Government of South Australia
Department for Energy and Mining

15 July 2025

Mr Rudy Gomez
Managing Director
Cartwheel Minerals Pty Ltd
5 Mais Street
BROMPTON SA 5007

rudy@cartwheelresources.com.au

Dear Mr Gomez,

Approval Notification - Exploration Program for Environment Protection and Rehabilitation (EPEPR2025-008) EL6239, EL6538

The program for EL6239, EL6538, final version submitted on 12 July 2025 to drill up to 11 diamond holes at Cobalt Cove Project, has been approved in accordance with Section 70B(5) of the *Mining Act, 1971 (the Act)*.

In accordance with section 62(1) of the *Mining Act, 1971*, a rehabilitation bond/bank guarantee to the value of **$30,000** is required to be lodged with the Mining Registrar. Appropriate documentation will be forwarded to you shortly. The bond must be lodged within 28 days of receiving these documents.

You are reminded that:

1. You must at all times implement and comply with the approved EPEPR.
2. The approved EPEPR will be made publicly available on the Mining Register.
3. Exploration operations on “native title land” (as defined in the *Native Title (South Australia) Act, 1994)* must be conducted in accordance with Part 9B of the Act.
4. In accordance with Section 70C of the Act, the licensee must review the EPEPR on request of the Minister’s Delegate within a time specified in the request and submit the revised EPEPR for approval.
5. As the operator for the approved EPEPR you must take all reasonable and practical measures to avoid undue damage to the environment and meet all the approved outcomes (when measured against the approved criteria) listed within the EPEPR.
6. In accordance with regulation 78 of the *Mining Regulations 2020* and Terms of Reference 012 (TOR 012), the licensee must submit an Exploration Compliance Report to the Mineral Exploration Branch each year, within 60 days after the anniversary of the date the licence was granted, and 60 days after the expiry or surrender of the EL, or in accordance with joint reporting requirements agreed to with the Minister.
7. In accordance with regulation 16(4) of the *Mining Regulations 2020*, drillhole and geological samples must be kept in accordance with guidelines issued by the Department for the term of the relevant tenement and for 7 years after the expiry, surrender, cancellation or forfeiture of the tenement to which the sample relates. Furthermore, samples must be retained by the tenement holder, or provided to the Director, in accordance with those guidelines (unless the Minister has authorised, on application by

the tenement holder in a manner and form set out in the guidelines, the destruction or disposal of the samples).

8. The EPEPR is approved for a period of twelve months from the date of this letter.

This approval does not constitute endorsement of the systems that you have in place to manage your exploration operations in compliance with the Act and licence conditions. In granting the approval, the EPEPR and your capacity to undertake the proposed activities have been considered. However, responsibility for compliance with the Act and the licence conditions, remains at all times with the licensee.

This approval relates only to the requirements of the Act. Other legislation relevant to this application includes the *South Australian Work Health and Safety Act, 2012* and Regulations. For example, Chapter 10 of the *Work Health and Safety Regulations, 2012 (SA)* introduced new requirements for mine operators in South Australia. The new requirements include a notification for mining operations and the establishment of a Safety Management System. For further information on your responsibilities, including a guide to Chapter 10 and the Mine Operator Notification Form, contact SafeWork SA on 08 8303 0255 or via its website at www.safework.sa.gov.au.

The proposed program may be subject to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Mineral exploration industry-specific information is contained in an appendix in the EPBC Matters of National Environmental Significance – Significant impact guidelines 1.1. This document is available on the Australian Government's Department for Agriculture, Water and the Environment website at http://www.environment.gov.au/resource/significant-impact-guidelines-11-matters-national-environmental-significance. For further information, contact the Department for Agriculture, Water and the Environment, or visit its website at www.environment.gov.au/.

Proposed changes to exploration operations stated in the approved EPEPR may require a *PEPR review* to be submitted for assessment. Where a *PEPR 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.*

If you require any further information, please contact Jason Perry on 8177 3413 or Simon Constable on 8429 2516 or email DEM.exploration@sa.gov.au.

Yours sincerely

Simon Constable
GENERAL MANAGER MINERAL EXPLORATION REGULATION & COMPLIANCE
In accordance with delegated
Ministerial powers and functions

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

APPLICATION Mining Act 1971 and Mining Regulations 2020

EXPLORATION PROGRAM FOR ENVIRONMENT PROTECTION AND REHABILITATION (PEPR)

Government of South Australia
Department for Energy and Mining

USE THIS TEMPLATE TO: Apply to conduct mineral exploration operations not covered by the Generic PEPR (Adopted Program) for a 12 month period of time on one or more exploration licences (ELs), retention leases (RLs) or mineral claims (MCs) in South Australia.

Refer to the Exploration PEPR Terms of Reference and Minerals Regulatory Guidelines MG22 when completing this application. Further information on exploration requirements in South Australia is available on the Department for Energy and Mining (DEM) Minerals website www.energymining.sa.gov.au .

SECTION A – GENERAL DETAILS

Operational approval period	**12-month approval period, with an additional 3 months to complete all rehabilitation**			
Tenement details	EL6538, EL6239			
Tenement holder(s) (for each tenement)	Cartwheel Minerals – EL6538, EL6239			
Operating company	Cartwheel Minerals Pty. Ltd			
Agency agreement (if applicable)	None			
PEPR prepared by	Adam Ainsworth, Cartwheel Minerals Geologist, adam@cartwheelminerals.com.au			
Project supervisor/contact person(s)	Rodolfo A. Gomez, Project in Charge, Dr. Can Yin, Exploration Manager, Mr. Adam Ainsworth, Cartwheel Minerals Consultant.			
Project/prospect name	Cobalt Cove Project			
Location details	Approximately 150 kilometres northwest of Port Augusta.			
Project description, commodity type and mineralisation model	The WNP is a project aiming at investigating the potential locations of economic mineral deposits adjacent to the Lake Gairdner National Park. The target minerals including but not limited to: 1. Gold, diamonds, tin oxide, copper sulphides, nickel sulphides, lead sulphide, zinc sulphide, uranium oxide, others The plan is to diamond core drill a number of holes to collect bedrock samples at locations where geophysical surveying indicates signs of potential economical mineralisation.			
Proposed project schedule	Start date	24/08/2025	End date	23/08/2026

DECLARATION

I, the tenement holder, declare under regulation 84 of the Mining Regulations 2020, that I have taken reasonable steps to review the information in this PEPR/revised PEPR to ensure its accuracy.

Name	Rudy Gomez	Signature (digital allowed)	Rodolfo M. Gomez
Position	Managing Director	Date	19/05/2025

Copy and paste the above table if there is more than 1 tenement holder.

Note: An authorised representative from each tenement holder must sign the declaration (eg in accordance with the Corporations Act 2001).

SECTION B – PROGRAM PREPARATION AND ACCESS TO LAND

Work undertaken in preparing the proposal

Summarise the research and fieldwork undertaken in preparing the proposal including:

- desktop reviews of existing information
- field visits for reconnaissance
- contractor consultation (i.e. equipment scale, type)
- other information used when planning the proposed program.

The Cobalt Cove Project area is approximately 243 kilometres from Port Augusta and is located adjacent to Lake Gairdner but outside of the Lake Gairdner National Park (Map 1). The ground at the target areas is dominantly over vegetated seif dunes, occasional red sand spreads with calcrete in places and the ground at the drilling location. The Cobalt Cove area consists of two exploration lease areas on pastoral lands (Map 1). The whole area is within the native title claim of the Gawler Ranges People although its east part is bordering on the claim of the Kokatha People (Map 1).

All the drilling in this project will be conducted on land outside of the National Park boundary on pastoral leases.

Cartwheel Minerals Pty. Ltd. holds a number of tenements on the area including EL's 6534, 6535, 6536, 6537, 6538, 6539, 6095, 6239, 6520, 6017 and 6104 and Cartwheel Minerals are conducting an exploration program within the National Park boundaries of Lake Gairdner under EPEPR 2022D0228809 and 2017DO32626 approved on 26th July 2017 and the Geophysical Exploration program of EPEPR 2016_066 and 2017DO14156 approved on 31st March 2017. Information gained in the initial phases of the exploration of the area have proved invaluable in consolidating Cartwheel Minerals relationship with the pastoral lease holders and in understanding the dynamic changes in the surface conditions and access routes that are used and how to accommodate them.

An aeromagnetic survey was undertaken over Lake Gairdner, Lake Everard and Lake Harris by the Department of Mines in 1993 and Dr. Can Yin has calibrated our WINDISP software on Carrapateena and this has proven useful in studying the magnetic anomalies on the Central Gawler Craton.

Information stored within various SA Government GIS databases has been interrogated as a part of the desktop review of the proposed drilling program. Drilling targets have been selected based on those geophysical studies, structural geological studies of Dr. Tim O'Driscoll and the geophysical gravity survey results conducted by Dr. Can Yin under EPEPR 2016_066 and 2017DO14156 since access to the Lake Gairdner surface was permitted on 18th March 2019.

The gravity survey conducted by Dr. Can Yin has provided the main information for this project.

Geophysical surface evaluation on Lake Gairdner has been used in conjunction with updated aero geophysical surveying data to define potential new drilling targets. Map 3 provides an anomaly map that Cartwheel Minerals are working with.

Consultation (r. 64)

Using the table below, provide a summary of the individual or group of similarly affected persons and summarise the results of consultation that has been undertaken on the proposed operation. Types of interested or affected parties include residents, council, government agencies etc (exclude native title groups and defence owned or controlled lands – refer to relevant sections below).

Exploration PEPR application – 12-month period

Tenement	Stakeholder	Land tenure	Land use	Date and type of NOE served	Type of exempt land	Date waiver obtained	Date consultation/access agreement and/or permits signed/authorised	Stakeholder concerns raised and how addressed
EL6538, EL6239	Lake Gairdner National Park	Crown	National Park	04/10/2018				Concerns have been addressed in meetings and in a visit of DEW to the Lake. DEW has been on south side of lake and viewed exploration routes with Cartwheel Minerals and both DEM and DEW have visited the northern area of the lake where exploration is to take place. Inspection by the DEM/DEW on the 18th March 2021 and a follow up inspection on 02/06/2021.
EL6239	Wirraminna Station	Pastoral	Farming	12/08/2016	N/A	N/A	Verbally discussed the project with the occupiers. Remuneration has been negotiated for camp and laydown rates as well as access. Communications are continuous on a daily basis with the Cartwheel Minerals camp located at the station.	NONE – Access confirmed with Wirraminna Station. Camp, fuel storage and main laydown will be at the Wirraminna Homestead.
EL6538, EL6239	Coondambo Station	Pastoral	Farming	12/08/2016	N/A	N/A	Verbally discussed the project with the occupiers. Renumeartion and access agreements made and agreed. Remuneration continues on a monthly basis and all communications are verbal due to good relationship with the stakeholder.	NONE – Remuneration has been negotiated for laydown rates as well as access. Remuneration has been confirmed with Coondamboo landholders for access along tracks to launch point. No access issues with any parties. Holes will be drilled on Coondambo land initially.

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

<Include text here.>

Provide any additional relevant information.

<Include text here.>

SECTION C – DESCRIPTION OF THE ENVIRONMENT

Include a description of the features of the environment that are expected to be affected by the proposed operations. Each of the elements of the existing environment listed below must be described only to the extent that they may need to be considered in assessing the impacts that the proposed exploration operations are reasonably expected to have on the environment. If the element is not likely to be impacted by the operation, a statement to that effect must be included.

Where the terms and conditions of an RL include environmental outcomes, include any new baseline environmental data relevant to the control strategies or measurement criteria, and where changes to the environment are identified, provide an updated description of the environment to describe the changes.

Proximity to infrastructure and housing

Provide the following information:

- Settlements – indicate the name and distance of the nearest town, and residences within, or near the proposed exploration operations.
- Roads and tracks – indicate existing fence lines, roads and tracks, including those which are to be used in the exploration program.
- Other human infrastructure such as schools, hospitals, commercial or industrial sites, roads, sheds, bores, dams, ruins, pumps, scenic lookouts.
- Railway lines, transmission lines, gas and water pipelines, communication lines – e.g. fibre optic cables etc., if these may be impacted by the exploration operations.

Provide this information on a locality plan/map.

- Settlements – The closest township is Woomera which is approximately 80km east from the northeast tip of Lake Gairdner where the drilling target is located. The nearest property to the target location is Wirraminna Homestead which is 20km away from the aforementioned north-east tip of Lake Gairdner. Wirraminna Homestead will be the site of the camp for the project and this has already been confirmed and etablished under the Central Gawler Craton Project (CGCP) currently underway under EPEPR 2022 D0228809 approved on 31st October 2022 and 2017DO32626 approved on 26th July 2017 and the Geophysical Exploration program of EPEPR 2016_066 and 2017DO14156 approved on 31st March 2017. This will reduce the environmental impact of the area and provide an ideal laydown area for materials.
- Roads and tracks – In consultation with pastoral lease holders, park rangers and the Cartwheel Minerals reconnaissance program associated with the CGCP through the area, tracks and fence lines of use and interest have been identified.
- Drilling target – short tracks will be required from the pre-existing tracks fence lines and roads from the Wirraminna Homestead and laydown area 3 (see Map .1 and Map.2).

Other human infrastructure – None of these infrastructures will be affected by the proposed exploration of the Wirra North Project.

All exploration activities in the Wirra North area will avoid National Park areas (in this case the surface of Lake Gairdner). The proposed drilling areas and laydown areas have been recently inspected and approved by GRAC monitors as advised by an email of the 29th January 2024. See Image .1, Photograph 2, Photograph 3,

Land use and tenure

Using the table below, select the land tenure and land use that the proposed exploration activities will occur in. Include additional information where prompted.

Land tenure/type	Applicable
Freehold	☐
Pastoral lease	☒
Perpetual lease	☐
Crown land	☒
Mining reserve	☐
Aboriginal freehold/leasehold land (e.g. Anangu Pitjantjatjara Yankunytjatjara and Maralinga Tjarutja lands)	☐
Forestry reserve	☐
Marine parks	☐
National parks, conservation parks, conservation reserves, regional reserves*	☒
Adelaide Dolphin Sanctuary	☐
Murray Darling Basin	☐
<If park/reserve is selected, please provide the name of the park>	
Other*	☐
It should be noted that the area of exploration is over a section 12 determination area, i.e. “Seven Sisters Cultural Site” and there are registered graves in some parts but not in areas of planned exploration activities. Cartwheel Minerals recognises its obligations under the Amended and Restated Native Title Mining Agreement (ARNTMA) and of the Ministerial conditions stipulated in an Approval letter dated 18/3/2019 and its associated heritage site maps.	

Land use	Applicable
Grazing	☒
Cultivated land	☐
Residential	☐
Township	☐
Industrial	☐
Tourism	☐
Conservation	☐
Defence activity	☐
Road reserve	☐
Sites of scientific significance (geological monuments, fossil reserves etc.)	☐
Orchard/vineyard	☐
*Native vegetation heritage agreements	☐
<Provide the name of the area>	
*European heritage sites	☐
<Provide the name of the site>	
*Other (e.g. historic mining)	
<Provide the name of the site>	

* Indicates more information required in field immediately below.

Describe any council policies (or out of council) or development plans that may impact the program area.

None

Provide a description of any known plans for future land use changes by other parties.

<Include text here.>

Provide any additional relevant information.

<Include text here.>

Woomera Prohibited Area (WPA)

Will activities be conducted within the WPA	Yes ☐	No ☒	Do you have a resource exploration permit in place?	Yes ☐	No ☒
In which zone will activities be conducted?					
Does the Exploration Permit allow the operator to conduct exploration operations in the WPA?				Yes ☐	No ☒
What is the expiry date of the resource exploration permit?					
Identify closure periods that may impact on the exploration program.					
<Include text here.>					

Other land owned or controlled by the Commonwealth Department of Defence

Lands in South Australia that are owned or controlled by the Commonwealth Department of Defence, which they manage either as a training or test area, include the Port Wakefield Proof and Experimental Establishment, Murray Bridge Training Area, and Cultana Training Area.

These lands remain to be mineral land under the Mining Act 1971 (SA) and can be accessed for mineral exploration and mining subject to certain restrictions and conditions under the Defence Act 1903 (Cth) and the Defence Regulation 2016 (Cth).

Will operations be conducted within the Port Wakefield Proof and Experimental Establishment, Murray Bridge Training Area, or Cultana Training Area?	Yes ☐	No ☒
<If yes, indicate which area.>		
Do you have a Deed of Access with Defence?	Yes ☐	No ☒
What is the expiry date of the Deed of Access?		
Provide the date the Range Control Officer granted access permission to conduct the proposed exploration operations. Describe the results of consultation and how any concerns raised were addressed.		
<Include text here.>		

Native title

Using the table below, describe how you have complied with the requirements of Part 9B of the Mining Act for each tenement (for further information refer to Minerals Regulatory Guidelines MG22).

Native title			
Is the proposed area of exploration located on native title land?		Yes ☒ No ☐ (If no, no further information in this section required.)	
Are there registered native title party/parties in the area of proposed exploration?	Yes ☒ No ☐	Gawler Ranges Aboriginal Corporation	If no, an Environment, Resources and Development (ERD) Court determination is required.
Have you negotiated a native title mining agreement?	Yes ☒ No ☐	Is the agreement registered?* Yes ☒ No ☐	ELs EL6239, EL6538, EL6520.
Have you accepted an Indigenous land use agreement (ILUA)?	Yes ☐ No ☐	Is the ILUA registered?* Yes ☐ No ☐	<List the tenements covered by the ILUA>
Have you obtained ERD Court determination?†	Yes ☐ No ☒	Is the determination registered?* Yes ☐ No ☐	<List the tenements covered by the determination>

* The registration date refers to the date the agreement, determination or ILUA was registered with DEM.

† An ERD Court determination cannot be conjunctive (i.e. cannot apply to subsequent licences).

Provide any additional relevant information.

In regards to accessing the Section 12 determination area, our activities will be undertaken in accordance with our Native Title Management Agreement with the Gawler Ranges Aboriginal Corporation (GRAC). Guidance will be sought from the said Native Title Management Agreement and in consultation with members of GRAC.

Landform and topography

Describe the topography of the general area affected by the exploration program. Include the susceptibility to erosion and visual attributes (steep or undulating slopes, plains, rocky outcrops, dunes, saltpans, claypans etc.).

All existing tracks on the northern and north eastern area adjacent to Lake Gairdner are cut through vegetated seif dunes, red sand spreads or aeolian gypsiferous dunes. There are small salt pans in the area but these are uncommon and not in the specific area of interest.

Soil and surface cover

Describe soil types and soil surface cover - e.g. gibber, rocky - in the general area affected by the exploration program. Include details on the susceptibility to compaction, erosion, dust, runoff and any other soil characteristics – e.g. acid sulphate – that may require control strategies to reduce environmental impacts during operations or rehabilitation.

- Access to the drilling targets is over vegetated seif dunes and red sand spreads with calcrete in places (Map .2).

There is no soil with humus throughout this area. Although most of the sand is not compactable there are areas of light clay and gypsum that may hold the surface together. Erosion of the sand by vehicle is limited as the sand is constantly moving with the wind. Some watering of the tracks may be helpful in reducing what dust there is from causing an issue.

Erosion of the surface is minimal. With regard to rehabilitation, the tracks will be blown over and disappear with the natural movement of the seif dunes but these tracks will be monitored for recovery for a period of time after the drilling project is completed.

Surface water

Will the proposed program interfere with surface water bodies and natural drainage (e.g. drainage lines, creeks, floodplains, wetlands)? If yes, describe the potential interference and surface water bodies and natural drainage on maps. If no, indicate why.	Yes ☐	No ☒
<include infromation here.>		
Is the program area located within water protection areas defined under the *River Murray Act 2003*? If yes, provide the name(s).	Yes ☐	No ☒
<If yes, provide the name(s)>		
Is the program area located within any prescribed watercourses or prescribed surface water areas under the *Landscape South Australia Act 2019*? If yes, provide the name(s).	Yes ☐	No ☒
<If yes, provide the name(s)>		

Groundwater

Is groundwater likely to be intersected when conducting the exploration program? If yes, use the table below to describe the expected groundwater (hydrogeological) conditions, and identify groundwater aquifers in the exploration area(s) that may be affected. Indicate the approximate depth of drillholes in each area. Copy and paste a new table for each area where different groundwater conditions are expected. If no, provide evidence or any supporting information demonstrating this.	Yes ☒	No ☐
This drilling location is outside the GAB (Great Artesian Basin) as indicated by some historical drillholes nearby. None of the previous drillholes has intersected any ground water aquifer.		

Description of the locality/area where different groundwater conditions may be encountered					
<Provide description here.>					
Formation age and/or stratigraphic unit	**Stratigraphic intervals (depth range) (m)**	**Aquifer formation name**	**Aquifer interval/thickness (from–to) (m)**	**Type of aquifer(s) intersected (e.g. unconfined, confined, artesian)**	**Provide aquifer salinity, depth to water level and any other relevant comments**
Gawler Range Volcanics - Mesoproterozoic	20 – 700m+	Gawler Craton fractured rock province	Unknown	probably confined	Salinity information available for Wirraminna and Coondamboo on the water connect website and the South Australian Arid Land Natural assessment indicated a salinity borehole level in the range of 5,000 to 20,000 ppm. SWL in holes between 5m and 45m although records are limited and the status of many of the holes is unknown. Previous drilling in the north of Lake Gairdner and close to the proposed holes in this application suggests confined aquifer(s).
Hiltaba Granite Suite - Mesoproterozoic	20 – 700m+	Gawler Craton fractured rock province	Unknown	probably confined	Salinity information available for Wirraminna and Coondamboo on the water connect website and the South Australian Arid Land Natural assessment indicated a salinity borehole level in the range of 5,000 to 20,000 ppm. SWL in holes between 5m and 45m although records are limited and the status of many of the holes is unknown. Previous drilling in the north of Lake Gairdner and close to the proposed holes in this application suggests confined aquifer(s).

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

Aquifer information is limited as the area of interest is south of the Western Eromanga portion of the Great Artisian Basin. Borehole water in the area has high salinity as confirmed by the local farmers and cannot be use for anything other than animal watering. Under the Environment Protection (Water Quality) Policy 2015 under the *Environmental Protection Act 1993,* the water in the area of exploration is “Primary Industries – livestock drinking water”.

The aquifers listed (Gawler Range Volcanics and Hiltaba Granite Suite) are described in the ogoing EPEPR (EPEPR2016-018) as “probably comfined” and describe the top 20m as unconfined and probably confined onwards. However, experience from drilling exploration holes CM001, CM002 and CM003 in the northern part of Lake Gairdner and close to the location described in this EPEPR application suggest that once drilling into the rock formations below Lake Gairdner that the aquifers are confined.

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

Information throughout the exploration area is limited and most of the area has no ecosystems analysed. Those that have been analysed in the immediate and adjacent area are classified as “Likely to be an IDE”. See Map 4 for a GDE map of the area.

Is the proposed program located within a prescribed wells area or prescribed water resource area? If yes, provide the name of the area.	Yes ☐	No ☒
<Insert the name of the area>		

Provide any additional information, if required.

<Include text here.>

Native vegetation

Will you be working within areas of native vegetation? If yes, provide the following information: • description of the formation and structure of vegetation in the area (e.g. woodland, shrubland, grassland) • list of the dominant species. If no, indicate why you will not be working within areas of native vegetation?	Yes ☒	No ☐

The surface of the areas of investigation are made up of aeolian sands or gibbers with dunes and small calcareous plain areas. There are playa lakes and samphire shrubland over chenopods. All of the areas of exploration interest are used for the grazing of cattle and sheep. Low open shrublands dominate. Notable species of the open shrubland area are below.

Cartwheel members of staff have extensive experience travelling the area of interest on preexistuing farm tracks that are extensive in the area. The area is part of the White Elephant Lake GairdnerNational Park Environmental Association which describes the area as undulating plain overlain by sand sheets and dunes, with occasional silcrete-capped rises. Vegetation consists of tall open shrubland, low woodland with a chenopod shrub understorey and low chenopod shrubland. The park conserves only 0.36% of the association and it is represented in no other protected area.

The remoteness of the park and restricted vehicle access has restricted the low number and extent of introduced plants and no species is known to be replacing native vegetation.

Statement of environmental objectives and environmental guidelines for mineral exploration activities in South Australia (document M33) offers practical guidelines to follow in keeping the impact of exploration activities on the native species to a minimum.

The dominant species on the sandy parts of the exploration locations are:

Witchetty Bush, Sandhill Wattle, Hopbush, Short-leaved Boobialla, Weeping Pittosporum, Silvertails and Sandalwood. Few if no rocky outcrops occur in the area of exploration.

Significant habitats and flora

If you are working within areas of native vegetation, use the table below to list any significant habitats and any rare or endangered flora 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/habitat	Common name
Acacia papyrocarpa	Western Myall
Maireana sedifolia	Bluebush
Atriplex spp.	Saltbush
Maireana astrotricha	Low Bluebush
Eragrostis spp.	Love-grass

Species/habitat	Common name	NPW Act rating*	EPBC Act rating†
Santalum spicatum	Sandalwood – OPP332447-1785144	V	V
Gilesia Biniflora	Western Tar-vine - A02112	R	*R*
Gratwickia monochaeta	U03158	R	R
Hibbertia crispula	Ooldea Guinea-flower - Q01344	V	V
Melaleuca armillaris ssp. akineta	Needle-leaf Honey-myrtle - G02299	R	R
Swainsona fuscoviridis	Dark Green Swainson-pea - C05553	R	R
Swainsona microcalyx	Wild Violet - S01793	R	R
Teucrium grandiusculum ssp. pilosum	Y04916	E	E

* *National Parks and Wildlife Act 1972* (NPW Act) conservation status includes extinct, endangered, vulnerable, threatened and rare.

† *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) listings include extinct, extinct in the wild, critically endangered, endangered, vulnerable and conservation dependent.

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*).

The remoteness of the park and lack of vehicle access have contributed to the low number and extent of introduced plants. Most species have become established as a result of past disturbance, usually from grazing pressure, and are confined to those disturbed sites. There are no species known to be aggressively replacing native vegetation.

Alien (weed) species found around Lake Gairdner include: Carrichtera annua (Wards Weed), Citrullus vulgaris (Paddy Melon), Hordeum vulgare (Barley Grass) (uncommon) and Buffel grass..

Fauna

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

A fauna survey has not yet been undertaken for this region. From observations of tracks on the lake surface and direct observation, Kangaroos *Macropus rufus and Macropus fuliginosus*, Emus *Dromaius novaehollandiae* and Camels *Camelus dromedarius* move quite freely across the areas. Evidence was found of Red Kangaroos, Western Grey Kangaroos and Euros *Macropus robustus* (Section 4.2.3, LGNP Management Plan).

The reconnaissance field trips to the proposed drilling areas revealed fauna to be dominated by the common large macropods: Red Kangaroo *Macropus rufus*, Western Grey Kangaroo *Macropus fuliginosus* and Euro *Macropus robustus*; with Lesser Emu *Dromaius novaehollandiae* and Wedge-tailed Eagle *Aquila audax* occurrences. Other birdlife encountered included the Galah *Eolophus roseicapilla*, White-winged Chough *Corcorax anorhamphos*, Mallee Ring-neck Parrot *Barnardius barnardi* and several species of Honeyeaters. Snake and lizard occurrences are likely to include: Shingleback Lizards *Tiliqua rugosa asper*, Blue Tongued Skinks *Tiliqua scincoides,* Eastern Brown Snake *Pseudonaja* textilis and Mulga Snake *Pseudechis australis*. Although not actually sited during the field reconnaissance trips, due to their nocturnal habits, there was evidence of the presence of Southern Hairy-nosed Wombats *Lasiorhinus latifrons*, distal to the proposed drilling areas. One bird species occurring is the vulnerable: Major Mitchell`s Cockatoo *Cacatua leadbeateri*. It is also likely that the vulnerable Thick-billed Grasswren *Amytornis textilis myall*, Redthroat *Pyrrholaemus Brunneus,* Rufous Fieldwren *Sericornis campestris* and the vulnerable Slender-billed Thornbill *Acanthiza iredalei* may inhabit the mainland. Feral animals in the project area include camels *Camelus dromedaries, g*oats *Capra hircus*, foxes *Vulpes vulpes*. Sheep *Ovis aries* and cattle *Bos taurus* from surrounding pastoral leases can be found in the area.

Floara and Fauna observations of significant types can be seen in Map.5. The data points on the map represent the observation lists in the associated spreadheets – Item 1, Item 2 and Item 3.

Significant fauna

Where possible, using the table below, list any rare or endangered 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	Common name	NPW Act rating	EPBC Act rating
CACATUA LEADBEATERI	Major Mitchell`s Cockatoo	Vulnerable	Not threatened
ACANTHIZA IREDALEI	Slender Billed Thornbill	Not Rated	Vulnerable
AMYTORNIS TEXTILIS MYALL	Thick Billed Grass Wren	Not Rated	Vulnerable
PYRRHOLAEMUS BRUNNEUS	Redthroat	Not Rated	Vulnerable
SERICORNIS CAMPESTRIS	Rufous Fieldwren	Not Rated	Vulnerable

Note: NPW Act conservation status includes extinct, endangered, vulnerable, threatened and rare.
EPBC Act listings include extinct, extinct in the wild, critically endangered, endangered, vulnerable and conservation dependent.

