



3/02/2026

Mr. Clinton Dubieniecki
Trachre Pty Ltd
79 King William Road
Unley, SA, 5061

Via email: clinton@orpheusuranium.com

Dear Mr. Dubieniecki

Notification of Approved Exploration Program for Environment Protection and Rehabilitation (EPEPR)

In reference to your final submission dated 16 January 2026 the EPEPR has been approved pursuant to section 70B(5) of the Mining Act 1971 (the Mining Act).

The approved EPEPR will be made publicly available on the Mining Register and the Department for Energy and Mining (DEM) website. Details of the approved EPEPR are listed below.

Approval Granted to	Trachre Pty Ltd
Tenement Type & Number	<i>Exploration License</i> <i>EL 6703; EL 6554; EL 6555; EL 6900</i>
Program Number	EP 03994
EPEPR Description	Ongoing EPEPR – to drill-test uranium targets within <i>EL 6703; EL 6554; EL 6555; EL 6900</i>

You are reminded that you must always implement and comply with this approved EPEPR.

This approval does not constitute endorsement of the systems that you have in place to manage the mining operations in compliance with the Mining Act. Whilst your capability to undertake this activity has been considered in this approval, the responsibility for compliance with the Mining Act always remains with the tenement holder.

The legislative requirements associated with the EPEPR are outlined below, and certain requirements must be actioned prior to commencement of operations authorised by the EPEPR.

1	PEPR Conditions In accordance with section 70B(7a)(b) of the Mining Act, the approved EPEPR is subject to the conditions listed in the Notice of Approval Conditions – EP-03994 (Appendix 1)
2	Public Liability Insurance

REGULATION AND COMPLIANCE



	Pursuant to Regulation 81 of the <i>Mining Regulations 2020</i> (the Mining Regulations), you are required to provide a copy of a certificate evidencing the insurance coverage over the tenement(s).
3	<p>Compliance Reporting</p> <p>You are required to submit an annual exploration compliance report. The report is required to be submitted within 2 months after the anniversary of the date the licence/ease was granted, or in accordance with joint reporting requirements agreed to with the Minister. Please refer to the DEM website for more information on the reporting requirements.</p> <p>You are reminded that a separate compliance report is required 2 months after the expiry or surrender of the EL.</p>
4	<p>Work, Health and Safety Compliance</p> <p>In accordance with Chapter 10 of the <i>Work Health and Safety Regulations 2012</i> (SA), you must meet the requirements for mine operators in South Australia, which include a notification for mining operations, the establishment of a Safety Management System, the identification of Principal Mining Hazards and development of a Principal Mining Hazard Management Plan. Further information on your responsibilities, including a guide to Chapter 10, and the Mine Operator Notification Form, is available on the SafeWork SA website.</p>
5	<p>Water Licence</p> <p>Under the requirements of the <i>Landscape South Australia Act 2019</i> a water affecting activity permit will be required for water wells. You are advised to consult with the Department for Environment and Water, Water Licensing Branch to seek further information regarding licensing requirements.</p>
6	<p>EPEPR Timeframe</p> <p>The EPEPR is approved for the term of Exploration Licence: EP - 03994. A further 3 months after expiry of the program notification is provided to complete all rehabilitation.</p>

Please note, proposed changes to exploration operations stated in the approved EPEPR may require a EPEPR review to be submitted for assessment. Where a EPEPR review is required, implementation of the operational changes can only occur after the revised EPEPR is approved. Further information on when an exploration PEPR review is required can be found in Departmental guideline [MG22 Conducting mineral exploration](#).

In addition to the requirements under the Mining Act, you are reminded that your operation will have other legislative requirements that you will need to comply with.



If you have any further queries, please contact DEM staff as below:

General enquiries	Cobus Martins Assessment Officer, Exploration Regulation DEM.exploration@sa.gov.au
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Yours sincerely

A handwritten signature in black ink, appearing to read 'SJM'.

Simon Constable
DIRECTOR, MINERALS EXPLORATION
In accordance with delegated
powers and functions

The Department's Regulatory Guidelines, Ministerial Determinations and Information Sheets are available at:
http://energymining.sa.gov.au/minerals/knowledge_centre



Appendix 1

Notice of Approval Conditions – EP - 03994

In accordance with section 70B(7a)(b) of the *Mining Act 1971*, EP-03994 is approved subject to the following conditions:

Notice of Approval Conditions – EP - 03994

- | | |
|----------|--|
| 1 | Prior to conducting exploration operations an EPEPR Program Notification must be submitted to the Department for Energy and Mining in accordance with the approved EPEPR, 21 days prior to commencement of operations. Please lodge Program Notifications through the MERS online portal. |
|----------|--|

Exploration PEPR - EPEPR | Ongoing PEPR

Reference Number: EP-03994 • Status: Assessment

Begin

PEPR Type

Ongoing PEPR



Select Applicable PEPR

Is historical?

No Yes

Previous PEPR ID

—

Search PEPRs

—

Applicant and General Details

Applicant Details

Kylie Braund

Full Name *

Kylie Braund

Business Phone

Mobile Phone

Email *

kylie@amets.com.au (mailto:kylie@amets.com.au)

Project Supervisor

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General Details

Tenement Details

Tenement Type	Tenement Name	Tenement Holder
Exploration Licence	EL 6703	Trachre Pty Ltd
Exploration Licence	EL 6554	Trachre Pty Ltd
Exploration Licence	EL 6555	Trachre Pty Ltd
Exploration Licence	EL 6900	Trachre Pty Ltd

Operating Company

Trachre Pty Ltd

If there is another Operating Company, please provide

Account Name	Entity Type	Registered Address	Registered Email
Trachre Pty Ltd	Private Company	79 King William Road UNLEY SA 5061 Australia	clinton@orpheusuranium.com (mailto:clinton@orpheusuranium.com)

Project/prospect name

Frome Project

Mineral Model

The primary exploration model targets sedimentary- and/or structurally-hosted uranium, particularly tabular and roll-front styles, analogous to deposits such as Beverley, Honeymoon, Goulds Dam, Saffron, and Oban. Regionally, uranium is hosted within the Eocene Eyre Formation, which contains several known deposits, and the Miocene Namba Formation, which hosts mineralisation at Beverley.

Primary Commodities

Commodity Name ↑	Commodity Group
Uranium	Exploration

Secondary Commodities

Commodity Name ↑	Commodity Group
There are no records to display.	

Project Description

The Frome Project aims to assess the potential for economic uranium mineralisation within Tertiary palaeovalleys and palaeochannels of the Callabonna Sub-Basin, Frome Embayment. The PEPR Authorisation Area covers the entire project, with exploration focused on priority target areas defined by geological, geophysical, and historic drilling data.

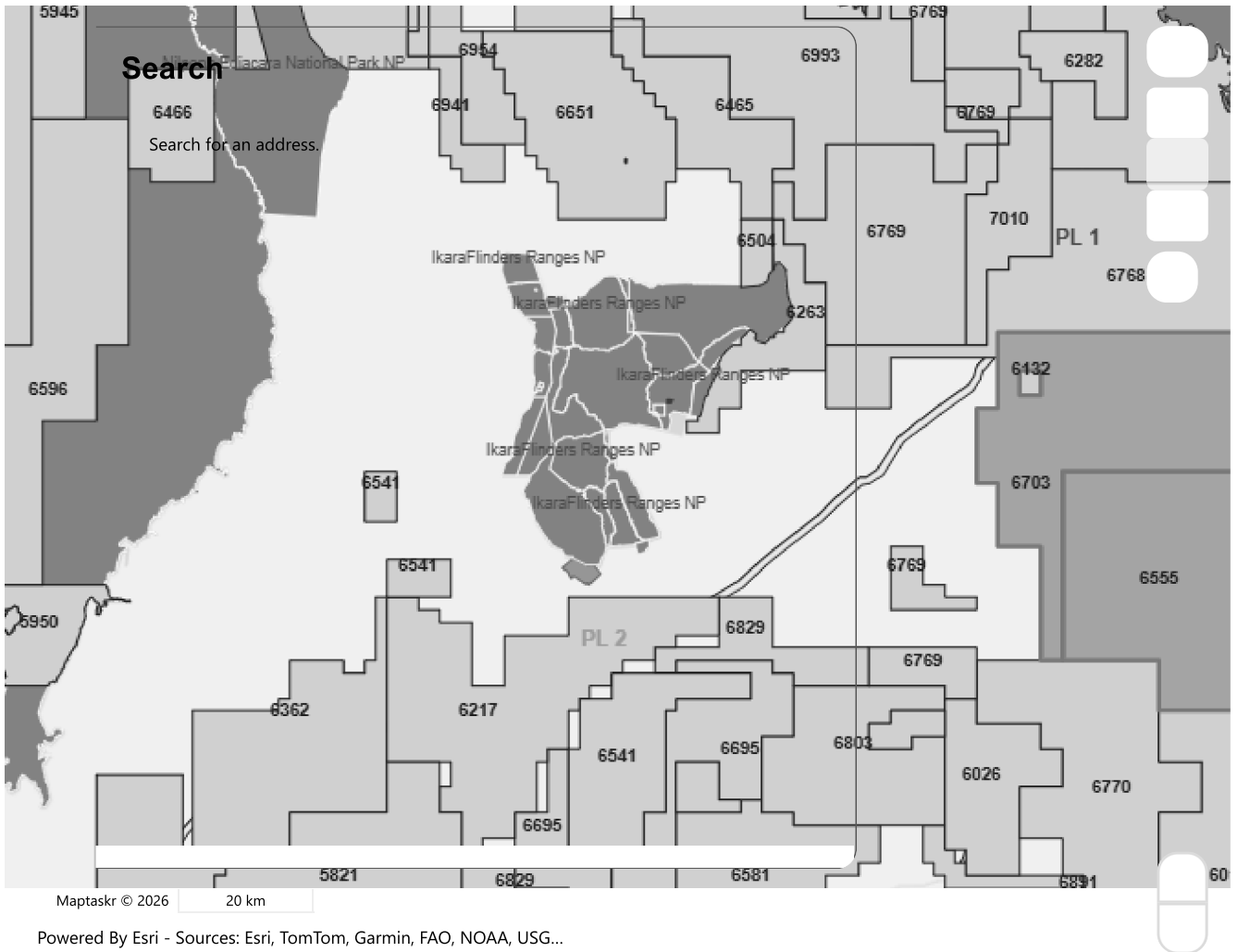
Exploration will focus on locating palaeochannels and palaeovalleys with valley-fill sands, carbonaceous or organic-rich facies, and features such as drainage confluences, depocentres, oxbows, or high-sinuosity channels. Areas proximal to radiogenic source rocks, redox boundaries (defined or inferred from drilling), and litho-structural traps will also be assessed.

Proposed activities include airborne and ground geophysics, downhole geophysical logging, geochemical sampling, and rotary mud, diamond, or sonic drilling. Targets will be progressively refined through data acquisition and interpretation to minimise environmental disturbance.

Current priority areas include Erudina Palaeochannel and Sandyootea Region (Eyre Formation), and the Crocker Well Granite Source Area and Namba Calcarenite Area (Namba Formation). Follow-up work is also planned at regional uranium occurrences identified utilising geophysical or geochemical surveys and drilling where appropriate.

Clearly describe why a PEPR review is required, summarise all content changes made to the approved PEPR, and provide appropriate justification where a time extension is required.

Identify Application Area



Map Layer Intersects

Application Area Details

Location Description

From Project area approximately 180km northeast of Peterborough

Area (Sqkm)

3,036.12

Spatial Data Intersects - Summary Table

Show entries

Search:

Spatial Layer Name	Category	Referral	Intersect Count
1:250K mapsheets	Other		6
Cadastral Parcels	Other		17
Determinations of Native Title	Other		7
Exploration licences (geothermal)	Other		2
Exploration licences (mineral/opal)	No-Go Area		5

Spatial Layer Name	Category	Referral	Intersect Count
Extractive minerals leases (EML)	No-Go Area		1
Licences, gas pipeline (petroleum)	Other		190
Licences, liquids pipeline (petroleum)	Other		95
National Wetlands	Other	Yes - Advice	1
Pastoral Lease Boundaries	Other		16

Showing 1 to 10 of 15 entries

Previous 2 Next

Spatial Data Intersects - Details Table

Show entries

Search:

Spatial Layer Name	Shape	Primary Attribute	All Attributes	Category
1:250K mapsheets	Shape 1	CURNAMONA	View attributes	Other
1:250K mapsheets	Shape 1	PARACHILNA	View attributes	Other
1:250K mapsheets	Shape 1	CURNAMONA	View attributes	Other
1:250K mapsheets	Shape 1	CURNAMONA	View attributes	Other
1:250K mapsheets	Shape 1	PARACHILNA	View attributes	Other
1:250K mapsheets	Shape 1	CURNAMONA	View attributes	Other
Cadastral Parcels	Shape 1	F251941AL50	View attributes	Other
Cadastral Parcels	Shape 1	D42207AL402	View attributes	Other
Cadastral Parcels	Shape 1	D84473AL12	View attributes	Other
Cadastral Parcels	Shape 1	H834700BL1218	View attributes	Other

Showing 1 to 10 of 534 entries

Previous 2 3 4 5 ... 54 Next

Program Preparation

Work Undertaken in Preparing the Proposal

This Ongoing Exploration PEPR has been prepared in accordance with the Government of South Australia's Minerals Regulatory Guidelines MG22 — Mineral Exploration PEPRs and Compliance, administered by the Department for Energy and Mining (DEM).

Stakeholder Consultation

Consultation undertaken in preparing this PEPR includes engagement with:

- Department for Energy and Mining (DEM)
- Environment Protection Authority (EPA) of South Australia
- Landowners (consultation and issue of regulatory notices)
- Native Title Claimants and Representative Bodies (consultation and regulatory notifications)
- Australian Cultural Heritage Management (ACHM)
- Contractors, including drilling, wireline logging, and earthmoving service providers.

Technical and Environmental Studies

- Site reconnaissance visits to assess access, logistics, and environmental considerations
- Reinterpretation of historic downhole lithology and geophysical logs
- Reprocessing and reinterpretation of historic magnetic and gravity datasets
- Reassessment of geological and structural mapping
- Development of updated 3D geological models and surfaces
- Searches for heritage sites (Aboriginal and non-Aboriginal heritage databases)
- Desktop studies, technical compilations, and environmental risk reviews.

Orpheus Uranium Limited has in place the following governance, policies, management and communication systems to ensure operations are conducted in a safe and environmentally focused and controlled approach.

Manuals/SOP's

Risk Management

Heat Stress

Personal Protective Equipment

Fatigue Management

Manual Handling

Working in Remote Areas

Fitness for Work

Vehicle/Plant Wash Down

Emergency Response Plan (ERP)

Compliance

Incidence Reporting and Investigation

Document and Record Management

Training and Competency Management

Cultural Heritage Management

Permit Review Checklist

Induction Register

Non-Compliance

Incident Register (OIR)

Incident Report

Communication

General Induction

Pre-Shift Meetings

Weekly Safety Talk Agenda

Policies

Health, Safety and Environmental Policy

Stakeholder and Cultural Policy

Risk Management Policy

Plans

Safety Management Plan

Principal Mining Hazard Management Plan

Radiation Management Plan

Consultation

Stakeholder Engagement Tracking

Lease Conditions

N/A

Land Access

Identify the Owners of Land and authority to access land

Land Title Reference	Plan Parcel Reference	Type of Land	Owner of Land ↑	Land Access Authorisation Method	Date of Form 21 or Agreement Signed	Instrument or Uploaded Document Id	Uncheck land not applicable to your application ar
CL 6191/455	D42207 AL402	Crown		Service of Notice of Entry			Unchecked
CL 6179/639	H83470 0BL1218	Crown		Service of Notice of Entry			Unchecked
CT 5833/587	H83480 0SE1570	Freehold		Service of Notice of Entry			Unchecked
CL 6213/306	D84473 AL11	Crown		Service of Notice of Entry			Unchecked
CL 6174/612	D42207 AL403	Crown	Bruce Nutt and Lloyd Nutt The Curnamona Pastoral Company Pty Ltd	Service of Notice of Entry	07/11/2025	112025_Form21A&am p;B_Curnamona	Checked
CL 6183/78	H83480 0BL120	Crown	Greg Treloar Billeroo West Station	Service of Notice of Entry	06/11/2025	112025_Form21A_Bill eroo West	Checked
CL 6225/306	D84473 AL12	Crown	Martins Well Station	Service of Notice of Entry	12/11/2025	112025_Form21A_Ma rtinsWell	Checked
CL 6182/348	F25171 6AL10	Crown	Neil Dunn Wertalooona Station	Service of Notice of Entry	07/11/2025	112025_Form21A_We rtalooona	Checked
CL 6183/830	F25194 1AL50	Crown	Sam Smyth Erudina Station	Service of Notice of Entry	07/11/2025	112025_Form21A&am p;B_Erudina	Checked
CL 6180/953	H83480 0BL1173	Crown	Willoway Farming Pty Ltd - Frome Downs Station	Service of Notice of Entry	07/11/2025	112025_FORM 21 A and B	Checked

Regulation 4 Consent – Exercise a right over a road, street or highway

No

Woomera Prohibited Area (WPA)

Will activities be conducted within the WPA?

No

In which zone will activities be conducted?

Name	Are you intending to undertake work?	Closure start date	Closure end date
There are no records to display.			

Do you have a resource exploration permit in place?

—

Permit No.

—

What is the expiry date of the exploration permit?

—

Does the Exploration Permit allow the operator to conduct exploration operations in the WPA?

—

Other Land Owned or Controlled by the Commonwealth Department of Defence

Indicate if you are intending to undertake exploration operations within the identified defence land?

No

Other Commonwealth Defence Land

Defence Land	Applicable
There are no records to display.	

Do you have a Deed of Access with Defence?

—

Expiry date of the Deed of Access

—

Enter the date the Range Control Officer granted permission to conduct the proposed exploration operations

—

Describe the results of consultation and how any concerns raised were addressed

—

Native Title

Does 'Native Title land' exist within the application area?

Yes

Using the table below, describe how you have complied with the requirements of Part 9B of the Mining Act for each tenement.

Name of Determined / Claimant Group	Agreement Type	Instrument Number	Applicable
Adnyamathanha People No. 1 (Stage 1)	Native Title		Yes
Adnyamathanha No 1 - Stage 2	Native Title		Yes
Adnyamathanha Settlement ILUA			No
Adnyamathanha Mineral Exploration ILUA			No

Provide any additional relevant information

There is one native title claimant that are stakeholders to the Frome Project:

Adnyamathanha Traditional Lands Association (Aboriginal Corporation) RNTBC (ATLA).

The exploration licence/s overlap two native title determinations.

SAD6001/1998 Adnyamathanha People No 1 – Stage 1 (SCD2009/003); and
SAD6001/1998 Adnyamathanha People No 1– Stage 2 (Vincent Coulthard and Ors v State of South Australia and Ors) (SCD2014/001).

ATLA has been under Special Administration since 26 March 2020. The company has been in ongoing communication including presentations regarding the Frome Project to the Culture Heritage and Native Title Committee (CHANT) advisory group to ATLA and associated administrators.

Despite ATLA currently being under special administration, Orpheus, has worked in close collaboration with other stakeholders, and developed a viable and community endorsed NTMA. This collaborative effort included a selection of other companies, spanning the exploration sector, all seeking to establish a fair and respectful agreement with ATLA under a refined, collective process. Execution of the NTMA documentation was completed on Nov 4th 2025, and submitted for registration on November 6th 2025.

A search of the Central Archive, which includes the Register of Aboriginal Sites and Objects (the Register), administered by Aboriginal Affairs and Reconciliation (AAR) for the Licence received at the time of licence grant has identified registered entries of Heritage Sites. In accordance with section 10 of the Aboriginal Heritage Act 1988 (SA), information derived from the Central Archive is confidential and such information cannot be redistributed.

A Heritage Survey Agreement (HSA) was executed on 14 April 2023 in relation to Exploration Licences EL 6554, EL 6555, EL 6703 and EL 6900. (this has been superseded by the establishment of an NTMA).

A Heritage Survey Request was submitted in February 2023 to prepare for a Heritage Survey at the Frome Project.

The company with consent from ATLA engaged Australian Cultural Heritage Management (ACHM) to conduct an Aboriginal Heritage Survey with members of ATLA in February 2024.

A Heritage Survey was conducted between 19-24 February 2024, including two travel days, survey days were 20-23 February 2024. The survey was conducted on foot along 50 m wide drill traverse corridors at the Erudina prospect, covering approximately 30 line-km and in the vehicle along one single existing station track at the Sandyoota region, covering approximately 12 line-km.

A Heritage Survey Report was received from ACHM on 7 March 2024. Results of the Heritage Survey indicate there are no new Aboriginal archaeological heritage sites identified, however, there are specific areas to be avoided/protected from drilling activities and recommendations have been made.

Additional Heritage Surveys will be conducted prior to drilling in areas outside of those areas cleared in the recent Heritage Survey.

Refer to Figure 3. Frome Project, native title determination areas.

Exempt Land

Has Exempt land been identified?

Yes

Upload Exempt Land Plan 

[Expand/Collapse](#)

File Name	File Size (Mb)	Created On	Download
Curnamona signed page_20240503-113327.pdf	0.57 Mb	05-12-2025 15:09:54	Download (MERS/EP-03994/Land Access and Consultation/Exempt Land/Curnamona signed page_20240503-113327_2025-12-05T04-39-53.956Z.pdf)
Orpheus_WaiverAgreement_CurnamonaStation_20240430.pdf	2.71 Mb	05-12-2025 15:09:54	Download (MERS/EP-03994/Land Access and Consultation/Exempt Land/Orpheus_WaiverAgreement_CurnamonaStation_20240430_2025-12-05T04-39-53.881Z.pdf)

Land Title	Plan Parcel	Owner of Land that has benefit of exemption ↑	Why is the land exempt land?	Waiver of exemption(s) been negotiated	Instrument Number or Uploaded Document Id
CL 6174/612	D42207A L403	Bruce Nutt and Lloyd Nutt The Curnamona Pastoral Company Pty Ltd	Land within 150 metres of a building or structure, with a value equal to or exceeding the prescribed distance, used for an industrial or commercial purpose	Yes	Orpheus_WaiverAgreement_CurnamonaStation_20240430
CL 6174/612	D42207A L403	Bruce Nutt and Lloyd Nutt The Curnamona Pastoral Company Pty Ltd	Land within 150 metres of a spring, well, reservoir or dam	Yes	Orpheus_WaiverAgreement_CurnamonaStation_20240430
CL 6174/612	D42207A L403	Bruce Nutt and Lloyd Nutt The Curnamona Pastoral Company Pty Ltd	Land situated within prescribed distance of a building or structure used as a place of residence	Yes	Orpheus_WaiverAgreement_CurnamonaStation_20240430
CL 6183/78	H834800 BL120	Greg Treloar Billeroo West Station			
CL 6225/306	D84473A L12	Martins Well Station			
CL 6182/348	F251716 AL10	Neil Dunn Wertalooona Station			
CL 6183/830	F251941 AL50	Sam Smyth Erudina Station			
CL 6180/953	H834800 BL1173	Willoway Farming Pty Ltd - Frome Downs Station			

Consultation

Stakeholder ↑	Land Use	Matters raised	Stakeholder concerns raised and how addressed
Adnyamathanha	Other (e.g. historic mining)	Ability to continue access to areas associated with cultural heritage and Native Title	Establishment of baseline with the NTMA and associated protocols, continued communication and engagement with relevant persons as to planned activities in areas of concern.
Billeroo West Pastoral Station	Grazing	No concerns raised.	Feedback requested to be informed if groundwater is intersected during drilling.
Bruce Nutt and Lloyd Nutt The Curnamona Pastoral Company Pty Ltd			
Curnamona Pastoral Station	Grazing	No concerns raised	N/A
Epic Energy South Australia Pty Ltd	Other (e.g. historic mining)	Prior to conducting surface excavations, the company must follow the: - Dial-Before-You-Dig procedure.	Prior to exploration activities, future communications will include: - The company shall contact Epic Energy South Australia Pty Ltd to notify them of the exploration program and provide GPS coordinates of locations of the crossings of the pipeline licence and details of the equipment that will be crossing the pipeline/s, to include number of axles and load per axle.
Erudina Pastoral Station	Grazing	No concerns raised	N/A
Frome Downs Pastoral Station	Grazing	No concerns raised	N/A
Greg Treloar Billeroo West Station			
Martins Well Pastoral Station	Grazing	Martins Well Station offers tourism services.	Consultation has focussed on scheduling exploration activities to avoid impacts on tourism operations.
Martins Well Station	Grazing	xxxx	xxxx
Neil Dunn Wertalooona Station			
Sam Smyth Erudina Station			
Wertalooona Pastoral Station	Grazing	No concerns raised	N/A
Willippa Pastoral Station	Grazing	No concerns raised	N/A
Willoway Farming Pty Ltd - Frome Downs Station			
Wirrealpa Pastoral Station	Grazing	Wirrealpa Station has an area that is subject to advanced vegetation regrowth.	This will be considered during activity planning.

If any individual or group of similar affected persons were not able to be consulted, what steps were taken to consult with them?

N/A

Describe any council policies (or out of council) or development plans that may impact the program area and a description of any known plans for future land use changes by other parties.

N/A

Provide any additional relevant information.

Orpheus Uranium Limited maintains a Stakeholder Consultation Register, recording all consultation events with stakeholders of the Frome Project.

Description of Environment

Proximity to Infrastructure and Housing

Proximity to infrastructure and housing

Settlements and Residences

The nearest town is Yunta, approximately 100 km south of the project area. Access from Adelaide is via the Barrier Highway (A32) to Yunta, then north along the Tea Tree Road, with alternate routes via Erudina Station and Martins Well Station to Hawker. The closest settlement to proposed drill areas is Curnamona Station (~7 km northeast of the Erudina Palaeochannel prospect and ~3 km northwest of the Crocker Well Source prospect). Erudina Station and Woolshed are near the Namba Calcarenite Prospect, and Frome Downs Station lies north of the Sandyoota Region. No residential dwellings are within immediate proximity to proposed drill sites, and activities are not expected to impact homesteads or station operations.

Roads, Tracks, and Fence Lines

The project area is serviced by an established network of station tracks, fence lines, and access routes, which will be used where practical. Maintenance or upgrades may be undertaken as required in consultation with relevant stakeholders. New and temporary access tracks will only be constructed where existing access is not feasible, and in consultation with landholders, with alignments designed to minimise disturbance to pastoral infrastructure, natural drainage, native vegetation or environment as per PEPR guidelines.

Other Human Infrastructure

Pastoral infrastructure includes fences, gates, windmills, water bores, dams, tanks, homesteads, sheds, and shearers' quarters. All exploration activities will be planned to avoid disturbance to this infrastructure through pre-activity consultation and site reconnaissance with landholders.

Petroleum Pipelines and Communication Lines

Exploration Licences EL 6555 and EL 6703 overlaps with the PL-1 Moomba–Adelaide Gas Pipeline, PL-2 Moomba–Port Bonython Liquids Pipeline, two petroleum pipeline facilities, and an associated above-ground communications line. These corridors are exclusion zones, and no exploration will occur without prior approval and access agreements from Epic Energy South Australia Pty Ltd. Any approved works will follow the Dial-Before-You-Dig procedure and Epic Energy's operational requirements, including provision of GPS coordinates and equipment specifications.

Extractive Minerals Lease (EML)

EL 6703 overlaps with EML 5377, a 2-hectare borrow pit owned by Epic Energy. Exploration activities will avoid interference with this lease unless access is granted and conditions are agreed with the tenement holder.

Refer to Figure 1: Frome Project location map showing exploration licences, townships, pastoral lease boundaries, access roads, and gas pipeline infrastructure.

Attach Files

[Expand/Collapse](#)

File Name	File Size (Mb)	Created On	Download
Figure 1 Location Map.pdf	0.91 Mb	18-11-2025 13:22:55	Download (MERS/EP-03994/Proximity to infrastructure/Figure 1 Location Map_2025-11-18T02-52-55.291Z.pdf)

Landform, Topography, Soil and Surface Cover

Describe the topography and soil and surface cover (e.g. gibber) of the general area affected by the exploration program. Include details on the susceptibility to compaction, erosion, dust, runoff and visual attributes (steep or undulating slopes, plains, rocky outcrops, dunes, salt pans, clay pans etc) any other characteristics (e.g. acid sulphate soils) that may require control strategies to reduce environmental impacts during operations or rehabilitation.

Landform and Topography

The Frome Project covers approximately 3,037 km² in the southwestern Callabonna Sub-basin, Frome Embayment. The region is characterised by a flat to gently undulating arid landscape shaped by sedimentary processes associated with Tertiary palaeochannels and Quaternary depositional systems. The project area is bounded by:

- Neoproterozoic sediments of the Adelaide Geosyncline to the east
- Benagerie Ridge to the west
- Proterozoic Willyama Supergroup of the Olary Ranges to the south.

These geological features define the regional topography, with palaeodrainage systems including the Curnamona, Billeroo, Erudina, Frome Downs, Stickhole, and Wyambana Palaeochannels traversing the area. Collectively, these contribute to a broad, low-relief alluvial plain draining northwards into Lake Frome.

Topographical Features of the Exploration Area

The proposed exploration areas are characterised by:

- Open, flat plains with some gently undulating terrain
- Ephemeral drainage channels, claypans, and floodplains responding to seasonal rainfall
- Low-lying Quaternary mesas and minor rocky outcrops
- Sand patches and isolated dunes, more common along palaeochannel margins

Vegetation is generally sparse, dominated by saltbush and chenopod shrublands that assist in soil stabilisation.

