



Mining application and proposal

Date	8 November 2022
Version number	1
Name of applicant(s)	Central Iron Pty Ltd
Name of proposed operation	Kultanaby Haul Road borrow pits
Mineral claim number	MC 4546
Commodity type	<input checked="" type="checkbox"/> Extractive minerals <input type="checkbox"/> Industrial minerals <input type="checkbox"/> Industrial minerals (prescribed purpose)
Mineral claim size (ha)	50.03 ha
Proposed lease application size (ha) (If applying over a reduced area)	50.03 ha
Contact details for application	Name: Diona Antonas Phone: 0411 563 972 Email: diona@peakiron.com

Section 1: Description of the existing environment

1. Existing environment	
1.1 Location	<p>The nearest town Glendambo is located 5.7 kilometres from the mineral claim.</p> <p>The distance from the mineral claim to the nearest house is 5.7 km</p>
1.2 Land use	<p>The local council area is: Pastoral Unincorporated Area or <input type="checkbox"/> Mineral claim is not located within a council area.</p> <p>The zoning as defined by the planning and design code or relevant council development plans is: Remote Areas Zone</p> <p>The land use (historical and current) for the application area is: Pastoral</p> <p>The surrounding land use is: Pastoral</p>
1.3 Land access	<p>Mineral claim is located on free-hold land <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>Certificate of title details: CL1284/10 - Crown Lease. Coondambo Nominees Pty Ltd</p> <p><input checked="" type="checkbox"/> There are no land restrictions/easements listed on the title. or The following land restrictions/easements are listed on the property title: Click to enter text.</p> <p><input checked="" type="checkbox"/> There is no exempt land within the mineral claim. or The following exempt land has been identified within the mineral claim: Click to enter text.</p> <p>Provide details of any waivers of exemption(s) and/or status of negotiations of any waivers: Not applicable</p> <p>Provide details of any native title land, if relevant: Gawler Ranges People</p>

	<p>Native title land means land where native title does or might exist, but does not include land where native title has been extinguished (as found or declared by an appropriate court). Land held under certain titles (including freehold and some perpetual leases) is not native title land.</p>
1.4 Heritage	<p>A search of the Register of Aboriginal Sites and Objects has been included in Appendix 7.</p> <p><input checked="" type="checkbox"/> There are no registered Aboriginal, non-Aboriginal or geological heritage sites located in or adjacent to the mineral claim.</p> <p><input type="checkbox"/> Heritage site(s) have been identified within or adjacent to the mineral claim.</p>
1.5 Groundwater	<p>The existing depth to groundwater is estimated at 8 metres below ground level.</p> <p>The buffer between groundwater and the lowest proposed depth of mining is estimated at 3 metres.</p> <p>Evidence to justify this is provided below: Kultanaby Haul Road modelled depth to groundwater</p>
1.6 Weeds and pests	<p>The following weeds and pests currently exist on the mineral claim:</p> <p>These species have been recorded within the local area: Buffel Grass (<i>Cenchrus ciliaris</i>), Burr-medic (<i>Medicago polymorpha</i>), Common Sow-thistle (<i>Sonchus oleraceus</i>), House Mouse (<i>Mus musculus</i>).</p>
1.7 Native Vegetation	<p><input type="checkbox"/> Native vegetation does not exist within the mineral claim</p> <p>or</p> <p>The following native vegetation exists within the mineral claim:</p> <p>EBS Ecology (2022, see Appendix 5) recorded two vegetation types within the MC area: VA1 - <i>Atriplex vesicaria</i> / <i>Sclerolaena ventricosa</i> Low Shrubland over <i>Austrostipa nitida</i> and annual forbs, and VA2 - <i>Maireana pyramidata</i> +/- <i>Maireana erioclada</i> +/- <i>Maireana aphylla</i> Shrubland over <i>Atriplex holocarpa</i> and <i>Austrostipa nitida</i>. No EPBC Act or NPW Act listed threatened plant species were recorded. See Appendix 5 for the SEB native vegetation assessment.</p>
1.8 Native fauna	<p>The following native fauna may be present in the area:</p> <p>EBS Ecology (2021, see Appendix 6) recorded 27 fauna species throughout the Kultanaby Survey Area. This included 1 reptile and 26 birds. No animal species listed as threatened or migratory under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) or National Parks and Wildlife Act 1972 (NPW Act) was recorded during the survey. Four species listed as threatened or migratory under the EPBC Act were assessed as possible or likely to occur (EBS 2021): Thick-billed Grasswren (<i>Amytornis modestus</i>) – Vulnerable, Oriental Plover (<i>Charadrius veredus</i>) – Migratory, Grey Falcon (<i>Falco hypoleucos</i>) – Vulnerable, Plains Mouse (<i>Pseudomys australis</i>) – Vulnerable. EBS Ecology (2021) found that it is unlikely that any of these species would be significantly impacted, and referral of the project under the EPBC Act is unlikely to be required.</p>

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Section 2: Description of proposed mining operations

2. Proposed mining operations	
2.1 Resource description, production and mine life	<p>Following is a geological description of the resource:</p> <p>Coarse sand and grit of ferruginous sandstone of the Cadna-owie Formation and/or Aglebuckina Sandstone</p> <p>The resource/commodity from the SA Commodities List https://energymining.sa.gov.au/minerals/mining/mineral_royalties to be extracted and sold is: Calcrete, Iron Stone, Gravel (Natural)</p> <p>Statement of the estimated resource or reserve and details of the basis of this estimate: Estimated resource: 2.951 million tonnes, based on nine borrow pits (2.75ha each and up to 5m deep) with an estimated total volume of 1,113,750m³ (volume= $(100+80)/2 \times 5 \times 275 \times 9$), multiplied by a bulk density factor of 2.65.</p> <p>The mined resource will be used for the following products, end use: Road construction</p> <p>The estimated annual production is 2.951 million tonnes estimated over life of mine tonnes per annum</p> <p>The estimated mine life is 10 years.</p>
2.2 Processing	<p>Following is a description of proposed processing:</p> <p>Deployment of a excavator, grader, or bulldozer onsite to remove the topsoil. Excavator to be used to extract construction material. Material to be loaded into truck for transport to haul road construction site.</p>
2.3 Product transport	<p>The estimated size of haulage trucks are:</p> <p>Construction style haul truck of up to nominal 30t capacity.</p> <p>The estimated truck movements per operational day is up to 170</p> <p>As per the Location Plan, Mine trucks are proposed to access the site via the following route: From Tarcoola Road, then along temporary access tracks to borrow pits, and then along newly constructed private haul road.</p>
2.4 Water use	<p>The amount of water required for mining operations is estimated at: During earthworks operations, approximately 300,000 to 500,000 litres per day.</p> <p>Water will be sourced from:</p>

	<p>Water will be trucked from the Buzzard Project pit dewatering activities. Water sourced from Buzzard will be extracted under the existing water licence and accounted for within the Buzzard Project allocation.</p>
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2.6 Mine staging and progressive rehabilitation

A staged mining plan showing how mining and progressive rehabilitation will occur over the life of the mine has been included as **Attachment 2**.

The plans and detail provided below demonstrate that there is a reasonable prospect that the land in respect of which the lease is sought could be effectively and efficiently mined.

The proposed final depth of mining below the surrounding ground level is not greater than 5 metres;

or

The height of the sand dune or surface outcrop above the surrounding land not greater than 10 metres.

The proposed maximum area of un-rehabilitated land will be less than 3 hectares at any one time.

Following is a description of how mining will occur over the life of the mine using a staged approach:

Borrow pits will be constructed to a maximum footprint of 3 ha, with only one borrow pit active in the proposed EML at any one time. The borrow pit will be rehabilitated prior to construction of an additional borrow pit (if required). The life of mine will be directly linked to the life of the haul road in the associated MPL, which will be a nominal 10 years.

Following is a description of the proposed post mining land use and landform:

Borrow pits will be rehabilitated on completion of extractive activities. Rehabilitated borrow pits will remain within haul road MPL boundary. Rehabilitation will aim to achieve stable landforms minimising water retention and erosion.

Staged progressive rehabilitation is planned in the following sequence to achieve the post mining landform design and allow for the proposed land use:

Borrow pits will be rehabilitated on completion of extractive activities. Rehabilitated borrow pits will remain within haul road MPL boundary. Rehabilitation will involve pushing down the topsoil windrows over the batter and floor of the borrow pit and then scarifying. Rehabilitation aims to create a stable landform, maintain self-draining capacity if possible, and allow for natural regeneration of vegetation cover. The current elevation of the proposed EML (estimated at the centrepoint) is 158.64 mAHD. The final elevation of the pit base will be no more than 5m below the pre-mining elevation, i.e. at least 153.64 mAHD.

2.7 Hours of operation

Regular/continuous/ongoing

Mining will occur on a regular/ continuous/ ongoing basis with the following operating hours:

Monday – Friday: 6 am to 6 pm

Saturday: 6 am to 6 pm

Sunday: 6 am to 6 pm

Public holidays: 6 am to 6 pm

Campaign

Mining will occur on a campaign basis within the following operating hours:

Monday – Friday: Click to enter text.

Saturday: Click to enter text.

Sunday: Click to enter text.

Public holidays: Click to enter text.

Section 3: Consultation

3. Consultation	
3.1 Landowner consultation	<input type="checkbox"/> I, the applicant, am also the landowner or <input checked="" type="checkbox"/> I, the applicant, am not the landowner Appendix 1 provides details of landowner consultation.
3.2 Adjacent Landowner Consultation	<input checked="" type="checkbox"/> There are no residences located on property adjacent to the mineral claim or <input type="checkbox"/> Residences are located on property adjacent to the mineral claim Appendix 2 provides details of consultation with adjacent landowners.
3.3 Stakeholder Consultation	The following additional stakeholders were consulted: Gawler Ranges Aboriginal Corporation (GRAC). An NTMA with GRAC is being negotiated and will be finalised prior to submission of the PEPR. Appendix 3 provides full details of additional stakeholder consultation.

Section 4: Management of defined environmental impacts

This section describes Environmental outcomes that are expected to occur and draft measurement criteria as outlined in the *Mining Act 1971*. Control and management strategies are also proposed to achieve the environmental outcomes.

4.1 Heritage	
<p>Outcome No damage, disturbance or interference to Aboriginal or non-Aboriginal heritage sites, objects or remains as a result of mining operations unless it is authorised under the relevant legislation.</p>	<p>Measurement criteria Production records and Mine Logbook will demonstrate that upon discovery within the tenement of any possible Aboriginal or Non-Aboriginal:</p> <ul style="list-style-type: none"> - sites of significance - objects - remains <p>that work ceased until the relevant authorities were notified and work recommenced only once authorisation was received.</p>
<p>Control and management strategies</p> <p>Mandatory strategies:</p> <p>All contractors and employees operating with the tenement will understand their obligations in regards to the <i>Aboriginal Heritage Act 1988</i> with regards to the discovery of Aboriginal sites, objects or remains and the <i>Heritage Places Act 1993</i> with regards to the discovery of places or objects of significance.</p> <p>Provide any additional strategies:</p> <p>An Aboriginal heritage survey was undertaken by the Gawler Ranges Aboriginal Corporation (GRAC) for the Kultanaby Haul Road area. Although areas of heritage significance were identified onsite during the survey, the haul road design, including the location of borrow pits, was modified to avoid sensitive areas, with the final design endorsed by GRAC. The report detailing the outcomes of the heritage survey has been kept confidential in accordance with the wishes of GRAC.</p>	

4.2 Traffic

Outcome

No traffic accidents involving members of the public and mine related traffic that could have been reasonably prevented by the Tenement Holder.

Measurement criteria

All traffic accidents involving the public at mine access points are recorded in Mine Logbook. All accidents will be investigated by a suitably qualified independent third party within one calendar month (or other time as agreed with Mining Regulator) and the results of the investigation show that the accident could not have been reasonably prevented by the Tenement Holder.

Control and management strategies

Mandatory strategies:

All operators will be made aware of the dangers of mine machinery and mine vehicles entering public roads during the site induction.

Optional strategies:

Road signs will be displayed at mine entry and exit points, warning the public of the dangers of large trucks entering and exiting the tenement.

Vehicles and machinery will be parked inside the tenement, not along road verges.

Provide any additional strategies:

The Buzzard Traffic Management Plan includes vehicle movements associated with extraction of construction materials from the proposed EML to support construction of the Kultanaby Haul Road.

Yes No

Yes No

4.3 Public safety (construction and operation of the mine)

Outcome

No public injuries and/or deaths resulting from unauthorised entry to the Land that could have been reasonably prevented.

Measurement criteria

All public injuries and/or deaths resulting from unauthorised access to the mine site are recorded in Mine Logbook and investigated by a suitably qualified independent third party within one calendar month (or other time as agreed with Mining Regulator) and the results of the investigation show that the incident could not have been reasonably prevented by the Tenement Holder.

Control and management strategies**Mandatory strategy:**

Access to the Tenement will be controlled through fencing and gates will be locked when not operational.

Optional strategy:

:
Site is sign posted making the public aware of hazards associated with the mine.

Provide any additional strategies

The area is a remote construction site with one connection to a public road with low volume usage. There will be signage at this access point, and roving field supervision will be used to monitor and control public access and protection. No fencing is required for the borrow pit as it will be located wholly within the proposed haul road MPL and is on a remote pastoral station.

Yes No

4.3a Public safety (post mine completion)

Outcome

The risks to the health and safety of the public so far as it may be affected by mining operations, are as low as reasonably practicable.

Measurement criteria

Following final rehabilitation work an appropriate person will inspect the site and verify in a report (to be stored in the Mine Logbook) that final rehabilitation has been undertaken in accordance with the Mining Plan.

Control and management strategies (post mine completion)**Mandatory strategies:**

Mining operations will be progressively rehabilitated as per Mining Plan.

All plant and equipment will be removed from the site.

Optional strategies:

All slopes will be battered to a slope ratio of at least 1:3 (18.4 Degrees).

Provide any additional strategies

On completion of the borrow pit, topsoil windrows will be pushed down over the batter and floor, and the surface scarified to encourage natural regeneration of vegetation.

Yes No

4.4 Weeds and pests

Outcome

No introduction of new species of weeds, or pests (including feral animals), nor increase in abundance of existing weed or pest species on the Land.

Measurement Criteria

Mine Logbook records of annual inspections (in Spring) by the Tenement Holder will demonstrate no introduction of new weeds or pests and no increased abundance of existing weeds and/or pests.

Control and Management Strategies (Post Mine Completion)**Mandatory Strategy:**

Weed spraying and pest animal control will be conducted by a suitably experienced person as required

Provide any additional Strategies:

Vehicle inspections verifying they are free from all soil and seed material prior to entering the proposed EML.

4.5 Soil

Outcome

The existing (pre-mining) soil quality and quantity is maintained.

Measurement Criteria

Annual inspection records in the Mine Logbook of all soil stockpiles will demonstrate that all stockpiles are less than 2 metres high and are maintained at the height when established.

Control and Management Strategies (Post Mine Completion)

Mandatory Strategies:

Soil stockpiled to a maximum of 2m in height to preserve seed stock and micro-organism function.

Soil stockpiles vegetated to prevent erosion and retain soil quality.

Optional Strategies:

Prior to mining, the amount of soil required for successful rehabilitation will be calculated.

Machinery will only be refuelled in a bunded area in accordance with EPA requirements.

Provide any additional Strategies

Operational vehicles will be required to keep to established and designated tracks and work zones. Saline water used for dust suppression activities during construction operations will be applied at such a rate, so as to ensure no runoff to undisturbed areas occurs. Regular inspection for any spills, spill management procedure to be implemented.

Yes No

Yes No

4.6 Waste

Outcome

All commercial, industrial and domestic waste is disposed of in accordance with relevant legislation.

Measurement Criteria

Waste disposal receipts demonstrate that all commercial, industrial (including contaminated soil) and domestic waste within the tenement was disposed of offsite in accordance with *Environment Protection Act 1993* requirements.

Control and Management Strategies

Mandatory Strategy:

Any general rubbish brought onto the tenement by workers or contractors will be removed on a daily basis or will be stored in rubbish bins and disposed of offsite at an EPA licensed waste facility.

Provide any additional Strategies:

The Buzzard Mine Site has a Waste Management Plan and will be serviced by a licenced waste operator collecting waste for disposal at a licenced facility offsite.

4.7 Noise

Outcome

No public nuisance impacts from noise as a result of mining operations.

Measurement Criteria

Records from Mine Logbook will demonstrate that any noise complaints received were resolved with the complainant within 48 hours (or other time as agreed with Mining Regulator).

If complaints are not resolved the Tenement Holder will conduct noise monitoring at the sensitive receptor to demonstrate noise levels comply with the *Environment Protection (Noise) Policy 2007*.

Control and Management Strategies

Optional Strategies:

Mining operations will only be carried out between the hours of 7am and 6pm Monday to Saturday

Trucks will be advised to avoid using air brakes in built up areas.

Provide any additional Strategies:

No additional control and management strategies are required as the site is remote with no sensitive receptors nearby. Site operational hours will be 6:00 am to 6:00 pm, seven days a week.

Yes No

Yes No

4.8 Air quality

Outcome

No public health and/or nuisance impacts from dust generated by mining operations.

Measurement Criteria

Records from Mine Logbook will demonstrate that any dust complaints received were acknowledged within 48 hours and resolved with the complainant within 7 days (or other time as agreed with Mining Regulator).

If complaints are not resolved to the satisfaction of Mining Regulation, air quality monitoring is to occur at locations, and using methods, as agreed with the Mining Regulator, to demonstrate:

- PM10* ground level concentrations leaving the tenement when measured over a 24-hour period (midnight to midnight) comply with the *Environment Protection (Air Quality) Policy 2016*, **and/or**
- dust deposition leaving the tenement does not exceed 4g/m²/month.

*Particulate matter with an aerodynamic diameter of ten micrometres or less

Control and Management Strategies

Mandatory Strategies:

Rehabilitation will occur progressively in accordance with the Mining Plan.

All loaded trucks leaving the Tenement will be covered.

Mining will not occur during extreme wind days (i.e. dry conditions and wind speeds over 50km/hr)

Haul roads will be watered when required to control dust.

Provide any additional Strategies:

No additional control and management strategies are required as the site is remote with no sensitive receptors nearby. Loaded trucks will not be covered when leaving the EML as they will remain within the proposed haul road MPL.

4.9 Surface water

Outcome

No adverse impact to surface water quality and water dependent ecosystems on or off the Land as a result of contamination and sedimentation caused by mining operations.

Measurement criteria

Photographic records in the Mine Logbook, following rainfall events resulting in run-off, will demonstrate that surface water coming into contact with mining operations is retained within the tenement.

Control and management strategies

Mandatory strategies:

Rehabilitation will occur progressively in accordance with the Mining Plan.

Any material amount of surface water impacted by mining operations will be captured and retained within the tenement.

Optional strategies:

Mining operations will not capture or retain any material amounts of surface water which would require management.

Yes No

Clean surface water runoff will be diverted around the working area

Yes No

A sump will be created to capture and hold surface water within the pit.

Yes No

Provide any additional strategies:

Click to enter text.

4.10 Visual amenity

Outcome

The form, contrasting aspects and reflective aspects of mining operations are visually softened to blend in with the surrounding landscape.

Measurement Criteria

Annual site inspection records in the Mine Logbook demonstrate that:

- the maximum area of un-rehabilitated land at any one time is 3 hectares; and
- progressive and final rehabilitation has been completed in accordance with the approved Mining Plan.

Control and Management Strategies**Mandatory Strategies:**

Mining operations will be progressively rehabilitated as per the Mining Plan.

The maximum area of un-rehabilitated land will be less than 3 hectares at any one time.

Provide any additional Strategies:

Click to enter text.

4.11 Post mining land use

Outcome

All land disturbed by mining operations is rehabilitated to achieve the post mining land use.

Measurement Criteria

Following final rehabilitation work an appropriate person will inspect the site and verify in a report (to be stored in the Mine Logbook) that final rehabilitation has been undertaken in accordance with the Mining Plan to achieve the approved post mining land use.