Environmentally sensitive locations

Are there any environmentally sensitive locations within or close to the proposed exploration area (e.g. areas having particular ecological, cultural, scientific, aesthetic or conservation value)? If yes, provide a description of identified environmentally sensitive location(s). Mark these areas on a locality plan to identify any areas of conflict so that access roads or other activities can be planned and located effectively.	Yes ☒	No ☐

Adjacent to the area of exploration activities is the Lake Gairdner National Park. In addition to being a National Park the area is a place of cultural significance and comes under a management plan of 2019 from the Lake Gairdner National Park CO-management Board – a partnership between the Gawler Ranges Aboriginal Corporation (GRAC) and the South Australian Government. However, all of the activities described in this application do not encroach on the lake area. The approach to dealing with Lake Gairdners' unique environment have been addressed in depth in our currently active exploration EPEPR 2022 D0228809 and 2017DO32626 approved on 26th July 2017 and the Geophysical Exploration program of EPEPR 2016_066 and 2017DO14156 approved on 31st March 2017.

In the event of any cultural remains or signs being discovered, Cartwheel Minerals will prevent impacts to the sites as outlined in the control strategies listed within the Environmental management table (Aboriginal Heritage potential impact).
The use of existing tracks for vehicle and personnel movement means there is little or no additional disturbance to plants and animals on the existing tracks.

Reference will be given to information sheet M33 of June 2004 - "Statement of environmental objectives and environmental guidelines for mineral exploration actives in South Australia". As tracks are to be created within areas with sand dunes, extra care will be taken and M33 Guidelines will be followed, including:
• limiting access created over dunes, and instead travelling along interdunal corridors;
• where necessary to cross dunes, sites must be selected to minimise impact on soil and vegetation;
• tracked rig and support truck would be preferable for a program of this nature;
• low dunes preferable for crossing and to be cut at right angles;
• if any dune material to be moved when track cut through, it is pushed to either side of the track, rather than pushed down slope.
• for drill sites located on the slope or crest of dunes all dune material movement required to create a safe drill platform will be sideways, in accordance with the M33 Objectives and Guidelines.

Are you likely to impact on the environmentally sensitive area? If yes, detail the likely effects the proposed program may have.	Yes ☐	No ☒

<If yes, include text>

Include a statement concerning whether or not an Aboriginal heritage survey has been conducted by the proponent and if so, the results of the survey.

The northern access point onto Lake Gairdner was originally surveyed by GRAC elders Lyn Smith and Dawn Taylor from the Walga office at Whyalla March 13, 2020 – Photograph 1. After minor changes made by Adam Ainsworth to the access route the northern access point was deemed acceptable. Cartwheel Minerals has an agreement with GRAC that any new route requires an additional survey. The Southern access point onto the lake Gairdner has been inspected by elders of GRAC in 2019 and was approved in a letter from GRAC via Norman Waterhouse Lawyers on 23d July 2019.

The proposed drilling areas and laydown areas have been recently inspected and approved by GRAC monitors as advised by an email of the 29th January 2024. (See Image .1)

Please reference Appendix.1 – CobaltCoveHeritage_V4 (003) for a detailed report on the heritage surveys conducted by GRAC members in the Cobalt Cove exploration area.

SECTION D – DESCRIPTION OF PROPOSED EXPLORATION OPERATIONS

Each of the elements listed below must be described only to the extent that they apply to the proposed exploration program.

Equipment and personnel requirements

Using the table below, describe the equipment, size and composition of field crews, and proposed working hours/days required to conduct the proposed program.

Geophysical gravity surveying conducted under EPEPR 2016_066 and 2017DO14156 approved on 31st March 2017 has indicated that known geological anomalies in the area are larger and more complicated than expected and deserve immediate land based drilling exploration. The proposed drill holes in this application have been selected based on geophysical data and ease of access. Additional recent geophysical information has allowed Cartwheel Minerals to focus attention on more specific locations.

The drilling program has been broken into 2 phases both of which are to be undertaken in this EPEPR application.

Phase 1: A single drilling hole to be drilled to gather important information for potential additional drilling.

Drilling target – located on the Northern side of Lake Gairdner within EL6538 and marked “Drill Hole Area A”on Map 2, This is Cobalt Cove.

Phase 2: A total of 10 drill holes to define in more detail any potential reserves that may have been discovered in the Phase 1 of drilling. The locations of these holes will be dependant on the Phase 1 results and any potential locations and depths are purely speculative. However, a grid pattern around any holes of interest will be created to get a better model to evaluate the next phase of exploration. The extent of Stage 2 boundaries are predicted to be within the 200 metres around the Phase 1 drilling areas. Exploration will take place around the lake area.

Drill holes are to be diamond cored and auger drilled at the surface (setting casing) by the Cartwheel Minerals drilling rig and manned by a crew of drilling contractors. No further geophysical exploration is required as part of the Cobalt Cove project.

Exploration activities in the Cobalt Cove project will be restricted to a diamond drilling program and possible auger drilling at the top of each hole section prior to placing surface casing in the hole to prevent caving. Cartwheel Minerals will drill a series of diamond core holes to a predicted depth of 1000m each (or 1 hole in Phase 1). All holes will utilize a diverter to provide well control should it be required. The drilling sites will use above ground mud tanks and no drilling sumps or excavations will take place. Drilling pads locations will be selected which are flat with little or no vegetation and all activities including blading for access tracks will be conducted under the M33 Earth Resources sheet “Statement of environmental objectives and environmental guidelines for mineral exploration activities in South Australia” and kept to an absolute minimum.

As tracks are to be created within areas with sand dunes, extra care will be taken and in particular the M33 Guidelines to be addressed and followed, including:
• limiting access created over dunes, and instead travelling along interdunal corridors;
• where necessary to cross dunes, sites must be selected to minimise impact on soil and vegetation;
• tracked rig and support truck would be preferable for a program of this nature;
• low dunes preferable for crossing and to be cut at right angles;
• if any dune material to be moved when track cut through, it is pushed to either side of the track, rather than pushed down slope.
• for drill sites located on the slope or crest of dunes all dune material movement required to create a safe drill platform will be sideways, in accordance with the M33 Objectives and Guidelines.

All exploration activities in the Cobalt Cove Project will avoid National Park areas (in this case Lake Gairdner) and the less significant salt lakes of the area. There are no reserves on the areas of proposed exploration.

All drilling targets under this EPEPR application are based on geophysical data results and data interpretation indicating anomalies of interest. Therefore, there is no set drilling spacing and drilling line density information planned under this application. No directional drilling will be conducted within park boundaries.EL

Tenement Details:
EL6239 of 2393 km2 granted to Cartwheel Minerals Pty Ltd on 30th July 2018.
EL6538 of 190 km2 granted to Cartwheel Minerals Pty Ltd on 17th July 2020.

Map 1 shows the licence boundaries of EL6239 and EL6538.

Forms part of the South Australia Arid lands.

Phase 1 Drilling program:

Drill Hole Name	EL	Easting (UTM Zone 53) Approx	Northing (UTM Zone 53) Approx
CMDD004 – Target A	EL6538	581600	6544250

The hole CMDD004 is approximately 100m away from the edge of the lake on farmland run by the Coondambo Pastoral Station as confirmed by Bruce Nutt the station owner.The final number of holes will depend on the results and the cost of drilling and the budget of this Project.

Type of personnel	Number	Name of contractor company (if applicable)
Geologists	2	Not Applicable
Land access/environmental	1	Not Applicable
Field assistants/technicians – see Geologists	0	Not Applicable
Drilling crew	6	Underdale Drilling
Site preparation and rehabilitation	3	Underdale Drilling

Other (provide details)	1	Not Applicable

Shifts worked per day	Hours worked per day	Days worked per week
Drilling operations on single shift	12 hours per shift	7

Equipment type	Owner/operator	Description/capacity	Activity/purpose
Sandvik DE710 Drilling Rig	Cartwheel Minerals	A mobile drilling rig which is able to AC/DD drill using HQ and NQ core. Able to drill in Excess of 1000m	Drilling of rock core
4WD Support Truck	Cartwheel Minerals	A multipurpose truck for transportation of light and medium equipment for the drilling process, to transport samples and drilling cuttings/water to a disposal site	Transportation Logistics
Water Tanks	**Cartwheel Minerals**	Portable water tank of 10,000 litre capacity for potable water for drilling.	Drilling fluid supply
Above ground pits	**Cartwheel Minerals**	Portable interconnected above ground tanks for drilling fluid	To minimise environmental footprint of DD drilling operations. It will re-circulate drilling water and possibly provide samples.
Portable Office	**Cartwheel Minerals**	Air conditioned unit with desks and coffee area	Unit for morning meetings, office work and eating.
Tool shed / workshop	**Cartwheel Minerals**	10ft container containing shelves and work bench	Storage of drilling spare equipment and small working area for repairs and maintenance.
4WD vehicles x 3	**Cartwheel Minerals**	Ford Rangers and Toyota Hilux	Transport of work staff
Portable toilet	**Rented**	Single toilet	Reducing environmental footprint
Telehandler	**Cartwheel Minerals**	4 tonne Telehandler	Moving heavy items
Grader	**Pastoral Lease Holder**	Medium sized grader	Route maintenance
Low Loader	**Pastoral Lease Holder**	Medium sized low loader	Route maintenance

Provide any additional information, if required.

<Include text here.>

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)? If yes, describe each type of low impact operations proposed.	Yes ☐	No ☒
<Include text here.>		

Drilling activities

Will exploration drilling activities be conducted? If yes, fill out the below table	Yes ☒	No ☐

Tenement	Drilling type	Maximum number of drillholes	Maximum drillhole depth (m)	Maximum number of sumps required at each site	Maximum size of sumps (length x depth x width) (m^3)	Average size of each drill pad* (m^2) (no excavation required)	Number of sites requiring pad excavation	Average volume (m^3) of material to be excavated (excluding sumps)
EL6239	Diamond	1 Phase 1	1000	N/A	N/A	900 m2	1	25
EL6538 and EL6239	Diamond	10 Phase 2	1000	N/A	N/A	900 m2	10	25
TOTAL		**11**	**11,000**			**9,900 m2**	**11**	**275**
		Total number of drillholes (add each row to calculate the total).	Total metres proposed (maximum number of holes x average depth for each row, then add each row to calculate the total).	Total number of sumps (maximum number of sumps x drillsites for each row, then add each row to calculate the total).	Total volume of sumps (maximum size of sumps x number of sumps for each row, then add each row to calculate the total).	Total area of disturbance (number of holes x average size for each row, then add each row to calculate the total).	Total number of pads requiring excavation (add each row to calculate the total).	Total volume of material to be excavated (number of sites requiring excavation x average volume for each row, then add each row to calculate the total).

* The footprint includes all areas of disturbance associated with the drillsite.

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.

All of the proposed drilling locations are on sparsely vegetated sand and gypsiferous sand. Clearing will be kept to an absolute minimum using a low loader or grader to skim the surface area to allow the roots of plants to be retained in the ground. Drilling pad size will be a maximum of 30m x 30m but use will be made of cleared areas from previous agricultural activities and/or naturally clear of vegetation areas of which there are many. Any topsoil and vegetation moved will be stockpiled for final rehabilitation after the drilling program is completed. If possible, use will be made of the numerous barren areas adjacent to the drillsite for placing mobile plant, water tanks or placing the car park.

Site levelling will be kept to a minimum by moving the loose sand and using the levelling capability of the drilling rig. Above-ground tanks will be used at all times and the entire site will be sheeted and bunded to protect the permeable and porous surface.

Drillhole construction and decommissioning

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 ☒	No ☐

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.

As a minimum, drillers are expected to hold RII40909 (Certificate IV in Drilling Operations) but also holding Class 1, Class 2, Class 3 and 4D endorsements.

The following procedures will be applied to the diamond core drilling:

1. Top hole HWT section will be drilled to approximately 50m and cased with steel casing. The casing will be cemented in place using fresh cement slurry mixed in accordance with the Mineral Exploration Drillholes – General specifications for construction and backfilling, M21 document. A diverter will be attached at surface for well control should it be needed and pressure tested.
2. HQ diamond coring will take place to a depth of approximately 200m followed by NQ2 coring through HQ rods to end of hole.

Drilling ahead of HQ core will take place to a predicted maximum of 1000m TVD

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.

If the drill hole intersected no values and is no longer of any use geologically, the hole will be abandoned according to the regulations of the DSD in Information Sheet M21. All holes will be rehabilitated immediately after the hole has been completed if no re-entry decision is made. If future re-entry of a diamond drilling hole is deemed necessary, the hole will be capped with metal plate at a depth of 1 metre according to regulations. The top 1 meter will be backfilled with local material so that the hole will be unnoticeable.

Holes will be abandoned by cementing from TD to 1.0 metre below the surface of the ground. The final 1 metre of the hole will be made good with backfill topped up with 0.3m of top soil or sand depending on the local material.

Should an artesian aquifer be penetrated, the shut in pressure of the fluid needs to be recorded. The hole will be cemented to 1metre of the surface of the hole as described above.

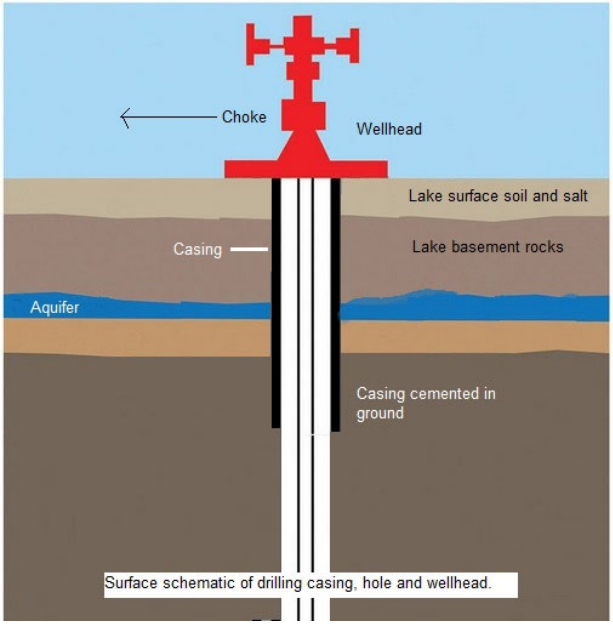
We will also provide DEW with data we have collected on the analysis of the fluids in the sediments. We will notify DEW inspector before drilling so that they can have an input on what information they need from our drilling in the sediments and on the hard rock.

Where confined or artesian conditions are expected, include a schematic diagram demonstrating how drillholes will be constructed and decommissioned

Drillhole construction

The drillhole will have a standard construction throughout the project. After drilling top hole and top of basement a run of casing will be cemented into the ground. A drilling wellhead with diverters, rams and bellows will be installed on the casing giving full well control should any pressured water aquifers be intersected.

A simple schematic of the drill hole can be seen below.

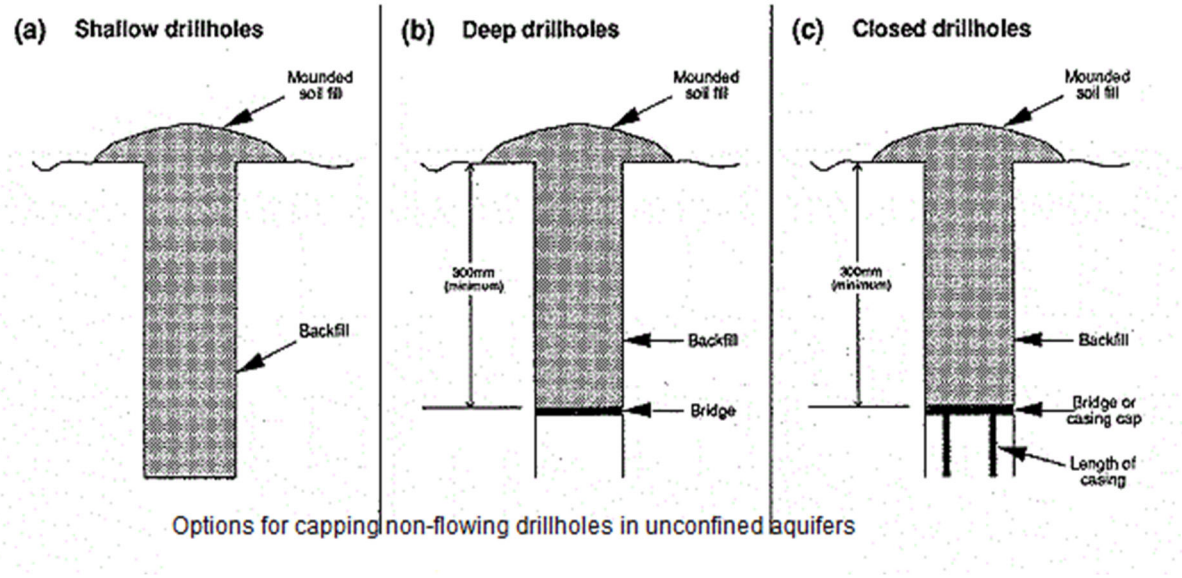


Decommissioning Of Drillholes

Drillholes that do not penetrate aquifers should be backfilled with drill cuttings or clean fill.

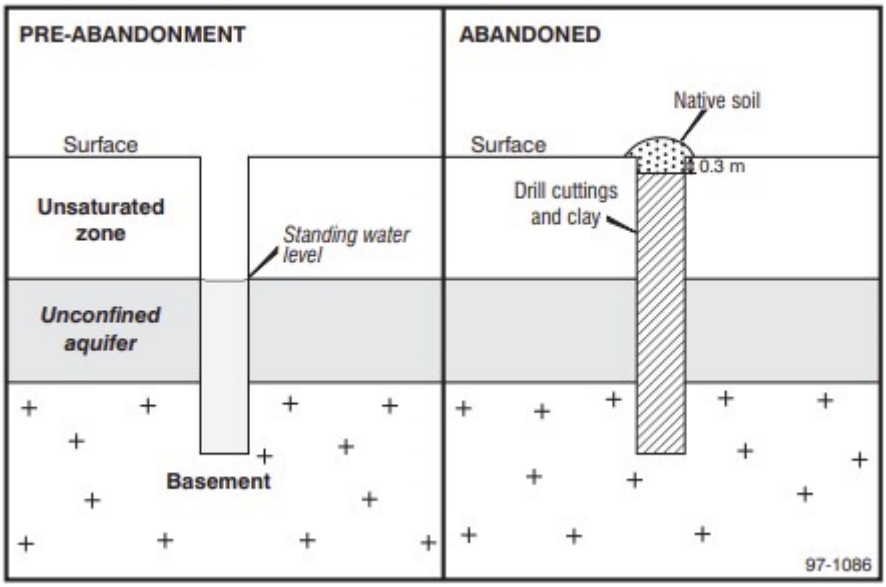
The main objective in sealing the drillholes that intersect only one rock type (provided that groundwater is not flowing from the hole) is to prevent entry of water or objects down the hole and to remediate the surface disturbance. They can sealed by backfilling with drill cuttings and the material should be compacted into the drill hole and the surface moulded over (a) below.

If not practical to completely backfill, a bridge plug can be positioned in uncased hole as a base for the backfill (b). If the hole is cased a bridge cap can be placed at the top of the casing (c).



Options for capping non-flowing drillholes in unconfined aquifers

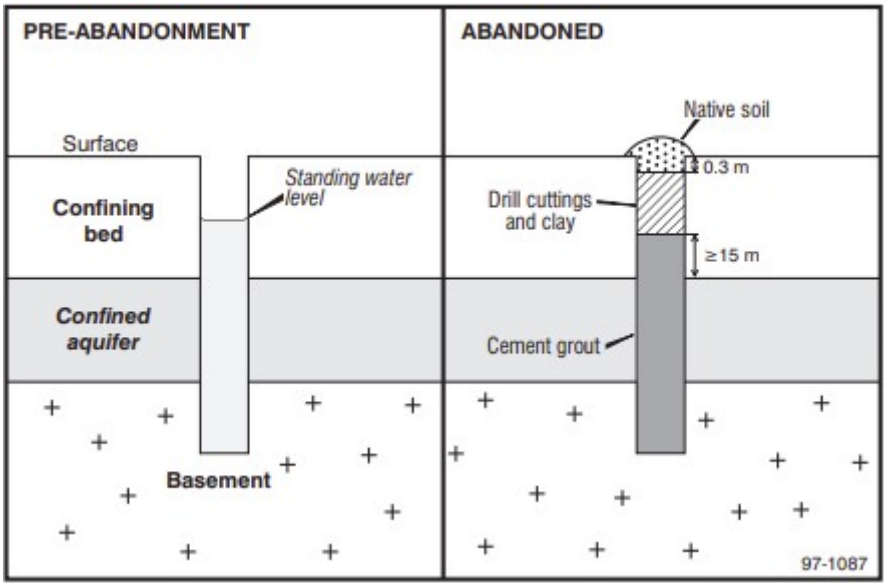
Drillholes which intersect a single unconfined aquifer can be backfilled with drill cuttings, clean fill or cement - see below (image from M21 – Mineral Exploration Drillholes – General specifications for construction and backfilling).



Single Unconfined aquifer

Confined Aquifers:

Drillholes which penetrate a single confined aquifer — plug from the level at which the aquifer was penetrated with cement grout back to a minimum of 15 m into the confining bed above; and then backfill with drill cuttings, clean fill containing clay, or cement. It should be thick enough to control the groundwater pressure (see below image from M21 – Mineral Exploration Drillholes – General specifications for construction and backfilling).



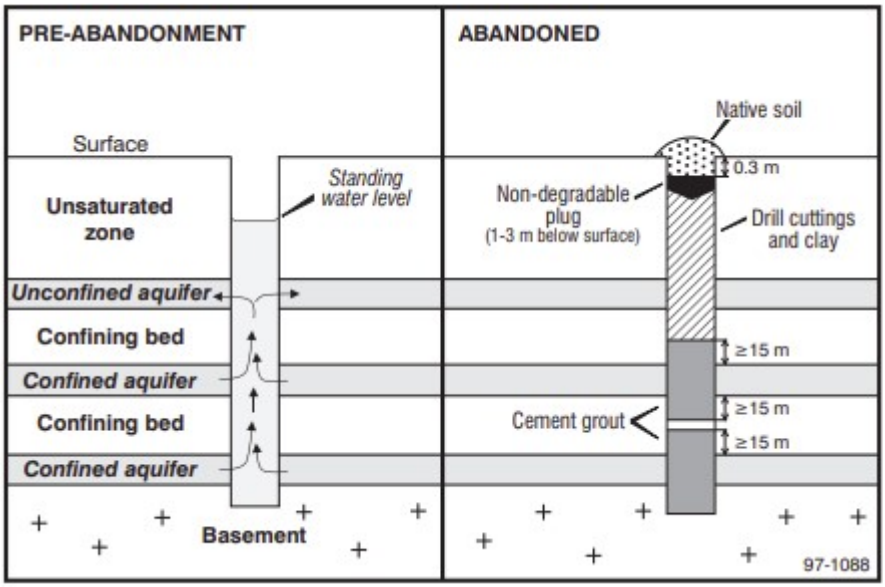
Plugging unconfined aquifer fom level of aquifer intersection

Multiple aquifer systems:

Sealing drillholes in multiple aquifer systems:

Major aquifers intersected in drillholes should be sealed to preventinter-aquifer flow via the drillhole. As it is not necessary to seal individual aquifer bed sequences, however grout plugs should be positioned between major aquifers (below).

Each aquifer should be separated by a cement grout plug and then backfilled with drill cuttings, clean fill containing clay, or cement. The length of plug used will be dependent on aquifer pressure and thickness. The plug should extend through the aquifer back into the confining bed above, with a total minimum length of 20 m of grout. In an intermediate aquifer the plug should be emplaced from 15 m below the aquifer and extend upwards through the aquifer and to a distance of 15 m above the aquifer. Generally a minimum of 20 m of cement should be positioned between aquifers. (see below image from M21 – Mineral Exploration Drillholes – General specifications for construction and backfilling).



Backfilling multiple aquifers penetrated by drillhole

Drillholes which penetrate artesian aquifers will be abandoned in such a way as to prevent the flow of water to the surface. The plug length required depends upon the 'shut-in' pressure produced by the aquifer.

Casing should be removed from the drillhole to provide placement of good seals. If casing cannot be removed the drillhole should be capped at or below ground level as agreed with the land owner.

This ePEPR application is for a period of 12 months and rehabilitation should be completed within 3 months of the ePEPR expiry. Additionally, authorised holes cannot remain open beyond the PEPR approval period.

Costeans and bulk sample disposal pits

Will costeans/bulk sample disposal pits be required for the proposed program? If yes, fill out the table below.	Yes ☐	No ☒

Tenement	Number of costeans/pits	Size of costean (length x width) (m^2)	Average depth (m)	Volume excavated (m^3)	Total volume excavated (m^3) (number of costeans/pits x volume)	Total area of disturbance* (length x width) (m^2)
						<Tab to add rows.>
TOTAL						
	Total number of costeans/pits (add each row to calculate the total).				Total volume of material to be excavated (add each row to calculate the total)	Total area of disturbance (number of costeans/pits x area of disturbance for each row, then add each row to calculate the total).

*Includes storage of excavated material at the site (e.g. topsoil and subsoil segregation).

Costeans and bulk sample disposal pit preparation

If costeans/bulk sample disposal pits are required, describe site preparation methods, vegetation clearance, and safety and maintenance requirements.

<Insert information here.>

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).

It is intended to collect drilled core starting from surface to end of hole and stored in generic core trays. Core will be initially collected in 3 metre core barrels and laid out on a core table for geological logging, photographing and analytical XRF testing before transfer to the drill core trays.

Trays will be logged and stored temporarily at site awaiting transfer to Adelaide. Each core tray will be supplied with its own lid to prevent core being lost at site. All core will be logged and stored according to the Cartwheel Minerals core logging procedure.

There is no plan to collect chip or cuttings samples.

Excess drilling cutting, drilling muds (environmentally friendly) and other drilling spoil will be disposed of at an approved disposal facility. Liquid waste products will be removed by an approved liquid waste company.

Access routes to work areas

Will existing tracks require upgrading and/or maintenance? If yes, detail the work required to upgrade/maintain existing tracks.	Yes ☒	No ☐

Access to the work camp at Wirraminna Homestead will be via a pre-existing track off the Stuart Highway at 2km in length.

All drilling will be on Coondambo pastoral land outside of the Lake Gairdner National Park and all access routes will be on this and Wirramina pastoral lease land.

Existing access tracks from the Wirraminna Homestead will serve as the main tracks to the proposed target areas. Local access roads will need to be constructed from these tracks to the drilling target A (Map 2).

Any new tracks will be created along the sparsely vegetated interdunal corridors or poorly vegetated flat sand pads that dominate both target areas in accordance with information sheet M33 of June 2004 - “Statement of environmental objectives and environmental guidelines for mineral exploration actives in South Australia”

A grader or light front loader will be sufficient to scrape the surface but retain roots in the ground. Points with sparse vegetation will be chosen and every effort will be made to pick a route through the area with the minimum disruption to the flora and fauna. Material moved will be appropriately stored and used for later rehabilitation. Existing tracks will require minor surface scraping as many have remained unused for a considerable time.

Existing tracks being used will undergo regular maintenance. These access routes have different seasonal characteristics - slightly dusty in the dry months and potentially muddy and soft in wetter periods. A procedure will be in place to conduct monitoring and care for these tracks but the key points are:

- Monitor tracks on a regular basis and enter in a report book,
- Contact supervisor if maintenance issues are recognised,
- Discuss with land holders and contractors a fast response maintenance schedule’
- Impose speed limits on the tracks to stop erosion to track and edges’
- Remove any rocks from the track, this prevents users breaking down edges when avoiding them,
- Fill pot holes or ruts and grade accordingly, discuss with lease holders,
- Check daily for edge deterioration,
- Allow drainage of any free standing water,
- Make sure tracks are free from branches and vegetation which may cause drivers to go around and damage edges,
- Check for continuous corrugations over 20m exceeding 40mm in depth; grade or tyre-drag as appropriate.

Any new tracks need to be maintained and monitored for unnecessary erosion and the procedure will include guidelines for Cartwheel staff and any contractors to follow. The key points have been presented above.

Drill core samples and personnel will be commuted over the tracks up to twice a day in standard 4WD vehicles. The drill core samples will be carried in the back of these vehicles from the drill site to the Wirraminna homestead. Fuel for the drilling rig will be transported by a third party in a bunded 20,000 litre tank and will be stored on site. A third party water truck will be visiting the drilling site periodically but the addition of a portable 10,000 litre water tank at the drilling site will reduce vehicle traffic. Cartwheel Minerals have use of a 8WD and a 4WD truck to provide materials transportation to each drill site. Their use will be restricted to the setup and breakdown of each drill site and occasional supply of heavy consumables. The main points of track selection are therefore:

- The intention is to use existing tracks as much as possible and with permission / confirmation from the lease holders,
- To choose naturally flat areas to reduce the risk of erosion and avoid vegetation where possible,
- Choose routes that are as close to the drill holes as possible to reduce the distance travelled on new tracks,
- routes that will require the least environmental impact on the area,
- routes that do not disturb any sites of significance.

Drilling target A Access: The access route follows well established tracks south from Wirraminna station to a westerly trending established fence line track and into the Coondamboo lease area. (Map 2).

Will access be required across adjoining tenements? If yes, detail the method(s) for gaining access, and if an agreement is in place with all stakeholders. Include the total area of disturbance required (i.e. length (km) and width (m) of tracks) and provide on a locality map.	Yes ☐	No ☒
Will access off existing tracks be required? If yes, detail the method(s) for gaining access and if vegetation clearance is required. Include 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).	Yes ☒	No ☐

All Cobalt Cove project areas are accessed as much as possible by using existing tracks. Every effort has been made to plan routes through the area to reduce the environmental impact to a minimum.

As the area is dominantly seif dunes and flat sand, vegetation is very sparse and it is proposed to use a small grader or low loader to cut a route and at the same time retain the vegetation root system in place. Drill sites have already been visited by Cartwheel Mineral staff and members of GRAC who gave approval as follows:

Target Area A: Approximate Track length

CMDD004 - Distance of new track - 0.4 km

An existing track is 400m away inland from the drill site. Therefore only a 400m new track will be created. There is very sparse vegetation between the existing track and the drill site (refer to Photograph 3). No roadwork is needed for access.