Susceptibility to Erosion

The project area has a low susceptibility to erosion due to its flat-lying topography and stabilising vegetation cover. Ephemeral drainage channels and claypans may experience short-term surface water flow during intense rainfall events, but these are naturally occurring features with minimal effect on landscape stability. Drill pad placement and access routes will, where practical, avoid steep embankments, drainage lines, and areas prone to soil scalding. Any track upgrades or new track construction will incorporate erosion control measures where feasible, including use of existing disturbed corridors, minimised vegetation clearance, and drainage controls in consultation with landholders.

Visual Landscape Attributes

The region has low visual sensitivity due to its remoteness and lack of elevated public viewpoints. The landscape is largely flat and expansive, with limited relief from low mesas and dunes. There are no significant scenic lookouts or public access areas within or adjacent to the exploration licences. The nearest conservation area is Lake Frome National Park, which borders EL 6554 Frome Downs to the north; no exploration activities are proposed within or directly adjacent to the park boundary.

The Frome Project covers an area of approximately 3,037 km² in a semi-arid, drought-tolerant region of inland South Australia, within the south-western Callabonna Sub-basin, Frome Embayment. The landscape is predominantly flat lying to gently undulating, with sand dunes, ephemeral drainage plains, and occasional outcropping Quaternary mesas.

Soil Types and Surface Cover

Soil types across the project area vary with topography and underlying geology. The key soil types features skeletal sandy loam soils that support saltbush (chenopod) vegetation across broad open plains. Sandy soils and low-lying undulating sand dunes provide habitat for patches of native grasses and spinifex, while loamy sands, clayey loams, and silts occur along ephemeral drainage lines and floodplains, often supporting larger eucalyptus species. Additionally, saline and gypsum-derived soils, particularly near Lake Frome and associated playas, host salt-tolerant vegetation.

The soil composition is primarily derived from Quaternary sediments, including:

- The Willawortina Formation (Czw): ~10 m of poorly sorted alluvial deposits with carbonate nodules and cemented conglomerates.
- The Eurinilla Formation (Qpe): Coarse channel deposits, finer floodplain facies, and clayey aeolian sediments towards the surface.
- Occasional gypsum crusts and surface saltpans near ephemeral drainage systems.

Soil Characteristics and Environmental Risks

- **Compaction Susceptibility:** Heavier textured floodplain soils and clay-rich substrates may be susceptible to compaction under wet conditions. Sandy loam plains and dunes, by contrast, are less prone to compaction but can be destabilised if vegetative cover is removed.
- **Erosion Potential:** The overall erosion risk is low due to the flat to gently undulating topography and stabilising vegetation cover. Localised erosion may occur along access tracks, drainage lines, and dune flanks if ground disturbance is not carefully managed. Surface water flow across floodplains during rainfall events could mobilise disturbed sediments.
- **Dust Generation:** Sandy and silty surface materials are prone to dust generation under dry, windy conditions. Dust emissions are expected to be localised and intermittent, with management measures such as speed limits and water spraying of high-traffic areas applied where necessary and practical.
- **Runoff and Sediment Control:** Given the low relief, surface runoff is typically slow-moving and dispersed. However, minor sedimentation impacts could arise from compacted track surfaces and disturbed drill pads during heavy rainfall. Where appropriate, simple sediment controls (e.g., silt socks or contour banks) may be installed to prevent sediment migration off-site.

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Surface Water

Will the proposed program interfere with surface water bodies and natural drainage (e.g. drainage lines, creeks, floodplains, wetlands)?

Yes

Describe the potential interference and surface water bodies and natural drainage on maps

The proposed exploration program may intersect ephemeral drainage lines and floodplain areas within the Frome Project; however, disturbance is expected to be minimal and unlikely to significantly impact surface water flow.

Surface Water Features

- Two main ephemeral watercourses traverse the project area:
 - o Siccus River (~153 km in length), receiving flows from Holowilena, Walpunda, Ootna, and Arcoota Creeks.
 - o Wilpena Creek (Pasmore River) (~135 km in length), which joins the Siccus River before discharging into Lake Frome during significant rainfall events.
- Surrounding floodplains are classified as Land Subject to Flooding, inundated only in exceptionally wet years.
- There are no permanent water bodies in the proposed exploration areas; Lake Frome lies adjacent to EL 6554 (Frome Downs).

Potential Interference and Impact Mitigation

- Drill tracks and pads may be located within broad ephemeral drainage corridors, which are flat and wide, reducing the likelihood of flow obstruction.
- Existing station tracks will be used where feasible to minimise new disturbance.
- New access tracks and drill sites will avoid active flow paths where practical, and no embankments or berms will be constructed that could alter natural flow.
- Erosion and sediment controls may be implemented in areas prone to concentrated runoff.
- Activities will be scheduled, where possible, to avoid operations during wet conditions.

Given the intermittent nature of surface water flows and the low-impact nature of the proposed activities, interference with surface water and drainage is expected to be minor, localised, and manageable with standard control measures.

Indicate how you will avoid disturbance

Is the program area located within water protection areas defined under the River Murray Act 2003?

No

Select the name(s) of protected water areas

Is the program area located within any prescribed watercourses or prescribed surface water areas under the Landscape South Australia Act 2019?

No

Select the name(s) of the prescribed watercourses or prescribed surface water areas under the Landscape South Australia Act 2019.

Name

Applicable

There are no records to display.

Attach Files 

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Groundwater

Is groundwater likely to be intersected when conducting the exploration program?

Yes

Provide evidence or any supporting information why groundwater is unlikely to be intersected.

xxxx

Description of the localities/area where different groundwater conditions may be encountered

The Frome Project covers part of the Far North Prescribed Wells Area (PWA), managed under the Water Allocation Plan (WAP) adopted on 28 February 2021. This area includes wetlands of national and international significance, including Lake Frome, which supports important waterbird populations, migratory species, and several nationally threatened and endemic species (DEW, 2020).

Groundwater Systems

- The Jurassic-Cretaceous (J-K) Aquifer (Cadna-Owie Formation and Algebuckina Sandstone) is the primary regional groundwater resource.
- The Eyre Formation and Namba Formation are shallow Tertiary palaeochannel aquifers targeted by the exploration program.

Interaction with Proposed Activities

- Planned drilling will not intersect pressurised artesian of the Cadna-Owie Formation, eliminating risk of uncontrolled artesian groundwater flows.
- Standard drilling methods (rotary mud, diamond, sonic) will assist to restrict aquifer cross-contamination.
- Drillholes will be backfilled and grouted within regulatory requirements.

Hydrogeological Context

As shown in the Stratigraphic Column (Michaelsen et al., 2016), the targeted Tertiary units (Eyre and Namba Formations) are separated from deeper regional aquifers by confining layers (Bulldog Shale, Coorikiana Sandstone).

Summary

The program poses negligible risk to groundwater resources, with appropriate safeguards in place.

Refer to Figure 4. Frome Project, environmentally sensitive areas; Far North Prescribed Wells Area (dark olive boundary), Far North PWA Zone B (blue region), Lake Frome National Park (dark blue region), NPW Districts (green boundary), pastoral stations (orange outline) and Native Title determination areas (olive boundary) (NatureMaps, December 2022).

Description of the locality/area where different groundwater conditions may be encountered

Groundwater occurs in several separate aquifer systems in the Frome Embayment area and includes:

- Mount Painter Complex, Benagerie Ridge, Oлары Block and other fractured rock aquifers (Proterozoic)
 - o Fractured rock aquifers may occur beneath Tertiary sediments.
- Great Artesian Basin (GAB) associated aquifers, the Algebuckina and Cadna-Owie Formations (Jurassic to Cretaceous)
 - o The GAB covers the majority of Lake Frome, however, does not extend far south in the Frome Project; Figure 4 shows the southern extent of the GAB in relation to the Frome Project.
- Eyre Formation aquifer, expected to occur within blanket and palaeochannel sand units (Tertiary, Eocene).
- Namba Formation aquifer, expected to occur within blanket and palaeochannel sand units (Tertiary, Miocene).
- Potential younger near surface units.

Below is a map of groundwater wells within the vicinity of the Erudina prospect, EL 6555 (Curnamona). Indicative water level data from these wells has been sourced from the WaterConnect website:

<https://www.waterconnect.sa.gov.au/Systems/GD/Pages/Default.aspx>.

RSWL (m AHD) is the Reduced Standing Water Level measured in metres AHD (Australian Height Datum). The elevation of the water level is calculated by subtracting the Depth to Water (DTW) from the reference elevation. A negative value indicates that the water level is below mean sea level. The map below of the Frome Project shows the observed RSWL readings, that range from 5.4 m AHD to 142.9 m AHD.

Aquifers that may be intersected during drilling operations at the Frome Project include the Namba Formation, Eyre Formation, and possible aquifers closer to surface. Further detail is provided in the table below and is provided as SWL. Standing Water Level (metres) is the distance from the ground surface to the water surface.

Add the different groundwater conditions for each localities/areas to the table below.

Name ↑	Formation age and/or stratigraphic unit	Stratigraphic intervals (depth range) (m)	Aquifer formation name	Aquifer Interval/thickness (from-to) (m)	Aquifer Type	Aquifer salinity (TDS)	Depth to groundwater (m)	Comments
EL 6554	Namba Formation aquifer (Tertiary, Miocene)	45	Namba Formation	2-90	Confined	30000-17000	20	
EL 6554	Eyre Formation aquifer (Tertiary, Eocene)	130	Eyre Formation	90-150	Confined	3000-12000	130	
EL 6554	Eyre Formation aquifer (Tertiary, Eocene)	130	Eyre Formation	90-150	Artesian	3000-12000	130	
EL 6703, EL 6900, EL 6555	Namba Formation aquifer (Tertiary, Miocene)	45	Namba Formation	2-90	Unconfined	3000-17000	20	
EL 6703, EL 6900, EL 6555	Eyre Formation aquifer (Tertiary, Eocene)	130	Eyre Formation	90-150	Unconfined	3000-12000	130	
EL 6703, EL 6900, EL 6555	Namba Formation aquifer (Tertiary, Miocene)	45	Namba Formation	88	Unconfined	3000-17000	20	
EL 6703, EL 6900, EL 6555	Namba Formation aquifer (Tertiary, Miocene)	88	Namba Formation	88	Unconfined	3000-17000	20	
EL 6703, EL 6900, EL 6555	Eyre Formation – blanket and palaeochannel sands, (Tertiary, Eocene)	125	Eyre Formation	125	Unconfined	3000-12000	150	
EL 6703, EL 6900, EL 6555	Namba Formation aquifer (Tertiary, Miocene)	45	Namba Formation Alternating fine to medium-grained sand, silt and clay, with thin dolomite and limy	2-90	Unconfined	3000-17000	20	

Provide the environmental value of each aquifer present determined according to the current Environment Protection (Water Quality) Policy.

In accordance with the Environment Protection Water Quality Policy 2015 (WQ Policy). Based on regional hydrogeological data, the aquifers within the Frome Project area are expected to fall into the following salinity ranges:

- Underground waters with a background TDS level of 1,200 mg/L to less than 3,000 mg/L
 - o Likely to occur in the southern regions of the Frome project area, further away from Lake Frome.
- Underground waters with a background TDS level of 3,000 mg/L to less than 13,000 mg/L
 - o Expected in the central and northern regions, particularly nearer to Lake Frome where groundwater salinity increases.

The Namba Formation aquifers are typically found within the higher TDS bracket (3,000–17,000 mg/L), while the Eyre Formation aquifers, particularly in the southern project area, may present lower salinity values suitable for pastoral water supply.

No aquifers of potable water quality (TDS <1,200 mg/L) are expected to be present within the project area.

Provide a description of the existence, location and value of all Groundwater Dependent Ecosystems (GDE) within and immediately surrounding the project area

GDEs within the Frome Project area are limited and predominantly associated with:

- Lake Frome (north of EL 6554)
- Major ephemeral drainage features including the Siccus River and Wilpena Creek.

The broader project area, outside of these major drainage lines, is largely absent of mapped GDEs.

The Siccus River, which traverses the Erudina Prospect, is identified as having a low to moderate potential for groundwater dependency. These features are primarily reliant on shallow unconfined aquifers and are at greater risk from groundwater extraction associated with pastoral wells rather than mineral exploration activities.

Environmental Value of GDEs

GDEs in this region provide important ecological functions, supporting:

- Drought-resilient riparian vegetation.
- Habitat for fauna during periods of surface water flow.
- Contribution to ecosystem biodiversity near Lake Frome.

Aquatic GDEs

In the project area, mapped aquatic groundwater dependent ecosystems (GDEs) are primarily associated with creeks, rivers, swamps, and lakes. The majority of these are mapped as low to moderate potential GDEs, with more restricted areas of high potential GDEs occurring along specific watercourses and swamp systems. Larger features such as Lake Frome are mapped only as moderate potential GDEs, while smaller features such as Claypan Swamp, Embankment Pond, The Rushes Swamp, and Lake Tom are mapped as high potential GDEs.

Key waterbodies within the project area include:

- Wilpena Creek / Pasmore River – High and moderate potential GDEs
- Jadiaura Creek – Moderate potential GDE
- Siccus River – Low, moderate, and high potential GDEs
- Claypan Swamp, Embankment Pond, The Rushes Swamp, Lake Tom – High potential GDEs
- Katchiwilleroo Swamp – Low potential GDE
- Lake Frome – Moderate potential GDE

Terrestrial GDEs

The project area includes low, moderate, and high potential terrestrial GDEs mapped within the Cooper Creek–Bulloo River region and the Far North groundwater management area.

Type: *Maireana astrotricha* (mixed) shrubland <1m

Potential: High potential GDE

Location: Far North

BOM Mapping Area: Cooper Creek–Bulloo River

Geomorphology: Broad plains with red duplex soils, often with scattered dunes or saline depressions.

Type: *Maireana astrotricha* (mixed) shrubland <1m

Potential: Low potential GDE

Location: Far North

BOM Mapping Area: Cooper Creek–Bulloo River

Geomorphology: Broad plains with red duplex soils, often with scattered dunes or saline depressions.

Type: *Maireana astrotricha* (mixed) shrubland <1m

Potential: Moderate potential GDE

Location: Far North

BOM Mapping Area: Cooper Creek–Bulloo River

Geomorphology: Broad plains with red duplex soils, often with scattered dunes or saline depressions.

Type: *Rhodanthe floribunda* (mixed) forbland

Potential: High potential GDE

Location: Far North

BOM Mapping Area: Cooper Creek–Bulloo River

Geomorphology: Claypans, ephemeral swamps, and shallow depressions.

Type: *Dodonaea viscosa* ssp. *angustissima* (mixed) shrubland >1m

Potential: Moderate potential GDE

Location: Far North

BOM Mapping Area: Cooper Creek–Bulloo River

Geomorphology: Foothills, stony rises, and drainage lines, often on rocky or shallow soils.

Is the proposed program located within a prescribed wells area?

Yes

Select the prescribed wells

Far North Prescribed Wells Area

Is the proposed program located within a prescribed water resource area?

No

Select the prescribed water resource areas

Provide any additional information

Driller/s will have read Earth Resources Information Sheet M21 Mineral Exploration Drillholes – General specifications for construction and backfilling, prior to commencement of drilling.

Attach Files 

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File Name	File Size (Mb)	Created On	Download
Figure 4 Environmental sensitive areas.pdf	0.53 Mb	18-11-2025 13:30:41	Download (MERS/EP-03994/Ground water/Figure 4 Environmental sensitive areas_2025-11-18T03-00-41.825Z.pdf)

Native Vegetation

Will you be working within areas of native vegetation?

Yes

Provide the following information:

Advanced exploration activities will be conducted within areas of native vegetation.

The following is a review of the South Australian native vegetation floristic areas, National Vegetation Information System (NVIS) database available from NatureMaps.

https://location.sa.gov.au/LMS/Reports/ReportMetadata.aspx?p_no=898

NatureMaps identified nine major native vegetation groups in the proposed exploration lease area.

The project area comprises a range of South Australian vegetation groups, with dominant communities including chenopod shrublands, tall open shrublands, woodlands, and grasslands. Key vegetation groups are described below.

Low sparse shrubland (<1 m) dominated by *Sclerolaena obliquicuspis* (Limestone Bindii or Limestone Copperburr), with *Enneapogon avenaceus* (common speargrass), *Asphodelus fistulosus* (onion weed), *Carrichtera annua* (gopher mustard/ward's weed), and *Erodiocarpus scleranthoides* (globe-fruited saltbush).

Occurs on broad plains with red duplex soils.

Low open shrubland (<1 m) of *Maireana astrotricha* (low bluebush), *Maireana pyramidata* (sago bush) and *Atriplex vesicaria* (bladder saltbush), over ground layers of *Sclerolaena diclatha*, *Enneapogon avenaceus*, *Erodiocarpus scleranthoides*, *Sclerolaena obliquicuspis* (Limestone Bindii), and *Sclerolaena decurrens*.

Found on plains with red duplex soils.

Tall open shrubland (1–3 m) of *Eremophila sturtii* (turpentine bush), *Eremophila duttonii* (Dutton's/red-flowered emu-bush), *Senna artemisioides* ssp. *petiolaris* (mullein senna or woody cassia) and *Acacia victoriae* (prickly/emu wattle), with understorey *Rhagodia spinescens* (spiny saltbush), *Maireana pyramidata*, *Dodonaea viscosa* var. *microzyga* (slender hopbush), *Sclerolaena obliquicuspis*, *Enneapogon avenaceus*, *Enchylaena tomentosa* (ruby saltbush), *Sclerolaena limbata*, and *Dissocarpus paradoxus*.

Occurs on low plains, rises, and remnant dune systems with sandy soils.

Salt-tolerant vegetation of saline and gypsum-derived soils near Lake Frome and associated playas, including *Atriplex vesicaria*, *Maireana pyramidata*, and other chenopods.

Associated with saline depressions, playas, and gypsum flats.

Low open shrubland (<1 m) of *Nitraria billardiieri* (nitre bush), often with *Maireana pyramidata*, *Atriplex vesicaria*, *Rhagodia spinescens*, *Carrichtera annua*, *Tetragonia tetragonioides* (warrigal greens), *Enneapogon avenaceus*, and *Disphyma crassifolium* (roundleaf pigface).

Found in drainage depressions, floodouts, floodplains and saline run-on areas where flooding occurs.

Low shrubland (<1 m) of *Atriplex vesicaria* (bladder saltbush) with *Maireana astrotricha*, *Maireana pyramidata*, *Rhagodia spinescens*, *Ptilotus obovatus*, *Sclerolaena obliquicuspis*, and *Solanum ellipticum*.

Occurs on plains and rises with clay to sandy soils.

Tall open shrubland (>1 m) of *Acacia victoriae* (emu/prickly wattle), with *Eremophila duttonii*, *Alectryon oleifolius* (bullock bush), *Senna artemisioides*, and occasional *Acacia ligulata* (umbrella bush). Understorey includes *Maireana pyramidata*, *Maireana aphylla*, *Sida* spp., *Enneapogon avenaceus* and several *Sclerolaena* species.

Found on plains and rises surrounding ranges with clay to sandy soils.

Low open woodland of *Acacia* spp. (wattles) and *Senna artemisioides* (desert senna), with *Eremophila sturtii*, *Atriplex vesicaria*, *Maireana pyramidata*, *Enchylaena tomentosa*, *Sida* spp., and *Sclerolaena obliquicuspis*.

Found on sand plains, dunes, and swales with clay to sand/loam soils.

Low open tussock grassland (<1 m) dominated by *Sclerolaena brachyptera* (short-wing copperburr) with *Enneapogon avenaceus*, *Sclerolaena diacantha*, *Atriplex vesicaria*, *Sclerolaena obliquicuspis*, and *Austrostipa* spp. (speargrasses).

Occurs on clay plains, depressions, and alluvial plains with clay to loam soils.

Curnamona Prospect

The Curnamona Prospect Region comprises two (2) distinct South Australian vegetation groups.

Low sparse shrubland (<1 m) dominated by *Sclerolaena obliquicuspis* (Limestone Bindii or Limestone Copperburr), with *Enneapogon avenaceus* (common speargrass), *Asphodelus fistulosus* (onion weed), *Carrichtera annua* (gopher mustard), and *Erodiocarpus scleranthoides* (globe-fruited saltbush – though a precise common name is not well established).

Occurs on broad plains with red duplex soils.

Low open shrubland (<1 m) of *Maireana astrotricha* (low bluebush), *Maireana pyramidata* (sago bush) and *Atriplex vesicaria* (bladder saltbush), over ground layers of *Sclerolaena diclatha* (no widely used common name), *Enneapogon avenaceus* (common speargrass), *Erodiocarpus scleranthoides*, *Sclerolaena obliquicuspis* (Limestone Bindii), and *Sclerolaena decurrens* (no common name readily available). Found on plains with red duplex soils.

Tall open shrubland (1–3 m) of *Eremophila sturtii* (turpentine bush or narrow-leaved emu-bush), *Eremophila duttonii*

(Dutton's emu-bush or wishbone bush), *Senna artemisioides* ssp. *petiolaris* (mullein senna or woody cassia) and *Acacia victoriae* (prickly wattle), with understorey *Rhagodia spinescens* (spiny saltbush), *Maireana pyramidata* (sago bush), *Dodonaea viscosa* var. *microzyga* (slender hopbush), *Sclerolaena obliquicuspis* (Limestone Bindii), *Enneapogon avenaceus* (common speargrass), *Euchlaena tomentosa* var. *tomentosa* (no common name well known), *Sclerolaena limbata* (no widely used common name) and *Dissocarpus paradoxus* (no established common name). Occurs on low plains and remnant dune systems with sandy soils.

Saline and gypsum-derived soils, particularly near Lake Frome and associated playas, support salt-tolerant vegetation such as *Atriplex vesicaria*, *Maireana pyramidata* and other chenopods.

Refer to Figure 5. South Australian native vegetation floristic areas – NVIS within the Frome Project area, NatureMaps 2023.

Indicate why you will not be working within areas of native vegetation?

Attach Files 

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File Name	File Size (Mb)	Created On	Download
Figure 5 flora.pdf	0.54 Mb	18-11-2025 13:32:03	Download (MERS/EP-03994/Native Vegetation/Figure 5 flora_2025-11-18T03-02-03.686Z.pdf)

Fauna

Describe the native and feral fauna that may be present in the application area, including feral species.

Fauna (Native and Feral)

A NatureMaps search identified 157 records of eight (8) fauna species of national and state conservation significance within the Frome Project area. This includes:

- Three (3) Vulnerable species:
 - o *Amytornis modestus* (Thick-billed Grasswren)
 - o *Notomys fuscus* (Dusky Hopping-mouse)
 - o *Hieraaetus morphnoides* (Little Eagle)
- One (1) Rare species:
 - o *Neophema elegans elegans* (Elegant Parrot)

Additionally, a subspecies of the Thick-billed Grasswren, *Amytornis modestus curnamona* (Curnamona Thick-billed Grasswren), is recorded within the Project area.

An EPBC Act Protected Matters Report (PMR) identified:

- Two (2) threatened mammal species and eight (8) threatened bird species that may occur within the Project area.
- Lake Frome (located to the north of the Project area) is listed as a Nationally Important Wetland (inland saline lake) and supports significant populations of migratory bird species during high rainfall and flood events.
- Eight (8) Listed Migratory Species and 13 Listed Marine Species were identified in the PMR as potentially occurring within the region.

It is expected that common feral mammal species present in the broader region may include:

- Feral dogs (*Canis familiaris*)
- Feral goats (*Capra hircus*)
- Feral cats (*Felis catus*)
- House mice (*Mus musculus*)
- European rabbits (*Oryctolagus cuniculus*)
- European red foxes (*Vulpes vulpes*)

Refer to Figure 6 for mapped conservation significant fauna records within the Frome Project area.

Significant Habitats, Flora and Fauna

Are there any significant habitats, flora and fauna within the project area?

Yes

Use the table below to list any significant habitats and any rare or endangered flora and fauna species located or reported to have been in the area that may be impacted by the proposed program. Include known sightings of listed species on a locality plan/map.

Species name/habitat	Common name	NPW Act Rating	EBPC Act Rating
Acacia carneorum	Needle Wattle, Dead Finish, Purplewood Wattle There are four (4) records within the Frome Project.	Vulnerable (VU)	Vulnerable
Acacia glandulicarpa	Hairy-pod Wattle	Endangered (EN)	Vulnerable
Codonocarpus pyramidalis	Slender Bell-fruit, Camel Poison	Vulnerable (VU)	Vulnerable
Frankenia plicata	Braided Sea-heath	Vulnerable (VU)	Endangered
Pterostylis xerophila	Desert Greenhood	Vulnerable (VU)	Vulnerable
Swainsona murrayana	Slender Darling-pea, Slender Swainson, Murray Swainson-pea	Vulnerable (VU)	Vulnerable

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File Name	File Size (Mb)	Created On	Download
Figure 6 Flora and Fauna Sites.pdf	3.9 Mb	18-11-2025 13:33:23	Download (MERS/EP-03994/Fauna/Figure 6 Flora and Fauna Sites_2025-11-18T03-03-23.210Z.pdf)

Weeds and Pathogens

Provide information of the extent the area is affected or potentially affected by weeds and pathogens (e.g. phytophthora; buffel grass *Cenchrus ciliaris*).

Weeds and Pathogens

The Frome Project lies within the South Australian Arid Lands (SAAL) Landscape region, managed under the South Australian Arid Lands Regional Landscape Plan 2021–2026, which identifies pest animals and weeds as key management challenges. Pest weeds compete with native vegetation, reduce landscape productivity, and can contaminate animal products.

The Plan can be sourced at:

<https://www.landscape.sa.gov.au/saal/plants-and-animals/pest-plants-and-animals/pest-plants>

A NatureMaps search identified three (3) occurrences of Weeds of National Significance (WoNS) within the Frome Project area, all being Athel Pine (*Tamarix aphylla*):

- Two (2) records within EL 6703 (Erudina)
- One (1) record within EL 6555 (Curnamona)

Athel Pine is an invasive species known for displacing native vegetation and altering riparian ecosystems. No WoNS were identified in the EPBC Act Protected Matters Report (PMR) for the Project area.

Additionally, the South Australian Buffel Grass Strategic Plan 2019-2024 places the Project area within Management Zone 2, where occurrences of Buffel Grass (*Cenchrus ciliaris*) must be contained. No Buffel Grass has been recorded within the Project area; however, one occurrence exists approximately 8 km west of EL 6554 (Frome Downs).

Control Requirements – South Australia Arid Lands: Take reasonable steps to kill or prevent spread by manual or chemical removal.

Phytophthora (dieback pathogen) is not present in the area, with the arid conditions unsuitable for its proliferation.

Photo of *Tamarix aphylla* (Athel Pine) sourced from PIRSA website, URL:
https://pir.sa.gov.au/biosecurity/weeds/controlling-weeds/athel_pine

Refer to Figure 7. Weeds of National Significance and Buffel Grass, NatureMaps 2025.

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File Name	File Size (Mb)	Created On	Download	Expand/Collapse
Figure 7 Weeds of National Significance and Buffel Grass.pdf	3.62 Mb	18-11-2025 13:34:37	Download (MERS/EP-03994/Weeds and Pathogens/Figure 7 Weeds of National Significance and Buffel Grass_2025-11-18T03-04-37.359Z.pdf)	

Aboriginal Heritage

Describe the steps taken to identify Aboriginal heritage sites within the proposed area of exploration. Include a statement advising if an Aboriginal heritage survey has been conducted by the proponent and if so, the results of the survey.

A Heritage Survey was conducted between 19-24 February 2024, including two travel days, survey days were 20-23 February 2024. The survey was conducted on foot along 50 m wide drill traverse corridors at the Erudina prospect, covering approximately 30 line-km and in the vehicle along one single 12 km existing station track at the Sandyoota region.

A Heritage Survey Report was received from ACHM on 7 March 2024. Results of the Heritage Survey indicate there are no new Aboriginal archaeological heritage sites identified, however, there are specific areas to be avoided/protected from drilling activities and recommendations have been made. Specifically, at the Sandyoota Region, along the existing station access track where recommendations include: care will be taken to avoid dunes, drainage channels, and trees and scrub when choosing the locations of the drill pads along the verge of the existing station track in EL6554.

Additional Heritage surveys will be conducted as required in the future.

Environmentally Sensitive Locations

Indicate if you are intending to undertake exploration operations within the environmentally sensitive locations listed.

Yes

Name	Applicable
Original Curnamona Station Homestead	No
Inland Saline Lakes	Yes

Are you likely to impact on the environmentally sensitive area?

No

Detail the likely effects the proposed program may have.