Control and Management Strategies

Mandatory Strategies:

Mining operations will be progressively rehabilitated to achieve post mining land use as per Mining Plan.

Optional Strategies:

The land will be revegetated with:

- native vegetation
- crops
- pasture
- as agreed with the landowner natural regeneration of native vegetation (please specify).

Yes No

Yes No

Yes No

Yes No

Provide any additional Strategies:

Click to enter text.

4.12 Groundwater

Outcome

No adverse impact to groundwater caused by mining operations.

Measurement Criteria

Annual inspection or survey (as agreed with Mining Regulator) of the pit floor recorded in the Mine Logbook will demonstrate that mining operations do not exceed the mine depth levels stated in the Mining Plan.

Control and Management Strategies**Mandatory Strategy:**

No mining to be undertaken within 2 metres of the estimated highest seasonal groundwater level.

Provide any additional Strategies:

Not applicable

4.13 Protection of Third Party Property, Infrastructure and Adjacent Land

Potential impacts from mining on third party property and Infrastructure, including adjacent land use, were identified as a concern during stakeholder consultation.

Yes

No (No further action required in this table)

Outcome

No unauthorised damage (including that caused by fire) to adjacent public or private property, infrastructure and adjacent land use.

Measurement Criteria

Any complaints of unauthorised damage to adjacent public or private property, infrastructure or impact to adjacent land use from mining operations will be recorded in the Mine Logbook at time of complaint and investigated within 7 days (or other time as agreed with Mining Regulator) to show that the mine operator did not cause the damage or impact through mining operations.

Control and Management Strategies

Mandatory Strategies:

Machinery will not be operated on the tenement during total fire ban days.

Optional Strategies:

A buffer of [Click to enter text.](#) metres will be observed around any third party infrastructure within the Tenement.

Provide any additional Strategies:

[Click to enter text.](#)

Yes No

4.14 Caves

The mineral claim is located in an area of known caves

Yes

No (No further action required in this table)

Outcome

No unauthorised damage to caves of significance as a result of mining operations.

Note: For the purposes of this outcome the term "cave" includes any underground opening or cavity with a cross sectional area greater than 0.25m², and a minor axis measurement greater than 0.4 metre.

Measurement Criteria

Mine Logbook records demonstrate that work ceased on discovery of a cave and a suitably qualified expert assessed the significance of the cave to the satisfaction of the Mining Regulator.

If the assessment concludes that the cave is significant, then records must demonstrate that measures have been implemented to ensure the cave continues to be protected from further damage. Mine logbook records will demonstrate that work recommenced only after approval from Mining Regulation.

Control and Management Strategies

Mandatory Strategies:

All operators will be made aware of their obligations regarding caves.

Provide any additional Strategies:

Click to enter text.

4.15 Native Vegetation

Native vegetation is located within the mineral claim

Yes

No (No further action required in this table)

Outcome

No loss of abundance and/or diversity of native vegetation on or off the tenement through;

- clearance,
- dust/contaminant deposition,
- fire,
- other damage,

unless a significant environmental benefit (SEB) has been approved in accordance with the relevant legislation.

Measurement Criteria

If native vegetation is retained:

Annual site survey/photographic evidence (stored in the Mine Logbook) will show no clearance of native vegetation identified and shown in the Mining Plan.

and/or

If native vegetation is to be cleared:

Clearance will be undertaken in accordance with the attached Native Vegetation Management Plan.

Control and Management Strategies

Optional Strategies:

If native vegetation is retained:

A buffer zone of a minimum 5m from the canopy drip line of native vegetation will be maintained and flagged during operations, where no excavation, stockpiling or other earthworks will be undertaken within this buffer zone.

and/or

If native vegetation is to be cleared:

Native vegetation areas for clearance will be identified and flagged as per the Native Vegetation Management Plan (NVMP) and all operators will be made aware of areas for clearance based on NVMP prior to commencement of mining.

Provide any additional Strategies:

The Kultanaby Haul Road and Borrow Pit NVMP will be provided as part of the PEPR application.

Yes No

Yes No

4.16 Blasting

Blasting is proposed during mining operations Yes No (*No further action required in this table*)

Will explosives be stored on site? Yes No

Proposed frequency of blasting: <insert>

Outcome

No public health and/or nuisance impacts from air blast, vibrations or flyrock caused by blasting.

Measurement criteria

Records from the Mine Logbook demonstrates that all blast related complaints received were acknowledged within 48 hours and resolved with the complainant within 7 days (or other time as approved by Mining Regulator) to the satisfaction of Mining Regulation.

If complaints are not resolved to the satisfaction of Mining Regulation blast monitoring is to occur at locations, and using methods as agreed with the Mining Regulator to demonstrate that:

- air blast and vibrations levels meet limits in the Australian Standards (AS 2187.2)
- there are no incidents of fly rock leaving the tenement boundary.

Control and management strategies

Mandatory strategies:

All blasts are to be recorded in Mine Logbook detailing timing, size and number of drill holes.

All blasting activities will be carried out by a fully licenced blasting contractor.

All blasts undertaken in accordance with the Australian Standards (AS 2187.2).

Notify the landowner and all adjacent receptors of a blast, 48 hours prior to a blast.

Provide any additional strategies:

Not Applicable

Section 5: Records

Records related to measurement criteria will be kept in a Mine Logbook. All records will be kept for the duration of the lease.

Section 6: Maps and plans

All maps and plans must be attached to this proposal when submitted.

6.1 Attachment 1 – Location plan

Scale and north point	<input checked="" type="checkbox"/> Yes
Tenement boundaries drawn on plan	<input checked="" type="checkbox"/> Yes
Infrastructure (houses, roads, railways, etc.)	<input type="checkbox"/> N/A <input checked="" type="checkbox"/> Yes
Distance to residences or third party property and/or exempt land	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Yes
Location plan labelled and attached to the proposal	<input checked="" type="checkbox"/> Yes
Proposed product transport route	<input checked="" type="checkbox"/> Yes
Sensitive areas in/adjacent to tenement (conservation areas, heritage sites etc.)	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Yes
If heritage areas separate plan attached <input type="checkbox"/> Yes	

6.2 Attachment 2 – Mining plan(s) (multiple plans can be included)

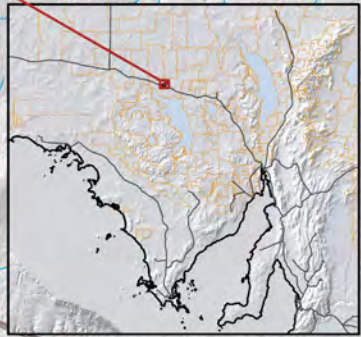
Scale and North Point	<input checked="" type="checkbox"/> Yes
Legend or key	<input checked="" type="checkbox"/> Yes
Tenement boundaries	<input checked="" type="checkbox"/> Yes
Identify any exempt land and distance from proposed mining operations	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Yes
Access road(s) (proposed and existing road(s))	<input checked="" type="checkbox"/> Yes
Areas proposed to be mined	<input checked="" type="checkbox"/> Yes
Existing infrastructure (house, road, electricity pole, etc.)	<input checked="" type="checkbox"/> Yes
Proposed plant and equipment (crusher, plant, etc.)	<input type="checkbox"/> Yes
Proposed stockpiles location (overburden, topsoil and product)	<input checked="" type="checkbox"/> Yes
Direction of mining	<input checked="" type="checkbox"/> Yes
Stages of workings (showing less than 3ha open at one time)	<input checked="" type="checkbox"/> Yes
Direction of progressive rehabilitation	<input checked="" type="checkbox"/> Yes
Proposed native vegetation in accordance with the NVMP	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Yes
Existing native vegetation what will not be cleared or impacted	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Yes
Buffer(s) (native vegetation, infrastructure, etc.)	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Yes
Visual screening measures (existing and proposed)	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Yes
Surface water and/or groundwater features (drainage lines, surface water management structure, bore locations)	<input type="checkbox"/> N/A <input checked="" type="checkbox"/> Yes
Previously disturbed areas	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Yes
Mining plan(s) labelled and attached to the Proposal	<input checked="" type="checkbox"/> Yes

6.3 Attachment 3 – Proposed final landform plan

Scale and North Point	<input type="checkbox"/> Yes
Legend or key	<input checked="" type="checkbox"/> Yes
Tenement boundaries	<input type="checkbox"/> Yes
Location of all reshaped and rehabilitated areas	<input type="checkbox"/> Yes
Location of all revegetated areas (including native vegetation, if applicable)	<input type="checkbox"/> Yes
Final pit outline and batters	<input type="checkbox"/> Yes
Remaining (undisturbed) native vegetation	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Yes
Location of drainage lines and watercourses	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Yes
Remaining infrastructure	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Yes
Final landform plan labelled and attached to the Proposal	<input checked="" type="checkbox"/> Yes

6.4 Attachment 4 – Cross-section plans

Scale (vertical and horizontal)	<input checked="" type="checkbox"/> Yes
North-south and east-west view	<input checked="" type="checkbox"/> Yes
Pre-mining natural surface	<input checked="" type="checkbox"/> Yes
Conceptual final rehabilitation surface	<input checked="" type="checkbox"/> Yes
Cross-section labelled and attached to the proposal	<input checked="" type="checkbox"/> Yes



Peak IRON MINES

Kultanaby Proposed Haul Road -
Location Map

14/09/2022 3:37 PM

1:80,000

GDA2020 MGA Zone 53

Proposed features

MPL

Haul road

Infrastructure (existing)

Road

Track

Highway

Road

Railway line

Mineral Claims

Pastoral station

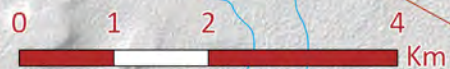
Hydrology

Waterbody

Lake

Lake - intermittent

Watercourse



CI22-008


24/10/2022 5:14 PM

1:60,000

User: JemShimmield

Proposed features

 Haul road

 MPL

Infrastructure (existing)

 Track

 Highway

 Road

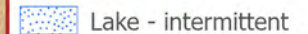
 Railway line

Mineral Claim

 Proposed

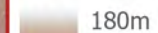
Hydrology

 Lake

 Lake - intermittent

 Watercourse

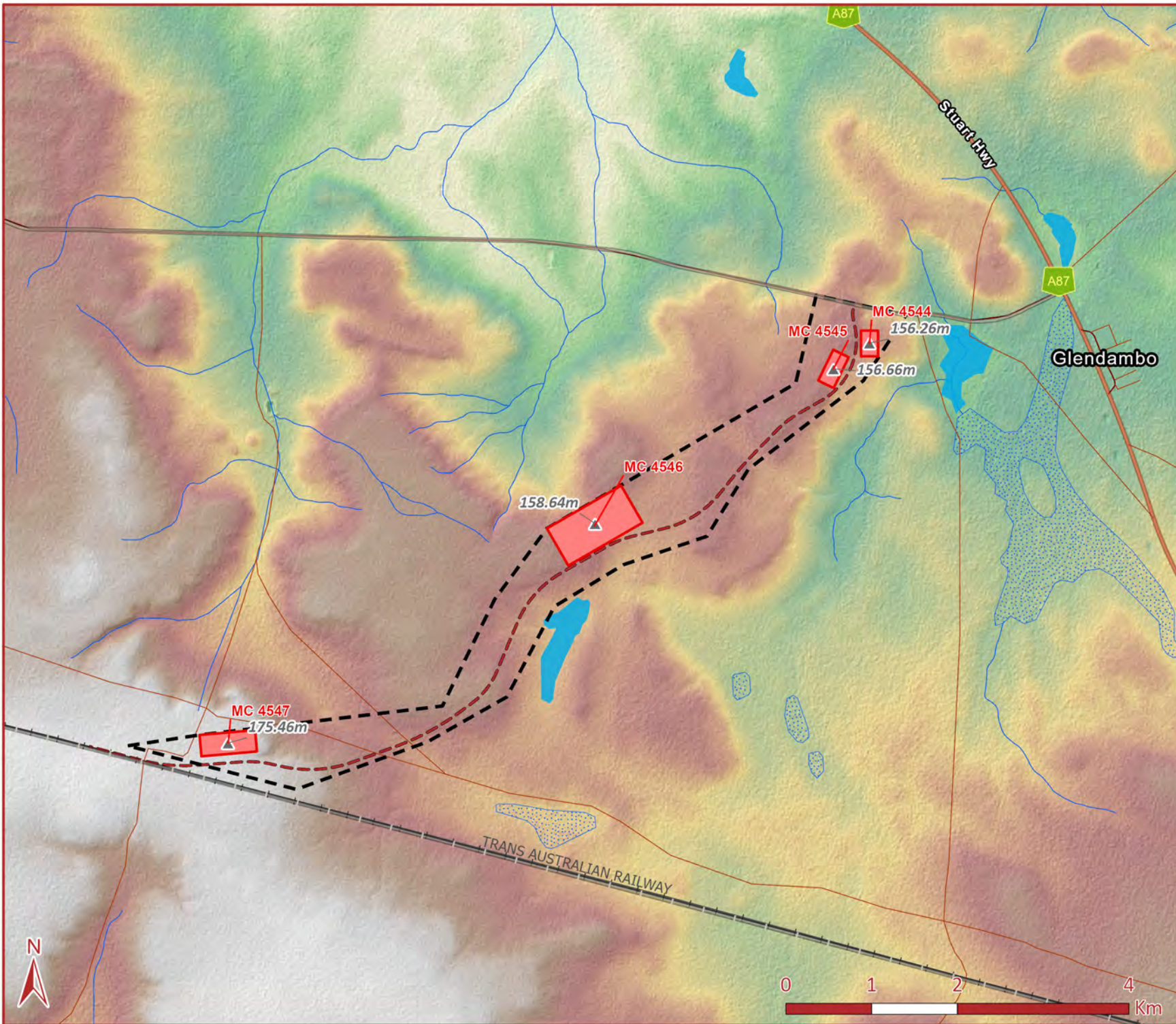
Elevation (mAHD)

 180m

 130m

 Spot elevation (mAHD)

There is no warranty that this map is free from errors or omissions. This map is not intended for external distribution.



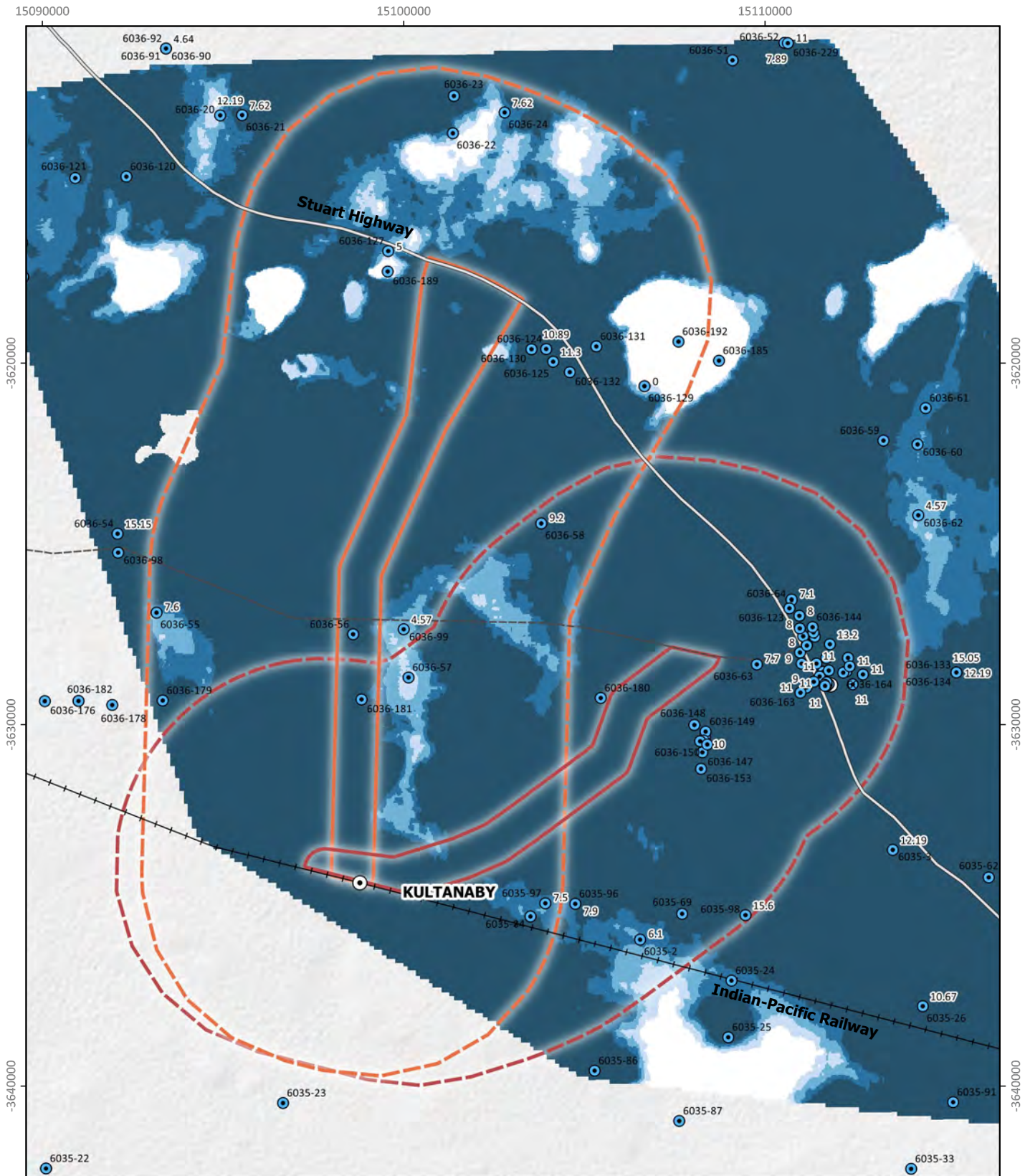
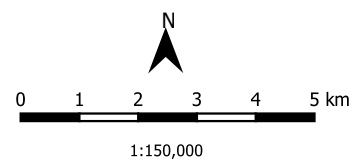


Figure 12 - Study Area Modelled Depth to Water

- | | |
|----------------------------|---------------------------|
| Road | Depth to water (m) |
| Rail | < 2 |
| Tarcoola - Glendambo Road | 2 - 4 |
| Northern Option 500m | 4 - 8 |
| Northern Option 5km Buffer | > 8 |
| Southern Option 500m | |
| Southern Option 5km Buffer | |
| WaterConnect Wells | |
- Black labels showing WaterConnect Unit No.
White labels showing depth to water (metres below ground level)

DATA SOURCES
Peak Iron
ESRI Satellite



DISCLAIMER
CDM Smith has endeavoured to ensure accuracy and completeness of the data. CDM Smith assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within this map.

