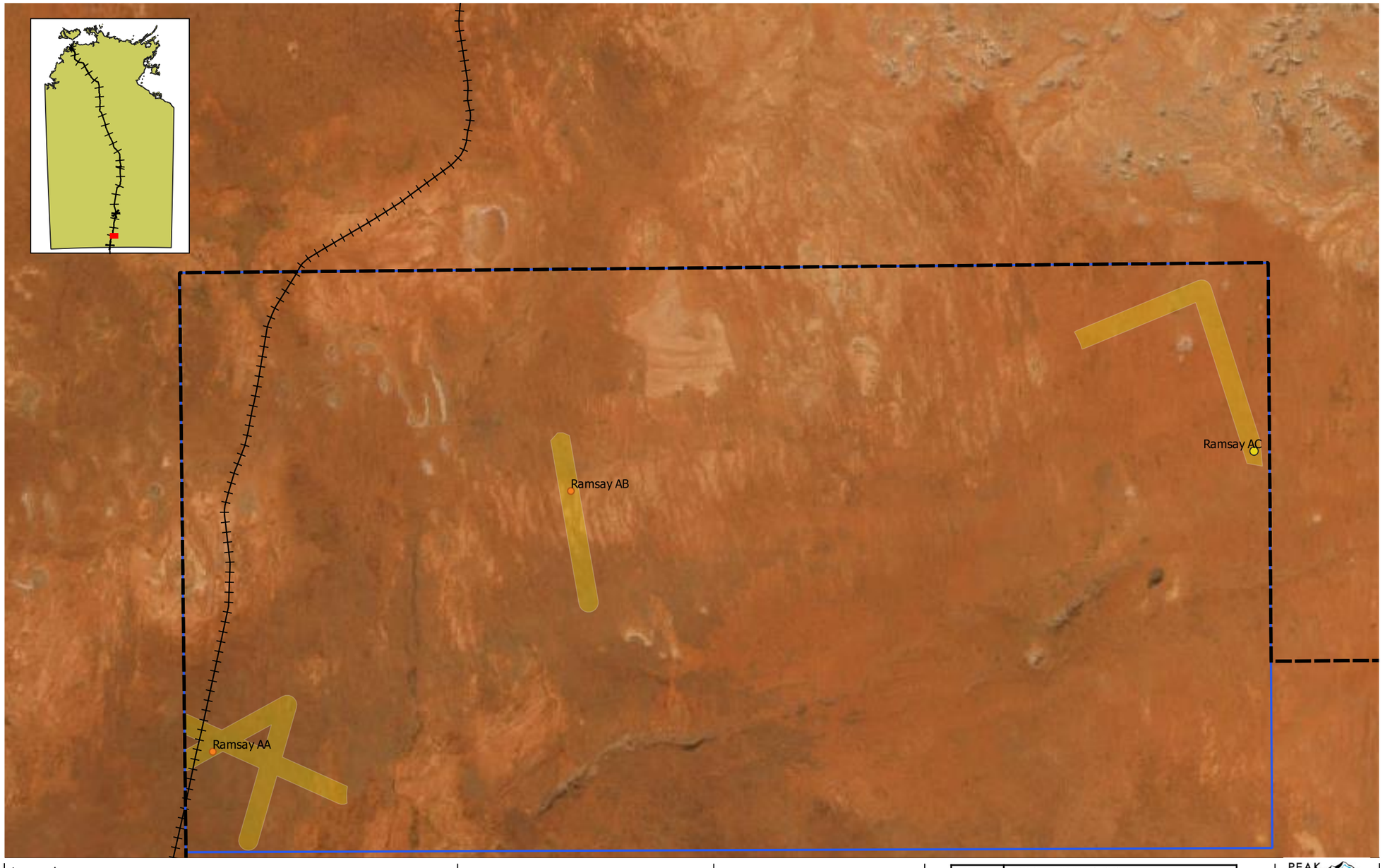


Figure 3.5—4 Location of Regulated Activities under this EMP – Proposed Well Pads – Indicative Locations

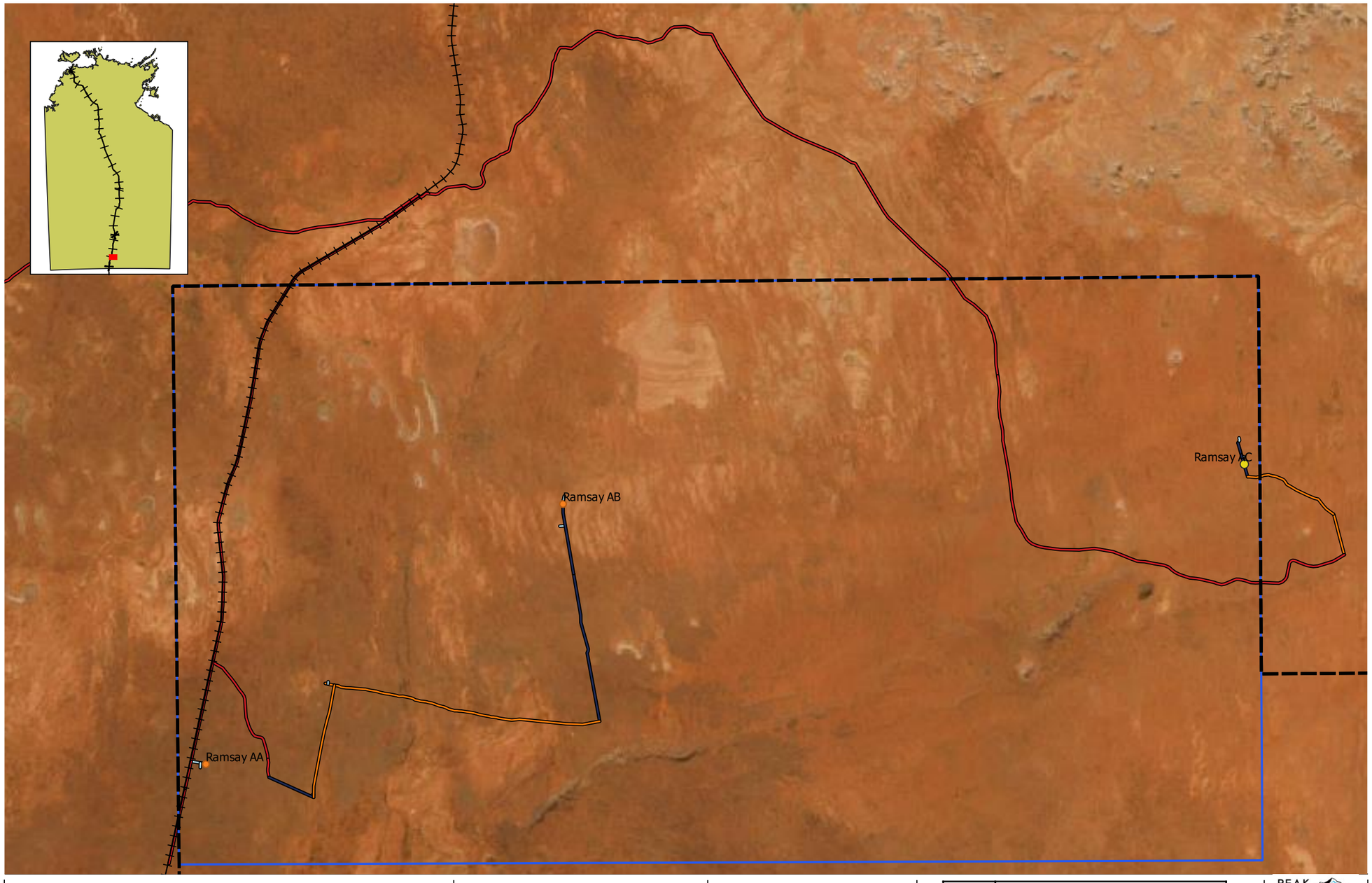


Figure 3.5—5 Location of Regulated Activities under this EMP – Proposed Access Tracks – Indicative Locations

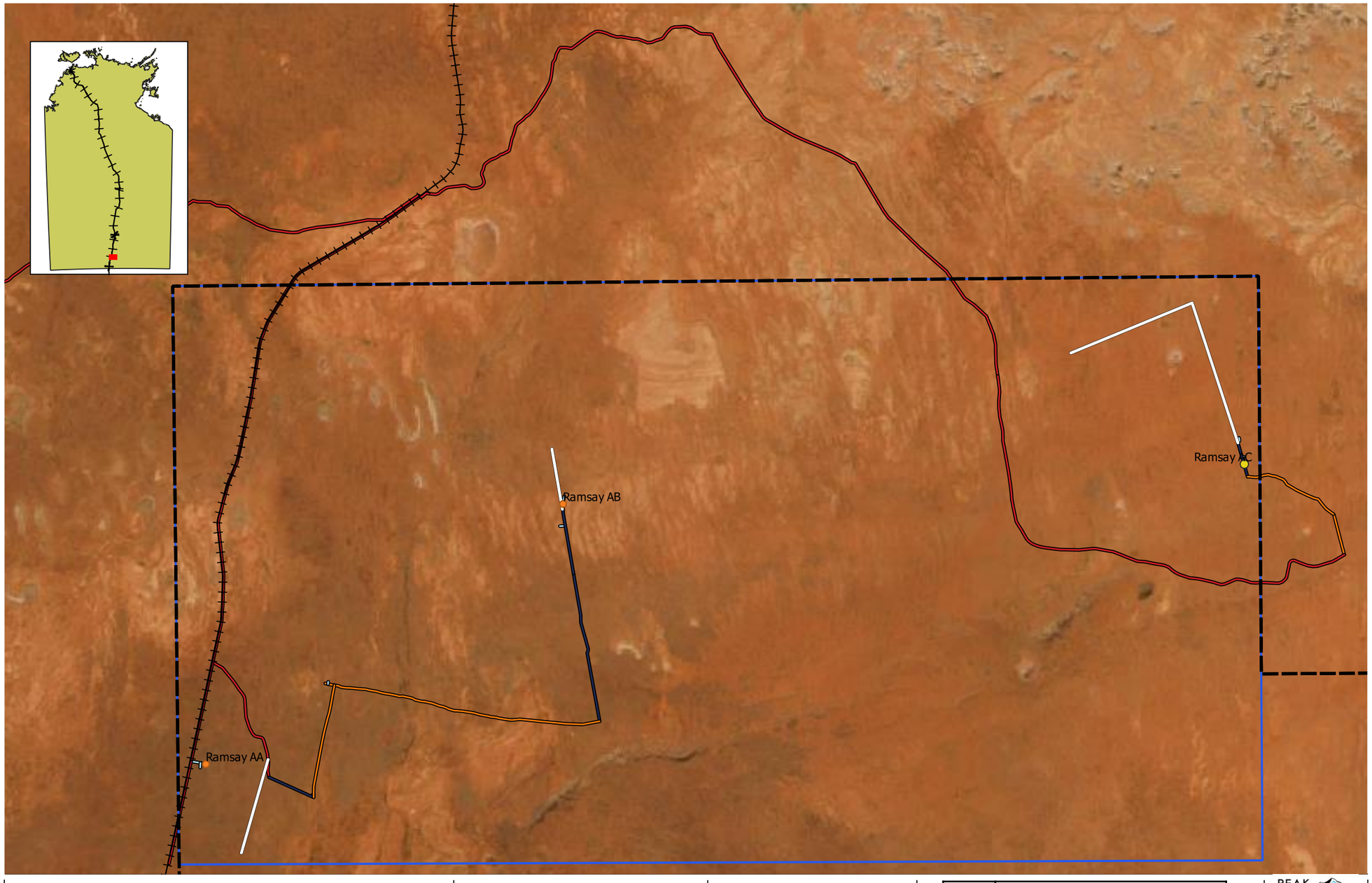


Figure 3.5—6 Land Clearing Practices for the Proposed Access Tracks

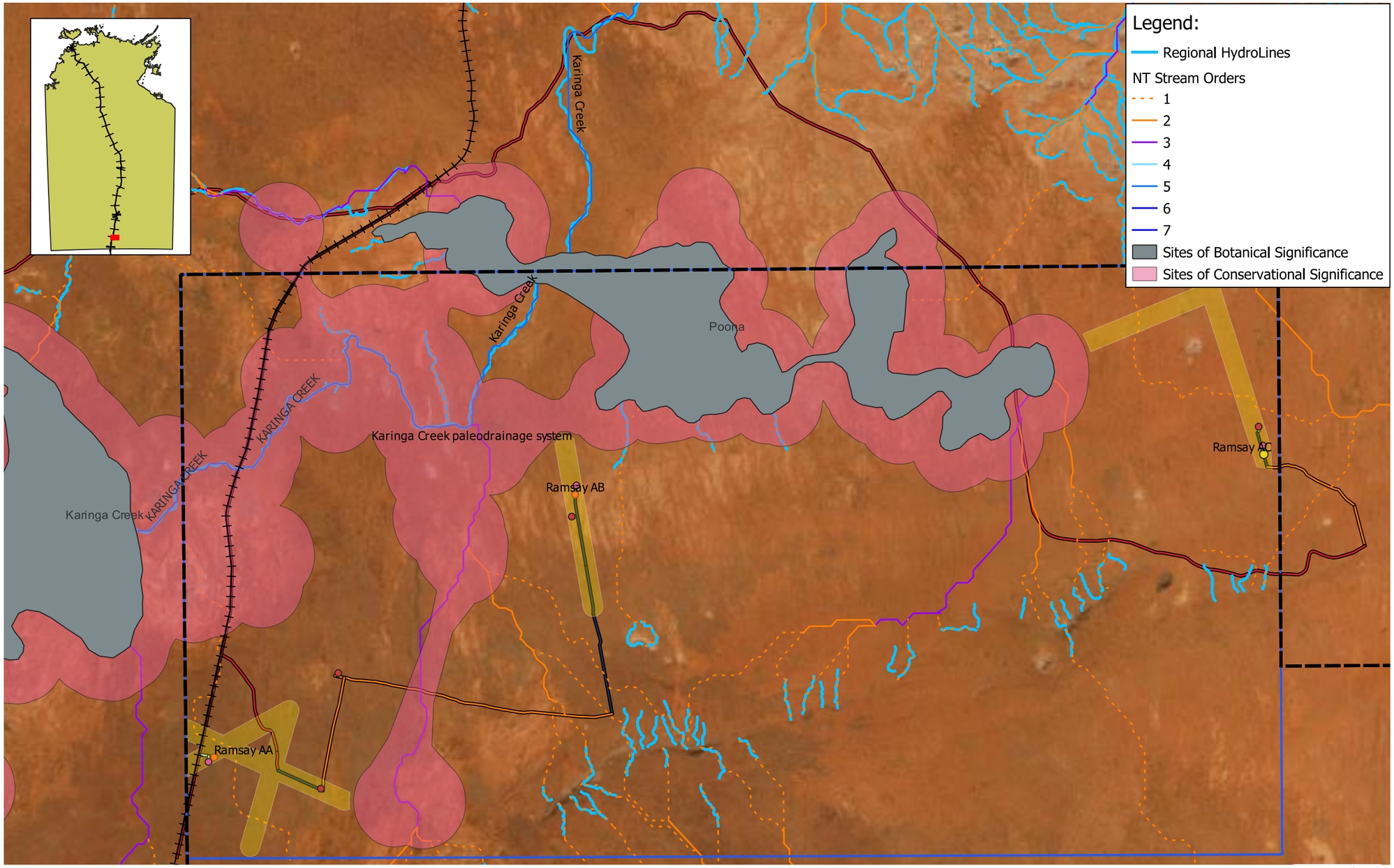


Figure 3.5—7 Land Access Clearing and Affected Areas

3.5.2 Site Selection – Desktop Alignments

Peak Helium has undertaken a desktop assessment of the ability to work within the construction corridors whilst minimising the impact, the methodology for this desktop assessment is as follows:

- Stream order mapping from NR Maps was visually aligned with watercourses visible on the 2016 satellite imagery utilised. An example can be seen in **Figure 3.5—8** below.
- Where Peak Helium's planned works cross a watercourse, the alignment was placed in the centre of the watercourse.
- These realigned stream orders were buffered in line with the land clearing guideline buffer distances.
- 20m was added to the required buffer distance to give a conservative desktop assessment and allow for the fact that buffers are measured from the edge of the riparian zone rather than watercourse centrelines.
- An indicative working route was desk topped for each location where linear infrastructure is planned to cross or be close to a watercourse.

Figure 3.5—8 Example Desktop Alignment of Watercourse Closest to Planned Works

3.5.3 Site Selection – New Infrastructure

Sites have been selected and designed following Part A of *the Code*. Site selection and layout have been carried out to reduce the impacts on existing landscape amenity to a level that is as low as reasonably practicable (ALARP) and acceptable by utilizing a hierarchy of controls, as shown in **Table 3.5—1** Peak Helium has picked preferred locations for all infrastructure to be constructed under this EMP. Ground-truthing and seismic survey results could necessitate shifting these locations within the infrastructure movement corridor zones discussed in **Section 3.5.1**.

Table 3.5—2 presents the selection criteria used for well pads.

Figure 3.5—9 to **Figure 3.5—17** show the landscape characteristics around the well pads.

Table 3.5—1 Infrastructure Site Selection Hierarchy of Controls

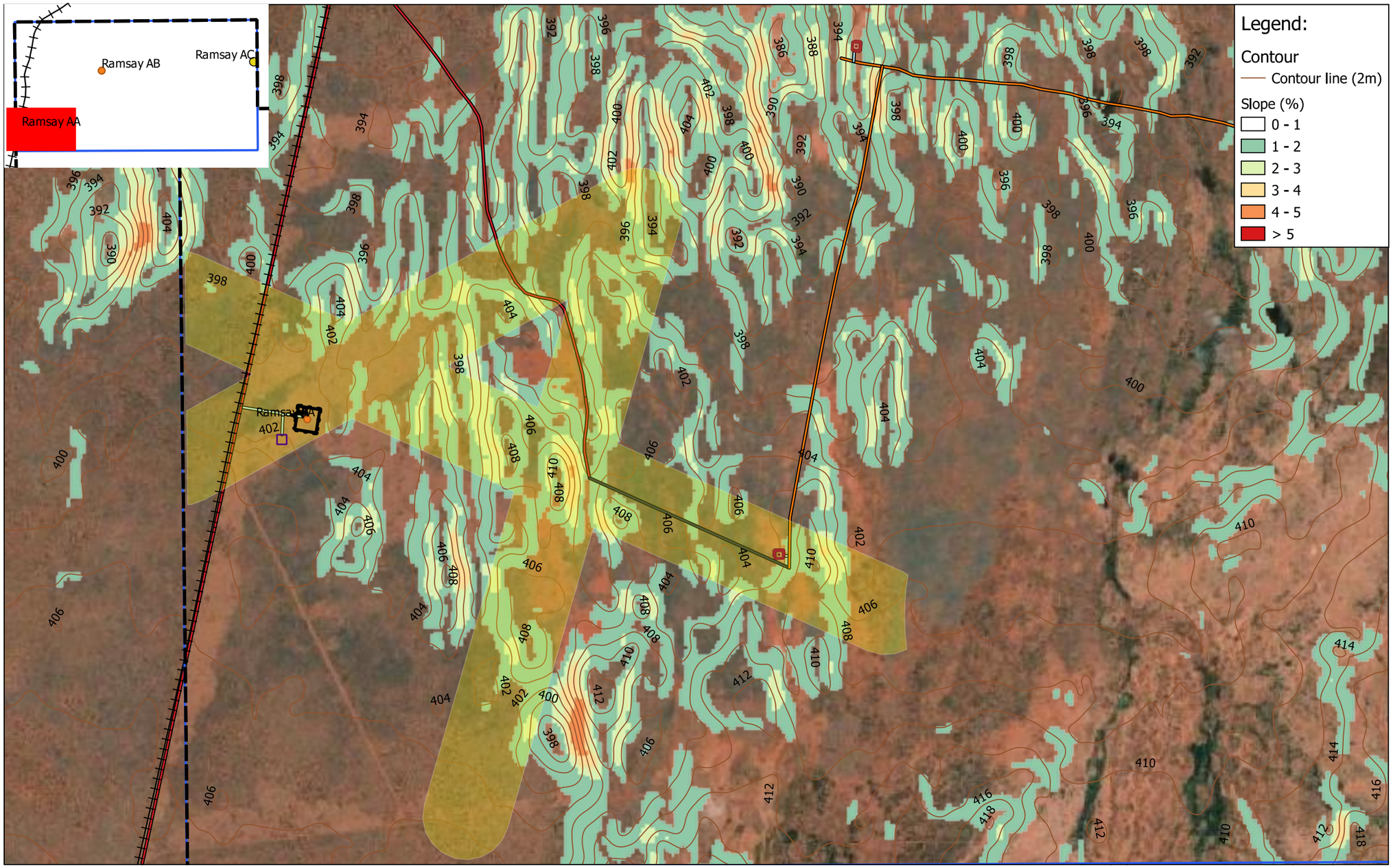
Controls and Demonstration of ALARP and Acceptability for Infrastructure Site Selection Within Corridors		
Hierarchy of Control	**Used?**	**Preventative Controls**
Elimination	No	The regulated activities under this EMP cannot be carried out without constructing infrastructure, e.g., access tracks, well pads, gravel pits and campsites.
Substitution	Yes	The use of existing infrastructure and multi-well pad/s reduce the amount of clearing required for the regulated activities.
Engineering/Design	Yes	• A baseline ecological assessment has been carried out for the infrastructure movement corridors. • The results from this baseline assessment will be used to guide the location of infrastructure. • An ecologist will be on-site to assess the location of infrastructure within the infrastructure movement corridors to reduce environmental disturbance. • Locations of infrastructure will be selected to minimise the risk of overland flow, as supported by flood modelling. • Locations of infrastructure will be selected to avoid Desert Oak (*Allocasuarina decaisneana*) as much as practicable. • Locations of infrastructure will be selected to avoid clusters of hollow-bearing trees (five or more trees) to maintain potential habitat for the Princess Parrot • The well pads to be constructed and drilled will be at least 1km from an existing water supply bore used for domestic or stock consumption. • Well pads and well infrastructure installed on the well pad post drilling will not be visible from any major public road that existed when the well pad was constructed. • Location of well pads will be >1km from landowner bores. • Traditional Owner representatives will be on-site prior to or during civil construction. • Infrastructure has been designed to be as small as practicable whilst allowing for safe and efficient operation. • The well pads constructed are over 2km apart, measured from the centre of the well pad.

Controls and Demonstration of ALARP and Acceptability for Infrastructure Site Selection Within Corridors		
		• The selected location of new infrastructure is outside of SOCS and SOBS. • Infrastructure movement corridor is to include a 200m buffer from the edge of the SOCS and SOBS buffers. • Selected location of infrastructure outside of non-isolated 1 in 100-year modelled flood zones. • Selected location of well pads, campsites, and gravel pits outside of watercourse paths.
Administration	Yes	Peak Helium has been issued an AAPA Authority Certificate (C2021/080).
Protective Equipment	No	N/A

Table 3.5—2 Selection Criteria Used for Well Pads Within Infrastructure Movement Corridor at Closest Point/s

Well Pad	Below 1 in 100 Year Flood Level	Slope (%)	Distance to Closest Current Bore (m)	Visible from Public Roads	Closest Stream Order	Distance to the Stream (m)	Distance to Closest Dwelling (m)
AA	No	<1%	1,900	No	1	>25*	>10,000
AB	Yes	<2%	6,000	No	1	670	>10,000
AC	Yes	<2%	4,200	No	1	>25*	>10,000

* NR maps indicates a potential first order stream within the corridor; however, based on satellite imagery and flood mapping, it is unlikely that this stream exists. During ground-truthing of the well pad location, this will be confirmed to ensure a well pad provides at least the recommended buffer of 25m as per the NT Land Clearing Guidelines. Proposed location is >1km away from the closest stream.