Attach Files 

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File Name	File Size (Mb)	Created On	Download
Figure 4 Environmental sensitive areas.pdf	0.53 Mb	05-12-2025 22:07:07	Download (MERS/EP-03994/Env sensitive locations/Figure 4 Environmental sensitive areas_2025-12-05T11-37-07.575Z.pdf)

Exploration Operations

Exploration Scope

Describe all exploration methods to be covered by the PEPR

Exploration Scope

Proposed Exploration Activities include:

- Airborne Geophysical Surveys
 - o Regional magnetic / Radiometrics, Gravity and/or Airborne Electromagnetics (AEM) surveys may be acquired across EL 6554, EL 6555, EL 6703 and EL 6900.
 - o Survey flight lines may be flown at ~200 m spacing, approximately 70 m above ground height where possible.
 - o In accordance with Exploration Licence grant documentation, Schedule C standard conditions, condition 18, the company will provide details to the Director of Mines via the 'Notification of an airborne survey on a Mineral Exploration Licence' form.
- Ground Geophysical Surveys
 - o Detailed ground geophysical surveys may be acquired at prospect scale.
 - o Geophysical methods employed may include the following:
 - Passive Seismic or Ambient Noise Tomography
 - Ground Geophysics (Radiometrics / Gravity / Magnetics / Induced Polarisation / Electromagnetics).
 - Geochemical surveys (ground) – Quaternary cover focus
 - o Geochemical sampling may be conducted at prospect scale, where mineralisation is expected to be at relatively shallow depths, to include:
 - Radon monitoring is a direct measure of uranium mineralisation and can be achieved using passive radon monitoring techniques.
 - Biogeochemical sampling, targeting specific vegetation species such as *Maireana sedifolia* (Pearl bluebush) that is prevalent in the region.
 - Soil sampling, targeting geochemical dispersion elements such as Bi, Pb anomalism that may indicate a geochemical dispersion halo from uranium mineralisation at shallow depths where Quaternary sediments overlie the prospective Namba Formation.
 - Rotary Mud Drilling and Downhole Geophysics – Eyre and Namba Formation – Palaeochannel Targets
 - o Drillholes are designed to test for roll-front uranium mineralisation within Tertiary palaeochannels (Namba and Eyre Formations).
 - o Planned drill depths will average 200–250 m, with potential to extend to ~400 m where palaeochannel thickness increases. (based upon historical data this depth may be necessary).
 - o Drillholes will be sited based on geological interpretation of palaeochannel trends, existing drilling data, geophysical anomalies, and heritage clearances.
 - o Drillhole line spacing is expected to be 400–600 m, with drillholes along each traverse spaced ~50–200 m apart, depending on geological variation. Closer spacing may be required depending on results.
 - o All drillholes will be logged geologically for lithology, weathering, oxidation/reduction states, moisture content, and uranium mineralisation indicators.
 - o Downhole geophysical logging may include a combination of total Gamma (natural), induction (resistivity), Borehole Magnetic Resonance (BMR), neutron porosity, formation density, Prompt Fission Neutron (PFN) logging for uranium quantification where appropriate.
 - o Drill cuttings will be collected at 1–2 m intervals, described and laid out on site.
 - o Selective samples (~3 kg per sample) will be collected where mineralisation or prospective zones are encountered and sent to a NATA-accredited laboratory for chemical assay.
 - o All drillholes will be plugged and rehabilitated as soon as reasonable able upon completion as per regulatory standards.
- Drilling (Sonic or Diamond Core) – Subject to Rotary Mud Results
 - o Sonic or Diamond Core drilling may be required following results from the Rotary Mud program, and will serve two primary purposes:
 - o To extract core for stratigraphic purposes, aiding in the interpretation of palaeochannel sedimentary sequences and associated redox fronts.
 - o To further investigate zones where uranium mineralisation of potentially economic grades has been identified.
 - o Drillholes are proposed to extend from surface to the target depth, with the aim of retrieving continuous core for detailed geological and geochemical analysis. Where appropriate, holes may include a Rotary Mud pre-collar, completed to the same standards as outlined for rotary drilling above.
 - o All drillholes will be geologically logged and recorded in the same manner as Rotary Mud holes.
 - o Downhole wireline logging will be undertaken by licensed and qualified contractors. Tool selection will be based on suitability and availability, and is expected to include one or more of the following:
 - Natural gamma (typically calibrated for equivalent uranium)
 - Resistivity / induction tools
 - Magnetic deviation
 - Borehole Magnetic Resonance (BMR)
 - Neutron porosity
 - Formation density
 - Prompt Fission Neutron (PFN).

Tools requiring radiation licences will be operated in compliance with all applicable regulatory requirements.

Where uranium mineralisation is intersected, core will be cut and sampled according to standard procedures, with

samples sent to a NATA-accredited laboratory for chemical analysis. Rotary Mud pre-collar chip samples, if present, will be handled and assessed to the same standards as outlined in the Rotary Mud section.

Should drilling results confirm a significant discovery or indicate uranium mineralisation with economic potential, additional resource drilling may be undertaken.

Program Flexibility

Given the real-time data provided by downhole geophysics and the adaptable nature of rotary mud drilling, it is intended that drilling programs remain somewhat dynamic. Nevertheless, all activities will conform to the scope and expectations set out in the relevant updated program notifications.

Describe the extent of exploration operations – e.g. drillhole spacing and drill line density.

- Airborne Geophysical Surveys
 - o Survey flight lines may be flown at ~200 m spacing, approximately 70 m above ground height where possible.
- Rotary Mud Drilling and Downhole Geophysics
 - o Drillhole line spacing is expected to be 400–600 m, with drillholes along each traverse spaced ~50–200 m apart, depending on geological variation. Closer spacing may be required depending on results.

Exploratory Drilling Approach

Drilling is exploratory in nature, with programs approved under this PEPR being guided by results from associated activities (e.g., geophysics), ongoing interpretation, and the remodelling of historical data. Exploration will focus on locating palaeochannels and palaeovalleys with valley-fill sands, carbonaceous or organic-rich facies, and features such as drainage confluences, depocentres, oxbows, or high-sinuosity channels. Areas proximal to radiogenic source rocks, redox boundaries (defined or inferred from drilling), and litho-structural traps will also be assessed.

Regional Drilling Methodology

In regional exploration areas, Rotary Mud drilling is expected to be conducted along transects oriented perpendicular to the interpreted redox front. Drill hole spacing across the front will range from 25 m to 400 m. Initial transects are expected to be spaced regionally (approximately 400 to 600 m apart), with infill drilling at closer spacing (100 m to 400 m) if areas of interest are identified.

Target Refinement Drilling

Where drilling intersects features consistent with the target criteria—such as mineralisation, alteration, or redox changes—closer-spaced drilling (10 m to 100 m) will be undertaken using Rotary Mud Drilling to better define the refined target area. These can be further complimented by Diamond Core and/or Sonic Drilling. This tighter spacing is necessary due to the narrow and sinuous nature of the target mineralisation. Wherever practicable, drill pads or pits will be reused to minimise ground disturbance. Until mineralisation is confirmed, drilling will occur on an as-required basis.

Describe the geographic extent of the area covered by the PEPR, including a general locality plan with tenement details, landowner boundaries and areas with environmental classifications or sensitivities.

See Figure 1

Describe the specific environments where exploration operations will not be conducted – e.g. parks, reserves, salt lakes etc.

Specific environments where exploration will not be conducted:

- Lake Frome Regional Reserve and other Parks/Reserves.
- Areas of Aboriginal heritage significance (as identified through Heritage Surveys).
- Active waterways, drainage lines, floodplains.
- Pastoral infrastructure (as agreed with landowners).

Equipment and Personnel Requirements

Describe the maximum composition of field crews (operator, contractors, and geologists) and proposed working hours/days for each type of activity.

Geologists 3

Land access/environmental 2

Field assistants/technicians 4

Drilling crew 6

Site preparation and rehabilitation 2

Other (provide details) 2

1 Shift per day. 12 hours per day. 7 days per week

Note it is envisaged that a common composition of field staff will be totalling up to 8 routine staff members, working on a single 12 hour shift, however, should it be warranted a double shift or 2 x 12 hour drilling shifts may occur as to enable continuous drilling activities for which numbers will increase accordingly. Increases in numbers may also temporarily occur due to shift changeover or site visits from management or other representative personnel.

It is anticipated that only one (1) drilling rig will be operational at any one time, however, may include an additional rig based on exploratory requirements e.g. 1 mud and 1 diamond. A Loader/Backhoe will be available throughout the program to prepare access tracks, dig sedimentation pits, and assist with rig access and site rehabilitation.

Using the table below, describe the equipment (size, number and contractor details) required to conduct the proposed operations.

Name	Owner/Operator	Description/capacity	Activity/purpose
Loader / Backhoe	Pre-approved contractor	Track clearance Drill pad clearance Sedimentation pit and suction pit excavation Bulk sample disposal pit excavation Bunding	Clearance requirements for advanced exploration activities Pit excavations to be surrounded by protective bunding barrier (to reduce impacts from sediment and/or water spills). Site preparation of access tracks, drill pads, sedimentation pits, disposal pit, site rehabilitation
Drilling Rig/s: (Rotary Mud) (Sonic) (Diamond core)	Drilling contractor	Rotary mud drilling rig Sonic drilling rig Diamond or multi-purpose drilling rig	Purposes of deep Rotary Mud drilling targeting mineralised Formations Purposes of coring or mineralised units where required using diamond or Sonic drilling
Support Vehicles Water truck Support truck	Contractor vehicles	Medium sized support truck/s	Transport of diesel, water, drilling rods, consumables to drilling rig throughout drilling operations. May include unit for grouting holes
Geophysical Vehicle	Geophysical wireline contractor	1 4WD light vehicle with wireline logging unit	Wireline logging unit
Light Vehicles	Vehicle hire / company vehicles	3-4 4WD light vehicles	Transportation of personnel, consumables, general field equipment and samples
Other Earthmoving (i.e., Grader)	Pre Approved Contractor / Landholder	TBA - however required heavy machinery such as a grader, front end loader and/or tip truck to undertake required maintenance on existing tracks.	Undertake maintenance on existing tracks and offer support to operations as required (note grader will not be used in association with temporary access tracks)

Low Impact Exploration Activities

Will low impact exploration operations be conducted that are not covered by the Generic program for environment protection and rehabilitation – low impact mineral exploration in South Australia, (generic PEPR)?

No

Describe each type of low impact operations proposed.

Drilling Operations

Will exploration drilling operations be conducted?

Yes

Identify all the drilling methods that will be used.

Rotary Mud, Diamond Drilling, Rotary Mud with Diamond Tails, Other

Where 'Other' drilling method is selected, provide a description of the drilling method.

Sonic Drilling Method

Sonic drilling is a technique that uses high-frequency vibrations to allow ease of penetration and provides recovery of near-complete, relatively undisturbed core samples from both solid and unconsolidated materials. The method uses a hydraulic mechanism, eliminating the need for drilling fluids and minimising the risk of sample contamination. Dual-tube drilling allows for simultaneous collection of formation water samples during drilling. Sonic drilling is particularly suited to uranium exploration in Tertiary palaeochannel sediments, as it maximises core recovery in soft sediments compared to other coring techniques.

Drillsite Preparation

If exploration drilling activities are proposed, describe the methods used to prepare sites, including vegetation clearance requirements, site levelling and digging of sumps.

Drilling activities (Rotary Mud, Sonic, and Diamond) will, where practicable, minimise surface disturbance by using existing station tracks, fencelines, historic drill lines, and previously cleared pads. Drill sites will only be cleared as necessary, with pads typically measuring ~30 m × 30 m to accommodate rigs, support vehicles, and infrastructure. Levelling will be avoided unless required for safety, and any vegetation clearance will, if feasible, be undertaken with a raised blade to preserve rootstock. Topsoil and cleared vegetation will be stockpiled separately for later reinstatement during rehabilitation where practicable.

Rotary Mud and Diamond drilling may require excavation of two, and occasionally three, sedimentation sumps (approx. 5 m × 2.5 m × 1.5–2 m) to contain drilling fluids and cuttings, with water use of ~25,000 litres per hole depending on ground conditions, additional water will be used as required to maintain hole conditions. Sonic drilling may require a single sump of similar dimensions, though often none is needed.

Rotary Mud drilling will, where practicable, collect cuttings every 1–2 m; Sonic and Diamond drilling will obtain core samples (high-recovery core for Sonic; continuous core for Diamond, with space allocated for core processing if required). All drillholes will be logged and grouted as per regulatory guidelines, to prevent aquifer crossflow and ensure secure closure.

Rehabilitation will occur as soon as practicable following drilling, allowing sumps to dry and operational needs (e.g. twin holes) to be completed. Disturbed areas will, where feasible, be recontoured, and stockpiled topsoil and vegetation respread to promote natural regeneration.

Clearance of native vegetation will be avoided wherever possible and minimised where necessary to establish safe operational areas as per PEPR guidelines.

Drillhole Construction and Decommissioning

Drillhole construction and decommissioning

Yes

Have the personnel responsible for implementing the proposed program read and understood the Earth Resources Information Sheet M21, Mineral exploration drillholes – general specifications for construction and backfilling?

Yes

Describe how drillholes will be constructed, including the casing material to be used, depth of casing, if the casing will be cemented, cementing intervals and the class of driller that will install the casing.

Rotary Mud drillholes are vertical holes to depths of typically 200-250 m, and up to 400 m. Rotary Mud drilling uses a rotating drill pipe with a hard-tooled drill bit attached at the bottom. Fluid is forced down through the drill pipe and then back up the borehole. It is then discharged at the surface through a ditch into a Sedimentation Pit. As the cuttings settle in the pit, the fluid overflows into a Suction Pit, where a pump recirculates the fluid back through the drill rods. Pit excavations will be surrounded by a protective bunding barrier (to reduce impacts from sediment and/or water spills). The drilling fluid serves to: (1) cool and lubricate the bit, (2) stabilise the borehole wall, (3) carry the cuttings, and (4) prevent the inflow of formation fluids, thus minimising cross contamination of aquifers. The drill string is driven by a rotary table which unlike more conventional rigs (top driven) is located level with the wheels at the rear of the rig. No casing of the drillholes will be necessary for the Rotary Mud method. Drillholes will be rehabilitated as per M21 guideline for backfilling of drillholes which penetrate more than one aquifer.

Sonic or Diamond Core Method drillholes will be used to collect drill core for analysis. Sonic drilling is a technique that uses vibration frequencies to allow ease of penetration and provides for near complete and relatively undisturbed core samples from solid and unconsolidated materials. A hydraulic mechanism removes any need for drilling fluid to achieve minimal contamination of core samples. Sonic drilling is suited to uranium mineralisation in Tertiary palaeochannel sediment environments as it maximises core recovery in soft sediments compared to other coring techniques. Diamond Core drilling uses a diamond-impregnated drill bit to cut through rock to produce a solid core. The core is captured in the hollow drill bit forming a continuous sample of rock. It's a highly accurate method with precise results. Drillholes will be rehabilitated as per M21 guideline for backfilling of drillholes which penetrate more than one aquifer. Suitably qualified and experienced drilling contractors will be commissioned to complete the drilling activities. All drilling contractors will be required to read and understand the Earth Resources Information Sheet M21, Mineral exploration drillholes – general specifications for construction and backfilling as part of the Site Induction. No artesian groundwater is expected to be encountered.

When describing drillhole decommissioning requirements, include the materials to be used, stratigraphic intervals where cement plugs will be placed, if the casing will be removed and when decommissioning will occur after drilling is completed.

All drillholes (Rotary Mud, Sonic, and Diamond) will be decommissioned following completion of sampling, downhole logging, and other data collection activities. Decommissioning will involve grouting per M21 guideline for backfilling of drillholes which penetrate more than one aquifer using cement-based grout to seal the borehole and any intersected aquifers, with stratigraphic control applied where applicable to ensure aquifer isolation. An attempt to remove any casing will be undertaken prior to grouting where feasible, unless removal is not possible due to hole instability, safety concerns, or other operational constraints whereby collars will be cut ~0.5m below surface and cut as per regulatory guidelines. For Sonic drilling, casing is only used if required to maintain hole integrity, and for Diamond drilling, casing is typically limited to upper unconsolidated intervals. All drillholes will be rehabilitated in accordance with M21 guideline for backfilling of drillholes which penetrate more than one aquifer, and any casing or other infrastructure protruding above ground will be removed. Photographic monitoring of rehabilitation will be undertaken for all sites and included in the Annual Compliance Report.

Attach Files 

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File Name	File Size (Mb)	Created On	Download
Schematic Backfilling of a drillhole_20260114.pdf	0.06 Mb	14-01-2026 10:12:36	Download (MERS/EP-03994/Drillhole construction and decommissioning/ Schematic Backfilling of a drillhole_20260114_2026-01-13T23-42-36.302Z.pdf)

Costeans and Bulk Sample Disposal Pits

Will costeans/bulk sample disposal pits be required for the proposed program?

Yes

Indicate the maximum dimensions and size of pits and costeans.

22.50

Describe site preparation methods, vegetation clearance, and safety and maintenance requirements

1. Disposal Pit - 2.5m deep x 3m long x 3m wide

A disposal pit may be required for the disposal of radioactive samples and cuttings from exploration activities. The location, dimensions and construction requirements will be outlined in the PEPR or Program Notification, to be approved by DEM. The details will clearly demonstrate why a specific location has been selected, taking into account all potential stakeholder and environmental issues including topography, social, biological and radiological aspects. The disposal pit is designed to:

- o Hold samples removed from their sample bags and containers, not for any other waste disposal type;
- o Be located in a stable area that does not compromise its future use, and on ground not subject to flooding or erosion which may re-expose the radioactive material;
- o Be constructed so as to ensure the material has at least 2 metres of clean and compacted soil cover;
- o Be located within the exploration licences associated with the authorised exploration program.

o It is envisaged that 2 Disposal Pits may be required - maximum dimensions will be 3 m long by 3 m wide by 2.5 m deep = 22.5 m³. This will allow for a total of 9 m³ (4.5 m³ per pit) of contaminated material to be disposed of to allow for 2 m of cover. The number of pits and dimensions will be further outlined in the Program Notification.

2. Disposal Pit Closure Report

A Disposal Pit Closure Report will be completed for each pit, providing the following details:

- o The location (GPS coordinates) and dimensions of the pit;
- o A list of contents;
- o Photographic confirmation of the construction of the pit;
- o Photographic confirmation of the pre-closure waste location within the pit indicating depth;
- o Photographic confirmation of the post-closure landform;
- o Measured gamma dose rates (scintillometer readings) before construction and after closure.

The Disposal Pit Closure Report will be provided to DEM within one month of pit closure.

Sample management

Describe the size of samples collected (including drilling samples and bulk sampling), collection methods, materials used when collecting the sample, sample disposal methods (including removal of sample bags), safety management and any other sample management requirements at the exploration site (e.g. tarps or matting used to contain cuttings). Include requirements for on-site geological sample management (splitting of archive samples, bag farms, core processing and storage).

Rotary Mud Method drill cuttings will be collected at 1–2 metre intervals using a bucket or shovel and laid out in rows on the drill pad. A representative sample will be retained for geological and geochemical analysis. Larger samples may be collected for assay from mineralised intervals or where results are considered significant for interpreting the mineral system. All samples showing elevated levels of Naturally Occurring Radioactive Materials (NORM) may be sent to a NATA-accredited laboratory, in accordance with the Radiation Management Plan (RMP). Remaining drill cuttings will be disposed of in the drill sump following standard environmental procedures.

Sonic/Diamond Core Method drill core will be relocated to a Core Storage facility at the Laydown Area or near the Campsite and laid out for logging purposes. Where uranium mineralisation is intersected, core will be cut and sampled according to standard procedures, and samples may be sent to a NATA-accredited laboratory for chemical analysis. Drill core will be stored appropriately or transported off-site on completion of the program.

As per Orpheus RMP Disposal of Radioactive Waste Materials

Where radioactive mud, cuttings or samples are present in mud pits, the pits will be allowed to dry and be covered by a minimum of 1 metre of compacted clean soil. For core cutting of radioactive samples, the waste slurry will be directed to a mud pit for disposal as above.

All samples will be removed from sample bags for disposal. Mineralised samples will be, where possible, returned to the mud sump (i.e. before other cuttings). The drill hole will then be rehabilitated in accordance with the PEPR and DEM Information Sheet; M21 Mineral exploration drillholes – General specifications for construction and backfilling. Where this is not possible, mineralised samples from individual drill holes will be buried in adjacent mud pits if available with at least 1 metre of compacted clean soil cover.

Transportation of radioactive samples will be conducted in accordance with the Radiation Management Plan, that states: Radioactive materials collected during exploration programs will be transported by the Company from the Frome Project, to within South Australia, in accordance with the following legislation:

- Code for the safe Transport of Radioactive Material (2019).

Most exploration samples collected will be either (1) non-radioactive, or (2) low-level radioactive. Radioactive samples can usually be transported as an 'Excepted Package'. All transportation shipments of radioactive samples will be packaged and labelled according to the Transport Code.

Refer to APPENDIX A, Radiation Management Plan.

Refer to APPENDIX B, endorsement of the Radiation Management Plan by the EPA.

Access Routes to Work Areas

Will existing tracks require upgrading and/or maintenance?

Yes

Detail the work required to upgrade/maintain existing tracks.

Most of the existing station tracks are in a good condition and do not require upgrading, however, ongoing monitoring and discussion with the

landholder(s) will be undertaken as to ensure they remain in usable condition.

It is envisaged track upgrading may be required in places, along old fence lines or overgrown sections of existing tracks.

Existing track (including fence line tracks) upgrading will be undertaken using the following method:

- Where possible a loader applying the lifted bucket technique to scrape / demarcate the pre-existing track. However, subject to

ongoing use and environmental conditions a grader may be utilised in consultation with the landholder to upgrade the tracks

used within the proposed program.

- Watering down of tracks using a water truck may be required for extended periods of time, or where significant bull dust develops.

- Mitre drains will be installed for the purposes of surface water management.

- Track upgrading will be conducted in consultation with the landowner and take into consideration the requirements of the

pastoralist as well as the requirements of the exploration program. Heavy vehicles such as water trucks require tracks of a

suitable standard to prevent damage to equipment.

- Track upgrading will be contracted to a Landowner where practicable and possible.

Refer to Figure 1: Location map of the Frome Project, including townships, pastoral lease boundaries, access roads and the gas pipeline.

Will access off existing tracks be required?

Yes

Detail the method(s) for gaining access and if vegetation clearance is required. Details of the total area of disturbance (includes drill traverses and seismic lines) required off existing tracks (i.e. length (km) and width (m) of new tracks) must be provided in the program notification.

Low-Impact Exploration Activities

Access off existing station tracks will be required for low-impact ground exploration activities, including:

1. Geochemical surveys (e.g. radon monitoring, soil sampling, biogeochemical sampling) — accessed using light 4WD vehicles along existing tracks and low-impact traverse lines.
2. Ground geophysical surveys:
 - o Gravity method — accessed using all-terrain light vehicles or quad bikes.
 - o Passive Seismic method — accessed using all-terrain light vehicles or quad bikes.

These low-impact activities will utilise minimal-disturbance access methods. No vegetation clearance is anticipated for these activities.

Advanced Exploration Activities

Access off existing tracks for advanced exploration is required for the following purposes:

1. Drill traverses for Rotary Mud drilling will require new (temporary) access tracks. These will be created using a loader with the lifted bucket technique to scrape and demarcate the track alignment and drill pad, and to excavate sedimentation pits.
 - o Rootstock will be retained in the ground where possible and safe to do so.
 - o Native vegetation will be avoided where possible. Where possible trees will be avoided but if required may be trimmed or removed to ensure safe access.
 - o Sedimentation pits will be moderately excavated, and material stockpiled to preserve topsoil for rehabilitation.
2. It is envisaged that no new access tracks will be required for Sonic drilling, as these holes are intended to follow up Rotary Mud targets and will utilise the same cleared access paths.
3. Consultation with stakeholders, including landowners and Traditional Owners, will occur before establishing any new access tracks.
4. Vegetation clearance and environmental screening of new access tracks will be undertaken in accordance with the company's land clearance protocol, which includes:
 - o Traversing the proposed track alignment on foot to identify any potential environmental sensitivities (e.g. Aboriginal heritage sites, significant flora/fauna habitat, surface water features, or existing infrastructure).
 - o Demarcating the approved access route with pink flagging tape.
 - o GPS logging of the route.
 - o Pre-clearance photographic monitoring for environmental records.
5. Total area of disturbance (i.e. length and width of new access tracks) will be provided in the Program Notification.

Access off existing tracks for low-impact exploration is required for the following purposes:

1. Ground geochemical survey(s) traverse and grid pattern will be accessed using a light vehicle 4WD.
2. Ground geophysical survey(s) grid pattern will be accessed using an all-terrain light vehicle, quad bike.

Access off existing tracks for advanced exploration is required for the following purposes:

1. Temporary access tracks will be required for drill traverses.
 - a) Drill traverses will require the Loader applying the lifted bucket technique to scrape (i.e. leaving rootstock in ground, where possible and safe to do so) and demarcate the track and drill pad, and to excavate sedimentation pits.
 - b) Native vegetation will be avoided where possible, including limiting the removal of trees or clustered vegetation, for which trimming will be prioritised if required.
 - c) Excavation of the sedimentation pits will be moderate, and material stockpiled so that topsoil is preserved for rehabilitation.
2. Temporary access tracks required for advanced exploration activities will be consulted with relevant stakeholders.
3. Temporary access tracks will be cleared in accordance with the company's land clearance protocols, i.e. the temporary access tracks will first be traversed to determine whether there are any potential environmental risks such as: Aboriginal heritage, species of significance (flora) and habitats (fauna), or infrastructure that need to be avoided prior to clearance. The new access track will then be demarcated with flagging, picked up with GPS tracking and representative pre-clearance photographic monitoring recorded.
4. Details of the total area of disturbance for temporary tracks will be provided in the Program Notification.

Attach Files 

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Campsites and Equipment Laydown Areas

Indicate where staff and contractors will be accommodated during the exploration program.

Accommodation for low-impact and advanced exploration activities will be at the following locations depending on the prospect location:

- Curnamona Station (Shearers Quarters) located adjacent to the Curnamona Homestead.
 - o This will be a main camp in consultation with the landowners to access the prospect areas (Curnamona Prospect Region, Erudina prospect).
- Erudina Woolshed
 - o This may be a main camp in consultation with the landowners to access the prospect areas (Namba Calcarenite prospect, Forester Bore, One Gum Bore prospects).
- Frome Downs Station (Accommodation)
 - o This may be a main camp in consultation with the landowners to access prospective areas in the northeast (Sandyoota prospect).

Temporary fly-camps may be used for low-impact exploration activities.

Details of the campsites will be provided in the Program Notification.

What is the maximum number of personnel requiring accommodation?

15

Is a campsite required to be established?

No

Provide a description and justification of the camp location (e.g. previously cleared areas etc.), and any other relevant information.

What will be the total area (ha) of the campsite(s)?

—

Will native vegetation clearance required?

—

What will be the total area (ha) of vegetation clearance for the campsite?

—

Describe the methods used to prepare the campsite including vegetation requirements and site levelling.

Will any excavations be required?

No

Describe the purpose of the excavation

Describe the maximum volume (m³) of material to be excavated.

—

Provide confirmation that the proposed ablution facilities have been endorsed for use by the Department of Health or local council, where applicable.

—

Indicate why endorsement approval is not required by the Department of Health or local council.

Proposed Infrastructure (includes caravans, tents, offices, hydrocarbon and water storage requirements etc)

Proposed infrastructure	Quantity	Description / capacity
Portable Drill Additive and Cement Store	1	Drill additives and cement will be containerised and stored on pallets. – All drill additives are biodegradable as used commonly within the exploration industry.

Will laydown areas be required?

Yes

Will the laydown area(s) be located at the same location as the campsite?

No

Provide a description and justification of the laydown area location (e.g. previously cleared areas etc.), and any other relevant information.

Where possible, Orpheus intends to utilise existing cleared and levelled areas previously used by station operations, subject to agreement with the landholders, or alternatively where possible utilise, a location associated with a cleared drill site. If required a centralised area(s) will be cleared in accordance with the above considerations.

What will be the maximum area (ha) required for the laydown area(s)?

0.25

Will native vegetation clearance be required?

No

What will be the total area (ha) of vegetation clearance for the laydown area?

—

Describe the methods used to prepare the laydown area including vegetation requirements and site levelling.

Will any excavations be required?

No

Describe the purpose of the excavation.

What will be the volume (m3) of material to be excavated.

—

Proposed infrastructure (includes hydrocarbon and water storage requirements)

Proposed infrastructure	Quantity	Description / capacity
Transportable (shipping) container/s to hold drilling equipment	1	<ul style="list-style-type: none">• The laydown area will be to contain drilling equipment located near the campsite and in area that can be readily accessed during drilling operations.• Shipping containers are used for the storage of maintenance equipment, drilling consumables and workshop equipment.
Portable Drill Additive and Cement Store	1	<ul style="list-style-type: none">• Drill additives and cement will be containerised and stored on pallets.• All drill additives are biodegradable as used commonly within the exploration industry.
Drilling Rods	1	<ul style="list-style-type: none">• An area at the laydown will be designated to store drilling rods.
Maintenance Area	1	<ul style="list-style-type: none">• Any maintenance would be undertaken on top of plastic sheeting or other ground protection measures to prevent spills or leaks to the ground surface.
Waste Storage	1	<ul style="list-style-type: none">• Recyclables and waste drums will be stored at the proposed waste storage facility prior to collection and transport to an appropriately licensed waste and recycling facility.

Other Exploration Methods and/or Ancillary Operations

Are any other proposed exploration methods (e.g. seismic) and/or ancillary exploration operations required?

Yes

Describe the activity(s), site preparation, vegetation clearance, and safety and maintenance requirements.

Geophysical surveys (ground)

- Detailed ground geophysical surveys may be acquired at prospect scale.
- Geophysical methods employed may include the following:
 - o Passive Seismic or Ambient Noise Tomography
 - o Ground Geophysics (Radiometrics / Gravity / Magnetics / Induced Polarisation / Electromagnetics)
- Vegetation clearance will be minimal with these activities and disturbance of the soil will only be required where applicable to the technique namely consisting of shallow holes or trenches to house the associated acquisition equipment. ATV or Light vehicles will be utilised with the acquisition.