CI22-010

28/10/2022 11:54 AM

1:100,000

User: JemShimmield

Groundwater bore

- Depth to groundwater (m)

Depth to groundwater



Proposed features

- - - Haul road

Infrastructure (existing)

- Track
- Highway
- Road
- +— Railway line

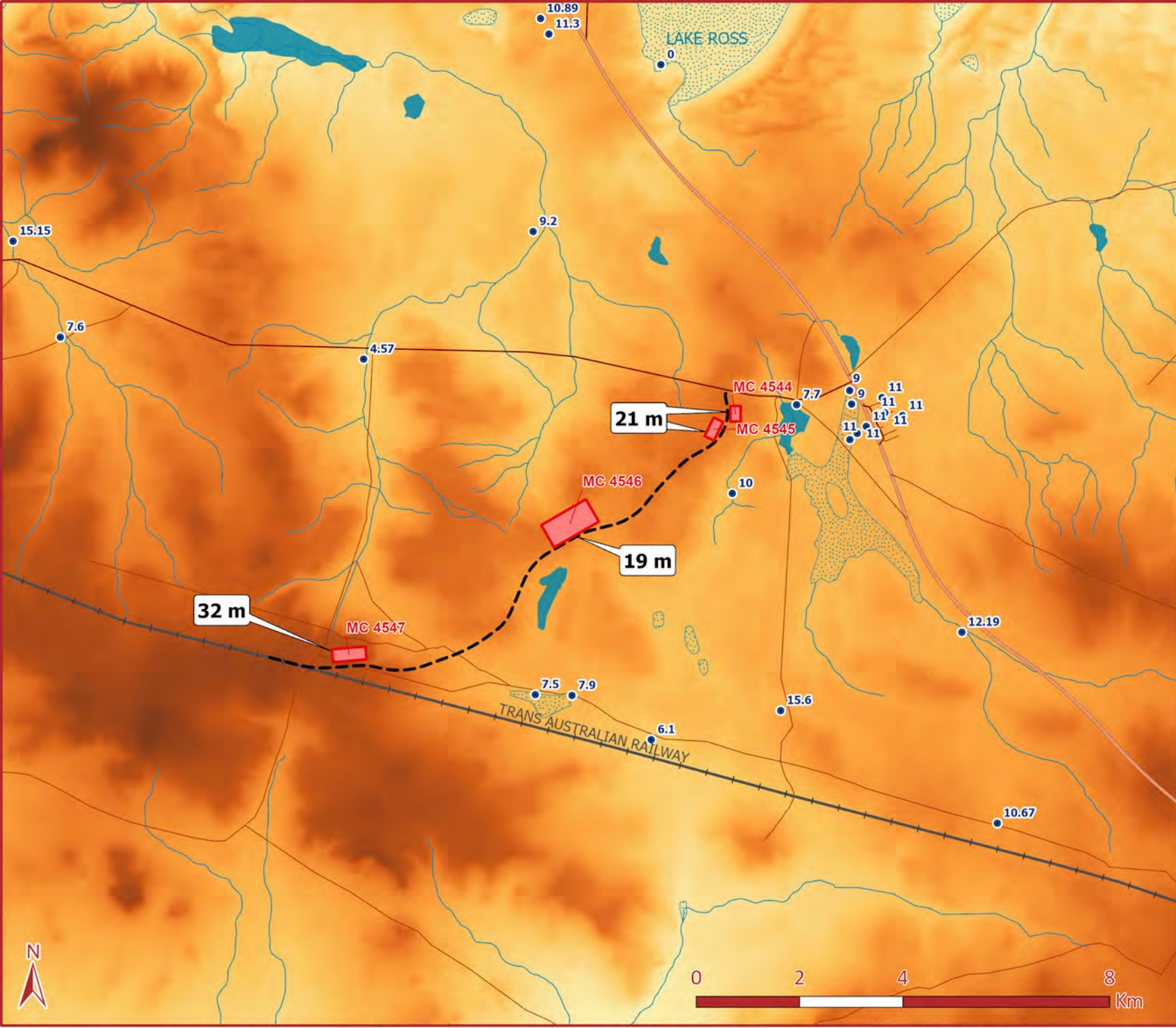
Mineral Claim

- Proposed

Surface hydrology

- Lake
- Lake - intermittent
- Watercourse

32 m Inferred depth to groundwater

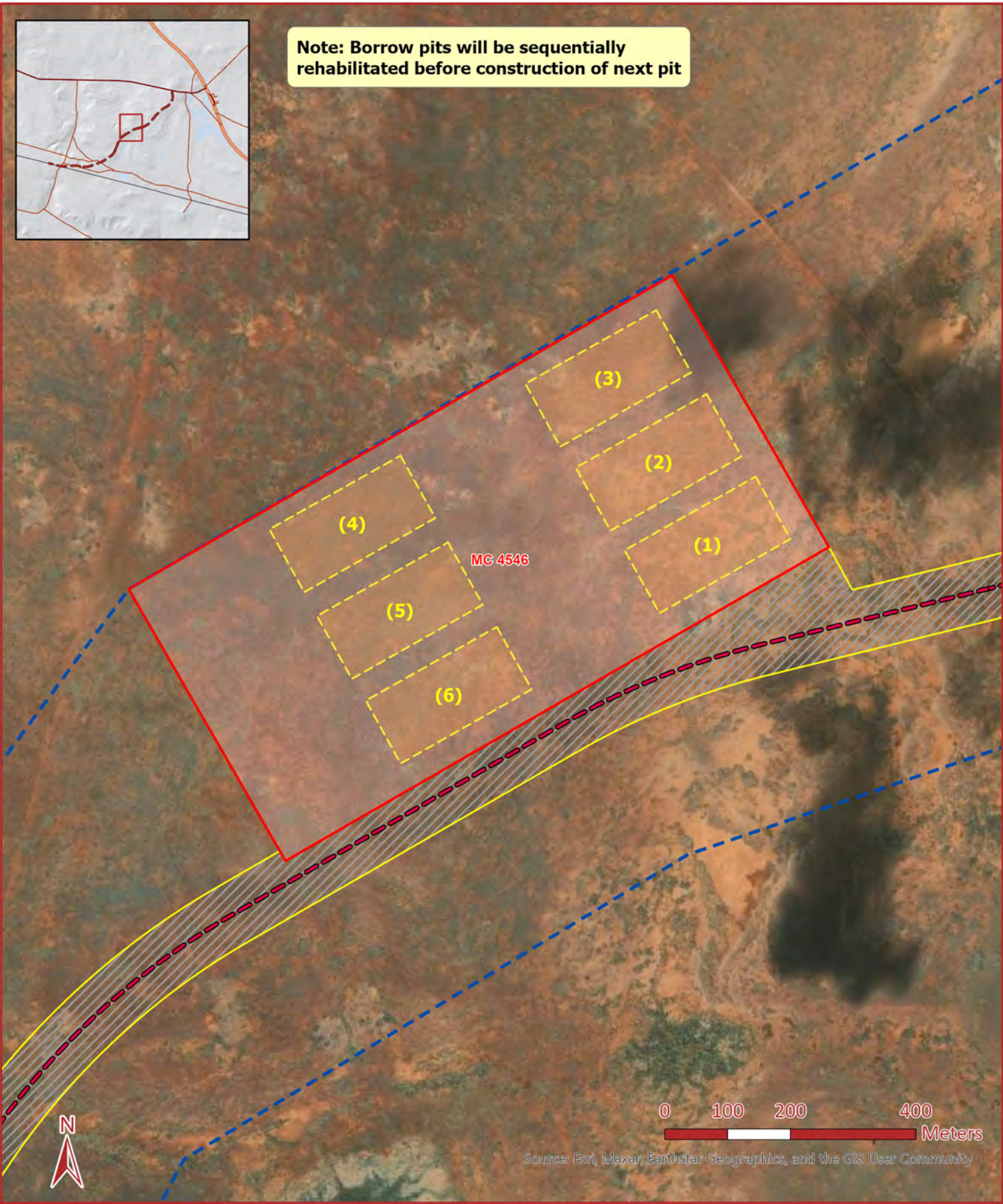


There is no warranty that this map is free from errors or omissions.

Table: Inferred groundwater level and estimated depth to groundwater from base of borrow pit

Mineral Claim	Surface elevation (mAHD)	Max base of pit elevation (mAHD)	Inferred groundwater level (mAHD)	Inferred depth to groundwater from base of pit (m)
MC4544	156	151	135	16
MC4545	157	152	136	16
MC4546	159	154	140	14
MC4547	175	170	143	27

Note: Borrow pits will be sequentially rehabilitated before construction of next pit



Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



MC 4546
1:8,000

14/09/2022 3:40 PM

GDA2020 MGA Zone 53

Proposed features

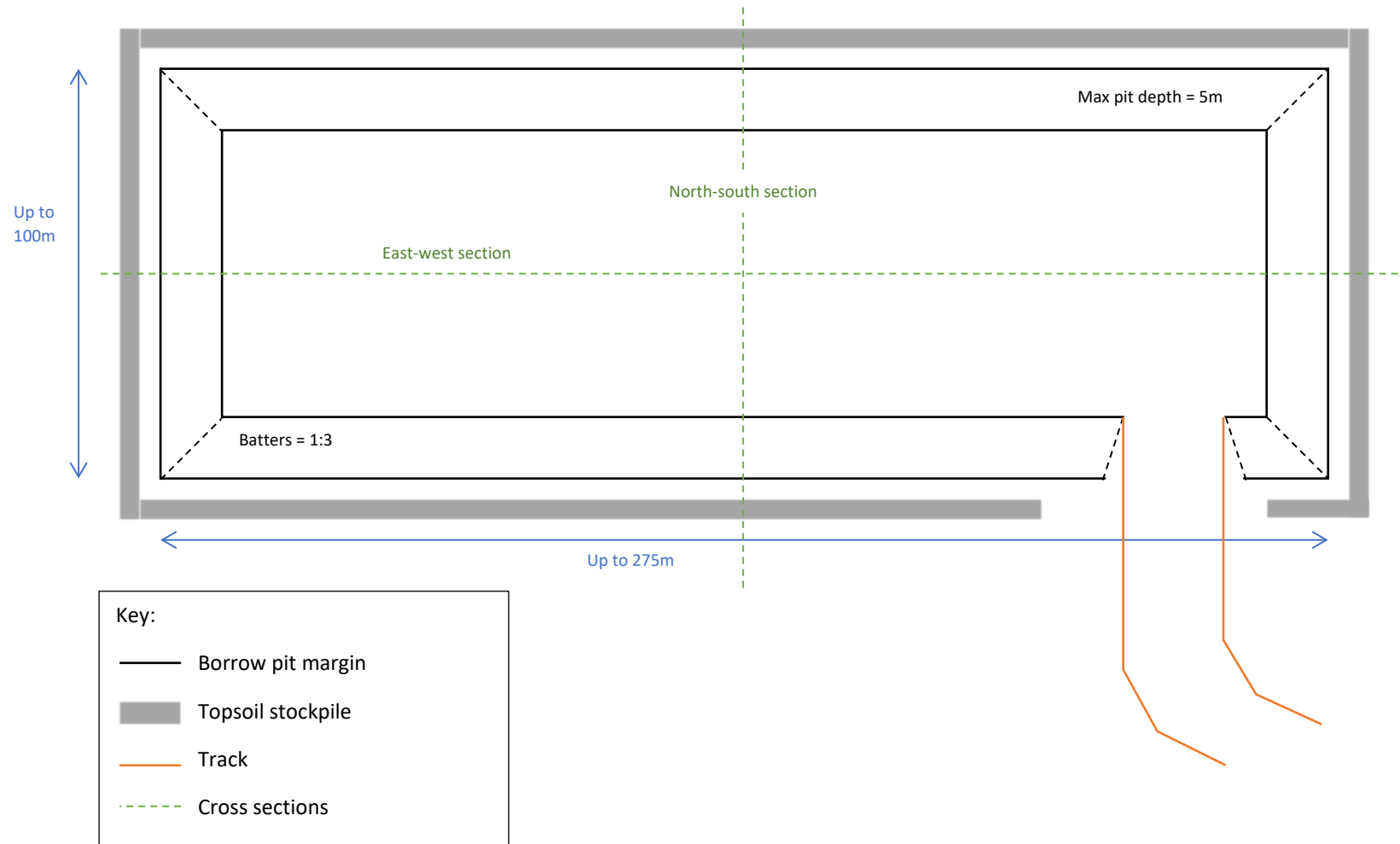
- MPL
- Haul road
- Indicative borrow pit location
- Haul road construction footprint

Mineral Claims



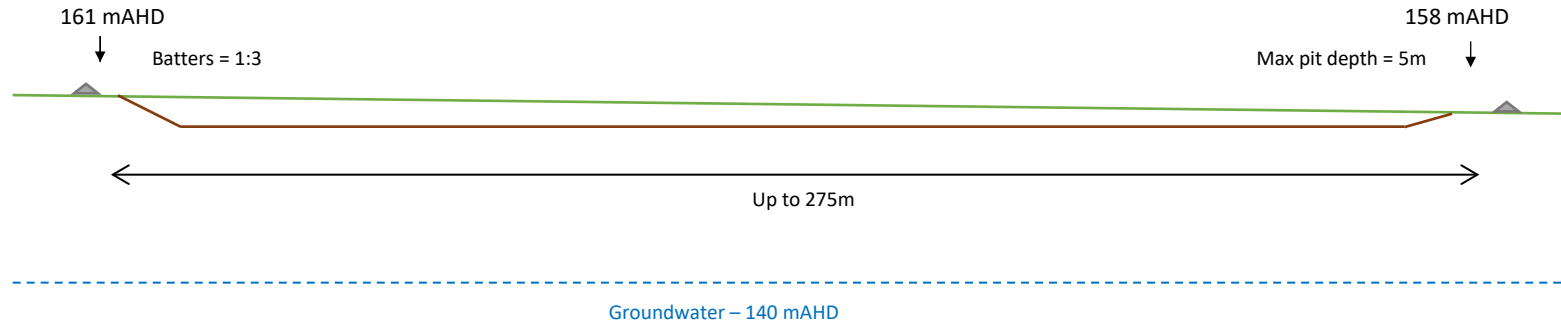
Attachment 4: Conceptual borrow pit layout and cross sections

4a: Conceptual borrow pit layout

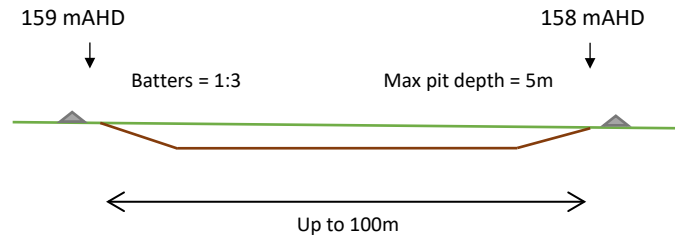


Attachment 4: Conceptual borrow pit layout and cross sections (MC 4546)

4b: Conceptual borrow pit cross section – west-east



4c: Conceptual borrow pit cross section – north-south



Key:

- Pre-mining surface
- ▲ Topsoil stockpile
- Conceptual final surface

Section 7: Applicant declaration

<input checked="" type="checkbox"/>	I have taken reasonable steps to review the information to ensure its accuracy and all statements made and information given in this application is true and correct.
<input checked="" type="checkbox"/>	I declare that the resource or reserve (or both) has been appropriately identified and estimated
<input checked="" type="checkbox"/>	Based on the control strategies provided I consider that the environmental outcomes will be able to be achieved.

Signature: 

Print name: Diona Antonas

Date: 8 November 2022

Position: Manager - Approvals, Environment and
Government Relations

Section 8: Operator capability and compliance history

I have the following technical, operational and financial capabilities and resources available for carrying out proposed mining operations:

Peak Iron Mines Pty Ltd (Peak) is a 100% Australian owned, private company established in April 2019 for the purpose of acquiring the Peculiar Knob Mine, the Hawks Nest Iron Project (EL 6395) which includes the Buzzard Project, and a suite of other tenements in the Coober Pedy area. Southern Iron (wholly owned subsidiary of Peak) owns the Peculiar Knob Mine and other tenements. Central Iron (also wholly owned subsidiary of Peak) owns the Hawks Nest Iron Project.

In the last 5 years, a related body corporate or I have failed to comply with a provision of a corresponding Australian law or designated Australian Act in connection with authorised operations that resulted in:

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	The revocation or suspension of an authority to carry out authorised operations; or
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	A prosecution for an offence; or
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	The imposition of a penalty by a court; or
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	The issuing of a notice, direction or order that required the suspension or discontinuance of any authorised operations or
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	the rectification of any harm to the environment or the rehabilitation of any land, place or other aspect of the environment

Further detail on noncompliance if relevant:

[Click to enter text.](#)

Appendix 1: Landowner consultation

The following information was discussed with the landowner to ensure that the landowner is fully aware of the proposed mining operations and to reduce potential issues arising once mining has commenced.

If there is more than one landowner, copy as required.

Proposed location of mining operations	<input type="checkbox"/> Yes
Exempt land and any required waivers of exemption	<input type="checkbox"/> Yes
Method of mining	<input type="checkbox"/> Yes
Duration of mining operations	<input type="checkbox"/> Yes
Operating hours	<input type="checkbox"/> Yes
Sequence and staging of mining and rehabilitation	<input type="checkbox"/> Yes
Communication plan, including notification of blasting (if relevant) and follow up meetings	<input type="checkbox"/> Yes
Rehabilitation outcomes including conceptual final landform and land use	<input type="checkbox"/> Yes
Access to tenement	<input type="checkbox"/> Yes
Timing and nature of significant agricultural programs in relation to mining plan	<input type="checkbox"/> Yes
Infrastructure construction and/or maintenance (during and post mining)	<input type="checkbox"/> Yes
Weeds and pests (feral animal) management (during and post mining)	<input type="checkbox"/> Yes
Protection of infrastructure and/or sensitive areas within the tenement	<input type="checkbox"/> Yes
Use of landowner services and utilities	<input type="checkbox"/> Yes
Impact on visual amenity	<input type="checkbox"/> Yes
Other? Please specify: A Land Access Agreement is currently being negotiated and will be finalised prior to submission of the PEPR.	<input type="checkbox"/> Yes

Did the landowner raise any matters in relation to the information discussed above?	<input type="checkbox"/> Yes <input type="checkbox"/> No
---	---

If you answered 'Yes' please provide details below:

<i>Matter(s) raised</i>	Click to enter text.
<i>Resolution(s) proposed</i>	Click to enter text.

LANDOWNER SIGNATURE

<input type="checkbox"/> I have read this document and have been consulted on the matters listed above.			
SIGNATURE:		
PRINT NAME:	Click to enter text.	DATE:	Click to select a date.

Appendix 2: Adjacent landowner consultation

The following information was discussed with residents that live adjacent to the mineral claim to ensure that they are fully aware of the proposed mining operations and to reduce potential issues arising once mining has commenced.

(If there is more than 1 adjacent landowner, copy as required.)

Proposed location of mining operations	<input type="checkbox"/> Yes
Exempt land and any required waivers of exemption	<input type="checkbox"/> Yes
Method of mining	<input type="checkbox"/> Yes
Duration of mining operations	<input type="checkbox"/> Yes
Operating hours	<input type="checkbox"/> Yes
Sequence and staging of mining and rehabilitation	<input type="checkbox"/> Yes
Communication plan, including notification of blasting (if relevant) and follow up meetings	<input type="checkbox"/> Yes
Rehabilitation outcomes including conceptual final landform and land use	<input type="checkbox"/> Yes
Access to tenement	<input type="checkbox"/> Yes
Timing and nature of significant agricultural programs in relation to mining plan	<input type="checkbox"/> Yes
Infrastructure construction and/or maintenance (during and post mining)	<input type="checkbox"/> Yes
Weeds and pests (feral animal) management (during and post mining)	<input type="checkbox"/> Yes
Protection of infrastructure and/or sensitive areas within the tenement	<input type="checkbox"/> Yes
Use of services and utilities	<input type="checkbox"/> Yes
Visual amenity	<input type="checkbox"/> Yes
Other? Please specify: Click to enter text.	<input type="checkbox"/> Yes

Did the adjacent landowner raise any matters in relation to the information discussed above?	<input type="checkbox"/> Yes <input type="checkbox"/> No
--	---

If you answered 'Yes' please provide details below:

<i>Matter(s) raised</i>	Click to enter text.
<i>Resolution(s) proposed</i>	Click to enter text.

LANDOWNER SIGNATURE

<input type="checkbox"/> I have read this document and have been consulted on the matters listed above.			
SIGNATURE:		
PRINT NAME:	Click to enter text.	DATE:	Click to select a date.

Appendix 3: Stakeholder consultation

Stakeholder name: Gawler Ranges Aboriginal Corporation

Date of consultation: Ongoing

Matter(s) raised:

Negotiation of a Native Title Mining Agreement for the Kutanaby Haul Road project (including associated EMLs).

Resolution(s) proposed:

Content of the Native Title Mining Agreement is confidential. The agreement will be finalised prior to submission of the PEPR.

Stakeholder name: Click to enter text.

Date of consultation: Click to select a date.

Matter(s) raised:

Click to enter text.

Resolution(s) proposed:

Click to enter text.

Appendix 4 – Eligibility criteria

Provide a copy of the eligibility criteria.