Legend:
- EP134
- Project Area
- Railway
- Proposed well pad - Indicative location (Idracowra)
- Well camp - Layout
- Gravel pit - Layout
- Well pad - Layout
- Fire Break

Access Tracks
- Access tracks - Proposed
- Repurposed Seismic Track
- Existing Pastoral Track (requires widening)
- Existing Pastoral Track
- Infrastructure Movement Buffer

0 0.5 1 km

Map Projection: Universal Transverse Mercator
Horizontal Data: WGS84
Grid: WGS84 / UTM Zone 53

Peak Helium
EP134
Infrastructure - Contour and slope
Ramsay AA

Project name:	Peak Helium - EMP PHK02 (EP 134)
Revision no.:	0
Created by:	Artur Shapoval
Created on:	2022-12-13
Data sources:	Living Atlas - World Imagery Geoscience Australia Proposed EP134 Work Program

Figure 3.5—9 Proposed Well Pad AA – Contour and Slope

Figure 3.5—10 Proposed Well Pad AA – 1 in 100-year Flood Levels and Registered Water Bores

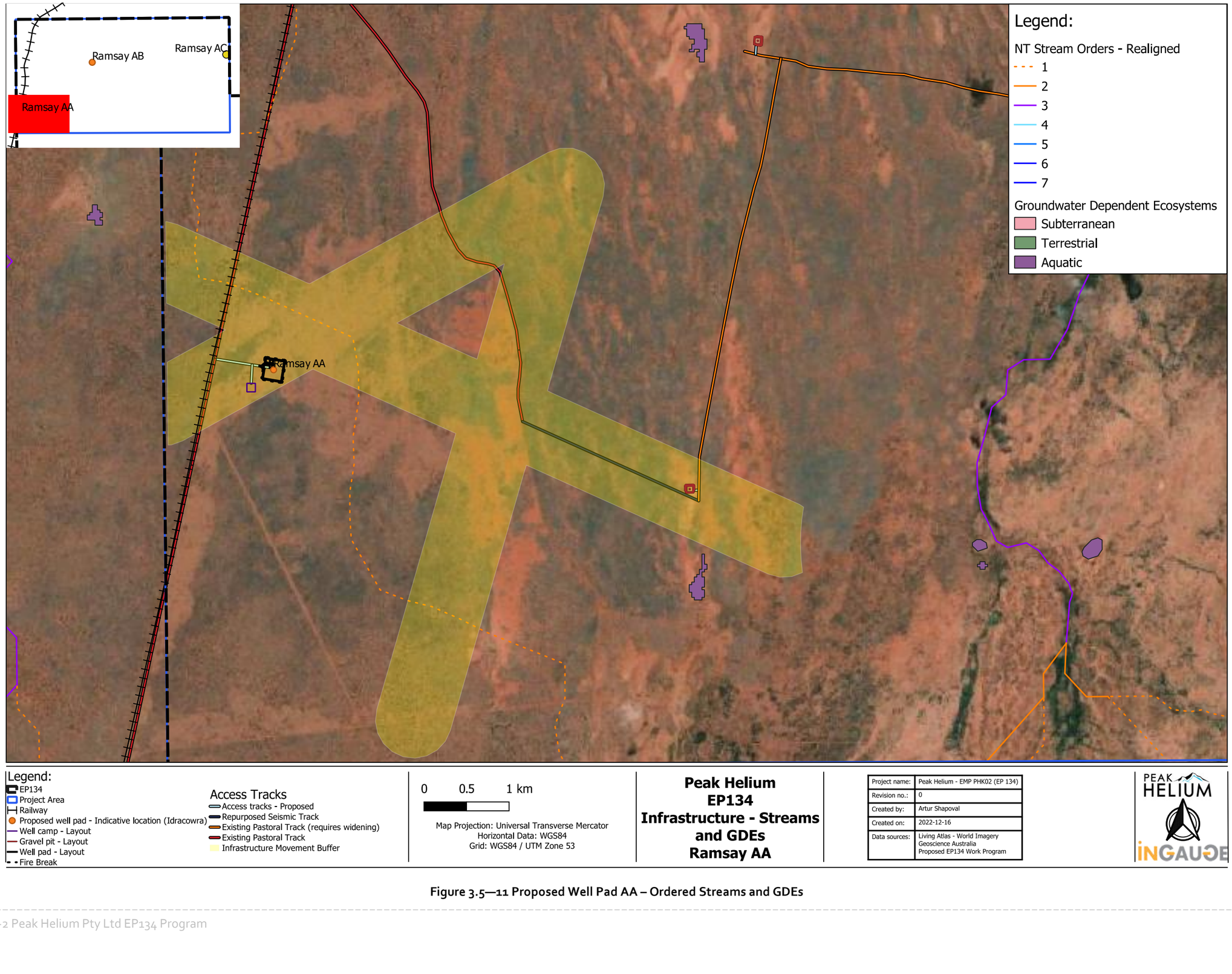
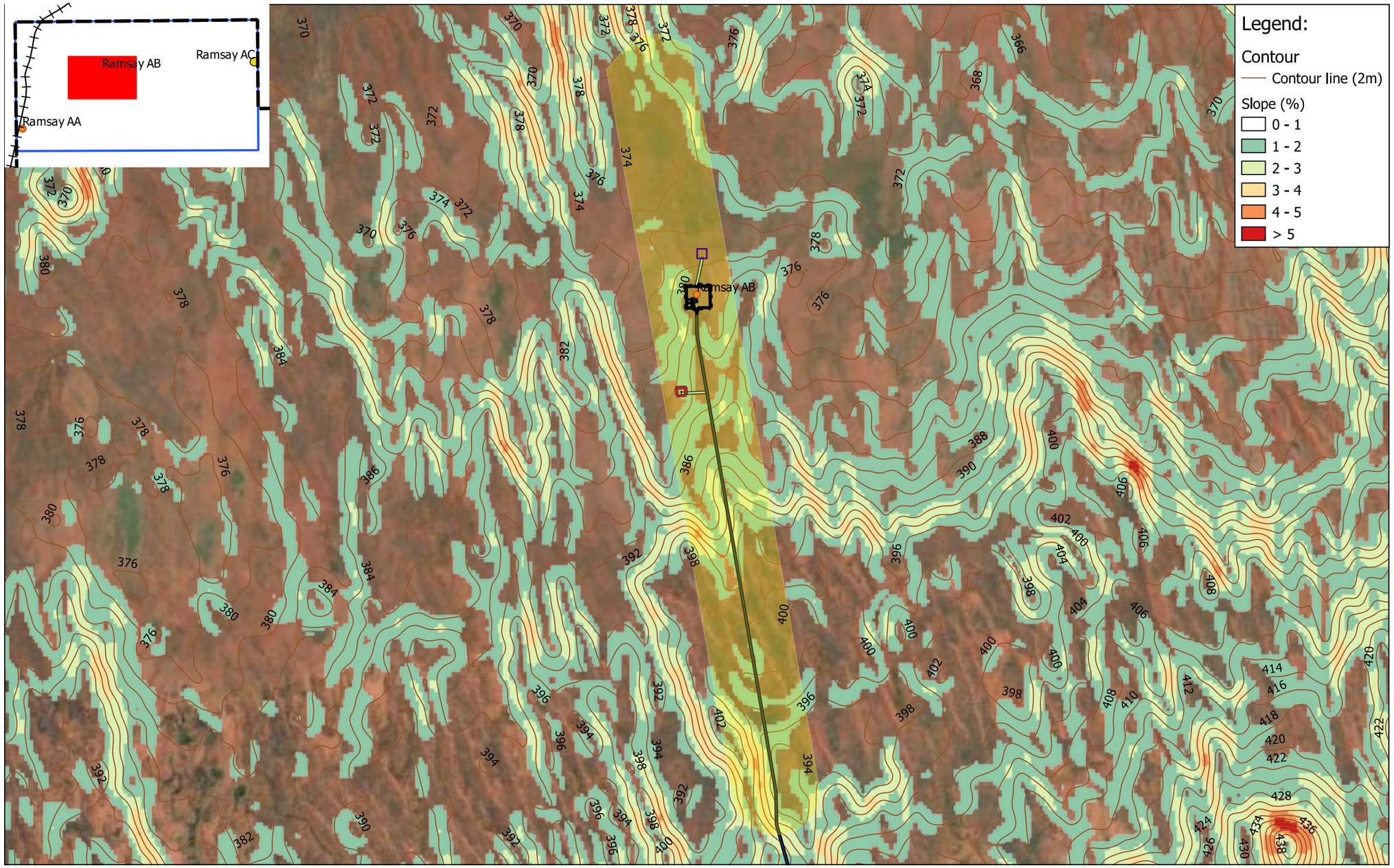


Figure 3.5—11 Proposed Well Pad AA – Ordered Streams and GDEs



Legend:
EP134
Project Area
Proposed well pad - Indicative location (Idracowra)
Well camp - Layout
Gravel pit - Layout
Well pad - Layout
Fire Break

Access Tracks
Access tracks - Proposed
Repurposed Seismic Track
Infrastructure Movement Buffer

0 0.5 1 km

Map Projection: Universal Transverse Mercator
Horizontal Data: WGS84
Grid: WGS84 / UTM Zone 53

Peak Helium
EP134
Infrastructure - Contour and slope
Ramsay AB

Project name:	Peak Helium - EMP PHK02 (EP 134)
Revision no.:	0
Created by:	Artur Shapoval
Created on:	2022-12-13
Data sources:	Living Atlas - World Imagery Geoscience Australia Proposed EP134 Work Program

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Figure 3.5—12 Proposed Well Pad AB – Contour and Slope

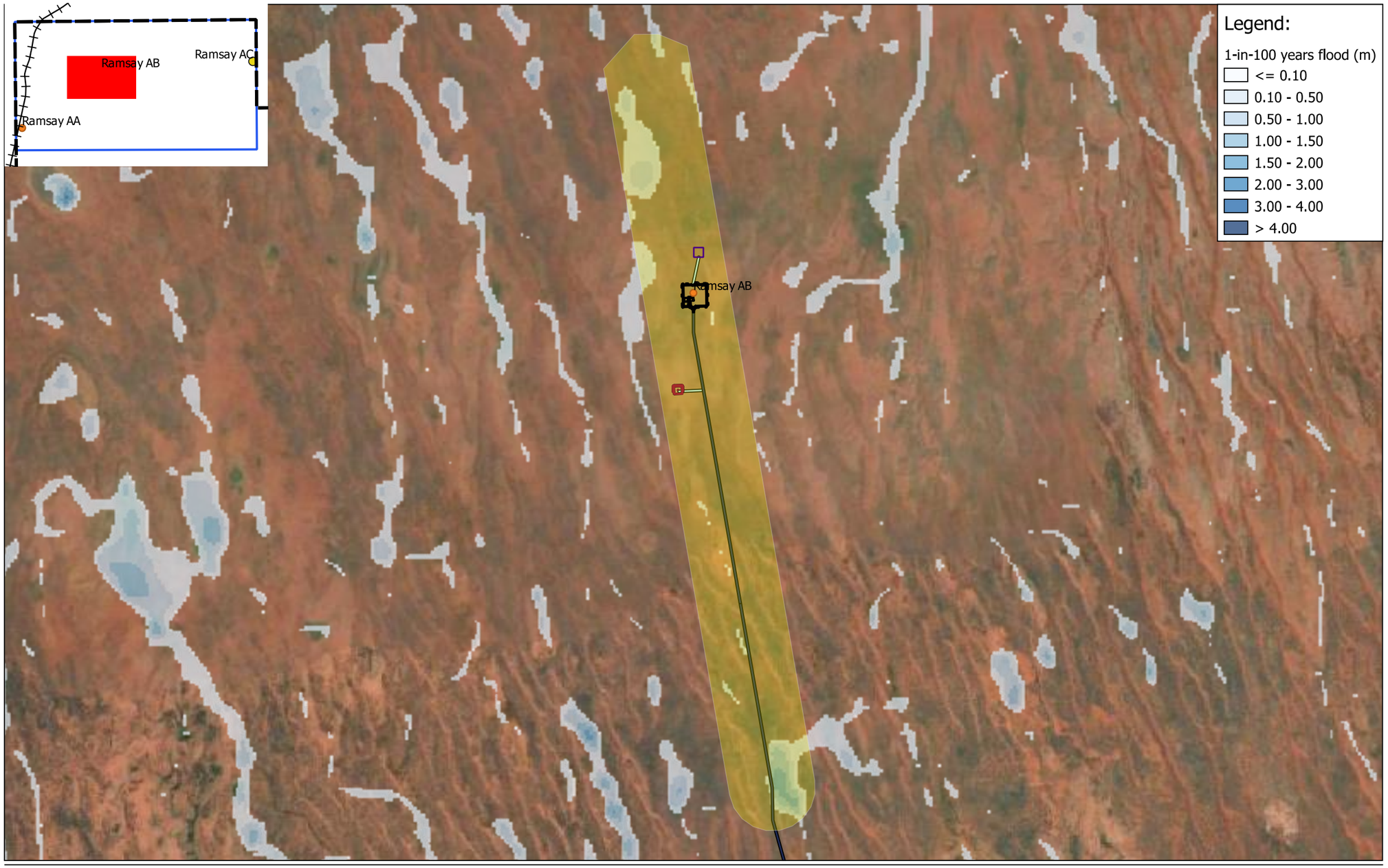


Figure 3.5—13 Proposed Well Pad AB – 1 in 100-year Flood Levels and Registered Water Bores

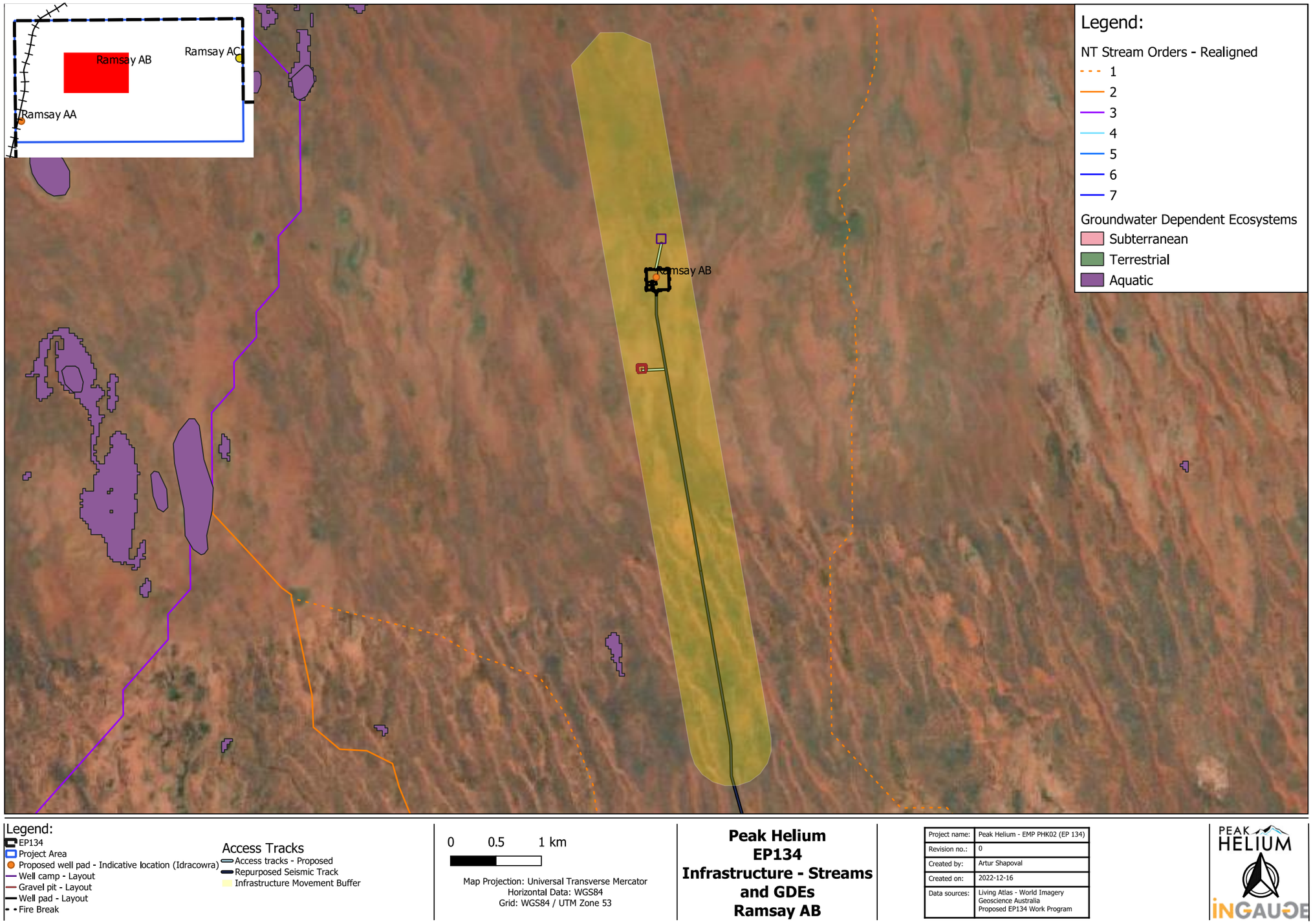


Figure 3.5—14 Proposed Well Pad AB – Ordered Streams (buffered) and GDEs

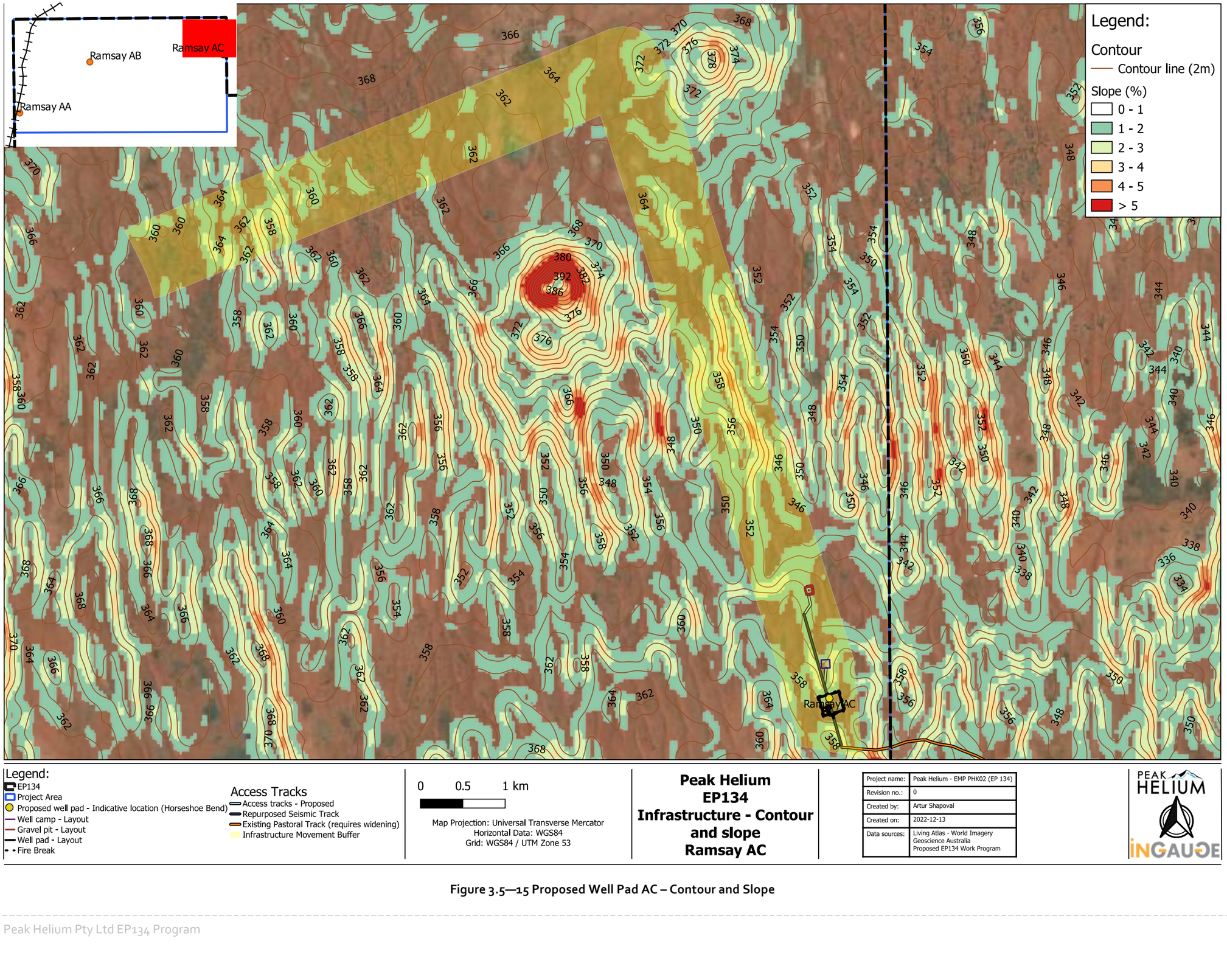


Figure 3.5—15 Proposed Well Pad AC – Contour and Slope

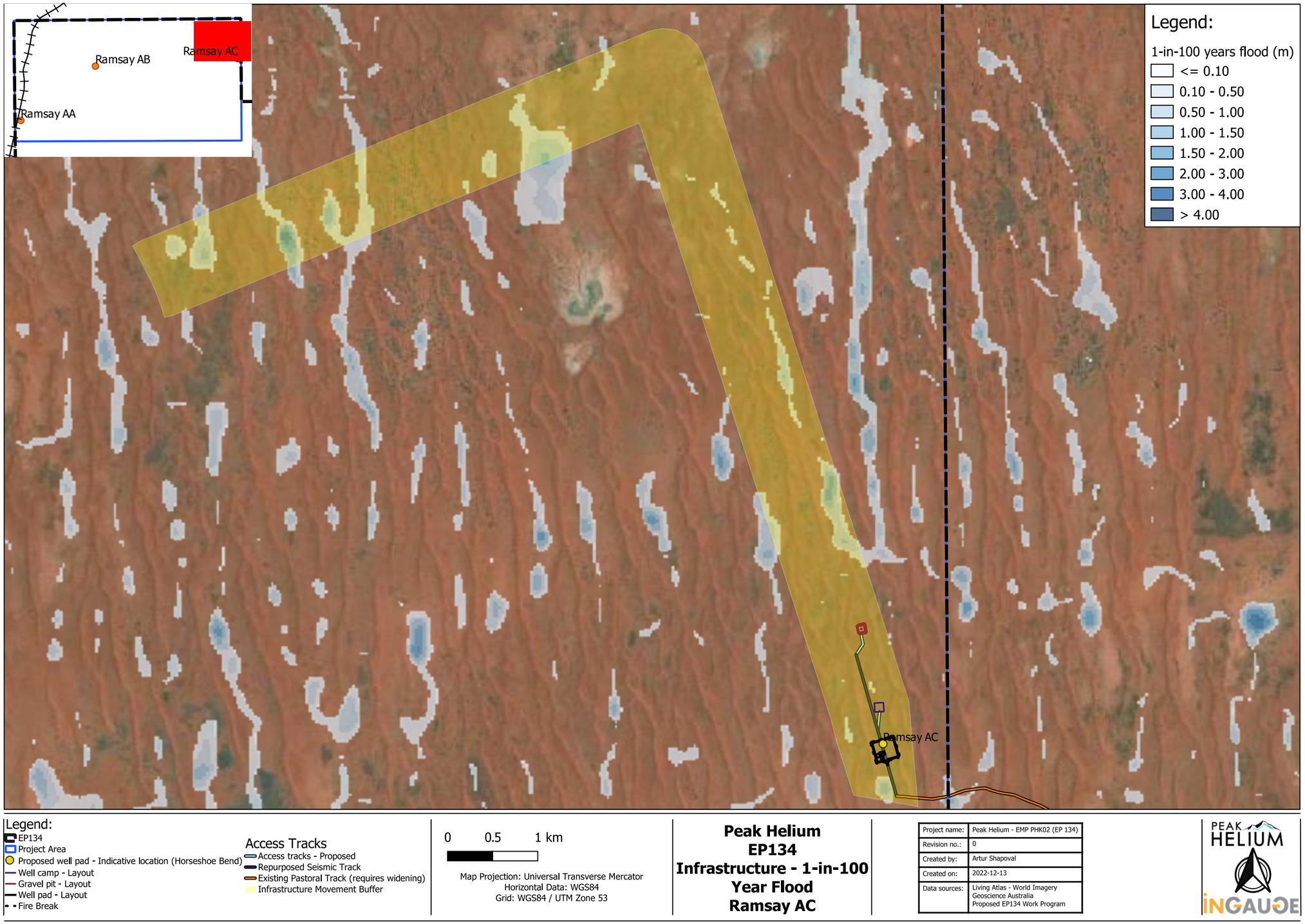


Figure 3.5—16 Proposed Well Pad AC – 1 in 100-year Flood Levels and Registered Water Bores

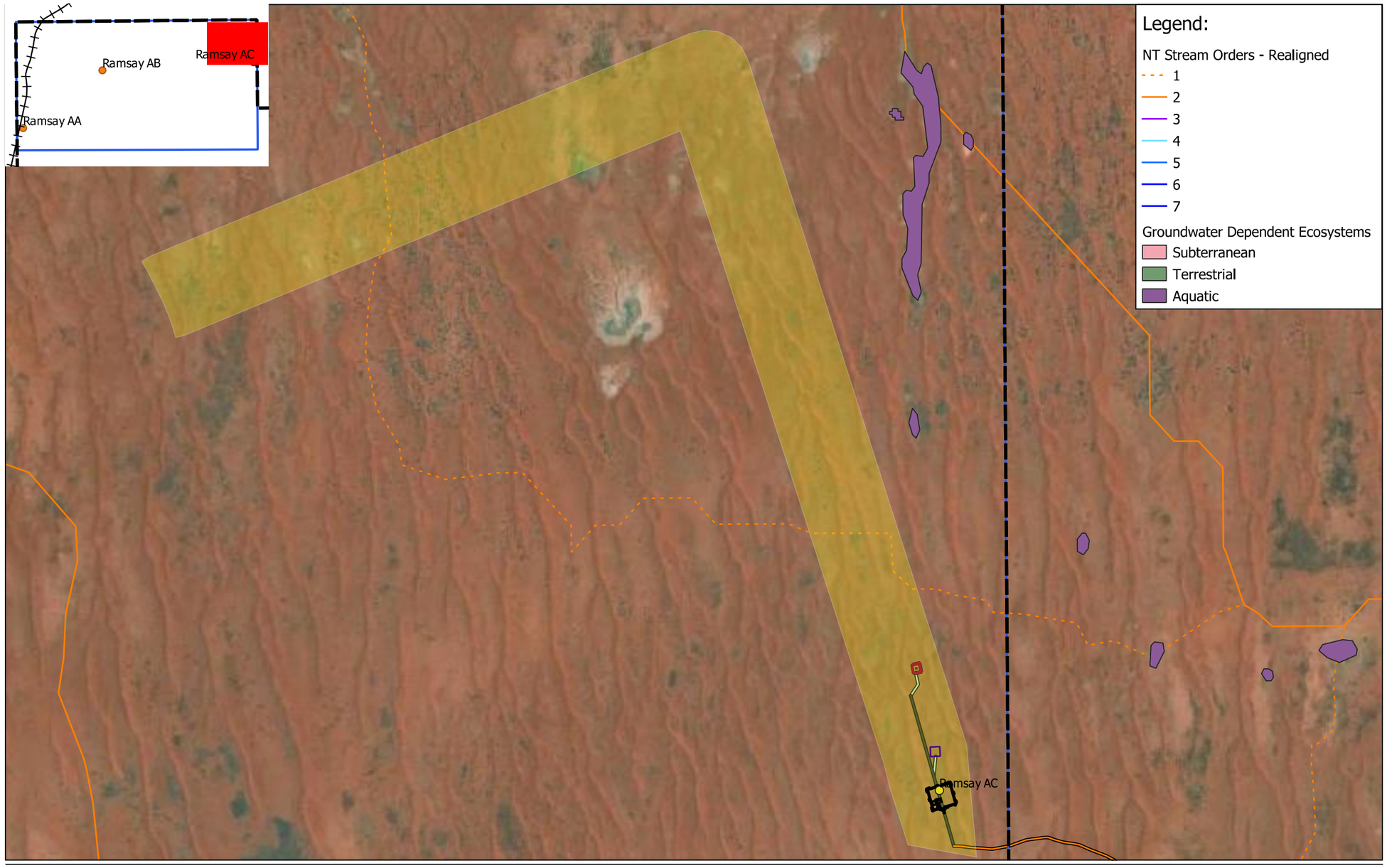


Figure 3.5—17 Proposed Well Pad AC – Ordered Streams (buffered) and GDEs

3.6 Civil Construction

The civil construction activities to be carried out under the EMP are:

- Well pad, gravel pit and campsite construction.
- Access track construction.
- Intersection construction.
- Potential groundwater bore access construction (if not placed on well pad).