Geophysical surveys (airborne) – No site prep or vegetation clearance required

- Regional magnetic / Radiometrics and/or Airborne Electromagnetics (AEM) surveys may be acquired.
- Survey flight lines may be flown at ~200 m spacing, approximately 70 m above ground height where possible.
- In accordance with Exploration Licence grant documentation, Schedule B schedule of conditions, condition 6 the company will provide details to the Director of Mines via the 'Notification of an airborne survey on a Mineral Exploration Licence' form.

Geochemical surveys and associated geological activities(ground)

- Detailed ground geochemical surveys may be acquired at prospect scale.
- Geophysical methods employed may include the following:
 - o Soil and Rock chip sampling
 - o Associated geological mapping
- Vegetation clearance will be minimal with these activities and disturbance of the soil will only be required where applicable to the technique namely collecting of samples. ATV or Light vehicles will be utilised with the acquisition.

*All activities will be completed in accordance with protocols established within the NTMA relevant to the exploration stage, and where relevant conform to the Generic PEPR for ongoing Exploration Operations.

Water Supply and Management

Will camp and/or drilling water be required?

Yes

Describe how and where water will be sourced for drilling, track maintenance and camping purposes (e.g. groundwater, surface water, mains). Indicate how wastewater and/or runoff water will be managed.

1. Drilling Water

- Water is required for the purposes of drilling activities.
- Water will be sourced from a station Water Bore in consultation with the Landowner.
- A support vehicle will transport water from the Water Bore to the drill site on an as needs basis.
- A water bore may be constructed and permitted per regulatory guidelines.

Will surface water and/or mineral drillholes be used as a water source/supply?

Yes

Indicate if a licence for water extraction/usage is required (refer to relevant Natural Resources Management water allocation plan available on the Department for Environment and Water (DEW) website.

No

Attach a copy of the licence or include a statement confirming that a licence will be obtained before the extraction and/or usage of water.

If required and upon consultation with the landholder and other required regulatory approvals the construction of a centralised water well may occur to source water for drilling and other support activities. Prior to extraction from this well, an appropriate approval and extraction licence will be obtained.

Groundwater Investigation and Water Affecting Activities

Will any water investigation (e.g. pump testing, water monitoring sites, water storage, turkey nests/dams) and/or water affecting activities, be undertaken (refer to s. 127 of the Landscape South Australia Act 2019)?

No

Describe the water investigation and/or water affecting activities, including site preparation, vegetation clearance, and safety and maintenance requirements.

Indicate if water affecting activities permits (eg well and water extraction/discharge permits) have been obtained and in accordance with the Landscape South Australia Act 2019.

—

Attach a copy of the permit(s) or include a statement confirming that permits will be obtained prior to the commencement of the water investigation activities.

Management of Hazardous Materials

Will activities be conducted in areas of known uranium and thorium mineralisation?

Yes

Attach Files 

File Name	File Size (Mb)	Created On	Download	Expand/Collapse
20251028 Orpheus Uranium Limited_RMPv2.2 endorsement letter.pdf	0.16 Mb	19-11-2025 10:07:37	Download (MERS/EP-03994/Management of hazardous/2025 1028 Orpheus Uranium Limited_RMPv2 .2 endorsement letter_2025-11-18T23-37-38.427Z.pdf)	
Radiation Management Plan_V3_202405.pdf	2.11 Mb	18-11-2025 12:28:21	Download (MERS/EP-03994/Management of hazardous/Radiation Management Plan_V3_202405_2025-11-18T01-58-21.961Z.pdf)	

Will any other hazardous material be encountered when exploring in the area?

No

List the types of hazardous materials and provide a management plan on how these materials will be managed.

Rehabilitation

Detail all the activities and strategies relating to the remediation of all impacts associated with the proposed exploration operations (includes exploration camps and laydown areas, tracks). Completion of rehabilitation must be achieved within 3 months after the expiry of each program notification.

Drill Sites

- All equipment and waste demobilised off site.
- Drill collar will be grouted as per regulatory guidelines.
- Compacted areas will be ripped and contoured where necessary.
- Where possible, vegetation and sticks/trunks will be dragged across to reflect the surrounding environment, with sites scarified to promote seed germination and vegetation growth
- Photographic records will be collected as part of ongoing site monitoring.

New Access Tracks

- Traversing to remove all waste.
- Slight scarification to reduce compaction where necessary.
- Resurfaced/graded where necessary where bull dust has developed.
- Recontouring along the natural contour to reduce the likelihood of potential erosion rilling.
- Photographic records will be collected as part of ongoing site monitoring.

Excavation Sumps. Disposal pits and Bunding

- Sumps will be allowed to dry completely prior to backfilling.
- Sumps will be backfilled with the material stockpiled from sump formation placing subsoil and topsoil in correct order to promote revegetation.
- A mound of material will be formed over the sump to allow for subsidence.
- Where possible, vegetation and sticks/trunks will be dragged across to reflect the surrounding environment.
- Radiation monitoring and inspections will be conducted in accordance with the Radiation Management Plan.
- Photographic records will be collected as part of ongoing site monitoring.

Water Source Infrastructure

- The washdown bay shall contain a liner (HDPE liner or similar) to contain potentially radioactive material. Ground sheets will be positioned to ensure no contamination to the ground surface. The liner (HDPE liner or similar) will either be disposed on site at the Disposal Pit or off-site at an appropriately licenced waste facility.
- The Water Bore will be rehabilitated to reflect the landscape at the bore prior to advanced activities. Unless under consultation with the landowner, the water bore is kept for further use.
- An already established water bore at the station will be used unless the construction of a new bore is required.

Laydown Area

- All equipment and waste will be demobilised offsite.
- All facilities will be left as they were found, with the intention to enhance facilities via upgrades to infrastructure where appropriate.
- Rehabilitation of campsite/laydown area/s will be to the satisfaction of the Landowner.

Reporting

- Rehabilitation activities will be reported in the Annual Exploration Compliance Report submitted 60 days post the anniversary date of the combined reporting period for the Frome Project.

State the estimated budget required to rehabilitate all impacted sites. Include a breakdown of the cost associated with each rehabilitation component.

The estimated budget required to rehabilitate all impacted sites for this ongoing E_PEPR is approximately \$100,000.

- All infrastructure and waste will be removed on completion of drilling and on completion of the program, so that rehabilitation will be required for (1) drill sites, (2) new access tracks, (3) excavation sumps and bunding, (4) water source infrastructure, (5) campsite and laydown area and (6) Disposal Pit/s.
- The estimated budget of \$100,000 accounts for all ongoing activities proposed. An estimated annual budget is approximately \$30,000.

Vegetation Clearance

Will any area of cleared native vegetation be unrehabilitated after the authorised period?

No

Provide a map and description of the vegetation present in the application area, the extent of any proposed vegetation clearance and the likelihood of the presence of threatened flora.

State the estimated quantum of significant environmental benefit (SEB) to be gained in exchange for the proposed native vegetation clearance and describe how the SEB will be provided.

Management of Environmental Impacts

Applicable environmental aspects and potential impacts

Environmental Aspect	Receptor	Potential Impact	Control Strategies	Risk	Outcomes	Outcome Measurement Criteria
Groundwater	Soil/vegetation/fauna	Discharge of groundwater into the surrounding environment.	<ul style="list-style-type: none"> The Site Supervisor will inspect drillsites to ensure that sumps are excavated to a suitable size for the drilling method and proposed depth. Sumps will be dug, so that a natural earth bund will be formed around the edge of the sump. Employees and contractors will be inducted to notify them that no groundwater discharge into the surrounding environment is permitted. 		No discharge of groundwater outside of the exploration site (e.g. drillsite) into the surrounding environment and no discharge of water into a watercourse, unless prior approval under the relevant legislation is obtained.	Maintain photographic evidence of all drillsites demonstrating that groundwater was not discharged into the surrounding environment, unless water affecting activity permits were obtained allowing the discharge of groundwater into watercourses and/or lakes. Representative photos and water affecting activity permits (where applicable) to be included within the annual exploration compliance report.

Environmental Aspect	Receptor	Potential Impact	Control Strategies	Risk	Outcomes	Outcome Measurement Criteria
Stakeholders	Stakeholders	Stakeholders: - freehold land owners - perpetual lease holders - pastoral lease holders - Aboriginal land (Anangu Pitjantjatjara Yankunytjatjara and Maralinga Tjarutja lands) - Department of Defence - state government departments. - local government (councils) - federal government - native title parties.	<ul style="list-style-type: none"> • Serving of regulatory forms and notices, agreements in accordance with the Mining Act. • Stakeholder engagement will be ongoing throughout the exploration program, for low-impact and advanced exploration activities. • Stakeholder consultation will be recorded in accordance with the company's Stakeholder Management Plan on the Stakeholder Consultation Register. • Stakeholder complaints will be recorded and actioned/remedied where required as soon as practicable. • The company will provide project updates to stakeholders. • Exploration activities that impact buildings, structures, existing tracks or other infrastructure will be monitored routinely to ensure interference is at a level expected by the stakeholder. • All employees, contractors and visitors will have conducted a Site Induction, prior to mobilisation to site. • All employees, contractors and visitors will have conducted a Heritage Induction, prior to mobilisation to site. • All employees, contractors and visitors will have completed the Site 		Stakeholders are fully informed and satisfied with the proposed methods used to conduct exploration activities on their land, and all prescribed forms are served and agreements obtained in accordance with the Mining Act.	Provide the information requested within the 'Complaints' section of the annual exploration compliance report demonstrating that all reasonable complaints from stakeholders are resolved to the satisfaction of both parties prior to and ongoing during the course of exploration program, without the involvement of DEM. Provide the information requested within the 'Landowner details and liaison' section of the annual exploration compliance report demonstrating that prescribed forms were served and agreements obtained in accordance with the Mining Act prior to the commencement of exploration activities.

Environmental Aspect Receptor Potential Impact Control Strategies Risk Outcomes Outcome Measurement Criteria

Access Forms, prior to mobilisation to site. • Site activities will be supervised by a designated Site Supervisor who will conduct routine inspections to monitor land use, track degradation, waste control and the general aesthetic values of the area. Potential Impacts (couldn't enter above)
Interference to: • existing or permissible land use (includes loss of income, noise, dust, light and other emissions). • buildings, structures, existing tracks or other infrastructure. • aesthetic values of an area.
Noncompliance with legislative requirements.

Environmental Aspect	Receptor	Potential Impact	Control Strategies	Risk	Outcomes	Outcome Measurement Criteria
Weeds and Pathogens	All flora and fauna, especially listed species.	Loss/modification of the environment (biological, social and economic) through the introduction of weeds and pathogens.	<ul style="list-style-type: none"> • All vehicles accessing the site will be required to complete a Site Access Form, prior to mobilisation to ensure all equipment is clean, in good working order and will be operated by an appropriately licensed operator. • Washdown facility will be provided at the Laydown area or Campsite to clean vehicles during the program where required, and prior to departure. • All employees and contractors to complete a Site Induction prior to site access. The Site Induction will provide a summary of flora and fauna (including listed species) and areas of restricted access. • All employees to report any flora and fauna incidents, especially listed species. • All employees and contractors to drive on designated tracks only. • All employees and contractors to observe road speed limits. • Photographs will be taken before, during and after exploration operations to demonstrate no new weeds and pathogens have been introduced. 	Low	No introduction of new species of weeds and plant pathogens, nor increase in abundance of existing weeds species.	Provide a statement within the 'Compliance with approved programs' section of the annual exploration compliance report, confirming that: <ul style="list-style-type: none"> • Vehicle logs were kept during the exploration program, demonstrating that all vehicles are clean and free of plant and mud material prior to entering properties† within the tenement areas, unless otherwise agreed to with the relevant landowners. • Photographic evidence before and during exploration operations and after rehabilitation of disturbed sites was captured, demonstrating that no new weeds and plant pathogens were introduced, nor an increase in abundance of existing weeds recorded.

Environmental Aspect	Receptor	Potential Impact	Control Strategies	Risk	Outcomes	Outcome Measurement Criteria
Soil	Soil	Disturbance to the soil profile and topography, and accelerated soil erosion caused by exploration activities (e.g. construction of sumps, new tracks and drill pads; ground compaction at laydown areas and camps).	<ul style="list-style-type: none"> • Employees and contractors will be inducted to ensure management of exploration activities (e.g. construction of sumps, new tracks and drill pads; ground compaction at laydown areas and camps). • Excavations will stockpile the topsoil and subsoil separately to be used for rehabilitation purposes, returned in the correct order of placement. • Sumps and drillholes will be backfilled and mounded to allow for subsidence. • In the event that the soil profile is impacted from drilling activities, rehabilitation will involve ripping the site and contouring to reduce potential impacts from erosion. 	Low	Where soil disturbance occurs as a result of exploration activities, ensure that: <ul style="list-style-type: none"> • topsoil quality and quantity is maintained • the soil profile and topography is reinstated to original conditions • there is no accelerated soil erosion. 	Maintain before, during and after photographic evidence of all excavations, drillsites, camps, laydown areas and new tracks demonstrating that: <ul style="list-style-type: none"> • The soil profile and topography is reinstated to original conditions and is consistent with natural surroundings within 3 months of the expiry of the PEPR approval (for PEPRs approved for a period of 12 months), or 3 months after the expiry of a program notification (for PEPRs approved for an ongoing period), unless otherwise authorised. • Where required, sufficient topsoil is removed (depending on soil profile), stored separately from subsoil and reinstated (in the correct order) within 3 months of the expiry of the PEPR approval (for PEPRs approved for a period of 12 months), or 3 months after the expiry of a program notification (for PEPRs approved for an ongoing period), unless otherwise authorised. • There are no signs of accelerated soil erosion during and post rehabilitation of disturbed sites. Representative photos to be included within the annual exploration compliance report. Provide the information requested within the 'Rehabilitation' section of the annual exploration compliance report.

Environmental Aspect	Receptor	Potential Impact	Control Strategies	Risk	Outcomes	Outcome Measurement Criteria
Fauna	All fauna	Entrapment of fauna through open drillholes and excavations.	<ul style="list-style-type: none"> • Drillholes will be capped on completion of drilling, prior to moving off the drill site, and until such time as rehabilitation, to avoid loss of fauna at the collar. • Drillholes will be plugged with a cement plug of appropriate diameter to permanently seal the drill hole and backfilled with locally sourced material to form a slight mound over the collar to allow for subsidence. • Sumps will be temporary, and where practicable one side will be dug at an angle suitable for the egress of fauna, if that is not possible, then the sumps will be barricaded with barrier mesh. 	Low	No fauna traps created as a result of exploration activities.	Maintain before, during and after photographic evidence of all drillholes and/or excavations demonstrating that: <ul style="list-style-type: none"> • All drillholes were permanently or temporarily capped/plugged immediately upon completion. • No fauna and livestock became trapped in drillholes and/or excavations throughout the duration of the program. • All rehabilitation was completed within 3 months of expiry of the PEPR approval (for PEPRs approved for a period of 12 months), or 3 months after the expiry of a program notification (for PEPRs approved for an ongoing period), unless otherwise authorised. Representative photos are to be included within the annual exploration compliance report. Provide the information requested within the 'Rehabilitation' section of the annual exploration compliance report.

Environmental Aspect	Receptor	Potential Impact	Control Strategies	Risk	Outcomes	Outcome Measurement Criteria
Surface Water	Surface Water	Alteration to surface water – interference to surface drainage.	Surface water features will be avoided where possible. • At Erudina prospect, new access tracks and drillholes will be positioned in areas of surface water features, however flat lying areas will be selected. Temporary new access tracks will be single-lane, no excavations should be required. Where tracks are visible across drainage features, these will be raked flat to reflect the original surface. • Where surface water features need to be impacted, pre, during and post photographic evidence will be recorded to demonstrate that original contours are consistent. Slight scarification/contouring may be required.	Low	No permanent modification to hydrological features caused by exploration activities without obtaining a water affecting permit from the relevant Landscape Board (under Landscapes Act SA 2019).	Provide before, during and after photographic evidence within the annual exploration compliance report demonstrating that original drainage contours (watercourses and lakes) are consistent with the natural relief post rehabilitation within 3 months of the expiry of the PEPR approval (for PEPRs approved for a period of 12 months), or 3 months after the expiry of a program notification (for PEPRs approved for an ongoing period). Alternatively, provide copies of water affecting permits within the annual exploration compliance report.
Other	Can't delete	Can't delete	Can't delete	Low	Can't delete	Can't delete

Environmental Aspect	Receptor	Potential Impact	Control Strategies	Risk	Outcomes	Outcome Measurement Criteria
Fire	Community/landowners	Damage to infrastructure and loss of income through fire.	<ul style="list-style-type: none"> • The Site Supervisor will regularly conduct a site inspection to ensure area is suitably clear for drilling equipment, no loose dried grasses or other combustible materials to be located near hot machinery. • Employees and contractors will be inducted to ensure all works are restricted to prescribed areas and tracks only. • Fire extinguishers (and fire blankets) in designated work areas (drill site, refueling station, campsite and in vehicles). • Communications must be available in all work areas. • Emergency Response Booklet to be kept in all vehicles. • Ongoing consultation with landholders and records of correspondence and communications maintenance, including any remedial requirements. • During high-risk bushfire days the exploration activities will be monitored by the Site Supervisor. 	Low	No loss of infrastructure or income through fire as a result of exploration activities.	Provide a statement within the 'Compliance with approved programs' section of the annual exploration compliance report confirming that no uncontrolled fires* occurred. Alternatively, provide a report on the independent investigation of all uncontrolled fires* demonstrating that the licensee could not have reasonably prevented the fire through the implementation of precautionary measures.

Environmental Aspect	Receptor	Potential Impact	Control Strategies	Risk	Outcomes	Outcome Measurement Criteria
Groundwater users	Groundwater users	Interference to existing water users when extracting water from existing dams, water bores or mineral drillholes.	<ul style="list-style-type: none"> • Consultation with the landowner regarding the location of, amount required, salinity levels for the extraction of groundwater for drilling and other ancillary purposes (campsite, washdown bay and tracks). 	Low	No public nuisance impacts resulting from the extraction of water for exploration purposes, unless prior approval under the relevant legislation is obtained.	Provide the information requested within the 'Complaints' section of the annual exploration compliance report demonstrating that all reasonable complaints from stakeholders were resolved to the satisfaction of both parties, prior to and ongoing during the course of the exploration program without the involvement of DEM. Where permits are required for the extraction and/or usage of groundwater, provide copies of the licence or permit within the annual exploration compliance report.

Environmental Aspect	Receptor	Potential Impact	Control Strategies	Risk	Outcomes	Outcome Measurement Criteria
Groundwater	Groundwater/aquifer	Groundwater contamination: • contamination of aquifers through entry of pollutants from the surface • interconnection between aquifers • degradation of natural hydrostatic conditions (maintain pre-drilling pressures).	<ul style="list-style-type: none"> • Driller/s will have read Earth Resources Information Sheet M21 Mineral Exploration Drillholes – General specifications for construction and backfilling, prior to commencement of drilling in addition to having undertaken the site induction. • Drillers will be Class 2 licenced as a minimum. No artesian groundwater is expected to be encountered. • Each drillhole will be decommissioned and capped in accordance with M21 guideline for backfilling of drillholes which penetrate more than one aquifer prior to site rehabilitation. • Rotary Mud and Sonic drillholes will be grouted in accordance with M21 guideline for backfilling of drillholes which penetrate more than one aquifer prior to site rehabilitation. • Photograph monitoring of drillsites will be conducted post rehabilitation and reported in the Annual Compliance Report. • All chemicals, fuels and waste to be stored in appropriately contained facilities. • No disposal of any waste onsite. All exploration equipment and materials to be removed from site 		Drillholes restored to controlling geological conditions that existed before the hole was drilled or, where it is intended to re-enter the hole, the hole must be completed with casing of adequate strength and the casing cemented so that all aquifers are isolated to prevent the movement of any fluids behind the casing.	Maintain evidence demonstrating that drillholes are decommissioned in accordance with Earth Resources Information Sheet M21, Mineral exploration drillholes – general specifications for construction and backfilling, and/or specific conditions from DEW (Groundwater) within 3 months of the expiry of the PEPR approval (for PEPRs approved for a period of 12 months), or 3 months after the expiry of a program notification (for PEPRs approved for an ongoing period), unless otherwise authorised. Provide the information requested within the 'Groundwater' section of the annual exploration compliance report.

Environmental Aspect	Receptor	Potential Impact	Control Strategies	Risk	Outcomes	Outcome Measurement Criteria
			at completion of works.			
Third party access	Soil/vegetation/fauna	Degradation of rehabilitated access tracks caused by third party access (includes previously closed and rehabilitated access tracks).	<ul style="list-style-type: none"> • New temporary access tracks that are rehabilitated will, where possible have trees or other natural material at the entry to minimise the risk of third-party access. • Consultation with the landowner regarding the location of rehabilitated temporary access tracks. 	Low	Rehabilitated access tracks remain permanently closed, unless prior approval under the relevant legislation is obtained.	Maintain before and after photographic evidence demonstrating that all tracks are closed and rehabilitated within 3 months of the expiry of the PEPR approval (for PEPRs approved for a period of 12 months), or 3 months after the expiry of a program notification (for PEPRs approved for an ongoing period), unless otherwise authorised. Representative photos are to be included within the annual exploration compliance report. Provide the information requested within the 'Rehabilitation' section of the annual exploration compliance report.
Hazardous materials - Uranium	General public, employees, contractors and the environment	Contamination of the environment when exploring for known uranium and thorium deposits. Public and employee/contractor exposure to low level radiation.	<ul style="list-style-type: none"> • Employees and contractors will be inducted to ensure all works are conducted in accordance with the Exploration PEPR and Radiation Management Plan. • Radiation levels will be recorded pre, during and post rehabilitation. • Site Supervisor to conduct routine inspections of work areas to monitor for radiation levels. 	Mod erate	No increase in background radiation levels, and employee/contractor exposure levels during the exploration program are within safe limits.	Maintain a database and provide a statement within the 'Compliance with approved programs' section of the annual exploration compliance report demonstrating that: <ul style="list-style-type: none"> • Radiation levels post exploration and rehabilitation are consistent with pre-existing background levels. • Employee and contractors exposure levels were within safe limits during the exploration program.

Environmental Aspect	Receptor	Potential Impact	Control Strategies	Risk	Outcomes	Outcome Measurement Criteria
Native Vegetation	Flora and fauna and their habitats; includes Common wealth and state scheduled species.	Loss/modification of native vegetation and associated habitats through the clearance of vegetation.	<p>Site Clearance • A Site Clearance Survey to be conducted prior to drilling rig and equipment access to scan for species of significance that may require avoidance. • Access of drilling rig and equipment is only to occur if a Site Clearance Survey has been conducted. • Temporary drill access lines must be clearly demarcated to ensure direct access to drill sites. No off track access is permitted.</p> <p>Personnel • Employees and contractors will be inducted to ensure all works are restricted to prescribed areas and tracks only.</p> <p>Vehicles and Equipment • All vehicles accessing site will be required to complete a Site Access Form, prior to mobilisation to ensure all equipment is clean, in good working order and will be operated by an appropriately licensed operator. • Vehicle speeds/signage will be implemented along access tracks to reduce dust, noise and other emissions. • All vehicles and equipment to be routinely inspected using checklists to identify possible hazards such as hydrocarbon leaks, to reduce risks from spills and potential fire sources. • All</p>	Mod erate	No permanent loss/modification of native flora and fauna populations and their habitats through: • clearance • fire • other unless prior approval under the relevant legislation is obtained.	Maintain before, during and after photographic evidence of all exploration sites (e.g. drillsites, new track exit/entry points off existing tracks, costeans, campsites) demonstrating that: • The area and method of disturbance is consistent with that described in the PEPR. • No uncontrolled fires* occurred as a result of exploration activities. Representative photos to be included within the annual exploration compliance report.

Environmental Aspect Receptor Potential Impact Control Strategies Risk Outcomes Outcome Measurement Criteria

vehicles and equipment to be maintained in accordance with manufacturers specifications. • Vehicles will be audited on arrival to ensure adequately equipped with first aid, communications, fire extinguishers and spill kits. Rain Events • Significant rain events would limit access to sites, vehicle access on station tracks when in flood is not advised.

Environmental Aspect	Receptor	Potential Impact	Control Strategies	Risk	Outcomes	Outcome Measurement Criteria
Aboriginal heritage	Aboriginal heritage sites	Disturbance to Aboriginal heritage	<ul style="list-style-type: none"> • Orpheus to conduct a Heritage Survey prior to advanced exploration activities with the native title party who are claimants of the determination area where those activities occur. • Site Supervisor to have read the Heritage Report and set up exclusion zones where necessary to avoid Aboriginal heritage sites identified during Heritage Survey/s and notify employees of the significance. • A Site Clearance Survey to be conducted prior to drilling rig and equipment access to scan for any additional Aboriginal heritage sites that may not have been identified during the Heritage Survey. • Employees and contractors will be inducted to ensure all works are restricted to prescribed areas and tracks only and to report any chance finds of Aboriginal heritage to the Site Supervisor. • In the event of an Aboriginal heritage site being discovered, works will cease in that area and the site will be recorded and reported to the authorities in accordance with the Aboriginal Heritage Act 1988. 	Mod erate	No disturbance to Aboriginal artefacts or sites of significance unless approval under the relevant legislation is obtained.	Maintain a database and provide a statement within the 'Compliance with approved programs' section of the annual exploration compliance report demonstrating that: <ul style="list-style-type: none"> • Heritage sites were not impacted during the conduct of the exploration program, unless prior approval was obtained under the appropriate legislation • Work ceased on discovery of a significant site and recommenced only after authorisation. • Aboriginal heritage sites identified during the exploration program were appropriately recorded and reported to authorities, if not previously known.

Environmental Aspect	Receptor	Potential Impact	Control Strategies	Risk	Outcomes	Outcome Measurement Criteria
Contamination	Soil/vegetation/fauna	Soil/vegetation contamination (e.g. hydrocarbons, rubbish, drill samples/cuttings, ablutions, other sources)	<ul style="list-style-type: none"> • All vehicles accessing site will be required to complete a Site Access Form, prior to mobilisation to ensure all equipment is clean, in good working order and will be operated by an appropriately licensed operator. • Fuel and chemical storage will be kept in accordance with EPA requirements. • All vehicles and machinery will be required to complete a Pre-start Checklist. • Spill kits will be kept at the drill rig and with vehicles carrying fuel for refuelling purposes. • Sites will be kept clean, with waste facilities to avoid any windblown waste into surrounding environment. • Site inspections will be conducted daily by the Site Supervisor. • Site inspections will be conducted at the completion of each drill site by the Site Supervisor. • Employees and contractors will be inducted to ensure all equipment and works is maintained to ensure there is no contamination to the surrounding environment. • All employees and contractors to observe road speed limits. • Waste disposal receipts will be kept. • Drill cuttings will be either: <ul style="list-style-type: none"> o removed from site and disposed of at a licensed facility; o buried in the 	Moderate	No contamination of soil and vegetation as a result of exploration activities.	<p>Demonstrate that all domestic or industrial waste (includes general rubbish and hydrocarbons) is disposed of in accordance with the Environment Protection Act 1993 within 3 months of the expiry of the PEPR approval (for PEPRs approved for a period of 12 months), or 3 months after the expiry of a program notification (for PEPRs approved for an ongoing period), and that all fuel and chemicals are stored in accordance with EPA requirements, by providing:</p> <ul style="list-style-type: none"> • The name, location and contact details of the authorised waste disposal facility. • A statement within the 'Compliance with approved programs' section of the annual exploration compliance report confirming domestic and industrial waste was removed from all exploration sites and disposed of at an authorised waste disposal facility. • Photographic evidence within the annual exploration compliance report demonstrating that all fuel and chemical storage facilities were managed in accordance with EPA requirements. Maintain photographs of all exploration sites and provide representative photos within the annual exploration compliance report demonstrating that drill cuttings are: <ul style="list-style-type: none"> • removed from site and disposed of at a licensed facility • buried under a minimum of 30 cm of soil, or in accordance with EPA guideline, Radiation protection guidelines on mining in South Australia: mineral exploration, available on the EPA website, or • backfilled down the drillhole, within 3 months of the expiry of the PEPR approval (for PEPRs approved for a period of 12 months), or 3 months after the expiry of a program notification (for PEPRs approved for an ongoing period), unless otherwise authorised. Provide the information requested within the 'Rehabilitation' section of the annual exploration compliance report.

Environmental Aspect	Receptor	Potential Impact	Control Strategies	Risk	Outcomes	Outcome Measurement Criteria
			sedimentation pit or the sample disposal pit in accordance with EPA guideline, Radiation protection guidelines on mining in South Australia: mineral exploration; and/or o backfilled down the drillhole, within 3 months of the expiry of the PEPR approval.			
General Public	General Public	Injury or death to members of the public as a result of exploration activities.	<ul style="list-style-type: none"> • No unauthorised third-party access permitted to the drill site/s. • Signage at access track and at drill site installed to notify of warning of restricted access and danger associated with equipment. • Vehicle speed warnings along unsealed tracks. • All employees and contractors to observe road speed limits. 	Mod erate	No accidents involving the public that could have been reasonably prevented by the licensee.	Provide a statement within the 'Compliance with approved programs' section of the annual exploration compliance report confirming no accidents occurred involving the public during and after the exploration program. If an accident involving the public did occur, provide a copy of the independent investigation report within the annual exploration compliance report demonstrating that the licensee could not have reasonably prevented the accident through the implementation of precautionary measures.