Phase 2 track lengths are as yet unknown until Phase 1 of the drilling program has been completed. These lengths will be calculated and submitted within the program notification for phase 2 of the program.

Any maintenance of existing tracks will be via consultation with the land holders. Many of these pastoral tracks have remained unused for considerable lengths of time and require some minor repair. This will most likely be carried out by the pastoral lease operators themselves. As tracks are to be created within areas with sand dunes, extra care will be taken and M33 Guidelines will be followed, including:

- limiting access created over dunes, and instead travelling along interdunal corridors;
- where necessary to cross dunes, sites must be selected to minimise impact on soil and vegetation;
- tracked rig and support truck would be preferable for a program of this nature;
- low dunes preferable for crossing and to be cut at right angles; and
- if any dune material to be moved when track cut through, it is pushed to either side of the track, rather than pushed down slope.

Indicate planned access routes on a locality plan and distinguish between existing and proposed new access tracks and drill lines (including fence lines).

Campsites, storage and equipment laydown areas

Using the tables below, provide a description of campsites and/or laydown areas required. Indicate the campsite and laydown area on a locality plan.

Campsite details		
Indicate where staff and contractors will be accommodated during the exploration program.		
Staff and contractors will be accommodated at the Wirraminna homestead in a camp and established housing adjacent to the work sheds		
What is the maximum number of personnel requiring accommodation?	11	
Is a campsite required to be established? If no, no further information is required.	Yes ☒	No ☐
Provide a description and justification of the camp location (e.g. previously cleared areas etc.), and any other relevant information.		
A campsite has already been established at the Wirraminna homestead. The campsite at the Wirraminna homestead is immediately adjacent to the main homestead buildings and takes advantage of already cleared areas at the station. There has been no disturbance of vegetation and no need for any clearing activities. Use of station services e.g. internet, water, fuel, maintenance facilities and phone mean that staying at the station reduces impact on the drilling locations.		
What will be the total area (ha) of the campsite(s)?	0.25 ha	
What will be the total area (ha) of vegetation clearance for the campsite?	0 ha	
If vegetation clearance is required, describe the methods used to prepare the site.		
N/A		
Will any excavations be required? If yes, describe the purpose of the excavation and the maximum volume (m^3) of material to be excavated.	Yes ☐	No ☒
<Include text here.>		
Are the proposed ablution facilities endorsed/approved for use by the Department of Health or local council, where applicable? If no, indicate why.	Yes ☒	No ☐
<Include text here.>		

Proposed infrastructure (includes caravans, tents, offices, hydrocarbon and water storage requirements etc)	**Quantity**	**Description/capacity**

Diesel Fuel Storage	Station supply or 1 x 4,000 litre tank	Cartwheel Minerals will take advantage of the already established facilities at Wirraminna Station or if required will supply a 4,000 litre bunded supply at the station just for vehicle transportation.
Water Storage	Station supply or 4 X 1000 litre	Potable water will probably be secured from the pastoral lease operators if available. If not available from the pastoral lease holders then the water will be sourced from Glendambo or Post Augusta. Potable water will be stored in 4 interconnected IBC (intermediate bulk container) 1000 litre tanks.
Donga accommodation	7	Accomodation donga at the Wirraminna homestead already established.
Donga	2	One donga as a rec room / meeting place and one as a drilling office.
Workshop and Generator	1	Workshop for drilling spares with camp generator attached at the back.
Car park	1	Area for maximum of 6 reverse park vehicles.
Laydown Area	1	Area for spares, PVC casing, drilling mud, drilling pipe if needed at Wirraminna Homestead.
Skip	1	Storage for temporary rubblish and waste.
Liquid waste and sewage	1	Shared with the stations current waste disposal

Laydown area details		
Will laydown areas be required? If no, no further information is required.	Yes ☒	No ☐
Will the laydown area(s) be located at the same location as the campsite? If no, has the location(s) been discussed with the landowner?	Yes ☒	No ☐
<Include text here.>		
What will be the maximum area (ha) required for the laydown area(s)?	1 ha	
What will be the total area (ha) of vegetation clearance for the site?	0 ha	
If vegetation clearance is required, describe the methods used to prepare the site.		
Areas are already established and do not require clearance. The laydown is at the Wirraminna Homestead on cleared land at the farm and in the worshops next to the house.		
Will any excavations be required? If yes, describe the purpose of the excavation and volume (m^3) of material to be excavated.	Yes ☐	No ☒
Lay down: The laydown area is already established at Wirraminna Homestead. Lay Down 3 (Map .2) adjacent to an established farm track on a clear area to service the drilling locations at Target.		

Proposed infrastructure (includes hydrocarbon and water storage requirements)	**Quantity**	**Description/capacity**
Diesel Fuel (as per campsite details above)	Station tank or 1 x 4,000 litre unit	Use of Station diesel fuel or by additional bunded 4,000 litre storage unit based at the station
Water for personal use	Station supply or 4 x 1,000 litre tank	Potable water for personal use will be obtained from the pastoral lease operators. If this source is limited then alternative supplies will be purchased from a local supplier. It is expected that a 4,000 litre tank or 4 x 1,000 litre interconnected IBC (intermediate bulk container) be used at the station.
Water for drilling activities	10,000 litre stand alone water tank	If suitable drilling water cannot be sourced from the local pastoral lease holder, water will be purchased from a local supplier and stored in a single 10,000 litre tank at site. Drilling water not required will be removed by a suitably certified local disposal company.
Provide a description and justification of the location (e.g. previously cleared areas), and any other relevant information if required.		
Areas have previously been cleared by land holder or area is naturally barren. There are multiple examples of these areas in the region.		

Other exploration methods and/or ancillary operations

Are any other proposed exploration methods (e.g. seismic) and/or ancillary exploration operations required? If yes, describe the activity(s), site preparation, vegetation clearance, and safety and maintenance requirements.	Yes ☐	No ☒
<If yes, include text here.>		

Water supply and management

Will camp and/or drilling water be required? If yes, describe how and where water will be sourced for drilling, track maintenance and camping purposes (e.g. groundwater, surface water, mains). Provide details on the volume of water required and how wastewater or runoff water will be managed.	Yes ☒	No ☐
It is anticipated that water for the drilling project will be sourced and purchased from the pastoral lease operator. In the likely event that water from that source is not available, water will be purchased locally from an operator. Water at the camp will be sourced via the station water supplies which will be added to by locally purchased water and is expected to be in the region of 750 litres per day. A solids recovery unit will be part of the drilling hardware and will reduce the amount of water required for the drilling operations. The drilling operation is expected to use 1000 litres a day. Water can be carted along existing tracks and newly created tracks.		
Will surface water and/or mineral drillholes be used as a water source/supply? If 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. If a licence is required and has been obtained please attach a copy. Where a licence has not been obtained, include a statement confirming that a licence will be obtained before the extraction and/or usage of water.	Yes ☐	No ☒
A license is not expected to be obtained as water from surface water or mineral drill holes will not be used.		

Groundwater and drilling investigation activities

Will any water bores be required and/or water investigation activities (e.g. pump testing, water monitoring sites, water storage, turkey nests/dams) be conducted? If yes, describe the water drilling and investigation activities, including site preparation, vegetation clearance, and safety and maintenance requirements.	Yes ☐	No ☒
<If yes, include text here.>		
Indicate if well permits have been obtained and whether or not a water extraction licence is required in accordance with the Landscape South Australia Act 2019. If yes, attach a copy of the permit(s)/licences. If no, provide a statement confirming that permits/licences will be obtained prior to commencement of water investigation activities.	Yes ☐	No ☒
A well permit is not required as no water investigation activities are to be undertaken.		

Water affecting activities

Will any water affecting activities, other than drilling a water well, be undertaken (refer to s. 127 of the Landscape South Australia Act 2019)? If yes, attach a copy of the permit. If a permit has not been obtained, provide a statement confirming that a water affecting activity permit(s) will be obtained and provide a description of the site preparation, vegetation clearance, and safety and maintenance requirements.	Yes ☐	No ☒
<If yes, include text here.>		

Management of hazardous materials

Will activities be conducted in areas of known uranium and thorium mineralisation? If yes, attach a Radiation Management Plan and confirmation of endorsement of the plan by the Environment Protection Authority South Australia (EPA).	Yes ☐	No ☒
Will any other hazardous material be encountered when exploring in the area? If yes, list the types of hazardous materials and provide a management plan on how these materials will be managed.	Yes ☐	No ☒
<If yes, include text here.>		

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.

Drilling Camps: The drilling camp is located at the Wirraminna Homestead on a cleared piece of land once used as shearing pens. The camp has been established for a number of years.

Lay down: The laydown area will be at the Wirraminna homestead and will be selected in an area of minimal vegetation on naturally clear ground adjacent to an existing farm track. Drilling fluids and chemicals will be stored in purpose built modular bunds or bunded units. All abandoned laydowns will be graded and replanted with natives if required.

Lay down 3 (Map .2) adjacent to an established farm track on a clear area to service the drilling location at Target A. Lay down 3 will be used for temporary storage of drilling rods, etc. It is accessed via a fence line of roughly 15km length from Sturt Highway.

Drill Pads: The drilling pads use above ground pits for drill returns and cuttings. Fresh water storage will also make use of water tanks. Drill pads will be remediated immediately after leaving site to reduce the need to return frequenty to the location. The hole will be abandoned according to the regulations of the DSD in Information Sheet M21.

The main objective in sealing the drillholes is to prevent entry of water or objects down the hole and to remediate the surface disturbance. They can sealed by backfilling with drill cuttings and the material should be compacted into the drill hole and the surface moulded over.

If not practical to completely backfill, a bridge plug can be positioned in uncased hole as a base for the backfill. If the hole is cased a bridge cap can be placed at the top of the casing.

Once the drilling equipment, mud tanks and all other equipment has been removed from the location a comprehensive clean up will be undertaken. When drilling, drill cuttings will be restricted to a bunded area which will be will mean it can be cleared mechanically and removed from site. The bund will then be removed and the set aside vegetative material and topsoil (if available) will be returned to the location and re-spread.

Raking the surface and additional remediation should not be necessary. In most cases there is no topsoil and the surface is composed of soft sands and sparse vegetation. Like Lake Gairdner, the movements of materials by wind and rain will make the drilling sites difficult to trace in the near future. Drilling holes from previous exploration programs conducted by other companies in the area are already difficult to see even with the use of a GPS unit.

Tracks on land: Cartwheel Minerals will make it policy to use existing farm tracks for personnel and equipment where available. These tracks will be maintained and abandoned after use and in consultation with the lease holders. Any created land tracks will be returned to pre-exploration condition using the advice provided in document M33 - Statement of environmental objectives and environmental guidelines for mineral exploration activities in South Australia. Historically, new tracks have been created with a minimum of disturbance to vegetation. This policy has allowed these tracks to be replanted and pushed over with minimum effort at the end of the project.

State the estimated budget required to rehabilitate all impacted sites.

The estimated budget for the completed rehabilitation of the project is $100,000. All the rehabilitation of the tracks, laydown areas when used and drilling sites will be conducted by Cartwheel Minerals personnel using Cartwheel Minerals mobile plant and equipment.

This will keep the costs down to a minimum. The use of above ground pits and a fully bunded drilling pad means a minimal disturbance to the ground with track removal being the main component of the remediation. Cartwheel Minerals has a policy of progressive rehabilitation and this has been undertaken on all previous drill holes in the northern section of the lake. All previous holes have been completed and the areas in question regenerated as an ongoing process during the exploration process and immediately after.

Vegetation Clearance

Will any area of cleared native vegetation be unrehabilitated after the authorised period?	Yes ☐	No ☒

If yes, provide a description of the vegetation present in the application area, the extent of the proposed vegetation clearance and the likelihood of the presence of threatened flora. Provide this information on a map.

<Include text here.>

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.

<Include text here.>

SECTION E – LEASE CONDITIONS

Retention leases

Where the retention lease includes specific conditions that are not environmental outcomes, demonstrate where these have been addressed in the PEPR (if relevant) or demonstrate how otherwise they have or will be complied with.

At this stage, Cartwheel Minerals has no retention leases.

SECTION F – MANAGEMENT OF ENVIRONMENTAL IMPACTS

Use the table below (instructions provided) to identify all of the potential environmental, social and economic impact events that are likely to occur as a result of the proposed exploration operations, how each of the identified impacts will be managed, and the residual risk, i.e. the level of risk remaining after implementing control and management strategies. Identified potential impact events should be developed based on the aspects of the environment that may be impacted on and the proposed operational details. Potnetial impact events must have corresponding outcomes and measurement criteria.

Where the terms and conditions of an RL include environmental outcomes, list them (where different) in the table below and complete all sections (ie receptor, potential impacts, control strategies, risk assessment and measurement criteria).

Environmental management – potential impacts/events, outcomes, measurable criteria and monitoring plan

			Likelihood of consequence (LH)				
			1	2	3	4	5
			Rare	Unlikely	Possible	Likely	Almost certain
Severity of consequence (CQ)	A	Insignificant	Low	Low	Low	Low	Low
	B	Minor	Low	Low	Moderate	Moderate	Moderate
	C	Moderate	Moderate	Moderate	High	High	High
	D	Major	High	High	Extreme	Extreme	Extreme
	E	Catastrophic	High	Extreme	Extreme	Extreme	Extreme

How to fill out the table

1. Based on the description of the environment and exploration operations, indicate which potential impacts are applicable to the proposed program. Note that some potential impacts are applicable to all programs.
2. For each applicable potential impact (and corresponding receptor), describe control strategies that will reduce the risk of the potential impact to an acceptable level, and achieve the corresponding environmental outcomes.
3. Conduct an impact assessment to determine if the control strategies address the potential impact (i.e. reduce the risk to an acceptable level). Indicate where there is uncertainty pertaining to the likely effectiveness of the control strategies. Where the risk is not considered low, provide justification that the risk is acceptable, or consider additional strategies to reduce the risk to an acceptable level.
4. For each applicable potential impact, the corresponding outcome and outcome measurement criteria are required.
5 Based on the description of the environment and proposed exploration activities, determine if any other potential impacts are applicable. For each new potential impact, describe proposed control and rehabilitation strategies, conduct an impact assessment, and develop corresponding outcomes and outcome measurement criteria.

Use the above matrix to conduct an impact assessment for each potential impact.

Impact assessment							Outcomes	Outcome measurement criteria (inc. monitoring plan)
Receptor Lists are not exhaustive.	**Potential impacts** Lists are not exhaustive.	**Is the potential impact applicable (Yes/No)** Some potential impacts are applicable to all programs.	**Control strategies** Indicate where there is uncertainty pertaining to the likely effectiveness of the control strategies. Where the risk is not considered low, provide justification that the risk is acceptable, or consider additional strategies to reduce the risk to an acceptable level. – refer to Minerals Regulatory Guidelines MG22 for more information.	**Risk assessment** LH = likelihood of consequence CQ = severity of consequence **LH**	**CQ**	**Risk**		
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.	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.	Yes (Applicable to all programs.)	- Consultation with pastoral lease holders for resolution of any issues. - Drill holes at least 10km from any residence. - Water for drilling to only be sourced from sites and in quantities approved by the pastoral lease owner. - Use existing track networks wherever possible. - Vehicle speed limits will be imposed to reflect local road conditions and the proximity to any infrastructure or stock. - Planning and coordination will be used to minimise the number of individual vehicle movements. - Rehabilitate any new tracks and pads at the end of the program. - Have resources in place to conduct periodic maintenance on pastoral lease tracks impacted by increased traffic flow.	2	A	Low	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.
Flora and fauna and their habitats; includes Commonwealth and state scheduled species.	Loss/modification of native vegetation and associated habitats through the clearance of vegetation.	Yes (Applicable to exploration programs located within or impacting on native vegetation.)	There is sparse vegetation or fauna where the drilling will be carried out. Tracks will cross certain flora and fauna habitats. Cartwheel Minerals will follow strategies below to reduce the impact. • Interrogate relevant SA Govt. GIS databases to become familiar with presence of significant flora and fauna species in the project area. • Information on significant species present in the area where campsites, new tracks and drillsites are located will be included in staff inductions. • Use designated tracks to access areas (as shown on Maps 2, 3, 4 & 5).. Tracks used in Phase 2 of the project will be monitored by all staff for potential blow-outs and widening of tracks. Track mats, conveyor belts to be used to minimise impact as used on previous EPEPR's. • Camp sites and laydown areas will be located in naturally cleared areas where possible at homesteads. • New track construction to take most direct, practical routes, whilst minimising impact on vegetation.	1	A	Low	No permanent loss/modification of native flora or 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.

Impact assessment							Outcomes	Outcome measurement criteria (inc. monitoring plan)
Receptor Lists are not exhaustive.	**Potential impacts** Lists are not exhaustive.	**Is the potential impact applicable (Yes/No)** Some potential impacts are applicable to all programs.	**Control strategies** Indicate where there is uncertainty pertaining to the likely effectiveness of the control strategies. Where the risk is not considered low, provide justification that the risk is acceptable, or consider additional strategies to reduce the risk to an acceptable level. – refer to Minerals Regulatory Guidelines MG22 for more information.	**Risk assessment** LH = likelihood of consequence CQ = severity of consequence				
				LH	**CQ**	**Risk**		
			• Tracks will be planned to utilise naturally open areas to avoid trees and densely vegetated areas. • During drilling phase, all vehicle movements to be limited to already created tracks and pads. • All new tracks and pads are to be rehabilitated after the drilling program is complete. • There will be no shooting or hunting of animals in the exploration area. • All top soil and soil or sand containing seeds will be stockpiled in a designated area adjacent to the disturbed area and will be respread over the disturbed area once drilling activities are concluded. • The area and method of disturbance is consistent with that described in the EPEPR and that accurate measuring of drill pads keeps the size to a maximum of 30m x 30m. All pad sizes, collar locations and any other activities affecting the location of drilling should be documented in the drilling pre-start sheet. • Vehicle speed limits will be imposed to reflect local road conditions and the proximity to any infrastructure or stock. • Planning and coordination will be used to minimise the number of individual vehicle movements. • Rehabilitate any new tracks and pads at the end of the program, such that access by third parties is unlikely or impossible. • No drilling activities will take place, nor will any Wirra personnel be adjacent to the national park on Catastrophic rated Fire Ban days. • No fires will be lit at any stage adjacent to the National Park. • All vehicles will be fitted with appropriate fire extinguishers and/or fire suppression systems.					
All flora and fauna, especially listed species.	Loss/modification of the environment (biological, social and economic) through the introduction of weeds and pathogens.	Yes (Applicable to all programs.)	To control weeds and pathogens in the land entrance and camp sites, following strategies will be used: • Make observations of current weed presence and distribution during the reconnaissance trips. • All new vehicles entering the program area, or vehicles re-entering the program area after travelling on other unsealed roads, are to be cleaned of dirt/mud and be visually inspected. Indicate where and how vehicles will be cleaned. • Risk of weed introduction to be discussed with all new personnel coming to site as a part of induction process. • Rehabilitated sites on land surrounding the lake are to be revisited periodically. If weed infestation or increase in abundance of pre-existing weeds is noticed, selective spraying is to occur in consultation with the relevant stakeholder (e.g pastoral lease holder). • Buffel grass awareness and control will be taught to all exploration personnel using guides and fact sheets, e.g. 4108_PIRSA_factsheet_Buffel_Grass_control.pdf and the CRC Weed Management Guide – aabr.org.au	*1*	*A*	*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: • 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.
All fauna	Entrapment of fauna through open drillholes and excavations.	Yes (Applicable to exploration programs that involve drilling and/or require excavations.)	Cartwheel Minerals will use a Solids Recovery Unit (SRU) containers during drilling so that there will be no need for excavated sumps on the drill sites. Upon completion, all drillholes will be cut, plugged and buried. All holes will be abandoned and rehabilitated immediately. There will be no 3 monthly wait.	*1*	*A*	*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: • 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 EPEPR approval (for EPEPRs approved for a period of 12 months), or 3 months after the expiry of a program notification (for EPEPRs approved for an ongoing period), unless otherwise authorised. Representative photos are to be included within the annual exploration compliance report.

Impact assessment							Outcomes	Outcome measurement criteria (inc. monitoring plan)
Receptor Lists are not exhaustive.	**Potential impacts** Lists are not exhaustive.	**Is the potential impact applicable (Yes/No)** Some potential impacts are applicable to all programs.	**Control strategies** Indicate where there is uncertainty pertaining to the likely effectiveness of the control strategies. Where the risk is not considered low, provide justification that the risk is acceptable, or consider additional strategies to reduce the risk to an acceptable level. – refer to Minerals Regulatory Guidelines MG22 for more information.	**Risk assessment** LH = likelihood of consequence CQ = severity of consequence				
				LH	**CQ**	**Risk**		
								Provide the information requested within the 'Rehabilitation' section of the annual exploration compliance report.
Aboriginal heritage sites	Disturbance to Aboriginal heritage.	Yes (Applicable to all programs.)	There are Aboriginal graves in the north and southern shores of Lake Gairdner. The following strategies will be used to ensure these graves will not be disturbed in this exploration programme. • A Section 23 application has been obtained prior to the commencing of any exploration activities within the section 12 determination area. • Heritage clearance survey will be conducted in accordance with the Native Title Agreement with the Gawler Ranges Aboriginal Corporation. • Heritage sites identified during the clearance survey will be flagged in the field and avoided. Personnel will be notified of any heritage sites during the induction process, on maps, and at toolbox meetings, etc. • Any heritage sites identified during the surveys will be recorded on appropriate registers and reported to appropriate authorities as per the DEM-AAR protocols. • All vehicle movements are to be limited to existing tracks where possible. • Where new tracks, camps and drill pads are required, a Heritage Clearance Survey will need to be completed before any ground-disturbing activities can occur. • All personnel will be reminded of the possibility of Heritage sites existing, and the importance of not disturbing any such sites, during the induction process.	*1*	*A*	*Low*	**No disturbance to Aboriginal artefacts or sites of significance unless prior 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: • 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.
European heritage sites and sites of scientific and environmental significance	Disturbance to European heritage sites and sites of scientific and environmental significance (e.g. geological monuments, fossil reserves).	No (Applicable to exploration programs located close to or within European heritage sites and sites of scientific and environmental significance.)	N/A				**No disturbance to European heritage sites and to sites of scientific and environmental significance unless prior approval under the relevant legislation is obtained.**	Demonstrate no impact to heritage sites and sites of scientific and environmental significance by: • Maintaining evidence, including detailed maps showing sites compared to the location of exploration activities, and photographic evidence of sites before and after the conduct of the exploration program. • Providing a statement within the annual exploration compliance report confirming sites were not impacted during the conduct of the exploration program.

Impact assessment							Outcomes	Outcome measurement criteria (inc. monitoring plan)
Receptor Lists are not exhaustive.	**Potential impacts** Lists are not exhaustive.	**Is the potential impact applicable (Yes/No)** Some potential impacts are applicable to all programs.	**Control strategies** Indicate where there is uncertainty pertaining to the likely effectiveness of the control strategies. Where the risk is not considered low, provide justification that the risk is acceptable, or consider additional strategies to reduce the risk to an acceptable level. – refer to Minerals Regulatory Guidelines MG22 for more information.	**Risk assessment** LH = likelihood of consequence CQ = severity of consequence **LH**	**CQ**	**Risk**		
Soil/vegetation/fauna	Soil/vegetation contamination (e.g. hydrocarbons, rubbish, drill samples/cuttings, ablutions, other sources).	Yes (Applicable to all programs.)	1. Water required for drilling and for personnel use will be purchased from pastoral lease operators. 2. Drilling slimes will be disposed of in accordance with council regulations at an approved centre. 3. All drilling core and samples will be returned to core storage facilities. 4. All bulk diesel or other hydrocarbon/chemical storage is to be bunded in accordance with EPA guidelines at camps. 5. Designated refuelling areas in camps/laydown areas are to be appropriately bunded. 6. At least one large spill kit to be present at the drill rig, and another at any bulk diesel storage. 7. All personnel to be reminded in the induction of the need to clean up any small hydrocarbon spills, using shovels and green plastic bags. 8. Any hydrocarbon spills >5L are to be reported. 9. All rubbish to be securely placed in bins or bags and disposed of at approved waste facility. Rubbish is not to be left in areas accessible to wildlife or vermin. Before leaving the campsites and lay down areas, all garbage must be removed and the site left as it was before the use as campsite and laydown area. 10. A portable toilet will be available for use at each drill site. 11. Ablution facilities will be available at all camp sites. 12. Any excess drill cuttings/slims will be disposed of down the drillhole, or an approved waste facility. 13. Radioactive slimes and drill cores will be disposed of according to Radiation Management Plan. Any non-natural liquid or solid spills are to be reported to the company and DEM.	*1*	*A*	*Low*	**No contamination of soil and vegetation as a result of exploration activities.**	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 EPEPR approval (for EPEPRs approved for a period of 12 months), or 3 months after the expiry of a program notification (for EPEPRs approved for an ongoing period), and that all fuel and chemicals are stored in accordance with EPA requirements, by providing: • 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: • 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 EPEPR approval (for EPEPRs approved for a period of 12 months), or 3 months after the expiry of a program notification (for EPEPRs approved for an ongoing period), unless otherwise authorised. Provide the information requested within the 'Rehabilitation' section of the annual exploration compliance report.
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).	Yes (Applicable to all programs.)	1. Use existing tracks where possible. 2. If topsoil and sand or soil containing seeds is to be scraped off prior to drillind, stored in a location along with vegetative material for remediation when the drilling program is completed. 3. Minimise potential for erosion on new tracks by not clearing low shrubby vegetation/grass, before driving over it. If there is no option but to clear the low loader will scrape the surface and leave the roots behind to maintain soil integrity. 4. All vehicles to stick to established pads and tracks during the drilling phase. 5. Avoid tight bends on tracks and impose speed restrictions. 6. Use sollids storage pods to prevent need for excavation of sumps. 7. Complete rehabilitation of new tracks and pads as per best-practice model – e.g. removing windrows, restoring original contours, lightly scarify if appropriate; replace stored topsoil and vegetation if required. Sandy surfaces should be allowed to recover by making use of wind and rain in the area. 8. Tracks used in Phase 2 of the project will be monitored by all staff for potential blow-outs and widening of tracks. Track mats, conveyor belts to be used to minimise impact as used on previous EPEPR's. 9. Ensure third party access to rehabilitated sites is either unlikely or impossible. Any station track or fence that is damaged by the drilling operation must be notified to the landowner and repaired to the same condition as before the exploration activity after consultation with the landowner.	*1*	*A*	*Low*	**Where soil disturbance occurs as a result of exploration activities, ensure that:** • **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: • The soil profile and topography is reinstated to original conditions and is consistent with natural surroundings within 3 months of the expiry of the EPEPR approval (for EPEPRs approved for a period of 12 months), or 3 months after the expiry of a program notification (for EPEPRs 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 EPEPR approval (for EPEPRs approved for a period of 12 months), or 3 months after the expiry of a program notification (for EPEPRs approved for an ongoing period), unless otherwise authorised. • There are no signs of accelerated soil erosion during and post rehabilitation of disturbed sites. • 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. 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.

Impact assessment							Outcomes	Outcome measurement criteria (inc. monitoring plan)
Receptor Lists are not exhaustive.	**Potential impacts** Lists are not exhaustive.	**Is the potential impact applicable (Yes/No)** Some potential impacts are applicable to all programs.	**Control strategies** Indicate where there is uncertainty pertaining to the likely effectiveness of the control strategies. Where the risk is not considered low, provide justification that the risk is acceptable, or consider additional strategies to reduce the risk to an acceptable level. – refer to Minerals Regulatory Guidelines MG22 for more information.	**Risk assessment** LH = likelihood of consequence CQ = severity of consequence **LH**	**CQ**	**Risk**		
Surface water	Alteration to surface water – interference to surface drainage.	No (Applicable to exploration programs that are likely to impact on surface drainage channels.)	N/A				**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 EPEPR approval (for EPEPRs approved for a period of 12 months), or 3 months after the expiry of a program notification (for EPEPRs approved for an ongoing period). Alternatively, provide copies of water affecting permits within the annual exploration compliance report.
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).	Yes (Applicable to all exploration programs that may intersect groundwater.)	For drilling inside bedrock, - Establish expected groundwater conditions in the area prior to drilling. - Alert drillers to the requirement to observe changing groundwater conditions during drilling. A well control flow preventer will be fitted to the drilling casing. - Record details of any aquifers intersected. - Ensure only approved drilling products are used downhole (e.g. bio-degradable products). - Ensure drillholes are not used for disposal of any unwanted hydrocarbons or chemicals. -If the drill hole intersected no values and is no longer of any use geologically, the hole will be cemented to 1 metre of the surface with the last 1 metre of the hole backfilled and topped with 0.3 metre top soil. Rehabilitation will take place immediately to prevent the need to return to the drill site. -Casing will be run from approximately 1.0 m below the surface of the ground to the basement and then cemented in place by 'squeezing" the cement between the outside of the casing and the open hole (annulus). This will prevent the annulus being a conduit for any unwanted movement or leakage of groundwater should it be present.	*1*	*B*	*Low*	**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*, within 3 months of the expiry of the EPEPR approval (for EPEPRs approved for a period of 12 months), or 3 months after the expiry of a program notification (for EPEPRs approved for an ongoing period), unless otherwise authorised. Provide the information requested within the 'Groundwater' section of the annual exploration compliance report.
Soil/vegetation/fauna	Discharge of groundwater into the surrounding environment.	Yes (Applicable to all exploration programs that may intersect groundwater or where activities require the discharge of groundwater into the surrounding environment.)	- All water used during the diamond coring process will be captured at the drill collar using the SRU poly pods. - Any further excess water will be disposed of via an approved off-site facility. - If required, drilling operations will cease to ensure that no groundwater runs beyond the drill pad. - holes will be cemented to 1 metre of the surface with the last 1 metre of the hole backfilled and topped with 0.3 metre top soil.	*2*	B	*Low*	**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.
Groundwater users	Interference to existing water users when extracting water from existing dams, water bores or mineral drillholes.	Yes (Applicable to all exploration programs that may require the use of water from existing dams, water bores or mineral drillholes.)	There will be no interference to ground water users in the Central Gawler Craton as a result of the drilling program. - Water will only be sourced from water access points (either from dams or bores), after approval from pastoral lease holders. - Water will only be extracted in quantities approved by pastoral lease holders. - Provision will be made to source any required additional water from other approved sources –e.g. purchase water from council standpipes and in the south from Whyalla.	*1*	*A*	*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.
Soil/vegetation/fauna	Degradation of rehabilitated access tracks caused by third party access (includes previously closed and rehabilitated access tracks).	Yes (Applicable to exploration programs that create new access tracks.)	All tracks are on privately owned pastoral leases (i.e. minimal through traffic). To prevent use by third party, • Once rehabilitation is complete, access to tracks, exit/entry points will be blocked and disguised with obstacles such as fallen tree trunks or branches etc. • New tracks will be doglegged off existing tracks. Any new tracks will be assessed, and application made to the DEM followed by a Heritage inspection prior to any work taking place.	*1*	*B*	*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 EPEPR approval (for EPEPRs approved for a period of 12 months), or 3 months after the expiry of a program notification (for EPEPRs approved for an ongoing period), unless otherwise authorised. Representative photos are to be included within the annual exploration compliance report.