The activities under this EMP will be carried out by clearing the minimal areas practical and minimising the disturbance by:

- Limiting new access track construction by utilising existing pastoral tracks and re-purposing seismic tracks to access well pads, campsites, and gravel pits. Access tracks will be widened only where required to minimise disturbance.
- Co-locating groundwater bores along access tracks in naturally clear areas (if no producing groundwater bore is constructed on well pad).
- Using multi-well pads where practicable.
- There will be no well pad, gravel/borrow pit, campsite, or new access track construction within SOCS or SOBS.
    - Infrastructure movement corridors have a 200m buffer from the edge of SOCS/SOBS
- There will be a pre-clearing survey conducted for both Grey Falcon nests within 300m of all planned activities and hollow-bearing trees (Princess Parrot) by an ecologist prior to activities. Any sensitive areas, nests, or potential habitats for listed threatened species (such as large or ≥5 hollow-bearing, trees) will be avoided under the guidance of an ecologist and clearing, and construction activities will be situated to avoid these locations. In the case of Grey Falcon nests, these will be given a 300m buffer from activities until they are no longer active.

The well pad design and site selection criteria aid in the prevention of spills of potentially harmful chemicals or those that may cause environmental harm to the ground of surface, or their release from the site by:

- Topsoil stripped from the well pad and pit areas and windrowed above the cut batter and fire break upslope, including bunding on fill areas as required to prevent uncontrolled rutting.
- Clean water diversion – diversion berms on the upslope side of the pad and pits to divert runoff around the pad or to dissipate runoff prior to it entering the pad.
- Perimeter bund to deflect surface water run-on from inundating the site and chemical storage areas (see **Appendix 05** Erosion and Sediment Control Plan).

- Dirty water diversion – pad runoff is to be dissipated using mitigation measures such as coir logs or mulch berms (see Section 6.2 of the ESCP (**Appendix 05**)).
- Lined pits to prevent seepage to ground from storage of drilling fluids.
- Bunded pits to prevent surface water from inundating the pit.
- Bunded tanks pads constructed, including clary core (or similar) bund as a compacted base, as contingency containment in case of above-ground tank fluid release.

A breakdown of the area required for the regulated activities and how much of it is new disturbance is shown in new disturbance areas is shown in **Table 3.6—1**.

Table 3.6—1 Disturbance Areas for Regulated Activities under this EMP

Description	Amount of Required Land	Amount of Already Cleared Land	Remaining Total Amount of Land Required	Unit of Measure
Well Pad	21.04	0.0	21.04	Ha
Access Tracks	42.27	33.83	8.44	Ha
Gravel Pits	4.6	0.0	4.6	Ha
Campsites	3.0	0.0	3.0	Ha
Groundwater Bores (potential)	1.0	0.0	1.0	Ha
Total	**71.91**	**33.83**	**38.08**	**Ha**

The amount of required land for access tracks is less than the remaining total amount of land required for access tracks, as 33.83Ha of existing pastoral tracks will be utilised. The clearing calculation for access tracks includes:

- New access tracks (6m).
- Existing pastoral tracks (≥ 6m).
- Widening of existing pastoral tracks (where required) (currently ≥ 4m).
- Repurposed seismic tracks and contingency access tracks (currently 5m).

This also includes sections for intersections and turn-out drains; access tracks can be seen in **Figure 3.5—6**.

Peak Helium will provide geospatial files, including the information required under Clause A.3.5 of *the Code* to DEPWS after construction activities are completed.

3.6.1 Multi-Well Pad Construction

For the four well program, a maximum of three well pads are proposed to be constructed. The use of multi-well pads will reduce the amount of clearing required compared to the alternative of having four single-well pads. As the wellheads are generally only 10m apart, the well pad footprint of a multi-well pad and a single well pad is the same.

If the drilling and EPT operations on different wells on the same well pad are carried out over multiple years, the wastewater can be moved between wells so that extra tanks and pits are not needed. Where wastewater is transferred, volumes of fluid transferred is to be recorded and tracked.

If the activities on different wells on the same pad are carried out in quick succession, larger pits and tanks will likely be required. The drilling pit/s on each well pad will be constructed to a capacity of 4500m3 in line with the indicative drawing in **Figure 3.6—3** to account for the anticipated drilling by-products that will be generated during drilling activity whilst maintaining the required freeboard. The number of pits and the pit profile is provided in **Figure 3.6—1**, **Figure 3.6—2** and **Figure 3.6—3**. Peak Helium will continue to re-assess the schedule as it works through the program and size pits and tanks accordingly. As drilling fluid is reused during drilling operations, there is not a linear increase of drilling by-products in relation to the number of wells on a pad.

The design requirements and operability of a multi-well pad operations across all seasons are not materially different from a single well pad, especially as the drilling consumables are delivered to the well pad as the drilling program progresses. No extra laydown or storage infrastructure is required for a multi-well pad.

One groundwater bore will be constructed on all well pads to minimize potential environmental disturbances. Where no producing bore can be established on a respective well pad, then and only then, will an alternative location need to be established for a groundwater bore as discussed in **Section 3.6.3**.

The proposed EP134 multi-well pad layout is shown in **Figure 3.6—1** and **Figure 3.6—2** below, including the indicative placement of wells, pits, tanks, erosion and sediment controls, and fire protection. Individual locations will be modified to suit site slope and vegetation.

3.6.2 Access Track Construction

The access tracks currently available on the EP are existing pastoral tracks and seismic tracks. As a priority, these tracks will be repurposed for the project activities to reduce the amount of land clearing required. All access tracks in the Project Area need to be 6m wide for the project activities.

There are five types of access tracks covered under this EMP, new access tracks, existing pastoral tracks that require widening, existing pastoral access tracks that are already of a sufficient width (currently 6m or wider), seismic tracks that require widening, and contingency access tracks which will utilise seismic tracks (if required). These five types of access tracks and their locations are shown in **Figure 3.5—6**. Below is a summary of the five types of tracks:

- All new construction will require a full 6m of clearing.
- The width of pre-existing pastoral tracks varies throughout the Project Area. Some of these tracks are 6m or greater in width currently, but some are not. Where pastoral tracks

are not 6m in width, these pastoral tracks are at minimum 4m wide. As such, the existing pastoral access tracks that require widening have been overestimated, as parts of the road highlighted for widening **(Figure 3.5—6)** will be of sufficient width already. For clearing calculations, it is assumed that all existing pastoral tracks that require widening are 4m wide and will require a 2-metre expansion, i.e., a worst-case assumption.

- Similarly, seismic access tracks are 5m in width and, therefore, will need to be expanded by one metre.
- Due to the indicative nature of the well pad locations, there is the potential that additional access tracks will be required if a well pad is required to be moved. It is important to note that the well pad location is selected based on seismic data, i.e., the most desirable location. As such, the location presented will most likely be the location unless it is required to be moved, e.g., identification of protected fauna or flora species in the area during ground-truthing. As such, contingency access tracks have been included. These contingency tracks account for the max clearing disturbance if a well pad is moved to the furthest point of a corridor. If a well pad is required to move due to ground-truthing, it is unlikely to move significant distances. Therefore, the contingency access tracks clearing calculations are an overestimate, as they most likely will either not need to be constructed to the full extent or not need to be constructed at all. Contingency access tracks will be re-purposed along seismic tracks and as such, will need to be expanded by one metre.

Some access roads and tracks intersect the area of the KCPS, however no new construction will occur in SOC/SOBS areas. It appears from the SOCS spatial data that widening will occur in a SOCS area; however, this specific area is not truly a SOCS. The Karinga Creek Paleodrainage System (KCPS) is defined as a GDE, a freshwater wetland, and/or a saline lake. The access track, as shown in **Figure 3.5—7,** traverses between two KCPS GDEs. The access track is roughly 5km from these GDEs at the closest point. This area comprises sandplains and low dunes/swales. Section 2.1.2.5 of *Recognising Sites of Conservation Significance for Biodiversity Values in the Northern Territory* states that a 2km buffer is applied to all sites of conservation [NORTHERN TERRITORY GOVERNMENT, 2009]. Therefore, the access track is roughly 3km from this imposed buffer, and the SOCS corridor, seen in **Figure 3.5—7,** is merely a connection of two SOCS areas, purely for the purpose of spatial mapping simplicity. This corridor contains no SOCS, as further evidenced by the fact that the corridor is less than 2km in width, which would not be the case if it had a site of significance within it. Therefore, no new construction will occur within any SOCS or SOBS on the EP.

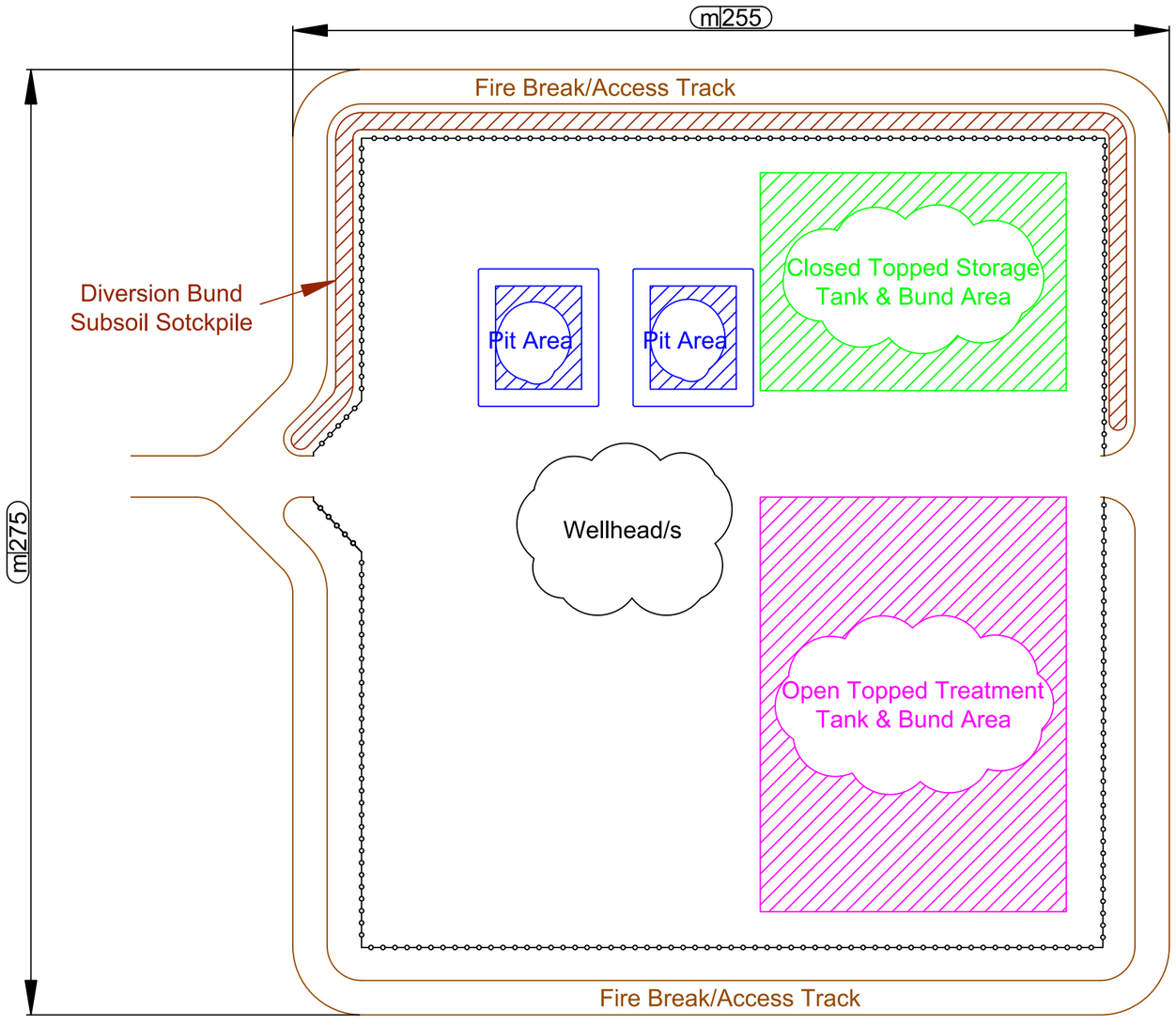
3.6.3 Potential Alternative Groundwater Bore Locations

The water supply target is the Hermannsburg sandstone aquifer that belongs to the Pertnjara Group of the Amadeus Basin, which will be reflected in the application for a groundwater extraction license. As outlined in more detail in **Section 4.1,** given the uncertainty of the aquifer's presence and yields, Peak Helium has applied for investigative bore works permits, meaning the water supply aquifer on the groundwater extraction license may change accordingly.

To minimise environmental disturbances, all groundwater bores will be positioned within well pad sites, except where a producing bore cannot be established on the pad. In the event that a producing groundwater bore cannot be established at a well pad site, an alternative location will be required for that bore. Alternate locations will be found adjacent to access tracks in naturally clear areas within the already-established well corridors. As such, an overestimate of one hectare of land is accounted for in the total disturbance area of the project, allowing for one-third of a hectare for each potential alternative bore location. Where a producing groundwater bore is able to be established on a well pad, the land clearing for the alternative location will not be required for that bore.

The proposed well pad locations are more than 2.5km from a GDE, as shown in **Figure 3.5—11**, **Figure 3.5—14** and **Figure 3.5—17**. The GDEs present on the EP are aquatic GDEs of low potential, identified through a national scale assessment. A review of aerial photography identifies the majority of the GDEs present to be associated with salt lakes part of the KCPS. No impacts to the potential GDEs present on the EP are anticipated, as the target aquifer is at a significant depth of ~100m below ground, and therefore, there is a significant thickness between the target zone and the water table that would provide a source of water to the GDEs. Groundwater bores will not be placed within 300m of a GDE. Furthermore, groundwater bores will not be constructed within 1km of a current bore.

Section 4.1 discusses the target aquifer in more detail.



Indicative Wellpad Layout

Flat site

Legend
- Wellhead
- Wellpad Fence
- In ground pits
- Closed top storage area
- Open topped treatment area
- Diversion bund/Topsoil stockpile
- Fire break/Access track

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02/08/2022

Figure 3.6—1 Multi-well Well Pad Footprint (and indicative tanks layout, where cut and fill is not required)

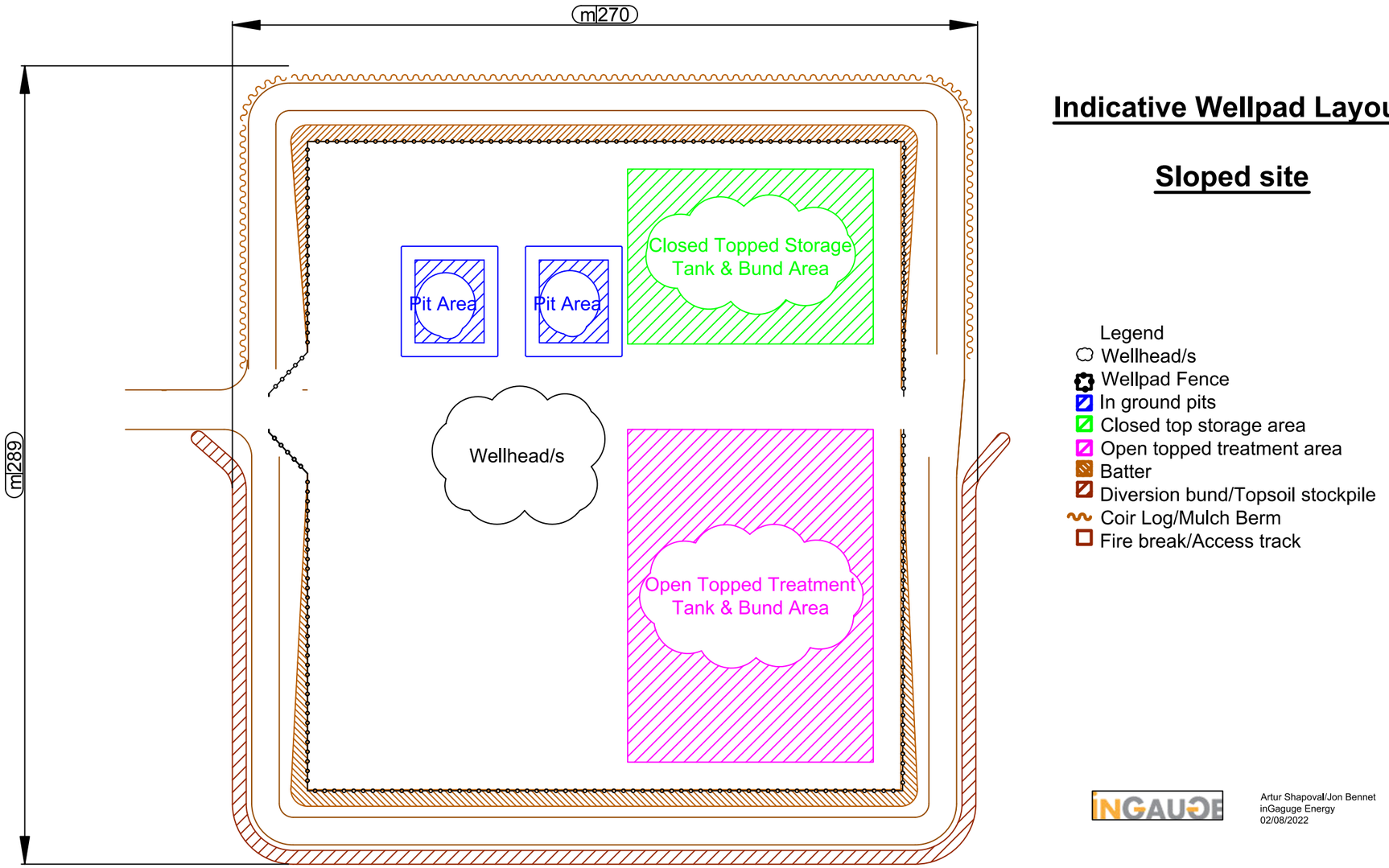

Figure 3.6—2 Multi-well Well Pad Footprint (and indicative tanks layout, where cut and fill is required)

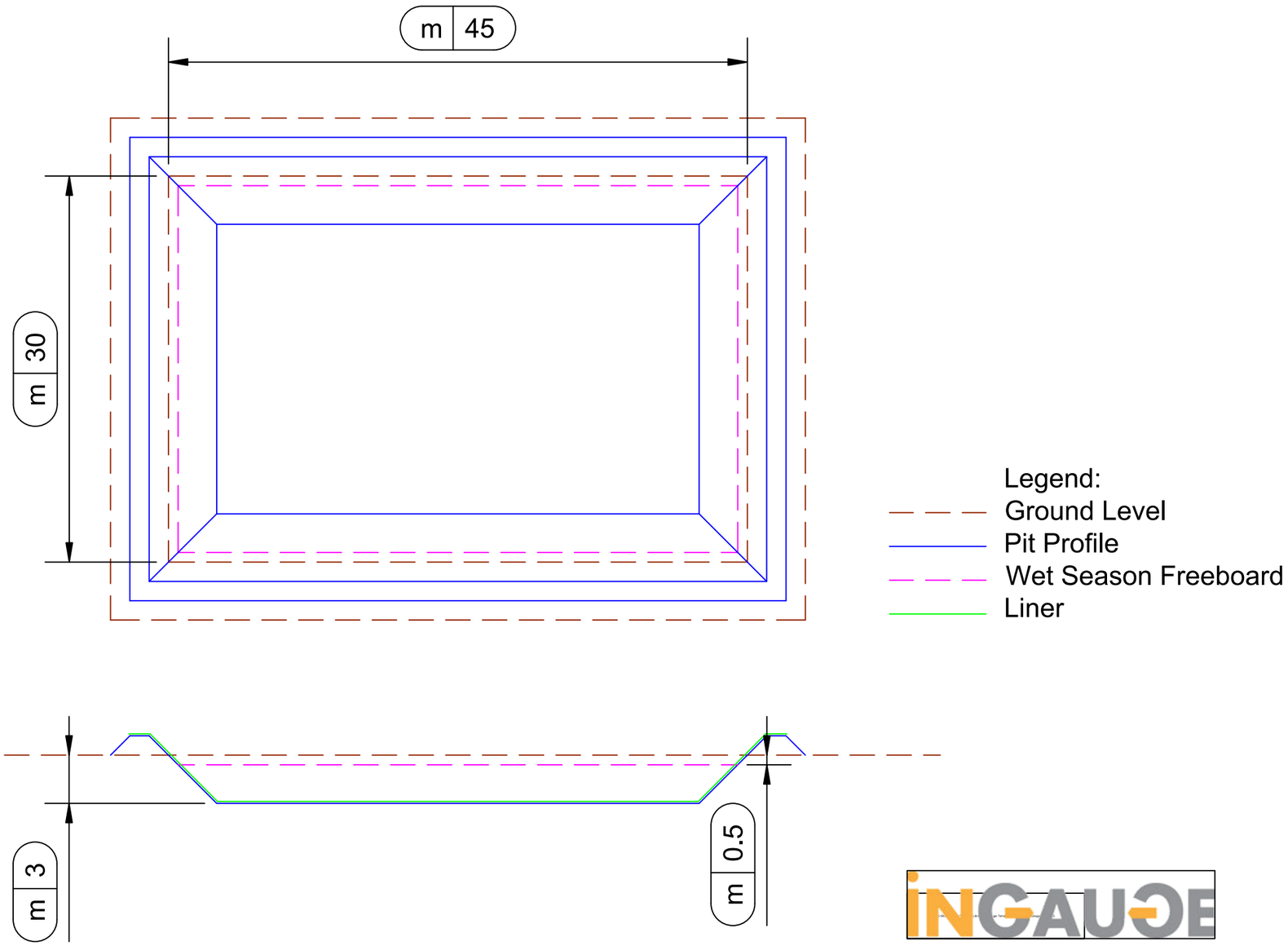

Figure 3.6—3 Well Pad Layout – Typical Pit Profiles

3.6.4 Highway Intersection Construction

The activities under this EMP do not require the construction of any highway intersections. Peak Helium will utilise existing intersections off the Stuart Highway and Horseshoe Bend Road; these intersections have been constructed for road train access for livestock transport and are, therefore, suitable for the trucks required for regulated activities under this EMP.

3.6.5 Campsites

The camp locations under this EMP will be located approximately 100m from each well pad location. Although no fixed-point locations have been finalised to allow for a minimal impact allocation of campsite/s post-determined drilling locations, indicative locations are provided in the following figures:

- Ramsay AA Camp is shown in **Figure 3.5—9** to **Figure 3.5—11**.
- Ramsay AB Camp is shown in **Figure 3.5—12** to **Figure 3.5—14**.
- Ramsay AB Camp is shown in **Figure 3.5—15** to **Figure 3.5—17**.

3.6.6 Gravel Pits

The gravel pits will be located where there are appropriate fill sources in the proximity of well pads and access tracks. Although no fixed-point locations have been finalised to allow for a minimal impact allocation of gravel/borrow pits post-determined drilling locations, indicative locations are provided in the following figures:

- Gravel pit **1** is shown in **Figure 3.5—9** to **Figure 3.5—11**.
- Gravel pit **2** is shown in **Figure 3.5—9** to **Figure 3.5—11**.
- Gravel pit **3** is shown in **Figure 3.5—12** to **Figure 3.5—14**.
- Gravel pit **4** is shown in **Figure 3.5—15** to **Figure 3.5—17**.

The indicative gravel pit layout is provided in **Figure 2.8 – 2** of **Appendix 02** and shows dimensions of 100m by 100m, including vegetation, topsoil, and diversion bunds. The layout size is to facilitate the predicted extraction volume of 15,000 m^3 of gravel / fill from each pit.

3.7 Groundwater Monitoring Program

Prior to drilling, a minimum of one sample will be taken at constructed groundwater bores to establish a baseline. The samples will be tested for the analytes listed in Section B.4.17 Table 6 *of the Code.*

On-going monitoring of the water extraction will comprise monthly flow meter readings from each extraction bore during operations.

3.8 Seismic

No seismic acquisition activities will be carried out as part of this EMP.

Section intentionally left blank.

3.9 Wastewater Flowline

No wastewater flowline activities will be carried out under this EMP.

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3.10 Drilling and Well Operations

3.10.1 Well Information

The wells to be drilled under this EMP are exploration-appraisal wells on the north-western section of EP134 in the Amadeus Basin.

Table 3.10—1 presents the general well information for the proposed exploration wells.

Figure 3.10—1 illustrates the proposed exploration wells' indicative stratigraphy, casing, and cement configuration.

All encountered aquifers will be isolated behind the cemented casing.

Some of the proposed wells will be drilled with a vertical pilot to provide more information on formations below the target formation. Others will not have a vertical pilot drilled below the target formation. The wells drilled with the vertical pilot will be plugged back to the kick-off point before drilling the lateral section. Both proposed well designs will have aquifers isolated behind cemented casing before drilling into the hydrocarbon-bearing zone, as shown in **Figure 3.10—1**.