Supporting Information

Photos

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File Name	File Size (Mb)	Created On	Download
Photo1.jpg	0.04 Mb	19-11-2025 13:23:23	Download (MERS/EP-03994/Supporting information/Photos/Photo1_2025-11-19T02-53-24.052Z.jpg)
Photo2.jpg	0.04 Mb	19-11-2025 13:23:23	Download (MERS/EP-03994/Supporting information/Photos/Photo2_2025-11-19T02-53-24.052Z.jpg)
Photo3.jpg	0.03 Mb	19-11-2025 13:23:23	Download (MERS/EP-03994/Supporting information/Photos/Photo3_2025-11-19T02-53-23.774Z.jpg)
Photo4.jpg	0.04 Mb	19-11-2025 13:23:23	Download (MERS/EP-03994/Supporting information/Photos/Photo4_2025-11-19T02-53-23.773Z.jpg)
Photo5.jpg	0.03 Mb	19-11-2025 13:23:23	Download (MERS/EP-03994/Supporting information/Photos/Photo5_2025-11-19T02-53-23.773Z.jpg)
Photo6.jpg	0.03 Mb	19-11-2025 13:23:23	Download (MERS/EP-03994/Supporting information/Photos/Photo6_2025-11-19T02-53-24.071Z.jpg)
Photo7.jpg	0.03 Mb	19-11-2025 13:23:23	Download (MERS/EP-03994/Supporting information/Photos/Photo7_2025-11-19T02-53-23.773Z.jpg)
Photo8.jpg	0.03 Mb	19-11-2025 13:23:23	Download (MERS/EP-03994/Supporting information/Photos/Photo8_2025-11-19T02-53-24.034Z.jpg)

Site identification	Date taken	Photo number & PEPR section reference	Easting (GDA94)	Northing (DGA94)	Zone	Details and comments	Document ID
Site reconnaissance to Erudina prospect	28/07/2022	Photo 1, Section I				Existing station tracks and general landscape	Photo1.jpg
Site reconnaissance to Erudina prospect	28/07/2022	Photo 2, Section I				Existing station tracks and general landscape	Photo2.jpg
Site reconnaissance to Erudina prospect	28/07/2022	Photo 3, Section I				Historic Areva drill site that has been rehabilitated and general landscape	Photo3.jpg
Site reconnaissance to Erudina prospect	28/07/2022	Photo 4, Section I				Historic Areva drill site that has been rehabilitated and general landscape	Photo4.jpg
Site reconnaissance to Erudina Palaeochannel – north of Erudina prospect	28/07/2022	Photo 5, Section I				Example of landscape where there is increased shrubs along the Sicchus Creek line	Photo5.jpg
Site reconnaissance to Erudina Palaeochannel – north of Erudina prospect	28/07/2022	Photo 6, Section I				Example of landscape where there is increased shrubs along the Sicchus Creek line	Photo6.jpg
Site reconnaissance to Sandyoota Region	01/12/2023	Photo 7, Section I				Existing station tracks at the Sandyoota Region, in areas requiring only minor upgrade for drill rig access	Photo7.jpg
Site reconnaissance to Sandyoota Region	01/12/2023	Photo 8, Section I				Existing station tracks at the Sandyoota Region, in areas requiring only minor upgrade for drill rig access	Photo8.jpg

Supporting Maps

Upload Maps 

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112025__Form_21A_Erudina-part-1.pdf	0.28 Mb	19-11-2025 13:38:02	Download (MERS/EP-03994/Supporting information/Maps/112025__Form_21A_Erudina-part-1_2025-11-19T03-08-02.310Z.pdf)
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Figure Description	Document ID
Figure 2. Frome Project showing Tertiary palaeochannels, the Crocker Well Granite Suite and uranium prospects.	Figure 2 Tertiary Paleochannels.pdf
Figure 3. Frome Project, Native Title determination areas.	Figure 3 Native Title.pdf

Additional Information

List any other supporting information and/or documents submitted with the application, including land access approvals/permits required to conduct the proposed exploration program.

NOEs and Express post envelopes

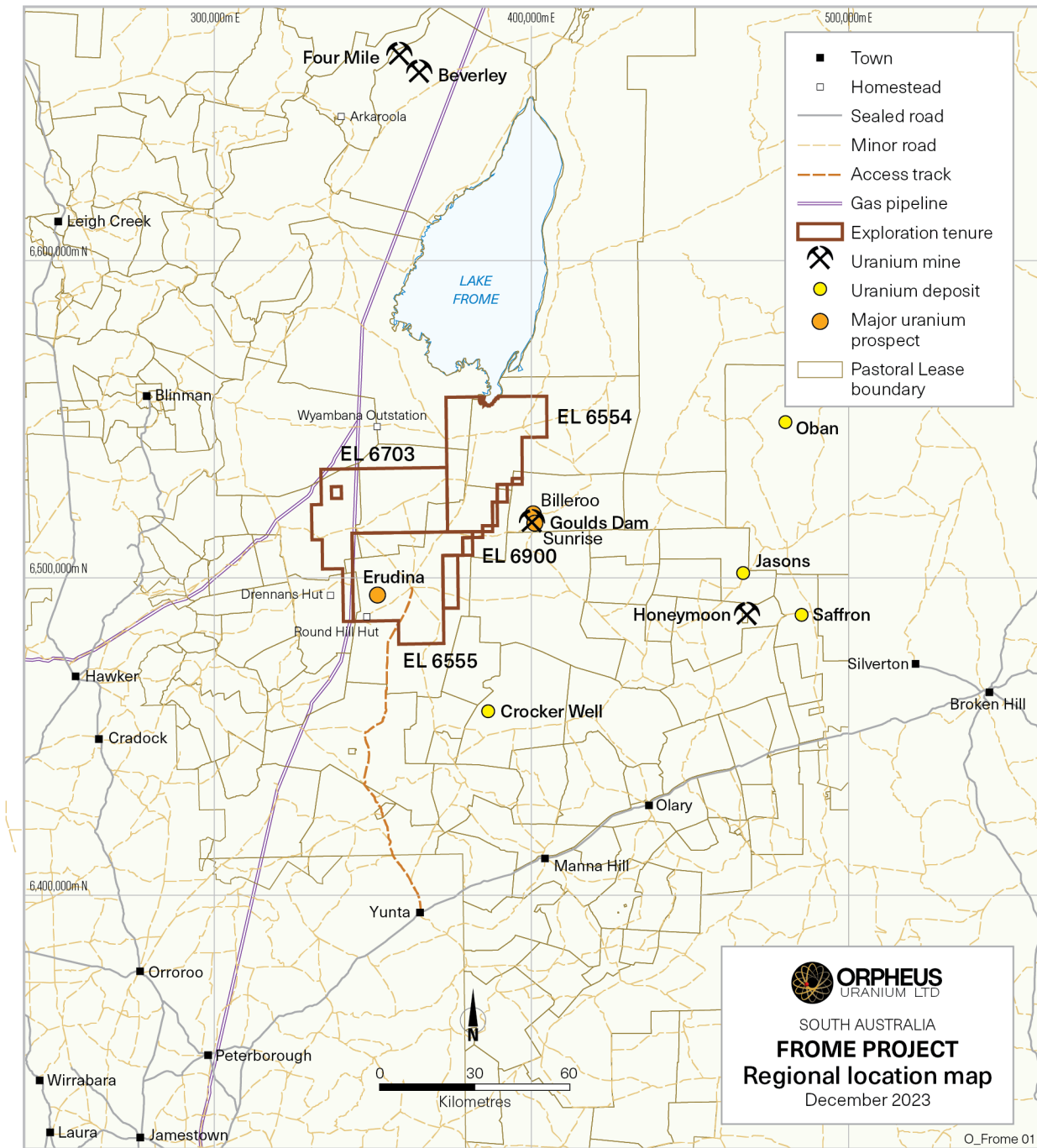


Figure 1. Location map of the Frome Project (EL 6554, EL 6555, EL 6703 and EL 6900), townships, pastoral lease boundaries, access roads and gas pipeline infrastructure.

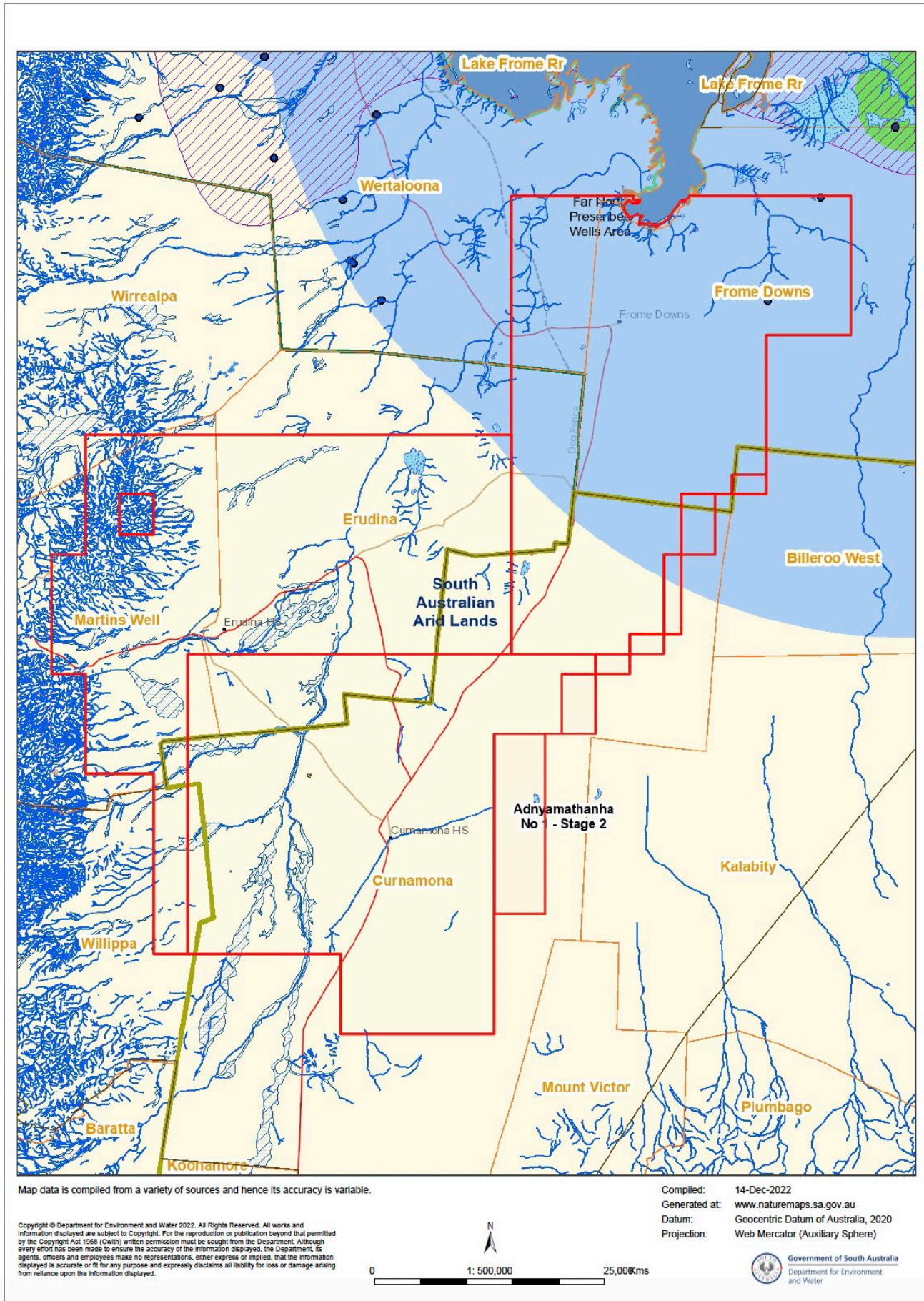
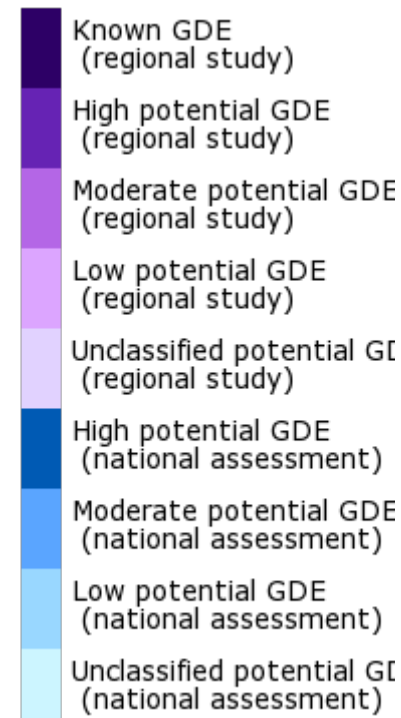


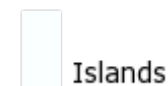
Figure 4. Frome Project, environmentally sensitive areas; Far North Prescribed Wells Area (dark olive boundary), Far North PWA Zone B (blue region), Lake Frome National Park (dark blue region), NPW Districts (green boundary), pastoral stations (orange outline), Great Artesian Basin (purple hashed region) and Native Title determination areas (olive boundary) (NatureMaps, December 2022).



Aquatic GDE



Islands



Data Source: Bureau of Meteorology, Geoscience Australia and State/Territory lead water agencies. Refer to metadata for further information: [Click here](#)

Australian Albers GDA94



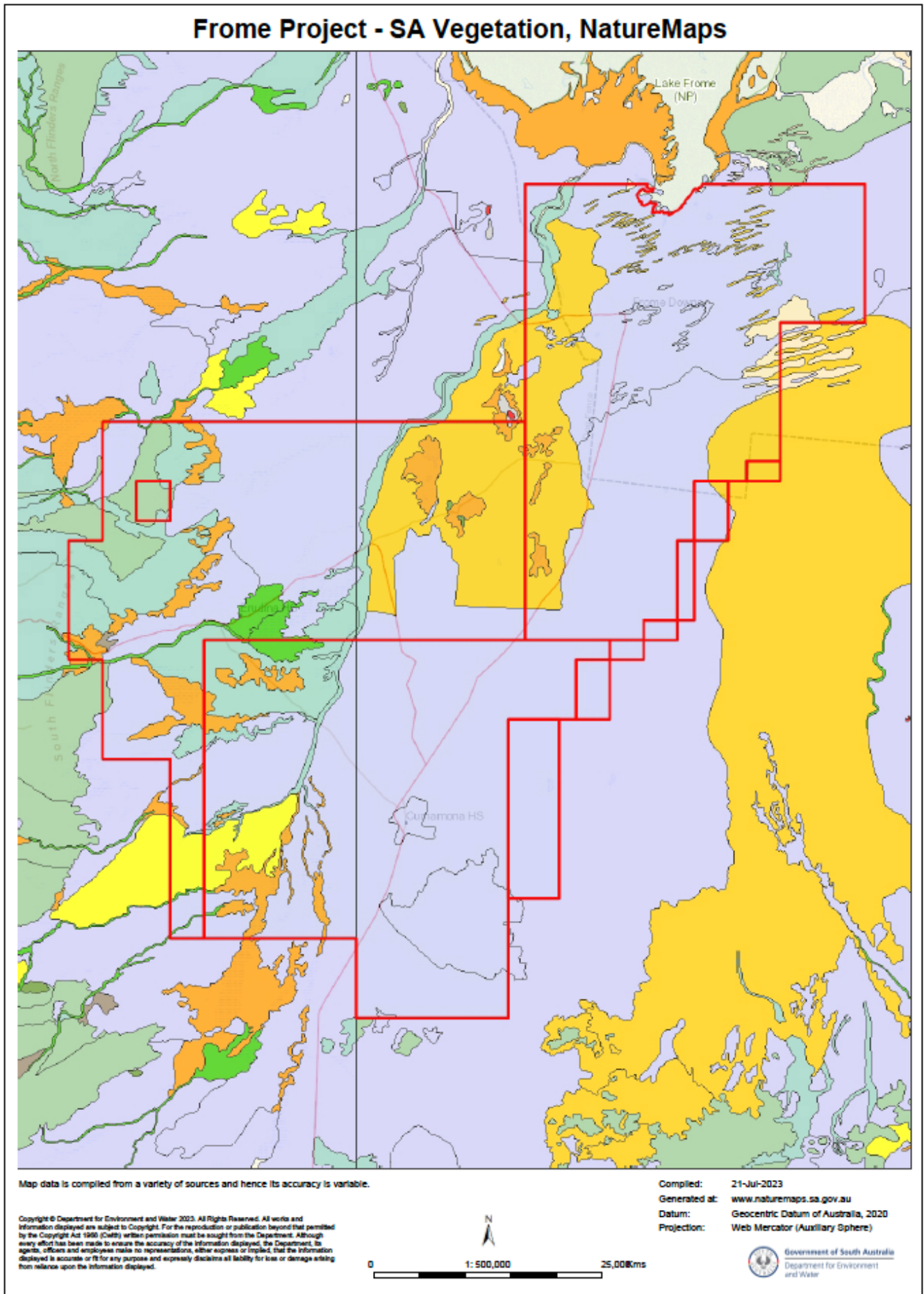
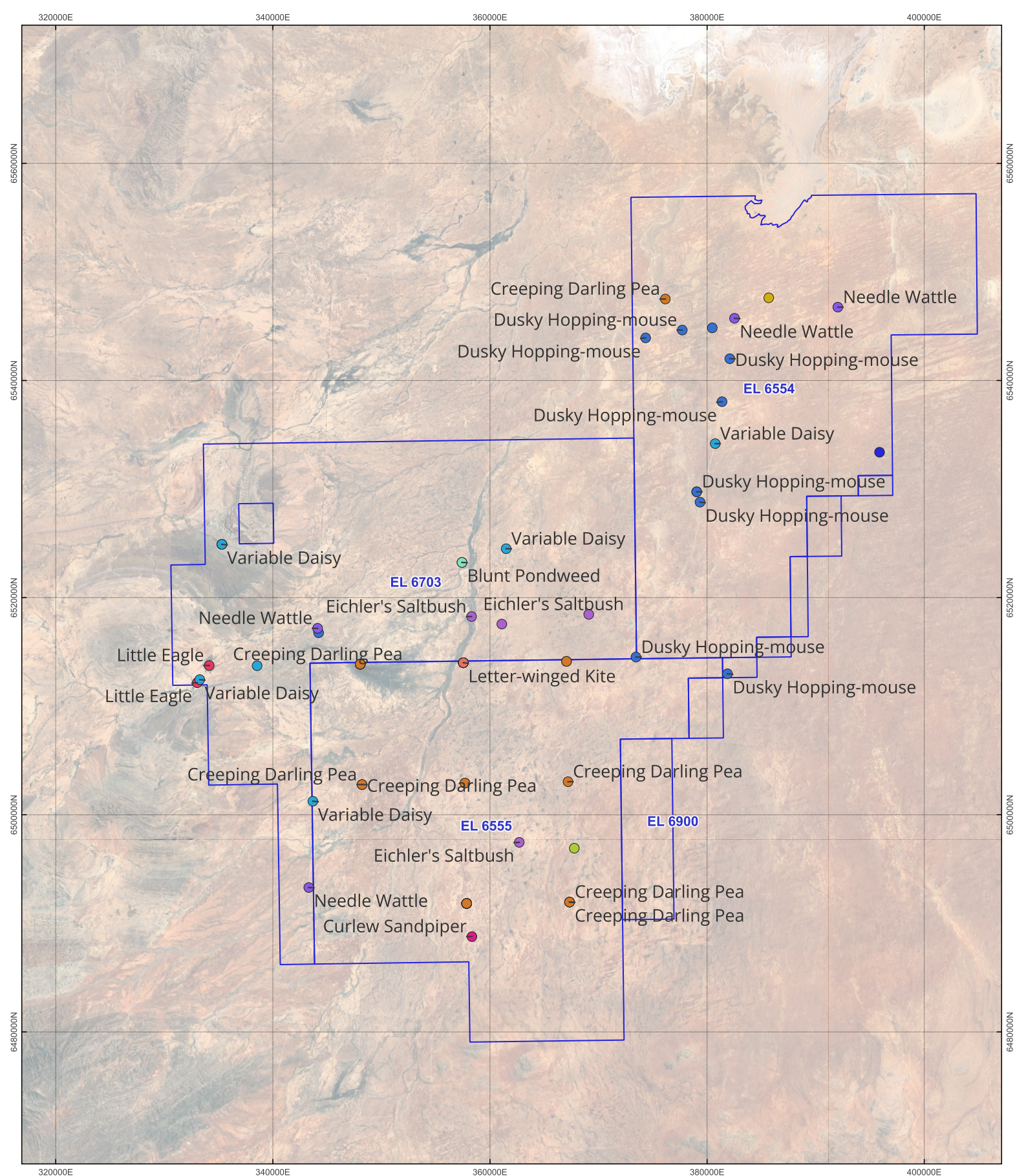


Figure 5. South Australian native vegetation floristic areas – NVIS within the Frome Project area, NatureMaps 2023.



- Tenements**
- Flora and Fauna**
- Australian Bustard
 - Black Falcon
 - Blunt Pondweed
 - Bottle Fissure-plant
 - Creeping Darling Pea
 - Curlew Sandpiper
 - Dusky Hopping-mouse
 - Eichler's Saltbush
 - Latham's Snipe
 - Letter-winged Kite
 - Little Eagle
 - Major Mitchell's Cockatoo
 - Needle Wattle
 - Restless Flycatcher
 - Variable Daisy

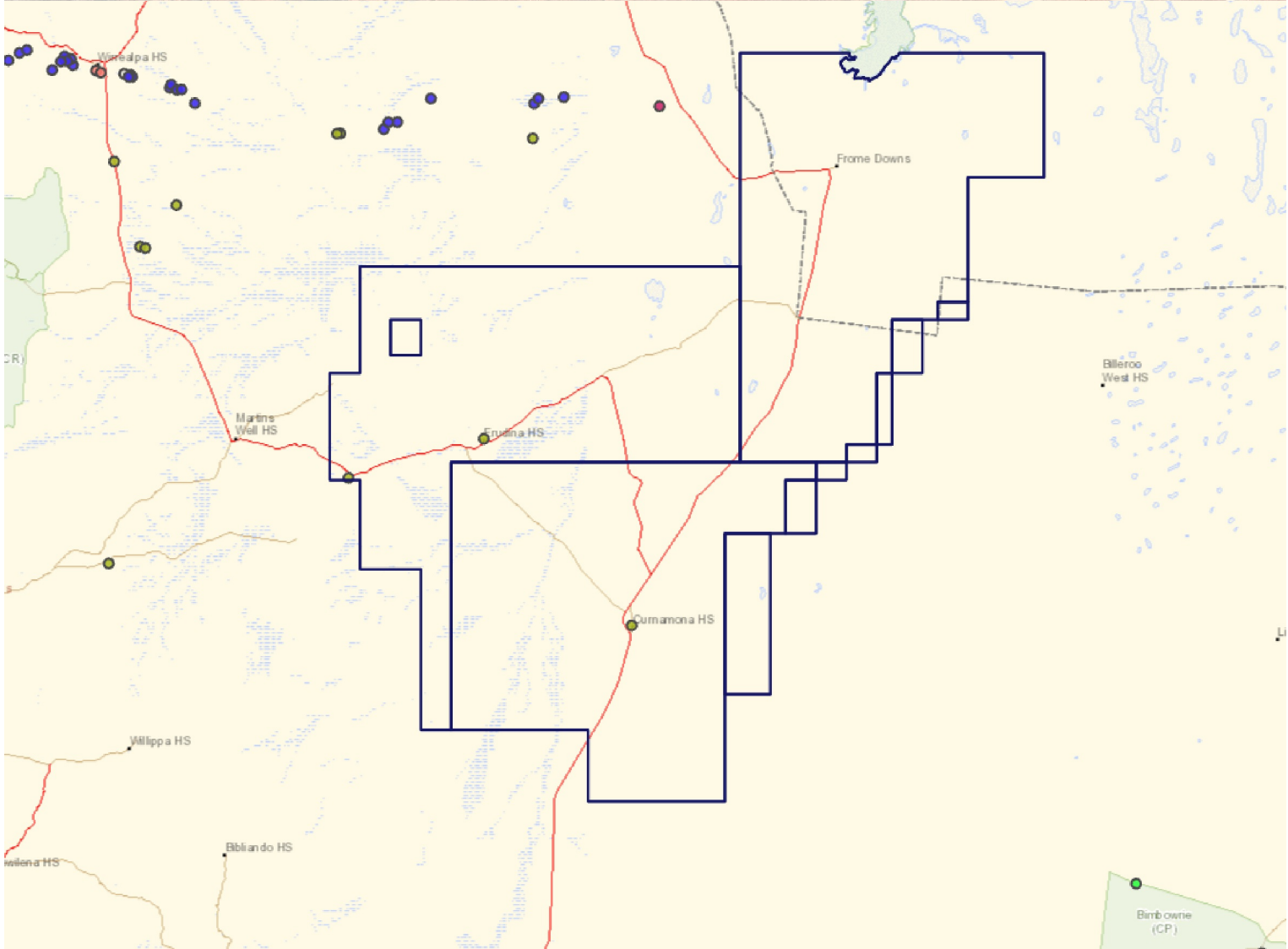
- Base Layers**
- Google Satellite
 - Frome Project

Frome Project EPEPR
State and National Rated
Flora and Fauna Sites

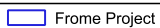
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Author: Kathryn Brown
 EPSG:3857; Projection: WGS 84 / Pseudo-Mercator

Scale 1:450,000

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Tenements
Frome Project



Wheel Pear	Light Blue
Bunny-ears	Purple
Devil's Rope Pear	Red
Erect Prickly Pear	Dark Blue
Buffel Grass	Blue
Silver-leaf Nighthshade	Orange
Velvet Pear	Green
African Boxthorn	Light Green
Cane Cactus	Yellow-Green
Alhal Pine	Yellow
Jerusalem Thorn	Pink
Mesquite	Light Green

Frome Project
EL 6554, EL 6555, EL 6703 EL 6900
Weeds of National Significance and Buffel Grass

DATE: 28 OCTOBER 2025
AUTHOR: KATHRYN BROWN
EPSG:3857; Projection: WGS 84 / Pseudo-Mercator



0 6 12 18 24 30 km



Scale 1:

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Environment Protection Authority

GPO Box 2607 Adelaide SA 5001

T (08) 8204 2004

Country areas 1800 623 445

EPA R/exploration RMP

Clinton Dubieniecki
Orpheus Uranium Ltd
79 King William Road,
Unley SA 5061

Dear Clinton

RE: Endorsement of Exploration Radiation Management Plan

I refer to your email of 15 October 2025 regarding the application for endorsement of exploration Radiation Management Plan (eRMP) v2.2 for undertaking mineral exploratory operations that may encounter uranium or thorium in at multiple locations in South Australia.

The revised eRMP version 2.2 supplied to the EPA on 15 October 2025 is endorsed for the purposes of the *Radiation protection guidelines on mining in South Australia: Mineral exploration 2010* published by the EPA.

For further information on this matter, please contact me directly via email at david.kruss@sa.gov.au or phone 08 8463 7827.