Impact assessment							Outcomes	Outcome measurement criteria (inc. monitoring plan)
Receptor Lists are not exhaustive.	**Potential impacts** Lists are not exhaustive.	**Is the potential impact applicable (Yes/No)** Some potential impacts are applicable to all programs.	**Control strategies** Indicate where there is uncertainty pertaining to the likely effectiveness of the control strategies. Where the risk is not considered low, provide justification that the risk is acceptable, or consider additional strategies to reduce the risk to an acceptable level. – refer to Minerals Regulatory Guidelines MG22 for more information.	**Risk assessment** LH = likelihood of consequence CQ = severity of consequence				
				LH	**CQ**	**Risk**		
								Provide the information requested within the 'Rehabilitation' section of the annual exploration compliance report.
Community/landowners	Damage to infrastructure and loss of income through fire.	Yes (Applicable to all programs.)	The Contractors and the personnel of Cartwheel Minerals are very experienced in carrying out their exploration program including avoiding bush fires that may damage its equipment or the infrastructure of the pastoral lease operators. The following strategies will be used: • Fires not permitted on fire ban days. • Management tools in place during the fire ban season to ensure internal approvals are required and appropriate safety management systems are in place before conducting activities such as welding, grinding, oxy cutting etc. • All vehicles will be fitted with fire extinguishers. • Fire suppression units will be fitted to large plant such as the rig. • Fires for warmth/cooking will only be authorised in designated places, with firefighting tools at hand.	*1*	*B*	*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.
General public	Injury or death to members of the public as a result of exploration activities.	Yes (Applicable to all programs.)	Following control strategies will be used to prevent unexpected public member involving the operation: • Only inducted personnel who have direct need to be in the work area of the rig will be permitted in close proximity to operations. • Any visitors to the drilling operations will undergo a visitor induction and will be required to be accompanied by a fully inducted staff member. - Warning signs, highlighting the hazards of drilling operations will be erected around the drill site. Although the operation carries high risk, it is acceptable because it is almost impossible that a member of the public will be in the area during the drilling program, also the risk will be minimum after the safety measure and supervision are present at the rig.	*1*	*E*	*High*	**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.
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.	Yes (Applicable to exploration programs located within known uranium or thorium deposits.)	All personnel working in the vicinity of drill site will be informed of the potential radioactivity. The drill site will be constantly under monitoring for radioactivity. If radioactive material is encountered, all personnel on site will follow the existing Radiation Management Plan. The public will not be exposed to radiation at a level higher than the natural background.	*1*	*A*	*Low*	**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: • 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.
Other (if applicable)								

* Uncontrolled fires = fires that escape outside of the work area (e.g. drillsite).

† Properties = freehold (cropping and grazing land); perpetual/pastoral lease land; council land; regional reserves; national, conservation and marine parks; Aboriginal land; Commonwealth land etc.

SECTION G - OPERATOR CAPABILITY

Provide information demonstrating that the tenement holder and operator (where applicable) has the capability to conduct the program in a manner that consistently ensures ongoing achievement of the environmental outcomes. This may be demonstrated within the PEPR by providing an overview of the following:

- Manuals or standard operating procedures that outline the safe and environmentally sound operation of all critical operations associated with the exploration program that ensure compliance with the PEPR.
- Systems in place to monitor, audit and assess compliance against the criteria approved in the PEPR.
- Systems in place to identify and report any noncompliance with regulatory requirements or relevant environmental outcomes (e.g. measures in place to report incidents in accordance with regulation 79(3)).
- Practices and procedures in place to provide appropriate communication of regulatory requirements to employees and contractors (e.g. induction programs).
- Practices and procedures in place to respond to, and communicate with landowners and external parties on the proposed program and compliance matters (e.g. complaints)

Cartwheel Minerals is a relatively small exploration company when compared with the larger operators in the region. The financial resources required to operate in such dynamic conditions are large and require fast management responses to the ever changing demands created by working in difficult conditions. A small experienced team is ideal for this scenario.

The exploration part of Cartwheel Minerals is made up of the following employees:

Manging Director - Rudy Gomez,
Geophysical Manager – Dr Can Yin,
Consultant – Adam Ainsworth
2 Geologists,
Company Lawyer.

Cartwheel Minerals has manuls and full SOP's for drilling, exploration and environmental compliance in South Australia. The care of the manuals and the updating of these manuals are the responsibility of the Geologists, Geophysics Manager, Consultant and Company Lawyer. These members of staff advise the employees and communicate proccedures and policies to them.

The Geophysics Manager and Geologists are also given the responsibility to ensure that the compliance to the EPEPR in the field is upheld. Any potential non-compliance is reported to the other sectional managers and the company lawyer. All personnel are required to contribute to identifying and reporting any possible non-compliance and in keeping daily reports up to date.

The frequent communications face to face with the landholders has meant that any queries and issues can be solved immediately. Cartwheel Minerals have very good relations with these parties and the signage available through the area of exploration provides contact numbers for any other parties to contact managers for queries and complaints. All employees in the field are introduced to the landowners and this has helped in creating a friendly trusting relationship.

Keeping individuals directly responsible for key operations and requirements in a small team means that communication and response to requirements in the field and office are rapid and easily passed on. The Cartwheel Minerals policies and procedures include but are not limited to:

Cartwheel Minerals Landowner Interaction Procedure,
Drill site induction training,
Works site emergency plans,
First Aid Training,
Harard Incident reporting,
Journey Management Plans
Emergency Response Management Procedure,
TARPs,
Environmental Policy,
Various vehicle and moving equipment operational and mechanical risk assessments,
Radiation Safety Management plan,
Site and drill site inspection checklists.
Rehabilitation Inspections

SECTION H –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.

Below is a list of Pastoral Leases around the Wirra North Project Area:

1- COONDAMBO STATION- Coondambo Nominees Pty. Ltd., Bruce Nutt, Manager, Private Bag 15, Port Augusta, 5701, Tel. 86438940, Mob. 0428438940, email pandurra@bigpond.com

2- WIRRAMINA STATION- Inglewood Pty. Ltd., PMB 7, Port Augusta, 5701, Rob. Davidson, Manager, Tel. 8672 1992, Mob. 0418817066, email jb.Sonia@bigpond.com

3- MAHANEWO STATION-PMB 46, Port Augusta, 5701, Paul Manning, manager, Tel. 86438962, Mob. ----, email mahanewo@activ8.net.au

4- MOONAREE STATION- PMB 113, Port Augusta 5701, Alistair and Katherine McTaggart, managers Tel. 8648 1813, Mob. ----, email-----

Refer to **Fig 2** for more details about the leases.

Form 21 (notice of entry) has been sent to pastoral lease holders;

Meeting with Aboriginal group representatives.

1- Gawler Ranges Aboriginal Corporation – Zoe Saunders Chairperson

Gawler Ranges Aboriginal Corporation RNTBC (ICN 7652) for and on behalf of the Gawler Ranges people as common law holders of native title, care of Richard Bradshaw, Johnson Withers Lawyers 17 Sturt Street, Adelaide SA 5000 (**GRAC**)

2- DEW – Tim Wilson, Coordinator of Conservation and Mining. Tel. 8124 4748, Mob. 0428 563 859, email Tim.Wilson2@sa.gov.au;
Michael Freak, Senior Ranger – Mining. Tel. 8688 3198, email Michael.Freak@sa.gov.au
Lindsay Brown, Senior Ranger of Lake Gairdner National Park. Tel

3- LAKE GAIRDNER CO MANAGEMENT BOARD - Jonathan Clark Tel 8688 3108, Mob. 0429 676 870.

Once all the drill hole locations, camp sites and access route are finalised, we will discuss with DEW and GRAC and resolve any concerns they have. Cartwheel Minerals will discuss the locations of exempt land with the land owners prior to commencing activities. This will help avoid any exempt land and help us adhere to the Mines Act Section 9.

DEW and the LAKE GAIRDNER CO MANAGEMENT BOARD will be notified immediately of any matters of interest.

The “Notice of use of Declared Equipment” form 22 of the Mining Act will be served 42 days prior to any advanced exploration operations

Landholders will be informed by letter and verbally by Dr Can Yin (Cartwheel Minerals) preferably in person before, during and after each part of the program. Additionally they will be given regular process updates through the program.

Native Title Holders and Land Holders are invited to actively communicate with Cartwheel Representatives at any time.

There have been no concerns raised by the Landowners. When we have approached them to gain permission for access onto their land we have adhered to any requests.

Gates are left as found and if we see any livestock in distress we communicate this to the farmer immediately

SECTION I – PHOTOS

Include photographs in this section:

- that have been obtained during site visits
- that help describe relevant environmental and operational aspects in the PEPR.

To insert photos, copy and paste the photo into the template below. Resize photos to fit page width. Ensure that all information about each photo is completed and refer to the photo number in the relevant section of the PEPR.

Site identification	Date taken	Photo number & PEPR section reference	Easting (GDA94)	Northing (GDA94)	Zone	Details and Comments
Photograph 1	13/03/2020		58200	6545450	53	GRAC inspection 2020

Site identification	Date taken	Photo number & PEPR section reference	Easting (GDA94)	Northing (GDA94)	Zone	Details and Comments
Photograph 2	29/01/2024		581600	6544250	53	Landscape of the planned drill site (facing the lake) – GRAC inspectoion 2024

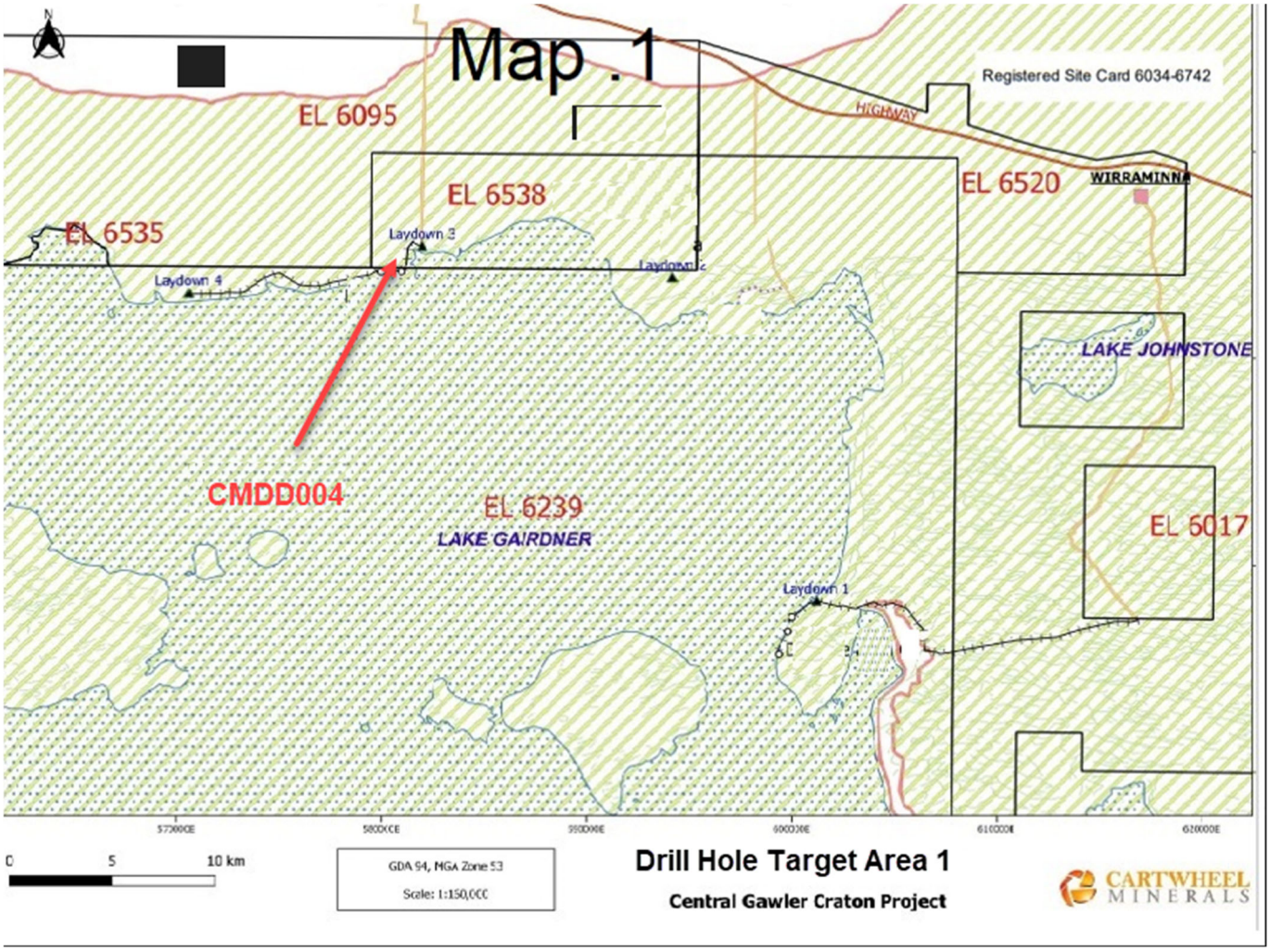
Site identification	Date taken	Photo number & PEPR section reference	Easting (GDA94)	Northing (GDA94)	Zone	Details and Comments
Photograph 3	29/01/2024		581600	6544250	53	Landscape of the planned drill site (facing the lake) – GRAC inspectoion 2024

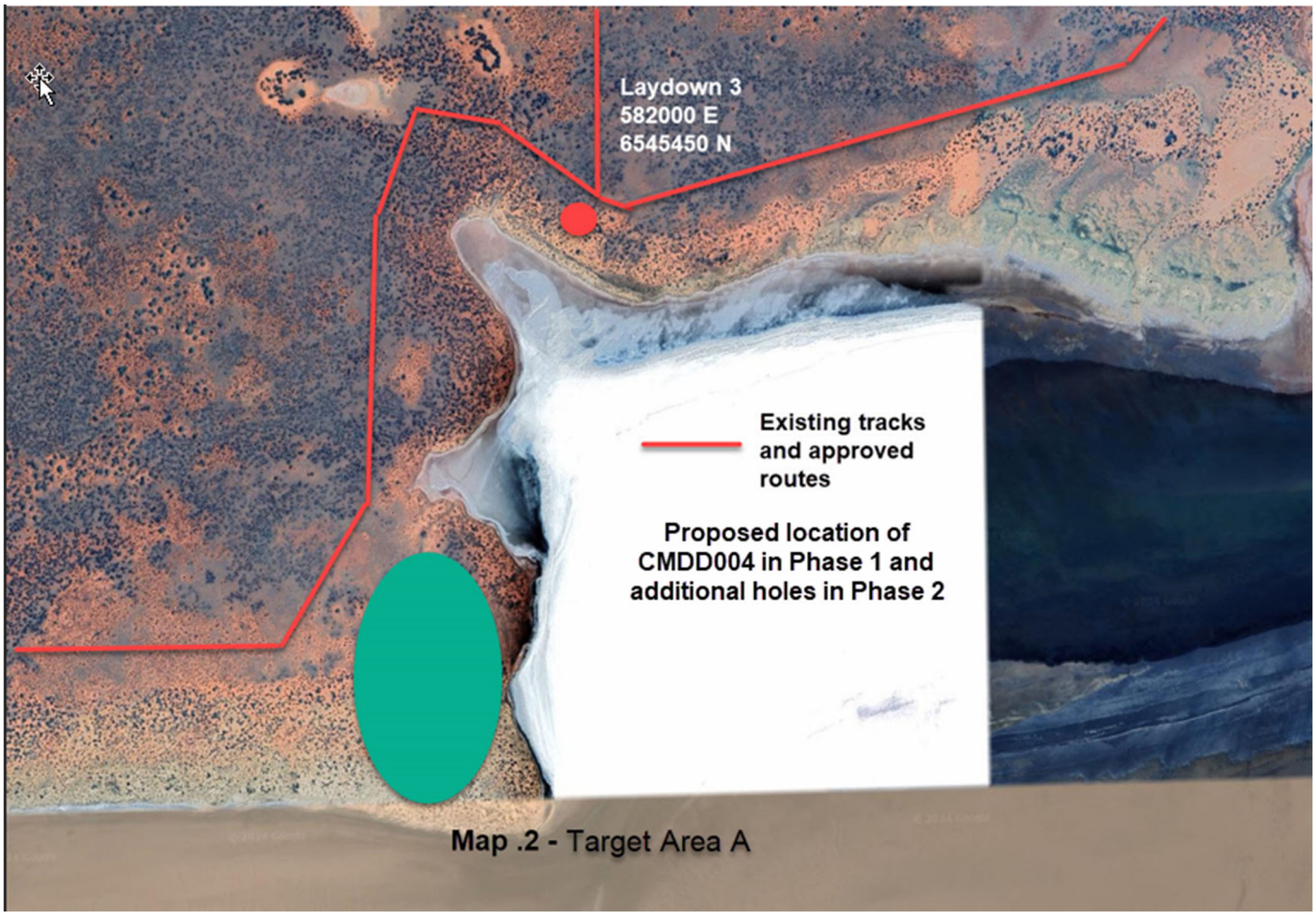
SECTION J – MAPS

Provide a map(s) showing the following information that is located adjacent to or within the proposed area of operations, where applicable:

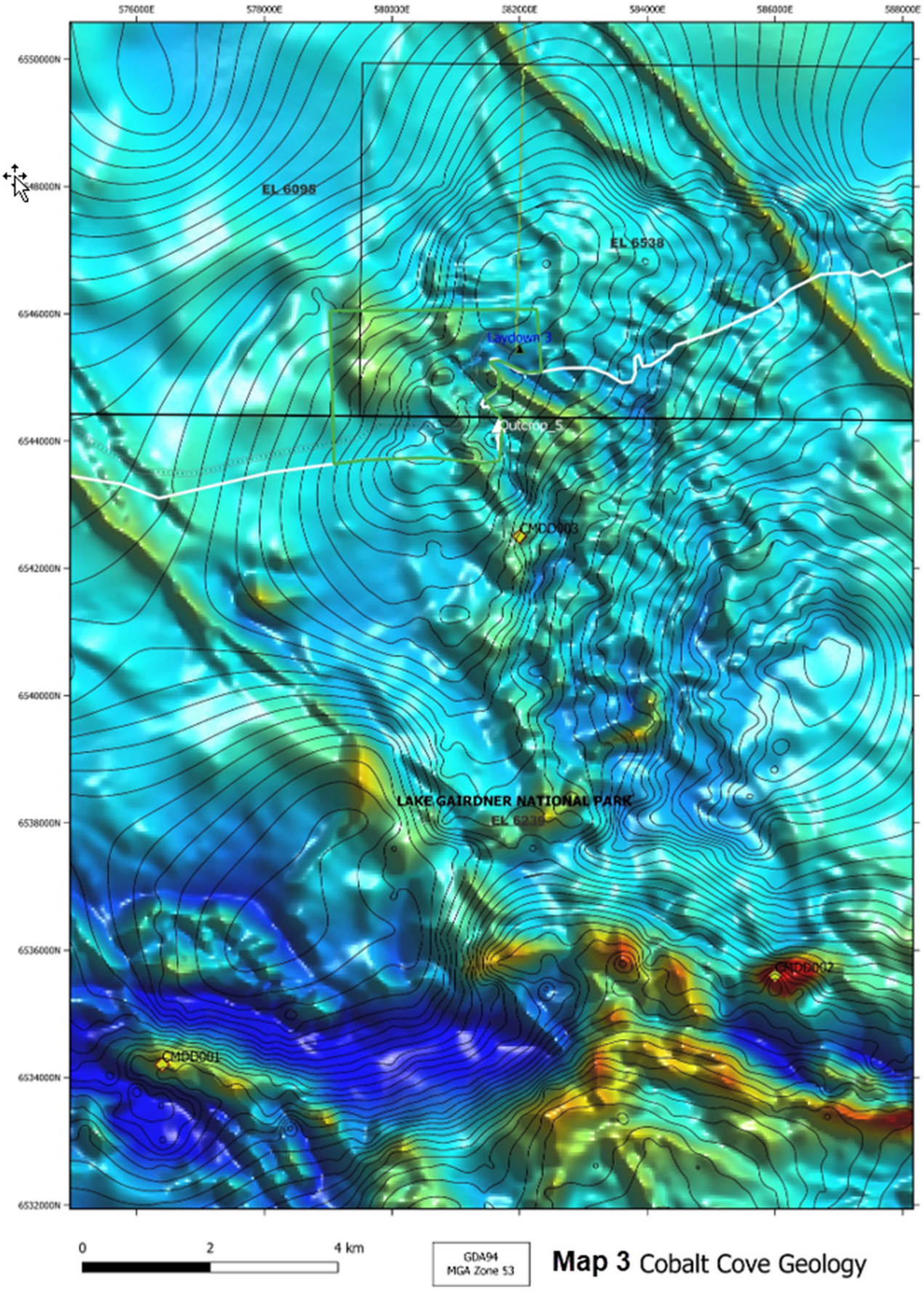
- tenement boundaries,
- cadastral information,
- existing surface contours,
- existing vegetation,
- location of the proposed exploration operations (includes drillholes, existing and new access tracks, drill traverses, campsites, laydown areas and other applicable information) and/or the target exploration area(s),
- location of existing ephemeral and permanent rivers, creeks, swamps, streams or watercourses and water management structures,
- location of towns, houses and homesteads, existing roads, rails, fences, transmission lines, buildings, dams and pipelines
- known sightings of listed species,
- location and extent of all environmentally sensitive areas,
- any relevant land use types (e.g. parks and reserves, Aboriginal freehold land, Woomera Prohibited Area).

All maps and sections must conform to the standards outlined in the Exploration PEPR Terms of Reference.

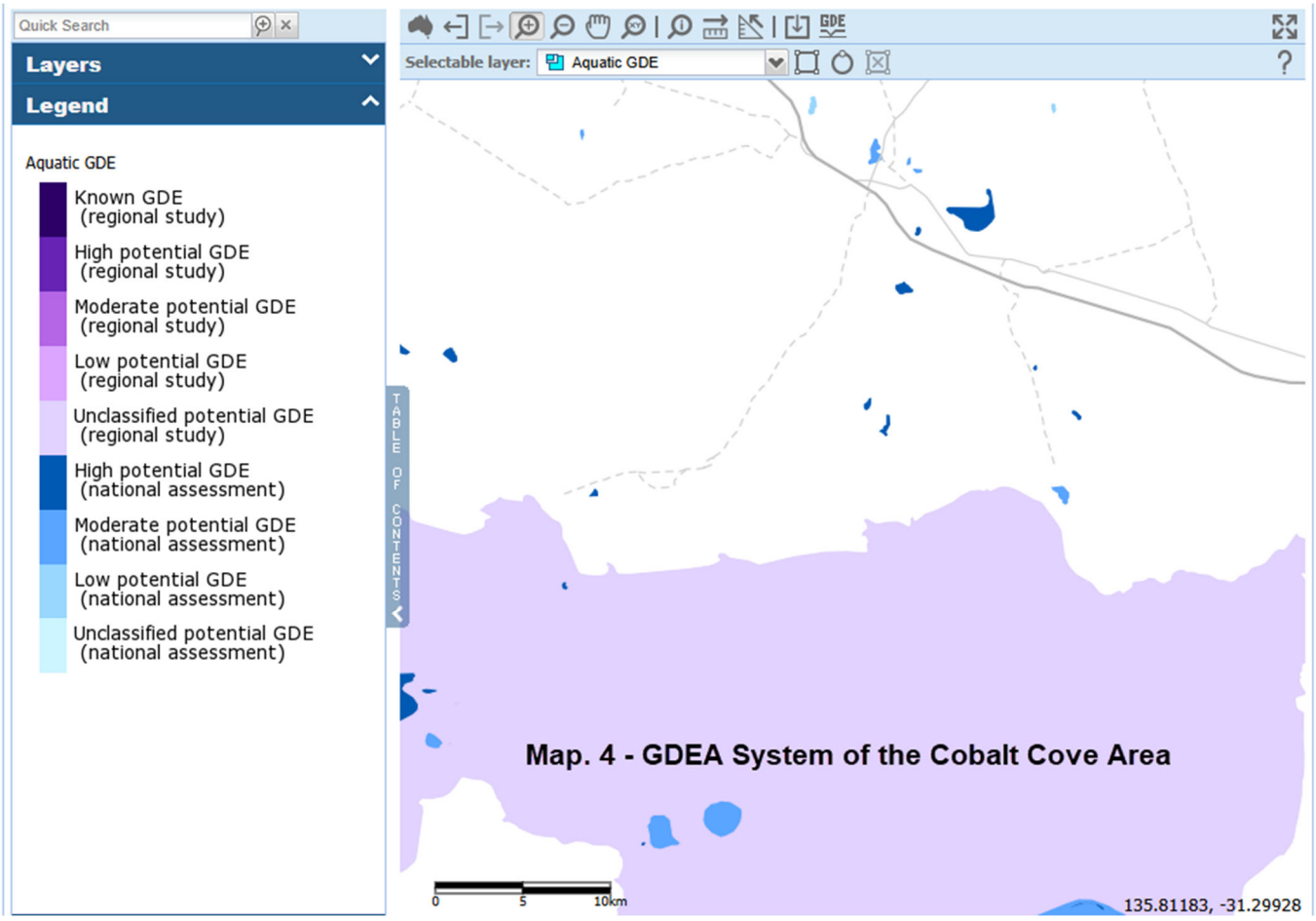


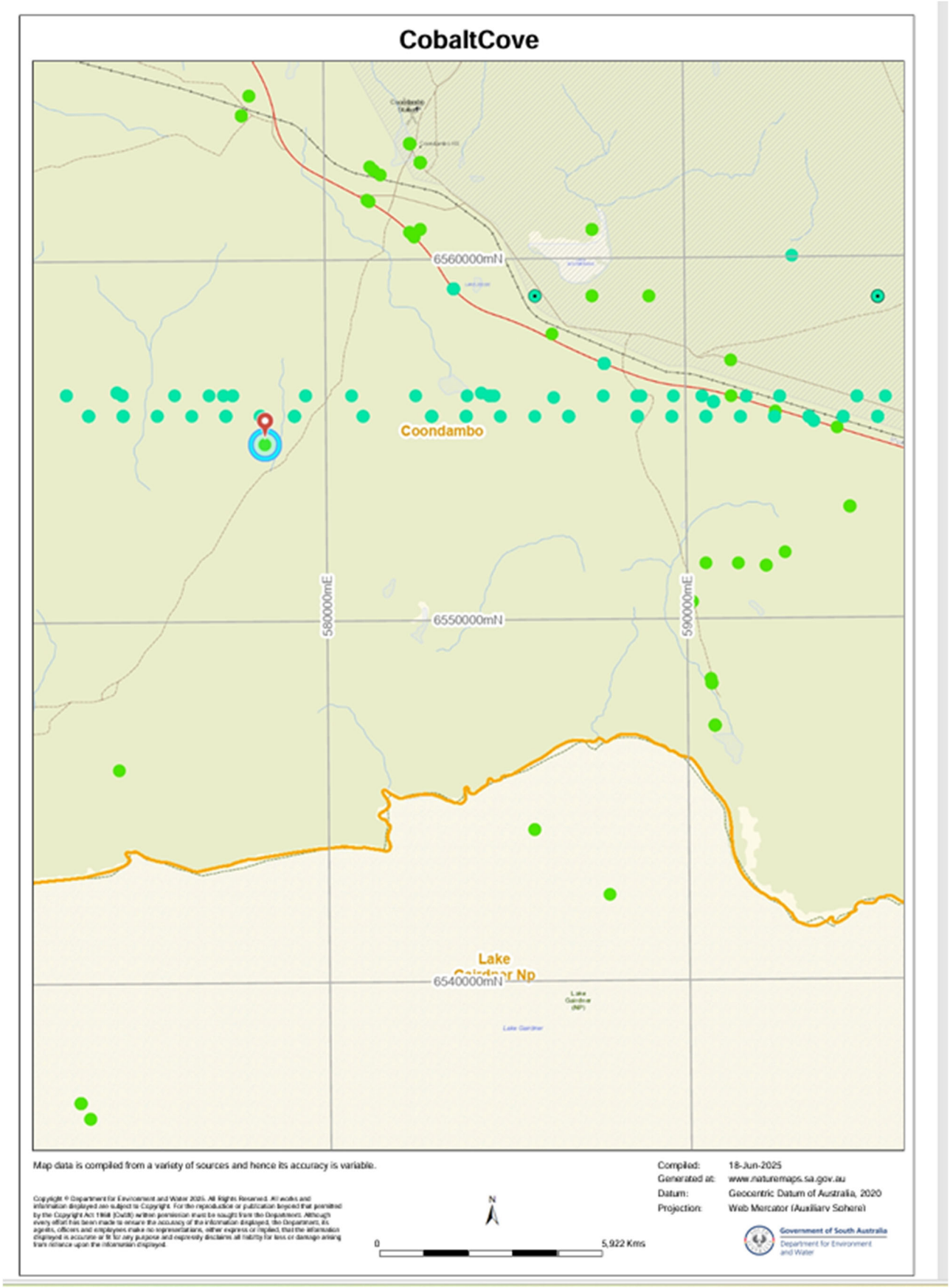


Map .2 - Target Area A



Map 3 Cobalt Cove Geology


Quick Search
Layers
Legend
Aquatic GDE
Known GDE (regional study)
High potential GDE (regional study)
Moderate potential GDE (regional study)
Low potential GDE (regional study)
Unclassified potential GDE (regional study)
High potential GDE (national assessment)
Moderate potential GDE (national assessment)
Low potential GDE (national assessment)
Unclassified potential GDE (national assessment)
Selectable layer: Aquatic GDE
TABLE OF CONTENTS
Map. 4 - GDEA System of the Cobalt Cove Area
0
5
10km
135.81183, -31.29928