An example of a horizontal well drilled *with* a vertical pilot is shown in **Figure 3.10—2**.

An example of a horizontal well drilled *without* a vertical pilot is shown in **Figure 3.10—3**.

For further information on drilling practices, please refer to **Appendix 02**.

Table 3.10—1 General Well Information

General Well Information				
Permit Area:	EP134			
Basin:	Amadeus Basin			
Well Name(s):	Ramsay AA Ramsay AB Ramsay AC			
Well Type:	Exploration			
Primary Target:	Basement			
Predicted Hydrocarbon:	Helium			
Exploration Well Pad Locations				
To facilitate flexibility whilst achieving ALARP, Peak Helium has included three well pad corridors, as listed below, that will accommodate the drilling of a total of four exploration wells under this EMP.				
Peak Helium utilises infrastructure movement corridors to allow fine-tuning of locations to reduce on-ground impacts; well pads have an approximate 1000m movement buffer from the coordinates shown below to enable movement.				
The locations may move within the infrastructure movement corridor between the two points listed below. The well pad, along with other new clearing areas, will be preferentially located outside of the recommended width for riparian buffers, as described in the *Land Clearing Guidelines Section 4.47* [DEPWS, 2020, 2021] and other constraints as defined in the well pad selection criteria. Where the wells cannot be located outside of the riparian buffers, the controls as per the ESCP (**Appendix 05**) will be implemented.				
Ramsay AA	**Property**		**Idracowra**	
Indicative Location	**Well Pad**	Eastings	350499	
		Northings	7193739	
Well pad Corridor(s) Centreline (MGA94, Zone 53)	**Line End**		**Western**	**Eastern**
	Associated Seismic Line ID		PH_2021_2.1	PH_2021_2.1
		Easting	349213.0512	353942.7245
		Northing	7193297.711	7195902.997
	Associated Seismic Line ID		PH_2021_5	PH_2021_5
		Easting	352109.5852	353942.7245
		Northing	7189490.72	7195902.997
	Associated Seismic Line ID		PH_2021_8	PH_2021_8
		Easting	349193.4525	356501.9441

General Well Information				
		Northing	7195036.682	7191746.571
Ramsay AB Indicative Location Well pad Corridor(s) Centreline (MGA94, Zone 53)	**Property**		**Idracowra**	
	Well Pad	Eastings	367076	
		Northings	7205810	
	Line End		**Western**	**Eastern**
	Associated Seismic Line ID		PH_2021_4.2	PH_2021_4.2
		Easting	366558.7969	367897.0183
		Northing	7208364.5	7200650.18
Ramsay AC Indicative Location Well pad Corridor(s) Centreline (MGA94, Zone 53)	**Property**		**Horseshoe Bend**	
	Well Pad	Eastings	398699	
		Northings	7207658	
	Line End		**Western**	**Eastern**
	Associated Seismic Line ID		PH_2021_1	PH_2021_1
		Easting	396274.8806	398852.0164
		Northing	7215139.702	7207066.297
	Associated Seismic Line ID		PH_2021_2.3	PH_2021_2.3
		Easting	390397.4233	396274.8806
		Northing	7212716.212	7215139.702

Table 3.10—2 Prognosed Well Formations

Layer	Depth (m AMSL)	Depth (m MDGL)	Layer Uncertainty (+/- m)	Cumulative Uncertainty (+/- m)
Ground Level	-402	0	2	2
Petermann Unconformity	-24	378	76	78
Areyonga Unconformity	952	1354	195	273
Basal Loves Creek Fm	1345	1747	79	351
Basal Upper Gillem Fm	1638	2040	59	410
Base Gillen Evaporites	2637	3039	200	610
Top Basement	2903	3305	53	663

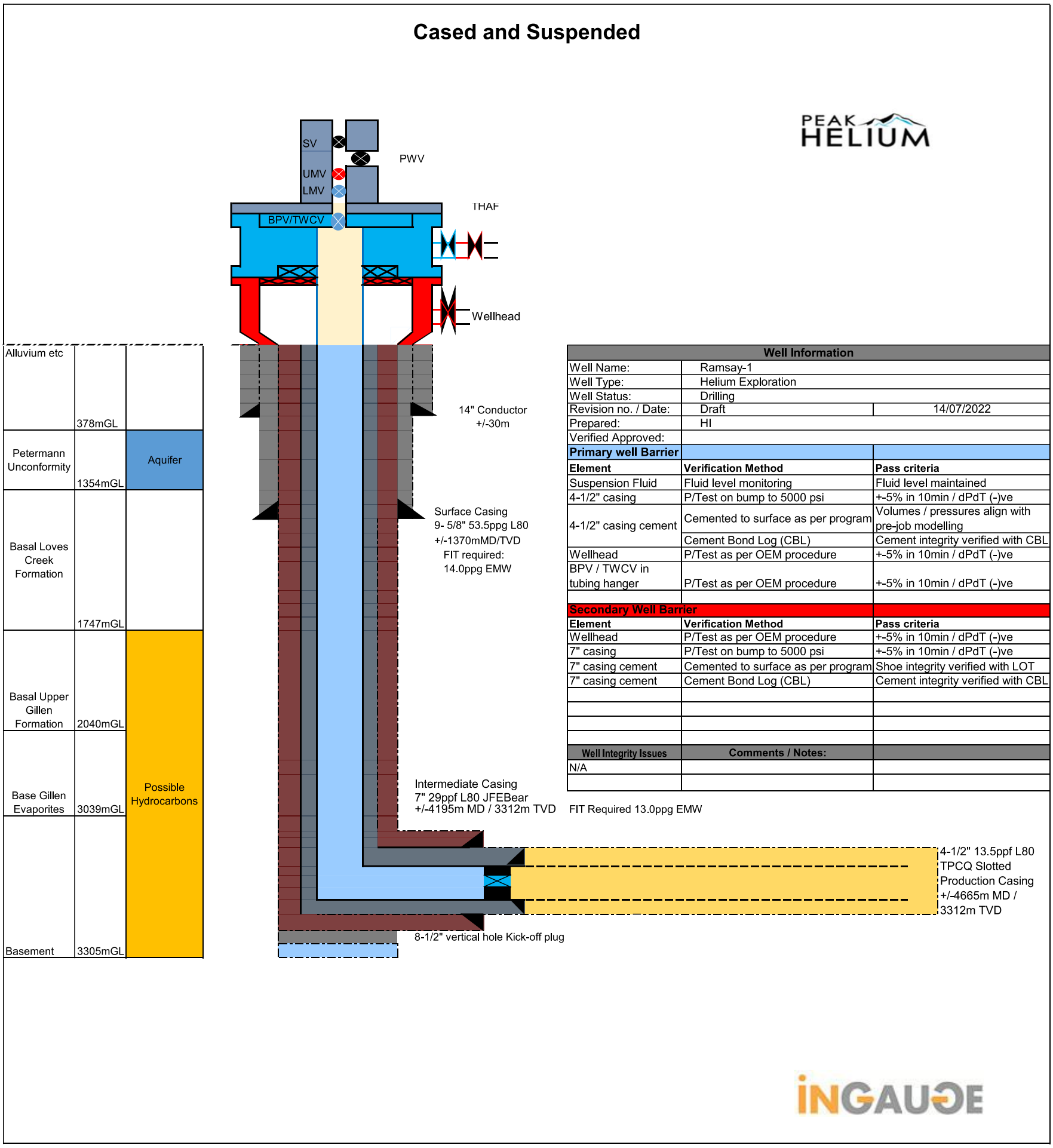

Figure 3.10—1 Indicative Stratigraphy, Casing, and Cement Configuration

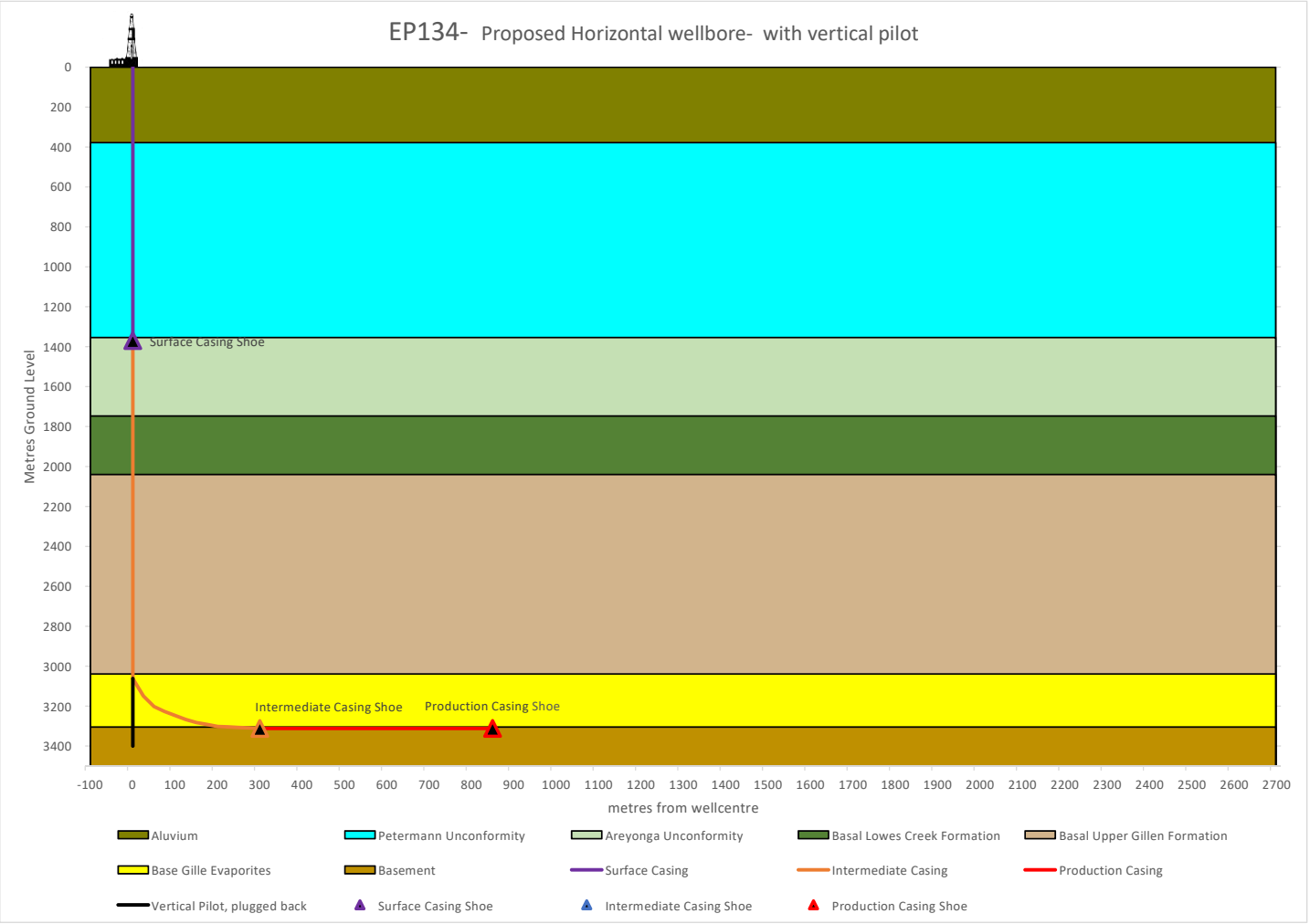

Figure 3.10—2 Proposed Horizontal Wellbore with Vertical Pilot

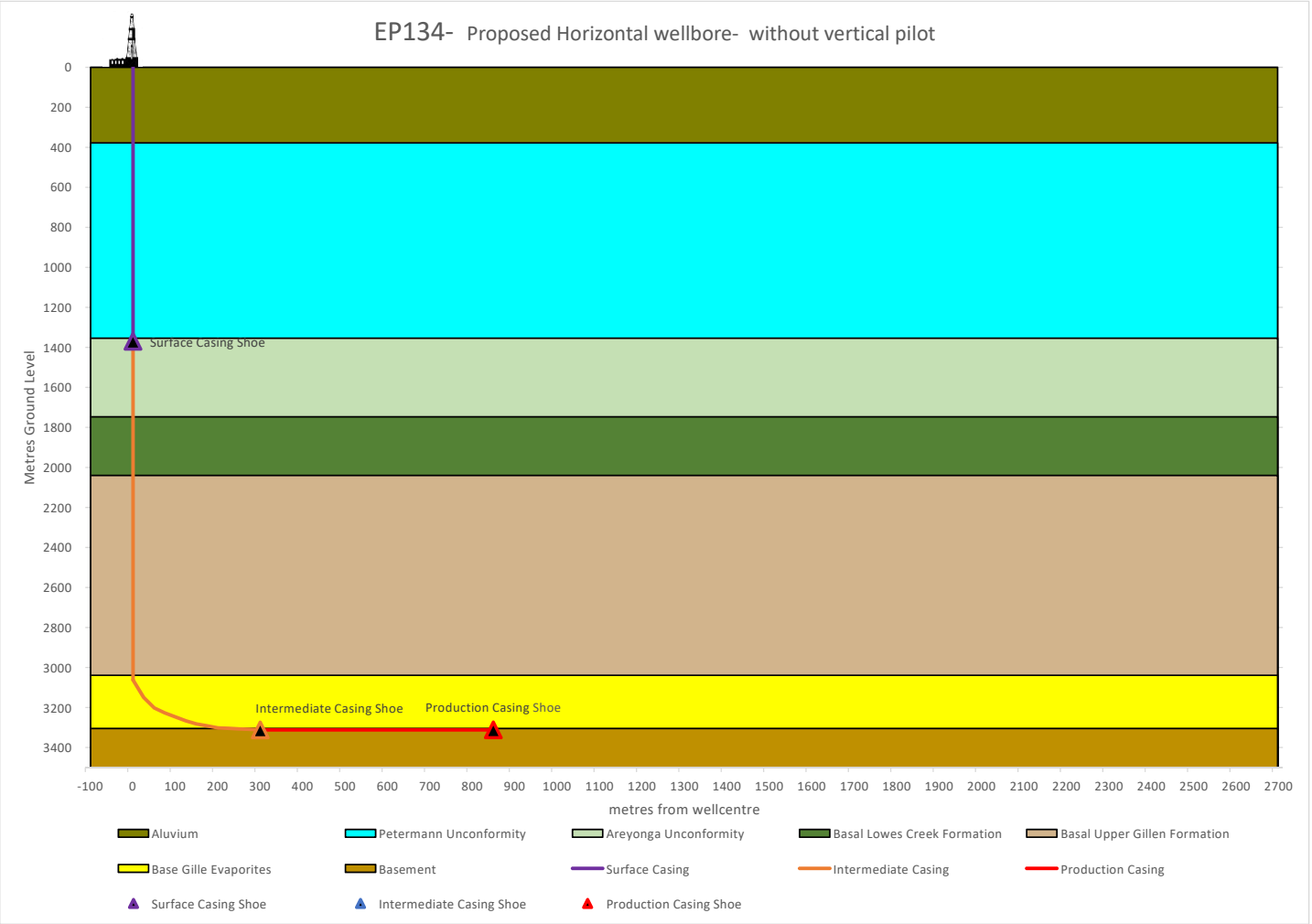

Figure 3.10—3 Proposed Horizontal Wellbore without Vertical Pilot

3.10.2 Well Operation Management Plan

Parallel to the EMP, Peak Helium is compiling a Well Operations Management Plan (WOMP) to cover the Drilling, Completions, and Extended Production Test (EPT) activities to be carried out under this EMP. The WOMP will be submitted to DITT for approval before those activities are carried out.

The WOMP covers requirements for section B of *the Code*. Section B requirements of *the Code* will be covered under the WOMP rather than the EMP to avoid ambiguity between the EMP and the WOMP. One exception to this is Aquifer protection. The EMP will address separation distances between aquifers on-site and the target formation and monitoring to be carried out for aquifer protection.

Peak Helium will provide DEPWS notification when DITT approves the revised WOMP.

3.10.3 Well Integrity Management

Well integrity management requirements are covered in the WOMP. The WOMP will be revised and approved by DITT before the regulated activities under this EMP are carried out. Peak Helium will provide DEPWS notification when DITT approves the revised WOMP.

3.10.4 Aquifer Protection

Casing setting depth will be selected to protect resources, including aquifers, according to section B.4.3.2 of *the Code*.

All aquifers encountered during drilling operations will be isolated from each other, the surface, and any hydrocarbon-bearing zones by appropriate well barriers. This will be done following section B.4.3 of *the Code*.

Primary cementing design and validation will be carried out following the WOMP and B.4.7 of *the Code*.

Monitoring of barriers and casing conditions will be carried out as per the WOMP and B.4.1 of *the Code*.

Peak Helium has an accurate understanding of what aquifers exist at the well pad, their depth from the surface, and their relationships to each other and other hydro-stratigraphic units. Peak Helium uses this knowledge during the well design phase. Please see the groundwater section of **Appendix 01** for this information.

If an aquifer is discovered during drilling that was not identified before the program, Peak Helium will notify the Minister in compliance with regulation 23 of the PER. This notification will determine whether or not the aquifer's environmental values have been adequately addressed under the EMP and whether or not the EMP requires revision under regulation 17 of the PER.

3.10.5 Well Design and Well Barriers

Well design and well barrier requirements are covered in the WOMP. Peak Helium's WOMP will be compiled, reviewed, and approved by DITT before the regulated activities under this EMP are carried out. Peak Helium will notify DEPWS when DITT approves the revised WOMP.

3.10.6 High-Pressure High-Temperature Well Design

The drilling of Dukas 1, the deepest well in Amadeus basin, was reviewed, and no oil fluorescence was found while drilling, the total gas peak reached 40U/7U, and the Heavitree formation was not reached, and the geothermal gradient was 94 degrees Celsius at 3,693m total vertical depth. A result of the review established EP134 does not fit within the high-pressure or high-temperature category.

3.10.7 Working with Hydrogen Sulphide (H_2S)

There was no evidence of Hydrogen Sulphide in offset wells Mt Kitty and Magee-1 wells.

3.10.8 Casing and Tubing

Casing and tubing requirements are covered in the WOMP. The WOMP will be compiled by Peak Helium and reviewed and approved by DITT before the regulated activities under this EMP are carried out. Peak Helium will notify DEPWS when DITT approves the WOMP.

3.10.9 Primary Cementing

Cementing requirements are covered in the WOMP. The WOMP will be compiled by Peak Helium and reviewed and approved by DITT before the regulated activities under this EMP are carried out. Peak Helium will notify DEPWS when DITT approves the WOMP.

3.10.10 Wellheads

Wellhead requirements are covered in the WOMP. The WOMP will be compiled by Peak Helium and reviewed and approved by DITT before the regulated activities under this EMP are carried out. Peak Helium will notify DEPWS when DITT approves the WOMP.

3.10.11 Well Control

Well Control requirements are covered in the WOMP. The WOMP will be compiled by Peak Helium and reviewed and approved by DITT before the regulated activities under this EMP are carried out. Peak Helium will notify DEPWS when DITT approves the WOMP.

3.10.12 Drilling and Completions Fluids

Drilling and completions fluids are selected and used in accordance with their designed function, the manufacturer's recommendations, and relevant (SDS). Drilling fluid requirements are covered in the WOMP. The WOMP will be compiled by Peak Helium and reviewed and approved by DITT before the regulated activities under this EMP are carried out. Peak Helium will notify DEPWS when DITT approves the WOMP.

A list of indicative drilling fluid additives, their functional description, and the potential for them to be hazardous has been included in **Section 7.15** of the Spill Management Plan. The actual drilling fluid additives (name, volume, and quantity) will be recorded during the drilling activities in the daily well reports as per *the Code.*

Water-based drilling fluids will be utilised. No non-aqueous fluids or fluids containing benzene, toluene, ethylbenzene, or xylene (BTEX) will be used while drilling. The management of residual drilling fluids for the regulated activities under this EMP is covered in the Wastewater Management Plan and the Spill Management Plan. See **Appendices 06** and **07**.

3.10.13 Air and Gas Drilling Fluids

Air and gas drilling fluids are not planned to be used under this EMP.

3.10.14 Well Evaluation, Logging, Testing and Coring

Well evaluation, logging, and open-hole testing requirements are covered in the WOMP. The WOMP will be compiled by Peak Helium and reviewed and approved by DITT before the regulated activities under this EMP are carried out. Peak Helium will provide DEPWS notification when DITT approves the WOMP.

3.10.15 Multiple Wells on a Single Well Pad

Peak Helium proposes the use of multi-well pads under this EMP if it allows the reaching of proposed targets.

Where multi-well pads are used, extra precautions are required to avoid collision of wellbores. Further information on collision avoidance is available in **Appendix 02**.

A plan view of this is shown in **Figure 3.10—4**.

Note:

- WB in this figure means wellbore.

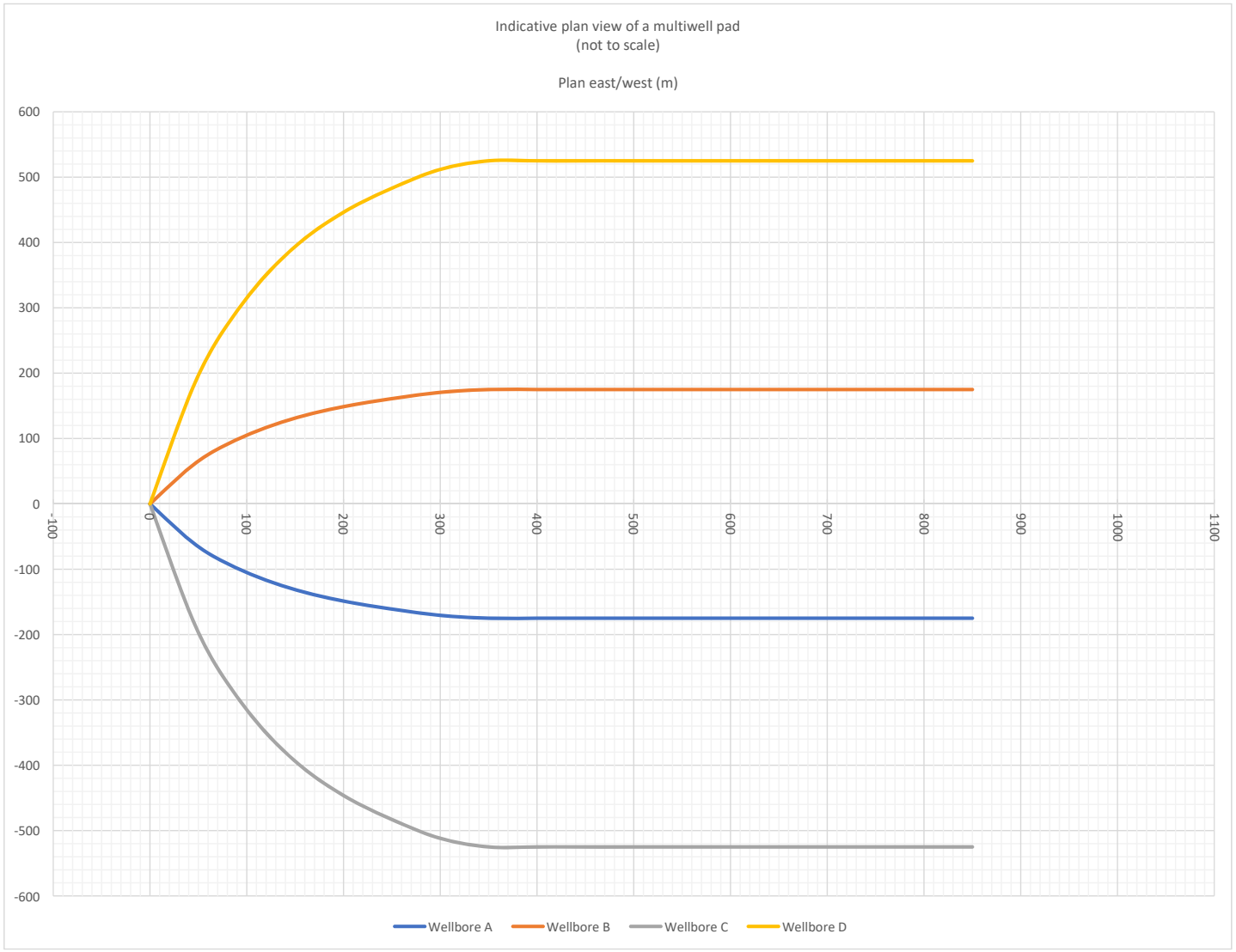

Figure 3.10—4 Indicative Plan View of Multi-Well Pad

3.11 Hydraulic Fracture

No hydraulic fracturing activities will be conducted under this EMP.

3.12 Extended Production Testing Activities

Extended Production Testing (EPT) activities are carried out to validate the well production rates. A three-phase separator is connected to the wellhead's outlet; the separator splits the well fluids into gas, oil, and water by gravity level controllers.

Depending on the composition, the gas is directed to flare, water to flowback storage and treatment tanks, and condensate to storage tanks or flare. All gas, water, and condensate flow volumes are measured and recorded.

Peak Helium will carry out extended production testing for a period of no longer than 365 days for each well.

Details of EPT activities are covered in **Appendix 02**.

EPT water will not contain BTEX at levels greater than expected in water produced from the drilled wells. BTEX levels in water used for drilling fluids will not exceed the levels prescribed in Table 9 of *the Code*. Peak Helium plans to use no BTEX in its drilling fluids as per **Section 3.10.12**.

3.13 Venting and Flaring

Due to the remoteness of the proposed activities and the likely volumes produced, it is not practical to capture the gas for sale or other use.

All test production will flow to a separator package fitted with accurate flow measurement devices. The gas flowing to a completion combustion device is equipped with a continuous ignition device to minimise gas release to the atmosphere.