Yours sincerely

David Kruss
Principal Radiation Specialist, Authorised Officer
Radiation Science
ENVIRONMENT PROTECTION AUTHORITY

Date: 28 October 2025

ORPHEUS URANIUM LIMITED

FROME PROJECT

RADIATION MANAGEMENT PLAN

Version 3.0

Document Owner

Orpheus Uranium Limited

Document Approver

Project Director

Revision History

Version No.	Date Published	Details
1.0	10/12/2023	First draft – submitted to management for comment
1.1	21/12/2023	Second draft – final document submitted to EPA for approval
2.0	17/05/2024	Final draft – in consultation with EPA
3.0	27/05/2024	Final – following feedback from EPA

Abbreviations

Abbreviation	Description
a	Annual
ACN	Australian company name
ACR	Annual compliance report
ALARA	As low as reasonably achievable
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ATLA	Adnyamathanha Traditional Lands Association
bq	Becquerel, SI derived unit of radioactivity
DEM	Department for Energy and Mining, South Australia
EL	Exploration licence
EP Act	<i>Environment Protection Act 1993 (SA)</i>
EPA	Environment Protection Authority, South Australia
EqU	Equivalent uranium
hr	Hour
IAEA	International Atomic Energy Agency
L	Litres
LSA	Low specific activity (LSA-1 package)
m	Metres
MG	Ministerial guideline
NATA	Nationally accredited testing authority
OSL	Optically stimulated luminescent (OSL)
PEPR	Program for environment protection and rehabilitation
PFN	Prompt fission neutron
PPE	Personal protection equipment

Abbreviation	Description
ppm	Parts per million
RMP	Radiation management plan (this document)
RPC Act	<i>Radiation Protection and Control Act 2021 (SA)</i>
RSO	Radiation safety officer
Sv; mSv; and uSv	Sievert; Milli sievert; and Micro sievert
TI	Transport index-package; and Transport index-vehicle
TLD badge	Thermoluminescent badge
U ₃ O ₈ ; and eU ₃ O ₈ ; and pU ₃ O ₈	Uranium oxide, measured as a chemical assay; and equivalent uranium oxide, measured as calibrated gamma; and uranium oxide measured by Prompt Fission Neutron
XRF	Handheld/portable x-ray fluorescent analyser

Definitions

Sourced from the *Radiation Protection and Control Act 2021 (SA)*

Term	Description
Environment	Means land, air, water, organisms and ecosystems, and includes – (a) Human-made or modified structures or areas; and (b) The amenity values of an area
Exploration	<i>Means operations of any kind carried out in the course of –</i> (a) Exploring for minerals; or (b) Determining the extent off a mineral deposit, And includes surface drilling and geophysical prospecting
High risk radioactive material	Means radioactive material of a kind designated by the regulations as high risk radioactive material for the purposes of the Act
High risk radioactive source	Means a radiation source of a kind designated by the regulations as a high risk radioactive source for the purposes of the Act
In-situ recovery	Means a process by which chemical solutions are injected into underground ore deposits to dissolve or leach – (a) Elements that include radioactive elements; or (b) Compounds that include radioactive compounds
Ionising radiation	Means electromagnetic or particulate radiation capable of producing ions directly or indirectly in passage through matter but does not include electromagnetic radiation of a wavelength greater than 100 nanometres
Ionising radiation apparatus	Means apparatus capable of producing ionising radiation by accelerating atomic particles
Licence	Means a radiation management licence or radiation use licence

Term	Description
Non-ionising radiation	Means electromagnetic radiation of a wavelength greater than 100 nanometres
Non-ionising radiation apparatus	Means apparatus capable of producing non-ionising radiation but no ionising radiation
Owner	In relation to an apparatus or thing that has been let out on hire, means the person who takes it on hire
Permit	Means a permit issued under section 48 of the Act
Radiation	Means ionising radiation or non-ionising radiation
Radiation apparatus	Means ionising radiation apparatus or non-ionising radiation apparatus
Radiation management licence	Means a radiation management licence issued under the Act
Radiation protection principle	The radiation protection principle is the principle that people and the environment should be protected from unnecessary exposure to radiation through the processes of justification, limitation and optimisation, refer to section 6 of the Act.
Radiation source	Means a sealed radioactive source, unsealed radioactive material or radiation apparatus, or any equipment, object, article or thing that emits or may emit ionising or non-ionising radiation when energised
Radiation use licence	Means a radiation use licence issued under the Act
Radioactive material	Means a material or substance occurring naturally or artificially produced (whether solid, liquid or gaseous) that – <ul style="list-style-type: none"> (a) Contains more than the prescribed concentration of a radioactive element or compound (whether natural or artificial); or (b) Contains a radioactive element or compound that has an activity exceeding the prescribed amount (or both) and includes a device or thing that contains such a material or substance
Sealed radioactive source	Means a radioactive material that is sealed in a capsule or associated with a material to which it is closely bonded, being a capsule or bonding material that is strong enough to maintain leak-tightness of the sealed source under the conditions of use and wear for which it was designed
Unsealed radioactive material	Means a radioactive material that is not a sealed radioactive source
Uranium	Includes a chemical compound of uranium

Glossary

Sourced from the *Radiation protection guidelines on mining in South Australia; Mineral Exploration* (EPA, 2010)

Word	Description
Accident	An unintended event which causes, or has the potential to cause, employees or members of the public to be exposed to radiation from which the individual doses or collective doses received do not lie within the range of variation which is acceptable for normal operation. An accident may result from human error, equipment failure or other mishap; it may require emergency action to save life or to safeguard health, property or the environment. An accident requires investigation of its causes and consequences and, possibly, corrective action within the program for control of radiation, and it may require remedial action to mitigate the consequences
Activity	The measure of quantity of radioactive materials, except when used in the term 'human activity'.
Approval	A written agreement by the relevant regulatory authority that a plan or proposal meets the requirements of the Code.
Disposal	The emplacement of waste in an approved, specified facility without intention of retrieval. Disposal may also include the approved direct discharge of effluent (eg liquid or gaseous waste) into the environment with subsequent dispersion.
Dose	A generic term which may mean absorbed dose, equivalent dose or effective dose depending on context.
Employee	A person who works for an employer within an operation including a contractor performing work on the project site on behalf of the owner/operator.
Employer	An operator who, or which, engages people to work within an operation; the term employer includes a self-employed person.
Exemption	A designation, by the relevant regulatory authority, for sources of radiation that are not subject to nuclear regulatory control because they present such a low radiological hazard; the deliberate omission of a practice from regulatory control, or from some aspects of regulatory control, by the relevant regulatory authority.
Exposure	either: <ul style="list-style-type: none"> the circumstance of being exposed to radiation or, a defined dosimetric quantity now no longer used for radiation protection purposes. (The context in which the word is used should avoid ambiguity.)
Incident	An event which causes, or has the potential to cause, abnormal exposure of employees or members of the public and which requires investigation of its causes and consequences. Such an event may require corrective action within the program for control of radiation, but is not of such scale as to be classified as an accident.
Licence	A written approval issued to an operator, which allows the operator to carry out an operation legally. This may be in the form of a licence or a registration, as required by the Radiation Protection and Control Act (2021), dependent on the activity being undertaken.
Mining and mineral processing	Mining is all activities associated with the extraction of minerals from the ground. Mineral processing is all activities associated with the processing of minerals to produce a physical or chemical concentrate, including hydrometallurgical and pyrometallurgical processing, and physical ore beneficiation.

Word	Description
Occupational exposure	Exposure of a person to radiation which occurs in the course of that person's work and which is not excluded exposure.
Operation	An instance of a practice; a particular human activity which may result in exposure to ionising radiation and to which a program of radiation protection applies.
Operator	Any person or entity responsible for a mining or mineral processing operation which may lead to exposure to ionising radiation.
Public exposure	Exposure incurred by members of the public from radiation sources, excluding any occupational or medical exposure and the normal local natural background radiation but including exposure from authorised sources and practices and from intervention situations.
Radiation	Electromagnetic waves or quanta, and atomic or sub-atomic particles, propagated through space or through a material medium.
Radiation Safety Officer (RSO)	An individual technically competent in radiation protection matters relevant for a given type of practice who is designated by the operator or employer to oversee the application of the requirements of the code.
Radioactive waste	Radioactive waste means material that contains or is contaminated with radionuclides at concentrations or activities greater than clearance levels as established by the relevant regulatory authority, and for which no use is foreseen.
System of radiation protection	A generic process of radiation risk management designed to limit the health risks arising from exposure to radiation to acceptable levels in a manner which takes economic and social considerations into account.
Waste management system	Includes all the facilities and procedures involved in the handling, treatment, storage and disposal of radioactive wastes.

Interpretation

Sourced from the Code of Compliance for radiation management plans 2022 South Australia (EPA, 2023)

Word	Description
Department	means the administrative unit of the Public Service that is responsible for assisting a Minister in the administration of the Act.
Medical Exposure Code	means the Code for Radiation Protection in Medical Exposure (2019) published by ARPANSA, as amended from time to time.
Mining Code	means the Code of Practice and Safety Guide for Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing (2005) published by ARPANSA, as amended from time to time
Planned Exposure Code	means the Code for Radiation Protection in Planned Exposure Situations (2020) published by ARPANSA, as amended from time to time
Security Code	means the Code of Practice for the Security of Radioactive Sources (2019) published by ARPANSA, as amended from time to time
Supervision – direct supervision	is when a person, licensed under the Act for that activity, is physically present and directing an individual undertaking an activity. The supervisor gives directions to the person prior to the activity and while undertaking the activity and ensures that radiation safety requirements are followed.

Word	Description
Supervision – indirect supervision	is when a person, licensed under the Act for that activity and working in the same premises or for the organisation, has oversight and provides directions to a supervised person for the activity undertaken, but does not constantly observe the person. The supervisor gives directions to the person prior to the activity, sufficient to ensure safety, and sets in place measures to verify that radiation safety requirements are followed. The supervisor must be accessible to the supervised person.
Transport code	means the Code for the Safe Transport of Radioactive Material (2019) published by ARPANSA

Interpretation

Sourced from the Code of Compliance for labelling and signage of ionising radiation sources South Australia (EPA, 2023)

Word	Description
Apparatus	means ionising radiation apparatus to which this code applies
Radiation symbol	means the radiation symbol described and shown in Schedule 1 of this code

Glossary of Terms

Sourced from the Code of Practice for Protection Against Ionising Radiation Emitted from X-ray Analysis Equipment (National Health and Medical Research Council, 1984)

Word	Description
Aperture	A gap in the protective material of a tube housing through which the radiation from an X-ray tube within the tube housing may pass with little or no attenuation.
Barrier	A physical guard used to prevent access to an area of potential hazard.
Collimator	A device to limit a primary beam to the required cross-sectional area at the point of interest.
Enclosed unit	An X-ray analysis unit which is wholly enclosed by interlocked barriers and/or shields and so designed that it can only be used, adjusted and aligned in ways which involve no possibility of exposure of any person to the primary X-ray beam.
Enclosure	A combination of shields and/or barriers, that surround a particular space, which prevents access to and attenuates X-radiation emerging from that space.
Gray	symbol Gy, is the SI unit of absorbing dose and kerma, corresponding to the absorption of one joule per kilogram of matter.
Interlock	The filtration of the primary X-ray beam effected by the irremovable materials of the X-ray tube assembly.
Leakage radiation	X-radiation emerging from the protective shielding of the X-ray tube housing or enclosure and all other parts of an X-ray analysis unit.
Operator	A radiation worker given the responsibility, by the user to operate an X-ray analysis unit.
Partly enclosed unit	An X-ray analysis unit, which is partly enclosed by interlocked barriers and/or shields or partly or wholly enclosed by fixed barriers and/or shields which require the use of tools for removal and is so designed that, in its normal use, adjustment and alignment, there is no

Word	Description
	possibility of an inadvertent exposure of any person to the primary X-ray beam.
Personal monitor	A radiation sensitive device that is worn by an individual and is used for the measurement of radiation dose.
Primary beam	That part of the X-radiation from an X-ray analysis unit which passes through an aperture of the tube housing and is intended for use as the primary source of X-radiation incident on a target.
Radiation Safety Officer	A person having appropriate qualification and experience in radiation safety, who is appointed to carry out the responsibilities of Radiation Safety Officer as specified in this Code.
Shield	A wall or cover made of material having sufficient density and thickness to attenuate X-radiation to a safe level.
Sievert	Symbol Sv, is the SI unit of dose equivalent, corresponding to the absorption of one joule in one kilogram of biological matter. taking into account the quality factor and other modifying factors.
Scattered radiation	Radiation that has been deviated in direction, during the passage of the primary beam through matter.
Shall	Indicates that the particular requirement is necessary to ensure protection from radiation.
Should	Indicates a procedure or precaution which is to be applied whenever practicable, in the interests of minimizing hazards.
Tube housing	The housing surrounding the X-ray tube, or the X-ray tube and parts of the X-ray analysis unit, that is constructed to provide adequate protection from radiation hazards and incorporates apertures to permit the emergence of primary beams in desired directions.
Tube shutter	An aperture cover designed to reduce, when closed, the intensity of the primary beam emerging from the aperture to such a level that the beam presents no hazard to persons at any point beyond the cover.
User	The person having administrative responsibility for use of a particular X-ray analysis unit. This person shall be the owner or hirer of the unit or his agent or, if the unit is owned or hired by an institution or organization, the agent of that body.
X-ray analysis unit	That portion of the equipment used to carry out X-ray analysis, consisting of a high tension generator, X-ray tube and tube housing and the analysis components including attachments such as cameras, goniometer and radiation detectors, but not including sealers or pulse height analysers and associated electronic equipment

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1. INTRODUCTION

This Radiation Management Plan (RMP) has been prepared by Orpheus Uranium Limited (*the Company*) in order to identify and appropriately manage all radiological risks associated with exploration activities conducted at the Frome Project (*the Project*). The RMP is a requirement to proceed with a Program for Environment Protection and Rehabilitation (PEPR) to explore for uranium in South Australia as governed by the Department for Energy and Mining (DEM).

The Company proposes to undertake exploratory drilling operations for uranium/thorium and has developed this RMP so that, in the event radioactive mineralisation is encountered, appropriate occupational radiation protection and waste management procedures can be implemented.

1.1 PROJECT BACKGROUND

1.1.1 Project Location

The Project comprises four contiguous exploration licences (EL) EL 6554 (Frome Downs), EL 6555 (Curnamona), EL 6703 (Erudina) and EL 6900 (Billeroo) that are located within an area of the Frome Embayment (Callabonna Sub-basin), south of Lake Frome, South Australia. The Project overlaps two registered Native Title Determinations, as recorded on the National Native Title Tribunal Register, registered to the Aboriginal people of the Adnyamathanha, as represented by the Adnyamathanha Traditional Lands Association (Aboriginal Corporation) RNTBC (ATLA). The Project also overlaps a portion of eight pastoral leases, issued on Crown land. Access is via the Barrier Highway to Yunta, and then via the gazetted dirt track, Tea Tree Road, toward the Project area (Figure 1).

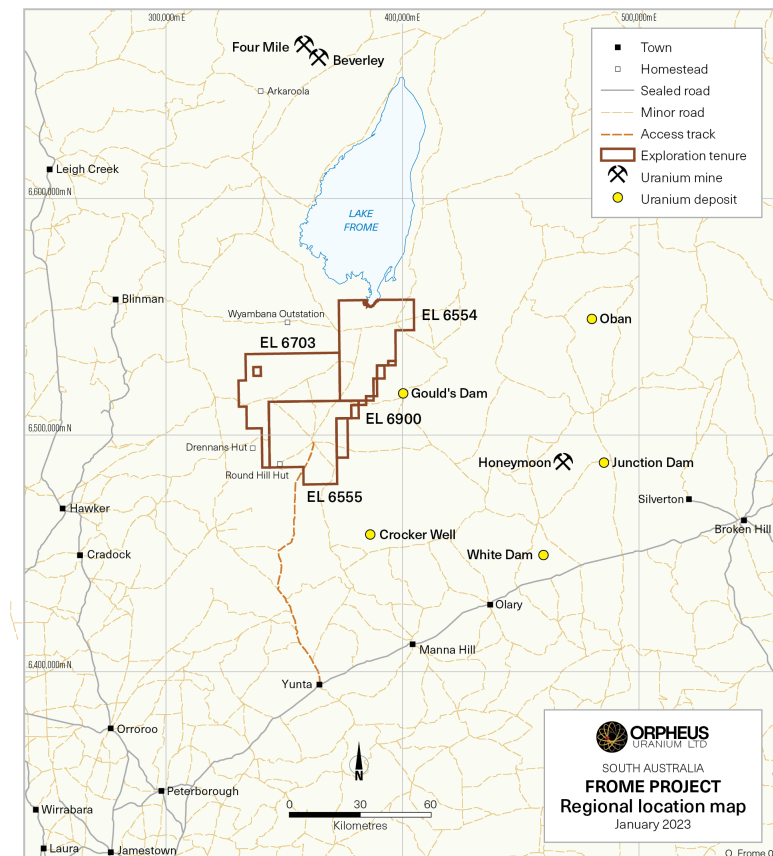


Figure 1. Frome project location map

1.1.2 Description of Operations

The target commodity is uranium, the exploration model is sedimentary-hosted uranium mineralisation in Cenozoic palaeochannels, within host units of the Namba Formation and/or Eyre Formation, similar to the nearby Beverley (Heathgate Resources) and Honeymoon, Goulds Dam and Jasons (Boss Energy Ltd) uranium deposits.

The Project area contains four historic uranium prospects with peak uranium grades ranging up to 1,500 ppm equivalent uranium (EqU) at the Erudina Palaeochannel Prospect, as defined by Areva Australia Pty Ltd between 2004-2014, where 56 drillholes intersected mineralised intervals with anomalous radiometric values (above 100 ppm EqU).

Exploration activities proposed that are likely to intersect radioactive materials include:

- Drill pads and sumps suitable to contain drilling fluids that may contain radioactive materials
- Rotary Mud, Sonic and Aircore drilling methods
- Downhole geophysical logging (gamma, spontaneous potential, resistivity, neutron, prompt fission neutron)
- Vehicles and equipment
- Personnel, work areas and campsite
- Sample collection
- Transportation of samples to Adelaide
- Site rehabilitation

Exploration drilling will predominately be Rotary Mud method (cuttings) with downhole geophysical monitoring, Sonic method (coring) may be conducted. Both drilling methods use drilling fluids and therefore generate little to no dust.

Rotary Mud comprises the addition of bentonite to drilling fluids (water fluids) and compressed air to circulate drill cuttings from the face of the bit through the annulus of the rods to the surface, where the mud is washed of the cuttings and recirculated back down the hole. The bentonite acts as a thin film on the walls of the borehole to help seal and prevent water loss during drilling and to stabilise the borehole evenly in unconsolidated formations. The mud viscosity can be adjusted based on different conditions of formations and the salinity of drilling fluids. Surface sumps or above-ground tanks are required to contain the drilling fluids, approximately 15,000 L holding capacity.

Sonic drilling comprises the use of sonic frequencies for the drilling of a core barrel. The core barrel is retrieved, producing a relatively undisturbed sample. Resonant sonic energy is controlled by the driller to match the frequency of the formation. There is limited waste, (no cuttings or drilling fluids) associated with sonic drilling.

Waste disposal requirements of material that may potentially contain radioactive material includes:

- Disposal of drilling mud and cuttings
- Disposal of washdown bay muds
- Samples returned from the laboratory
- PPE and workwear

1.1.3 Description of Workforce

The workforce at the Project, for the purposes of radiation protection, comprises two groups:

- Designated workers; and
- Non-designated workers.

Designated workers are defined as those that regularly work in controlled areas and have the potential to receive a measurable dose of more than 5mSv per year, or who are on site for more than two weeks. Non-designated workers are all other workers on site. Designated workers require to be listed on the **Designated Worker Dose Register** and must wear the relevant radiation measurement devices during work hours, as provided by the Company. The workforce will comprise:

- Geologist/s (Site Supervisor)
- Radiation Safety Officer (RSO)
- Field Technician/s
- Driller/s and Driller's Offsider/s
- Drill Supervisor
- Camp Manager
- Wireline Loggers (downhole logging)
- Visitors, such as native title groups, anthropologists, landowners, regulators, environmental survey groups.

1.1.4 Authorisation to Operate

Orpheus currently operates the Frome project comprising four contiguous exploration licences, EL 6554 (Frome Downs), EL 6555 (Curnamona), EL 6703 (Erudina) and EL 6900 (Billeroo), granted by the Minister for Energy and Mining, that contain a Schedule of Conditions. The RMP is a requirement of the Program for Environment Protection and Rehabilitation (PEPR).

1.2 RMP BACKGROUND

1.2.1 Purpose

The purpose of this Radiation Management Plan (RMP) is to:

- Identify all radiation risks associated with the exploration program.
- Outline procedures to control the risks to people and the environment.
- Outline methods of monitoring and recording of doses to workers.
- Outline procedures for managing incidents and spills involving radioactive samples, waste or drilling fluids.
- Outline the program of disposal of radioactive waste generated on site or returned to site from laboratory testing.
- Outline the processes to ensure all contaminated equipment is cleaned before leaving site.
- Outline procedures to suitably record and report information as necessary.
- Outline procedures to ensure compliance with any transport or storage requirements under the Act.
- Outline the roles of the Radiation Safety Officer and the availability of resources to implement the RMP.
- Document the induction and training programme for all workers and contractors on site.

Beyond its legal and contracted obligations aimed at the radiation control process the Company recognises the importance of good exploration practices with the land where the Company operates.

This includes providing adequate induction training, licensing, record keeping, monitoring equipment, suitable Personal Protective Equipment (PPE) and environmental controls to ensure protection from radiation associated with exploration.

The Company's outlook is to maintain strong work, health and safety and environmental outcomes through careful and managed exploration activities which adhere to environmental rehabilitation and protection standards.

1.2.2 Application

The requirements set out in this RMP apply to all Project activities including those of staff, contractors and visitors. The RMP is prepared to adhere to the following regulatory requirements:

- *Mining Act 1971 (SA) (as amended)*
- *Mining Regulations 2020 (SA)*
- *Radiation Protection and Control Act 2021 (SA)*
- *Radiation Protection and Control Regulations 2022 (SA)*
- *Environment Protection Act 1993 (SA)*
- *Environment Protection and Biodiversity Conservation Act 1999 (Cth)*
- *The Aboriginal Heritage Act 1988 (SA) (AHA)*
- *Pastoral Land Management and Conservation Act 1989*
- Conditions associated with exploration licences; EL 6554 (Frome Downs), EL 6555 (Curnamona), EL 6703 (Erudina) and EL 6900 (Billeroo), including any renewals and subsequent licences
- Program for Environment Protection and Rehabilitation (PEPR)
- Program Notifications

Changes to any of these may result in changes to the RMP.

1.2.3 Commencement

This RMP applies from the endorsement date, as provided by the Radiation Protection Division of the Environment Protection Authority (EPA).

1.2.4 Authority and Review

The Project Executive Committee approved this RMP on 27 May 2024. The Project Manager is the custodian of this RMP. The RMP is reviewed on a two-year cycle to determine whether any updates are required, unless a more frequent update is necessary to reflect rapidly changed business, regulatory and/or Agreement circumstance. Any requests for RMP changes must be addressed to the Project Executive Committee and will be subject to appropriate review and approval processes.

The RMP, and subsequent changes must be submitted and endorsed by the Radiation Protection Division of the EPA.

2. SCOPE

2.1 SCOPE OF THIS RMP

This RMP applies to the management of radioactive material for the protection of workers, the public and the environment from exploration activities conducted at the Frome project.

This RMP will assist the Company maintain compliance with relevant radiation legislation and to keep radiation doses As Low As Reasonably Achievable (ALARA), with economic and societal factors being considered.

The measures described align with the document: **Radiation protection guidelines on mining in South Australia: Mineral exploration** (Radiation Protection Division, EPA, 2010), in accordance with the *Mining Act*, in addition to the Project’s procedures and permits that include the following documents:

- Orpheus’ Radiation Policy
- Orpheus’ Environmental Policy
- Orpheus’ Work Health Safety Policy
- Frome Project Exploration PEPR/s
- Program Notification/s
- Annual Compliance Reporting

2.2 OVERLAP WITH OTHER MANAGEMENT PLANS

This RMP is part of the overall management framework developed for the Frome project and has overlaps and cross-linkages to other management plans, including:

- Frome Project PEPR/s
- Safety Management System
- Site Inductions
- Safe Work Procedures

3. ROLES AND RESPONSIBILITIES

Principal roles and responsibilities for the implementation of this RMP are outlined in Table 1.

Table 1. Key roles and responsibilities

Role	Responsibilities
Senior Management	<ul style="list-style-type: none"> • Detailed understanding of the RMP requirements and ensuring there are appropriate resources and time to implement requirements. • Overall accountability for the RMP and its implementation. • Monitoring the implementation of the RMP and relevant reporting. • Ensuring the RMP procedures are reviewed on a regular basis. • Consultation with and seeking approvals from relevant government bodies and community groups. • Ensuring relevant Registers are up to date and maintained. • Providing direct lines of communication with regulators. • Management of statutory or policy changes regarding radiation and transportation.
Project Manager	<ul style="list-style-type: none"> • Detailed understanding of the RMP requirements and ensuring there are appropriate resources and time to implement requirements. • Primary contact for the Project for on-ground radiation matters. • Development of any specific Site Protection Plans. • Ensuring work activities do not cause unacceptable radiation levels without appropriate approvals. • Ensuring that personnel involved in work that may intersect radioactive minerals receive appropriate training and induction to understand their responsibilities. • Reviewing and reporting on Dose Registers and annual dose limits provided by the RSO.

Role	Responsibilities
Radiation Safety Officer (RSO)	<ul style="list-style-type: none"> • Detailed understanding of the RMP requirements and ensuring there are appropriate resources and time to implement requirements. • Primary contact for the Project for on-ground radiation matters. • Development of any specific Site Protection Plans. • Ensuring work activities do not cause unacceptable radiation levels without appropriate approvals. • Ensuring that personnel involved in work that may intersect radioactive minerals receive appropriate training and induction to understand their responsibilities. • Collection of and recording of radiation measures to calculate and maintain the Dose Registers and annual dose limits.
Project Employees	<ul style="list-style-type: none"> • Be familiar with Project procedures through induction training. • Understand and comply with RMP requirements. • Attend relevant training and provide certificates to Employer. • Notify Supervisors of any incidents or near misses occurrences that involve radioactive materials. • Notify RSO of past Worker radiation dose levels. • Liaise with regulators only as required and agreed with Supervisors.
Project Contractors	<ul style="list-style-type: none"> • Be familiar with Project procedures through induction training. • Understand and comply with RMP requirements. • Comply with Project requirements set out in contractor contracts. • Provide evidence of licensing of ionizing radiation apparatus. • Notify RSO of past Worker radiation dose levels. • Liaise with regulators only as required and agreed with Supervisors.

4. KEY REGULATORS

The key regulator of the Frome project is the Exploration Regulation Division of DEM. The key regulator of this RMP is the Radiation Protection Division of the EPA. The RMP and any subsequent changes, must be approved by the EPA prior to approval of the PEPR.

5. APPLICABLE LEGISLATION FOR URANIUM EXPLORATION

Applicable Acts and Regulations for uranium exploration in South Australia include:

- *Mining Act 1971 (SA)*
- *Mining Regulations 2020 (SA)*
- *Radiation Protection and Control Act 2021 (SA)*
- *Radiation Protection and Control Regulations 2022 (SA)*
- *Environment Protection Act 1993 (SA)*

Uranium mineralisation within drill core, cuttings and samples is classified as ‘**radioactive material**’ in accordance with Regulation 8(1)(b) of the *Radiation Protection and Control Regulations 2022* in relation to naturally occurring radioactive material if:

- (i) **it contains 1 or more of the radionuclides in the Uranium decay chain or the Thorium decay chain with an activity concentration that exceeds 1 Bq/g; or**
- (ii) **it contains the radionuclide K-40 with an activity concentration that exceeds 10 Bq/g.**

5.1 SOUTH AUSTRALIAN LEGISLATION

The *Radiation Protection and Control Act 2021 (SA)* outlines control activities involving radiation sources to provide for the protection of people and the environment from effects of radiation.

Section 6 of the Act outlines (1) the **radiation protection principle**, the principle that people and the environment should be protected from unnecessary exposure to radiation through the processes of justification, limitation and optimisation.

(2) Justification involves –

- a) Assessing whether the benefits of a practice involving ionising radiation or its use outweigh the detriment; and
- b) Only adopting the practice if it produces sufficient benefit to outweigh the detriment.

(3) Limitation involves –

- a) Setting radiation dose limits or specifying radiation emission or absorption standards and ensuring compliance with those limits or standards; or
- b) Imposing other measures and ensuring compliance with those measures, so that the risks to people and the environment from exposure to radiation are below levels considered unacceptable.

(4) Optimisation of protection, in relation to the conduct of a radiation practice, or the use of a radiation source, that may expose people or the environment to ionising radiation, means the following:

- a) Keeping the magnitude of individual doses of, or the number of people that may be exposed to, ionising radiation as low as is reasonably achievable, taking into account economic, social and environmental factors; and
- b) If the magnitude of individual doses, or the number of people that may be exposed, is uncertain – keeping the likelihood of incurring exposures of ionising radiation as low as reasonably achievable, taking into account economic, social and environmental factors.

The *Environment Protection Act 1993* (SA) (EP Act) is to provide for the protection of the environment.

Section 10 of the EP Act outlines the **principles of ecologically sustainable development**;

- (i) That the use, development and protection of the environment should be managed in a way, and at a rate, that will enable people and communities to provide for their economic, social and physical well-being and for their health and safety while –
 - a. Sustaining the potential of natural and physical resources to meet the reasonably foreseeable needs of future generations; and
 - b. Safeguarding the life-supporting capacity of air, water, land and ecosystems; and
 - c. Avoiding, remedying or mitigating any adverse effects of activities on the environment.

5.2 CODES OF PRACTICE

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) has published a Radiation Protection Series that consists of Codes and Standards. Those relevant to the Frome project include:

- *Code of Practice on Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing, Radiation Protection Series No. 9 (2005, the Mining Code)*
- *Code of Practice for the Safe Transport of Radioactive Material, Radiation Protection Series C-2 (Rev. 1) (2019)*
- *Code of Practice for the Near-surface Disposal of Radioactive Waste in Australia, Radiation Health Series No. 35 (1992)*
- *Code of Practice for the Disposal of Radioactive Waste by the User, Radiation Protection Series C-6 (2018)*

The objective of the **Code of Practice on Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing (2005)** is to provide a regulatory framework to manage the protection of workers, members of the public and the environment from harmful effects of radiation exposures arising from mining or mineral processing and from the waste resulting from these activities both now and in the future.

The objective of the **Code of Practice for the Safe Transport of Radioactive Material, Radiation Protection Series C-2 (Rev. 1) (2019)** is to establish national uniformity for the requirements for the transport of radioactive material in Australia and applies to the transport of radioactive material by road, rail or waterways under jurisdiction of States and Territories in Australia.

The objective of the **Code of Practice for the Near-surface Disposal of Radioactive Waste in Australia, Radiation Health Series No. 35 (1992)** is to provide a basis for the near-surface disposal of solid radioactive waste in a way which ensures that there is no unacceptable risk or detriment to humans, other biota or the environment, at present, and that future risks or detriment will not exceed those currently accepted. Provisions of this code are intended to encourage uniform practice in Australia for the near surface disposal of radioactive waste.

The objective of the **Code of Practice for the Disposal of Radioactive Waste by the User, Radiation Protection Series C-6 (2018)** is to set out levels for the disposal and discharge of radioactive material to landfill, sewer and the atmosphere below which no authorisation is required from the relevant regulatory authority. It is intended that the Code can be incorporated into regulatory instruments to ensure a uniformed approach to the disposal and discharge of radioactive material across Australia.