Map 5 – registered Flora and Fauna Observations Lake Gairdner North

NSXCODE	FAMILY NAME	SPECIES	COMMON NAME	NATIVE	NATIONAI	STATE RAT	NUMBER (	DATE OF LAST RECORD
Z00111	ALISMATACEAE	Damasonium minus	Star-fruit	Y			1	10-Apr-1993
C06141	AMARANTHACEAE	Amaranthus mitchellii	Boggabri Weed	Y			1	11-Jun-2013
W01143	AMARANTHACEAE	Atriplex nummularia ssp. nummu	Old-man Saltbush	Y			1	01-Feb-2024
K01157	AMARANTHACEAE	Atriplex velutinella	Sandhill Saltbush	Y			2	06-Aug-1971
U32322	AMARANTHACEAE	Atriplex vesicaria	Bladder Saltbush	Y			3	01-Feb-2024
Z01183	AMARANTHACEAE	Maireana astrotricha	Low Bluebush	Y			2	06-Aug-1971
W01187	AMARANTHACEAE	Maireana ciliata	Hairy Fissure-plant	Y			1	10-Apr-1993
U01194	AMARANTHACEAE	Maireana integra	Entire-wing Bluebush	Y			1	09-Aug-1971
Q01204	AMARANTHACEAE	Maireana pyramidata	Black Bluebush	Y			1	01-Feb-2024
C01209	AMARANTHACEAE	Maireana sedifolia	Bluebush	Y			1	01-Feb-2024
U10614	AMARANTHACEAE	Maireana sp.	Bluebush/Fissure-plant	Y			2	01-Feb-2024
Q01212	AMARANTHACEAE	Maireana trichoptera	Hairy-fruit Bluebush	Y			1	06-Aug-1971
S04565	AMARANTHACEAE	Salsola australis	Buckbush	Y			1	01-Feb-2024
C01241	AMARANTHACEAE	Sclerolaena diacantha	Grey Bindyi	Y			1	01-Feb-2024
Q01256	AMARANTHACEAE	Sclerolaena obliquicuspis	Oblique-spined Bindyi	Y			1	01-Feb-2024
M01270	AMARANTHACEAE	Threlkeldia diffusa	Coast Bonefruit	Y			1	01-Feb-2024
E02978	ASTERACEAE	Brachyscome lineariloba	Hard-head Daisy	Y			1	10-Aug-1971
Q10144	ASTERACEAE	Brachyscome sp.	Native Daisy	Y			1	01-Feb-2024
A03000	ASTERACEAE	Calotis cymbacantha	Showy Burr-daisy	Y			1	27-Oct-1989
K03021	ASTERACEAE	Centaurea melitensis	Malta Thistle	N			1	01-Jul-2009
Y04164	ASTERACEAE	Gnephosis arachnoidea	Spidery Button-flower	Y			1	25-Oct-1980
M10450	ASTERACEAE	Gnephosis sp.		Y			1	01-Feb-2024
Z03199	ASTERACEAE	Isoetopsis graminifolia	Grass Cushion	Y			1	
U03202	ASTERACEAE	Leiocarpa websteri	Narrow Plover-daisy	Y			1	10-Apr-1993
K03233	ASTERACEAE	Polycalymma stuartii	Poached-egg Daisy	Y			3	11-Jun-2013
A03052	ASTERACEAE	Pycnosorus pleiocephalus	Soft Billy-buttons	Y			2	28-Aug-1954
U03174	ASTERACEAE	Rhodanthe floribunda	White Everlasting	Y			1	23-Oct-1958
W03191	ASTERACEAE	Rhodanthe tietkensii	Tietken's Daisy	Y			1	11-Jun-2013
K03305	ASTERACEAE	Senecio gregorii	Fleshy Groundsel	Y			1	10-Jun-2013
Q01396	BRASSICACEAE	Arabidella trisecta	Shrubby Cress	Y			1	20-Jun-1965
U01442	BRASSICACEAE	Lepidium phlebopetalum	Veined Peppercress	Y			1	01-Feb-2024
K03381	CUPRESSACEAE	Callitris glaucophylla	White Cypress-pine	Y			1	03-May-1971
A06328	EUPHORBIACEAE	Euphorbia drummondii (NC)		Y			1	11-Jun-2013
Z01547	FABACEAE	Acacia burkittii	Pin-bush Wattle	Y			1	02-Aug-1966
Z01599	FABACEAE	Acacia papyrocarpa	Western Myall	Y			1	21-Sep-1963
M15342	FAMILY NOT ASSIGNED -ANGIOSPERM	Unidentified sp.		Y			1	16-Jun-2013
G30583	GEASTRACEAE	Geastrum floriforme		Y			1	19-Aug-2009
S02877	GOODENIACEAE	Goodenia cycloptera	Serrated Goodenia	Y			1	01-Feb-2024

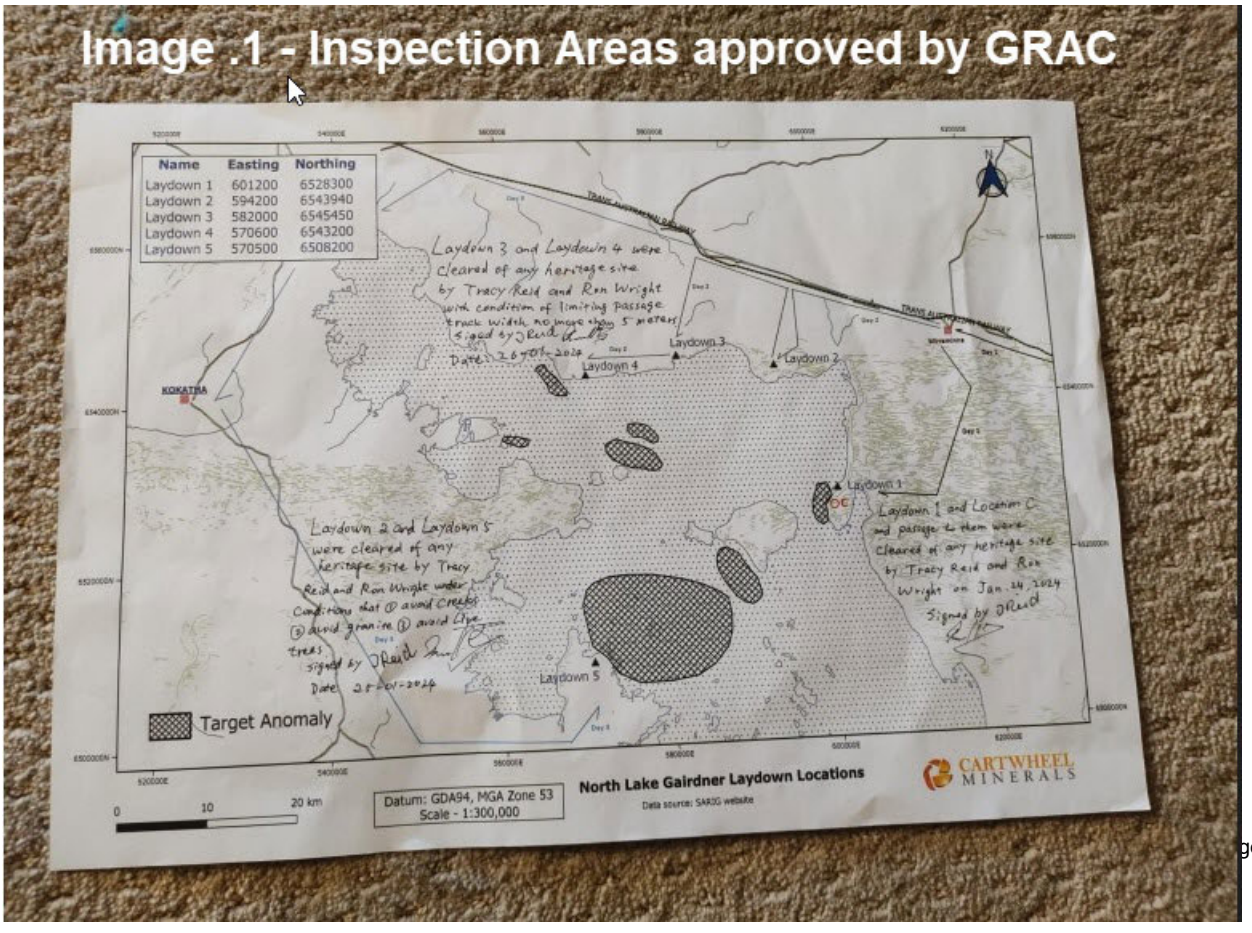
Item 1 – Flora and Fauna List, see Map 5

Z02891	GOODENIACEAE	Goodenia pinnatifida	Cut-leaf Goodenia	Y			2	17-Aug-1973
A02332	HALORAGACEAE	Haloragis aspera	Rough Raspwort	Y			1	11-Jun-2013
Z02099	MALVACEAE	Sida corrugata var. corrugata	Corrugated Sida	Y			1	01-Feb-2024
E10626	MYRTACEAE	Melaleuca sp.	Tea-tree	Y			1	11-Jun-2013
C00029	OPHIOGLOSSACEAE	Ophioglossum polyphyllum	Large Adder's-tongue	Y		R	1	10-Jun-2013
W04955	POACEAE	Aristida holathera var. holathera	Tall Kerosene Grass	Y			1	10-Apr-1993
K00145	POACEAE	Austrostipa nitida	Balcarra Spear-grass	Y			4	21-Sep-1963
E10950	POACEAE	Austrostipa sp.	Spear-grass	Y			1	01-Feb-2024
C05369	POACEAE	Cenchrus ciliaris	Buffel Grass	N			2	01-Feb-2024
M00322	POACEAE	Enneapogon avenaceus	Common Bottle-washers	Y			2	01-Feb-2024
Z00323	POACEAE	Enneapogon caerulescens	Blue Bottle-washers	Y			1	06-Aug-1971
S00325	POACEAE	Enneapogon cylindricus	Jointed Bottle-washers	Y			1	01-Feb-2024
W00327	POACEAE	Enneapogon nigricans	Black-head Grass	Y			1	01-Feb-2024
C00329	POACEAE	Enneapogon polyphyllus	Leafy Bottle-washers	Y			2	28-Aug-1954
S05373	POACEAE	Enteropogon ramosus	Umbrella Grass	Y			1	01-Apr-1993
U04750	POACEAE	Eragrostis dielsii	Mulka	Y			1	01-Feb-2024
E00354	POACEAE	Eragrostis laniflora	Hairy-flower Woollybutt	Y			1	01-May-1931
K00357	POACEAE	Eragrostis setifolia	Bristly Love-grass	Y			1	10-Jun-2013
K00437	POACEAE	Neurachne munroi	Window Mulga-grass	Y			1	01-May-1931
Y00284	POACEAE	Rostraria pumila	Tiny Bristle-grass	N			1	06-Aug-1971
E00362	POACEAE	Triraphis mollis	Purple Plume Grass	Y			2	11-Jun-2013
E00910	PROTEACEAE	Grevillea nematophylla ssp. nem	Water Bush	Y			1	03-May-1971
E04930	SCROPHULARIACEAE	Eremophila alternifolia	Narrow-leaf Emubush	Y			4	21-Sep-1963
G02783	SCROPHULARIACEAE	Eremophila latrobei ssp. glabra	Crimson Emubush	Y			1	10-Jun-2013
M05610	SCROPHULARIACEAE	Eremophila paisleyi ssp. paisleyi		Y			1	29-Oct-1929
M02794	SCROPHULARIACEAE	Eremophila rotundifolia	Round-leaf Emubush	Y			3	04-Mar-1993
Y02696	SOLANACEAE	Solanum quadriloculatum	Plains Nightshade	Y			1	01-Feb-2024
M02134	THYMELAEACEAE	Pimelea microcephala ssp. micro	Shrubby Riceflower	Y			1	10-Jun-2013
G20287	ZYGOPHYLLACEAE	Roepera aurantiaca ssp.	Shrubby Twinleaf	Y			1	01-Feb-2024
Q01900	ZYGOPHYLLACEAE	Roepera howittii	Clasping Twinleaf	Y			1	11-Jun-2013

Item 2 – Flora and Fauna List, see Map 5

NSXCODE	CLASS NAI	SPECIES	COMMON NAME	NATIVE	NATIONAL RATIN	STATE RATING	NUMBER (	DATE OF LAST RECORD
S04117	AVES	Acanthage	Spiny-cheeked Honeyeater	Y			2	17-Feb-2005
E00486	AVES	Acanthiza	Yellow-rumped Thornbill	Y			1	30-Jun-1997
S00481	AVES	Acanthiza	Chestnut-rumped Thornbill	Y			1	30-Jun-1997
U00466	AVES	Apheloce	Southern Whiteface	Y	sp		1	30-Jun-1997
G04139	AVES	Aquila au	Wedge-tailed Eagle	Y			2	27-Jun-2018
Z04115	AVES	Artamus c	Black-faced Woodswallow	Y			1	17-Feb-2005
M00294	AVES	Barnardiu	Australian Ringneck	Y			1	17-Feb-2005
Y04120	AVES	Coracina r	Black-faced Cuckooshrike	Y			1	30-Jun-1997
A04144	AVES	Corvus co	Australian Raven	Y			2	17-Feb-2005
U04150	AVES	Dicaeum h	Mistletoebird	Y			1	30-Jun-1997
C00001	AVES	Dromaius	Emu	Y	ssp	ssp	19	12-Jul-2015
C00273	AVES	Eolophus	Galah	Y			1	17-Feb-2005
S00705	AVES	Gymnorhi	Australian Magpie	Y			1	17-Feb-2005
E21050	AVES	Lophochr	Major Mitchell's Cockatoo (NW, EP)	Y		SP	4	29-Apr-2005
Z00535	AVES	Malurus l	White-winged Fairywren	Y			1	30-Jun-1997
E00310	AVES	Melopsitt	Budgerigar	Y			1	15-Jul-2011
A21032	AVES	Northiella	Eastern Bluebonnet (eastern and central SA)	Y			2	17-Feb-2005
W00043	AVES	Ocyphaps	Crested Pigeon	Y			2	17-Feb-2005
G00419	AVES	Oreoica g	Crested Bellbird	Y			2	17-Feb-2005
K00381	AVES	Petroica g	Red-capped Robin	Y			2	17-Feb-2005
K00445	AVES	Pomatost	White-browed Babbler	Y			3	17-Feb-2005
E09442	AVES	Taeniopyg	Zebra Finch	Y			2	01-Feb-2024
W01531	MAMMAL	Canis lupu	Feral Dog, Dingo	N			1	15-Jul-2011
S01521	MAMMAL	Capra hirc	Goat (Feral Goat)	N			7	23-Jun-2014
Y01536	MAMMAL	Felis catu	Domestic Cat (Feral Cat)	N			1	01-Jan-1996
W01275	MAMMAL	Macropus	Red Kangaroo	Y			239	27-Jun-2018
Z01263	MAMMAL	Macropus	Western Grey Kangaroo	Y			11	04-Jul-2016
U01522	MAMMAL	Ovis aries	Sheep (Feral Sheep)	N			1	12-Jul-2015
Q02196	REPTILIA	Ctenopho	Central Netted Dragon	Y			2	26-Mar-1979
W02199	REPTILIA	Ctenopho	Painted Dragon	Y			1	26-Mar-1979
K02257	REPTILIA	Tympanoc	Eyrean Earless Dragon	Y			1	26-Mar-1979
E10598	REPTILIA	Varanus s	goannas	Y			1	01-Feb-2024

Item 3 – Flora and Fauna List, see Map 5



SECTION K – PUBLIC RELEASE

PEPR documents will be registered on the mining register and publicly released in full without the need to request consent from the tenement holder(s). Ultimately, it is the applicant's responsibility to ensure that confidential, or commercially sensitive, information is not included within the PEPR application.

SECTION L – SUBMISSION OF THE APPLICATION

An application for an Exploration PEPR or PEPR review, must be submitted in the following form, unless otherwise specified by the Director of Mines or an authorised officer:

- an electronic version of the PEPR must be submitted using the exploration PEPR template(s) provided on the DEM Minerals website,
- the electronic version must be submitted online through the DEM Minerals website using the exploration PEPR submission form,
- the electronic version must be submitted in one single Acrobat PDF file, and
- Microsoft Word-compatible files must be submitted if requested by the Director of Mines (or delegate), or other authorised officers.

Appendix 1

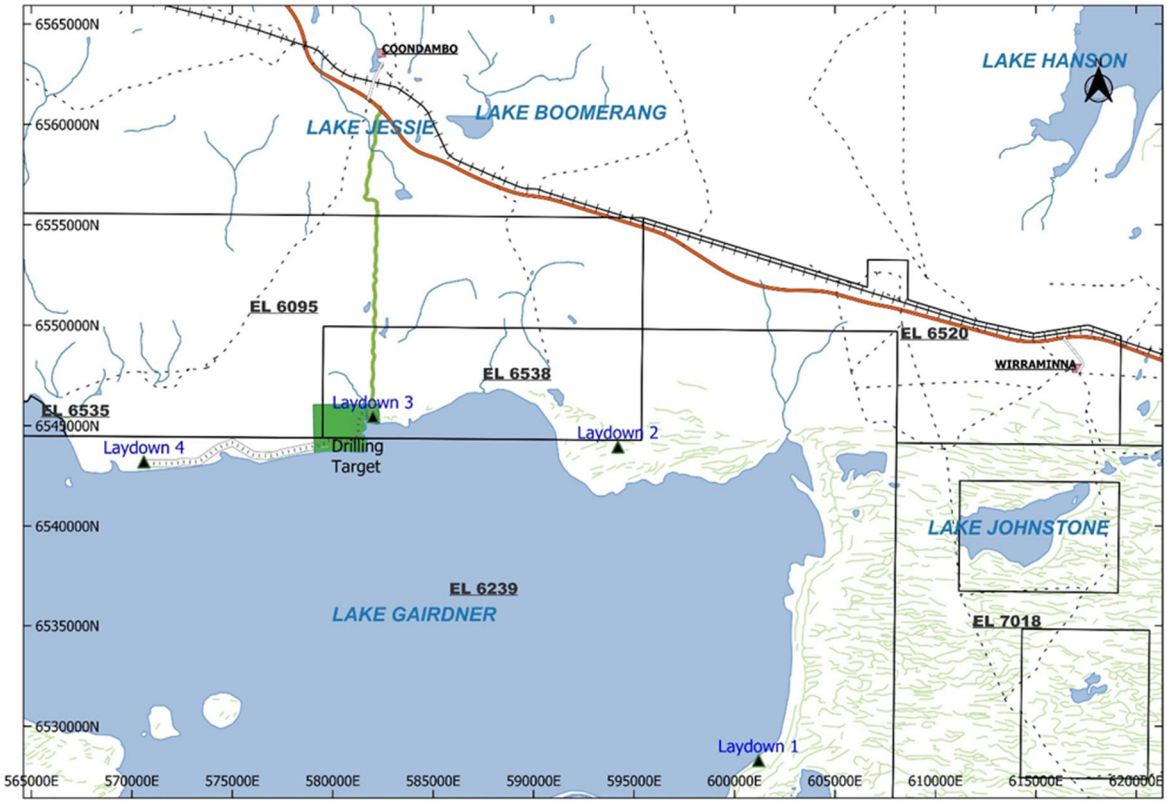
Report and Conclusions on the heritage issue around Cobalt Cove

Overview

Cartwheel Minerals is planning to drill some exploration holes on the north shore of Lake Gairdner near the so-called Cobalt Cove area. This part is on the native titled land of Gawler Ranges Aboriginal Corporation (GRAC People). Under normal circumstances, a heritage survey is required before any exploration activities can be conducted. However, in this special case, the Cobalt Cove area has been surveyed by two different groups of Aboriginal representatives (monitors) on two separate occasions. And none of the Aboriginal monitors raised any concern during or after the inspections. Therefore, Cartwheel Minerals considers a new heritage survey of Cobalt Cove target area is not required. It should be allowed to conduct exploration drilling immediately.

locality

The target area is within Coondambo Station, north shore of Lake Gairdner. It is marked in the map below.



Map 1, Locality of drill target (shaded in green) and previous heritage surveys.

geological rationale

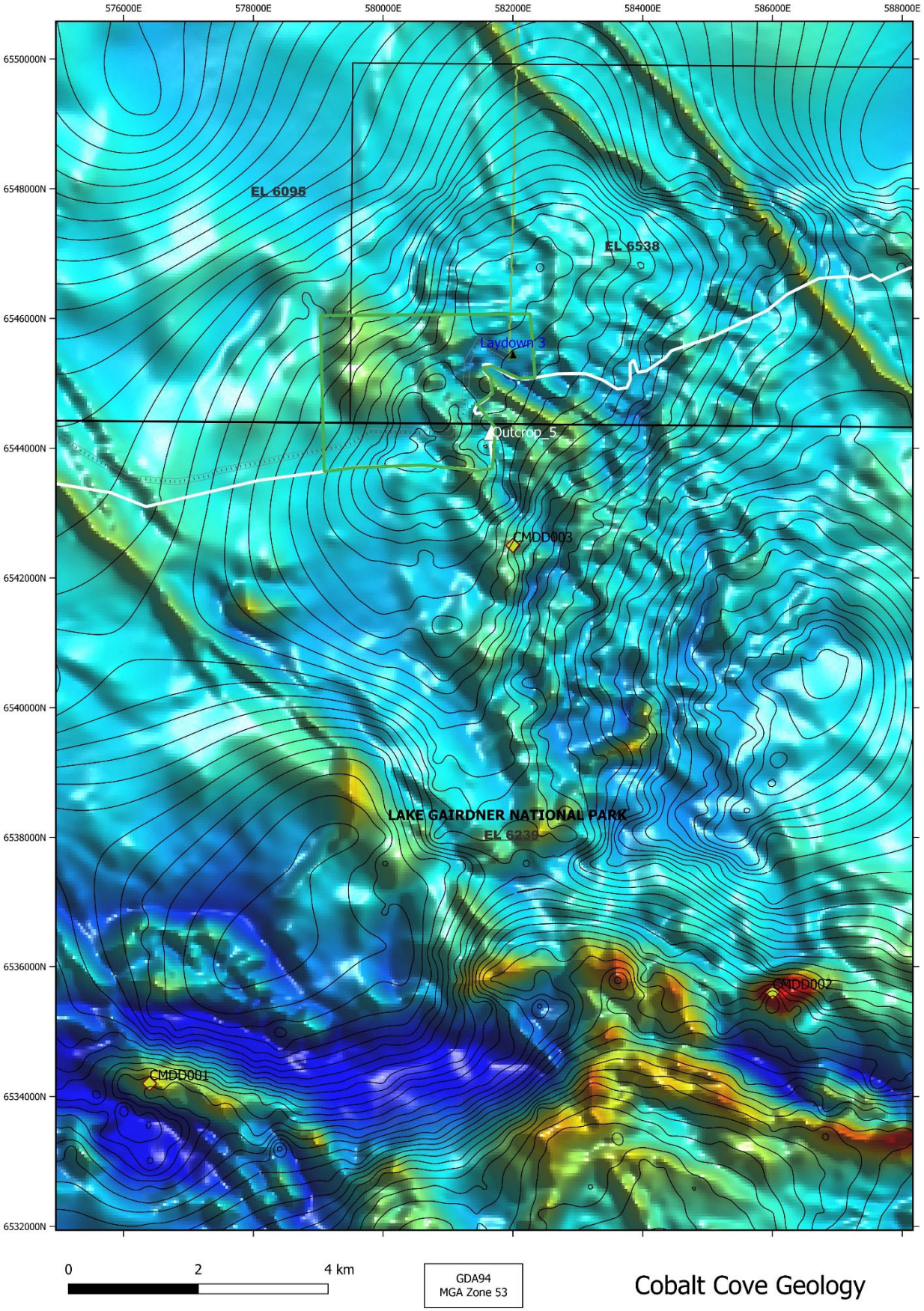
The Cobalt Cove area has shown strong geological anomaly. South Australia government has conducted several rounds of airborne geophysical surveys over this region. The magnetic data shows that the anomaly extends from inside the lake to the land. Cartwheel Minerals also conducted ground gravity survey in this area. Although most of the survey stations were on the lake, some land stations were also surveyed. The gravity data indicates that the anomaly covers both inside and outside the lake.

The geological rationale is reflected in the picture below (Figure 1), in which magnetic image is displayed along with gravity data shown as contours.

Cartwheel Minerals geologists have collected some rock chip samples in this area. One sample (Outcrop_5) shows high concentration of cobalt and nickel which is very encouraging. Considering the strategic importance of these two elements, if a significant deposit of cobalt and nickel could be found in this area, it will benefit both the state and the nation.

Cartwheel Minerals plans to drill this target from both land and lake. If the lake is too wet for machinery access, the focus will be on the land drilling.

The drill holes on Lake Gairdner have already been approved by both DEM and GRAC.


576000E
578000E
580000E
582000E
584000E
586000E
588000E
6550000N
6548000N
6546000N
6544000N
6542000N
6540000N
6538000N
6536000N
6534000N
6532000N
EL 6098
EL 6538
Laydown 3
Outcrop_5
CMDD003
LAKE GAIRDNER NATIONAL PARK
EL 6239
CMDD002
CMDD001
0
2
4 km
GDA94
MGA Zone 53
Cobalt Cove Geology

first inspection

Time: March 13, 2020.

Venue: Laydown 3, Laydown 4 and the area between them.

Aboriginal representatives:

Lyn Smith and Dawn Taylor from GRAC.

Cartwheel Minerals Personnel:

Rudy Gomez – Managing Director (Cartwheel Resources)

Dr Holly Aquin – Vice President (Cartwheel Minerals & Cartwheel Exploration)

Adam Ainsworth – Exploration Manager and Geology Manager

Dr Can Yin – Geophysics Manager

Inspection Program:

Rudy Gomez and Dr. Holly Aquin picked up elders Lyn Smith and Dawn Taylor from the Walga office at Whyalla at 7 am on March 13, 2020 and proceeded to Wirranminna homestead. After transferring over into two 4WD vehicles the party inspected the proposed access route across sand dunes to the edge of Lake Gairdner (Shear Access) and visually inspected from a distance the area where the drilling hole will be located.

After a brief lunch the party moved to the second proposed route known as the 400 access. This route across the dunes from an existing farm fence line track was the main focus of the visit and permission is being sought to allow Cartwheel Minerals to drive a route across the moving seif dunes to the edge of the lake as soon as possible.

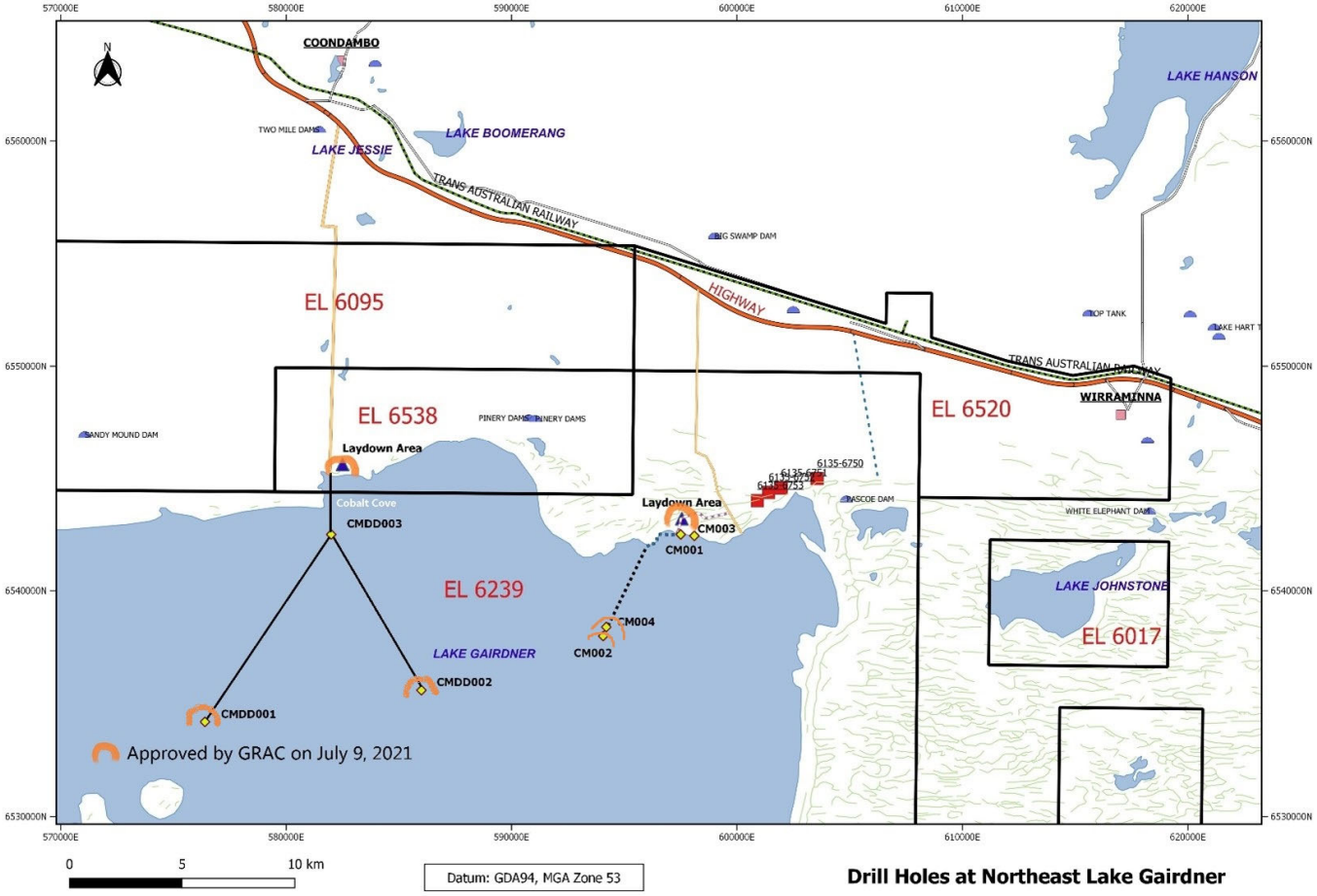
After the inspection, Rudy Gomez, Dr. Holly Aquin and the elders drove back to Whyalla and arrived back at the Walga Office at 7:09 pm.