Defined Impact (MP) eQuestionnaire: MC 4546

The Defined Impact Mining Proposal (MP) eQuestionnaire has been designed to evaluate whether you as an applicant are eligible for use of the Mining Proposal Template.



- The questionnaire consists of thirteen questions, to answer each question check the Yes or No option provided.
- On completion of eQuestionnaire please print a copy for your records using the print icon provided.

More Information & Guidelines:
 Mineral Resources Website: [Extractive Minerals](#)

For enquires contact:

Resource Information Centre:
 Customer Services
 Phone: +61 8 8463 3000
 email: resources.customerservices@sa.gov.au

START QUESTIONNAIRE

1	Is the Mineral Claim located outside of the 'Evaluation Eligibility Criteria' layers on the SARIG map?	<input type="radio"/> Yes <input type="radio"/> No
2	Interaction with other tenements Will the tenement be operated (stockpile, store or process material) in conjunction with another lease or application area?	<input type="radio"/> Yes <input checked="" type="radio"/> No
3	Potential Impact Receptors Infrastructure Is mining proposed less than 50 metres from any gas pipelines, overhead transmission lines, water pipeline or underground telecommunication lines? Note: infrastructure within 150 metres of proposed mining operations, may initiate the requirements of exempt land in accordance with Section 9 of the <i>Mining Act 1971</i> .	<input type="radio"/> Yes <input checked="" type="radio"/> No
4	Surface Water Is mining proposed less than 25 metres from a Watercourse?	<input type="radio"/> Yes <input checked="" type="radio"/> No

5	Groundwater Is mining proposed to stay two metres above known groundwater levels?	<input checked="" type="radio"/> Yes <input type="radio"/> No
6	Potential Sources of Impact Is continuous 24 hour mining operations?	<input type="radio"/> Yes <input checked="" type="radio"/> No
7	Is the rock to be mined likely to contain hazardous minerals? E.g. sulphides, asbestos and/or radioactive minerals.	<input type="radio"/> Yes <input checked="" type="radio"/> No
8	Will proposed mining involve any wet processing?	<input type="radio"/> Yes <input checked="" type="radio"/> No
9	Will the maximum area of land disturbed by mining (including stockpiles) be greater than 3 hectares at any one time?	<input type="radio"/> Yes <input checked="" type="radio"/> No
10	Will proposed mining operations occur to a depth less than 5 metres from ground level?	<input checked="" type="radio"/> Yes <input type="radio"/> No
11	Will proposed mining operations require blasting? Note: if the applicant does not meet this criteria but believes the risk profile of the application will meet other criteria please call Mining Regulation to discuss.	<input type="radio"/> Yes <input checked="" type="radio"/> No
13	Will proposed mining be conducted on a sand dune or a surface outcrop less than 10m in height?	<input checked="" type="radio"/> Yes <input type="radio"/> No
This application has met the eligibility criteria for the Defined Impact Mining Proposal (MP) eQuestionnaire to proceed with your application: Defined Impact Mining Proposal (MP) DOC Template 2021.docx		

Appendix 5: Native vegetation assessment and native vegetation management plan

If native vegetation clearance is proposed, please provide the native vegetation assessment undertaken by a native vegetation council accredited consultant.

If the significant environmental benefit (SEB) will be met via providing an on ground off-set, please provide a native vegetation management plan.

Tegan Stehbens
Senior Environment and Approvals Officer
Peak Iron Mines
Level 12, 33 King William St
ADELAIDE SA 5000

Wednesday, 29 June 2022

Re: Buzzard Project Kultanaby Haul Road Significant Environmental Benefit (SEB) obligation.

Dear Tegan,

Following field surveys undertaken in October 2020 and April 2021 and detailed project design designating the impact footprint of the proposed Kultanaby haul road development, the SEB obligation of the vegetation clearance has been calculated.

The field surveys occurred across a larger Survey Area of 1955 ha and clearing of native vegetation cannot be avoided. However, the proposed haul road and associated infrastructure (Project Area) have been designed to impact as little native vegetation as possible. The Survey Area and Project Area, including the haul road construction footprint and extractive pits, are shown on the map in Figure 1. The map also shows impacted Vegetation Associations.

The total SEB obligation for the clearance of 190.16 hectares (ha) of native vegetation is summarised in the table below, with a detailed breakdown of calculations shown in the following pages. The calculation includes the haul road construction footprint and extractive pits used to source road building materials.

Scoresheets used to calculate the SEB from data collected using the Rangelands Assessment Method are provided as electronic attachments (Attachment 1 to 6), as is spatial data for impacted Vegetation Associations (Attachment 7).

	Impact Area (ha)	Total Biodiversity score	Total SEB points required	Hectares Required (on-ground SEB)	SEB Payment	Admin Fee	Total Payment
Haul Road Construction Footprint	109.94	5647.08	5929.44	741.18	\$301,825.33	\$16,600.39	\$318,425.72
Extractive Pits	80.22	4039.61	4241.59	530.19	\$215,908.68	\$11,874.98	\$227,783.66
SEB TOTAL	190.16	9686.69	10171.02	1271.37	\$517,734.01	\$28,475.37	\$546,209.38

Regards,



Jesse Carpenter
Senior Ecologist

M: 0400 254 201
P: (08) 7127 5607
E: jesse.carpenter@ebsecology.com.au

Native Vegetation Impacted

Two native Vegetation Associations will be impacted within the Kingoonya IBRA subregion. These are listed in Table 1, with the number of hectares impacted also listed. The location of the impact footprint in relation to Vegetation Associations is shown in Figure 1. Only a single landscape type, an undulating plain, occurs in the impacted area.

Table 1. Vegetation Associations impacted by the clearance.

Landscape Type	Vegetation Association	Clearance Area (ha)		
		Haul Road Construction Impact	Extractive Pit	Total Impact Area
Undulating Plain	<i>Atriplex vesicaria</i> / <i>Sclerolaena ventricosa</i> Low Shrubland over <i>Austrostipa nitida</i> and annual forbs.	81.06	64.79	145.85
	<i>Maireana pyramidata</i> +/- <i>Maireana erioclada</i> +/- <i>Maireana aphylla</i> Shrubland over <i>Atriplex holocarpa</i> and <i>Austrostipa nitida</i> .	28.88	15.43	44.31

Significant Environmental Benefit Calculations

The Significant Environmental Benefit (SEB) obligations of the clearance have been calculated by using the Rangelands Assessment Method scoresheets issued by the Native Vegetation Council. These scoresheets use data collected in the field to calculate measures, or scores, of vegetation condition and conservation significance. These scores are then used with other variables such as rainfall to calculate the SEB.

These calculations are summarised in Table 2. Scoresheets are provided as electronic attachments (Attachment 1 to 6).

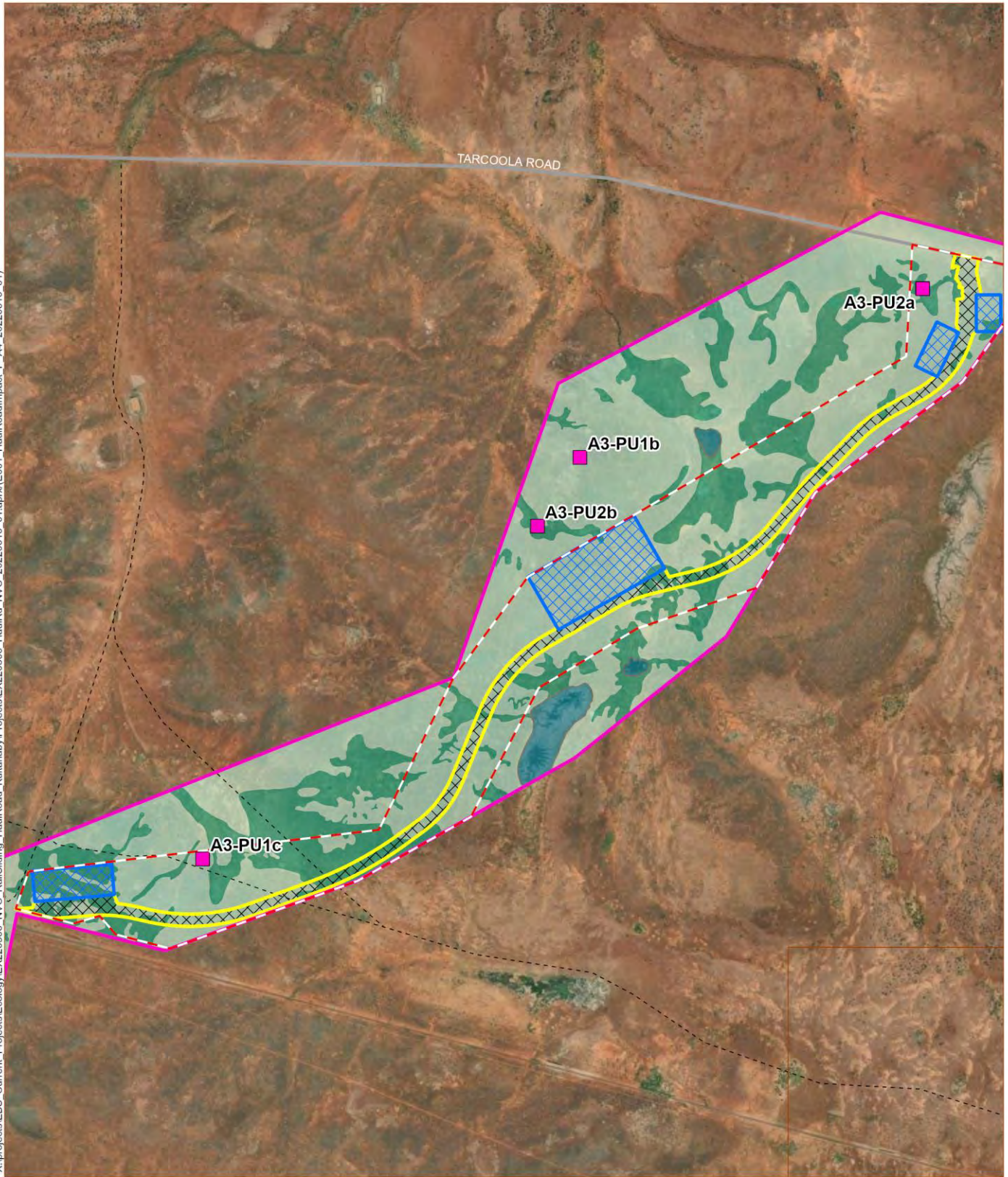
Table 2. Significant Environmental Benefit calculation summary. LCS: Landscape Context Score. VCS: Vegetation Condition Score. CSS: Conservation Significance Score. UBS: Unit Biodiversity Score. TBS: Total Biodiversity Score.

HAUL ROAD CONSTRUCTION IMPACT												
Landscape Type	RAM Site	Impact (ha)	LCS	VCS	CSS	UBS	TBS	SEB Points	Hectares Required	SEB Payment	Admin Fee	Total
Undulating Plains	A3-PU1b	81.06	1.05	37.31	1.10	43.1	3493.36	3668.02	458.50	\$186,712.98	\$10,269.21	\$196,982.19
	A3-PU1c	81.06	1.05	45.11	1.10	52.1	4223.33	4434.50	554.31	\$225,728.80	\$12,415.08	\$238,143.88
	MEAN	81.06		41.21		47.6	3858.35	4051.26	506.41	\$206,220.89	\$11,342.15	\$217,563.04
	A3-PU2a	28.88	1.05	50.69	1.10	58.54	1690.75	1775.29	221.91	\$90,367.37	\$4,970.21	\$95,337.58
	A3-PU2b	28.88	1.05	56.56	1.10	65.33	1886.72	1981.06	247.63	\$100,841.51	\$5,546.28	\$106,387.79
	MEAN	28.88		53.625		61.94	1788.74	1878.18	234.77	\$95,604.44	\$5,258.25	\$100,862.69
Subtotal – Haul Road Construction Impact		109.94		94.84		109.54	5647.08	5929.44	741.18	\$301,825.33	\$16,600.39	\$318,425.72

EXTRACTIVE PITS												
Landscape Type	RAM Site	Impact (ha)	LCS	VCS	CSS	UBS	TBS	SEB Points	Hectares Required	SEB Payment	Admin Fee	Total
Undulating Plains	A3-PU1b	64.79	1.05	37.31	1.10	43.1	2792.19	2931.80	366.47	\$149,236.79	\$8,208.02	\$157,444.81
	A3-PU1c	64.79	1.05	45.11	1.10	52.1	3375.65	3544.43	443.05	\$180,421.53	\$9,923.18	\$190,344.71
	MEAN	64.79		41.21		47.6	3083.92	3238.12	404.76	\$164,829.16	\$9,065.60	\$173,894.76
	A3-PU2a	15.43	1.05	50.69	1.10	58.54	903.33	948.50	118.56	\$48,281.46	\$2,655.48	\$50,936.94
	A3-PU2b	15.43	1.05	56.56	1.10	65.33	1008.04	1058.44	132.30	\$53,877.58	\$2,963.27	\$56,840.85
	MEAN	15.43		53.63		61.94	955.69	1003.47	125.43	\$51,079.52	\$2,809.38	\$53,888.90
Subtotal – Extractive Pits		80.22		94.84		109.54	4039.61	4241.59	530.19	\$215,908.68	\$11,874.98	\$227,783.66

TOTAL SEB		190.16		189.67		219.07	9686.69	10171.02	1271.37	\$517,734.01	\$28,475.37	\$546,209.38
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X:\projects\EBS_Current\Projects\Ecology\EX220306_NVC_RailSliding_HaulRoad_Kultanaby\Projects\EX220306_HaulRd_NVC_20220616_01.aprx(E001_HaulRoadImpact_P_A4_20220616_01)



Data Source: EBS Ecology (2022), ESRI (2022), DEW (2021), DIT (2021)

- Main road
- - - Vehicle track
- Survey Area
- Proposed MPL
- RAM survey site
- Project Area**
- Extractive pit
- Haul road construction footprint

Vegetation Association

- VA1: *Atriplex vesicaria* / *Sclerolaena ventricosa* Low Shrubland over *Austrostipa nitida* and annual forbs.
- VA2: *Maireana pyramidata* +/- *Maireana erioclada* +/- *Maireana aphylla* Shrubland over *Atriplex holocarpa* and *Austrostipa nitida*
- VA3: *Chenopodium nitrariaceum* +/- *Muehlenbeckia florulenta* Shrubland to Open Shrubland over *Eragrostis australasica*, *Eragrostis setifolia* and *Eleocharis pallens*.

0 1 2 km
GDA2020 MGA Zone 53 N



Figure 1. Kultanaby haul road, showing the haul road construction footprint, extractive pits and impacted Vegetation Associations.



EBS Ecology
112 Hayward Avenue
Torrensville, SA 5031
www.ebsecology.com.au
t. 08 7127 5607



Appendix 6: EPBC Act protected matters search

If required, provide a copy of the results of the Protected Matters Search.



Buzzard (Kultanaby Haul Road)
Baseline Flora and Fauna Assessment

Buzzard (Kultanaby Haul Road) Baseline Flora and Fauna Assessment

5 March 2021

Version 1

Prepared by EBS Ecology for Peak Iron Mines

Document Control					
Revision No.	Date issued	Authors	Reviewed by	Date Reviewed	Revision type
1	18/12/2020	J. Carpenter	A. Derry	17/12/2020	Draft
2	27/01/2021	H. Merigot	C. Gibson	29/01/2021	Draft
3	26/02/2021	H. Merigot	C. Gibson	26/02/2021	Final

Distribution of Copies			
Revision No.	Date issued	Media	Issued to
1	18/12/2020	Electronic	Richard Lewis (Environmental Projects) and Kurt Cramer (Peak Iron Mines)
2	5/3/2021	Electronic	Richard Lewis (Environmental Projects) and Kurt Cramer (Peak Iron Mines)

EBS Ecology Project Number: EX200802

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CITATION: EBS Ecology (2021) Buzzard (Kultanaby Haul Road) Baseline Flora and Fauna Assessment. Report to Peak Iron Mines. EBS Ecology, Adelaide.

Cover photograph: *Frankenia serpyllifolia* was an uncommon sub-shrub in the Chenopod shrublands of the Haul Road Project Area.

EBS Ecology
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<http://www.ebsecology.com.au>
email: info@ebsecology.com.au



GLOSSARY AND ABBREVIATION OF TERMS

BDBSA	Biological Database of South Australia (managed by the Department for Environment and Water)
EBS	Environmental and Biodiversity Services Pty Ltd – trading as EBS Ecology
EP	Environmental Projects
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ha	Hectare(s)
HR	Haul Road
HR Project Area	The proposed haul road for the Buzzard haematite deposit, located west of Kultanaby.
IBRA	Interim Bioregionalisation for Australia, Version 7
km	Kilometre(s)
LSA Act	<i>Landscapes South Australia Act 2019</i>
m	metre(s)
mm	millimetre(s)
MNES	Matters of National Environmental Significance, as defined by the EPBC Act
NPW Act	<i>National Parks and Wildlife Act 1972</i>
NV Act	<i>Native Vegetation Act 1991</i>
NVC	Native Vegetation Council
PMST	Protected Matters Search Tool, maintained by http://environment.gov.au/land/native-vegetation/national-vegetation-information-system
RAM	Rangelands Assessment Method
SEB	Significant Environmental Benefit
sp.	Species
ssp.	Subspecies
TBS	Total Biodiversity Score
TEC	Threatened Ecological Community
UBS	Unit Biodiversity Score
VA	Vegetation Association
VCS	Vegetation Condition Score

EXECUTIVE SUMMARY

EBS Ecology (EBS) was contracted by Central Iron Pty Ltd to undertake baseline flora and fauna surveys of both the proposed Buzzard mine site, 120 kilometres (km) south of Coober Pedy, and haul road/rail siding infrastructure near Glendambo. The objectives of the Project were to:

- Establish the likelihood of presence of any flora and/or fauna species listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or *National Parks and Wildlife Act 1972* (NPW Act);
- Collect vegetation data that can be used to calculate the Significant Environmental Benefit (SEB) associated with the Project;
- Identify legislative requirements that will inform the project design and approvals; and
- Make recommendations to assist in gaining approvals related to flora and fauna.

Two options are being considered for the location of the Haul Road to access the Kultanaby rail siding development. This report discusses the results of surveys undertaken within the vicinity of the two proposed Haul Road and rail siding development. Option 1 is the 11 km long link between the Kingoonya Road and Trans-Australia railway line, and Option 2 is the 15 km link between the Stuart Highway and Trans-Australia railway line (see Figure 1).

The **Option 1** survey mapped two Vegetation Associations in the Option 1 Kultanaby Area, including shrublands and low shrublands as listed below. Both Vegetation Associations were found to be in medium condition, with 48 plant species recorded, including two introduced species. These were:

- VA1. *Atriplex vesicaria* / *Sclerolaena ventricosa* Low Shrubland over *Austrostipa nitida* and annual forbs; and
- VA2. *Maireana pyramidata* +/- *Maireana erioclada* +/- *Maireana aphylla* Shrubland over *Atriplex holocarpa* and *Austrostipa nitida*.

The survey recorded 36 fauna species throughout the Kultanaby Project Area. This included 12 reptiles, 21 birds and three mammals (one introduced).

No plant or animal species listed as threatened or migratory under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or *National Parks and Wildlife Act 1972* (NPW Act) was recorded during the survey.