The National Health and Medical Research Council has published a Code for the protection against ionising radiation emitted from X-ray analysis equipment. The objective of the **Code of Practice for Protection Against Ionizing Radiation Emitted from X-ray Analysis Equipment (1984)** outlines responsibilities of personnel involved with the use of X-ray analysis equipment.

The South Australian EPA has published Codes of Compliance. Those relevant to the Frome project include:

- Code of Compliance for radiation management plans (2022)
- Code of Compliance for apparatus used for borehole logging (2022)
- Code of Compliance for labelling and signage of ionising radiation sources (2022)
- Portable XRF Apparatus (2022)

These are sourced from the EPA website:

https://www.epa.sa.gov.au/business_and_industry/radiation/codes-of-compliance

5.3 REGULATORY GUIDELINES

Regulatory guidelines compiled by the Radiation Protection Division of the EPA include:

- The **Radiation protection guidelines on mining in South Australia; Mineral exploration (2010)**, which provides a basic understanding of the nature of radiation hazards associated with exploration for radioactive minerals and provides a systematic approach to managing those hazards to ensure compliance with current statutory and regulatory requirements. The guideline covers radiation protection and radioactive waste management issues arising from exploration drilling, sample handling, analysis, transport, storage and site rehabilitation in areas of known radioactive mineralisation.

Regulatory guidelines provided by DEM relevant to exploration include:

- *MG8 Preparation of a program for environment protection and rehabilitation (PEPR) for low impact mineral exploration in South Australia*
- *MG13 Mineral exploration reporting guidelines for South Australia*
- *MG22 Guidelines for conducting mineral exploration in South Australia*
- *MG16 Guide for a significant environmental benefit for the clearance of native vegetation associated with the minerals and petroleum industry*
- *MG20 Radioactive core storage and handling: standard operating procedure*
- *MG22 Conducting mineral exploration in South Australia*
- *MG33 Exploration licences guideline*

6. RADIATION MANAGEMENT PLAN

This RMP comprises core components to include:

- **Radiation Management Plan**
 - Dose limits of occupational workers and public
 - Radiation management
 - Monitoring
 - Personnel and resources
 - Records
 - Incidents
- **Transportation of Radioactive Material**
 - Sample packaging
 - Package classification
 - Transport incidents
- **Disposal of Radioactive Waste Material**
 - Liquid waste
 - Solid waste
 - Bulk samples
 - Analytical sample return
 - Potentially contaminated waste materials
- **Off-site Storage of Radioactive Samples**

6.1 DOSE LIMITS OF OCCUPATIONAL WORKERS AND PUBLIC

The **Code of Practice on Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing (2005)** outlines dose limits for occupational workers and for the public as reported in Schedule 1 of *ARPANSA's Recommendations for Limiting Exposure to Ionizing Radiation (2002) – Dose Limits*.

Table 2. Dose limits (ARPANSA, 2005)

Application	Dose Limits ¹	
	Occupational	Public
Effective dose	20 mSv per year, averaged over a period of 5 consecutive calendar years ²	1 mSv in a year ⁴

Application	Dose Limits ¹	
	Occupational	Public
Annual equivalent dose in:		
The lens of the eye	150 mSv	15 mSv
The skin ⁵	500 mSv	50 mSv
The hands and feet	500 mSv	-

1. The limits shall apply to the sum of the relevant doses from external exposure in the specified period and the 50-year committed dose (to age 70 years for children) from intakes in the same period.
2. With the further provision that the effective dose shall not exceed 50 mSv in any single year. In addition, when a pregnancy is declared by a female employee, the embryo or fetus should be afforded the same level of protection as required for members of the public.
3. (DELETED)
4. In special circumstances, a higher value of effective dose could be allowed in a single year, provided that the average over 5 years does not exceed 1 mSv per year.
5. The equivalent dose limit for the skin applies to the dose averaged over any 1 cm² area of skin, regardless of the total area exposed.

NOTE 1: The above dose limits table has been directly extracted from ARPANSA's Recommendations for limiting exposure to ionizing radiation (1995), [republished as RPS 1 in 2002]. However, as the RHC now advises that the exceptional circumstances clause is not recommended for use in Australia, note 3 of the table in RPS 1 has been deleted from this Code.

NOTE 2: Exposure to radiation from natural sources is generally excluded from occupational or public exposure, except when the exposure is a direct consequence of a practice or is specifically identified by the appropriate authority as requiring control through the implementation of a program of radiation protection. Medical exposure includes doses received by patients undergoing medical diagnosis or therapy, doses received by volunteers in medical research, and doses received knowingly and willingly by persons other than health care workers as a consequence of their proximity to an exposed patient. Dose limits do not apply to exposures from natural sources, except as described above, or to medical exposures.

6.2 RADIATION MANAGEMENT

6.2.1 Sources of Radiation Exposure

Radiation doses can be received by the human body by four **dose delivery pathways**, these are:

1. Direct shine by gamma rays emitted by radioactive materials;
2. Inhalation of radon gas progeny (or 'radon daughters') in the air;
3. Inhalation of airborne dust containing radioactive materials; and
4. Ingestion of radioactive materials.

These dose delivery pathways contribute differently to a dose amount depending on the work circumstances and the controls in place. For instance, in an underground uranium mine, inhalation of radon progeny is most important, requiring a high standard of ventilation, whereas in all above ground situations it is trivial. For a pipeline weld testing industrial radiographer using a sealed high intensity gamma ray source, item (1), direct gamma irradiation, is very important, and requires careful control, but in that instance all other pathways for dose delivery are non-existent.

Dose delivery pathways likely to be possible at the Frome project include:

1. Direct shine by gamma rays emitted by radioactive materials
 - Standing near radioactive material that emits gamma rays
2. Inhalation of radon gas progeny (or 'radon daughters') in the air
 - Accessing stored radioactive samples in an enclosed area, which might have radon built-up
3. Inhalation of airborne dust containing radioactive materials
 - Relevant to high dust activities such as RC drilling through radioactive material
4. Ingestion of radioactive materials
 - Relevant to contact with radioactive material through dust and improper hygiene practices resulting in ingestion of radioactive material.

External Exposure Sources

During site operations at the Frome project the following external exposures may be possible from the following sources:

- Sampling of drill cuttings/core where uranium mineralisation is present.
- Handling of large quantities of radioactive core samples and drill cuttings.
- Handling of drilling wastewater from drilling where uranium mineralisation has been encountered downhole.
- Working or residing near stored samples containing uranium mineralisation.
- Transporting large quantities of radioactive samples for storage or analysis off-site.
- Transporting large quantities of radioactive waste for disposal off-site.
- Proximity to ionising radiation apparatus.

Internal Exposure Sources

During site operations at the Frome project the following internal exposures may be possible from the following sources:

- Inhalation of dust created from drilling through radioactive ore zones or cutting of cores.
- Ingestion of radioactive materials or inhalation of dust through handling core samples and drill cuttings.
- Ingestion of radioactive materials through poor personal hygiene (not washing hands after handling radioactive samples).
- Inhalation of radon decay products where large quantities of samples are kept in enclosed and poorly ventilated storage areas.

6.2.2 Control of Radiation Exposure

The general guiding principle in all radiation protection is to keep doses "As Low As Reasonably Achievable" in the circumstances. This is called the ALARA principle. This does not mean that every particle of uranium or thorium from escaping will be prevented, which is impossible and unnecessary, or that shielding against even the lowest intensity of gamma rays is possible, but it does mean that reasonable good work practices are obligatory to minimise doses.

External Control of Radiation Exposure

External control of radiation exposures will be implemented by:

- Work hours spent with radioactive samples will be monitored and minimised.
- Radioactive samples will be located in a designated, and ventilated area, away from occupied areas and well sign posted, refer to section below, On-site Sample Storage.

- Radioactive samples will be attenuated to shield gamma rays as much as possible, using non-radioactive materials, such as steel or lead shields.

Internal Control of Radiation Exposure

Internal control of radiation exposures will be implemented by:

- Mandatory and correct application of PPE.
- Appropriate hygiene facilities.
- Mess facilities located away from radioactive storage areas.
- Washing work clothes separately.

On-site Sample Storage

Radioactive samples will be stored away from occupied areas and in well ventilated areas if held in an enclosed space, for extended periods. A designated storage site for particularly active samples will be located and adequately signposted.

Labelling

All radioactive samples will be clearly labelled, and radioactive sample bags will be sealed and in good condition to prevent release of radioactive dust.

6.2.3 Radiation Monitoring, PPE and Hygiene Equipment

Equipment stored on site for the duration of drilling activities likely to intersect uranium/thorium mineralisation for the purposes of controlling occupational radiation protection includes:

1. Radiation monitoring equipment
2. Personal protective equipment
3. Hygiene equipment
4. Attenuation equipment

Radiation Monitoring Equipment and Calibration

Radiation monitoring equipment required to control exposure to external radiation (gamma rays) on site will comprise:

- A portable gamma survey meter.

Radiation monitoring equipment will be calibrated in accordance with the manufacturers guidelines and the certificates of calibration retained and reported in the Annual Compliance Report.

Radiation monitoring equipment that requires registration with the EPA includes:

- Downhole geophysical probes. This is referred to as 'nuclear logging' and includes techniques that either detect the presence of unstable isotopes, or that create isotopes in the vicinity of the borehole. Nuclear logging techniques include gamma, gamma spectrometry, gamma-gamma and several different types of neutron logs.
- Handheld portable XRF that produce x-rays that create ionizing radiation when in use. Information and guidance for operators of portable XRF apparatus to ensure compliance with the radiation protection and control legislation in South Australia, prepared by the EPA is provided (Appendix D).

If the Company is responsible for these instruments, registration and licencing will be sought in accordance with the following sections of the *Radiation Protection and Control Act 2021* (SA):

- Section 22 Possession of radiation source;

- Section 24 Operation of radiation apparatus; and
- Section 27 Radiation apparatus.

The radiation use licence will be reported in the Annual Compliance Report.

Personal Protective Equipment

Personal Protective Equipment (PPE) required to control internal exposure to (alpha, beta particles) on site will comprise:

- Dust masks (P2) filter must be used when there is potential for exposure to dust when intersecting radioactive material or cutting core samples. Rotary mud drilling and diamond core drilling has little dust generated from drilling so the risk is considered minimal when compared to Reverse Circulation or Aircore drilling.
- Safety glasses and/or goggles must be used when there are risks from radioactive dust, or to avoid rubbing eyes.
- Gloves and appropriate work clothing must be worn when using drilling equipment and when handling radioactive samples or waste materials to minimise any transfer of contamination.

Hygiene Equipment

Hygiene equipment required to control external or internal exposure on site will comprise:

- Washing facilities at the worksite will be provided to ensure hands are washed before eating or smoking.
- Shower and laundry facilities, workers should shower and change out of work clothing at end of shift or before leaving site. Clothes should be laundered regularly and in a designated washing machine.
- Cleaning equipment and regular cleaning of work areas where there is significant build-up of dust or mud.

6.3 RADIATION MONITORING

Monitoring of radiation levels in the workplace and the environment will be conducted to:

- Identify the presence and activity levels of radioactive material.
- Provide information on the effectiveness of the control measures at the site.
- Determine the radiation exposure of workers and demonstrate compliance with regulatory radiation dose limits.
- Assess the impact of the project on the local environment and confirm that rehabilitation of the site has been successful.

Monitoring for Site Controls

A gamma survey will be conducted of cores, samples and drill cuttings to determine the presence of radioactive material to determine any controls necessary to minimise exposure to workers.

The instrument/s used for monitoring will comprise:

- Spectrometer (Photo 1), to measure gamma rays and concentrations of potassium (K), thorium (Th) and uranium (U); and/or
- Scintillometer (Photos 2 and 3), to measure gamma rays.

The instrument/s will be calibrated in accordance with manufacturers guidelines and calibration certificates reported in the Annual Compliance Report.



Photo 1. Spectrometer RS-125



Photo 2. Scintillometer RS-120



Photo 3. Scintillometer RadEye PRD4

Monitoring of workers

Average radiation doses received by workers during exploration activities are typically well below the recommended annual limit for members of the public (1 mSv/a) (Environment Protection Authority, 2010). Workers who will be exposed to radioactive material for longer than two weeks, will be considered to be a **designated worker** and will be monitored to record average radiation doses received during their time at the Frome project. Monitoring of designated workers will be achieved by issuing a personal dosimeter, such as a thermoluminescent dosimeter (TLD) or Optically Stimulated Luminescent (OSL) badge (Photo 4), sourced and assayed by ARPANSA or a NATA accredited laboratory.

The dose results for designated workers will be recorded on the **Designated Worker Dose Register**, template attached, (Appendix A). The dose results for designated workers will be recorded annually in the Annual Compliance Report.

If workers are exposed to significant levels of dusts involving radioactive ores, then dust monitoring will be undertaken using personnel dust pumps (Photo 5), measuring becquerel (Bq) per cubic metre, results recorded on the **Designated Worker Dose Register**. Significant levels of dust will be determined through visual inspections of work areas, or based on type of work activities, such as Reverse Circulation or Aircore drilling methods.



Photo 4. Optically stimulated luminescent (OSL) badge



Photo 5. Dust pump

Monitoring of the Environment

Monitoring of the environment will comprise the following monitoring locations:

- Pre-monitoring to determine background gamma dose rates (or scintillometer count rates) prior to commencement of earthworks in areas to include:
 - Drillsite/s, sedimentation pit
 - Disposal pit
 - Radioactive material storage area/s
 - Washdown area
- Post-monitoring to determine residual gamma dose rates (or scintillometer count rates) post rehabilitation in areas to include:
 - Drillsite/s, mud pit
 - Disposal pit
 - Radioactive material storage area/s

Monitoring of the environment at monitoring locations will be conducted by:

- Using a handheld scintillometer or spectrometer to record count rates per second.
- The instrument will be held at waist height, and the area will be scanned on a grid approximately walking at 2 m spaced lines across the area.
- Readings will be recorded to include the maximum, minimum and average reading for that area.
- If elevated radioactivity occurs post rehabilitation this will be reported to the Supervisor and additional rehabilitation will be required to reduce the count rate to background levels recorded at the pre-reading.

Before leaving the site, background gamma dose rates must be proven to be similar to initial background levels. Both pre and post readings are to be recorded in the Annual Compliance Report.

6.3.1 Decontamination of Machinery and Equipment

It is possible that some machinery and equipment may become contaminated through significant or prolonged contact and build-up with radioactive material.

Entry to Site

The **Site Entry Access** form requires a contractor to state whether machinery and equipment is operational and clean prior to arriving on site.

The **Machinery and Equipment Inspection** form requires the Company to review whether machinery and equipment once arrived on site is clean. This relates not only to radioactive material but also to biological material, hydrocarbons and other contaminants that may enter the environment.

Exit from Site

Prior to departure all machinery and equipment, where required must be cleaned at the designated washdown bay. The washdown bay shall contain a liner (HDPE liner or similar) to contain potentially radioactive material. This material will either be disposed on site at the Disposal Pit or off-site at an appropriately licenced waste facility. A **Machinery and Equipment Inspection** will be conducted by the Company prior to departure. At this point it will be determined whether abrasive cleaning methods such as abrasive blasting is required to remove fixed surface contamination, prior to departure.

6.3.2 Spills Management

Each drill site will comprise a sedimentation pit (sumps) of suitable capacity to contain drilling muds. Alternate methods include using above ground sumps, in environmentally sensitive areas. Earthen bunds and shallow trenching will be formed to prevent loss of fluids from spills.

In the event of a spill on to bare ground, the soil contamination will be removed for burial whether in a mud pit, or Disposal Pit, or disposed of at an appropriately licenced waste facility. Where mud pits have been used for this purpose, these should be allowed to dry out before covering with at least one metre of compacted clean soil.

6.4 PERSONNEL AND RESOURCES

The Company will appoint a **Radiation Safety Officer** (RSO). The RSO will be the primary contact for the Project for on-ground radiation matters. The RSO will:

- Have a detailed understanding of the RMP requirements and ensure there are appropriate resources and time to implement requirements.
- Develop any specific Site Protection Plans and Safe Work Procedures.
- Ensure work activities do not cause unacceptable radiation levels without appropriate approvals and controls.
- Ensure that personnel involved in work that may intersect radioactive minerals receive appropriate training and induction to understand their responsibilities.
- Undertake or supervise the collection of and recording of radiation measures to calculate and maintain Dose Registers.
- Undertake or supervise the collection of and recording of radiation measures to measure environmental radiation (baseline and post rehabilitation).
- Undertake or supervise the collection of and recording of radiation measures to measure machinery and equipment.
- Ensure adequate licensing for ionizing radiation apparatus used on site.

The RSO will discuss responsibilities with senior management of the drilling and other contractor/s detailing their requirements and necessary resources required to implement protection to personnel and the environment from radioactive materials.

The Company will provide adequate resources required to implement protection to personnel and the environment from radioactive materials.

6.4.1 Induction and Training of Workers

All site personnel will be inducted to the site on arrival. The **Site Radiation Induction** includes a briefing on the RMP to explain sources of radiation, radiation monitoring and equipment, PPE requirements, hygiene and laundering requirements, adhering to monitoring requirements, washdown facilities and incident reporting. No work can commence until induction has been completed. Induction records will be maintained by the Company.

A **Medical Site Entry Form** is a requirement of the Company's **Safety Management System**.

The Medical Form includes a question regarding the workers history of working with radiation. Previous dose levels may be discussed with the person and in consultation with ARPANSA, if the RSO believes there is a risk to that person to exceed the annual dose rate limit from conducting work at the Frome project.

6.4.2 Contractors with Radiation Sources

Contractors that carry radiation sources that require registration with the EPA must declare, current registration and calibration of the instruments to the Company by providing current certificates.

Instruments expected to be used at the Frome project include:

- Downhole geophysical probes. This is referred to as 'nuclear logging' and include techniques that either detect the presence of unstable isotopes, or that create isotopes in the vicinity of the borehole. Nuclear logging techniques include gamma, gamma spectrometry, gamma-gamma and several different types of neutron logs, and Prompt Fission Neutron (PFN) logging.
- Handheld portable XRF that produce x-rays that create ionizing radiation when in use.

Those instruments that have been on site within a 12-month period will be documented in the Annual Compliance Report.

6.5 RECORDS

Records will be kept of the following information and/or events:

- Instrumentation details and calibration certificates of radiation monitoring equipment.
- RSO details.
- Employee training, induction and awareness records of radiation safety.
- Personnel medical forms, that remain confidential.
- Results of all employee radiation monitoring undertaken, recording estimates of doses received by workers.
- Site workplace inspections, hygiene, PPE, radioactive gamma scanning, checklists and site entry forms.
- Incidents involving exposure to radiation and the corrective actions.
- For rehabilitation purposes, records will be kept of any measurements related to soil contamination caused by exploration activities.
- In particular, records will be kept in relation to bulk sample disposal pit closure reports, the survey method used to establish gamma levels (or scintillometer count rates) before construction and after closure of the pit, and records kept of the results, as provided to DEM.
- Transportation records of Excepted Packages and LSA-1 Packages.

6.6 INCIDENTS

Incidents regarding radioactive samples and/or waste materials on or off site must be reported, as soon as practicable, to the Project Manager.

The Project Manager will report notifiable radiation incidents to the EPA in accordance with Regulation 98 of the *Radiation Protection and Control Regulations 2022* (SA):

- (1) *An employer must report a notifiable radiation incident to the Minister as follows:*
 - (a) *in the case of an incident of a kind referred to in Schedule 3 clause 1, 4 or 6—in writing within 7 days of the incident being reported to the employer;*
 - (b) *in the case of an incident of a kind referred to in Schedule 3 clause 2—*
 - (i) *orally as soon as reasonably practicable after the employer becomes aware of the incident;**and*

- (ii) in writing within 7 days of the incident being reported to the employer;
- (c) in the case of an incident of a kind referred to in Schedule 3 clause 3—
- (i) if the radiation source is a security enhanced radiation source—
- (A) orally as soon as reasonably practicable after the employer becomes aware of the incident (in any case not more than 24 hours after the employer becomes aware of the incident); and
- (B) in writing within 7 days of the incident being reported to the employer;
- (ii) in any other case—
- (A) orally within 24 hours of the employer becoming aware of the incident; and
- (B) in writing within 7 days of the incident being reported to the employer;
- (d) in the case of an incident of a kind referred to in Schedule 3 clause 5, 7 or 8—
- (i) orally as soon as reasonably practicable after the employer becomes aware of the incident (in any case not more than 24 hours after the employer becomes aware of the incident); and
- (ii) in writing within 7 days of the incident being reported to the employer.
- (2) A report of a notifiable radiation incident under subregulation (1) must contain all the information entered by the employer in the register of radiation incidents in relation to the incident.

Notifiable radiation incidents are listed in Schedule 3 of the *Radiation Protection and Control Regulations 2022* (SA):

- 1) Medical exposures of patients to ionising radiation
- 2) Incidents that cause or may lead to radiation injuries or radiation doses exceeding the annual dose limits to workers or members of the public
- 3) Loss or theft of radioactive sources or radiation apparatus
- 4) Incidents relating to the transport of radioactive material
- 5) Unintentional or unauthorised discharges of radioactive material into the environment
- 6) Damage to, or malfunctioning of, radiation apparatus or sealed radioactive source
- 7) Contamination with, or dispersal of, radioactive material
- 8) Out of control radiation sources

The Project will notify DEM within 24 hours of an incident occurring on site.

Steps taken following an incident involving radioactive waste include:

- The area will be made safe, the spill contained, and pegged and signposted for clear sight.
- The area will be surveyed with a handheld portable gamma response meter to determine radioactive levels.
- An incident investigation will be conducted by the RSO, or Site Manager.
- The incident will be notified to DEM and an **Initial Incident Report** will be provided to DEM.
- The radioactive material will be removed and the incident site remediated.
- The area will be surveyed with a handheld portable gamma response meter to determine radioactive levels – post remediation.
- A **Comprehensive Incident Report** will then be provided to DEM documenting the steps involved in remediation and to confirm radiation levels meet surrounding background levels.
- Incidents will be recorded in the Annual Compliance Report.

Should the incident involve the public and/or public roads the incident will be reported to:

- The Director, Radiation Protection Division of the Environment Protection Authority
 - Telephone: (08) 8463 7826, or
 - Fax: (08) 8124 4671.
 - After hours EPA contact: (08) 8204 2004 (stating type of radiation incident).
- Local Police.

7. TRANSPORTATION OF RADIOACTIVE MATERIAL

Radioactive materials collected during exploration programs will be transported by the Company from the Frome project, to within South Australia, in accordance with the following legislation:

- Section 21 of the *Radiation Protection and Control Act 2021*; and
- *Code of Practice for the Safe Transport of Radioactive Material (2008)* [the **Transport Code**].

Radioactive samples collected during exploration programs will not be transported outside of South Australia. The majority of exploration samples collected will be either (1) non-radioactive, or (2) low-level radioactive material and will therefore most likely be transported as an 'Excepted Package'. All transportation shipments of radioactive samples will be packaged and labelled according to the Transport Code.

7.1 SAMPLE PACKAGING

Sample packaging will be such that it will keep the radioactive samples contained during routine conditions of transport. Packaging can range from a sturdy box for small packages to a sturdy plastic bucket or steel drum for larger samples. Multiple packages may be combined onto a pallet for transport together. The samples will be secured together onto a pallet. Sample packages grouped together in this way would be treated as if it was one package under the Transport Code.

7.2 PACKAGE CLASSIFICATION

Classification for radioactive samples for transport will be determined by measurement of the gamma dose rate at the surface of the package. This gamma dose rate will be determined using a suitably calibrated portable gamma survey meter. Where packages are grouped together, for example on a pallet, the pallet will be rearranged to result in a lower dose rate at surface, as possible. That is, samples with a low level of radioactivity will be used to shield higher-level samples. In such cases, where shielding is occurring, packaging will be sufficient to ensure the shielded higher activity samples do not dislodge during transport.

7.2.1 Excepted Packages

Radioactive samples will be transported as **Excepted Packages** under the Transport Code. That is, the sample container will be transported as an excepted package provided that the gamma dose rate measured on the surface is less than 5uSv/hr. If a package has an external dose rate greater than 5uSv/hr in one area, attempts at repackaging will be done to reduce the dose rate to below 5uSv/hr (for example by placing the high activity material in the centre of the package, shielded by lower activity samples).

Excepted packages with activity <5uSv/hr will be transported in accordance with the **Transport Arrangements for Excepted Materials**, (Appendix B).

7.2.2 Higher Activity Samples (LSA-1 Package)

Higher activity samples, are those samples where the dose rate is $>5\mu\text{Sv/hr}$. Samples with activity $>5\mu\text{Sv/hr}$ will be transported as **Low Specific Activity (LSA-1)** material, in accordance with the **Transport Arrangements for LSA Materials**, (Appendix C).

7.3 TRANSPORT INCIDENTS

To avoid transport incidents, the following steps will be employed for the transportation of radioactive materials, from the Frome project:

- Drivers must be suitably qualified and licensed.
- Transport vehicles will be suitably maintained and checklists complete prior to travel.
- Drivers will be inducted on the procedures of transport of radioactive materials.
- Drivers will be inducted in Fit for Work protocols.
- Communications will be available in the transport vehicle, UHF radio, mobile phones.
- A designated travel-route will be provided on a map that includes start point, travel route and destination.
- No off-route travel permitted whilst carrying radioactive materials, unless previously arranged with the RSO.
- Notification will be required for start of journey to end of journey, managed by the RSO.
- Correct documentation as outlined in:
 - **Transport Arrangements for Excepted Materials**, (Appendix B), or
 - **Transport Arrangements for LSA Materials**, (Appendix C).
- All transport events will be recorded in the **Transport Register**.

Should there be an incident involving the loss or dispersal of radioactive samples (e.g. though a vehicle accident or failure of the packaging), the driver should as soon as practicable, contact:

- The site manager (or sender)
- The Director, Radiation Protection Division of the Environment Protection Authority
 - Telephone: (08) 8463 7826, or
 - Fax: (08) 8124 4671.
 - After hours EPA contact: (08) 8204 2004 (stating type of radiation incident).

8. DISPOSAL OF RADIOACTIVE WASTE MATERIALS

Radioactive waste is defined as any radioactive material in the form of a solid, liquid or gas (or combination thereof) that is left over, surplus or an unwanted byproduct of any business or domestic activity (in this case, exploration activities), whether of value or not, but excluding the following:

- a) Substances to which the regulations under the *Radiation Protection and Control Act 2021* do not apply.
- b) Substances that have been exempted from regulatory control under provisions of Section 76 – Exemptions of the *Radiation Protection and Control Act 2021*; as approved by the Minister, by notice in the Gazette and listed on the EPA website:
(https://www.epa.sa.gov.au/business_and_industry/radiation/gazette-notices-and-exemptions), such as: low activity sealed sources.
- c) Material containing activities or activity concentrations of radioactive elements below the exemption levels specified in the National Directory of Radiation Protection published by the Australian Radiation Protection and Nuclear Safety Agency.

Radioactive material wastes shall not be disposed off-site or near permanently occupied areas, except for samples received by NATA accredited laboratories where the laboratory has its own disposal regime.

8.1 LIQUID WASTE

Liquid waste can include:

- Drilling muds;
- Slurry from core cutting;
- Vehicle and equipment wash-down water; and
- Groundwater containing elevated natural levels of radionuclides (such as radium).

Where radioactive mud, cuttings or samples are present in mud pits, the pits will be allowed to dry, and be covered by a minimum of 1 metre of compacted clean soil. For core cutting of radioactive samples, the waste slurry will be directed to a mud pit for disposal as above.

Vehicle of equipment wash-down will be conducted on site and wastewater will be directed to a mud pit or similar, allowed to dry, and be covered by a minimum of 1 metre of compacted soil.

Care will be taken to minimise the surface spread of groundwater. Groundwater will be directed to a mud pit or similar, allowed to dry and be covered by a minimum of 1 metre of compacted clean soil.

8.2 SOLID WASTE

Solid waste material generated during exploration activities may include radioactive samples and returned analytical samples (in discussion with the laboratory/s), as well as contaminated PPE, equipment and containers.

8.2.1 Sample Waste

All samples will be removed from sample bags for disposal. Radioactive samples will be, where possible returned to the drill hole (i.e. before other cuttings). The drill hole should then be rehabilitated in accordance with the PEPR and DEM Information Sheet; *M21 Mineral exploration drillholes – General specifications for construction and backfilling*. Where this is not possible, radioactive samples from individual drill holes will be buried in adjacent mud pits if available with at least 1 metre of compacted clean soil cover.

8.3 BULK SAMPLES

In the situation where radioactive samples cannot be backfilled down the hole and no mud pit is available, the samples will be removed from their sample bags, mixed with barren cuttings or clean soil to reduce any artificial concentration of the material, and be buried in a purpose-built disposal pit as outlined below.

8.3.1 Disposal Pit

A disposal pit may be required for the disposal of radioactive samples and cuttings from exploration activities. The location, dimensions and construction requirements will be outlined in the PEPR or Program Notification, to be approved by DEM.

The details will clearly demonstrate why a specific location has been selected, taking into account all potential stakeholder and environmental issues including topography, social, biological and radiological aspects. The disposal pit is designed to:

- Hold samples removed from their sample bags and containers, not for any other waste disposal type;

- Be located in a stable area that does not compromise its future use, and on ground not subject to flooding or erosion which may re-expose the radioactive material;
- Be constructed so as to ensure the material has at least 2 metres of clean and compacted soil cover;
- Be located within the exploration licences associated with the authorised exploration program.