Left to right, Dawn Taylor, Adam Ainsworth, Rudy Gomez, Lyn Smith, Can Yin.

Image taken at Location 1 - “Shear Access” point

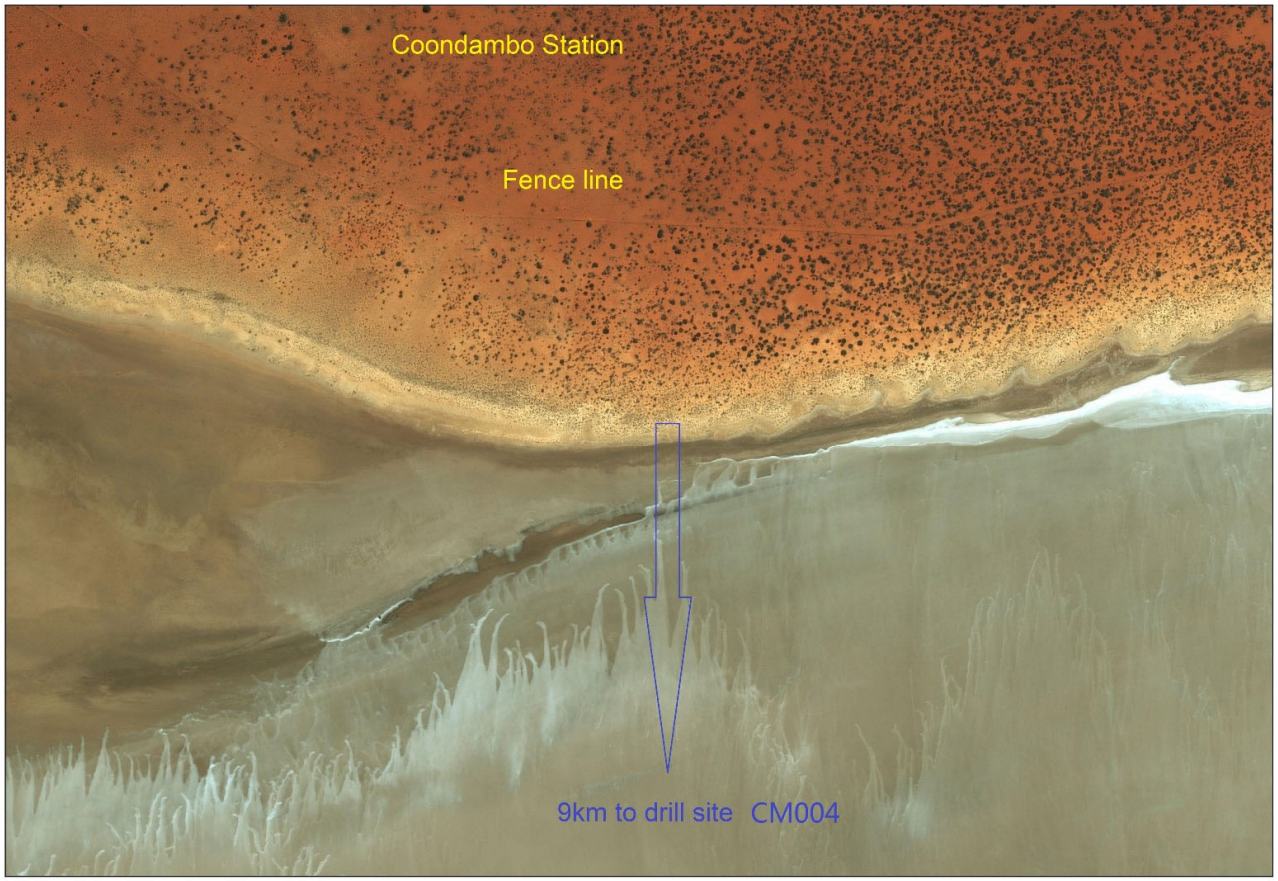
Locations 1- "shear access"

The holes of interest (CM002 and CM004) are located approximately 9km off the shore of the lake and can be seen in the map below (Map 2). A known access route to within 300m of the lake edge has been well used in the past and Cartwheel Minerals were hoping to drive a narrow route across the adjacent sand dunes to the edge of the lake. This would therefore reduce the amount of travelling on the surface and edge of the lake from the current access point at the Wirraminna / Coondamboo boundary fence further east.



Map 2, Locations of all drill holes approved by GRAC during the first survey.

The environment of this region is shown by a satellite image below. Existing tracks along the farm fence lines not far from the shore are clearly visible.



Cartwheel Minerals was acceptable and a simple non disruptive track could be created. Cartwheel Minerals also pointed out a stake marking the proposed location of the future drilling hole and both Elders agreed that there was no issue with the lake route and the location of the stake.

“Shear Access” - Route looking towards lake from Existing fence line

Stakes marking location of CM002 and CM004

Locations 2- “400 access”

The 400 access point was the main focus of the visit and drilling is planned to commence immediately permission is granted to use this proposed amended route onto the lake.
The locations of the diamond drilling holes (CM001 and CM003) are only a short distance off the edge of the lake and this proposed route over the bordering seif dunes will reduce unnecessary commuting on the lake edge by more than 3km.
Cartwheel Minerals pointed out the proposed first hole location to the GRAC elders a short distance from the shore of the access point. The location was determined as being acceptable for the drilling program.

The party drove over the dunes to close to the edge of the lake following a pre surveyed path through the dunes.
Dawn Taylor expressed concerns about the initial proposed route through the sand dunes. She explained that her ancestors may have camped in the more open areas of the dune groups. She discussed a proposed route starting adjacent to some exposed rocks near the lake edge and as a result Adam Ainsworth has resurveyed the route and taken into account the recommendations proposed by the Elders. The track will be laid with track matting and belt conveyors where required to keep the disruption to the surface to a minimum. The new route and details can be seen in the following sections.

Location 2 – “400 Access”

Location 2 – “400 Access”

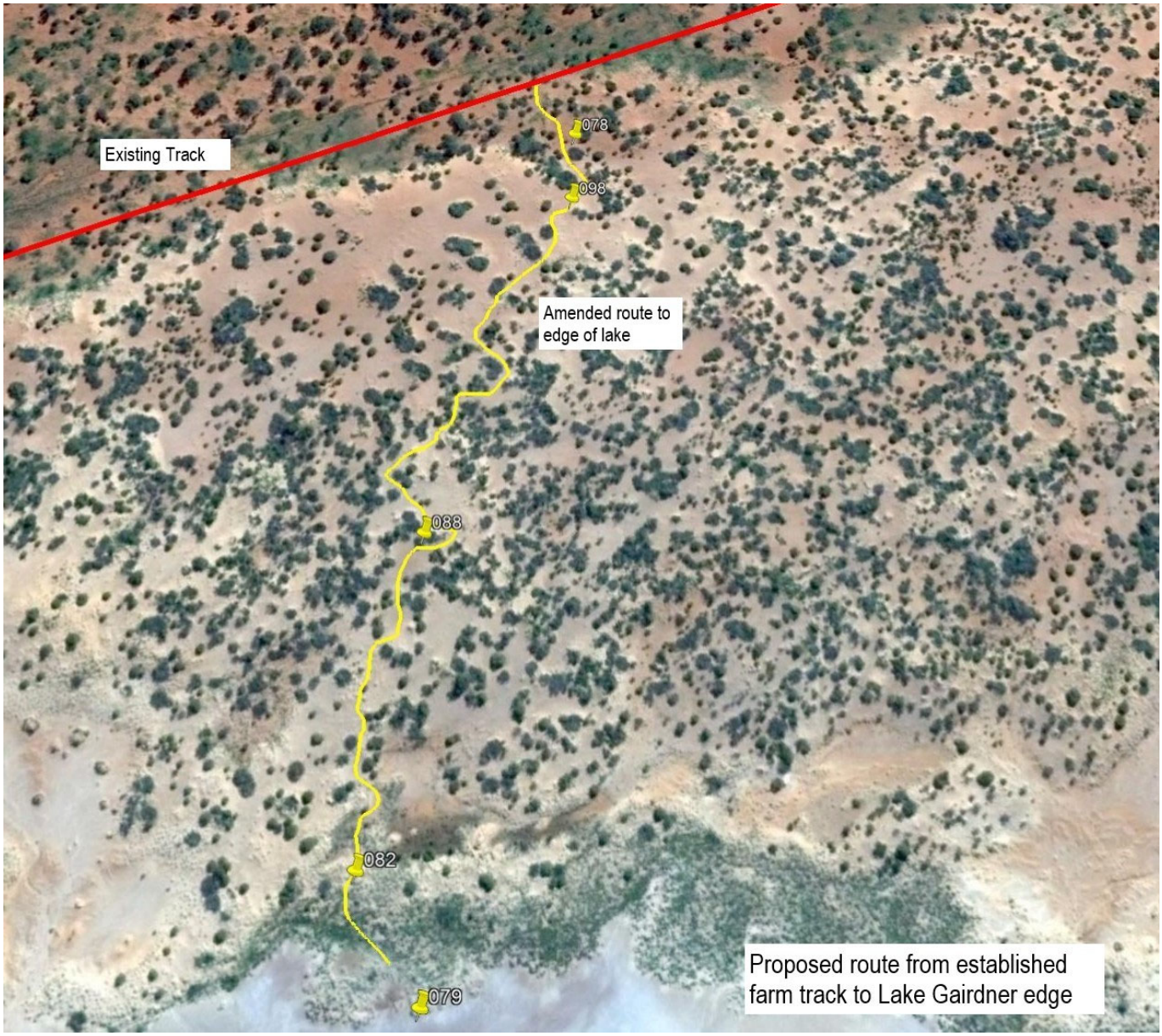
Location 2 – “400 Access”

Location 2 – “400 Access”

The above images were taken at Location 2- “400 Access” looking towards the first drilling hole after evaluating the proposed 400m route.

The route

The new route surveyed by Adam Ainsworth on the 17th March 2020 can be seen in the picture below (Map 3). The route has taken into account the Elders recommendations to avoid open dune areas but at the same time limit disruption to foliage and fauna in the area.
Some of the route follows the original survey path recorded by Dr Can Yin and these tyre tracks can be sometimes seen in the following photographs.
The marker numbers on the map reference photographs as follows:
Picture 1: - Location 078 looking from the fence line up the dunes towards the lake.
Picture 2: - Location 098 looking towards the fence line at the top of the dunes.
Picture 3: - Location 088 looking uphill to the fence line.
Picture 4: -Location 088 looking downhill towards the lake.
Picture 5: - Location 082 looking towards the fence line.
Picture 6: - Location 082 looking towards the lake.
Picture 7: - Location 079 looking towards the lake.
Picture 8: - Location 079 looking towards the fence line up a gentle slope.
The photographs give a clear indication that the amended route through the dunes avoids more open dune spaces that were a point of discussion with the GRAC elders.



Map 3, The amended route to edge of lake.

Picture 1

Picture 2

Picture 3

Picture 4

Picture 5

Picture 6

Picture 7

Picture 8

Conclusions

The GRAC Elders approved all the drill holes inside Lake Gairdner listed on Map 2.

The amended route onto Lake Gairdner addresses all the concerns brought up by the Elders visit to the area. As previously mentioned, the route on the 400 access will be covered with track mats and conveyor belt to reduce the erosion of the surface where required to a minimum.

Second inspection

Time: January 26, 2024

Venue: Laydown 3, Laydown 4 and the area between them.

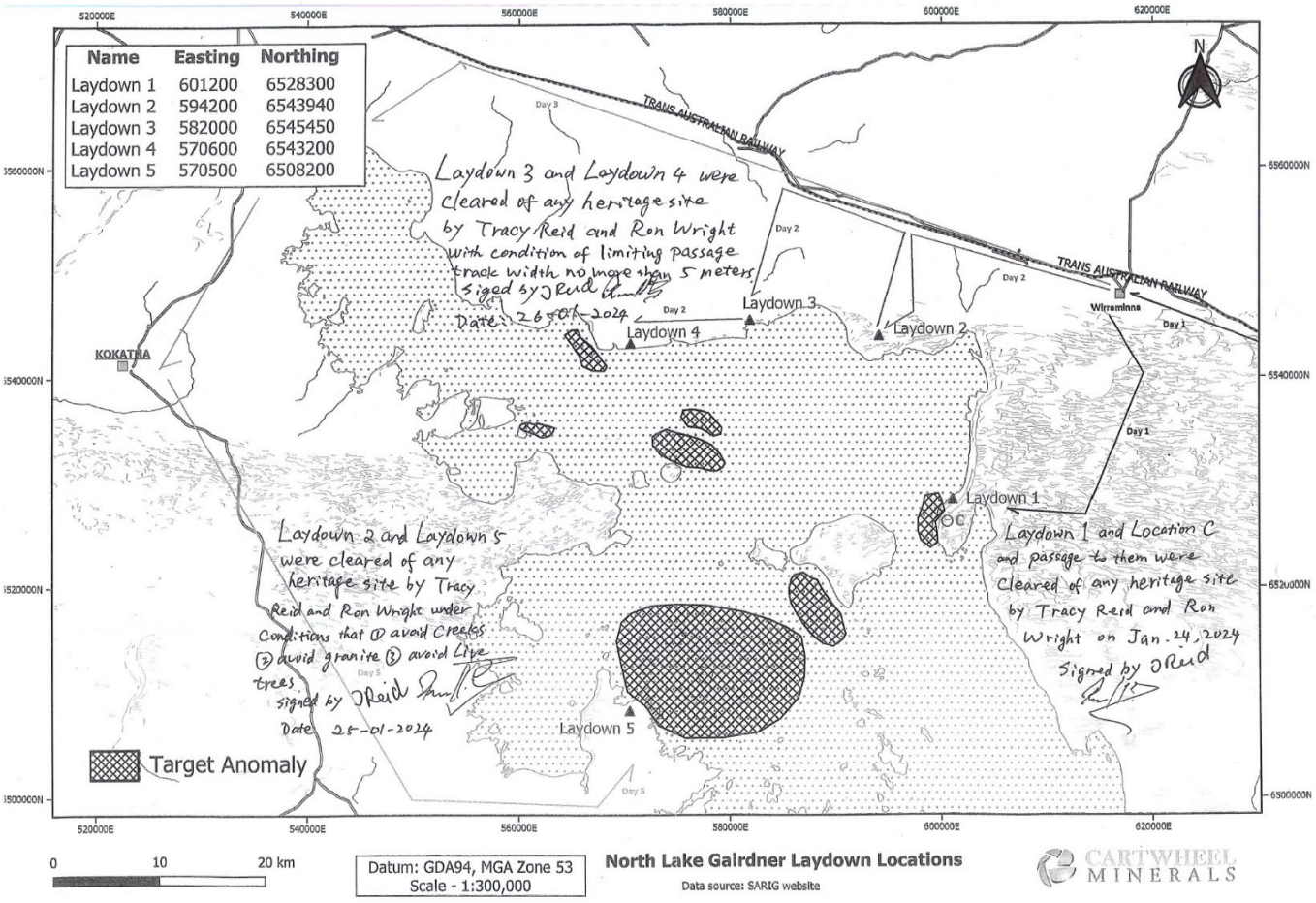
Aboriginal Representatives:

Tracy Reid and Ron Wright from GRAC/Kokatha.

Cartwheel Minerals Personnel:

Can Yin and Mitch Toft.

Any Concern: No.



Map 3, Locations of January 2024 heritage inspection with acknowledgement from the two Aboriginal monitors.

Survey Summary:

On January 24, 2024, the two GRAC/Kokatha monitors inspected Laydown 1. They declared there is no heritage site in this location and along the access route.
On January 25, the two GRAC/Kokatha monitors inspected Laydown 2 and Laydown 5. They declared there is no heritage site in these locations and along the access route.
On January 26, the two GRAC/Kokatha monitors inspected Laydown 3 and Laydown 4. They declared there is no heritage site in these locations and along the access route.
The two GRAC/Kokatha monitors signed on the map where they have inspected and cleared of any heritage issue.

Photos of the second survey

Photo 1, Landscape at Laydown 3 near the entrance to Cobalt Cove target.

Photo 2, Landscape at Laydown 4.

Conclusions

The Cobalt Cove drill target area has been surveyed by both GRAC Monitors and Kokatha Monitors on two different occasions. There was no finding related to any heritage issue. No concern was raised during and after both inspections. Therefore, it is justifiable that there is no need to conduct another round of heritage survey over the target area.

Radiation Management Plan

for Cartwheel Minerals Pty Ltd.

Contents

1 Abbreviations

Term	Definition
ACP	Authorised Contact Person
ALARA	As Low As Reasonably Achievable, social and economic circumstances being taken into account
AMR	Automatic Mutual Recognition
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency. This is a Commonwealth organisation who published codes of practice related to radiation safety. While the codes are adopted by state and territory acts, ARPANSA is not a state or territory regulator.
Bq	Becquerel, SI unit for radioactivity 1 Bq = 1 disintegration per second
Bq/cm^2	Unit for surface contamination unit, radioactivity per surface area
Bq/g	Unit for activity concentration in solids, radioactivity per mass of solid material
Bq/m^3	Unit for activity concentration in the air, radioactivity per volume, used for radon, RDP and LLAA
CGCP	Central Gawler Craton Project
EL	Exploration Licence
LLAA	Long-lived alpha activity
LSA	Low Specific Activity
NORM	Naturally Occurring Radioactive Material
OSL Badge	Optically Stimulated Luminescence Dosimeter, personal radiation badge, records time integrated radiation dose.
PPE	personal protection equipment
PIRSA	Department of Primary Industries and Resources South Australia
pXRF	Portable X-Ray Fluorescence
RDP	Radon decay products
RML	Radiation Management Licence
RMP	Radiation Management Plan
RSO	Radiation Safety Officer
SA EPA	South Australian Environment Protection Authority
Sv	Sievert, SI unit of equivalent and effective dose
uSv/h	Dose rate
Th	Thorium (240 ppm Th = 1 Bq/g Th232)
Th-nat	Th232 and its decay products in equilibrium
TI	Transport Index, max dose rate in uSv/h measured at one meter from a package, divided by 10
U	Uranium (80 ppm U = 1 Bq/g U238)
U-nat	U238 and its decay products in equilibrium
XRF	X-Ray Fluorescence

Summary

This Radiation Management Plan (RMP) has been prepared by Cartwheel Minerals, for its exploration activities. Compliance with this plan will ensure that radiation exposure to employees and contractors is minimised and that radioactive waste is managed to minimise environmental impact.

Nearly all the proposed drilling sites of Central Gawler Craton Project (CGCP) will be conducted within or bordering the three lakes of Lake Gairdner National Park. The drilling cores obtained to date have contained minute traces of radioactive minerals (less than 10 ppm uranium, or 0.13 Bq/g U-nat). However, should radioactive material (80 ppm U or 1 Bq/g) be encountered during our future drilling operations, we would expect that it would be no more than the levels encountered at Olympic Dam and Carrapateena.

Since the extent of radioactive minerals within the subsurface of the lakes is unknown, Cartwheel Minerals geologists will analyse all core and chips on site. In the event that future drilling intercepts high grade uranium mineralisation, the drilling program will be placed on hold, so that the monitoring program detailed in this RMP can be implemented.

Because the remoteness of the drilling sites, external exposure of members of the public to radiation during exploration activities is close to nil. Any high content of radioactive materials will be quarantined, safely stored and transported to our laboratory in Adelaide. The core samples will be assessed and if required an application to be a registered facility will be submitted.

1 Introduction

Cartwheel Minerals may encounter Naturally Occurring Radioactive Material (NORM) during exploration activities. Cartwheel Minerals also owns portable X-Ray Fluorescence analysis units (pXRF), which produce ionising radiation. An XRF analyser uses ionising radiation (X-ray) to identify elemental composition of materials.

This document is applicable to all sources of ionising radiation covered under the Cartwheel Minerals authority as well as any other ionising radiation sealed source/apparatus that may be operated or brought onto the site by a subcontractor.

The RMP sets out the responsibilities of Cartwheel Minerals, the Radiation Safety Officer (RSO), Assistant RSOs, staff and contractors while using sources of radiation for which Cartwheel Minerals is responsible. The RMP includes legal obligations which staff and contractors using sources of radiation need to be aware of. All persons who use sources of radiation must be familiar with, and comply with the requirements of, this RMP.

The intent of this document is to ensure the company meets all of its regulatory obligations for the management of Naturally Occurring Radioactive Material (NORM) and for the use of portable XRF analyser. This RMP contains policies and procedures designed to establish and maintain safe working conditions for staff, and to minimise radiological risks to the public and the environment.

This Management Plan must be read in conjunction with the working rules and safe work procedures listed in Appendix A and Appendix B.

The RMP sets out the responsibilities of Cartwheel Minerals, the Radiation Safety Officer (RSO), and staff while handling NORM or using ionising radiation equipment for which Cartwheel Minerals is responsible.

The RMP includes legal obligations which workers handling NORM and using pXRF units need to be aware of. All persons who handle NORM and use a pXRF must be familiar with this RMP, and all radiation practices involving the use of the equipment must be conducted in accordance with this RMP.

This RMP fulfils the legal requirements imposed by South Australian legislation[1, 2] and relevant Codes of Practice, Codes of compliance and Guidelines.

The purpose of this plan is to provide a basic understanding of the nature of radiation hazards associated with exploration for radioactive minerals and provide a systematic approach to managing those hazards to ensure compliance with current standards and regulatory requirements.

1.1 Cartwheel Minerals

Cartwheel Minerals is a mineral exploration and technology company which has held several mineral exploration projects in South Australia.

The company's address is detailed below:

Cartwheel Minerals
5 Mais Street
Brompton SA 5007
Phone +61 (8) 8346 8825

1.2 Description of Exploration Activities

Exploration activities may include any or all of the following:

- Drilling;
- Down hole geophysical logging;
- Analysis of historical samples;
- Collection of rock samples (core, sediments, chips);
- Collection of soil samples;
- XRF analysis of samples;
- Trenching; and
- Various ground geophysical survey techniques (e.g. magnetic, gravity,…).

Depending on the style and depth of target, drilling types will vary. These include but are not limited to:

- Rotary Mud;
- Reverse Circulation (RC);
- Rotary Air Blast (RAB);
- Diamond Drilling (coring); and
- Air Core.

All activities will involve some form of sample collection, of which procedures for the handling, storage, transport and final disposal are all described later in this document. Procedures for the usage of the XRF analyser are also provided in this document.

[1] South Australian Government Radiation Protection and Control Act 2021

[2] South Australia Government Radiation Protection and Control (Ionising Radiation) Regulations 2022

1.3 Work group details

On each drilling exploration site a maximum of three work groups will be set up:

- Drillers & support crew;
- Geologists & Field Assistants; and
- Geophysical Loggers.

The number of personnel in each work group will depend upon the types and complexity of activities being undertaken. Typically, a single drill rig operation will have 2-3 drillers and support crew, one geologist, one field assistant. Geophysical loggers may be required.

Ground survey crew (geophysical investigation) vary in size, depending on the technique applied.

Exploration personnel generally work twelve-hour shifts. Rosters vary depending on the requirements of the program and the arrangements of the drilling contractor. The total length of the exploration campaign is dependent on a number of variables and cannot be accurately estimated.

1.4 Authority

This Plan can only be altered with the approval of the Radiation Safety Officer (RSO).

1.5 Document Control

Cartwheel Minerals seeks to continuously improve work practices as soon as improvements are identified and validated. The RMP will therefore be under constant review, and staff will be kept up to date with any changes (in addition to periodic refresher training).

The RMP will be reviewed at least once every 2 years, and relevant staff will be kept up-to-date with any changes.

Controlled copies may be obtained on the Intranet. Copies are only valid on the day of printing.

Any changes made to this document shall be communicated to the South Australian Environment Protection Authority (SA EPA) and any changes directed by the SA EPA shall be included.

2 Premises, radiation sources and radiation risks

2.1 Premises

Cartwheel Minerals operates within exploration tenements in South Australia (see Figure 1). To avoid unnecessary regulation of the low radiation risk activities arising from exploration, this RMP describes what radiation safety measures would be applied to activities currently managed on Exploration Leases 6017, 6095, 6104, 6239, 6520, 6534, 6535, 6536, 6537, 6538, 6539 where possible radioactive mineralisation could be encountered.

The RMP also describes what measures would be applied regarding those exploration related activities conducted outside of the above mentioned leases.

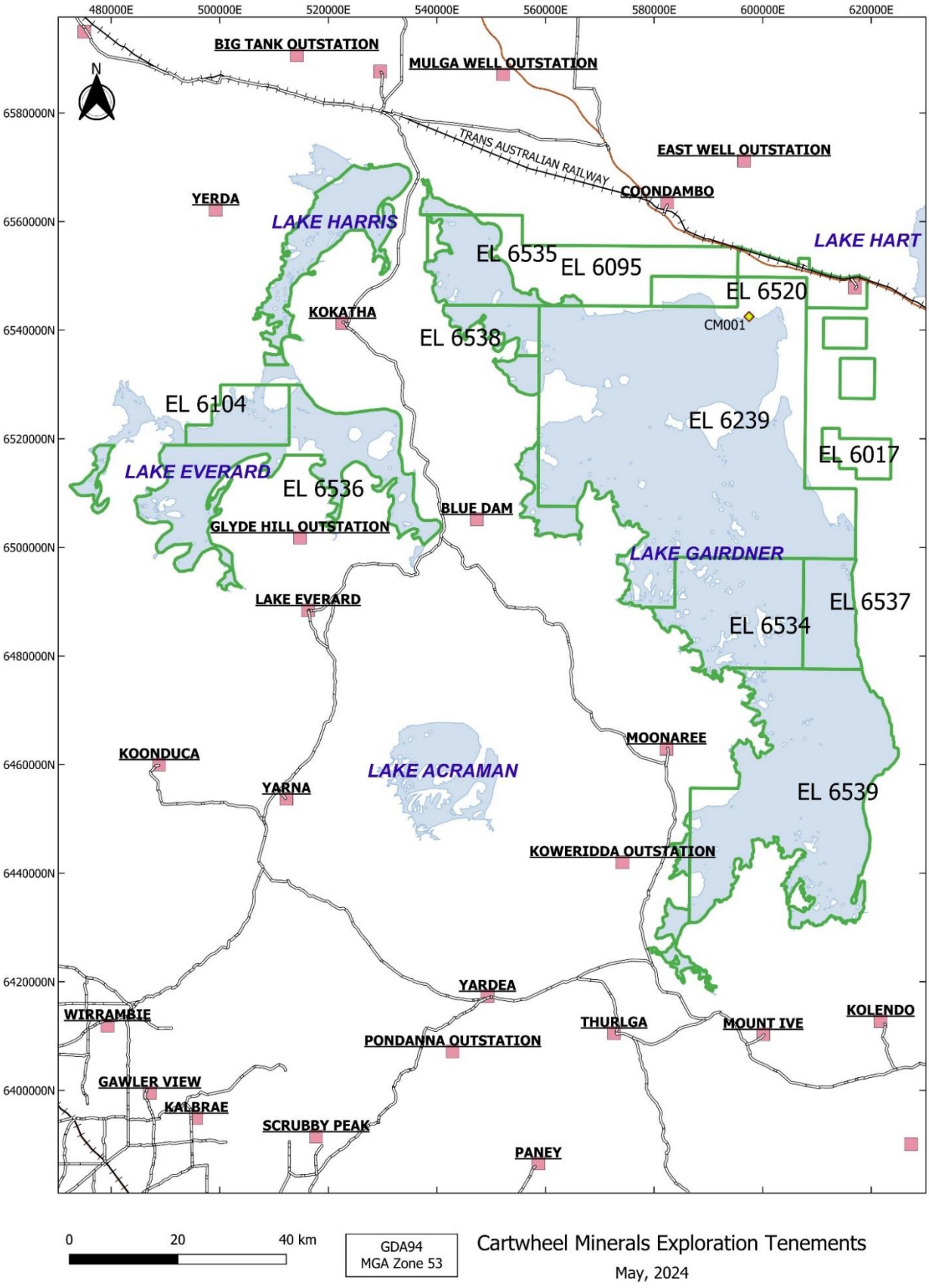


Figure 1: Cartwheel Minerals exploration tenements in SA.