Venting may be carried out rather than flaring if the gas flow is insufficient to allow the separator to function correctly. The use of a combustion device creates a fire or safety hazard.

When venting is the only technically feasible option for managing produced gas, the technical considerations preventing the use of the recovered gas will be recorded and included in Peak Helium's annual report.

Gas volumes emitted during the drilling, completion, EPT and workovers will be measured using direct measurement as governed under the *Commonwealth National Greenhouse and Energy Reporting (Measurement) Determination 2008* and reported per Part D of *the Code* [AUSTRALIAN GOVERNMENT, 2008].

During system upsets or accidental releases, emissions will be estimated using methods consistent with the *National Greenhouse and Energy Reporting (Measurement) Determination* 2008 [AUSTRALIAN GOVERNMENT, 2008].

3.13.1 Flare Design and Efficiency

Produced gas, and pending results, potentially condensate, during EPT will be sent to a vertical flare system to allow a controlled release and gas burning. It is equipped with an autoignition system that provides electrical impulses to generate a spark every 1.3 seconds to ensure that the flare is always operational. Any flares used under this EMP will have a tip efficiency of greater than 96%.

3.13.2 Flare Pits

Peak Helium does not intend to use flare pits for the regulated activities under this EMP.

3.14 Completion, Workover, and Intervention

Completion, workover, and intervention requirements are covered in the WOMP. The WOMP will be compiled by Peak Helium and reviewed and approved by DITT before the regulated activities under this EMP are carried out. Peak Helium will provide DEPWS notification when DITT approves the WOMP.

3.15 Well Suspension and Decommissioning

This EMP's project schedule is planned for a temporary well suspension before further activity. For the temporary well suspension planned, the primary considerations and activity plans will ensure that:

- Well integrity is maintained at all times as set out in Section B4.1 of the *the Code of.*
- Monitoring requirements can be met.
- All safety requirements are met.

A well may be decommissioned or abandoned under this EMP, but the decision on whether to proceed or not is dependent on the outcome of the drilling and evaluation program. If the well is abandoned or decommissioned, the EP134 wells will undergo the following:

- Two permanent barriers to ground level from any:
    - Hydrocarbon bearing zone.
    - Over-pressured permeable zone.
- One permanent barrier to ground level from any:
    - Normally pressured non-hydrocarbon bearing, permeable zone drilled after the BOPs are installed.
- One permanent barrier will be provided between discrete permeable zones with different pressure regimes.
- All aquifers will be isolated:
    - From each other and the surface by a minimum of one well barrier; and
    - From any permeable hydrocarbon-bearing ones by a minimum of two well barriers.

Section B.4.15 of the *NT Code of Practice* for the Suspension and Decommissioning of Wells will be complied with for any well abandonment and suspension activity via detailed well suspension or abandonment programs before the activities are conducted [DENR, 2019].

Well suspension and decommissioning requirements are covered in the WOMP. The WOMP will be compiled by Peak Helium and reviewed and approved by DITT before the regulated activities under this EMP are carried out. Peak Helium will provide DEPWS notification when DITT approves the WOMP.

3.16 Waste and Wastewater Generation

Appendix 06 (Waste and Wastewater Management Plan) and **Appendix 07** (Spill Management Plan) cover waste and wastewater management in detail.

The wastewater that will be generated per well and the estimate for the project is summarised in **Table 3.16—1**.

Table 3.16—1 Wastewater Volumes and Characteristics

Waste Type	Volume Anticipated per Well	Total Estimated Off-Site Disposal Volume per Project	Characteristics
Residual Drilling Fluids	2.360 ML	• ~0.5ML • Note: 95% anticipated to be evaporated.	Hazardous chemical additives possible e.g., to treat bacteria and control pH. Note: chemicals additives are mixed with a high percentage of water >90%. **Fluids:** • Approximately >90% ground/bore water. • Chemical fluid additives* **Cuttings:** • Formation solids generated during the drilling process. **Cement Returns:** • Residual cement and cement post-well cementing activity (Non-hazardous). †
Residual Solids (e.g., Cuttings, and Cement Returns)	800 m^3	• ~3200 m^3 • Volume anticipated to be buried on-site.	
Completion Fluids	~0.080 ML	• ~0.016 ML max • 95% of volume anticipated to be evaporated.	• Hazardous chemical additives possible, e.g., to treat bacteria. • Note: chemicals additives* are mixed with a high percentage of water >90%.
Produced Fluids (not anticipated)	Up to 1 ML	• ~0.2 ML • 95% of volume anticipated to be evaporated.	• Formation water.

* See **Section 7.15.1** of **Appendix 07** for an indicative list and description.

† Refer to **Table 7.15 – 2** of **Appendix 07** for an indicative list of cementing additives.

Table 6.7 – 1 of **Appendix 06** (Waste and Wastewater Management Plan) described the management measures for the waste types.

4. Ancillary Activities

4.1 Project Water Use

Peak Helium will apply for a groundwater extraction license and will work with the NT Government's Water Resources Division in obtaining a bore works permit, ensuring the appropriate methodology for sourcing water is undertaken. The exploration site is not within declared Water Control Districts or a Water Allocation Plan area (declared, draft or in progress) [DENR, 2018].

The Project Area is situated in the Amadeus Basin. The north-central part of the basin contains extensive identifiable sandstone aquifers. These aquifers are namely the Hermannsburg, Mereenie and Pacoota sandstone aquifers. However, in the south-east of Amadeus Basin, where the Project Area is situated, there has been strong folding and faulting that has resulted in the development of fractured rock aquifers that are not easily identifiable [J.W LLOYD, JACOBSON, G, 1987; S. J. TICKELL, 2008] The Project Area longitude ranges from 133.5° to 134°.As evidenced in **Figure 4.1—1** strong folding and faulting is evident within this area.

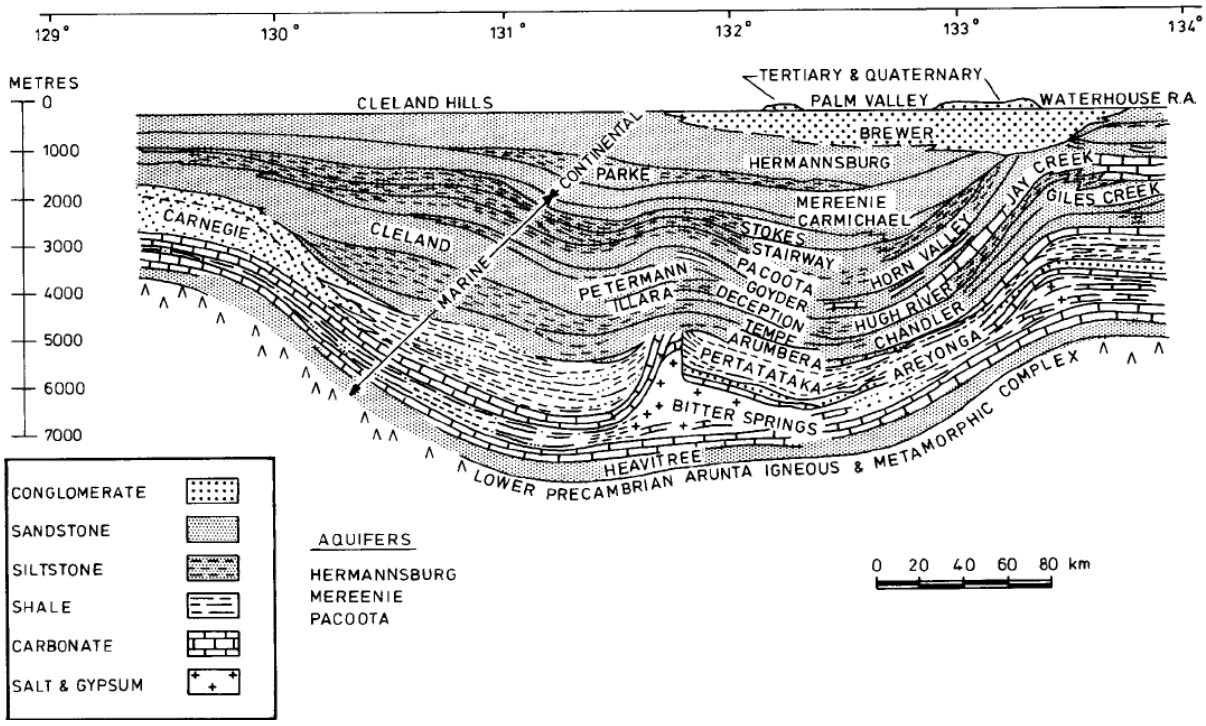

Figure 4.1—1 Geological Cross-Section of Amadeus Basin [J. W. LLOYD et al., 1987]

Through the review of groundwater bores and aquifer datasets on NR Maps and available literature, it is possible to establish a groundwater bore at approximately 100-200m within the Project Area. Bore logs indicate that these bores are in a sandstone formation [N.T.A WATER RESOURCES DEPARTMENT BRANCH, 1950, 1961; NORTHERN TERRITORY ADMINISTRATION - WATER RESOURCES BRANCH, 1993]. At this depth, it is likely an aquifer within the Pertnjara Group of the Amadeus Basin which are outlined in **Figure 4.1—2** below. This includes the Brewer Conglomerate, Hermannsburg Sandstone

and the Parke Silstone fractured rock formations. However, there is the possibility that in parts of the Project Area, the Mereenie Sandstone aquifer or one of the Larapinta Group formations is prevalent near the surface due to folding.

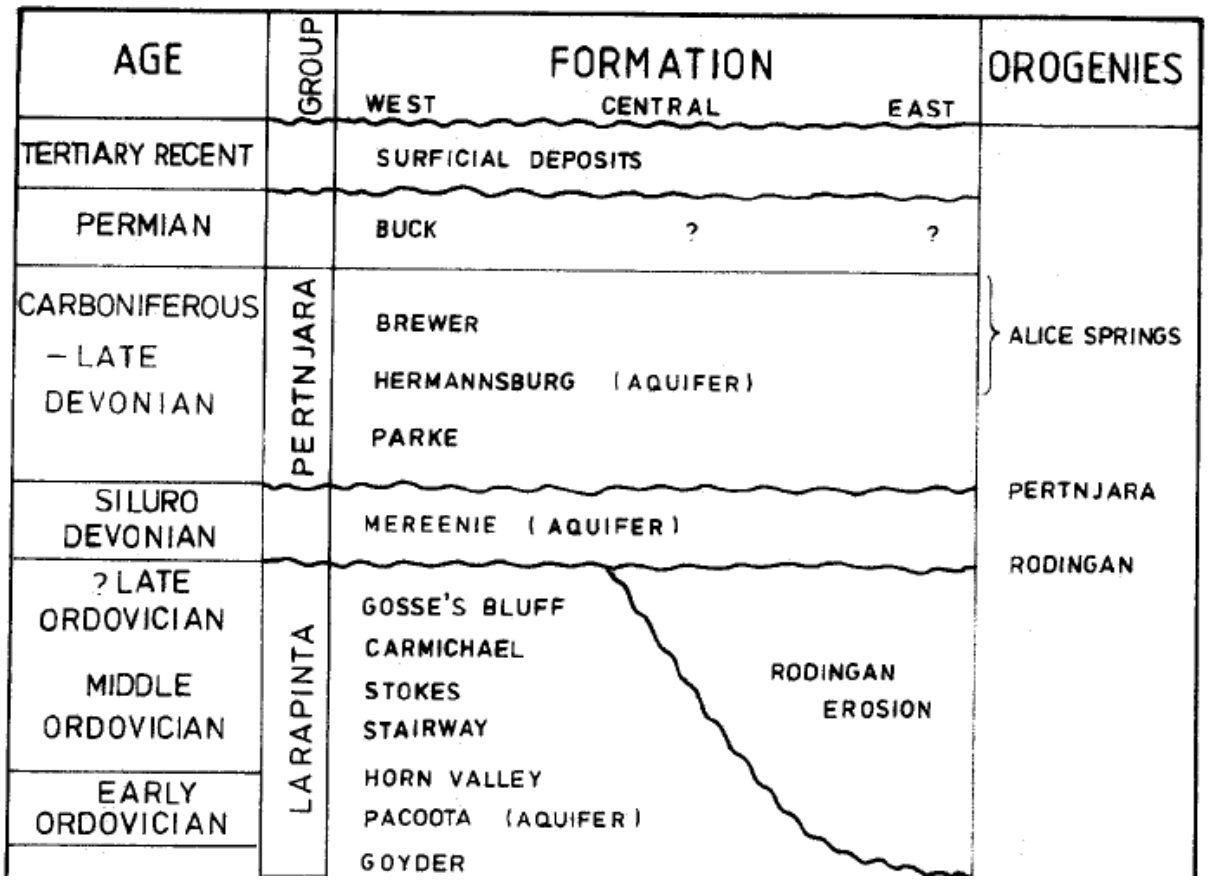

Figure 4.1—2 Geological Succession of the Amadeus Basin [J. W. LLOYD et al., 1987]

Nonetheless, based on bore logs and the above figures, it is reasonable to anticipate that the water supply target aquifer will be the Hermannsburg Sandstone aquifer.

Due to the uncertainty of the aquifer yields, Peak Helium will drill investigation water bores to locate groundwater. These investigation water bores will allow us to find a producing location and determine the formation the bore will be extracting from. A permit will be applied for under the pretext that the water supply target is a fractured rock aquifer of the Pertnjara Group, namely the Hermannsburg Sandstone formation. This is in line with the Water Resources Northern Territory processes.

The target depth, based on the depths of surrounding water bores (only pastoral users), is approximately 100-200m below ground. The sustainable bore pumping rate is estimated as 2-5 L/s, based on the surrounding water bores' production rates.

Groundwater will be used for all project activities except those that require potable water. The campsite water use will be approximately 200 L/day per person on-site but will utilise potable water acquired off-site. Operational activities, e.g., road and site maintenance and vehicle wash downs, are included in the construction and drilling total usage.

Other groundwater users in the Project Area are limited to pastoral users and local surface GDEs. Due to the depth of the target aquifer (~>100m) there will be no impact on surface GDEs in the area.

Furthermore, groundwater extraction will have minimal impact on the aquifer storage and pastoral users, as detailed below.

In accordance with the *NT Water Allocation Planning Framework*, for the Arid Zone of the NT, the total extraction over a period of at least 100 years must not exceed 80 % of the total aquifer storage at the start of extraction [DENR, 2020]. The extraction percentage has been calculated with the following assumptions:

- Calculated for the area of the Project Area, which is highly conservative as the aquifer boundary extends the Project Area boundaries.
- An aquifer thickness of 100m at a porosity of 5%. Todd and Mays [D. K. TODD et al., 2005] indicate that there is a porosity range of 33% to 37% for siltstones and sandstones. As a result, using 5% provides a highly conservative estimate.
- Continuous pumping for 100 years from all current production bores within the Project Area at their maximum yield identified in the NR Maps database, plus 100 years of extraction by Peak (100 times the required volume).

Based on these worst-case assumptions, the percentage reduction in the volume of storage has been calculated as 0.6 % and, therefore, is significantly below the 80% reduction limit. Therefore, the impact of the regulated activities in conjunction with current pastoral uses will be minimal. Similarly, based on the aquifer depth, there will be no impact to the surface GDEs. Furthermore, extraction will comply with the groundwater extraction license conditions, which as per Section 90(1) of the *Water Act* will be imposed having regard to the existing and likely future demand for the water source [DEPWS, 1992].

The water required for the project, a breakdown of the water usage and volumes is provided in **Table 4.1—1**.

Table 4.1—1 Forecast Water Use for Regulated Activities under this EMP

Use	Scope	Total Use (ML)
Civil Construction	• 0.33 ML per well pad	1.0
Drilling	• 2.5 ML per well	10
Well Completion	• 0.6 ML per well	2.4
	Total	13.4

Figure 4.1—1 outlines the expected water usage, by month, until the end of the project scope for this EMP.

Table 4.2—1 presents the estimated water consumption for the whole program.

Table 4.1—2 Estimated Water Use for Regulated Activities under this EMP, by Financial Year

Year	Total Use (ML)
2022/23	3.8
2023/24	3.8
2024/25	4.9
2025/26	0.9
2026/27	0.0
Total	**13.4**

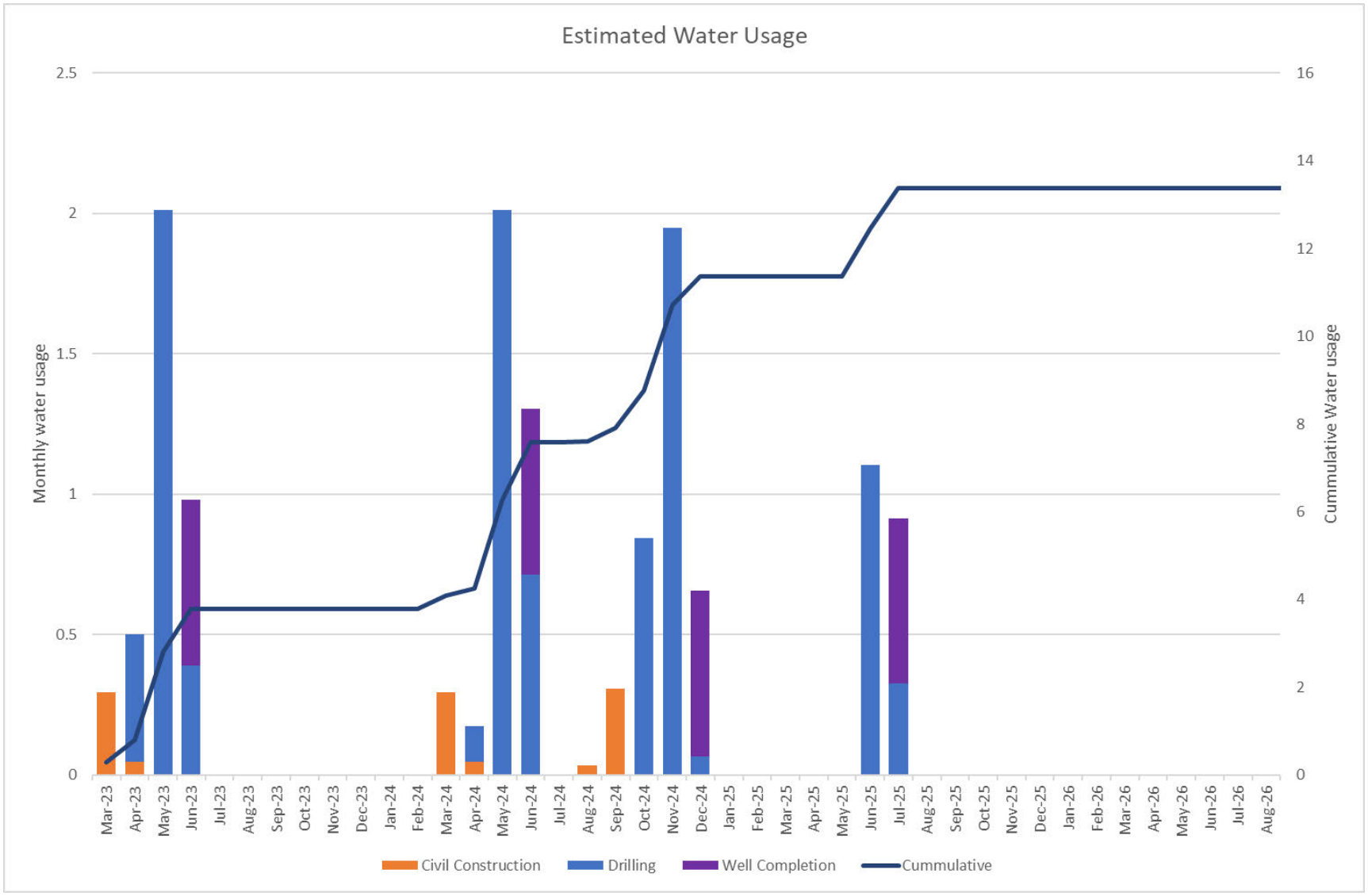

Figure 4.1—3 Estimated Water Usage for this EMP by Month

4.2 Greenhouse Gas Emissions

The threshold calculator developed for the National Greenhouse and Energy Reporting scheme was used to estimate the Greenhouse gas (GHG) emissions related to activities covered in this EMP. The estimation was calculated using factors and formulas available in the Emissions and Energy Threshold Calculator 2021 - *2022* from *the National Greenhouse and Energy Reporting (Measurement) Determination 2008* (NGER Determination) [AUSTRALIAN GOVERNMENT, 2008].

GHG emissions generation will be mitigated by adopting *the Code*. Peak Helium will use a Reduced Emissions Completion (REC) and undertake routine monitoring for leaks. RECs involve the capture and combustion of hydrocarbons in a flare. The combustion of gasses produced will reduce the emissions generated compared to venting. The emissions from flaring are reduced because there are fewer hydrocarbon compounds present in natural gas. The GHG estimates for the regulated activities carried out under the EMP over three years are provided in **Table 4.2—1**.

Figure 4.2—1 and **Table 4.2—2** below present the produced greenhouse gas emissions per quarter during the regulated activities for this EMP by financial year, as well as how these figures were determined.

All flaring will be measured using flow meters compliant with NGERS. A methane emissions monitoring program will be implemented, and the wells will be tested every six months for any leaks as per *the Code*, and the emissions will be reported per the NGERS.

The NT Government has released its policy, *Greenhouse Gas Emissions Management for New and Expanding Large Emitters* (*the Large Emitters Policy*) [DEPWS, 2021B]. The *Large Emitters Policy* identifies the Government's minimum requirements for how greenhouse gas emissions are to be managed for new or expanding industrial and land use development projects.

The *Large Emitters Policy* applies to development projects that require an environmental authorisation to be granted under NT environmental legislation. This could include onshore petroleum activities requiring approval under the *Petroleum (Environment) Regulations 2016* [NT GOVERNMENT, 2016A].

The emissions threshold (100,000 tonnes CO_2-e) will be applied to all of an interest holder's onshore petroleum activities in a given year, ensuring that cumulative impacts can be assessed and managed, as required by the *Petroleum (Environment) Regulations 2016* [NT GOVERNMENT, 2016A].

From the *Large Emitters Policy*, a petroleum interest holder is a person or corporate body that holds an exploration permit, retention license, production license, access authority or a lease granted under Northern Territory petroleum legislation.

As the exploration permit holder of EP134, Peak Helium will cumulatively account for the scope one emission from all activities within Peak Helium's Exploration Permits occurring in a financial year and requiring approval under the *Petroleum (Environment) Regulations 2016* [NT GOVERNMENT, 2016A].

From **Table 4.2—1**, the estimated scope one emissions in any financial year over the life cycle of a project (not including emissions generated from land clearing directly associated with the project) will be under 100,000 tCO_2-e.

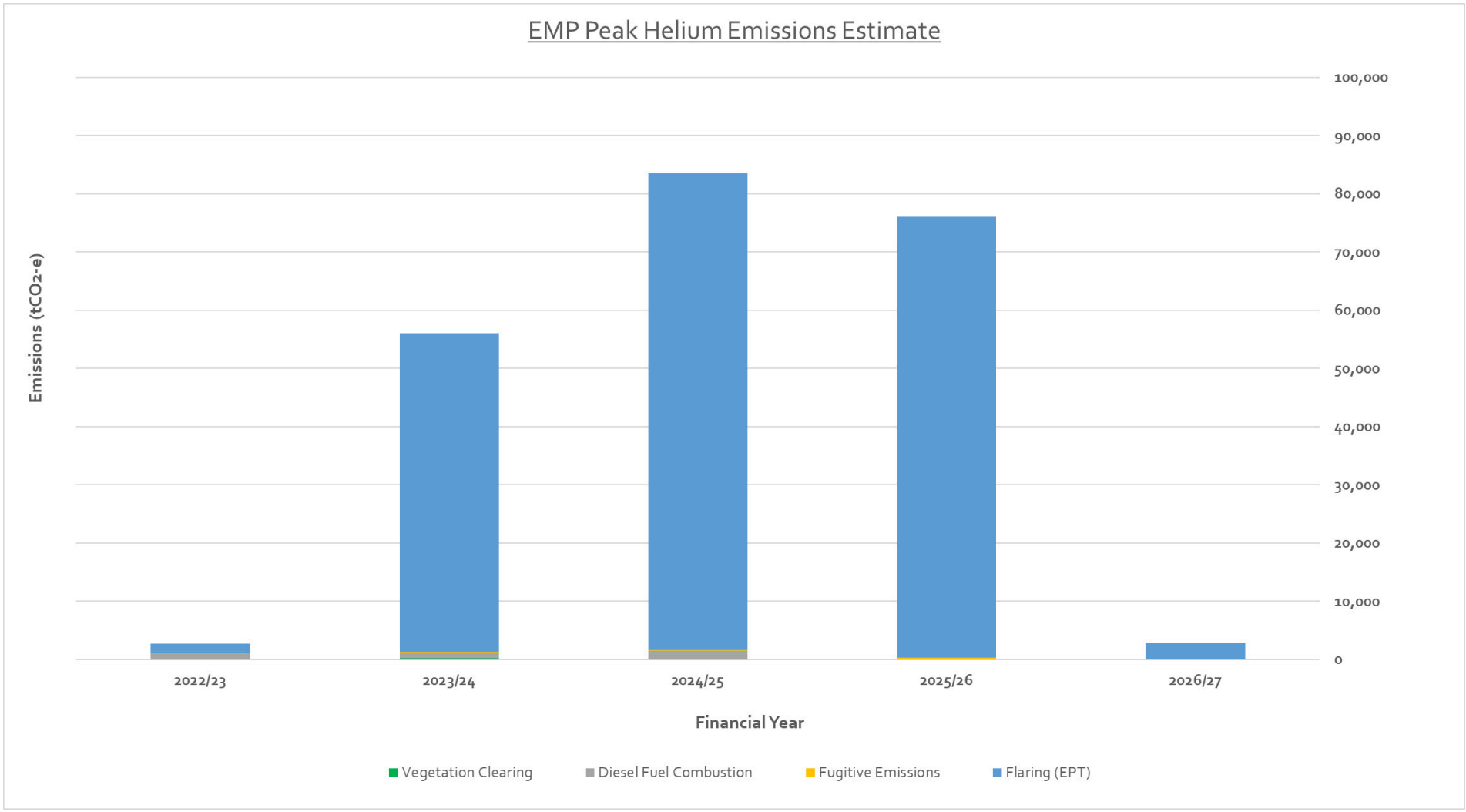

Figure 4.2—1 Estimated Greenhouse Gas Emissions Estimates for the Regulated Activities for this EMP

Table 4.2—1 Estimated Greenhouse Gas Emissions Estimates for the Regulated Activities for this EMP

Emissions Source	Inputs	Assumptions	2022/23	2023/24	2024/25	2025/26	2026/27	Total
Vegetation Clearing	38.08Ha	• Based on the FullCAM model.	105	158	111	-	-	**375**
Diesel Fuel Combustion	Drilling and completion activities as per schedule	• Estimate based on the Emissions and Energy Threshold Calculator – 2022: o Drilling rig fuel consumption of 8000L/Day. o Completions rig fuel consumption of 2000L/Day.	957	957	1,327	109	-	**3350**
Fugitive Emissions	Completion activities as per schedule	• Based on Australian National Greenhouse Accounts National Inventory Report 2011 Vol 1 Emissions Factor for gas well completions of 25.9 tonnes/completion day.	27	27	27	27	-	**109**
Flaring (EPT)	Extended Production Test activities as per schedule	• Based on the *National Greenhouse and Energy Reporting (Measurement) Determination 2008* (Section 3.44) [AUSTRALIAN GOVERNMENT, 2008]. • Emissions factor of CO_2-e/tonnes flared, with assumed flaring rate of 5mmcf/day and a tip efficiency on flare (>96%). o CO_2 factor tCO_2-e is 2.8 o CH_4 factor tCO_2-e is 0.93 o N_2O factor tCO_2-e is 0.026	1,485	54,778	81,945	75,710	2,821	**216,737**
		Total	**2,703**	**56,050**	**83,540**	**75,975**	**2,821**	**221,089**

*Flaring is the combustion of fuels for non-productive (non-commercial) reasons. 'Method 1' has been used to estimate emissions from fuel flaring.