8.3.2 Disposal Pit Closure Report

A **Disposal Pit Closure Report** will be completed for each pit, providing the following details:

- The location (GPS coordinates) and dimensions of the pit;
- A list of contents;
- Photographic confirmation of the construction of the pit;
- Photographic confirmation of the pre-closure waste location within the pit indicating depth;
- Photographic confirmation of the post-closure landform;
- Measured gamma dose rates (or scintillometer rates) before construction and after closure.

The Disposal Pit Closure Report will be provided to DEM within one month of pit closure.

8.4 ANALYTICAL SAMPLE RETURN

If the laboratory requests to return samples to the Company, any radioactive samples will be disposed of in the disposal pit in the same manner as on-site samples. Other wastes (sample bags, PPE, etc) should be disposed of to an appropriately licenced waste disposal facility, as uncontaminated waste (in respect to radioactivity) provided they are not radioactively contaminated. Radioactive waste is not permitted for disposal to general landfill. Sample returns from barren intervals (i.e. not radioactive samples) may be disposed of in a licenced landfill.

8.5 POTENTIALLY CONTAMINATED WASTE MATERIALS

Empty sample bags, used PPE, and other miscellaneous wastes are unlikely to be contaminated to the extent that they are considered a 'radioactive waste' material requiring special disposal arrangements. These wastes will be disposed of at an appropriately licenced waste disposal facility. In the unlikely event items are suspected of being contaminated to the extent they are considered 'radioactive waste', waste items will be drummed, labelled and stored securely on site for further assessment. The EPA will be contacted for advice on the assessment required.

9. OFF-SITE STORAGE OF RADIOACTIVE SAMPLES

The Company acknowledges the requirement to register a premise, that is located off-site, for the storage of unsealed radioactive materials in accordance with section 25 of the RPC Act and Regulation 19 and 60 of the RPC Regulations.

At the exploration phase of the Frome project, an off-site storage premise is not required. In the event that an off-site storage premise is required, the Company will compile an off-site RMP specific for that site, to be registered and approved by the EPA prior to storage of radioactive samples.

10. MANAGEMENT CONTROLS AND MONITORING

A range of management and monitoring controls are in place to manage the risks and potential impacts of radioactive materials. These are set out in Table 3 together with references to documentation where further information on implementation is available.

Table 3. Key RMP management and monitoring controls

Potential Impact	Applicability	Control Description	Responsible Parties	Means of verification
Radiation dose to worker or public	Protection of site personnel	Radiation monitoring devices	Project Manager, RSO	Designated Worker Dose Register
Environmental contamination impacts	Access to explore within the exploration licence area	The PEPR outlines Section F – management of environmental impacts including receptors, potential impacts, control of rehabilitation strategies, risk assessment and outcome measurements.	Project Manager, RSO	Workplace inspections Incident reports: - Initial Incident Report; and - Comprehensive Incident Report Annual Compliance Report DEM site investigations
Transportation incident	Transportation of radioactive materials, off-site	Portable gamma response measures and correct packaging	Project Manager, RSO	Transportation documentation for: - Excepted packages - LSA-1 packages

11. DESIGNATED WORKER DOSE REGISTER

The Company will maintain a **Designated Worker Dose Register** to record dose rates to designated workers received during time spent at the Frome project. The Designated Worker Dose Register is maintained by the Company as confidential information. An example of the register is provided, (Appendix A).

12. REPORTING

RMP reporting is designed to provide evidence of protection to workers, public and the environment from hazards associated with radioactive materials encountered during uranium exploration.

Reporting will be undertaken in accordance with the requirements of the PEPR and will include an Annual Compliance Report (ACR). An ACR is a requirement of the South Australian Government for authorised operations on a mining lease and is designed to provide assurance to the community, industry, government and other stakeholders that regulatory obligations are being met.

ACR's will be compiled in accordance with the terms of reference:

Determination: Terms of reference 009 – Mining compliance reports (Notice under Regulation 77 of the Mining Regulations 2020) (Department for Energy and Mining, 2020).

ACR's will be compiled in accordance with the guideline and template:

MG3 Preparing a mining compliance report (Department for Energy and Mining, 2021).

13. BIBLIOGRAPHY

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Appendix B: Transport Arrangements for Excepted Packages

Package (container)

- The package must be such that it will retain its contents under routine transport conditions.
- The design should provide for strength of lifting attachments, ease of handling and securing, and ease of decontamination.
- The package should not have external surface alpha contamination above 0.4 Bq/cm². In practice this condition is met if there is no visible contamination or dust on the surface.
- The radiation level at any point on the external surface of an excepted package shall not exceed 5 µSv/h.

Documentation

The shipment must be accompanied by documentation, which includes (in the following order):

- 'Radioactive Material, Excepted Package – Limited Quantity of Material'
- 'UN Class Number 7, UN-2910'
- "Uranium ore samples-solid"
- The maximum activity of the shipment. For material of 1,000 ppm U, this is 12KB q/kg. As the activity (grade) will generally not be known, make a generous estimate based on this figure.
- A signed and dated declaration in the form: "I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packed, marked and labelled, and are in all respects in proper condition for transport by road according to the applicable international and national governmental regulations".
- Sender and receiver details.
- Instructions to the consignor.
- Emergency procedures.

Labels

- Each Excepted Package should be labelled 'Radioactive' on an internal surface such that upon opening, the warning is clearly visible.
- The package is marked 'UN2910' on the outside surface.
- Sender and receiver details should be marked on the outside surface.
- For packages exceeding 50kg the mass to be marked on the outside.

Appendix C: Transport Arrangements for LSA Material

LSA-1 Package

Higher activity samples where the dose rate $>5\mu\text{Sv/hr}$, must be transported as Low Specific Activity (LSA) Material. The transport arrangements are described below assuming samples are packaged within a single vehicle.

Package (container)

Package requirements for transporting solid LSA material are similar to those for Excepted Packages, with the additional requirement that the smallest external dimension of the package must not be less than 10cm. The EPA will be contacted for advice, if there is a need to transport liquid LSA-1 material.

Transport Index-Package

- A Transport Index (TI) must be determined for the package. The TI reflects the external radiation hazard associated with the handling of the package.
- The TI is determined by first measuring the dose rate at 1 metre from the package surface. For core samples, the dose rate is typically less than $1,000\mu\text{Sv/hr}$.
- The dose rate (measured in $\mu\text{Sv/hr}$) is then divided by 10 to determine the TI.
- The determined TI is to be rounded up to the first decimal place. However, a TI of 0.05 or less can be rounded to zero (0).

Transport Index-Vehicle

- A TI needs to be determined if shipping multiple packages together in a container or on a single vehicle. In this case the TI is either the sum of all TI's of all the contained packages or it can be determined by direct measurement of radiation level for the vehicle or container (as above).
- For tanks, freight containers and unpackaged LSA-1 material the TI is modified by a multiplication factor based on the size of the load.

Table 1. Multiplication factors for tanks, freight containers and unpackaged LSA-1 and SCO-1

Size of load ^a	Multiplication factor
Size of load $\leq 1 \text{ m}^2$	1
$1 \text{ m}^2 < \text{size of load} \leq 5 \text{ m}^2$	2
$5 \text{ m}^2 < \text{size of load} \leq 20 \text{ m}^2$	3
$20 \text{ m}^2 < \text{size of load}$	10

^a Largest cross-sectional area of the load being measured

Documentation and Labels

- If the TI is less than 1 and the surface dose rate is less than 0.5 mSv/hr the package is a Category II-Yellow category.
- The contents of 'LSA-1' and the maximum activity of the package contents must be marked on the label. The TI of the package is to be included on the label.
- Sender and receiver details should be marked on the outside surface.
- The package is marked 'UN2912' and 'Radioactive material, low specific activity (LSA-1)' on the outside surface.
- The packages exceeding 50 kg the mass to be marked on the outside.

- If the surface dose rate of any package exceeds 0.5 mSv/hr, the EPA will be contacted for further advice.

Placards

- The vehicle transporting the LSA packages must have placards attached as shown in the figures below:



Figure 1 Category II-Yellow Package Label



Figure 2 Placard for Radioactive Material

Appendix D: Portable XRF Apparatus, EPA 2023

Portable XRF apparatus

Issued December 2023

EPA 1148/23: The purpose of this document is to provide information and guidance to current and potential owners and operators of portable XRF apparatus (sometimes referred to as 'handheld') to ensure compliance with the radiation protection and control legislation in South Australia.

This guidance has been published to address gaps arising from the 40-year-old Code of practice for protection against ionising radiation emitted from X-ray analysis equipment RHS9 (1984), published by ARPANSA. The RHS9 did not consider compact pXRF incorporating miniature x-ray tubes.

1 Scope

This guideline states the EPA's compliance expectations regarding portable X-ray fluorescence (pXRF) apparatus that meet the definition below.

Persons who use or operate a pXRF meeting this definition are exempt¹ from any requirement in the *Code of practice for protection against ionizing radiation emitted from X-ray analysis equipment RHS9 (1984)* subject to the following condition: The registered owner of the pXRF ensures compliance with section 4, tables 4.1 and 4.2 of this guideline.

2 Definition

pXRF apparatus represent a category of ionising radiation apparatus which are handheld and portable, capable of in-situ elemental analysis through the generation and use of X-ray beams.

The apparatus must have a maximum X-ray tube power of 10W.

3 Guidance on requirements that apply to pXRF

3.1 Applicable legislation

- [Radiation Protection and Control Act 2021](#) (RPC Act)
- [Radiation Protection and Control Regulations 2022](#) (RPC Regulations)
- [Codes of Compliance](#)

¹ Exemption gazetted 11 January 2024

3.2 Licence requirements

pXRF apparatus are required to be registered according to section 27 of the RPC Act and used under the coverage of a radiation management licence (sections 18 to 22) granted by the EPA.

pXRF apparatus users must have a **radiation use licence** as per section 24 of the RPC Act unless they meet the criteria for unlicensed use.

An unlicensed person is permitted to operate a pXRF apparatus only if either:

- 1 they are undergoing training in the operation of a portable X-ray fluorescence spectroscopy instrument; where the operation is under the direct supervision* of a person, who holds a current radiation use licence authorising operation of a radiation apparatus, or
- 2 they are operating pXRF apparatus as a benchtop interlocked enclosure workstation (deemed similar to an enclosed X-ray analysis apparatus in this set-up), and
 - a the pXRF has had its software programmed so that the pXRF is only capable of operation when installed in the enclosure workstation, and
 - b the interlocked barriers are in place, and
 - c they operate such apparatus under the directions** of a person who holds a radiation use licence in respect of the apparatus and the certificate of registration is conditioned to restrict the pXRF to benchtop operation (EPA condition 4031).

* direct supervision and ** under the directions of a person (terms mentioned above) are defined in the clause 1 of the [Code of Compliance for radiation management plans 2022](#).

3.3 Impact of the updated legislation (commenced 11 February 2023), compliance checks and radiation management plans

pXRF apparatus owners are required to review and update their radiation management plan (RMP) in accordance with the updated legislative requirements and this guideline. The [Code of Compliance for radiation management plans 2022](#) details the information that must be contained within an RMP and the updated RMP is to be submitted to the EPA. Apart from the required safety checks, the new legislation represents very little change to the owners and users of pXRF apparatus.

The compliance checks (eg inspections, radiation monitoring, safety feature checks, etc.) for pXRF apparatus are recommended to be modified by the current users of the pXRF to match the requirements as detailed in this document.

pXRF apparatus owners, making an application under the RPC Act are required to await an authorisation (radiation management licence) from the EPA upon approval of their RMP, prior to operating the pXRF apparatus.

3.4 pXRF apparatus risk profile

The risks related to the use and operation of pXRF apparatus arise from exposure to the primary beam and scattered radiation during measurements.

While pXRF are low-power devices, the dose rate of the primary beam at the window is still high enough to exceed the dose limit to skin of 500 mSv in as little as one minute² and this factor justifies the requirement to register the pXRF and license its operators.

² As described in pXRF user guides such as *XL3 Analyzer User's Guide Revision C*, Version 7.0.1, November 2010 Thermo Fisher Scientific Inc.

Poor sampling practices are generally responsible for exposure to the primary beam. Examples of poor practice include holding the sample in hand, inadvertent pressing of the trigger and taking measurements on low density materials which allow transmission (eg benchtops, walls).

The exposure from scattered radiation depends on the substrate of the target. Low-density materials such as plastic result in the highest scatter dose. Metal targets such as steel usually result in negligible scatter. For soil, ores and building materials (eg drywall, wood products), scatter doses are in between metal and low-density targets.

A damaged or poorly handled pXRF is likely to expose the operator (and bystanders) to higher than usual levels of radiation, which is more than expected for that apparatus design setting. Other scenarios likely to increase operator radiation exposure can arise from failure of proximity sensors, leakage from damaged equipment housing and improper use of remote-control software.

A radiation incident (as defined in the RPC Regulations) that could arise from the use and operation of pXRF apparatus is mainly due to operator error, equipment failure or the failure to abide to the documented radiation safety management systems of the business.

3.5 Personal dosimeters and survey instruments

The exemption for pXRF apparatus owners from supplying apparatus users with personal dosimetry devices applied until 11 February 2024. After this date apparatus owners are required under Regulation 86 to issue an approved personal radiation monitoring device for each worker who will receive a radiation dose that exceeds –

- 1 under all foreseeable scenarios (including credible accident scenarios) – 1 mSv per year, or
- 2 under low probability scenarios³ – a dose limit set out in Regulation 85.

For workers whose only radiation work is operation of pXRF or XRF, the Regulation 86 requirement is unlikely to be met and no personal radiation monitoring device will be required.

For workers who undertake activities involving radiation sources in addition to pXRF use, it is for the employer to determine the total radiation doses, and to issue a personal radiation monitoring device to those workers who meet the criteria.

The primary beam energy of most pXRF apparatus ranges between 15 and 50 keV depending on set-up mode but can be lower for some modes (eg light element) and the scatter energy can be much lower. Survey instruments used for testing pXRF must be capable of detecting the primary beam energy.

3.6 Disposal, sale and transfer

Disposal of pXRF, is subject to the EPA approval upon demonstration that the pXRF is incapable of operation [as per Regulation 43 (2)], and would not generate X-rays (eg removal of the X-ray tube control module).

The photographic evidence for this, with radiation label/trefoil removed along with the [decommission form](#) (Radiation Form 27B) is to be submitted to the EPA, prior to undertaking disposal of the pXRF apparatus.

Owners of pXRF who sell their apparatus may do so via transferring the registration if the purchaser is based in South Australia or via a notification of sale in accordance with the regulation 26 or 41 and apply to surrender the registration.

³ A low probability scenario is one where the probability of occurrence does not exceed one in 100 per year.

4 Compliance requirements

A pXRF must comply with the apparatus and operational requirements as detailed in Tables 4.1 and 4.2 to be exempt from the requirements in the *Code of practice for protection against ionizing radiation emitted from X-ray analysis equipment RHS9* (1984). Note: because it did not contemplate compact pXRF incorporating miniature X-ray tubes, it is likely that owners and operators would have difficulty in demonstrating compliance with the Code.

Table 4.1 Apparatus requirements for portable X-ray fluorescence (pXRF) apparatus

Durability	
4.1.1	The radiation apparatus must be constructed of material of sufficient strength and thickness to ensure that it cannot be fractured or deformed by normal use, accidental impact or misuse.
Radiation warning label	
4.1.2	<p>The radiation apparatus must be durably and legibly marked with a label incorporating the following information in a conspicuous location:</p> <ol style="list-style-type: none"> 1 radiation warning sign (trefoil) 2 the word 'caution' or 'warning'. <p>Note that the labelling is a requirement for the apparatus (being used in portable mode) only, and not for the building/room. However, if apparatus is set up in a bench-top mode for operation; then signage requirements for the area/room/building applies. See Part 2 section 5 of the Code of Compliance for labelling and signage of ionising radiation sources 2022.</p> <p>No additional signage is required when operating in the field.</p>
Unauthorised operation	
4.1.3	<p>The radiation apparatus must incorporate a key operated switch so that X-rays are not produced, or able to be produced, when the key is removed.</p> <p>For this clause, the <i>key</i> requirement may be satisfied through use of a magnetic card, numeric panel, USB key, password, or similar.</p>
Exposure control	
4.1.4	<p>The radiation apparatus must incorporate an exposure control that is always provided and requires:</p> <ul style="list-style-type: none"> • continuous actuation (eg a trigger), or • a pre-set time interval. <p>Emission of X-rays must not be possible after the timer has expired, or the trigger is released.</p>
Warning lights	
4.1.5	The radiation apparatus must be fitted with a clearly distinguishable light that provides a warning to the operator whenever the X-ray tube is energised.

Proximity sensor	
4.1.6	<p>The radiation apparatus must incorporate a proximity sensor so that the radiation apparatus will not continue to emit X-rays if the apparatus is not in the 'measurement' position (eg in direct contact with the sample being analysed).</p> <p>If the proximity sensor can be disabled by the operator⁴, it must not be able to remain in a disabled condition when the apparatus is de-energised, then re-energised; ie it must be a conscious act by the user to de-activate the proximity sensor for each measurement session.</p> <p>For radiation apparatus which allows a proximity sensor to be disabled, the radiation apparatus must not continue to emit X-rays if the detector experiences a low count rate.</p> <p>This clause does not apply when a pXRF apparatus is used in a local enclosure.</p>
Local enclosure	
4.1.7	<p>If a local enclosure with appropriate shielding is provided for use with the radiation apparatus (ie can be used in a bench top mode), the following must be complied with when operated in the enclosure:</p> <ul style="list-style-type: none"> a the radiation dose rate outside this enclosure is not to exceed 2.5 $\mu\text{Sv/h}$ when the X-ray tube is operated at its maximum output b a durable and legible radiation warning label is visible in a conspicuous location, containing the information: <ul style="list-style-type: none"> i radiation warning sign (trefoil) ii the word 'caution' or 'warning'. c there is a clearly distinguishable light that provides a warning to the operator whenever the X-ray tube is energised. <p>If the proximity interlock is effectively disabled by using a local enclosure, then the local enclosure must have:</p> <ul style="list-style-type: none"> a an interlocked hood/door/cover that is connected to the XRF, and b prevents it from operating while the hood is open.
Radiation dose rate	
4.1.8	<p>The radiation apparatus housing must be shielded, so that when the X-ray tube is energised, and operating at its maximum output, the radiation dose rate must not exceed 10 $\mu\text{Gy.h}^{-1}$ at any accessible point 5 cm from any external surface when measured against a steel target.</p> <p>The survey instrument shall be appropriate for the purpose and calibrated annually. The survey instrument must be capable of detecting X-ray energies ranging from ± 10 keV (energies are lower due to scatter).</p> <p>Notes: Non-metallic materials will result in higher backscatter dose rate. For a pXRF with a primary beam energy of 30keV the survey meter must respond to an energy range of 20–40 keV.</p>

⁴ For example, disabled in order to measure on soft surfaces which does not allow sufficient contact pressure to activate the proximity sensor).

Radiation dose rate (continued)	
4.1.9	Radiation dose rate measurement inspections of the pXRF apparatus are to be undertaken and recorded every six (6) months to detect unintended radiation emissions from the pXRF apparatus.

Mandatory operational requirements (as specified in Table 4.2) for pXRF are to be incorporated into the radiation management plan and work procedures.

Table 4.2 Operational requirements for portable X-ray fluorescence (pXRF) apparatus

General	
4.2.1	pXRF apparatus must be in a good working order, free of damage and structurally sound; ie no cracks in housing, damage to trigger, proximity sensor and interlocks.
4.2.2	pXRF must be taken out of service if they are believed to be damaged or if any of the safety features is not working as required.
4.2.3	Good operating practice to minimise radiation exposure is always ensured, as per manufacturer's specifications. Strictly no pointing at persons – including keeping operator's hand away.
4.2.4	pXRF apparatus safety features are checked and maintained in accordance with manufacturer's guidelines.
4.2.5	pXRF is only to be repaired/maintained by a competent person
4.2.6	Logbooks (hardcopy or electronic) are maintained to ensure pXRF apparatus records are kept and maintained for all operational, safety and maintenance checks (both minor and major service) undertaken. These records must be produced if requested to do so, by the EPA.
4.2.7	The pXRF must be securely stored. For example, stored in a secure room or locked cabinet or lockable transport case.
4.2.8	Appropriate disposal of pXRF apparatus is undertaken if the apparatus is damaged and incapable of operation (please see section 3.6).
4.2.9	Incidents involving pXRF are recorded and dealt with as per business management systems. Any notifiable incident (detailed in Schedule 3 of the RPC Regulations) must be reported to the EPA.

While it is desirable to remove the battery from the pXRF when in storage, there is nothing prohibiting storage with the battery installed in circumstances where the battery cannot be transported loose, for example, to satisfy airline rules when carried as luggage by the owner or user.

5 References

Queensland Government 2021, [Standard for radiation sources – industrial, mining, manufacturing, and other practices](#)

AMC Technical Brief 2009, [Portable X-ray fluorescence analysis](#)

Handheld X-ray Fluorescence Spectrometers: Radiation Exposure Risks of Matrix-Specific Measurement Scenarios 2015, [Handheld X-ray Fluorescence Spectrometers: Radiation Exposure Risks of Matrix-Specific Measurement Scenarios - PubMed \(nih.gov\)](#)

Further information

Legislation

[Online legislation](#) is freely available.

General information

Environment Protection Authority
GPO Box 2607
Adelaide SA 5001

Telephone: (08) 8204 2004
Facsimile: (08) 8124 4670
Website: <https://www.epa.sa.gov.au>
Email: EPARadiationProtectionBranch@sa.gov.au



















Exploration PEPR application – ongoing

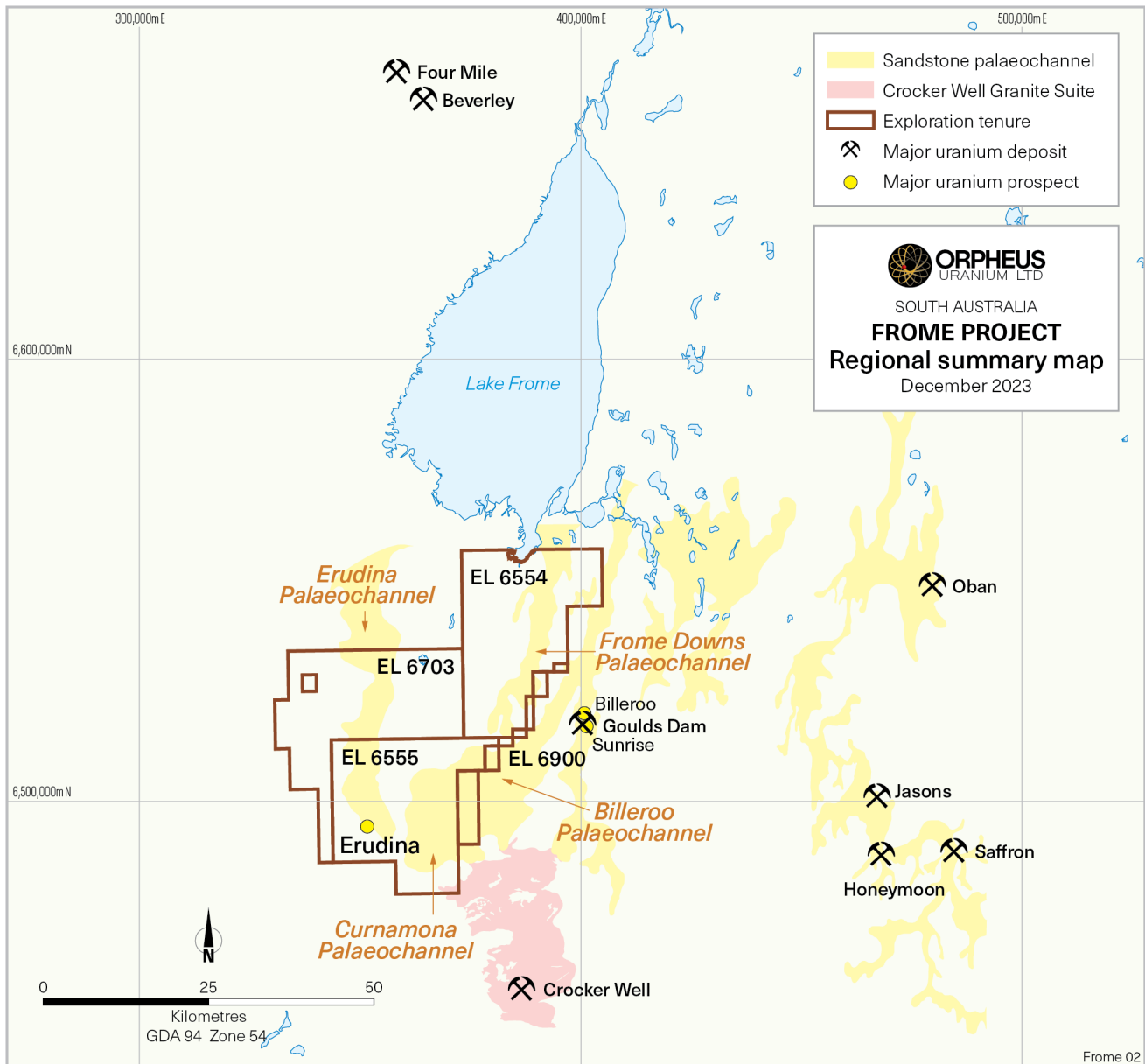


Figure 2. Frome Project showing Tertiary palaeochannels, the Crocker Well Granite Suite and uranium prospects.

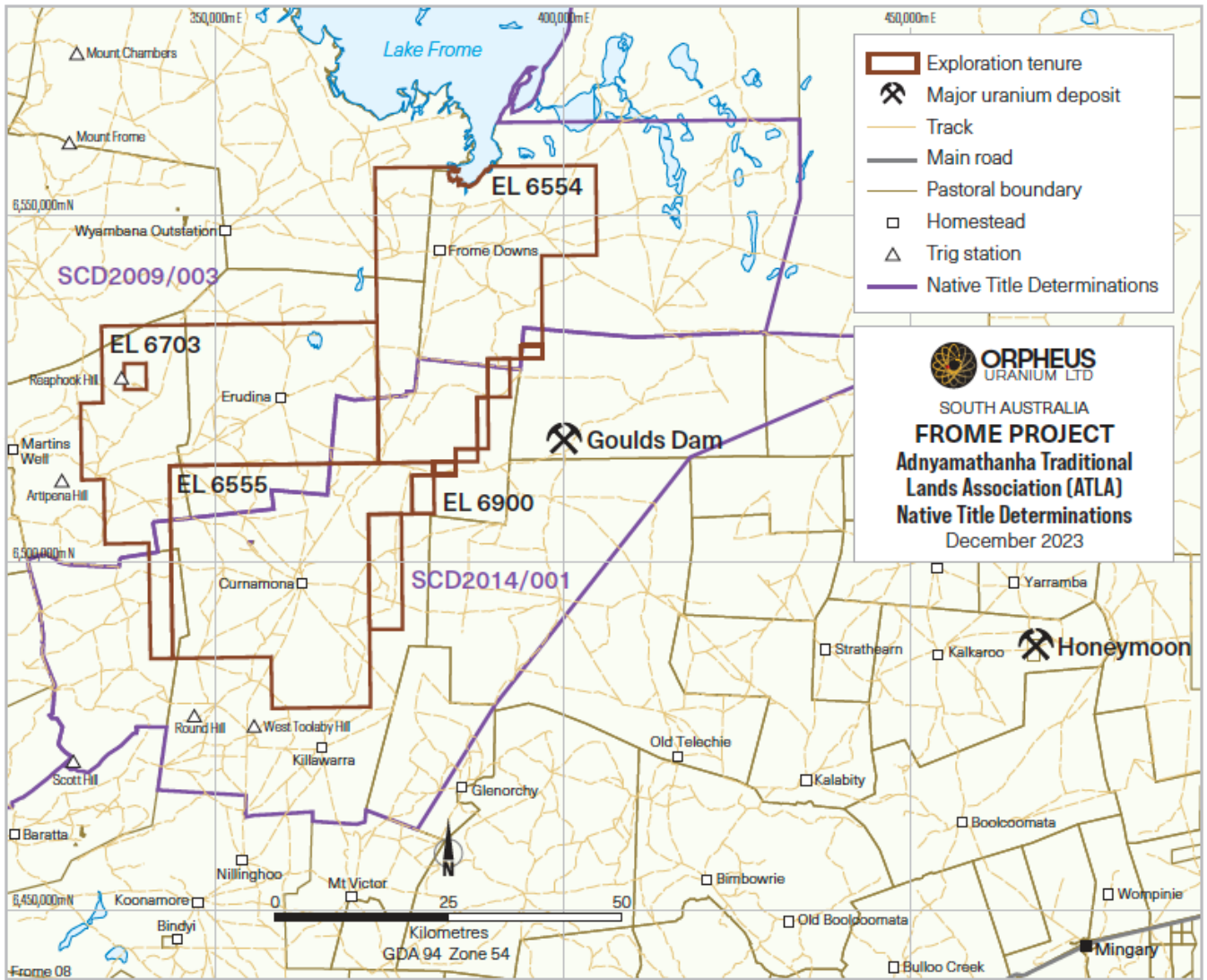


Figure 3. Frome Project, Native Title determination areas.