Samples will be handled, analysed and temporarily stored in the field. They may temporarily transit in our laboratories in Netley and Brompton. The addresses are detailed below:

8 Transport Avenue
Netley SA 5037

5 Mais Street
Brompton SA 5007

Radioactive samples will be assessed at either of the above addresses and, if required, an application will be submitted to be a registered facility. .

2.2 Devices

Cartwheel Minerals owns portable XRF units. Details of the units appear in Appendix C.

The units in operation are registered with the SA EPA. Units kept in stock are listed on the register.

While the pXRF will be primarily used at the address above, it may be deployed in other areas for exploration activities and field work. A movement register will be updated to capture any temporary change of location (Appendix C).

Any changes of the pXRF (make, model, serial number) will be notified using the SA EPA forms within 7 days of the change.

2.3 Sources and pathways of radiation exposure

Much of the material encountered during exploration activities is not mineralised and therefore does not contain radioactive materials in quantities significant enough to present a risk to workers or the environment. If mineralised zones are discovered, the main radioactive materials encountered include NORM that contains varying concentrations of uranium and thorium.

South Australia defines radioactive material as material containing 1 Bq/g of uranium or thorium or a total activity of 1000 Bq of uranium and thorium.

Depending upon the exploration activity being conducted, NORM may be present in various forms:

- Solid core material, cuttings and samples;
- Airborne dusts from drilling;
- Airborne radon gas (Rn222, commonly referred to as radon and Rn220, called thoron) and their decay products (RDP);
- Groundwater containing natural radioactivity; and
- Contaminated fluids from drilling, coring and related activities.

Further to NORM, portable XRF analysers are used on the field to conduct initial analysis of element concentrations. The XRF analysers and associated X-rays are therefore also considered as a radiation source.

Radiation exposure only occurs when there is a pathway or exposure route between NORM or X-ray and a person. There are two general types of exposure; external and internal exposure.

- **External exposure** occurs when the source of radiation is outside of the body. An example is the

exposure received during a medical X-ray.

- **Internal exposure** arises from radioactive material inside the body. The most common ways that radioactive materials enter the body are by inhalation or ingestion (swallowing).

2.3.1 External Gamma Radiation Exposures

Possible pathways for external gamma radiation exposure from exploration involving NORM include:

- Sampling from an outcropping mineralisation;
- Handling of large quantities of high-grade core samples and drill cuttings;
- Working inside or near a core storage area containing radioactive material;
- Using the XRF analyser; and
- Keeping radioactive core samples in occupied areas.

2.3.2 Internal Exposures to Inhaled or Ingested Dust Containing NORM

Possible pathways for the inhalation or ingestion of mineralised ore dust during exploration involving NORM include:

- Inhalation of dusts created from percussion drilling through mineralised zones;
- Inhalation of dust from cutting of core samples;
- Ingestion of radioactive materials or inhalation of dust through handling of core samples and drill cuttings; and
- Ingestion of radioactive materials through poor personal hygiene (for example, not washing hands after handling radioactive samples).

2.3.3 Internal Exposures to Inhaled Radon or Thoron and their Decay Products

The only pathway of any significance for the inhalation of radon or thoron and their decay products (RDP) during exploration involving NORM is working inside a poorly ventilated field storage shed/container or a room containing mineralised samples.

2.3.4 Environmental Contamination

Possible pathways for environmental contamination during exploration involving NORM include:

- Spill of radioactive waste (cuttings, dust, core cutting waste);
- Incident during the transport of high-grade samples; and
- Release and transport of contaminated equipment out of the site.

2.4 Radiation risk

Everyone is constantly exposed to natural ionising radiation from the environment. Sources of natural ionising radiation include the ground, building materials, cosmic rays, food, water, and air.

In Australia, the average natural background dose is approximately 1.5 mSv per year. The world average is approximately 2.5 mSv per year. Occupational exposures will cause additional exposure above background levels.

It is well established that exposure to high doses of ionising radiation can cause deterministic effects, such as skin burns and cataracts, and stochastic effects, specifically cancer.

At doses below 100 mSv there has been no measurable statistical increase in rates of stochastic effects above background rates of disease in population studies. It is possible that there is a risk at lower doses that studies

cannot measure. To be conservative, radiation regulation has adopted a 'linear no-threshold' (LNT) approach, whereby known risks at high doses are extrapolated so that any radiation dose is deemed to carry some cancer risk.

In order to control the potential hazards from exposure to radiation, radiation dose limits for radiation workers and the public have been set internationally and legislated in Australia and other countries. These appear in the ARPANSA Code[3], and have been adopted by South Australia. The limits are 20 mSv per year for radiation workers, and 1 mSv per year for non-radiation workers. Note that these limits are in addition to the annual background radiation dose of 1.5 mSv.

It is expected that by implementing the controls within this document doses will be maintained below 1 mSv above background on Cartwheel Minerals exploration sites. At dose levels below the regulated limits there are no deterministic effects and any increase in stochastic effects are too low to measure against background rates of disease.

3 Responsibilities

3.1 Cartwheel Minerals

The Responsible Person is the conventional phrase for the person that has ultimate legal responsibility for complying with legislation, and ensuring requirements of the RMP are followed by staff and contractors. Cartwheel Minerals has nominated the person listed in Table 1 to act in the capacity of the Responsible Person:

Table 1: Responsible Person

Name	Role	Contact (Mobile)	Email
Mitchell Toft	Geologist	0466 381 930	mitchell.toft@cartwheelresources.com.au

Responsible Person responsibilities include:

- General compliance with South Australian legislation that relates to radiation safety, including renewal of licences and registrations;
- Maintaining workers exposures below 20 mSv and public exposures below 1 mSv;
- Ensuring the radiation devices and radiation safety equipment remain in good working order;
- Ensuring that workers are informed of any faults with equipment;
- Ensuring that any faults with equipment are rectified as soon as practicable;
- Ensuring the RSO and assistant RSOs have appropriate knowledge, skills, time and equipment to perform their responsibilities;
- Ensuring that radiation workers are appropriately trained in radiation safety, are informed of the name of the RSO, the location of the RMP, and any changes to Safe Work Procedures;
- Ensuring that when a source is disposed of or transferred, approval has been granted by the SA EPA prior to its relocation;
- Ensuring the RMP is reviewed at the stated interval;
- Making available all information requested by the SA EPA in a timely manner;
- Ensuring any radiation events are investigated, and the RMP is modified (if necessary) to prevent a reoccurrence of the event;

[3] ARPANSA RPS C-1 (Rev. 1) Radiation Protection Series C-1 (Rev. 1) - Code for Radiation Protection in Planned Exposure Situations, Australian Radiation Protection and Nuclear Safety Agency, 2020

- Ensuring records of training, incident investigations, and documentation from the SA EPA are maintained in an accessible location (intranet); and
- Ensuring that notifiable incidents are reported in accordance with Table 2.

Table 2: Notifiable incidents

Notifiable radiation incidents Reporting period (Reg 98)	Schedule 3 Clause	Comment
7 days	4	Transport Loss or damage of DG7 package during transport or transit No documentation/placards/labels
	6	Damage Damage to radiation apparatus or sealed radioactive source Malfunctioning of radiation apparatus or sealed radioactive source
24 hours	3	Loss or theft of source Apparatus or radioactive material mat that is NOT security enhanced
Immediately	2	Exposures Radiation injury Exposures that may lead to a dose above 20 mSv/y to a worker, or more than 1 mSv/y to a member of the public
	5	Discharges Unintentional or unauthorised discharges of radioactive material into the environment
	7	Contamination Contamination resulting from the spillage of more than 100 times the exempt activity

3.2 Radiation Safety Officer

The RSO is the conventional phrase for the person whom the Responsible Person asks to ensure the requirements of the RMP are fulfilled. The RSO also provides advice to radiation workers in relation to use of radiation devices. The RSO is supported by assistant RSOs who have been trained and can assist with all RSO tasks.

Cartwheel Minerals has nominated the persons listed in Table 3 to act in the capacity of the RSO and assistant RSO.

Table 3: RSO and assistant RSO

Name	Role	Contact (Mobile)	Email
Can Yin	RSO	0417 082 958	can.yin@cartwheelminerals.com.au
Linde Li	Assistant RSO	0410 774 922	linda@cartwheelminerals.com.au

RSO responsibilities include:

- Advising Cartwheel Minerals on how to remain compliant with the requirements of relevant legislation,

including that appropriate radiation licences and registrations are held by Cartwheel Minerals.
- Advising Cartwheel Minerals on any radiation safety updates that are occurring within the State and nationally that relate to the pXRF.
- Ensuring this RMP, safe work procedures and working rules remains up to date.
- Assisting with the investigation of incidents and emergencies, and reporting as necessary to the relevant regulator.
- Providing support to Cartwheel Minerals and staff on any radiation safety issues that may arise from time to time, including arranging radiation awareness training.
- Ensure the Radiation Safety Folder is up to date.
- Ensuring staff that need to be issued with personal monitors are provided with them, and that personal doses reported are within acceptable limits.
- Ensuring dosimeters are exchanged as required, and the periodic return and distribution of personal dosimeters.
- Updating and maintaining dosimetry records.

3.3 Worker

Radiation workers are staff and contractors that handle NORM or use radiation devices in the course of work activities at Cartwheel Minerals premises or exploration tenements. Radiation workers may hold a radiation licence (as required for using borehole logging equipment or portable XRF), or they may be supervised by a licensed person (as allowed for fully enclosed XRF). A list of licensed personnel is maintained in the Licence Register (Appendix D).

Radiation worker responsibilities include:
- Ensuring they operate within their licence conditions;
- Ensuring procedures are followed;
- Completing radiation awareness training;
- Reporting radiation incidents;
- Reporting defects or faults that could lead to an incident;
- Notify pregnancy to Cartwheel Minerals; and
- Unless trained and authorised to do so, not attempting to use, repair or adjust:
    - XRF or XRD units;
    - bore hole logging equipment; and
    - other radiation devices containing sealed sources (fixed or portable).

4 Contractual arrangements

This document addresses predominantly the management of radiation practices associated with the possession and handling of NORM and XRF as listed in the Cartwheel Minerals Radiation Management Licence (RML) issued by the SA EPA.

This document does not cover specific safety relating to externally registered sources of radiation. Specialist contractors must submit their radiation management plan and licence conditions to Cartwheel Minerals' RSO. This includes all work activities which may require ionising radiation sources to be brought onto one of Cartwheel Minerals' site and are not listed on Cartwheel Minerals' RML (such as borehole logging).

Only trained employees or contractors can package NORM for transport.

Portable XRF must only be operated by licenced employees or contractors. XRF servicing and maintenance must only be carried out by a licenced employee or contractor.

Contractors who conduct work at any Cartwheel Minerals site, which requires the use of a sealed ionising radiation source or ionising radiation apparatus not listed under Cartwheel Minerals' Management Licence must also be aware of and comply with all radiation safety measures. Contractors may mobilise for such purposes as, borehole logging, non-destructive testing, operation of portable moisture gauges etc. Such contractors must provide their RMP, work procedures and licences (RML and user licences) for review and approval by Cartwheel Minerals' RSO.

The RSO or assistant RSOs conduct checks to ensure employees and contractors hold an appropriate radiation licence in South Australia, or their home State (in which case verify that the SA EPA has been notified of their intention to work under Automatic Mutual Recognition (AMR)).

5 Competency and training

In South Australia, a user licence is required for:

- the handling of NORM with a dose rate of more than 5 uSv/h, measured at a distance of 10 cm from its surface[4].
- A user licence is required for the operation of pXRF units.

Workers who use or handle NORM in the course of the exploration activities authorised by the Management Licence issued to Cartwheel Minerals do not require to maintain a user licence.

All workers and contractors working in this project will be inducted and trained regarding the radiation aspects of their work and in the precautions necessary to control their exposure to radiation. Training of all personnel in the principles of radiation protection would be undertaken as part of the site induction with refresher training conducted annually.

Signed records of inductions would be kept by Cartwheel Minerals. Additional radiation safety briefings would be given as toolbox meeting topics, to reinforce personal monitoring, dust control, spillage control and site clearance control measures. The dates of these safety briefings would be recorded along with identifying information on attendees

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

- they are undergoing training in the operation of a pXRF and they are under the direct supervision of a licenced person;
- they are operating a pXRF apparatus set up as a benchtop interlocked enclosure workstation under the following conditions:
    - the pXRF has had its software programmed so that the pXRF is only capable of operation when installed in the enclosure workstation;
    - interlocked barriers are in place;

[4] WISE-Uranium modelling suggests that such a dose rate would be measured 10 cm from a 500 mm H × 35 mm Ø volume of ore containing 2,400 ppm (30 Bq/g U-nat)

- the worker operates the XRF under the indirect supervision of a licenced radiation person; and
- the pXRF registration conditions restrict the pXRF to benchtop operation.

Refresher training should be conducted at least once a year for all personnel. A record of the training is maintained by the Site RSO.

6 Supervision of radiation workers

Unlicenced staff can handle NORM and operate a pXRF set up in a benchtop.

RSO and assistant RSO receive relevant NORM and XRF training and provide indirect supervision to all workers.

Indirect supervision means staff only perform tasks according to standard operating procedures that they have been deemed competent in the RSO, assistant RSO or licenced person are contactable. Any activity that deviates from the standard operating procedure will be risk assessed with consultation and sign off from the RSO and assistant RSO.

Workers are only permitted to handle NORM on the basis that;
- They have completed radiation safety awareness training;
- They follow the SWP for the handling of NORM; and
- They are able to contact the RSO or assistant RSO in the event of an abnormal occurrence.

An RSO and assistant RSO is contactable by phone at all times.

7 Quality assurance programs and risk assessments

This Section of the RMP details the requirements for monitoring personal doses to staff, and periodic surveys of the sources of radiation.

In this section a number of control measures are described that will ensure radiation exposure to workers as a result of exploration activities are minimised.

7.1 Controls for NORM

Much of the material encountered during exploration activities will not be radioactive. To help workers determine when radioactive material is present, a survey meter and a contamination meter will be provided. The XRF analysis will also assist in quantifying the uranium and thorium content and estimate the radioactivity concentration in samples.

The survey meter can detect external exposure. It will be used to check geological samples. While drilling, it may be placed close to the sample collection facility, alerting field staff for the need to implement radiation control measures.

The contamination meter can detect radioactive contamination on surfaces (such as ground, equipment surfaces, furniture surfaces in office spaces or crib rooms). It will be used to check that surfaces are free from contamination by dust containing NORM.

7.1.1 External Gamma Radiation Exposures

The basic principles for radiation protection from external sources will be applied:

- Minimise TIME spent near a source;
- Maximise the DISTANCE from a source; and
- Construct SHIELDING between a source and workers.

In the context of exploration activities, specific control measures will include:

- Pre-clearance surveys to identify mineralised outcrops;
- Mineralised core and grab samples will be kept in one central storage area that is clearly sign posted and away from general occupied areas;
- Strongly radioactive samples (>10 uSv/h on contact) will be identified and will be stored in a drill rod secured with end caps and placed in a designated area at the rear of the facility (low occupancy area),
- Radioactive samples will not be kept in offices or other occupied areas.

7.1.2 Internal Exposures to Inhaled or Ingested Ore Dust

Wherever possible the generation of airborne ore dust will be minimised through the use of water and other dust suppression techniques. In addition, the following control measures will be implemented:

- When drilling through higher grade mineralised zones, whenever possible workers will be positioned up-wind from any dust generation and wear respiratory protection;
- Where practicable dust suppression controls will be used on drill rigs;
- Respiratory protection will be used when clearing drill pads with identified mineralised outcroppings;
- Respiratory protection will be used when handling dry drill cuttings if there is a dust risk; and
- Wet cutting methods will be used wherever possible.

Good personal hygiene practices are essential to ensure the ingestion of radioactive materials is minimised and that doses are kept As Low As Reasonably Achievable (ALARA). Personal hygiene control measures that will be actively implemented at each exploration site include:

- Use of gloves when handling radioactive samples;
- Washing of hands and face before eating, drinking or smoking;
- Washing of hands and face and other exposed skin surfaces immediately after handling radioactive samples;
- Wearing of designated field clothing;
- Showering and changing at the end of each day, especially before entering communal areas;
- Regular cleaning of work areas used to handle samples (with minimal dust generation); and
- Use of plastic bags for radioactive samples to minimise the spread of contamination.

7.1.3 Internal Exposures to Inhaled RDP

Radon and thoron decay products can only present an exposure risk if they are allowed to accumulate in a confined area or location with little or no air movement. Open spaces, natural convection currents and wind all ensure that exposure is minimised. For situations where this is not the case additional control measures will be required.

The following practices will be undertaken at all exploration sites to ensure exposure to RDP is minimised:

- Suitable ventilation procedures will be developed for field & central core storage facilities;
- Where ore has been stored in containers or poorly ventilated stores, doors will be left wide open for at least 10 minutes before staff can enter the area; and
- Radioactive samples will not be stored in office areas.

7.1.4 Environmental Contamination

NORM may represent a risk to the environment if incidents occur during the transport of samples containing radioactive ore and during the release and subsequent transport of contaminated items out of site. Samples will be handled and transported in accordance with the Transportation of Geological Field Samples Containing Ore procedure (Appendix E).

The following equipment will be monitored in accordance with clearance procedures (Appendix F):

- Equipment mobilised to site (ensuring there is no surface contamination legacy); and
- Any equipment that has come in contact with significant quantities of radioactive material (including drill rigs and associated equipment before site release, bench tops and other surfaces in laboratory)

The radiation waste management is discussed in chapter 9 together with mitigation strategies for each pathway.

7.1.5 Respiratory Protection Factors

Respiratory protection can be used to reduce inhalation of particulates.

Table 5 outlines the protection factors for a range of respirators, as per the Australian Standard. For tight fitting respirators the protection factor is only applicable if the user is clean shaven.

Where dust cannot be eliminated, a respirator must be worn to reduce particulate inhalation when dust is present, or is likely to be present. When cutting core a respirator must be worn with a minimum protection factor based on previous results (Table 4). Where previous results are not available or not applicable the highest protection factor must be worn from Table 4. For all other dust exposures, a respirator with Protection Factor of 10 or higher must be worn.

Table 4 Minimum Protection Factor

Exposure	Minimum Protection Factor
< 2 uSv/h	10
> 2 uSv/h	50

Table 5 Minimum Protection Factors for Respirator Types

Respirator Type	Clean Shaven?	Filter Type	Filter Class	Minimum Protection Factors*
Disposable Respirator	Yes	Flat fold respirator (P2) with valve	P2	10
Half Face Respirator	Yes	Filter With P2 Particulate attachment	P2	10
		PAPR P2 Filter	P2	10
		With external supplied airline	Airline	50
Full Face Respirator	Yes	Combination Filter With P2	P2	50
		Combination Filter With P3	P3	100
		PAPR P2 Filter	P2	50
		PAPR P3 Filter	P3	100+
		With external supplied airline	Airline	100+
Head covering	No	PAPR P2 filter	P2	50
		PAPR P3 filter	P3	50
		With external supplied airline	Airline	100+

7.2 Controls for XRF

The use of pXRF is subject to Working Rules. The Working Rules appear in this RMP (Appendix A). A printed copy is normally located near or with the pXRF, but as the printed copy is not controlled, the authorised contact person will ensure that the printed copy version matches the controlled (electronic) version.

7.2.1 Access control

A secure pin code is required to energise and operate the pXRF.

7.2.2 Housing

The pXRF is constructed so that housing components offer adequate shielding and cannot be removed.

7.2.3 Interlocks and lights

The pXRF has a number of safety features and interlocks including:

- warning lights;
- warning sign;
- trigger;
- proximity interlock;
- low counts interlock; and
- Password protection.

7.2.4 Labels and signs

The pXRF must be durably marked in a visible location with a label incorporating the radiation symbol and the word caution or warning. No additional signage is required when operating in the field.

Figure 2: Examples of an entrance sign (left) and portable X-ray device label (right).

A warning sign must be placed at each entrance to any laboratory or room within which an operable pXRF is operated in benchtop mode.

7.3 Radiation dose monitoring of staff

In general, any person who is occupationally exposed to radiation must be monitored. For workers who would routinely receive less than 1 mSv per year, personal dose monitoring is not required (Regulation 86 [2]). Workers handling NORM at low activity concentration, and operating a portable XRF who follow the Safe Work Procedures will receive less than 1 mSv per year from external radiation, and therefore are not monitored, unless:

- significant mineralisation (5 metres or more) above 80 ppm U or 240 ppm Th is encountered in a drill hole;
- Dose rates above 1 uSv/h are measured one metre away from geological samples (core, cuttings, chips); or
- Surveys carried out on the XRF return dose rates above 2 uSv/h to the operator.

In such cases, radiation monitoring at exploration sites will include:

- External gamma and beta exposure: Optically Stimulated Luminescence (OSL) badges will be issued to personnel or areas for assessment of the following work groups:
    - Geologists & Field assistants;
    - Drillers & Drill Offsiders; and
    - Geophysical loggers.
- Personal monitoring is required for pXRF operators in South Australia. Personal dose monitoring of staff is conducted by Landauer or ARPANSA, organisations approved by the SA EPA. Users must return the dosimeters to the authorised contact person every 3 months. A register is maintained for each quarter (Appendix G);
- A control dosimeter must be stored in a location where it will detect background radiation only (for example, in an office space away from NORM and the XRF, but not in a metal box). The monitors and control are sent to the dosimetry organisation, and the results are reviewed by the authorised contact person. Personal monitoring records are kept in the Radiation Safety Folder. Any abnormal readings are investigated by the authorised contact person;
- The dosimetry reports are sent automatically to the RSO every quarter. The RSO shall review the dosimetry records as soon as they are received and save a copy of the results in the Radiation Safety Folder;

- External gamma exposure: the monitoring of all core, samples and drill cuttings will be carried out with a calibrated survey meter. Any material with a contact dose rate above 2 uSv/h will be analysed using XRF to determine uranium concentration. Material that contains 1000 ppm uranium, 2400 ppm thorium or higher will be identified as having elevated radioactivity and stored away from occupied locations;
- Pre-clearance gamma surveys of drill pads will be completed to identify mineralised outcrops;
- *NORM inhalation*: dust monitoring will be conducted during drilling or core cutting operations that may generate dust. A calibrated dust pump (3 L/min) with MCE filter (0.8um) will be operated in a location that represents the quality of air that workers are breathing. Pumps will be operated for at least 5 hours to give good minimum detection limits of airborne NORM. The filters will be counted by a laboratory in an alpha drawer assembly, with the results converted to dose rate. Monitoring frequency will be determined by the RSO based on mineralisation levels and previous monitoring data.
- *RDP inhalation:* radon and radon decay products will be controlled through the use of ventilation (i.e. work will be conducted outdoors where possible). If work needs to be conducted in a poorly ventilated store, the store door must first be opened for at least 10 minutes. For tasks that will take longer than 1 hour to complete in the store, radon concentration will be measured. If radon concentrations are shown to be higher than 200 Bq/m^3, an RDP measurement will be conducted using the 5-3-5 Borak method so that dose rates to workers can be estimated;
- *NORM ingestion:* the monitoring of surfaces where dust containing NORM may have settled will be performed with a contamination meter. This includes equipment, surfaces in office spaces or communal areas such as crib rooms; and
- *Environmental NORM contamination:* the monitoring of equipment that has come in contact with significant quantities of radioactive material will be conducted at completion of works in accordance with clearance procedures.

It will be the responsibility of the RSO or assistant RSO to ensure all monitoring is conducted according to this program.

Radiation monitoring will only be conducted by appropriately trained personnel.

7.4 XRF Monitoring

To ensure safety features are working correctly XRF apparatus will have pre-start checks prior to each use. Unless there is a failure with the pre-start checks, a dose rate survey will be carried out every 6 months. Leakage radiation monitoring requires the use of a radiation survey meter that can detect a minimum of 30 keV X-rays. Measurements are taken on all sides of the apparatus, using a steel target. Radiation levels must be below 5 uSv/h at any accessible point 5 cm from any external surface. Leakage radiation monitoring must also occur following any repairs or maintenance to the apparatus.

It is recommended that when a pXRF is being used, safety interlocks and safety lights are checked on a daily basis, as part of the prestart safety checks.

Records of pre-delivery inspection and daily checks are kept in the Radiation Safety Folder.

If a fault or defect is discovered, the pXRF must be immediately de-energised and the fault or defect must be immediately reported to the authorised contact person. Cartwheel Minerals will notify all users of the pXRF of the fault or defect, and have the fault repaired as soon as practicable. The pXRF can be reused once repairs have been completed and the pXRF has been inspected by a competent person.

If the user of the XRF suspects unusual radiation fields being emitted by the device, the user must immediately switch the device off and report the incident to the authorised contact person. The pXRF can be reused once proposed repairs have been approved and the equipment has been inspected by a competent person.

Table 6 Minimum Protection Factor

Parameter	Method	Frequency
Pre-Start Checks	Check unit, signs and labels are in good condition and safety features (PIN code, interlocks, lights, control mechanism) are working.	Prior to operation
Radiation Monitoring	Leakage radiation survey on surface of housing with survey meter and formal inspection of safety features.	6 monthly
Gamma	OSL	Continuous to all personnel operating the XRF (if operator dose >2 uSv/h and >2 hour use per day)

7.5 Calibration

All radiation monitoring equipment will be calibrated annually or every two years. This calibration will be undertaken by an external service provider. In addition, routine maintenance and calibration checks will be performed on the instruments as required.

Calibrated radiation meters must be kept on site. The meter or meters are calibrated on

- Contamination (CPS) mode. A CPS threshold corresponding to 0.4 Bq/cm^2 alpha and beta is clearly labelled on the calibration sticker and used to establish clearance levels. The meter is calibrated every two years for contamination; and
- Survey (uSv/h) mode. The meter has sufficient sensitivity to accurately measure a range of photon energies between 30 and 1000 keV.

7.6 Special circumstances, pregnancy

The risk of detrimental effects from ionising radiation on a foetus may be higher than the risk to a worker, so the normal dose limit for a radiation worker (20 mSv) is reduced during pregnancy.

South Australian legislation requires the same level of protection for the foetus as for a member of the public, being 0.75 mSv to the abdomen during the term of pregnancy. The doses to workers handling NORM at low concentration and operating the XRF are typically indistinguishable from background and the risk to the foetus (if any) is expected to be very small.

The RSO must be informed of the pregnancy (this information is kept private and confidential) so that work practices can be re-evaluated for the remainder of the pregnancy if required. A note on the use and operation of the ionising radiation during pregnancy and breastfeeding is available.

7.7 Dose estimates

Exposure pathways that are relevant for exploration activities are via external exposure to gamma and beta radiation, and via the inhalation of long-lived alpha activity (LLAA) in dust. The use of XRF may contribute to the external exposure. Other exposure pathways (inhalation of radon decay products, ingestion etc) are not expected to be significant.

Doses are determined annually and reported in an annual radiation safety report. All employees are considered to have the same exposure profile and therefore will be assigned the same dose based on the assessment methodology outlined below.

7.7.1 Occupancy factors

Personnel may work according to a 14 day on 7 day off roster for 12 hours per day. This equates to approximately 2912 hours respectively worked per year. This does not consider any annual leave or other absences, which applies a level of conservatism to the dose assessment.

7.7.2 Gamma/beta dose

Gamma/beta dose at drilling sites is monitored on a quarterly basis using static OSLD monitor placed on drilling rigs. During periods where mineralised core is expected.

Results for area monitors are reported for a full quarter of 24 hour per day exposure, being 2190 hours. The reported dose received by the monitor is converted to a dose rate, which is then applied to the hours worked per year to determine an annual dose contribution from the gamma/beta exposure pathway.

Personal dosimeters will also be assigned to selected workers (geologists, drillers, field assistants) and to all users of pXRF. Their gamma/beta dose will be taken directly from their personal dosimeter without adding results from area monitors.

Dosimeters have a limit of detection. Any monitor returning a result that is less than the limit of detection will be assigned the value of the detection limit.

7.7.3 Inhalation dose (long lived radioactive dust)

Dose from the inhalation of long-lived radioactive dust is determined from the results of dust monitoring.

A dust monitor samples air at the premises, and the filter is analysed to determine the alpha activity concentration of the air that it has sampled, which is reported in Bq/m^3. Dose rate is determined from the alpha activity concentration using the following formula.

$$E_D = C \times Br \times DCF \times RPF \text{ (uSv/h)}$$

Where:
C = average alpha activity concentration (Bq/m^3)
Br = Breathing rate (1.2 m^3/h)
DCF = dose conversion factor (uSv/adps)
RPF = Respiratory Protection Factor[5]

[5] Respiratory Protection Factor as defined in ASNZ1915. Respiratory Protection Factor should only be applied if respirators are worn in accordance with the standard.

The dose conversion factor for ores varies depending on the type of material. For example, there will be different factors for uranium ore, heavy mineral sands or copper concentrate. DCF will be determined using ARPANSA[6] amended tables supplied spreadsheet with typical radionuclide ratios reported by elemental analysis and a radon retention factor of 70%.

The result is the dose rate from the inhalation of dust. This dose rate is then applied to the hours worked per year to determine an annual dose contribution from the dust inhalation pathway.

7.7.4 Annual Occupational Dose

The annual occupational dose is determined by summing dose contributions from all exposure pathways.

Annual Dose = X-ray/Gamma/beta dose + Inhalation Dose (long lived radioactive dust)

Radiation monitoring results and worker exposure records are available for inspection by the EPA.

8 Security of radiation devices

A register of XRF is maintained. Portable XRF will be stored in locked cupboards when not operating.