The **Option 2** survey mapped nine Vegetation Associations in the Option 2 Kultanaby Area, including Acacia woodlands, shrublands and low shrublands as listed below. All Vegetation Associations were found to be in medium to medium-high condition, with 82 plant species recorded, and no introduced species. These were:

- VA1. *Acacia papyrocarpa* low open woodland over *Rhagodia spinescens* +/- *Senna artemisioides* ssp. *petiolaris*;
- VA2. *Atriplex vesicaria* +/- *Maireana appressa* Low Shrubland over *Tecticornia* sp.;

- VA3. *Acacia aneura* Very Open Woodland over *Maireana pentatropis* +/- *Maireana georgei* +/- *Aristida contorta*;
- VA4. *Melaleuca glomerata* and *Melaleuca lanceolata* Open Shrubland over *Dodonaea viscosa*;
- VA5. *Senna artemisioides* ssp. *petiolaris* +/- *Maireana sedifolia* shrubland with emergent *Myoporum platycarpum*;
- VA6. *Acacia papyrocarpa* Open Woodland over *Maireana sedifolia*;
- VA7. *Acacia aneura* Open Woodland over *Maireana georgei* +/- *Maireana sedifolia* +/- *Aristida contorta*;
- VA8. *Maireana sedifolia* +/- *Atriplex vesicaria* Low Shrubland; and
- VA9. *Atriplex vesicaria* +/- *Sclerolaena* sp. Low Shrubland over *Aristida contorta* and annual forbs.

The survey recorded 27 fauna species throughout the Kultanaby Area. This included 1 reptile and 26 birds.

No plant or animal species listed as threatened or migratory under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or *National Parks and Wildlife Act 1972* (NPW Act) was recorded during the survey.

Based on survey and desktop results which combined both sites, five species listed as threatened under the NPW Act were assessed as possible or likely to occur in the HR Project Area:

- Slender-billed Thornbill (*Acanthiza iredalei iredalei*) – Rare.
- Thick-billed Grasswren (NW) (*Acanthiza modestus indulkanna*) – Vulnerable.
- Chestnut-breasted Whiteface (*Aphelocephala pectoralis*) – Rare.
- *Ophioglossum polyphyllum* (Large Adder's-tongue) – Rare.
- *Santalum spicatum* (Sandalwood) – Vulnerable.

Four species listed as threatened or migratory under the EPBC Act were assessed as possible or likely to occur:

- Thick-billed Grasswren (*Amytornis modestus*) – Vulnerable.
- Oriental Plover (*Charadrius veredus*) – Migratory.
- Grey Falcon (*Falco hypoleucos*) – Vulnerable.
- Plains Mouse (*Pseudomys australis*) – Vulnerable.

Based on the extent of impact known at the time of writing and survey results, it is unlikely any of these species would be significantly impacted by the proposed mine development, meaning referral of the Project under the EPBC Act is unlikely to be required.

The following recommendations have been made based on the findings of this report.

Recommendation	Discussion
Consider the Mitigation Hierarchy at all stages of Project design.	<p>Although native vegetation cannot be completely avoided in this instance, impact can be minimised by reducing the extent of clearing to the minimum possible and avoiding vegetation of higher diversity and better condition wherever possible. This would include selecting Option 1 as the location of the haul road. Option 1 has fewer vegetation types, less species diversity and is in poorer condition than the majority of the Option 2 vegetation, therefore, it is likely to have a lesser impact on fauna and flora.</p> <p>Minimisation and rehabilitation measures should include clearly defined, measurable and achievable management objectives and strategies.</p>
Habitat avoidance	<p>Wherever possible, avoid the following habitat features:</p> <ul style="list-style-type: none"> - Run-on areas and drainage features that provide potential habitat for Thick-billed Grasswren and Plains Mouse. - Gilgais and areas of cracking clay soils that provide potential critical habitat for Plains Mouse. - Taller shrublands and woodlands that are potential habitat of <i>Santalum spicatum</i> (Sandalwood).
Achieving an SEB	<p>If possible, preference should be given to achieving the SEB through an on-ground offset, at least in part. Grazing and fire management on land managed as an SEB area will be critical for achieving this in this instance.</p>
Further biodiversity survey	<p>Undertake the following when detailed design of the Haul Road is available:</p> <ul style="list-style-type: none"> - Where potential habitat is impacted, targeted survey for Thick-billed Grasswren and Plains Mouse consistent with minimum survey guidelines, including pre-clearing surveys. - Targeted search of tall shrublands and/or woodlands impacted for <i>Santalum spicatum</i> (Sandalwood), including pre-clearing surveys.
Native Vegetation Clearance Data Report	<p>Required as part of an application to clear native vegetation.</p>
EPBC Act self-assessment	<p>When final Project design and results of any recommended future surveys are available, undertaking an EPBC Act self-assessment process to properly address the significance of impact to Thick-billed Grasswren, Plains Mouse and Grey Falcon.</p> <p>Referral under the EPBC Act will be required if impact is significant.</p>

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1 INTRODUCTION

EBS Ecology (EBS) was contracted by Central Iron Pty Ltd to provide environmental services for the Buzzard Iron Ore Project (the Project), an undeveloped haematite deposit 120 kilometres (km) south of Coober Pedy. The Project consists of the mine development and associated infrastructure, including haul road from near Glendambo to the trans-Australia railway line and construction of a rail siding and loading facility at Kultanaby.

1.1 Scope and objectives

EBS was contracted by Central Iron Pty Ltd to undertake baseline flora and fauna surveys of both the proposed Buzzard mine site and two options for the haul road/rail siding infrastructure. This included the following:

- Desktop review including searches of relevant databases, previous reports and other relevant literature and information sources to be used to inform survey design and effort;
- Fauna survey, including establishment of control and impact monitoring sites; and
- Flora survey, including establishment of control and impact monitoring sites and survey consistent with Native Vegetation Council (NVC) methodology for the assessment of vegetation clearing proposals.

The objectives of the Project were to:

- Establish the likelihood of presence of any flora and/or fauna species listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or *National Parks and Wildlife Act 1972* (NPW Act);
- Collect vegetation data that can be used to calculate the Significant Environmental Benefit (SEB) associated with the Project;
- Identify legislative requirements that will inform the project design and approvals; and
- Make recommendations to assist in gaining approvals related to flora and fauna.

This report discusses the results of surveys undertaken within the vicinity of the proposed haul road and rail siding.

1.2 Project area

Two possible areas have been selected for the location of the proposed Haul Road corridor referred to in this report as Option 1 and Option 2. The Project Area for the proposed Option 1 haul road corridor, is a 100 metre (m) wide, 11 km long link between the Glendambo - Tarcoola Road and Trans-Australia railway line and associated rail siding and loading facility. The Option 2 Project Area is a 100 m wide, 15 km link between the Stuart Highway and Trans-Australia railway line.

Option 1 and 2 are hereafter collectively referred to as the Kultanaby Project Area, it is situated on Coondambo Station and shown in Figure 1.



Figure 1. Location of Option 1 and Option 2 of the haul road corridor and proposed rail siding (Kultanaby Project Area).

2 COMPLIANCE AND LEGISLATIVE SUMMARY

2.1 Summary of Legislative Requirements

Impacts on biodiversity as a result of the Project, including clearing of native vegetation and impact to threatened species and ecological communities, are subject to Commonwealth and State legislation as listed in Table 1.

How this legislation relates to the Project is discussed further in the following Sections.

Table 1. Commonwealth and South Australian legislation relevant to biodiversity impacts of the Project Area.

Jurisdiction	Legislation
Commonwealth	<ul style="list-style-type: none"> • <i>Environment Protection and Biodiversity Conservation Act 1999</i>
South Australia	<ul style="list-style-type: none"> • <i>Native Vegetation Act 1991</i> • <i>National Parks and Wildlife Act 1972</i> • <i>Landscape South Australia Act 2019</i>

2.2 Environment Protection and Biodiversity Conservation Act 1999

The *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *Environment Protection and Biodiversity Conservation Regulations 2000* provide a legal framework to protect and manage Nationally and Internationally important flora, fauna, ecological communities and heritage places – defined in the Act as Matters of National Environmental Significance (MNES). The nine MNES protected under the Act are:

1. World Heritage properties;
2. National Heritage places;
3. Wetlands of international importance (listed under the Ramsar Convention);
4. Listed threatened species and ecological communities;
5. Migratory species protected under international agreements;
6. Commonwealth marine areas;
7. The Great Barrier Reef Marine Park;
8. Nuclear actions (including uranium mines); and
9. A water resource, in relation to coal seam gas development and large coal mining development.

Three of the nine MNES protected under the Act may be of relevance to the Project Area, which are:

- Listed threatened species;
- Listed Threatened Ecological Communities (TECs); and
- Migratory species protected under international agreements.

Any action that has, will have, or is likely to have a significant impact on MNES requires referral under the EPBC Act. Substantial penalties apply for undertaking an action that has, will have, or is likely to have a significant impact on a MNES without approval.

The *Matters of National Environmental Significance Significant Impact Guidelines 1.1* (Department of Environment, 2013) provide overarching guidance to help determine whether an action is likely to have a significant impact on a MNES.

2.3 National Parks and Wildlife Act 1972

Native plants and animals in South Australia are protected under the *National Parks and Wildlife Act 1972* (NPW Act). It is an offence to take a native plant or protected animal without approval. Threatened plant and animal species are listed in Schedules 7 (Endangered species), 8 (Vulnerable species) and 9 (Rare species) of the Act. Persons must not:

- Take a native plant on a reserve, wilderness protection area, wilderness protection zone, land reserved for public purposes, a forest reserve or any other Crown land;
- Take a native plant of a prescribed species on private land;
- Take a native plant on private land without the consent of the owner (such plants may also be covered by the *Native Vegetation Act 1991*);
- Take a protected animal or the eggs of a protected animal without approval;
- Keep protected animals unless authorised to do so; and
- Use poison to kill a protected animal without approval.

Conservation rated flora and fauna species listed on Schedules 7, 8, or 9 of the NPW Act may occur within the Project Area. Persons must comply with the conditions imposed upon permits and approvals.

2.4 Native Vegetation Act 1991

Native vegetation that is present within the Project Area is subject to the *Native Vegetation Act 1991* (NV Act). This legislation is principally in place to provide incentives and assistance for the preservation and enhancement of native vegetation and to control the clearance of native vegetation.

Native vegetation refers to any naturally occurring local plant species that is indigenous to South Australia, from small ground covers and native grasses to large trees and water plants. It also includes naturally occurring regrowth and in certain circumstances, dead trees (Department of Environment and Water, 2020a).

The *Native Vegetation Regulations 2017* outline the circumstances where clearing native vegetation is permitted, outside of the clearance controls in the NV Act. The Regulations allow clearance for certain activities, such as mining and exploration, building homes, upgrading infrastructure (e.g., power lines) and road maintenance.

2.5 Landscape South Australia Act 2019

The *Landscape South Australia Act 2019* (LSA Act) recently replaced the *Natural Resources Management Act 2004* (NRM Act). Under the LSA Act, new regional landscape boards have been established. The aim is to deliver NRM related services to regional communities, including effective water management, pest plant and animal control, soil and land management and support for broader sustainable primary production programs. Under the LSA Act, landholders have a legal responsibility to manage declared pest plants and animals and prevent land and water degradation.

3 BACKGROUND INFORMATION

3.1 Administrative boundaries

The Project Areas fall within the administrative regions shown in Table 2.

Table 2. Administrative regions of the Project Areas.

Project Area	Administration	Region
KHaul Road	State Government Region	Far North
	Local Government Area	Unincorporated
	Landscape Management Region	South Australian Arid Lands
	Soil Conservation District	Kingoonya

3.2 Climate

The closest meteorological stations to the Kultanaby Area are the Woomera Aerodrome, recording temperature and rainfall (100 km east) and Coondambo Station, recording rainfall only (17 km south-east). The area experiences an arid climate with warm to hot summers and cool to mild winters. Prolonged dry periods are typical, interspersed with brief, significant rainfall events.

Mean maximum temperatures range from 17.1°C in July to 34.7°C in January, with minimum temperatures from 5.8°C to 19.6°C, also in July and January respectively (Bureau of meteorology, 2020).

The area experiences a low rainfall spread consistently throughout the year, with July the driest month on average (11.5 mm) and June the wettest (17.7 mm). The mean annual rainfall total is 171 mm (Bureau of meteorology, 2020).

Climate data for the Kultanaby Area is presented in Figure 2.

The field survey for Haul Road Option 1 was undertaken from the 19th to the 24th October 2020. Weather experienced during that period survey was warm to hot during the day with mild nights. Maximum temperatures reached 38.4°C on the 22nd October, with the coolest minimum reached 16.2°C on the night of the 23rd October.

Significant rain had fallen in the month prior to commencement of surveys. During the survey period, localised storms with short periods of heavy rain were experienced on the 22nd and 23rd October. Although no rainfall was recorded in nearby gauging stations, rain fell in the Kultanaby Area, causing some flash flooding at survey sites.

The field survey for Haul Road Option 2 was conducted on the 22nd December 2020. Weather experienced during the survey was moderate with a maximum temperature of 25.6°C and a minimum temperature of 12.3°C.

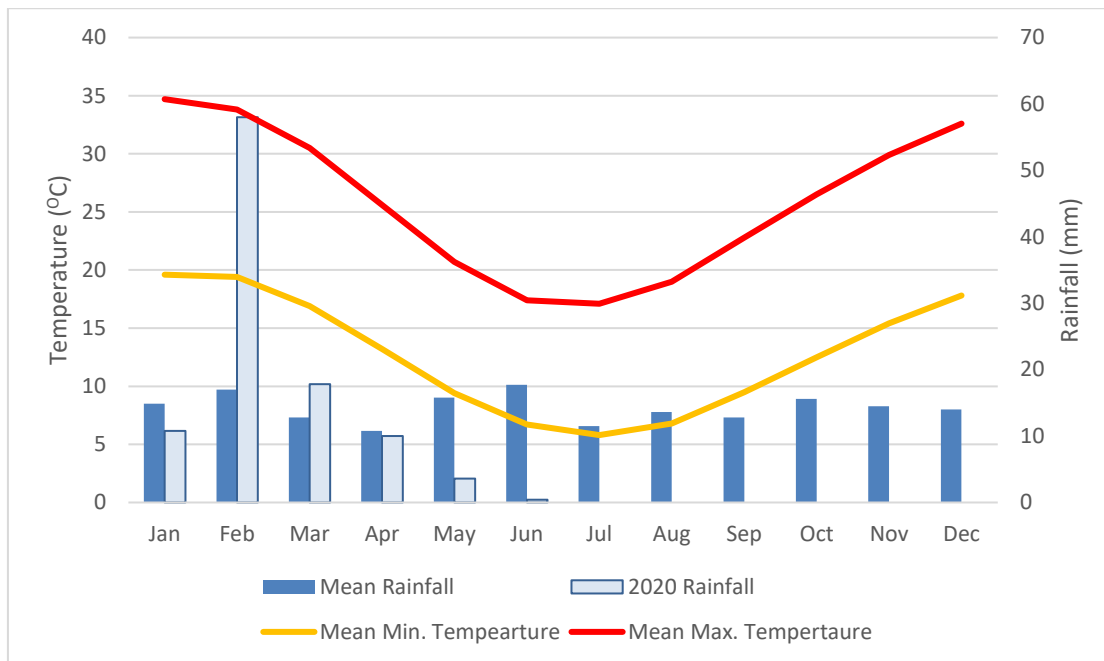


Figure 2. Climate data showing mean maximum and minimum temperatures and rainfall for the Kultanaby Area. Temperature data comes from the Woomera Aerodrome meteorological station (station 16004), while rainfall is as recorded at Coondambo (station 16009) (Bureau of meteorology, 2020).

3.3 Interim Bio-regionalisation of Australia (IBRA)

The Interim Bio-regionalisation of Australia (IBRA) classifies Australia’s landscapes into geographically distinct Bioregions based on common climate, landform, geology and native vegetation. Each Bioregion is further divided into smaller sub-regions based on differences in the above at a more local scale.

The Kultanaby Area is located within the Kingoonya subregion of the Gawler Bioregion (Table 3).

Table 3. IBRA Bioregion and subregion of the HR Project Area.

Gawler Bioregion	
Semi-arid to arid, flat-topped to broadly rounded hills of the Gawler Range Volcanics and Proterozoic sediments, low plateaux on sandstone and quartzite with an undulating surface of aeolian sand or gibbers and rocky quartzite hills with colluvial footslopes, erosional and depositional plains and salt encrusted lake beds, with Black Oak (and Myall low open woodlands, open mallee scrub, bluebush/saltbush open chenopod shrublands and tall mulga shrublands on shallow loams, calcareous earths and hard red duplex soils.	
Kingoonya Subregion	
This subregion consists of the plains lying between the quartzite plateaux of Arcoona and Woomera and the silcrete tablelands abutting the northern margin of the region. The plains west of Kingoonya are erosional, but the eastern and central parts of the region comprise depositional plains with occasional red sand dunes and in the north-east, local rocky rises. Shallow loams with rock outcrop occur on the rises, and deep red calcareous earths on the plains. A system of lakes and pans following old drainage lines is present toward the centre of the subregion. Low open woodland or tall open shrubland dominates throughout. Mulga (<i>Acacia aneura</i>) and other wattles, e.g. Dead Finish (<i>Acacia tetragonophylla</i>) and Myall (<i>Acacia papyrocarpa</i>), are the major components. Native pine woodlands occur on many dunes. Saltbush vegetation is found in areas which do not support tree growth.	
Remnant vegetation	Approximately 99% (1887190 ha) of the subregion is mapped as remnant native vegetation, of which 7% (131027ha) is formally conserved.
Landform	Plains broken by hills and ridges; some dune tracts; saline flats; clay pans; seasonal swamps and lakes. Lakes fringed on the eastern margins by lunettes.
Geology	Sand mantle with minimal soil development. Dune sands, outcrops of bare rock; clay silt & sand in alluvial & seasonal swampy lowlands. Gypsum & halite deposits; some kopi dunes. Silcrete & ferricrete development. Deeply weathered Palaeozoic basement rocks.

Soil	Brown calcareous earths, Siliceous sand, Loamy soils with weak pedologic development.
Vegetation	Arid and semi-arid <i>Acacia</i> low open woodlands and shrublands with tussock grass.
Conservation significance	19 species of threatened fauna, 17 species of threatened flora. 0 wetlands of national significance.

3.4 Wetlands and watercourses

The Haul Road Option 1 has been designed to avoid watercourses, run-on areas and wetlands, taking a route that follows high ground. While there are several un-named first and second Strahler order watercourses mapped nearby, none are impacted by the proposed haul road route (Figure 3). All watercourses in the area are ephemeral in nature, only containing water following significant rainfall events. The Haul Road Option 2 route crosses several low lying drainage areas which run into ephemeral waterbodies. Although these areas are typically dry, they will contain water following significant rainfall events.

There are no nationally important wetlands in the Kultanaby Area.

3.5 Current and historical land use

The Kultanaby Area is situated within Coondambo Station. Grazing is primarily sheep, with the Project Area located as close as 3.5 km to Kultanaby Dam, an artificial watering point in current use. Livestock is grazed on the natural vegetation without improvement of pasture.



Figure 3. Watercourses and wetlands of the HR Project Area with the two Haul Road Options.

4 METHODS

4.1 Desktop assessment

Desktop research was undertaken in preparing this report. This included database searches and a review of literature relevant to the two Project Areas to determine if any ecological constraints exist. These searches helped to identify a list of threatened species and ecological communities and MNES that are known or likely to occur in the Project Area.

The following databases and resources were reviewed:

- Commonwealth Protected Matters Search Tool (PMST) to identify all MNES potentially within 5 km of the Project Area. MNES include threatened species, ecological communities and migratory species listed under the EPBC Act;
- Species Profile and Threats Database for entities listed under the EPBC Act, available at <https://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>;
- Records, filtered to those since 1995, within 50 km of the Project Area from the South Australian Department for Environment and Water Biological Database of South Australia (BDBSA). Record set number DEWNRBDBSA200928-2; and
- Other relevant websites, reports, fact sheets and papers.

4.2 Field survey

4.2.1 *Vegetation associations and condition*

Vegetation associations and condition were surveyed according to the Rangelands Assessment Method (RAM). This method aligns the assessment of vegetation (and land) condition with the method developed by Natural Resources South Australian Arid Lands for the rapid assessment of pastoral properties. It has been adapted for use for the assessment of native vegetation clearing proposals in the arid rangelands of South Australia.

Details of site selection/stratification and assessment protocols, the biodiversity components assessed, factors that influence these components and field procedures are outlined in the *Rangelands Assessment Manual* (Native Vegetation Council, 2020).