Table 4.2—2 Summary of Emissions Calculations

Emissions Source	Units	Assumptions / Source	Total Units	Total	2022/23	2023/24	2024/25	2025/26	2026/27
Vegetation Clearing	Ha	Project Schedule	Ha	38.08	11	16	11	-	-
	tCO_2-e / Ha	9.85	tCO_2-e	**374**	**105**	**158**	**111**	**-**	**-**
Diesel Fuel Combustion	**Drilling**								
	Days	Project Schedule	Days	154	44	44	61	5	-
	Litres per day	8,000	Litres	1,232,000	352,000	352,000	488,000	40,000	-
	tCO_2-e / Litre burnt	0.00272	tCO_2-e	**3,350**	957	957	1,327	109	-
	Completions								
	Days	Project Schedule	Days	20	5	5	5	5	-
	Litres per day	2,000	Litres	40,000	10,000	10,000	10,000	10,000	-
	tCO_2-e / Litre burnt	0.00272	tCO_2-e	**108**	27	27	27	27	-
		Total	tCO_2-e	**3,458**	**984**	**984**	**1,354**	**136**	**-**
Fugitive Emissions	**Completions**								
	Days	Project Schedule	Days	20	5	5	5	5	-
	tonnes/day	25.9	tCO_2-e	**520**	**130**	**130**	**130**	**130**	-
			Days	1,460	10	369	552	510	19
Flaring	mmcf/day	5.00	mmcf Gas	7,300	50	1,845	2,760	2,550	95
	mmcf/tonne	20.32	tonne Gas	148,336	1,016	37,490	56,083	51,816	1,930
	Percentage N	61%		90,544	620	22,884	34,233	31,628	1,178
	Percentage CO_2	0.1%		134	1	34	50	47	2
	Percentage Gas	38.9%		57,658	395	14,573	21,800	20,141	750
	CO_2	2.8	CO_2 tCO_2-e	**161,443**	1,106	40,803	61,039	56,394	2,101
	CH_4	0.93	CH_4 tCO_2-e	**53,794**	368	13,596	20,339	18,791	700
	N_2O	0.026	N_2O tCO_2-e	**1,500**	10	379	567	524	20
		Total	tCO_2-e	**216,737**	1,484	54,778	81,945	75,709	2,821
			Total (tCO_2-e)	**221,089**	**2,703**	**56,050**	**83,540**	**75,975**	**2,821**

4.3 Erosion and Sediment Control

Peak Helium has engaged a Certified Professional consultancy in Erosion and Sediment Control (CPESC) accreditation to prepare an Erosion and Sediment Control Plan (ESCP) for the activities covered under this EMP. The ESCP is attached as **Appendix 05**.

As the well pad ESC drawings have been generated using desktop information and the well pad locations may have changed based on ground conditions or seismic interpretation, they will be updated via Management of Change during construction to ensure they reflect the actual site conditions and the controls needed.

4.4 Site Material and Fluid Management

Peak Helium will follow the Waste and Wastewater Management Plan (**Appendix 06**) to correctly store, collect, track, and dispose of waste to minimise any risk of solid or liquid waste discharges into the surrounding environment.

The environmental impacts and risks associated with the proposed treatment, handling and reuse are deemed to be reduced to ALARP and acceptable based on multiple controls detailed in **Appendix 04** (Risk Assessment), including, but not limited to the below:

- **Handling and segregation of waste:**
    - Waste generated throughout the day will be separated into metals, plastic, paper and cardboard, putrescible and hazardous waste to minimise waste going to landfill.
- **Storage and treatment of wastewater:**
    - Details on wastewater storage are found in **Section 6.6.1** of the WWMMP. They include, but are not limited to, *the Code* requirements to limit the ingress of rainwater into an above-ground enclosed storage tank and that the tanks be designed to reduce the risk of a build-up of explosives gases (Clause C.4.2.2(b)(ii) and C.4.2.2(b)(Vi)).
- **Reduce, reuse, treat and disposal of waste:**
    - Wastewater generated from the Project Area will be assessed and either be removed from the Project Area for disposal or reduced by evaporation or reused. See **Table 6.7 – 1** in the WWMP for the details.
    - Drilling by-products remaining will be assessed by a suitably qualified Third Party for on-site burial suitability as per *the Code* (inc. leachability testing, NORMS, etc.)
    - The main opportunity for fluid to be reused is during drilling activities. Given the limited volume of make-up water required to drill a well, the volume of fluid estimated to be reused is approximately 25% of what is required to drill a well.
    - Wastewater/fluid from drilling activities can be reused when solids are removed. Once the solids are removed from the residual, the fluids will be tested by rig personnel to ensure they are of suitable quality. If the fluids are unsuitable, they will continue to be stored in the drilling pits for evaporation.
    - The primary method to manage drilling, completions and produced fluids generated is evaporation. The estimated volume of fluid that will evaporate prior to pit closure/tanks removal is 95%. To maximise evaporation, open-topped treatment tanks will be used when no forecasted significant rain events are forecast, and these tanks will be enclosed with lids to reduce the addition of

water via rainfall 8 hours before a significant rain event or transferred to above-ground enclosed storage tanks.

- **Waste monitoring/tracking:**
    - Peak Helium will monitor/track total waste volumes generated, including wastewater transferred to above-ground enclosed storage tanks or reused for alternative purposes e.g., drilling activities (a complete list is in **Section 6.10** Monitoring of **Appendix 06**) and removed from site.
    - Tracking will include volumes of water and wastewater removed from the site and its destination as well as estimates of fluids evaporated from each tank.
    - Records will include the license number of any licensed waste transporters utilised.
- **Transport of wastewater:**
    - Licensed transport providers under the *Waste Management and Pollution Control Act 1998* will be utilised.
    - Use wastewater storage and treatment facilities licensed per the Northern Territory Government regulations.
    - Transport wastewater interstate to a licensed storage and treatment facility if no licensed facility is available in the Northern Territory.
    - When wastewater is required to be transported interstate, a consignment authority, as per the National Environment Protection Act, is to be obtained.
    - The Interest Holder will apply for an interstate waste transport consignment authority as per the NEPM before transportation occurs.
    - Where applicable, disposal of wastewater containing radioactive material will be tracked and documented as per the requirements of the *Radiation Protection Act 2004* [DoH, 2004].
    - Transport of chemicals or wastewater on unsealed roads during the wet season is only approved by the supervisor when damage to the roads is assessed as negligible, a spill unlikely, and no significant rainfall events are forecast.
    - Activate the Contingency Plan/Emergency Response Plan (**Appendix 14**) if a vehicle becomes bogged so that extraction activities be conducted safely and prevent loss of contents.
    - If drilling by-products are required to be removed from site, they will be classified in accordance with the *Waste Management and Pollution Control (Administration) Regulations 1998* (NT) and be assessed for NORMS.

A more detailed explanation of the waste streams and their management is covered in **Appendix 06** (Waste and Wastewater Management Plan) and **Appendix 07** (Spill Management Plan)

Table 8.7 Environmental performance standards detail the measurement criteria of critical controls to help demonstrate the associated risks re being reduced to a level that is ALARP and acceptable.

4.5 Containment of Contaminants

Activities that involve wastewater or chemical storage will be carried out according to:

- The Waste and Wastewater Management Plan (**Appendix 06)**.
- The Spill Management Plan (**Appendix 07)**.

Use, storage, and handling of materials on a site of petroleum activities:

- Which are or contain hazardous chemicals will comply with WHS legislation and appropriate standards for the type of chemicals.
- Will be used, stored, and handled in accordance with their approved SDS.
- An assessment was carried out on whether the materials (solids or liquids) expected to be used or produced during the activities are, or could be considered to be, or could contain, hazardous chemicals and could potentially cause environmental harm as per *the Code*. The assessment and the outcomes are detailed in **Appendix 07 (**Spill Management Plan).

Liquid chemicals that may cause environmental harm will be stored in double-lined tanks or bunded areas. Bunds will have sufficient capacity to hold 100% of the largest container volume stored in the area, plus 10% unless the container is equipped with individual secondary containment.

Materials that escape from primary containment or are otherwise spilled onto secondary containment will be removed as soon as possible (including accumulation of rainwater), with the aid of a spill kit or vacuum truck for disposal to a licensed facility.

Inspection reports and maintenance records of secondary containment will be kept.

Liquid hydrocarbons will be stored in aboveground tanks, whether separated or mixed with other fluids at a concentration greater than 1% by volume.

If condensate is produced during EPT operations in significant volumes, it will be stored for offsite disposal at a registered facility; if the condensate volumes are small, it will be sent to flare.

If condensate is stored or separated on-site, it will be done in designated double-lined storage tanks as per AS1940. These tanks will be monitored and have controls to prevent vapours from exceeding the Lower Explosive Limit (LEL) of the condensate outside the tank.

In addition to the above controls to prevent spills of potentially harmful chemicals or those that may cause environmental harm to the ground surface or their release from the site see **Section 3.6** Civil Construction.

Where rainwater is contained within the berms on the well pad that has not come into contact with chemicals or wastewater, it will be either left in situ to evaporate, be mechanically dispersed on-site to aid in evaporation, or diverted to the coir logs or mulch berms to aid in the controlled release from

site. Where rainwater that is required to be released from site, not through coir logs or mulch berms, it will be tested for pH and electrical conductivity (EC) as per **Table 8.5—2**.

The lifecycle chemical handling management of risks has also been considered; see **Appendix 07** (Waste and Wastewater Management Plan).

4.6 Generation of Noise and/or Light

The project activities that will produce noise and light under this EMP are shown in **Table 4.6—1**.

Table 4.6—1 Light and Noise Sources from Regulated Activities under this EMP

Operation	Produce Noise	Night Operations	Produce Light
Civil Construction	Yes	No	No
Drilling and Completions	Yes	Yes	Yes (Work Lighting)
Extended Production Test	Yes	Yes	Yes (work Lighting and Flare)
Wastewater Treatment/Disposal	No	No	No

Due to the remote location of the proposed activities, there are no receptors, as defined in table 3.5 of the *Northern Territory Noise Management Framework Guideline Version 0.1*, within 5km [NT EPA, 2018].

Regulated activities will not be above the minimum project intrusiveness noise levels as defined in table 3.4 of the *Northern Territory Noise Management Framework Guideline Version 0.1* at any receptors.

5. Existing Environment

A description of the existing natural environment can be found in **Appendix 01**.

Appendix 01 is compiled from a combination of desktop and on-ground environmental assessments.

The Environmental Assessment and weed survey were carried out in June 2021 and amended in June 2022. They cover the EMP activities' disturbance footprint.

The Environmental Assessment Report is attached as **Appendix 01.02**.

5.1 Rainfall

Peak Helium has carried out a thorough investigation of the rainfall in the Project Area; this can be found in **Appendix 01,** covering:

- Average daily rainfall.
- Significant rainfall events.
- Evaporation.
- 1 in 1,000-year events – wet season.

5.2 Pests and Weeds

An Environmental Assessment and a weed survey were carried out in June 2021 and updated in June 2022; it covers this EMP's disturbance footprint.

The reports are available in **Appendix 01.02** (Ecological Assessment Report) and **Appendix 09** (Weed Management Plan). A review of the NT Weed Branch weed dataset shows that the Project Area is located within the Athel Pine management zone and the Bellyache Bush, Brazilian Pepper, Gamba Grass and Mimosa Eradication zones.

Two weed species were recorded during on-ground surveys by EcOz in the Project Area and in close proximity to the Project Area. Buffel Grass and Athel Pine were confirmed to occur on-site. One weed species was recorded in the Project Area in June 2022 – Buffel Grass (*Cenchrus ciliaris*). Buffel Grass is not a declared weed under the *Weed Management Act.* However, it is considered a Category 2 priority species in *The Alice Springs Regional Weeds Strategy 2021-2026* [DEPWS, 2001, 2021A*]*. Other weed species noted to occur in the surrounding region are Couch Grass (*Cynodon dactylon*) and Colocynth (*Citrullus colocynthis*). Athel Pine (*Tamarix aphylla*) was identified in the old borrow pits/dams on the western side of the railway, close to the Project Area. Athel Pine spreads easily by vegetative growth and is to be avoided. Peak Helium is committed to following the *Weed Management Strategy for Athel Pine 2017-2027*. An overview of Peak Helium's weed management strategy is presented in **Appendix 01** (Description of the Environment) and **Appendix 09** (Weed Management Plan).

Table 5.2—1 shows the relevant weeds to the Project Area.

Table 5.2—1 Relevant Weeds to the Project Area

Scientific Name	Common Name	NT Class	WoNS†	Status in Management Plan
Cylindropuntia spp. including C. imbricata, C. fulgida	Rope Cactus	A	No	Category 1, Very High
Opuntia spp. including Opuntia stricta	Prickly Pear	A	No	Category 1, Very High
Cenchrus Pedicellatus	Athel Pine	A/B	Yes	Category 2, Very High
Parkinsonia aculeata	Parkinsonia	B	No	Category 2, Very High
Cenchrus ciliaris	Buffel Grass	Not Declared	No	Category 2, Very High
Eragrostis spp. Including E. cilianensis, E. barreleri, E. cylindriflora, E. minor	African Lovegrasses	Not Declared	No	Category 3, *Medium
Argemone ochroleuca	Mexican Poppy	B	No	Category 3, Medium
Aerva javanica	Kapok	Not Declared	No	Category 3, N/A
Rumex vesicarious; formerly Acetosa vesicaria	Ruby Dock	Not Declared	No	Category 3, Low
Carthamus lanatus	Saffron Thistle	B	No	Category 3, Medium
Cenchrus echinatus	Mossman River Grass	B	No	Category 3, Medium
Tribulus terrestris*	Caltrop*	B	No	Category 4, Low

It is uncertain whether caltrop (*Tribulus terrestris*) is considered native or introduced to the Northern Territory. It is a weed to be controlled around tracks, parks, and other infrastructure because its spiny fruit can cause nuisance.

See **Appendix 09** for the complete Weed Management Plan.

5.3 Cultural Environment

5.3.1 Sacred Sites and Aboriginal Archaeological Sites

An archaeological survey was conducted in June 2021 and updated in June 2022 by Ellengowan Enterprises, an approved NT archaeological consultant [ELLENGOWAN ENTERPRISES, 2022]. See **Appendix 01.01** for the survey report.

An AAPA Authority C C2020/080 is in place for works carried out under this EMP.

Traditional Owner representatives will be on-site during all first disturbance activities under this EMP.

Note: Any direction given by a Traditional Owner on-site in relation to sacred site protection would not have any legal standing in the case that damage occurs to a sacred site. The Authority Certificate is the definitive document for the protection of sacred sites under *the NT Aboriginal Sacred Sites Act* 1989 [ABORIGINAL AREAS PROTECTION AUTHORITY, 1989].

Any unexpected heritage discoveries will be managed in line with inGauge's *Unexpected Heritage Discovery procedure – ING_PRO_UHD_01*. This procedure aims to set out the actions to be undertaken by inGauge staff and contractors if a suspected find of Aboriginal or non-Aboriginal cultural heritage is made during civil construction activities under this EMP.

If suspected previously unrecorded cultural heritage is uncovered during project work:

- All work is to cease within 10m of the suspected find.
- Traditional Owner representative is to assess the find and recommend any necessary management measures.
- Work is not to recommence in the vicinity of the find until the Traditional Owner representative provides direction.
- This direction may include flagging the discovery, deviating project work around the suspected find or relocating the work front to a new location removed from the suspected find.
- If the find is determined to be of Aboriginal heritage, the Project Manager will notify the Director of the Heritage Branch of the NT Government.

If any suspected human remains are discovered during any activity, 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:

- All activity in the vicinity must cease, and the Site Supervisor will be notified immediately.
- The police must be notified immediately of the discovery by the Site Supervisor.
- The remains must be left in place and protected from harm or damage with a minimum of a 50m buffer.

- It is essential to use best judgement and restrict all movement in the immediate vicinity around the discovery until directed otherwise by the police; any disturbance could contaminate a potential crime scene.
- Likewise, do not set up temporary fencing unless directed by the police.
- If the appointed expert investigating the find under the relevant Coroners Act believes that there are reasonable grounds to believe the remains to be:
    - **A crime scene:** the police will provide direction on managing the discovery.
    - **Aboriginal ancestral remains or historical remains:** the relevant Director Heritage Branch, Department of Tourism and Culture, is to be contacted at (08) 8999 5039 (Darwin office) or (08) 8951 9247 (Alice Springs office) or email heritage@nt.gov.au.

5.3.2 Non-Aboriginal Heritage Sites

A historic site, consisting of a round wooden horse pen, was found during the archeological survey; it is not within the Project Area. This site is thought to originate from the 19th Century and was used by Aboriginal stockmen to break in horses. See **Appendix 01.01** for further details.

5.4 Socio-economic Environment

The dominant economy in the region is pastoralism, with cattle stations of Horseshoe Bend, Idracowra, and Lilla Creek providing the local and export markets with Red Angus, Shorthorn, Poll Hereford and Droughtmaster breeds. These stations are mostly family-owned and operated.

Alongside pastoralism, the economy is boosted by tourism. Current regional tourism focuses on the Mac Clark (*Acacia peuce*) Conservation Reserve, the 4WD Binns and Finke tracks, and those wanting to visit some of Australia's pastoral history (e.g., Charlotte Waters Telegraph Station). The regulated activities under this EMP will not impact these regional tourism focuses.

Several mineral titles have been granted; however, there are no operating mines in the region.

5.4.1 Settlements

The region immediately surrounding the Project Area comprises pastoral properties and is sparsely populated. There are no settlements within 30km of the Project Area; the closest settlement is Erldunda Roadhouse, located at the intersection between the Stuart Highway and the Lasseter Highway.

See **Table 3.5—1** for the hierarchy of controls for site selection and **Table 3.5—2** for the distances between well pads and dwellings to be constructed under this EMP.

5.5 Protected Areas

Peak Helium has carried out a thorough investigation into the Protected Areas which occur within the Project Area. **Appendix 01** provides further detail; however, in summary, the Project Area contains the KCPS and the Poona SOCS/SOBS (**Figure 3.5—7**). To prevent disturbance/impact on SOCS/SOBS the following controls will be implemented:

- There will be no clearing activities within the SOCS or SOBS.
- No new access tracks will be constructed within SOCS or SOBS.
- Only existing pastoral access tracks will be utilised to traverse SOCS and SOBS, and these will not be widened. (Note: a small section requires widening that appears to be within the SOCS, but the area being traversed is a connecting corridor, not a SOCS (see **Section 3.6.2** of the EMP).
- Where SOCS and SOBSs areas are traversed, they will be clearly identified so that the on-site team are made aware, and a speed limit of 40km/hr will be implemented.
- There will be no storage of chemicals or fuel in SOCS and SOBS areas.
- There will be spill kits available where SOCS and SOBS are being traversed.
- Transport of chemical or wastewater on unsealed roads during wet weather conditions is only to occur with an approval by the Site Supervisor when damage to roads is deemed negligible, risk of a spill unlikely, and there are no forecasted significant rain events during the transport activity.
- In the event of a transport vehicle becoming bogged, Emergency Response Plan (**Appendix 14**) is to be activated so extraction activities are conducted safely and prevent loss of contents.

6. Environmental Risk Assessment

6.1 Environmental Risk Assessment Methodology

Under this EMP, an environmental risk assessment was undertaken for Regulated Activities using the methodology outlined in **Appendix 03** (Environmental Risk Assessment Framework).

6.2 Risk Assessment

Peak Helium has identified, with the assistance of multi-disciplinary personnel, the consequence, likelihood, and risk of an environmental impact associated with the proposed regulated activities.

Risk controls have been identified to prevent/stop an unwanted event from occurring, detect an event and/or mitigateor reduce the impact of an unwanted event after it has occurred. The framework for this risk assessment is present in **Appendix 03** (Risk Assessment Framework) and the results of this risk assessment are shown in **Appendix 04** (Environmental Risk Assessment).

A summary of the environmental factors and key risks is given below in **Table 6.2—1**.

Table 6.2—1 Summary of the Environmental Factors and Key Risks

Environmental Factor	Aspects of the Regulated Activities	Key Risks
Atmospheric Processes	• Access track, well pad, campsite/s, and gravel pit construction. • Drilling and completions operations. • Extended Production Testing.	• Increased greenhouse gas emissions. • Extended Production Testing flaring.
Community and Economy	• Movement of heavy and light vehicles and machinery on public and private roads. • Access track, well pad, campsite/s and gravel pit construction. • Drilling and completions operations. • Extended Production Testing.	• Damage to public and private roads. • Nuisance (noise, light and dust). • Spread of biosecurity risk material. • Completion of the project without input/involvement of local businesses or people. • Bushfire.
Culture and Heritage	• Disturbance to land from the construction of new infrastructure.	• Disturbance or damage to artefacts and/or cultural heritage sites.
Human Health	• Movement of heavy and light vehicles and machinery on public and private roads.	• Nuisance (dust). • Safety of the public.
Inland Water Environmental Quality	• Access track, well pad, campsite/s, and gravel pit construction. • Drilling and completions operations.	• Sediment release from cleared infrastructure. • Constructed infrastructure impedes natural surface water flow. • Loss of well circulation while drilling. • Loss of well control. • Overflow of drilling by-products storage pit/s. • Leak in drilling by-product storage pit liner. • Spills at fluid additive, chemical or fuel storage and handling points.

Environmental Factor	Aspects of the Regulated Activities	Key Risks
		• Spills of fluid additive, chemical or fuel during transport in the wet season (e.g., within KCPS SOCS/SOBS). • Use of groundwater for construction and drilling activities. • Horizontal well bore collision on a multi-well pad.
Landforms	• Access track, well pad, campsite/s, and gravel pit construction. • Drilling pits.	• Change to previous landscape and visual amenity/aesthetics.
Terrestrial Ecosystems	• Access track, well pad, campsite/s, and gravel pit construction. • Drilling and completions operations.	• Impact on fauna movements from new infrastructure, noise, or light. • Entrapment of fauna or stock in drilling by-product storage pit.
Terrestrial Environmental Quality	• Access track, well pad, campsite/s, and gravel pit construction. • Drilling and completions operations.	• Change or degradation of habitat features. • Sediment release from cleared infrastructure. • Spread of biosecurity risk material. • Pooling of runoff of greywater and treated sewage effluent from irrigation areas. • Spills at fluid additive, chemical or fuel storage and handling points. • Spills of fluid additive, chemical or fuel during transport (e.g., within KCPS SOCS/SOBS). • Bushfire. • Rehabilitating site to previous land use, or to an acceptable level for continued landowner use.

These key risks are well-understood, and through the identification and implementation of preventative and mitigative controls, Peak Helium has demonstrated that the activity will be carried out in a manner by which the environmental impacts and risks of the activity will be reduced to a level that is ALARP and is acceptable.

6.3 Assessment of Risk Against Land Clearing Guidelines

The Land Clearing Guidelines (LCG) determine that riparian zones should not be cleared; however, where clearing is required, it must be demonstrated that the impact is not significant in a regional context [DEPWS, 2020, 2021]. The LCG provides processes for determining the risk to threatened species and regional biodiversity due to clearing. The following section summarises how this EMP addresses the LCG requirements.

The clearing footprint has been assessed against the requirements of the *Land Clearing Guidelines* to determine whether the proposed activities will significantly impact threatened species and regional biodiversity. In summary:

Establishment of Well Pads, Campsites, and Gravel/Borrow Pits:

- All well pads, campsites and gravel pits are proposed to be located outside of riparian zones and preferentially outside of the minimum width for riparian buffers. Where the retention of the minimum width riparian retention buffers is not possible, the measures described in the ESCP will be implemented.
- There is no proposed clearing of high-value vegetation, riparian zones, or areas of high density of hollow-bearing trees. Where clearing of mature trees is unavoidable, an ecologist will assess for active use of hollows to inform a decision.
- If Grey Falcon nests are discovered in the pre-clearing surveys, these trees will be avoided and given a 300m buffer from any project activities (including clearing).