Radioactive Material will be logged in a sample register when placed in the temporary field store area. Samples will be returned to the site for disposal and the log updated to reflect the samples leaving the premises. All radioactive core samples will be assessed at our laboratory and, if required, an application to register premises will be submitted or samples will be sent to registered premises for storage.

The sample register includes:

- Radionuclide contained in the material
- Activity or nominal activity of the material
- Date the material was sampled.
- Date upon which the material was placed in the store
- Name of person receiving the material.
- When storage sites are unoccupied, they are securely locked.

9 Lifecycle management of radiation sources

9.1 Radioactive material

Exploration activities may generate quantities of radioactive waste, all of which originates from drilling operations. The following details possible drilling waste steams:

- Solid Waste
    - Drill cuttings from mineralised zones;
    - Gloves, rags etc contaminated with radioactive material; and

[6] https://www.arpansa.gov.au/amended-tables-rps-9-and-rps-91

- Radioactive contaminated drilling or core cutting equipment.

- **Liquid Wastes**
  - Spillages of groundwater containing NORM intersected during drilling;
  - Spillages of water used for drilling that intersects mineralised zones; and
  - Spillages of water used for cutting mineralised core.
- **Airborne Wastes**
  - Airborne dusts generated during percussion drilling (including RC drilling) and core cutting activities.

9.1.1 Waste Management Systems

9.1.1.1 Disposal of Radioactive Material & Rehabilitation of Site

At the completion of drilling, each hole will be abandoned. If the hole intersected mineralisation (U > 80 ppm or Th > 240 ppm), radioactive waste will have been generated.

Cartwheel Minerals collects solids and cuttings in ground portable tanks that are emptied and cleaned out at regular intervals. If radioactive ore is encountered, all solids will be screened and all NORM will be collected and transferred to our lab in Adelaide. Only drilling waste without radioactive content will be buried outside of the lake with the agreement of the pasture lease holders. All radioactive samples (core, cuttings or chips) and waste will be collected for further analysis. The likelihood of NORM present in significant quantities in drilling mud and in-situ brine is extremely low. If present, NORM in liquids will be highly diluted in the volumes of water used in the drilling process.
No radioactive waste will be left uncovered at drill sites. Each drill site will be checked before site preparation and after rehabilitation with a survey meter and the dose rate at 1 m above ground will be recorded on a Pre and Post Drillhole Data Form (see Appendix I).

9.1.1.2 Decontamination of Equipment

At the completion of a drilling campaign, all drill rigs and equipment that may have come in contact with radioactive material shall be thoroughly cleaned.

If drill rigs and equipment have come in contact with significant quantities of radioactive material, then they will be checked for radioactive contamination. Any contaminated equipment found will be cleaned and re-checked prior to being released from the exploration site. Records will be kept on clearance forms (Appendix F).

In cases where the contamination on an item can't be removed and is estimated to be in excess of 0.4 Bq/cm^2 for both alpha and beta/gamma, those items are required to be transported as surface contaminated objects (SCO).

9.1.1.3 Spill Management

Spillages of liquids containing radioactive materials will be minimised as much as practicable utilising the following practices:

- Construction of plastic bunds around work areas that may contain liquid radioactive material;
- Use of spill kits and absorbent material;
- Removal of contaminated soil; and
- Evaporation of remnant liquid.

9.1.1.4 Dust Management

Airborne radioactive dust management practices implemented to ensure occupational exposures are minimised will ensure environmental impact from this pathway is minimised.

9.2 XRF units

Each X-ray apparatus must remain registered until possession of the XRF has been transferred to the owner, to another entity or is disabled and disposed in accordance with the Regulations and the Act. Note that XRF that are no longer used, but are still operable, must remain registered. If the XRF to be sold or disposed of is not be operated after the sale or disposal the XRF must be made incapable of operation before the sale or disposal.

10 Application of Regulations and Codes

The Act requires Cartwheel Minerals to hold a Radiation Management Licence (RML). An RML has been issued to Cartwheel Minerals by the SA EPA.

The Act requires Cartwheel Minerals to register apparatus. All apparatus used by Cartwheel Minerals will be registered unless apparatus are kept as stock or on loan for less than 3 months. Regulation 21 states that ionising apparatus hired for less than 3 months do not require registration.

Regulation 8 defines radioactive material as

- naturally occurring radioactive material as ores containing uranium or thorium with an activity concentration and an activity in excess of:
    - 1 Bq/g (80 ppm U) and 1 kBq of U-nat, or
    - 1 Bq/g (240 ppm Th) and 1 kBq of Th-Nat
- SCO with surface contamination in excess of:
    - 0.4 Bq/cm^2 for beta and gamma emitters and low toxicity alpha emitters
    - 0.04 Bq/cm^2 for other alpha emitters

However, a geological sample that emits radiation at a level not more than 5 uSv/h measured at a distance of 10 cm from its surface is exempt (not considered radioactive), as per Schedule 4 of the Regulations.

The Regulations require Cartwheel Minerals to produce an RMP (this document) and submit it to the SA EPA. The RMP must comply with the requirements of COC-1, which in turn calls up RPS C-1.

This RMP addresses the requirements as set out in COC-1 and RPS C-1.

The labelling and signage requirements of COC-7 and the requirements of the Guideline on Portable XRF have been incorporated into the Safe Work Procedures.

Signage must be erected at every entrance to storage areas. All containers where radioactive material is kept must be labelled.

Figure 3 Entrance to a store sign (left), Container Label (Right)

Warning signs must be placed such that a person approaching a pXRF used in a fixed location or as a benchtop set up will be alerted to the fact that it produces ionising radiation. When deployed on the field, there is no signage requirement. A label also needs to be placed on the apparatus that warns of the production of X-rays.

Figure 4 XRF: Room/Area Sign (Left), Apparatus Label (Right)

The requirements of the RPS 9 Code apply to the handling and monitoring of NORM. Monitoring and controls have been incorporated into this document and into the Safe Work Procedures, including amendments published by ARPANSA.

The requirements of RPS C-2 apply to the transport of the radioactive material. They have been incorporated into the Safe Work Procedures.

The requirements of RHS 9 apply to the use of x-ray analysis apparatus. Monitoring and controls have been incorporated into this document and the Safe Work Procedures.

Should Cartwheel Minerals enter into an agreement for the sale or transfer of the apparatus, the EPA must be notified within 7 days of entering into the agreement for sale or transfer, including all details required under Regulation 26(2).Should Cartwheel Minerals dispose of the apparatus (other than by way of sale or transfer to which regulation 26 applies), the EPA must be notified within 14 days of the disposal, including all details required under Regulation 41. Responsibility for notifying the EPA in each of these circumstances rests with Cartwheel Minerals.

The handling of unsealed radioactive material and radiation apparatus are subject to Working Rules, See Appendix B. A printed copy of the Type C working rules is prominently placed within the Type C area. A printed copy of the pXRF working rules is located in a prominent position either in the equipment box or if used regularly in a stationary position, on the wall.

In general, any person who is occupationally exposed to radiation must be monitored using a personal dosimeter approved by the EPA. For workers who would routinely receive less than 1 mSv per year, personal dose monitoring is not required (Regulation 86 [2]). Users of the radiation material and apparatus within Cartwheel Minerals premises who follow the Safe Work Procedures will receive less than 1 mSv per year from external radiation, and therefore are not monitored.

If mineralised material (above 80 ppm U or 240 ppm Th) is encountered, or if dose rates above 1 uSv/h are measured one metre away from geological samples, monitoring will be implemented for areas and staff (LLAA in dust and dosimeters).

If the active usage rate of X-ray analysis apparatus is greater than 2 hours a day and dose rates to the operators measured during inspections are greater than 2 uSv/h to the operator's body, personal monitoring will be implemented for operators.

10.1 Radiation Safety Legislation

The legislation pertaining to Radioactive Material and Apparatus in South Australia is in two parts:

- The South Australian Government Radiation Protection and Control Act 2021, and
- The South Australian Radiation Protection and Control (Ionising Radiation) Regulations 2022.

Codes of Practice and guideline listed in the Regulations or gazetted:

- SA EPA:
  COC-1 Code of Compliance for radiation management plans 2022
  COC-7 Code of Compliance for labelling and signage of ionising radiation sources 2022
  EPA 1148/23 Guideline – Portable XRF apparatus, December 2023

- ARPANSA
  RPS C-1 Code of Practice for radiation protection in planned exposure scenarios (2020)
  RPS 9 Code of Practice and Safety Guide for Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing (2005)
  RPS 9 Amended Tables
  RPS C-2 Code for the Safe Transport of Radioactive Material (2019)
  RHS 9 Code of Practice for Protection Against Ionizing Radiation Emitted from X-ray Analysis Equipment (1984)

Documents are available for viewing from the web links above. Printed copies are available from the Site RSO.

The legislation is administered by the Radiation Protection Branch of the South Australian Environment Protection Authority. Contact details are as follows:

Emergency Response Team (ERT): 1800 307 733
Email: eparadiationprotectionbranch@sa.gov.au

10.2 Radiation Management Licence details

Table 7: Management Licence details

Licence Holder	RML Number	Expiry date
Cartwheel Minerals	51288	31/08/2025

Should there be a change of address for service of Cartwheel Minerals, the EPA must be notified within 14 days

including all details required under Regulation 26(3). Cartwheel Minerals is responsible for notifying the EPA in these circumstances.

11 Reporting and Record Keeping

Radiation safety related records will be managed and kept by the RSO. They include primarily records of monitoring conducted, calibration of equipment, reports on exposure and audits/reviews of the RMP.

Routine reporting of the results of the monitoring program will be according to the requirements of the relevant regulatory authority.

A dose assessment will be undertaken for each worker at the end of each campaign where mineralised material was encountered (above 80 ppm U and 240 ppm Th, or if dose rates above 1 uSv/h are measured one metre away from geological samples. Reports will be made available to individuals upon request. The final radiation safety report for each drilling campaign will include the average dose for the work group.

12 Personnel and resources

To enable the detection of radioactive materials during drilling, Cartwheel Minerals will provide field staff with a radiation meter (contamination and survey modes) and appropriate training in its use.

Designated site personnel will be trained in the principles of radiation safety and serve as Radiation Technicians for each of their field sites. They will be responsible for the radiation monitoring.

Whenever radioactive mineralisation is encountered, the field geologist will report immediately to the RSO who will advise the company management. Depending on the grade of ores, the whole drilling operation may be ordered to shut down immediately and the drill hole covered and secured.

Cartwheel Minerals will ensure that an adequate time allowance is provided to enable them to perform this task. Radiation protection advice will be provided to management and employees by the RSO.

13 Radiation Events

All radiation events must be reported to the RSO, no matter how minor they are. The RSO will direct the workers on the appropriate response. Cartwheel Minerals have Hazard & Incident Reporting Management Procedure. Radiation events will be reported according to this procedure.

The response to radiation incidents and emergencies includes the following steps:

- Ensure people whose lives are at risk are attended to first (if safe to do so);
- Prevent the spread of radioactive material;
- Prevent access, to the extent feasible, of any unauthorised persons to the area where radioactive material is located;
- Move people upwind; and
- Alert your RSO and/or call 000.

Radiation incidents and emergencies (dangerous events) will be reported according to the requirements of the SA EPA. This includes:

- The loss or theft of radioactive material;
- The loss or theft of an XRF analyser;
- Unexpected high exposures; and
- The uncontrolled spillage of radioactive material despite activating appropriate and approved remediation procedures.

In those cases, Cartwheel Minerals must notify the Radiation Branch of the SA EPA orally within 24 hours and in writing within 7 days of the event's occurrence.

13.1 Remediation procedures

Examples of events occurring while exploring for ore containing NORM and contingency plan are detailed below. Each event must be immediately reported to the RSO.

Event
A spill of dry material (cuttings, core cutting debris or dust) onto the ground.
Contingency
Collect NORM using a broom and shovel and dispose of in accordance with the procedure detailed in the waste management chapter and in accordance with environmental management requirements. Check ground for contamination. Remove soil and place in a container if necessary.

Event
A spill of NORM contaminated water on a worker.
Contingency
Wash skin, clothing and boots. Contain washing water and let the water evaporate. Check affected areas for contamination and further wash if necessary. Do not scrub skin.

Event
A spill of NORM contaminated water on the ground.
Contingency
Contain the spill with earthen bunds. Use absorbent material from spill kits and dispose of in accordance with the procedure detailed in the waste management chapter and in accordance with environmental management requirements. Let remnant water evaporate. Check affected areas for contamination.

Event
A transport accident involving radioactive material where there has been a spill or release of NORM into the environment.
Contingency
Collect NORM using broom and shovel and dispose of in accordance with the procedure detailed in the waste management chapter and in accordance with environmental management requirements. Check ground for contamination.

Table 8: Incident response for events associated to the use of the XRF

Event type	Examples	Action of worker	Action of Authorised contact person
Minor Incident Internal reporting	Missing radiation sign or label Inspection not conducted within the required period. Interlock failure Unauthorised use	Report to authorised contact person immediately	Investigate Review SWP Records to Radiation Safety Folder
Major Incident, reportable to SA EPA	The XRF is or has been damaged or has malfunctioned, in a manner that could result in a person receiving a higher radiation dose than would be received under normal circumstances	Report to authorised contact person immediately	Investigate Review SWP Records to Radiation Safety Folder Oral notification to SA EPA within 24 hours Written incident report to SA EPA within 7days
Extreme (Emergency)	**Missing or stolen XRF**	**Report to authorised contact person immediately**	Oral notification to SA EPA within 24 hours Written incident report to SA EPA within 7days

14 Storage and Transportation of Radioactive Material

Temporary storage facilities for core and samples will be set up at each field location. The following management practices will be applied to all storage facilities:

- The facilities will be secured to prevent unauthorised access;
- The location will be clearly signed;
- The facilities will be set up away from any habitation or office areas;
- The facilities shall be designed to maximise ventilation by having open sides or equivalent means;
- Strongly radioactive core will be identified as such (> 5 uSv/h on contact) and will be stored in a drill rod and secured with end caps and placed in a designated area away from occupied areas.

Some samples will require transportation from the field location to either laboratories for analysis or permanent storage facilities. The transportation of all radioactive materials will be conducted according to the Code for the Safe Transport of Radioactive Material, 2019. Storage and analysis of radioactive material will be carried out in registered premises. Cartwheel Minerals will ensure that external providers have laboratories that are appropriately registered and licenced. In accordance with Reg 19(1)(d), radioactive core samples with a total mass above 100 kg will either be stored at Cartwheel Minerals premises, if registered as Type C premises, or sent to a third party registered premises for long term storage.

The majority of samples collected will either be non-radioactive or only mildly radioactive. Transport of these samples will be mainly as exempt and excepted packages. On occasions where higher activity samples are collected then transportation will be as “Low Specific Activity – LSA 1” with packaging and labelling as per the code.

Transportation of radioactive material may also include surface contaminated objects (SCO).

A field procedure and a spreadsheet have been prepared to assist workers to comply with the Transport Code (see Appendix E). Note that exempt or excepted packages do not require transport by a company holding an RML in South Australia. However all other package types (including LSA-1) do require licensing. Cartwheel Minerals’ RML allows the transport of radioactive material by Cartwheel Minerals workers.

Appendix A XRF Working rules

X-Ray Safety

Pre-start

Check operation of Interlocks and Safety Lights during daily pre-start checks

Access Control

Only authorised personnel should have access to the secure pin code

Failsafe Light

Light activates to indicate x-rays are being generated. If this light fails x-rays tube should be disabled

Proximity Interlock

A proximity sensor stops x-rays from being generated unless close to an object

Low Count Interlock

If the apparatus is not measuring enough return x-rays it will stop x-rays from being generated

Weekly Checks

Check Signs and Labels every week

Area Signs

Area signs are required to ensure other personnel remain more than 2m away

Labels

A label is required on the apparatus that indicates x-rays are produced

X-Ray Safety

TIME

Minimise your exposure time

Personal Dosimeters

Wear your personal dosimeter when using the apparatus if you have been instructed to do so

Training

Only licenced personnel are authorised to use a portable XRF

SHIELDING

Where reasonable, use shielding

DISTANCE

Maximise your distance

Working Rules

- If an XRF analyser is missing or stolen, notify the authorised contact person immediately.
- If you have not received appropriate training, you must not use a handheld XRF under any circumstances.
- Before operating the handheld XRFs, ensure that signage is in place
- If you notice any abnormal behaviour or faults with a handheld XRF, cease using the device, tag it ‘out of service’ and report it to the authorised contact person
- If you detect or suspect any abnormal radiation fields from a handheld XRF, immediately switch the handheld XRF off and notify the authorised contact person. Do not switch on the handheld XRF until a competent person has inspected the XRF and is satisfied that it is safe to operate.

Appendix B NORM handling working rules

Working Rules

Radiation meter

Are you trained, or is a trained person on site?

PPE

Minimum is safety glasses and gloves.

Dust? Wear P2 dust mask.

Dust and dirt

Clean-up as it is generated.

Place in designated container, seal, and store in secure area

Possible contaminated waste

Ask licensed person to check the item.

Contingency Plan (spills)

Spill on a person?

- Remove contaminated PPE and clothing
- Hair/eyes/face - rinse with water away from eyes, mouth & nose
- Wash skin using mild soap and water
- Check with radiation contamionation meter

Spill on floor, ground or bench?

- Wear gloves, glasses and P2 mask
- Isolate spill from other workers
- Clean-up from outside edge towards inside
- Minimise generation of dust
- Check with radiation contamionation meter

Reporting

- Call Site Manager (or RSO if emergency - see below)
- Complete Incident Report

Appendix C XRF Register and XRF movement register

Register

Instrument	Brand	Model	Serial number	Date of manufacture	Storage location	Use or stock
pXRF 1	Olympus Vanta	M series: VMR-CCC-G3-A	842268	June 2021	Brompton	Use
pXRF 2	Olympus Vanta	M series: VMR-CCC-G3-A	842273	June 2021	Brompton	Use
pXRF 3	Olympus	DCC-6000-C	571146	July 2016	Brompton	Held in stock

Movement register

Instrument	Sign Out Date & Time	Operator	Site	Temporary Storage location	Signature	Sign In Date & Time	Signature

Appendix D Licenced user register

Name	Licence type (apparatus or radioactive material)	Licence number	Licence condition	Expiry date
Can Yin	Licence to operate radiation apparatus	31889	SCHEDULE LX-INS-11 Apparatus, Open beam x-ray analysis -handheld (excluding enclosed x-ray analysis apparatus)	31/08/2024
Linde Li	Licence to operate radiation apparatus	31912	SCHEDULE LX-INS-11 Apparatus, Open beam x-ray analysis -handheld (excluding enclosed x-ray analysis apparatus)	31/10/2024
Mitchell Toft	Licence to operate radiation apparatus	31913	SCHEDULE LX-INS-11 Apparatus, Open beam x-ray analysis -handheld (excluding enclosed x-ray analysis apparatus)	31/10/2024

Appendix E Transportation of Geological Field Samples Containing NORM Procedure

Health, Safety, Environment & Community

Minimum PPE	Gloves must be worn when handling radioactive material
Safety Equipment	If handling large amount of radioactive core, then a personal dosimeter shall be worn
Training Requirements	Current Induction in Radiation Safety (12 monthly)

Procedures

1. **Sample analysis:**

- Determine the mass (in grams) of each sample within the consignment;
- Determine the concentration (in ppm) of uranium and thorium for each sample through XRF analysis;
- Using the exempt limit calculation spreadsheet, calculate the U and Th activity concentration (Bq/g) for each sample. The following conversion factors are used:
    - 80 ppm U = 1 Bq/g U-nat
    - 240 ppm Th =1 Bq/g Th-nat
- Calculate the total activity (Bq) of each sample;
- Identify the most active samples.

2. **Package Preparation:**

- Place samples in sealed plastic bags. If samples are in cloth bags, place these into a larger sealed plastic bag.
- Place the plastic bags in the transport package
    - For small quantities use a sturdy box (cardboard box is adequate)
    - For larger quantities (10 - 50 kg), use a sturdy plastic bucket, steel drum or similar.
    - For bulk material (50+ kg), use a bulky bag to contain the individual plastic bags.
- Place the most active samples in the centre of the package. For very high activity samples shielding material (e.g. low activity soil or other dense material) may be necessary to comply with transport dose rate requirements.
- Where multiple packages are being sent it may be useful to strap them all to a pallet.
- Under no circumstances shall loose samples or bags be sent outside of a sturdy package as described above.
- Do not seal the packages until completing this procedure as some require documents to be placed on the inside of the package.

3. **Package analysis:**

- Determine the total mass (g) of the package by adding the masses of each sample within the package.

- Determine the total activity (Bq) of the package by adding the total activity (Bq) of each sample within the package.
- Calculate the package activity concentration

$$package\ activity\ concentration\ (^{Bq}/_{g}) = \frac{package\ total\ activity\ (Bq)}{package\ mass\ (g)}$$

4. Package Type Classification

Packages will be classified as EXEMPT, EXCEPTED or IP-1.

- Using the exempt levels calculation spreadsheet, determine if the package is EXEMPT. If it is the case, the Transport Code does not apply. The samples can be transported as non-radioactive mineral samples.

  Note that it is acceptable to combine mineralised samples with unmineralised samples, so that the average concentration is lowered in order to achieve EXEMPT package status.
- If the dose rate on the surface of the package is ≤5 uSv/h, the package is EXCEPTED. It is acceptable to repackage the samples (into a larger package, or to add shielding, to reduce the surface dose rate to achieve EXCEPTED package status.
- If the dose rate is ≥ 5 µSv/h then the sample will need to be shipped as “Low Specific Activity (LSA 1) Material”. In these cases the activity of the material will need to be determined and the package transported according to the full dangerous good regulations. The package needs to meet IP-1 requirements.

  NB – bulky bags are unlikely to meet IP-1 requirements. Remove ‘hot’ bags from the bulky, re-position ‘hot’ bags into the centre of the bulky, or shield the ‘hot’ bags.
- If the dose rate is ≥ 5 µSv/h and there is contamination (in excess of 0.4 Bq/cm^2 for alpha and beta / gamma emitters) on an item and it can’t be removed, those items are required to be transported as surface contaminated objects (SCO).

5. Labelling of EXCEPTED, SCO-1 and IP-1 packages, and Transport Documents

Excepted Packages:

- Place a sign with the word ‘RADIOACTIVE’ in the top of the package so it is visible when the package is opened.
- Label the outside of the package with the Name and Address of where the package is to be sent and the Name and Address of where it is being sent from. Specially made labels are available for this
- Label the outside of the package with “UN2910”
- If the package total weight is in excess of 50 kg, then clearly mark the weight on the outside of the package
- If transporting by courier, then clearly mark on the consignment declaration “UN2910”. Complete two class 7 Dangerous Goods shipping declarations and print one copy of the information for carriers. Give the 3 documents to the driver of the transport vehicle.

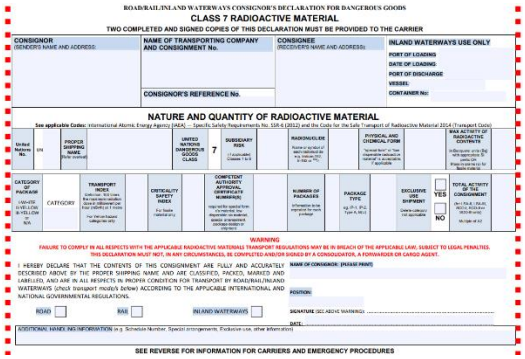
LSA-1 and SCO-1 Packages:

- Measure the maximum dose rate (in µSv/h) at surface and at 1m from the package or object.
- Use the Table below to determine label type:

Dose rate @ 1m from package or object	Dose rate @ package surface or object	Category
≤ 0.5	< 5	I White 
> 0.5 and ≤ 10	> 5 and ≤ 500	II Yellow 
> 10 and ≤ 100	> 500 and ≤ 2000	III Yellow 

- Fill out 2 appropriate category labels with “LSA-1” or “SCO-1” in the contents section. Write the package total activity.
- Place the 2 labels on opposite sides of the package or object.
- Clearly label the outside of the package or object with the Name and Address of where the package or object is to be sent and the Name and Address of where it is being sent from. Specially made labels are available for this.
- Clearly label the outside of the package or object with either
    - For LSA-1: “UN2912 Radioactive Material, Low Specific Activity (LSA-1)” and the “Type IP-1”.
    - For SCO-1: “UN2913 Radioactive Material, Surface Contaminated Objects (SCO-1)”

- If the package or object total weight is in excess of 50kg, then clearly mark the weight on the outside of the package or object.
- Complete two class 7 Dangerous Goods shipping declarations and print one copy of the information for carriers. Give the 3 documents to the driver of the transport vehicle


ROAD/RAIL/INLAND WATERWAYS CONSIGNOR'S DECLARATION FOR DANGEROUS GOODS
CLASS 7 RADIOACTIVE MATERIAL
TWO COMPLETED AND SIGNED COPIES OF THIS DECLARATION MUST BE PROVIDED TO THE CARRIER
CONSIGNOR
NAME OF TRANSPORTING COMPANY AND CONSIGNMENT No.
CONSIGNEE
INLAND WATERWAYS USE ONLY
NATURE AND QUANTITY OF RADIOACTIVE MATERIAL
WARNING
SEE REVERSE FOR INFORMATION FOR CARRIERS AND EMERGENCY PROCEDURES


INFORMATION FOR CARRIERS

- Place three placards on the vehicle transporting one or more package(s) with labels (white I, Yellow II or Yellow III), 2 on each side of the vehicle and one at the rear

- The company transporting the package(s) must have a Management Licence authorising the transport of DG7 packages.

Appendix F Clearance Procedures

Equipment and Tools	Competent Persons	**Training and Competency**
Radiation Alert Ranger	Trained person	Radiation safety training course

Protective Equipment	**Potential Hazards**	**Potential Incidents / Injuries**
Disposable gloves if potential for hand contamination	Ingestion of radioactive material	Radiation dose
P2 mask if item is dusty	Inhalation of radioactive material	Radiation dose

Procedure	**Equipment & Tools**	**HSEC Hazards / Risks**	**Control Measures**
Visual inspection	n/a	Release of radioactive material to uncontrolled area can risk exposure of public and environment	The item (equipment, machinery, surface) must be visibly clean and dry before carrying out a clearance survey.
Turn meter on and test	Radiation meter	Correct mode required to ensure correct readings are made	Switch mode to 'CPS' After a few seconds, meter should chirp every few seconds Place near test source – chirp rate should increase
Check item for contamination	Radiation meter	Release of radioactive material to uncontrolled area can risk exposure of public and environment	Remove protective cap at the back of the meter Keep meter above item (stops dirt striking sensor) Bring meter within 5 mm of item surface Listen for an increase in chirp rate
Classify item	Radiation meter	Segregate radioactive material from non-radioactive material	No discernible increase = not radioactive (normal waste) Any increase of 0.9 CPS above background = contaminated item Clean further or isolate item
Problems with meter	Radiation meter	Incorrect readings	Contact Site Manager or RSO

Clearance Certificate

Date		Time	
Site			
Surveyed by			
Contamination meter (model, S/N)	Tracerco T401-1 Contamination Monitor Serial no. 1122233	Last calibration	June 2024
Item			
Item description			
Visually clean?		Dry? (Item must be dry before survey)	

Equipment survey *(All measurements in cps)*

Background average		Background below 0.9 CPS	

Description	Average	Max	Description	Average	Max

Are all measurements showing levels below 0.9 CPS above background? (0.9 cps is equivalent to 0.4 Bq/cm^2 alpha) If no, further washing is required.	

Photos or comments

Issued by:		Date of issue:	
Signature			

Appendix G Dosimeter Register

Name	Date of birth	Dosimeter Number	Quarter	Date Issued	Date Collected	Comments

Appendix H Prestart Checks

Instrument	Site	Operator	Grading: G (good), A (average), P (poor)				Signature or initials
			Proximity sensor	Low count interlock	Warning light	Warning sign and label	

Appendix I Pre and Post Drillhole Survey Procedure and Form

When:

1. Before drill pad clearance and
2. after rehabilitation activities

Where: every drilling site

Equipment:

- Survey meter

  Polimaster PM1605BT supplied by InMed
- Gamma survey field sheets

For each site:
Turn ON the survey meter:

- Turn meter on.
  - The dose rate is displayed on the screen, in uSv per hour, or $\frac{uSv}{h}$
- Take the coordinate of the drill hole
- Walk the drill pad area, holding the survey meter at waist height
- Record the average and maximum dose rate seen on the survey meter, over a minimum of 4 readings.
  - For average – use the number that represents what you see most often (not halfway between highest and lowest)

Pre-Clearance and Post-Rehabilitation Drill Pad Survey Form

Hole ID: _____	**Coordinates (UTM, GDA94): zone 53j _____m East _____m North**
Date drilling commenced:	
Date drilling ceased:	
Date rehabilitation of site was completed:	

Background Gamma Radiation Results:	
Device Used to take Measurement:	○ Polimaster: PM1605BT ○ Calibration of instrument conducted at least once per year. - Last calibration: 29 Feb 2024 - Next calibration due: 28 Feb 2025
Background Radiation Before Drilling Commencement:	Average: _____ µSv/h Maximum reading: _____µSv/h
Background Radiation After Site Rehabilitation	Average: _____ µSv/h Maximum reading: _____µSv/h
Note: ○ The dose rate is displayed on the screen, in µSv per hour, or $\frac{uSv}{h}$ ○ Walk the drill pad area, holding the survey meter at waist height ○ Record the **average** and **maximum** dose rate seen on the survey meter, over a minimum of 4 readings. - For average – use the number that represents what you see most often (not halfway between highest and lowest).	

Is the dose rate after rehabilitation comparable to pre-clearance: Yes: ☐ / No: ☐
Note: *if "no" checked: Report to RSO*

Name of person conducting *Radiation Evaluation Report*:		**Position:**	
Date report completed:	_____/_____/_____.		