Data collected using the field methods is used to calculate a Vegetation Condition Score (VCS) and Unit Biodiversity Score (UBS) that are used as an expression of vegetation condition. When the extent of impact to vegetation is known, the Unit Biodiversity Score is then used to determine the Total Biodiversity Score (TBS) and the Significant Environmental Benefit (SEB) required to offset any proposed vegetation clearing.

For the purposes of this report, while the VCS and UBS have been calculated to assess vegetation condition, the TBS and SEB requirement has not been calculated, since the final proposed impact extent is not known.

Plant species were identified in the field wherever possible. Where plants could not be identified, voucher specimens were collected for identification at a later stage. Voucher specimens of threatened species were also collected to confirm identification using appropriate field guides and identification keys.

The locations of RAM survey sites for Option 1 are shown in Table 4 and Option 2 are shown in Table 5.

Table 4. Location of Option 1 RAM survey sites.

RAM Site	Location	
	Easting	Northing
A1a (BHR003)	562440.7	6569304.6
A1b (BHR004)	559177.8	6569123.1
A2 (BHR005)	568321.1	6573967.3

Table 5. Location of Option 2 RAM survey sites.

RAM Site	Location	
	Easting	Northing
B1	514948.8	6680625.3
B2	516183.9	6681218.6
B3	514831.8	6684446.9
B4	514068.5	6684695.8
B5	514749.2	6681407.6
B6	515441.7	6682419.3
B7	514376.3	6680156.2
B8	514190.5	6680171.1
B9	514075.5	6680018.1

4.2.2 Vegetation impact monitoring

Although the establishment of permanent vegetation impact monitoring plots was not in the scope for the Kultanaby Area, three temporary sites were surveyed to collect baseline data for the Option 1 Haul Road. These sites are suitable for use as permanent monitoring sites should it be required in future. The location of the sites is shown in Table 6.

No vegetation impact monitoring plots were set up in the Option 2 Haul Rd location.

Each survey site consisted of a 5 metres (m) x 2 m plot, consisting of 10 1 m x 1 m quadrats arranged either side of the 5 m centreline at each 1 m interval. At each site, the following data was collected:

- Site photograph taken from the top of the 0 m steel dropper with the camera aimed at the steel peg at the 5 m point.
- Overall vegetation condition, rated as follows:
 1. Virtually no cover.
 2. Undisturbed natural.
 3. Disturbed natural.
 4. Degraded natural.

5. Highly degraded.

- Climatic condition, rated as follows:
 1. Wet – rainfall
 2. Dry – vegetation
- Within each 1 m x 1 m quadrat, the percent cover of each perennial species and the number of juveniles of each perennial species.
- Species list of annual species within the 5 m x 2 m plot.
- Any other relevant comments or notes on vegetation condition.

As change in cover and number of annual species is more likely a reflection of climatic condition, rather than mine impact, only a list of species present was compiled. Cover and abundance of juveniles was not recorded.

Table 6. Location of vegetation impact monitoring sites for Option 1.

Site Name	Vegetation Association	Location	
		Easting	Northing
BHR1003	<i>Atriplex vesicaria</i> / <i>Sclerolaena ventricosa</i> Low Shrubland over <i>Austrostipa nitida</i> and annual forbs.	559164.3	6569106.9
BHR1004	<i>Atriplex vesicaria</i> / <i>Sclerolaena ventricosa</i> Low Shrubland over <i>Austrostipa nitida</i> and annual forbs.	562440.7	6569304.6
BHR1005	<i>Maireana pyramidata</i> +/- <i>Maireana erioclada</i> +/- <i>Maireana aphylla</i> Shrubland over <i>Atriplex holocarpa</i> and <i>Austrostipa nitida</i> .	568319.3	6573928

4.2.3 Fauna

Fauna was surveyed in the Project Area according to the methods set out below, with survey sites stratified by Vegetation Associations likely to be impacted by the mine development. To monitor mammals and reptiles, two temporary fauna monitoring sites (Pitfall traps and funnel traps) were implemented – one along the Option 1 Haul road site and one in the vicinity of the rail siding. No pitfall traps or funnel traps were deployed along the Option 2 Haul Road site. In the Kultanaby Project Area any opportunistic sighting of reptiles, mammals or birds were recorded. Birds were also monitored at the 3 Option 1 flora monitoring sites and 2 Option 2 pitfall monitoring sites using the timed area search method (described below).

1. **Pit traps** – used to survey for mammals and reptiles. Two temporary monitoring sites were established, each site consisting of two lines of six pits. Pits were 600 mm deep and spaced approximately 10 m apart with a drift fence running between all pits. Traps were checked in the early morning and late afternoon over a three-night period. Data was recorded on a standard datasheet, with species, number of individuals, age (if known) and sex (if known) recorded. Captured animals were marked before release so that re-captures could be recorded.
2. **Funnel traps** – used to survey reptiles. Two funnel traps were positioned at each end of the pit line drift fence. Traps were checked in the early morning and late afternoon over a three-night period. Data was recorded on a standard datasheet, with species, number of individuals, age (if

known) and sex (if known) recorded. Captured animals were marked before release so that recaptures could be recorded.

3. **Timed area search** – used to survey birds. An area search for birds was conducted at each of the two permanent fauna sites as well as an additional three sites. The search was conducted over a 2 hectare (ha) area for a period of 20 minutes. Data was recorded on a standard datasheet, with species, number of individuals and activity recorded.
4. **Opportunistic observation** – any fauna observed while travelling throughout the Kultanaby Project Area was recorded. This included any signs of fauna, such as tracks, scats or nests. Data was recorded on a standard datasheet, with species, number of individuals, distance from observer, habitat and GPS location recorded.

Fauna survey effort and methodology used for each taxonomic group surveyed for the Option 1 site is summarised in Table 7 and surveys dates and trap effort is provided in Table 8. Fauna survey effort and methodology used for each taxonomic group surveyed for the Option 2 site is summarised in Table 9.

Table 7. Summary of fauna survey effort for Option 1.

Fauna	Survey Site	Location		Method/s
		Easting	Northing	
Reptiles Mammals	BHR1001	560318.4	6568528.1	1. Pit traps 2. Funnel traps 4. Opportunistic observation
	BHR1002	562433.6	6569240.4	
Birds	BHR1001	As above		3. Timed area search (20 minutes, 2 ha).
	BHR1002			4. Opportunistic observation
	BHR003	559164.3	6569106.9	4. Opportunistic observation
	BHR004	562440.7	6569304.6	4. Opportunistic observation
	BHR005	568319.3	6573928	4. Opportunistic observation

Table 8. Summary of trap dates and effort for the two Option 1 pit sites.

Survey Site	Trap type	# traps	# nights trapped	Total trap effort (trap nights)	Dates trapped
BHR1001	Pit traps	12	4	48	19-23 October
	Funnel traps	4	4	16	19-23 October
BHR1002	Pit traps	12	4	48	20-24 October
	Funnel traps	4	4	16	20-24 October

Table 9. Summary of fauna survey effort for Option 2.

Fauna	Survey Site	Location		Method/s
		Easting	Northing	
Reptiles Mammals	BHR2001	514948.8	6680625.3	4. Opportunistic observation
	BHR2002	516183.9	6681218.6	
	BHR2003	514831.8	6684446.9	
	BHR2004	514068.5	6684695.8	
	BHR2005	514749.2	6681407.6	
	BHR2006	515441.7	6682419.3	
	BHR2007	514376.3	6680156.2	
	BHR2008	514190.5	6680171.1	
	BHR2009	514075.5	6680018.1	
Birds	BHR2001	As above		3. Timed area search (20 minutes, 2 ha). 4. Opportunistic observation
	BHR2002			
	BHR2003			
	BHR2004			
	BHR2005			
	BHR2006			
	BHR2007			
	BHR2008			
	BHR2009			

4.3 Likelihood of Occurrence Assessment

Threatened species identified as potentially occurring in the Kultanaby Area by desktop research were assessed as to the likelihood of their occurrence. This assessment followed the field survey, which confirmed the habitat available in the Kultanaby Area and whether any threatened species were observed and/or captured.

Each threatened species has been rated as either highly likely/known, likely, possible, or unlikely to occur in the Kultanaby Area according to the criteria listed in Table 10.

Table 10. Criteria for the likelihood of occurrence of threatened species.

Likelihood	Criteria
Highly Likely/Known	Recorded in the last 10 years, the species does not have highly specific niche requirements, the habitat is present and falls within the known range of the species distribution or; The species was recorded as part of field surveys.
Likely	Recorded since 1995, the area falls within the known distribution of the species and the area provides habitat or feeding resources for the species.
Possible	Recorded since 1995, the area falls inside the known distribution of the species, but the area provides limited habitat or feeding resources for the species. Recorded within 40 years, survey effort is considered adequate, habitat and feeding resources present, and species of similar habitat needs have been recorded in the area.
Unlikely	Recorded since 1995, but the area provides no habitat or feeding resources for the species, including perching, roosting or nesting opportunities, corridor for movement or shelter. Recorded within 40 years; however, suitable habitat does not occur, and species of similar habitat requirements have not been recorded in the area. No records despite adequate survey effort.

4.4 Limitations

The desktop assessment was based on existing datasets and references from a range of sources. EBS has not attempted to verify the accuracy of any such information. The findings and conclusions expressed by EBS are based solely upon information in existence at the time of the assessment.

Flora and fauna records were sourced from the BDBSA, which only includes verified flora and fauna records recorded by the Department for Environment and Water (DEW) or submitted to DEW by partner organisations. It is recognised that knowledge is poorly captured, and that the spatial reliability of the data varies. It is possible that significant species occur that are not reflected by database records. Although much of the BDBSA data has been through a variety of validation processes, the lists may contain errors and should be used with caution. DEW give no warranty that the data is accurate or fit for any particular purpose of the user or any person to whom the user discloses the information.

The field survey was undertaken in late spring. Although rainfall had occurred in the month prior, it came at the end of a prolonged dryer than average period. While conditions were suitable for detecting flora and fauna that are able to quickly respond to improvement in climatic conditions, species that require time to rebuild populations may not have been detected. The survey does not account for seasonality or alternative climatic conditions.

5 RESULTS

5.1 Desktop Assessment

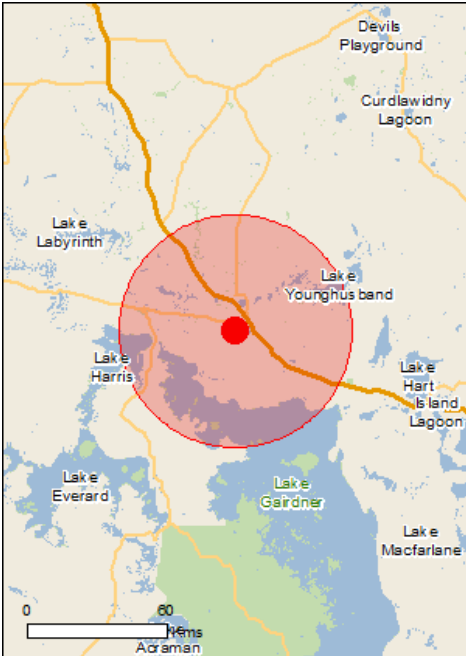
5.1.1 Matters of national environmental significance

The PMST report identified that two Matters of National Environmental Significance protected under the EPBC Act may occur in the Kultanaby Area:

- Threatened species (11 species); and
- Migratory species (9 species).

This is summarised in Table 11.

Table 11. Matters of National Environmental Significance potentially occurring in the Kultanaby Area (Department of Agriculture, Water and the Environment, 2020a).

Search Area (5 km buffer)	Matters of National Environmental Significance	Identified within the search area
 <p>This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010</p>	World Heritage Properties	None
	National Heritage Places	None
	Wetlands of International Importance	None
	Great Barrier Reef Marine Park	None
	Commonwealth Marine Area	None
	Listed Threatened Ecological Communities	None
	Listed Threatened Species	11
	Listed Migratory Species	9

5.1.2 Nationally Threatened flora

Two nationally threatened plant species were identified by the PMST. They are listed in Table 12.

Table 12. Nationally threatened flora identified by the PMST report.

Scientific name	Common name	Conservation status	
		Aus	SA
<i>Frankenia plicata</i>		EN	
<i>Hibbertia crispula</i>	Ooldea Guinea-flower	VU	

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). SA: South Australia (*National Parks and Wildlife Act 1972*). Conservation codes: CE: Critically Endangered. EN/E: Endangered. VU/V: Vulnerable. R: Rare.

5.1.3 Nationally threatened and migratory fauna

The PMST report identified nine nationally listed threatened species as potentially occurring in the Kultanaby Area. This includes three mammals and six birds. The report identifies an additional eight bird species that are listed as Migratory. These species are listed in Table 13.

Ten species listed in Table 13 are also listed as threatened under the NPW Act.

Table 13. Nationally threatened and migratory fauna identified by the PMST report.

Scientific name	Common name	Conservation status	
		Aus	SA
BIRDS			
<i>Actitis hypoleucos</i>	Common Sandpiper	Mi	
<i>Amytornis modestus</i>	Thick-billed Grasswren	VU	E
<i>Apus pacificus</i>	Fork-tailed Swift	Mi	
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Mi	
<i>Calidris ferruginea</i>	Curlew Sandpiper	CE	E
<i>Calidris melanotos</i>	Pectoral Sandpiper	Mi	R
<i>Charadrius veredus</i>	Oriental Plover	Mi	
<i>Falco hypoleucos</i>	Grey Falcon	VU	R
<i>Leipoa ocellata</i>	Malleefowl	VU	V
<i>Motacilla cinerea</i>	Grey Wagtail	Mi	
<i>Motacilla flava</i>	Yellow Wagtail	Mi	
<i>Pezoporus occidentalis</i>	Night Parrot	EN	E
<i>Polytelis alexandrae</i>	Princess Parrot	VU	V
<i>Tringa nebularia</i>	Common Greenshank	Mi	
MAMMALS			
<i>Notomys fuscus</i>	Dusky Hopping-mouse	VU	V
<i>Pseudomys australis</i>	Plains Mouse	VU	V
<i>Sminthopsis psammophila</i>	Sandhill Dunnart	EN	V

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). **SA:** South Australia (*National Parks and Wildlife Act 1972*). Conservation codes: CE: Critically Endangered. EN/E: Endangered. VU/V: Vulnerable. R: Rare. Mi: Migratory.

5.1.4 State listed threatened species

Seven species of state listed threatened fauna and six species of flora have been recorded from within 50 km of the Kultanaby Area. These are listed in Table 14. The locations of these records are shown on the maps in Figure 4 and Figure 5.

One species is also nationally listed and were identified as potentially occurring by the PMST report.

Table 14. State listed threatened species potentially occurring within the project area.

Scientific name	Common name	Conservation status	
		Aus	SA
Flora			
<i>Austrostipa nullanulla</i>	Club Spear-grass		V
<i>Ophioglossum polyphyllum</i>	Large Adder's-tongue		R
<i>Santalum spicatum</i>	Sandalwood		V
<i>Swainsona dictyocarpa</i>			V
<i>Swainsona fuscoviridis</i>	Dark Green Swainson-pea		R
<i>Swainsona microcalyx</i>	Wild Violet		R
Birds			
<i>Acanthiza iredalei iredalei</i>	Slender-billed Thornbill (western)		R
<i>Amytornis modestus indulkanna</i>	Thick-billed Grasswren (North-west)	VU	E
<i>Aphelocephala pectoralis</i>	Chestnut-breasted Whiteface		R
<i>Biziura lobate menziesi</i>	Musk Duck		R
<i>Lophochroa leadbeateri mollis</i>	Major Mitchell's Cockatoo		R
<i>Myiagra inquieta</i>	Restless Flycatcher		R
<i>Pachycephala inornata</i>	Gilbert's Whistler		R

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). SA: South Australia (*National Parks and Wildlife Act 1972*). Conservation codes: CE: Critically Endangered. EN/E: Endangered. VU/V: Vulnerable. R: Rare.

A full assessment of the likelihood of Nationally and State threatened flora and fauna is located in Appendix 5.

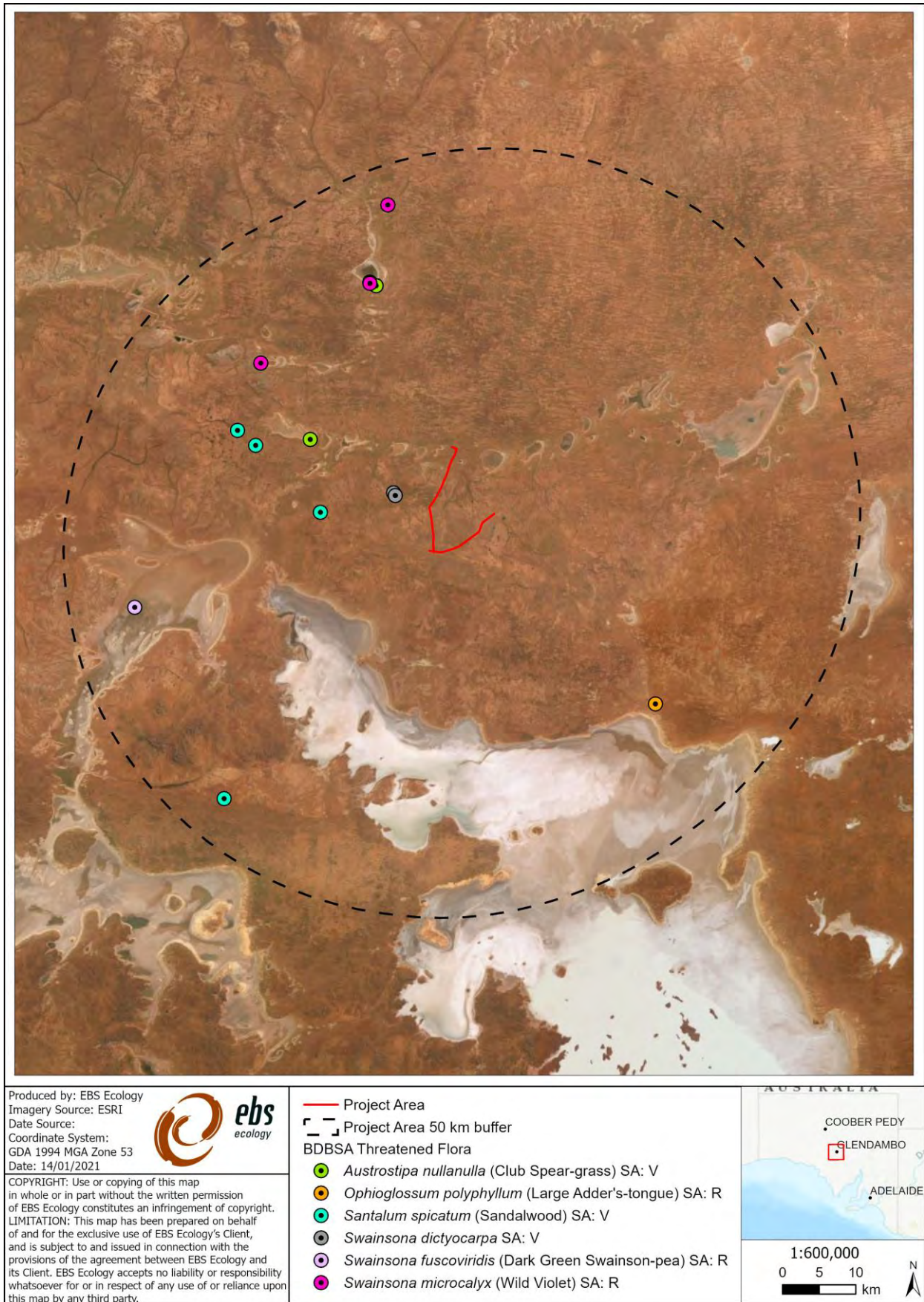


Figure 4. BDBSA records of threatened flora from within 50 km of the Kultanaby Area (Department of Environment and Water, 2020b).