Establishment of Access Tracks:

- All new access tracks are proposed to be located outside of riparian zones and associated areas. However, there is one area where a new crossing may be required based on NR Maps and satellite imagery (see **Figure 3.5—7**), and four other areas that may require crossings if the well pads are required to be moved within the infrastructure movement corridors. The way in which these crossings are managed is detailed in **Section 3.5**.
    - There is no proposed clearing of high-value vegetation or areas with a high density of hollow-bearing trees. Where clearing mature trees is unavoidable, they will be checked for active use of hollows to inform a decision.
    - Where new access tracks or re-purposed seismic tracks cross a stream order, these circumstances may result in the clearing of riparian vegetation.
    - Some access roads and tracks intersect the area of the KCPS; however, no new construction will occur in SOC/SOBS area (see section 3.6.2).

Decision tree for clearing of trees, as per **Figure 2.2—1** in **Appendix 02**.

6.3.1 Clearing Footprint Assessment

The information that has been considered at the clearing footprint scale in line with the LCG and Peak Helium's findings regarding the land clearing for the Regulated Activities under this EMP is:

- The area (location and extent) of native vegetation proposed to be cleared (i.e., the proposed clearing footprint).
- The maximum proposed clearing footprint is shown in **Figure 3.5—6** Land Clearing Practices for the proposed access tracks.
- The type and general condition (e.g., 'intact', 'previously cleared', 'disturbed' or 'cleared') of the native vegetation proposed to be cleared.
- Access tracks on previously cleared land are prioritised (e.g., seismic tracks and existing pastoral tracks).
- The flora and/or fauna species that are likely to occur within the proposed clearing footprint.
- Peak Helium believes, given the area of clearing proposed and the large area of potential habitat within the region, that the proposal does not pose a significant risk to regional populations of these species.

6.3.2 Regional Level Assessment

The regional context assessment considered the area surrounding the disturbance footprint. Peak Helium has defined the area immediately surrounding the disturbance footprint as the 'Project Area', which is a smaller area than the catchment or bioregion recommended in the LCG. Using the smaller Project Area gives the disturbance a higher impact percentage than if benchmarked against the catchment or bioregion recommended in the LCG. The extent of the Project Area used for benchmarking is shown in **Figure 1.1—1**.

The information that has been considered regarding the land clearing for the regulated activities under this EMP is as follows:

- The composition and extent of remnant vegetation (e.g., intact/uncleared native vegetation).
- All of EP134 and the majority of the Amadeus Basin and the McArthur basin are used for pastoral purposes and therefore are impacted by grazing, as observed during baseline surveys of the Project Area; see **Appendix 01.01** for further details.
- Connectivity between areas of remnant vegetation.
- Fragmentation is not considered significant because the width of the clearing is not sufficient to impede fauna movement.
- The relative importance of the affected vegetation as habitat for threatened species.
- Upon the desktop review of NR Maps and Satellite imagery, it appears that there is likely to be only one new watercourse crossing required under this EMP. However, as explained in **Section 3.6.2**, if contingency tracks are required to be constructed to the maximum extent at each well pad corridor, up to four new watercourse crossings could be required. Although, during ground-truthing, these watercourses may be found to not exist, or conversely, more watercourse crossings may be identified. Nevertheless, the controls listed in the Erosion and Sediment Control Plan (**Appendix 05**) will be implemented for watercourse crossings. This includes the maintenance of the pre-existing tracks, the re-establishment of seismic tracks or the construction of new tracks that cross natural channels in which water flows, whether or not the flow is continuous.
- New watercourse crossings will be oriented close to perpendicular to the creek's flow direction to minimise the crossing's impact and be constructed as a bed level.

6.3.3 Surrounding Land Uses

The surrounding land is utilised for grazing stock; as such, the clearing for the regulated activities under this EMP will have a negligible impact.

Based on the information gathered from the ecological assessment from EcOz, and a desktop review of data, Peak Helium considers that the proposed activities are unlikely to have a significant impact on threatened species.

6.3.4 Biodiversity

Peak Helium has assessed the overall risk to biodiversity on the likelihood of occurrence of biodiversity values in line with table 17 of the LCG, the potential impact of the clearing on those values, and any measures proposed to reduce potential impact with a focus on the conservation of significant biodiversity values.

Peak Helium has used the LCG to assess risk to biodiversity as a medium risk for the activities under this EMP because while significant biodiversity values are present, effective mitigation measures are proposed, reducing the likelihood of impact of the proposed clearing. Peak Helium does not consider the clearing to be assessed as a high risk since the extent of clearing as a proportion of habitat available to the species will be minimal. Under this EMP, a max of 38.08 Ha is anticipated to be cleared, representing 0.00022% of the Amadeus Sub-basin. Avoidance of clearing habitat that may support nesting hollows for the Grey Falcon and the Princess Parrot is a critical control measure of the Environmental Risk Assessment (**Appendix 04**). Furthermore, the Princess Parrot is listed as vulnerable, not threatened. There will also be an ecologist on-site during clearing to ensure sensitive areas are avoided.

To minimise any disturbances to threatened fauna and flora and critical habitat, Peak Helium will utilise an ecologist to ground-truth for the following (pre-clearing activities):

- Known and potential ground habitat (spinifex bush, tussock grass, saltbush and dunes that have evidence of burrows or, in the case of the Great Desert Skink – animal latrines).
- Hollow-bearing trees (5 or more) that might provide habitat for Princess Parrot).
- Large trees that may be used for nesting by the Grey Falcon.
- Known and potential habitats for threatened species within the EP will be avoided for the purpose of clearing and construction activities. These activities will be repositioned and/or re-routed within the infrastructure movement corridors where practicable. Clearing for access tracks, well pads, gravel pits and campsites will be situated to avoid large trees and potential habitat for listed threatened species (e.g., nesting habitat for the Grey Falcon). A decision tree for tree clearing is shown in **Figure 2.2—1** in **Appendix 02.**

Further mitigation measures to prevent disturbance and impacts to threatened species within the EP include:

- An ecologist will be on-site during clearing activities.

- Peak Helium will conduct a pre-clearing survey for potential Grey Falcon habitat within 300m of proposed activities. If active nests are encountered, a 300m exclusion zone will be established until the nests are no longer active.
- In addition to the above, Peak Helium will avoid clearing or disturbing clusters of 5 or more hollow-bearing trees to maintain potential nesting habitat for the Princess Parrot, under the direction of an ecologist.
- Peak Helium will avoid swamps that may provide habitat in all clearing and construction activities.
- The Weed Management Plan (**Appendix 09)** will be implemented and carefully monitored to ensure that weed infestations are avoided or controlled. Specifically, the Interest Holder will ensure that Buffel Grass or Athel Pine is not spread within or without the Project Area. Buffel Grass is implicated in the diminishing populations of the Slater's Skink.
- Peak Helium will maintain and implement a Weed Management Plan (**Appendix 09**) to prevent noxious weed infestations and threatened fauna ingesting poisonous weeds.
- Peak Helium will maintain and implement a Waste and Wastewater Management Plan (**Appendix 06**) to prevent attracting pest species that may prey on threatened fauna and alter habitat through grazing.
- Vehicle speed limits of 40km/hr will be implemented when traversing SOCS and SOBs to prevent the chance of high-impact collisions.
- Fire Management (Appendix 8) Plan in place to reduce the potential of fire and a Waste Management (Appendix 6) Plan that will reduce the potential of attracting introduced predators.

7. Management Plans

7.1 Weed Management

A project-specific weed management plan has been developed as part of the EMP; refer to **Appendix 09**.

7.2 Fire Management

A project-specific fire management plan has been developed as part of the EMP; refer to **Appendix 08**.

7.3 Rehabilitation Plan

A project-specific rehabilitation management plan has been developed as part of the EMP; refer to **Appendix 12**.

7.4 Erosion and Sediment Control Plan

Peak Helium has engaged a Certified Professional consultancy in Erosion and Sediment Control (CPESC) accreditation to prepare an Erosion and Sediment Control Plan (ESCP) for the activities covered under this EMP. The ESCP is attached as **Appendix 05**.

7.5 Wastewater and Waste Management Plan

A project-specific Wastewater Management Plan has been developed as part of the EMP; refer to **Appendix 06**.

7.6 Spill Management Plan

A project-specific Spill Management Plan has been developed as part of the EMP; refer to **Appendix 07**.

7.7 Methane Emissions Monitoring Plan

A project-specific Methane Emissions Management Plan has been developed as part of the EMP; refer to **Appendix 10**.

7.8 Emergency Response Plan

A project-specific Emergency Response Plan has been developed as part of the EMP; refer to **Appendix 14**.

The Emergency Response Plan, in conjunction with incident management protocols, is the contingency plan to be activated in the case of an environmental incident.

8. Implementation Strategy

8.1 Health and Safety Environmental Management System

Peak Helium's Health Safety Environment Management System (HSEMS) is the central system that contains the policies and procedures that Peak Helium will utilise to manage and minimise the impact of its activities.

The HSEMS covers:

- Accountabilities.
- Planning and objectives.
- Training and competency.
- Communication.
- Legal Obligations.
- Hazard identification and risk management.
- Contractor management.
- Emergency response:
    - The Emergency Response Plan (**Appendix 14**) of this EMP is the contingency plan that specifies arrangements for the response to emergencies or potential emergencies (e.g., surface spills of chemicals, wastewater, fuels, and oils, etc.) to ensure environmental impacts are minimised in the event of an incident.
- Incident management:
- The incident management protocols include trigger points to escalate incidents to be managed as emergencies.
- Performance reporting.
- Interface management.

Environmental outcomes will be achieved through the implementation of the HSEMS, monitoring (**Section 8.5.4**), inspections and audits (**Section 8.5.2**).

8.2 Roles and Responsibilities

Project management hierarchy of key roles and responsibilities for the regulated activities under this EMP are:

- Project Manager:
    - Oversees all planning and the execution of the exploration program and is ultimately responsible for ensuring all other parties work within the HSEMS.
    - The Project Manager's role is predominantly office-based.

- Civil Construction Superintendent (Site Supervisor):
    - Responsible for ensuring all areas of civil construction are carried out as per the EMP and Peak Helium's HSEMS.
    - Acts as the point of contact for all Civil Construction contractors.
    - Acts as the designated point of contact for any civil-related complaints and incidents following the pre-determined strategies in this EMP or relevant ERP.
    - Undertakes monitoring, inspections, and audits.

- Weeds Officer, responsible for:
    - Planning and executing weed monitoring requirements during civil construction.
    - Facilitating the training of all workers (including contractors) in weed management requirements, with support from the Northern Territory Government Regional Weed Officer - Onshore Shale Gas Development.
    - Overseeing the implementation of weed control mechanisms, including but not limited to wash-downs and proactive weed control programs.

- Drilling and Completions Lead:
    - Responsible for ensuring the drilling, completions, and well-testing activities are designed and implemented per the NT legislation and *the Code*.
    - Responsible for ensuring all drilling, completion, and well-testing activities are undertaken per *the Code*.
    - Responsible for selecting and designing equipment and practices to manage environmental risk.
    - Responsible for selecting and engaging drilling, completion, and well-testing contractors.
    - Responsible for ensuring all contractors comply with the contract terms, including compliance with the EMP requirements.

- Drilling and Completions Superintendent (Site Supervisor):
    - Responsible for ensuring the drilling, completion, and well-testing activities are executed following the works program, EMP and Peak Helium's HSE Policy.
    - Ensures all drilling, completion, and well testing activities are undertaken per the NT Petroleum Code of Practice.
    - Manages environmental risk through the selection and design of equipment and practices.
    - Ensures all contractors comply with the contract terms, including compliance with the EMP requirements.

- Operating Company Representative:
    - Responsible for ensuring that all areas of drilling, completion, and well testing are carried out following the associated programs, WOMP, EMP and Peak Helium's HSEMS.
    - Responsible for the planning and executing of the drilling, completion, and well testing activities on-site, including understanding and communicating the environmental requirements of this plan.
    - Facilitate inductions and review training of all workers' (including contractors).
    - Ensures all reporting requirements are met.
    - Act as the designated point of contact for drilling, completion and well testing environmental incidents and emergencies following the pre-determined strategies in this EMP or relevant ERP.
    - Undertakes monitoring, inspections, and audits.
    - Acts as the point of contact for all drilling, completion, and well-testing contractors.

- Contractors:
    - Civil construction Drilling, Completions, Well Testing service providers (contractors) that are responsible for delivering the commitments outlined in this plan.
    - Contractors to comply with the nominated contractual terms and work instructions issued under this EMP.
    - Contractors must ensure all staff are aware of their obligations, are appropriately trained and that procedures and controls are fully implemented and complied with.

- Field Personnel:
    - All staff, including Peak Helium, inGauge and contractors working in the exploration permit areas are responsible to comply with this plan and associated procedures.

8.3 Training

Peak Helium's HSEMS outlines their policies and procedures, including training and competency.

Most of the work conducted under this EMP will be via contractors under Peak Helium and inGauge staff's supervision. Contractors must demonstrate they have appropriate systems, procedures, and training to manage specific risks covered under this EMP before award.

These includes:

- HSE prequalification process.
- Contractor management system.
- General HSE inductions.
- Site-specific inductions.
- Task-specific training, procedures, and competency requirements.

All staff and contractors entering the site will be required to attend a site-specific induction. The induction covers the following aspects:

- Regulatory requirements for the area, including specific conditions on the exploration permits and agreements.
- The importance of reporting environmental incidents (e.g., spills and sediment releases).
- Environmental considerations and procedures for environmental protection (e.g., weed and spill management).
- Safety procedures that cover remote area operations.
- Emergency response.
- Landowner sensitivities, including Aboriginal communities and their specific cultural requirements.
- Procedures for handling any culturally or archaeologically sensitive materials that may be discovered.

8.4 Review and Update

Implementation of this EMP will be continually monitored and revised following Regulation 22 as required, based on inspection and audit results, incident learning, complaints, employee and stakeholder feedback, and any change to the proposed work program.

This EMP to be reviewed and revised, if necessary, every five years.

8.5 Governance

8.5.1 Management and Non-Conformances

For this EMP, a non-conformance is classed as:

- A breach of an Environmental Outcome or Environmental Performance Standard (**Section 8.7**).
- A recordable incident resulting in an environmental impact.

Non-conformances are identified via:

- Audits and inspections.
- Incident reports and investigations.

For identified non-conformances, corrective actions are to be taken and logged. Where a recordable incident is identified, measures will be implemented to assess the cause of the incident, correct it, and prevent reoccurrence immediately.

To ensure that recordable incidents lead to learning and improvements for both the activity and the company, non-conformance incidents and corrective actions will be communicated to:

- Peak Helium and inGauge management.
- Operational personnel.

Recordable incidents and corrective actions will be:

- Recorded in Peak Helium's Incident Management System, and actions tracked to completion.
- Reviewed by the actioner's manager before being closed to ensure actions are completed and implemented.
- Tracked and reported, ensuring the status of corrective actions are communicated in the annual environmental report.

8.5.2 Inspection and Audits

Desktop and/or field-based inspections and audits will be conducted by Peak Helium to verify that controls are in place to meet Environmental Outcomes and Environmental Performance Standards (see **Section 8.7**). The inspection and audit schedule is presented in **Table 8.5—1**. The results will be included in the annual environmental report.

Table 8.5—1 EMP Inspection and Audit Schedule

Section/ Audit	Scope	Frequency	Responsibility	Audit Type
Inspection	Measurement criteria for Environmental Outcomes and Environmental Performance Standards (**Section 8.7**).	Quarterly	Peak Helium Representative	Control Verification
Audit	Compliance with Environmental Outcomes and Environmental Performance Standards, monitoring, recording, and reporting requirements.	Annually	Peak Helium Representative	Control Verification

8.5.3 Management of Change

Peak Helium will use inGauge's Management of Change Procedure for operations in EP134.

The Internal Management of Change process is applied to all changes and deviations from regulated activities. Examples of planning and operational activities where the Management of Change Procedure will be used include civil construction, drilling, completion, production testing, well abandonments or workovers, or any other work designed and executed by Peak Helium on EP134. Deviations from operations may become necessary due to uncertainties in the operating environment or problems encountered during operations.

The procedure's (ING_PRO_MOC_01) purpose is to guide and facilitate the agreement of change between various stakeholders (e.g., Peak Helium, inGauge Management Team). Change is achieved through the initial determination and understanding of the value and impact of a change and the subsequent documentation of the approval process of accepting the change. The Management of Change process includes a risk assessment to determine whether there is a change to the risk profile. **Figure 8.5—1** below outlines Peak Helium's method to determine which change process will be applied.

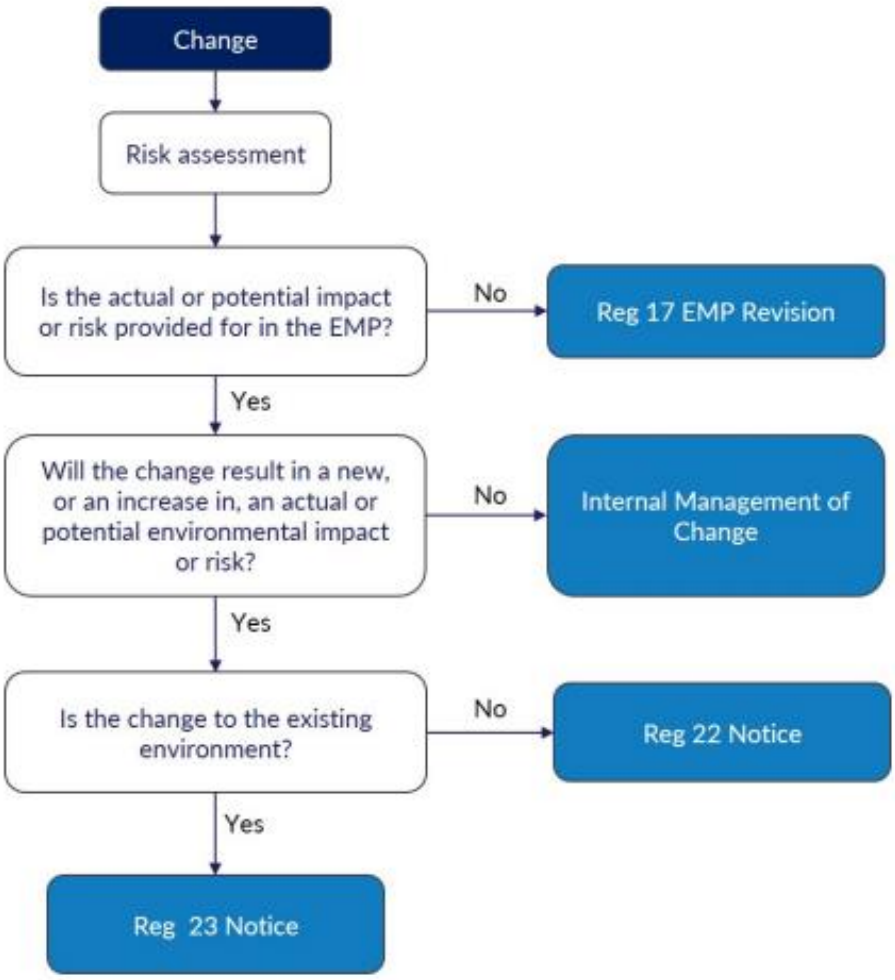

Figure 8.5—1 Decision Diagram: Appropriate Method of Change

8.5.4 Monitoring

The purpose of monitoring in an Implementation Strategy is to collect data for interpretation in a timely manner to prevent a negative environmental outcome that is transparent and auditable.

Monitoring is conducted weekly, monthly, or yearly based on the item being monitored.

For items identified to be outside of the listed parameters, actions to rectify are to be taken and documented.

The monitoring program is presented in **Table 8.5—2**.

Table 8.5—2 Monitoring Program

Item	Location	Parameters	Monitoring Frequency and Method
Drilling By-products	Well pad pit/s.	• Assess the potential impacts posed by the drilling by-products, the available disposal options and collect data for Third Party on-site disposal assessments/approvals. • Assess the hazard associated with the drilling by-products, including the potential for Naturally Occurring Radioactive Material (NORMs) and leachability, BTEX and metals.	• Post-drilling activity, prior to pit re-instatement or off-site management at the end of the local wet season. • NORMS as per C.5.2 of *the Code*. • Leachability testing of drill cuttings in accordance with the Australian Standard Leaching Procedures as described section C.4.1.2 of *the Code.* • Other analytes as per Table 9 of *the Code.*
Freeboard of Pits and Tanks	Well pad pit/s and tanks.	• Drilling by-product storage pit/s free board levels maintained at >500mm.	• Drilling by-product pit and open-topped treatment tank levels monitored daily, by on-site personnel or by online telemetry, during operations. • Post-operations, monitoring to be completed pre and post significant rainfall events by online telemetry.
Groundwater	Production water bores	• Volume of water utilised is less than licenced amount as detailed in licence conditions. • As per *NT Water Act*. • Analysed for analytes listed in B.4.17 of *the Code.*	• Every extraction measured by installed approved water meter. • A groundwater sample analysed by a NATA accredited lab before drilling to establish a baseline.
Waste and Wastewater	Construction, drilling, completions and EPT operations.	• Total volume of waste removed from site and its destination (including licence number of transporter) Total volume of water and wastewater reused during drilling and completions activities or other purposes.	• Recorded at the time of transport or transfer by on-site personnel. • Wastewater tracking documentation reported to the Minister annual basis. At the time of well suspension, an assessment of the potential accumulation of NORM in well equipment assessed and measured put in place to reduce risks to HSE as per B.4.15.5(b) of *the Code*. • See drilling by-products (above) for additional monitoring requirements.
Stormwater	Well pads, campsite, access tracks.	• Prior to assisted release from site pH 6.5-8.5 and EC <2000 us/cm.	• Prior to release of rainwater that has not freely flowed off-site through type 2 controls.
Fauna	Wastewater treatment tanks, pit/s and sewage treatment and irrigation area.	• Less than seven fauna interactions recorded. • Less than one threatened fauna species impacted.	• Monitored weekly until pit closure by on-site personnel or via remote telemetry.
Bushfire	NAFI website	• Hot spots alerts and fire danger known.	• Weekly checks during operations.
Methane Emissions	Drillings, completions, EPT (inc. flaring), and ongoing well operations.	• No leaks undetected. • Volume of emissions.	• Leak detection tests - from seven days of commissioning a well and six monthly until well abandonment utilising gas detection instruments calibrated and maintained following the manufacturer's requirements utilising either USEPA Method of 21 or Optical Gas Imaging. • Emissions measured in accordance with **Section 10.9.2** of **Appendix 10**.
Spills	Chemical, fluid, fuel, and additive storage areas.	• Sites free of spill-related contamination.	• Monthly inspections if chemicals, fluids, fuel, or additives are stored on-site. • Secondary containment, when in use, to be visually inspected weekly during the dry season and daily during the wet season for damage, spills or water for management. As per A.3.8.i of *the Code* • Note: if secondary containment is found to be damaged, it must be repaired as soon as practicable.
Erosion and Sediment Control	Access tracks, well pads, campsites, and gravel pits.	• ESC measures in place as per ESC plan.	• Inspection pre and post significant rainfall events (if site access available) during operations by on-site personnel.

Item	Location	Parameters	Monitoring Frequency and Method
			• Monthly monitoring of ESC measures during the wet season until commencement of site rehabilitation. • Annually, at the end of the wet season, until handover with landowner for final environmental sign-off.
Weeds	Well pad, campsite, gravel/borrow pits, access tracks.	• Weeds identified and treated.	• Within four weeks of a significant rainfall event. • At the completion of the project.
Rehabilitation	New access tracks, well pads, campsites, and gravel/borrow pits	• Presence of a stable and self-sustaining landform re-instated to reflect the pre-existing condition. • 70% of canopy and ground cover established as compared to analogue site.	• Annually, starting 12 months post cessation of activities, at the end of the local wet season until final environmental sign off.
Public Roads	Stuart Highway / Horseshow Bend intersection	• Roadway does not degrade with project use.	• Post peak transport movements.
Significant Rainfall	Well pads	• Significant rainfall event forecast	• Weather forecast monitored weekly during the wet season while wastewater present in open-topped treatment tanks, pits are open – or chemicals/wastewater is planned to be transported.

8.6 Reporting

8.6.1 Incident Reporting

Incident reporting and investigation provide the mechanism to prevent a recurrence.

All personnel must report all incidents and near-misses and identify potential hazards for continuous improvement, and to determine if the regulator is to be notified.

Table 8.6—1 covers regulatory incidents and reporting requirements.