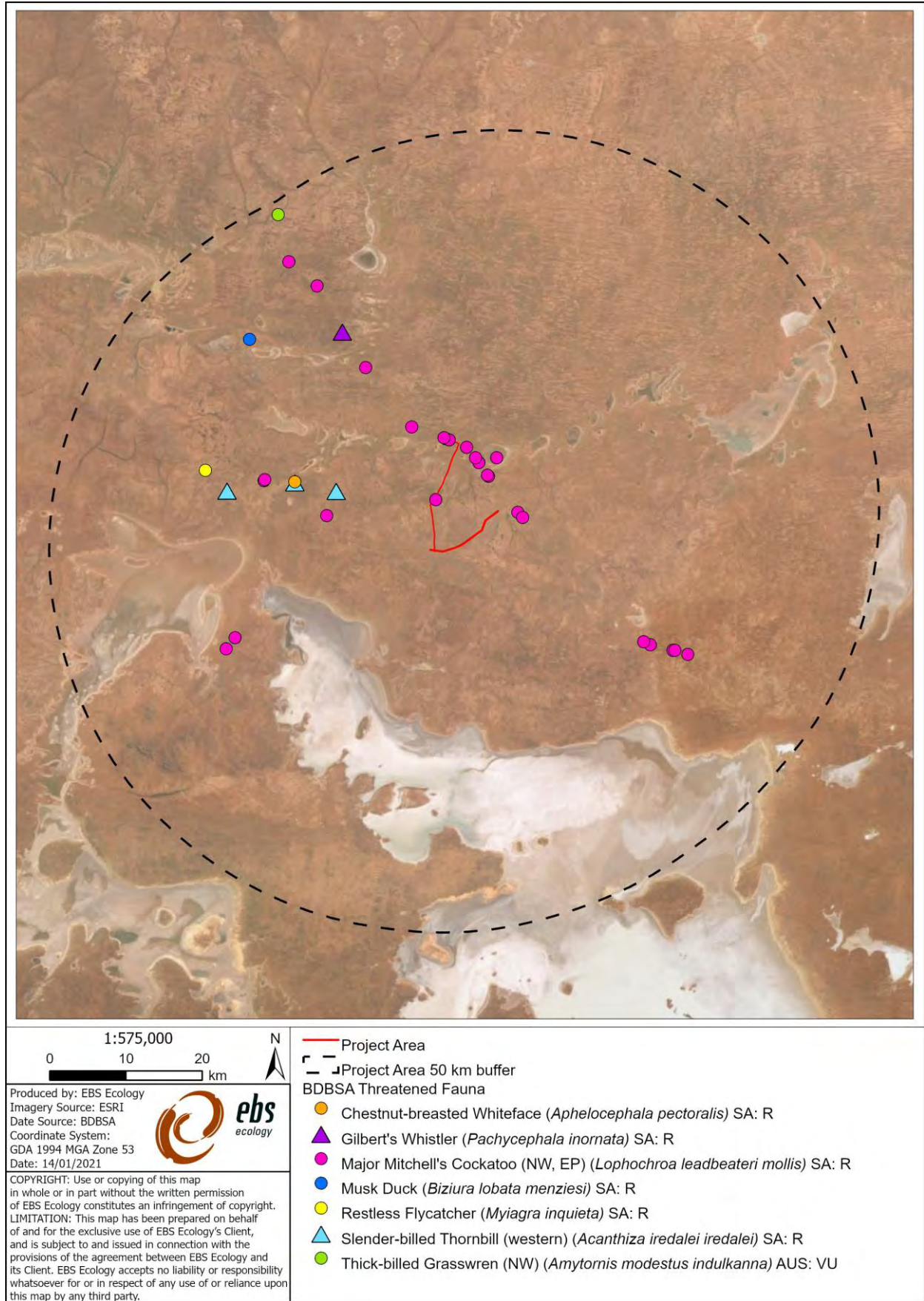


Figure 5. BDBSA records of threatened fauna from within 50 km of the Kultanaby Area (Department of Environment and Water, 2020b).

5.2 Option 1 Field Survey

5.2.1 Vegetation associations and condition summary

The Option 1 Kultanaby Area consisted of Chenopod shrublands and low shrublands, with two Vegetation Associations (VA) present (Table 15).

Table 15. Vegetation associations in the Option 1 HR Project Area.

VA Code	Description
VA1 (A1)	<i>Atriplex vesicaria</i> / <i>Sclerolaena ventricosa</i> Low Shrubland over <i>Austrostipa nitida</i> and annual forbs.
VA2 (A2)	<i>Maireana pyramidata</i> +/- <i>Maireana erioclada</i> +/- <i>Maireana aphylla</i> Shrubland over <i>Atriplex holocarpa</i> and <i>Austrostipa nitida</i> .

*() = map code

5.2.2 Vegetation association descriptions

Table 16. Description of VA1 (A1).

VA1 (A1) *Atriplex vesicaria* / *Sclerolaena ventricosa* Low Shrubland over *Austrostipa nitida* and annual forbs.



General Description	<p>Sparse, low shrubland dominated by <i>Atriplex vesicaria</i>, with emergent <i>Maireana</i> spp. Ground vegetation is sparse, with <i>Austrostipa nitida</i> and annual forbs such as <i>Gnephosis arachnoidea</i> dominant.</p> <p>Disturbances include light grazing and erosion close to some vehicle tracks and fence lines.</p> <p>Occurs on an Undulating plain with gibber pavement and clay soils.</p>	Survey Sites	A1a A1b
----------------------------	---	---------------------	------------

Threatened Species or Ecological Community	Possible: - Grey Falcon (<i>Falco hypoleucos</i>)				
Landscape Context Score	1.1	Vegetation Condition Score	43.74	Conservation Significance Score	1.02
Unit Biodiversity Score	49.08	Condition category	Medium		

Table 17. Description of VA2 (A2).

Maireana pyramidata +/- *Maireana erioclada* +/- *Maireana aphylla* Shrubland over *Atriplex holocarpa* and *Austrostipa nitida*.



General Description	Run-on areas with heavy, stony soils and cracking clay gilgais.		Survey Sites	A2	
Threatened Species or Ecological Community	Likely: - Slender-billed Thornbill (<i>Acanthiza iredalei iredalei</i>) - Chestnut-breasted Whiteface (<i>Aphelocephala pectoralis</i>) - Plains Mouse (<i>Pseudomys australis</i>) Possible: - Thick-billed Grasswren (<i>Amytornis modestus</i>) - Grey Falcon (<i>Falco hypoleucos</i>) - <i>Ophioglossum polyphyllum</i> (Large Adder's Tongue) - <i>Santalum spicatum</i> (Sandalwood)				
Landscape Context Score	1.1	Vegetation Condition Score	49.34	Conservation Significance Score	1.1
Unit Biodiversity Score	59.71	Condition category	Medium		

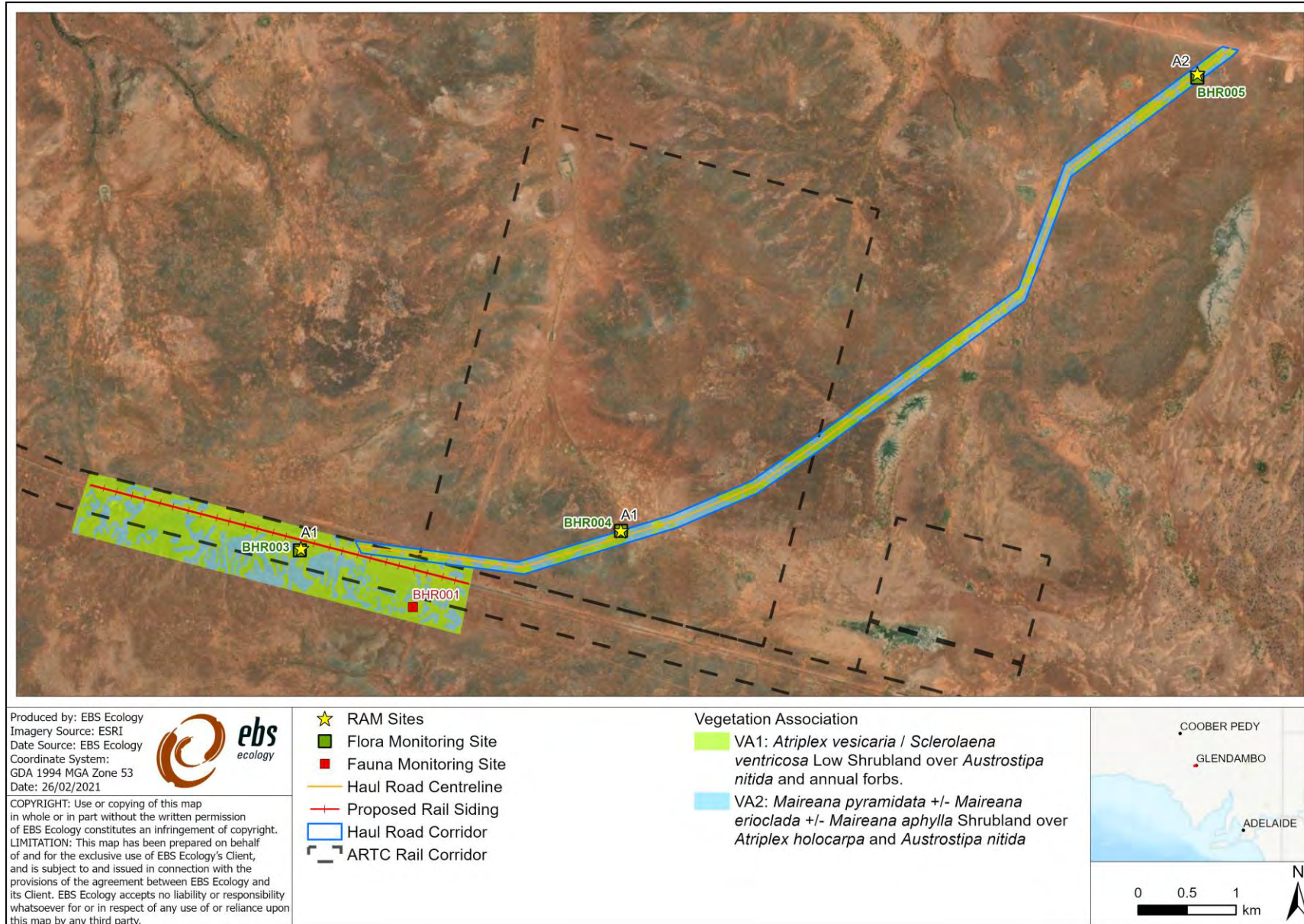


Figure 6. Vegetation associations of the Option 1 Kultanaby Area and rail siding infrastructure. The map also shows the location of sites used during the field survey.

5.2.3 Vegetation impact monitoring

Vegetation impact monitoring results are summarised in Table 18. Seventeen species of perennials were recorded and measured across the four sites. The number of perennials at each site ranged from six at BHR004 to 10 species at BHR005. Although shrubs were responding well to recent rain with new growth only lightly grazed, evidence of past heavy grazing was visible on larger shrubs. All sites were recorded as in a disturbed natural condition.

Vegetation showed an obvious response to recent rainfall, with annual forbs, such as *Erodium cygnorum*, present and moderate cover of short-lived perennial grasses. These aspects of vegetation condition can be seen in the site photographs shown in Figure 7 to Figure 11.

Generally, there were few numbers of juvenile plants present. The exception was at BHR004, where six species showed recruitment of seedlings, particularly *Sclerolaena ventricosa*.

Grass cover was low at all sites and limited to three perennial species – *Aristida contorta* (Bunched Kerosene Grass), *Austrostipa nitida* (Balcarra Spear-grass) and *Enneapogon avenaceus* (Native Oat Grass). There was no perennial grass cover at BHR003. Similarly, perennial forbs were sparse. Cover ranged from 0 % at BHR004 to only 0.78 at BHR003.

Shrubs <0.5 m height had the highest cover of all plant life forms, with over 20% cover at BHR003 and BHR004. However, BHR005 was dominated by shrubs >0.5 m with only a sparse cover of low shrubs (0.5%). Cover of each plant life form for the survey sites is shown in Figure 10.

Table 18. Summary of vegetation impact monitoring results, showing the mean percent cover and total number of juveniles at each survey site.

Scientific Name	Common Name	BHR003		BHR004		BHR005	
		% Cover	No. Juvenile	% Cover	No. Juvenile	% Cover	No. Juvenile
<i>Maireana pyramidata</i>	Blackbush	-	-	-	-	8.2	1
<i>Aristida contorta</i>	Bunched Kerosene Grass	-	-	-	-	1.4	2
<i>Sida corrugata</i>	Corrugated Sida	-	-	-	-	0.1	0
<i>Roepera apiculata</i>	Common Twinleaf	-	-	1.11	9	0.1	0
<i>Sclerolaena ventricosa</i>	Salt Bindyi	2.22	18	8.2	23	0.25	7
<i>Enneapogon avenaceus</i>	Native Oat Grass	-	-	0.1	1	0.3	0
<i>Maireana erioclada</i>	Rosy Bluebush	-	-	-	-	0.05	4
<i>Ptilotus obovatus</i>	Silver Mulla Mulla	-	-	-	-	0.1	3
<i>Atriplex holocarpa</i>	Pop Saltbush	0.22	0	-	-	0.05	3
<i>Maireana sclerolaenoides</i>		-	-	-	-	0.1	0
<i>Atriplex vesicaria</i>	Bladder Saltbush	12	2	10.6	10	-	-
<i>Sclerolaena brachyptera</i>	Short-winged Copperburr	0.44	7	0.9	13	-	-
<i>Frankenia serpyllifolia</i>	Bristly Sea-heath	5.89	0	-	-	-	-
<i>Senecio glossanthus</i>	Slender Groundsel	0.78	0	-	-	-	-
<i>Maireana appressa</i>	Cotton Bush	0.22	0	-	-	-	-
<i>Minuria cunninghamii</i>	Bush Minuria	0.11	0	-	-	-	-
<i>Austrostipa nitida</i>	Balcarra Spear-grass	-	-	0.4	2	-	-

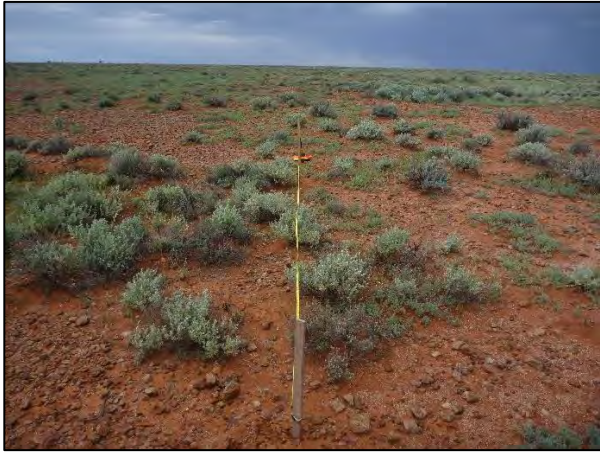


Figure 7. BHR003 impact monitoring site.



Figure 8. BHR004 impact monitoring site.

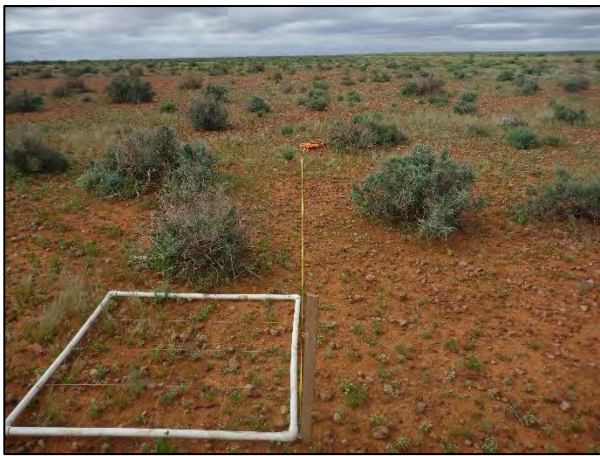


Figure 9. BHR005 impact monitoring site.

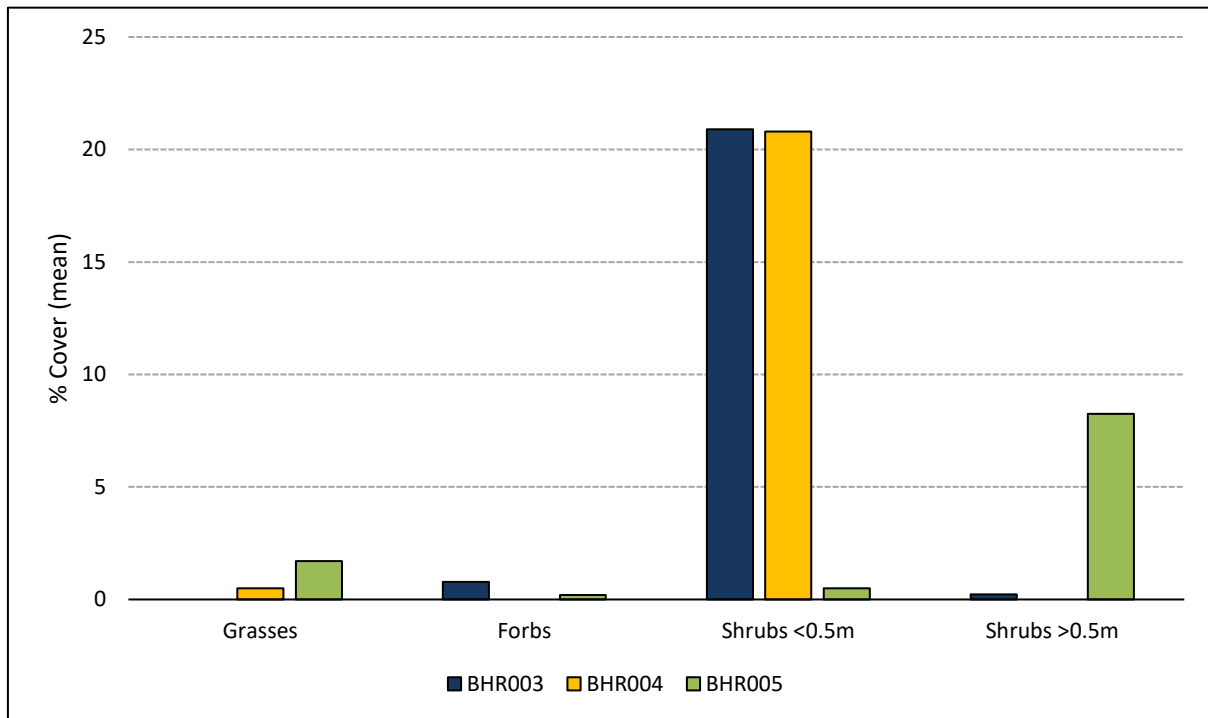


Figure 10. Mean cover percent (%) of plant life forms at vegetation monitoring sites.

5.2.4 Flora

The field survey recorded 48 plant species, including 2 introduced species, *Medicago polymorpha* and *Sonchus oleraceus*, neither of which is a declared plant under the LS Act. Plant species recorded during the survey are listed in Appendix 1.

Species recorded were generally typical of arid Chenopod shrublands and low shrublands, with perennial shrubs and sub-shrubs such as *Maireana* spp. and *Atriplex* spp. providing the dominant cover throughout the HR Project Area. Annual and short-lived perennial forbs and grasses were present but sparse, except in run-on areas and gilgais (Figure 11) where species such as *Austrostipa nitida*, *Enneapogon avenaceous*, *Erodium cygnorum* and *Frankenia serpyllifolia* (Figure 12) occurred in greater density.

No EPBC Act or NPW Act listed threatened plant species were recorded.



Figure 11. Gilgais and run-on areas, evident as green vegetation in this photograph, had a higher diversity of annual plant species and greater vegetation cover.



Figure 12. The sub-shrub *Frankenia serpyllifolia* grows in low-lying run-on areas in the HR Project Area.