Table 8.6—1 Incident and Reporting Requirements

Requirement	How and By When
Petroleum (Environment) Regulations	
Recordable Incident Reporting: **A recordable incident is a breach of an Environmental Objective or Environmental Performance Standard in the Environment Management Plan that applies to the activity and is not reportable.**	
The recordable incident report must contain: 1) A record of all recordable incidents that occurred during the reporting period. 2) All material facts and circumstances concerning the recordable incidents that the operator knows or is able, by reasonable search or enquiry, to find out. 3) Any action taken to avoid or mitigate any adverse environmental impacts of the recordable incidents. 4) The corrective action that has been taken, or is proposed to be taken, to prevent similar recordable incidents.	Notify DEPWS (this may be orally or in writing) as soon as practicable, but no later than 15 days after the reporting period.
Reportable Incident Reporting: A reportable incident is an incident relating to the activity that has caused or has the potential to cause material or serious environmental harm as defined under the Petroleum Act.	
The recordable incident report must contain: 1) A record of all recordable incidents that occurred during the reporting period. 2) All material facts and circumstances concerning the recordable incidents that the operator knows or is able, by reasonable search or enquiry, to find out. 3) Any action taken to avoid or mitigate any adverse environmental impacts of the recordable incidents. 4) The corrective action that has been taken, or is proposed to be taken, to prevent similar recordable incidents.	Notify DEPWS (this may be orally or in writing) as soon as practicable, but no later than 15 days after the reporting period.
Recordable Incident Reporting: A recordable incident is a breach of an Environmental Objective or Environmental Performance Standard in the Environment Management Plan that applies to the activity and is not a reportable incident.	
The initial verbal report will include as much preliminary information as possible about the incident (e.g., interest holder, location, type of incident, affected stakeholders, initial assessment of environmental harm and initial response).	Notify DEPWS Onshore gas noncompliance hotline: **(ph) 1800 413 567** or **(e) Onshoregas.DEPWS@nt.gov.au**. Initial notification (this may be oral or in writing) will be as soon as practicable but no later than two hours after the first occurrence of the incident or after the time the interest holder becomes aware of the incident.
The initial written report will include: 1) The results of any assessment or investigation of the conditions or circumstances that caused or contributed to the occurrence of the reportable incident, including an evaluation of the effectiveness of the designs, equipment, procedures, and management systems that were in place to prevent the occurrence of an incident of that nature. 2) The nature and extent of the material environmental harm or serious environmental harm that the incident caused or had the potential to cause. 3) Any actions taken, or proposed to be taken, to clean up or rehabilitate an area affected by the incident. Any actions taken or proposed to be taken to prevent a recurrence of an incident of a similar nature.	Any verbal report will be followed up by a written report within 24 hours of giving verbal notice. Then, an initial report will be provided to DEPWS no later than three days after the incident occurs.

Requirement	How and By When
The final reportable incident report must include a root cause analysis of the reportable incident.	The final report is to be provided to the Minister as soon as practicable but no later than 30 days after the clean-up or rehabilitation of the area affected by the reportable incident is completed.
Waste Management and Pollution Control	
Duty to notify of incidents causing or threatening to cause pollution. Where an incident occurs in the conduct of an activity and the incident causes or may threaten to cause, pollution resulting in material environmental harm or serious environmental harm. A notification is required to specify: 1) The incident causing or threatening to cause pollution. 2) The place where the incident occurred. 3) The date and time of the incident. 4) How the pollution has occurred, is occurring or may occur. The attempts made to prevent, reduce, control, rectify or clean up the pollution or resultant environmental harm caused or threatening to be caused by the incident; and the identity of the person notifying.	The proponent must notify the NT EPA as soon as practicable after (and in any case within 24 hours) first becoming aware of the incident or the time they should reasonably be expected to become aware of it.
Heritage Act	
When a proponent discovers a place or object that is known to be an Aboriginal or Macassan archaeological place or object, they must provide: 1) A description of the place or object. 2) Its location. 3) The person's name and address. If known by the person –the name and address of the owner or occupier of the place or where the object is located.	The proponent must provide a report to the Central Land Council (CLC) as soon as practicable, but within seven days of the discovery.
Work Health and Safety (National Uniform Legislation) Act and Regulations	
A person who conducts a business or undertaking must ensure that the regulator is notified immediately after becoming aware that a notifiable incident arising from the conduct of the business or undertaking has occurred. A notifiable incident means: 1) The death of a person. 2) A serious injury or illness of a person. 3) A dangerous incident. Requirement to notify NT WorkSafe if the volumes of chemicals held on-site exceed requirements.	Any person who conducts a business or undertaking.
Transport of Dangerous Goods by Road and Rail (National Uniform Legislation)	
If a driver of a road vehicle transporting dangerous goods and the vehicle is involved in an incident resulting in a dangerous situation, they must notify the prime contractor for the goods, the Competent Authority, and the police or fire service of the incident.	As soon as practicable after the incident occurred.

8.6.2 Routine Reporting

Table 8.6—2 presents the routine reporting details required under this EMP.

Table 8.6—2 Reporting Details

Frequency	Report Detail	Recipient
Before the Commencement of Regulated Activities	The commencement of a regulated activity.	• The Minister for Environment. • The occupier of the land in which the activity is carried out. • The owner of the land for which the activity is to be carried out.
Quarterly	Quarterly recordable incident report summarising recordable incidents during operational and non-operational activities.	DEPWS
Annually	An annual environmental performance report will be prepared and submitted to the Minister, covering the following: • A summary of the works completed under the EMP during the reporting period. • A summary of performance against measurement criteria. • A summary of all the recording, monitoring, and reporting information about the regulated activity to which this EMP relates in a manner that will enable the Minister to determine whether the environmental outcomes and environmental performance standards in the plan are being met.	DEPWS
Emissions Report	• Emissions reporting must be in accordance with Section D.5.6 of *the Code*. • The natural gas industry must estimate and report all greenhouse gas emissions to the Australian Government's Clean Energy Regulator annually in accordance with the NGERS framework. • Hence emissions associated with venting and flaring, as described in Section D.5.9, must be consistent with the reporting requirements of the Clean Energy Regulator but must be provided separately to the Northern Territory Government in accordance with *the Code*.	Department of Industry, Science, Energy and Resources And DEPWS

8.6.3 Record Keeping

Peak Helium's HSEMS outlines the policies and procedures governing data management and prescribed records.

To the extent the following documents are 'prescribed records' for the *NT Petroleum (Environment) Regulations 2016*, they will be kept for the longer of five (5) years following the period during which the petroleum interest is in force, or 15 years after the record comes into existence [NT GOVERNMENT, 2016A]:

- Records linked to measurement criteria, commitments, and statutory reporting requirements.
- Induction records.
- Waste records.
- Hazardous goods manifest.
- Fuel usage.
- Chemicals stored and transported.
- Drilling and completion fluid additives utilised (name, type, and quantity)
- Weed monitoring.
- Non-compliances and corrective action records.
- Internal audits and inspection records.
- Management of change records.

The records will be kept within Australia and in a manner that allows for easy retrieval.

8.7 Environmental Outcomes, Performance Standards and Measurement Criteria

This EMP has been developed to protect the integrity of the existing and surrounding environment from risks associated with the project activities through the establishment and implementation of:

Environmental Outcomes: Those that will be achieved if the environmental impacts and environmental risks of a regulated activity are reduced to a level that is ALARP and acceptable.

Environmental Performance Standards: Those that relate to managing environmental impacts and environmental risks of a regulated activity; and apply to persons, systems, equipment, or procedures involved in the activity.

Measurement Criteria: The criteria used to determine if an environmental outcome or environmental performance standard has been met.

Responsibility: Refers to the person who owns the critical controls required to achieve the desired environmental outcome.

The following section provides the risk management controls that Peak Helium will implement during its activities for each environmental factor:

- Air quality and atmospheric processes
- Community and economy
- Inland water environmental quality
- Landforms
- Terrestrial ecosystems
- Terrestrial environmental quality

The tables below **Table 8.7—1** to **Table 8.7—6** detail the measurement criteria of critical controls (those controls that, if absent, would increase the risk of an environmental impact) of the risks identified in **Appendix 04**.

Table 8.7—1 Environmental Outcomes, Performance Standards and Measurement Criteria – Air Quality and Atmospheric Processes

Environmental Outcome	Environmental Performance Standard	Measurement criteria (effective, can be improved, needs to be improved)	Responsibility
Protect air quality and minimise greenhouse gas emission	• All vehicles, plants, and equipment are maintained in accordance with Original Equipment Manufacturer's procedures.	• Records of maintenance are available for vehicles, plant and equipment.	Project Manager
	• Flaring to be used rather than venting during production testing.	• All venting and flaring during production testing measured using flow meters compliant with NGERS, calibrated, and maintained in accordance with manufacturer's specifications. • Records available for venting and flaring events, including volumes produced during production testing.	Project Manager
	• Well heads are maintained and inspected by trained and competent personnel for leaks every six months.	• Records of maintenance and inspections available as per the US EAP Method 21.	Project Manager Site Supervisor

Table 8.7—2 Environmental Outcomes, Performance Standards and Measurement Criteria – Community and Economy

Environmental Outcome	Environmental Performance Standard	Measurement Criteria (effective, can be improved, needs to be improved)	Responsibility
Enhance communities and the economy for the welfare, amenity, and benefit of current and future generations.	• Access to Project Area is limited during wet weather events to critical equipment only.	• If operating during wet weather, an approval process is in place before the mobilisation of non-critical equipment. • Transport of chemicals or wastewater on unsealed roads during the wet season is only approved by the supervisor when damage to the roads is assessed as negligible, a spill unlikely, and no significant rainfall events are forecast. • Contingency Plan (Emergency Response Plan (**Appendix 14**) available for an immediate coordinated response to spill scenarios.	Site Supervisor
	• Project access points approved and signed clearly.	• Clear signage at project access points and/or detailed directions available to all contractors via the Emergency Response Numbers. • Training and inductions cover speed limits and approved access points.	Site Supervisor
	• Nuisance (noise and light) limited to sensitive receptors.	• Land access agreements in place with landowners. • Adjacent landowners have been informed of activities in writing if activities are within 5000m and documented in stakeholder engagement log.	Site Supervisor
	• No biosecurity risk material transported to or within the site.	• Weed survey conducted before and after projects activities and weeds identified and managed. • Vehicles and machinery are cleaned down and inspected before mobilisation to the Project Area.	Site Supervisor

Environmental Outcome	Environmental Performance Standard	Measurement Criteria (effective, can be improved, needs to be improved)	Responsibility
	• Opportunities associated with project activities provided to communities and people.	• Contracts with construction and rig operators have local hire and procurement clauses.	Project Manager
	• Drilling fluids reused do not contaminate wastewater streams	• Only wastewater reused under this EMP are fluids that have been settled out from the drilling pits for drilling purposes.	Site Supervisor
	• All waste and wastewater tracked	• Waste transported off site completed by licenced waste transporter. • Volume and destination of waste and wastewater removed from site tracked	Site Supervisor
	• No bushfires caused by project activities.	• Fire breaks constructed around well pads and campsite/s. • Flare use for Extended Production test to located with a 20m fuel load exclusion zone. • Annual fire mapping completed.	Site Supervisor

Table 8.7—3 Environmental Outcomes, Performance Standards and Measurement Criteria – Cultural Heritage

Environmental Outcome	Environmental Performance Standard	**Measurement** Criteria (effective, can be improved, needs to be improved)	Responsibility
Protect sacred sites, culture, and heritage.	• No disturbance to artefacts and/or cultural heritage sites.	• Archaeological survey conducted to identify artefacts. • Recommendations from archaeological report assessed before clearing prior to construction activity.	Site Supervisor
	• Compliance with the AAPA Authority Certificate.	• Restricted work areas listed / mapped in the AAPA certificate checked prior to conducting the Activities to verify they will not be breached. • Activity access tracks signed and all vehicles to remain on approved access tracks. • Restricted work areas along dedicated access tracks sign posted to with restriction. • Activity personnel inducted on importance of adhering to tracks and AAPA restrictions.	Site Supervisor

Table 8.7—4 Environmental Outcomes, Performance Standards and Measurement Criteria – Terrestrial and Inland Water Environmental Quality

Environmental Outcome	Environmental Performance Standard	Measurement Criteria (effective, can be improved, needs to be improved)	Responsibility
Protect the quality of land, soil, groundwater, and surface water so that environmental values, including ecological health, land uses, and the welfare and amenity of people, are maintained.	• Potential for erosion of soils and sediment release managed.	• As-built erosion and sediment control plans on file. • Monitoring reports cover an assessment of erosion and sediment control measures.	Site Supervisor
	• Natural water flow not impeded by construction of well pads, campsite/s, or gravel pits.	• Site selection outside of natural water flow paths, or • Bund constructed to divert overland flow around well pad, campsite/s or gravel pits.	Site Supervisor
	• Prevention of potential environmental impact from the loss of circulation.	• Drilling completed using water-based, not oil-based, drilling fluid additives. • When drilling through aquifers, non-toxic additives utilised. • Drilling additives utilised (name, type, and quantity) recorded.	Site Supervisor
	• Prevention of loss of well control (subsurface).	• Well operations management plan in place. • Well control training and procedures in place during drilling.	Site Supervisor
	• Fluids do not overflow open topped tanks.	• 500mm of freeboard to be maintained in the tanks. • Fluid level monitored on-site and remotely. • Significant rain events monitored to enable movement of fluids from open topped tanks to enclosed tanks 8 hours prior to a significant rain event as per Clause C.4.2.2.	Site Supervisor
	• Fluids do not leak into sub-soils or groundwater.	• Above-ground enclosed storage tanks and open tanks are placed on bunded compacted tank pads.	Site Supervisor

Environmental Outcome	Environmental Performance Standard	Measurement Criteria (effective, can be improved, needs to be improved)	Responsibility
		• Tanks are doubled lined with leak detection between liners and monitored on-site during operations and remotely until removal.	
	• Prevention of potential environmental impact from wellbore collision.	• Separation factor between wellbores >2, unless under risk assessment/MOC.	Project Manager / Site Supervisor
	• Drilling by-products do not overflow from storage pit/s.	• Perimeter bund constructed around the pit to prevent overland flow. • 500mm of freeboard maintained in the drilling by-product pit/s.	Site Supervisor
	• Drilling by-products do not leak into sub-soils or groundwater.	• Drilling pit/s lined with an impermeable liner. • Drilling pit/s, containing drilling by-products, integrity and fluid level monitored on-site and remotely.	Site Supervisor
	• Prevention of spills at fluid storage and handling points.	• Fluid additives, chemicals, fuels, etc. that are hazardous, or have the potential to cause environmental harm are stored within secondary containment as per *the Code* (A.3.8). * • Routine inspections of additive and chemical storage areas conducted. • Hazardous chemicals contained in bunded storage tanks in accordance with the SDS.	Site Supervisor
	• Prevention of spills during transport during.	• Transport of chemicals or wastewater on unsealed roads during the wet season only approved by supervisor when damage to roads assessed as negligible, a spill unlikely, and no significant rain fall event forecast.	Site Supervisor

Environmental Outcome	Environmental Performance Standard	Measurement Criteria (effective, can be improved, needs to be improved)	Responsibility
		• Contingency Plan (Emergency Response Plan – **Appendix 14**) available for immediate coordinated response to spill scenarios.	

* See **Section 7.15.1, Table 7.15 – 1,** and **Table 7.15 – 2** of **Appendix 07** for an indicative list and description of chemicals.

Table 8.7—5 Environmental Outcomes, Performance Standards and Measurement Criteria – Inland Water Environmental Quality

Environmental Outcome	Environmental Performance Standard	Measurement Criteria (effective, can be improved, needs to be improved)	Responsibility
Protect the quality groundwater so that environmental values, including ecological health, land uses, and the welfare and amenity of people, are maintained.	• Prevention of potential environmental impact from the loss of circulation.	• Drilling completed using water-based, not oil-based, drilling fluid additives. • When drilling through aquifers, non-toxic additives utilised. • Drilling and completions additives utilised (name, type, and quantity) recorded.	Site Supervisor
	• Prevention of loss of well control (subsurface).	• Well operations management plan in place. • Well control training and procedures in place during drilling.	Site Supervisor
	• Drilling by-products do not leak into sub-soils or groundwater.	• Drilling pit/s lined with an impermeable liner. • Drilling pit/s, containing drilling-by-products, integrity and fluid level monitored on-site and remotely.	Site Supervisor
	• Groundwater use limited.	• Groundwater extraction volumes recorded. • Groundwater use will be less than the maximum permitted volume for the activity. • Residual drilling fluids, reused from the drilling pits during operations where possible.	Site Supervisor

Table 8.7—6 Environmental Outcomes, Performance Standards and Measurement Criteria – Terrestrial Environmental Quality

Environmental Outcome	Environmental Performance Standard	Measurement Criteria (effective, can be improved, needs to be improved)	Responsibility
Protect the quality and integrity of land and soils so that environmental values are supported and maintained.	• Avoid impacting essential or important habitat for threatened species	• Ecologist on-site to do complete a pre-clearance survey to aid in site selection to avoid sand dunes, disturbance of Desert Oak, large hollow bearing trees and establish buffers if required to protect species and habitat. • No clearing within SOCs or SOBs. • 40km speed limit in place when traversing SOCs and SOBs. • Spill kits available for use in SOCS and SOBs areas being traversed. • Transport of chemicals or wastewater on unsealed roads during the wet season is only approved by the supervisor when damage to the roads is assessed as negligible, a spill unlikely, and no significant rainfall events are forecast. • Contingency Plan (Emergency Response Plan (**Appendix 14**) available for an immediate coordinated response to spill scenarios.	Site Supervisor
	• Compaction to soils minimised to promote successful rehabilitation.	• Topsoil is removed from well pads and stockpiled <1.5 m high away from water flow paths. • Access to well pads is limited during wet weather to critical equipment.	Site Supervisor
	• Grey water and treated sewage effluent are controlled and dispersed in designated areas.	• Irrigation by use of dispersion hoses and/or sprinklers to evenly distribute water by spraying across the irrigation disposal area.	Site Supervisor

Environmental Outcome	Environmental Performance Standard	Measurement Criteria (effective, can be improved, needs to be improved)	Responsibility
		• Irrigation area on vegetated land with a slope <5%.	
	• No biosecurity risk material transported to or within the site.	• Weed survey conducted before and after project activities and weeds identified and managed. • Vehicles and machinery cleaned down and inspected before mobilisation to the Project Area.	Site Supervisor
	• No bushfires caused by project activities.	• Fire breaks constructed around well pads and campsite/s. • Annual fire mapping completed.	Site Supervisor
	• Potential for the erosion of soils and sediment release managed.	• As-built erosion and sediment control plans on file. • Monitoring reports cover an assessment of erosion and sediment control measures.	Site Supervisor
	• Areas constructed for petroleum activity progressively rehabilitated to final rehabilitation.	• Progressive rehabilitation at the cessation of the petroleum activity initiative within 12 months. • Areas handed over to the landowner are in stable condition and approved for handover by the Pastoral Land Board.	Project Manager

9. Stakeholder Engagement

9.1 Overview

Peak Helium's approach to stakeholder engagement proactively focuses on building respectful relationships with key stakeholders. Peak Helium seeks to ensure that these stakeholders are fully informed of exploration activities through regular communication and consultation. Peak Helium recognises that stakeholder engagement is integral to achieving exploration objectives.

Peak Helium aims to establish and maintain enduring and mutually beneficial relationships with the communities it is a part of, ensuring that activities generate positive economic and social benefits for and in partnership with these communities.

A stakeholder communications log is attached as **Appendix 11**.

9.2 Identification of Stakeholders

The NT Petroleum (Environment) Regulations define a 'Stakeholder' as:

- A person or body whose rights or activities may be directly affected by the environmental impacts or environmental risks of the regulated activity proposed to be carried out; or
- An agent or representative or a person or body mentioned in the point above [NT GOVERNMENT, 2016A]

Using this Stakeholder Definition, Peak Helium has identified the following as the key relevant stakeholder groups for EP134:

- Landholders, Landowners and Land Occupiers (Host Pastoralists); and
- Traditional Owners.

Other community members who do not meet the definition of stakeholder but are consulted more broadly by Peak Helium are:

- Pipeline operators within the Project Area.
- Railway operators within the Project Area.
- Community members in the area surrounding the Project Area.
- Businesses operating in the area surrounding the Project Area.
- Government agencies.

- Northern Territory Fire and Rescue Service (NTFRS).
- Central Land Council (CLC).
- Industry representative bodies.
- Local and regional councils.
- Tourism groups.

Peak Helium has undertaken actions to initiate stakeholder engagement with pastoralists and Traditional Owners who will be affected by the proposed activities. All regulated activities will be subject to negotiating consent for access and government approvals. Activities will be conducted in accordance with appropriate legislative requirements.

9.2.1 Traditional Owners

Peak Helium engages with the Traditional Owners across these permit areas. Further details on engagement with Traditional Owners is available in **Appendix 11** (Stakeholder Engagement). *The Native Title Act* is a Commonwealth law passed through Parliament in 1993. *The Native Title Act* [AUSTRALIAN GOVERNMENT, 1993] allows governments, companies, and native title holders to negotiate agreements about future developments on the land, waters, and sea.

9.2.2 Pastoralists

While permit EP134 covers a vast array of land, a specified target area has been identified to narrow the focus for immediate engagement. The proposed activities will impact two pastoral stations within these permit areas, Horseshoe Bend and Idracowra.

9.3 Stakeholder Contact Details

Table 9.3—1 Stakeholder Contact Details

Stakeholder	Contact Details

9.4 Assessment of Merit of Objections and Claims

Objections and complaints related to the activities carried out under this EMP are recorded on a register and acknowledged in writing.

Peak Helium will continue to assess the merit of any objections or complaints made and respond accordingly.

Complaints will be investigated as incidents, including formal responses to remedy the complaint if relevant and appropriate.

9.5 Traditional Owner Engagement

Peak Helium has held several On Country Meetings with Traditional Owners regarding the regulated activities under this EMP and its long-term plans. This engagement is ongoing.

Peak Helium had Traditional Owner representatives on-site during previous regulated activities.

Peak Helium will continue to build a respectful and collaborative relationship with the Traditional Owners.

A record of the consultation related to the regulated activities under this EMP is attached in **Appendix 11**; this consultation is ongoing.

9.6 Pastoral Stakeholder Engagement

Peak Helium recognises the requirement to engage with landholders and to negotiate a Land Access and Compensation Agreement as a requirement of the *Petroleum Regulations* 2020 [NT GOVERNMENT, 2020B]. It is a requirement to apply for land access to carry out regulated petroleum operations in the Northern Territory.

Peak Helium has operated with pastoral leaseholders for previous regulated activities in EP134, being the 2022 seismic acquisition, and will continue to build on the good relationships developed during those works.

A record of the consultation related to the regulated activities under this EMP is attached in **Appendix 11**; this consultation is ongoing.

9.7 Stakeholder Engagement Activities

Peak Helium has and will continue to consult and communicate directly with Traditional Land Owners. Communication and consultation include face-to-face meetings. Peak Helium has consulted with pastoralists and other relevant stakeholders.

Key relevant stakeholder engagement has been facilitated through face-to-face meetings and communication methods, including emails and phone calls directly. Peak Helium views its commitment to stakeholder engagement as ongoing as the work program under this EMP is delivered.

Briefing sessions with key individuals and groups will continue to be carried out with timely feedback on the project's issues and concerns. The purpose of the consultation is to give each stakeholder information about:

- The regulated activity Peak Helium proposes to carry out.
- The location/s where Peak Helium proposes to carry out the activity.
- The anticipated environmental impacts and environmental risks of the activity.
- The proposed environmental outcomes concerning the activity.

The possible consequences of carrying out the activity to the stakeholder's rights or activities. By providing honest and clear stakeholder engagement and allowing a reasonable period for the stakeholder to respond to the information, Peak Helium aims to achieve the following:

- Informed stakeholder feedback on analysis and alternatives to decisions.
- Working directly with the stakeholders throughout the process to ensure their concerns and aspirations are consistently understood and considered.
- Partnering with the stakeholder in each aspect of the decision-making process, including the development of alternatives and the identification of the preferred solutions.
- Building and maintaining stakeholder confidence through regular consultation.
- Gaining the trust and acceptance of the local community and groups through appropriate stakeholder engagement.
- Working with stakeholders to understand why and how the company operates.

Peak Helium has communicated with other community members who are not key relevant stakeholders, or on an inquired basis, mainly via direct conversation, either face-to-face or via phone.

A log of communications with relevant stakeholders since lodging the Drilling EMP in relation to Peak Helium's activities in EP134 is attached in **Appendix 11**.

9.8 Workforce

Peak Helium is committed to building relationships with local businesses where practicable, although they are not key stakeholders.

Peak Helium's strategies for engaging local businesses, facilities, and suppliers and supporting the employment of local/regional people include engaging with the Industry Capability Network NT as a Project Owner and the NT Indigenous Business Network to source Indigenous content and support.

Ideally, Peak Helium will engage local suppliers for the delivery of works and procure them from local and Indigenous businesses where these sources are available and economically accessible, that will DIDO to work.

These works may include:

- Civil construction.
- Weed control.
- Drilling contractors for water bores.
- Supply, installation, and maintenance of water bore pumps.
- Well pad monitoring.
- Fencing construction and maintenance.
- Traffic control.
- Accommodation.
- Catering supplies
- Vehicle hire.
- General logistics services.
- The employment of cultural clearance monitors during land-clearing activities

The workforce for specialized activities such as drilling and production testing will be primarily conducted by principal contractors whose workforce is comprised of FIFO workers. Where principal contractors require services, contract terms and conditions will promote local hire.

9.9 Ongoing Consultation

Before any land access or activities, Peak Helium will notify all owners and occupiers of land of the intention to carry out and/or commence construction or drilling as part of the activities in accordance with the Petroleum Regulation requirements to the landholder under the *Petroleum Regulations 2020* [NT GOVERNMENT, 2020A]. Peak Helium will also uphold and respect any specific requirements for notification and consultation under the existing exploration agreement. Peak Helium will not access any person's land without prior consent.

During the program activities, Peak Helium will have field representatives in the activity areas. Field-based representatives will be the primary point of contact for all landholders and community members during the work phases. Field representatives will manage the day-to-day activities and communications concerning the landholders to ensure they are consistently updated on the program's status.

Stakeholders will have direct access to a company representative based in Brisbane who has existing relationships and is experienced in the agreements required to conduct exploration activities under this EMP.

Peak Helium takes a proactive engagement strategy in its Northern Territory operations to ensure that stakeholders are consistently engaged and informed. Peak Helium's ongoing strategy for respectful engagement is to maintain availability to inform stakeholders of current operations, review past operations' status and findings, and communicate plans for any potential future operations.

Where stakeholders have requested, or Peak Helium believes it would be beneficial to engage with stakeholders on an ongoing basis during the activity, communications will continue until the activity has concluded.

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