5.2.5 Fauna

From the pitfall trapping, funnel trapping, timed area searches and opportunistic observations conducted on the 19-24th October, 36 fauna species were recorded throughout the Kultanaby Option 1 Project Area. This included 12 reptiles, 21 birds, and 3 mammals (Appendix 2).

Reptiles

Twelve species of reptiles from seven families were recorded or captured during the survey. The most trapped species was the Central Nettle Dragon (*Ctenophorus nuchalis*) (Figure 13). The SCINCIDAE was the most diverse reptile family represented in captures, with six species recorded including Common Desert Ctenotus (*Ctenotus leonhardii*) and Short-legged Ctenotus (*Ctenotus strauchii*). However, most families were recorded as a single species, such as the PYGOPODIDAE, represented in the captures by Burton's Snake-lizard (*Lialis burtonis*) (Figure 14).

Re-captures of some individuals occurred, with two Central Nettle Dragons individuals captured over successive nights. The single Common Barking Gecko (*Underwoodisaurus milii*) (Figure 15) recorded during the survey was also captured twice in a pit trap.

Mengden's Brown Snake (*Pseudonaja mengdeni*) (Figure 16) was the only snake species recorded in the HR Project Area. A single individual was observed on the Kingoonya road at the northern end of the proposed haul road.

No reptile species listed as threatened under the EPBC Act or NPW Act was recorded.

Birds

Bird species were not diverse. Twenty-one species were observed across the HR Project Area, all typical species of arid stony plains vegetated with Chenopod shrublands, such as the Orange Chat (*Epthianura aurifrons*) and Inland Dotterel (*Peltohyas australis*) (Figure 17).

Several species associated with inland wetlands were observed at a dam in the Kultanaby Project Area, including the Grey Teal (*Anas gracilis*) and Black-winged Stilt (*Himantopus leucocephalus*). Despite these records, habitat for these and other wetland birds in the Project Area is limited to artificial watering points that are not within the impact area of the Project.

No bird species listed as threatened under the EPBC Act or NPW Act was recorded.

Mammals

Only three species of mammals were recorded. Trapping results were poor, with only three animals representing two species caught. Two Stripe-faced Dunnarts (*Sminthopsis macroura*) (Figure 18) and a single Bolam's Mouse (*Pseudomys bolami*) were caught in pit traps at BHR002. No mammals were captured at BHR001.

The only other mammal observed was the domestic sheep (*Ovis aries*).

No mammal listed as threatened under the EPBC Act or NPW Act was recorded.



Figure 13. The Central Netted Dragon (*Ctenophorus nuchalis*) was one of the most commonly captured species.



Figure 14. Two Burton's Snake-lizards (*Lialis burtonis*) were captured during the survey, one at each fauna survey site.



Figure 15. A single Common Barking Gecko (*Underwoodisaurus milledgei*) was caught in a pit trap at BHR001. The same individual was captured on two nights.



Figure 16. Mengden's Brown Snake (*Pseudonaja mengdeni*) was the only snake species recorded during the survey.



Figure 17. The Inland Dotterel (*Peltodytes australis*) is a characteristic species of sparsely vegetated, arid gibber plains.



Figure 18. The Stripe-faced Dunnart (*Sminthopsis macroura*) was one of only two mammal species captured.

5.3 Option 2 Field Survey

5.3.1 Vegetation associations and conditions summary

The Option 2 Kultanaby Area consisted of a mixture of Acacia woodlands, Chenopod shrublands, open shrublands, and low shrublands with nine Vegetation Associations (VA) present (Table 19).

Table 19. Vegetation associations in the Option 2 HR Project Area.

VA Code	Description
VA1 (B1)	<i>Acacia papyrocarpa</i> low open woodland over <i>Rhagodia spinescens</i> +/- <i>Senna artemisioides</i> ssp. <i>petiolaris</i> .
VA2 (B2)	<i>Atriplex vesicaria</i> +/- <i>Maireana appressa</i> Low Shrubland over <i>Tecticornia</i> sp.
VA3 (B3)	<i>Acacia aneura</i> Very Open Woodland over <i>Maireana pentatropis</i> +/- <i>Maireana georgei</i> +/- <i>Aristida contorta</i>
VA4 (B4)	<i>Melaleuca glomerata</i> and <i>Melaleuca lanceolata</i> Open Shrubland over <i>Dodonaea viscosa</i>
VA5 (B5)	<i>Senna artemisioides</i> ssp. <i>petiolaris</i> +/- <i>Maireana sedifolia</i> shrubland with emergent <i>Myoporum platycarpum</i>
VA6 (B6)	<i>Acacia papyrocarpa</i> Open Woodland over <i>Maireana sedifolia</i>
VA7 (B7)	<i>Acacia aneura</i> Open Woodland over <i>Maireana georgei</i> +/- <i>Maireana sedifolia</i> +/- <i>Aristida contorta</i>
VA8 (B8)	<i>Maireana sedifolia</i> +/- <i>Atriplex vesicaria</i> Low Shrubland
VA9 (B9)	<i>Atriplex vesicaria</i> +/- <i>Sclerolaena</i> sp. Low Shrubland over <i>Aristida contorta</i> and annual forbs

*() = map code

5.3.2 Vegetation association descriptions

Table 20. Description of VA1 (B1).

VA1 (B1) *Acacia papyrocarpa* low open woodland over *Rhagodia spinescens* +/- *Senna artemisioides* ssp. *petiolaris*.



<p>General Description</p>	<p>Sparse, low woodland dominated by <i>Rhagodia spinescens</i> and <i>Senna artemisioides</i> ssp. <i>petiolaris</i> understorey. Ground vegetation is sparse, with <i>Austrostipa nitida</i> and annual forbs such as <i>Gnephosis arachnoidea</i> dominant. Disturbances include light grazing and erosion close to some vehicle tracks and fence lines. Occurs on an Undulating plain with sandy soils.</p>			<p>Survey Sites</p>	<p>Site B1</p>
<p>Threatened Species or Ecological Community</p>	<p>Possible: - Grey Falcon (<i>Falco hypoleucos</i>)</p>				
<p>Landscape Context Score</p>	<p>1.18</p>	<p>Vegetation Condition Score</p>	<p>65.14</p>	<p>Conservation Significance Score</p>	<p>1.02</p>
<p>Unit Biodiversity Score</p>	<p>78.40</p>	<p>Condition category</p>	<p>Medium-High</p>		

Table 21. Description of VA2 (B2).

VA2 (B2) *Atriplex vesicaria* | *Maireana appressa* Low Shrubland +/- *Tecticornia* sp.



General Description	Chenopod shrubland dominated by <i>Atriplex vesicaria</i> and <i>Maireana appressa</i> plus <i>Tecticornia</i> sp. Occurs on Claypan soil.			Survey Sites	Site B2
Threatened Species or Ecological Community	Likely: <ul style="list-style-type: none"> - Slender-billed Thornbill (<i>Acanthiza iredalei iredalei</i>) - Plains Mouse (<i>Pseudomys australis</i>) Possible: <ul style="list-style-type: none"> - Thick-billed Grasswren (<i>Amytornis modestus</i>) - Grey Falcon (<i>Falco hypoleucos</i>) - Chestnut-breasted Whiteface (<i>Aphelocephala pectoralis</i>) 				
Landscape Context Score	1.18	Vegetation Condition Score	61.50	Conservation Significance Score	1.10
Unit Biodiversity Score	79.83	Condition category	Medium-High		

Table 22. Description of VA3 (B3).

VA3 (B3) *Acacia aneura* Very Open Woodland over *Maireana pentatropis* +/- *Maireana georgei*



General Description	Very sparse <i>Acacia aneura</i> woodland over <i>Maireana pentatropis</i> and <i>Maireana georgei</i> . Occurs on a level plain with sandy soils.			Survey Sites	Site B3
Threatened Species or Ecological Community	Possible: - Grey Falcon (<i>Falco hypoleucos</i>)				
Landscape Context Score	1.18	Vegetation Condition Score	61.20	Conservation Significance Score	1.02
Unit Biodiversity Score	73.66	Condition category	Medium-High		

Table 23. Description of VA4 (B4).

VA4 (B4) *Melaleuca glomerata* +/- *Melaleuca lanceolata* Open Shrubland over *Dodonaea viscosa*



General Description	Open shrubland dominated by <i>Melaleuca sp.</i> over <i>Dodonaea viscosa</i> . Occurs on drainage lines/flood outs on sandy soils.		Survey Sites	Site B4	
Threatened Species or Ecological Community	Possible: <ul style="list-style-type: none"> - Grey Falcon (<i>Falco hypoleucos</i>) - <i>Ophioglossum polyphyllum</i> (Large Adder's Tongue) 				
Landscape Context Score	1.18	Vegetation Condition Score	57.55	Conservation Significance Score	1.06
Unit Biodiversity Score	71.98	Condition category	Medium-High		

Table 24. Description of VA5 (B5).

VA5 (B5) *Senna artemisioides* ssp. *petiolaris* +/- *Maireana sedifolia* with emergent *Myoporum platycarpum*



General Description	Open shrubland dominated by <i>Senna artemisioides</i> ssp. <i>petiolaris</i> and <i>Maireana sedifolia</i> with emergent <i>Myoporum platycarpum</i> . There is some evidence of grazing activity that is having an impact on plants. Occurs on a level plain on sandy soils.		Survey Sites	Site B5	
Threatened Species or Ecological Community	Possible: <ul style="list-style-type: none"> - Grey Falcon (<i>Falco hypoleucos</i>) - <i>Ophioglossum polyphyllum</i> (Large Adder's Tongue) 				
Landscape Context Score	1.18	Vegetation Condition Score	55.49	Conservation Significance Score	1.06
Unit Biodiversity Score	69.41	Condition category	Medium		

Table 25. Description of VA6 (B6).

VA6 (B6) *Acacia papyrocarpa* Open Woodland over *Maireana sedifolia*



General Description	Open <i>Acacia aneura</i> woodland dominated by <i>Maireana sedifolia</i> understorey. Occurs on a level plain on sandy soils.		Survey Sites	Site B6
Threatened Species or Ecological Community	Possible: <ul style="list-style-type: none"> - Grey Falcon (<i>Falco hypoleucos</i>) - <i>Ophioglossum polyphyllum</i> (Large Adder's Tongue) 			
Landscape Context Score	1.18	Vegetation Condition Score	58.15	Conservation Significance Score 1.06
Unit Biodiversity Score	72.74	Condition category	Medium-High	

Table 26. Description of VA7 (B7).

VA7 (B7) *Acacia aneura* Open Woodland over *Maireana georgei* +/- *Maireana sedifolia* +/- *Aristida contorta*



General Description	Open <i>Acacia aneura</i> woodland with an understorey of <i>Maireana sedifolia</i> , <i>Maireana georgei</i> and <i>Aristida contorta</i> . Occurs on a level plain on sandy soils.			Survey Sites	Site B7
Threatened Species or Ecological Community	Possible: <ul style="list-style-type: none"> - Grey Falcon (<i>Falco hypoleucos</i>) - <i>Ophioglossum polyphyllum</i> (Large Adder's Tongue) 				
Landscape Context Score	1.18	Vegetation Condition Score	61.86	Conservation Significance Score	1.06
Unit Biodiversity Score	77.37	Condition category	Medium-High		

Table 27. Description of VA8 (B8).

VA8 (B8) *Maireana sedifolia* +/- *Atriplex vesicaria* Low Shrubland



General Description	Very low open dominated by <i>Maireana sedifolia</i> and <i>Atriplex vesicaria</i> . Occurs on a level plain on sandy soils.		Survey Sites	Site B8
Threatened Species or Ecological Community	Possible: <ul style="list-style-type: none"> - Slender-billed Thornbill (<i>Acanthiza iredalei iredalei</i>) - Plains Mouse (<i>Pseudomys australis</i>) - Grey Falcon (<i>Falco hypoleucos</i>) - <i>Ophioglossum polyphyllum</i> (Large Adder's Tongue) 			
Landscape Context Score	1.18	Vegetation Condition Score	58.52	Conservation Significance Score 1.12
Unit Biodiversity Score	77.34	Condition category	Medium-High	

Table 28. Description of VA9 (B9).

VA9 (B9) *Atriplex vesicaria* +/- *Sclerolaena* sp. Low Shrubland over *Aristida contorta* and annual forbs.



General Description	Very low open dominated by <i>Maireana sedifolia</i> and <i>Atriplex vesicaria</i> . Occurs on a level plain on sandy soils.		Survey Sites	Site B9
Threatened Species or Ecological Community	Likely: <ul style="list-style-type: none"> - Slender-billed Thornbill (<i>Acanthiza iredalei iredalei</i>) - Plains Mouse (<i>Pseudomys australis</i>) - Chestnut-breasted Whiteface (<i>Aphelocephala pectoralis</i>) Possible: <ul style="list-style-type: none"> - Grey Falcon (<i>Falco hypoleucos</i>) - <i>Ophioglossum polyphyllum</i> (Large Adder's Tongue) - <i>Santalum spicatum</i> (Sandalwood) 			
Landscape Context Score	1.18	Vegetation Condition Score	48.50	Conservation Significance Score 1.16
Unit Biodiversity Score	66.39	Condition category	Medium	

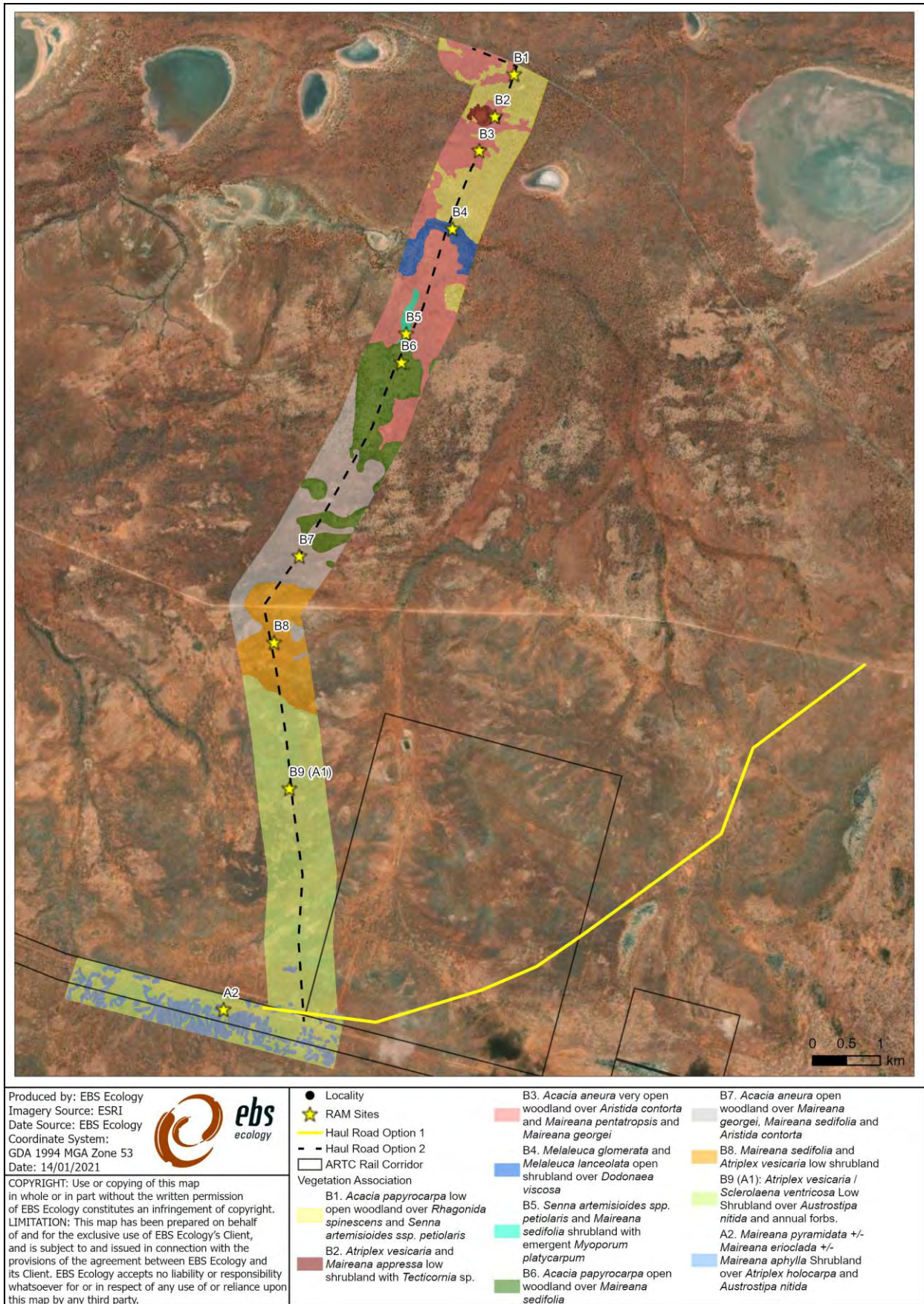


Figure 19. Vegetation associations of the Option 2 Kultanaby Area and rail siding infrastructure location. The map also shows the location of sites used during the field survey.

5.3.3 Flora

The field survey recorded 82 plant species, with no introduced species. Plant species recorded during the survey are listed in Appendix 3.

Woodlands typically consisted of *Acacia aneura* or *Acacia papyrocarpa* with understory dominated by *Maireana* sp. and *Aristida contorta*. In the Chenopod shrublands, perennial shrubs and sub-shrubs such as *Maireana* spp. and *Atriplex* spp. provided the dominant cover. An area of drainage consisted of *Melaleuca* sp. and *Dodonaea viscosa*. Annual and short-lived perennial forbs and grasses were present but sparse particular in the *Melaleuca* sp. shrubland and *Acacia papyrocarpa* woodlands where species such as *Austrostipa nitida*, *Enneapogon avenaceous* and *Erodium cygnorum* occurred in greater density.

No EPBC Act or NPW Act listed threatened plant species was recorded.

5.3.4 Fauna

From the timed area searched and opportunistic observations conducted on 22nd December, 27 fauna species were recorded throughout the Option 2 Kultanaby Project Area (Appendix 4), all birds except one reptile (Sand Goanna, *Varanus gouldii*).

Bird species were not diverse. Twenty-six species were observed across the Option 2 Kultanaby Project Area, all typical species of arid plains vegetated with *Acacia* woodlands or shrublands, such as the Budgerigar (*Melopsittacus undulatus*) and White-winged Fairywren (*Malurus leucopterus*).

No bird species listed as threatened under the EPBC Act or NPW Act was recorded.

No reptile species listed as threatened under the EPBC Act or NPW Act was recorded.

No mammal species were recorded during the survey.

5.4 Likelihood of Occurrence of Threatened Species

Given the proximity of the two Haul Road locations and the survey results for both options, the likelihood of occurrence of threatened species for each option is likely to be the same. Based on survey results, including flora and fauna species observed, Vegetation Associations present and their condition and the presence/absence of other habitat features, threatened species identified by desktop searches were assessed for their likelihood of presence. Results are summarised in Table 29, with the full assessment for each species provided as Appendix 5.

Results indicate the following:

- No species listed as threatened under the EPBC Act or NPW Act was recorded during the surveys.
- Three species have been assessed as likely to occur in the HR Project Area based on the proximity of recent records and suitable habitat being widespread:
 - Slender-billed Thornbill (*Acanthiza iredalei iredalei*) (NPW Act Rare);
 - Chestnut-breasted Whiteface (*Aphelocephala pectoralis*) (NPW Act Rare); and
 - Plains Mouse (*Pseudomys australis*) (EPBC Act Vulnerable, NPW Act Vulnerable).

- Six species have been assessed as possibly occurring, based on proximity of recent records and only limited or marginal habitat present. This includes two species listed as Vulnerable under the EPBC Act, one listed as Migratory under the EPBC Act and two listed as Vulnerable and one as Rare under the NPW Act.

Table 29. Threatened species potentially occurring within the Project area.

Scientific name	Common name	Conservation status		Likelihood of occurrence within project area
		Aus	SA	
BIRDS				
<i>Acanthiza iredalei iredalei</i>	Slender-billed Thornbill (western)	-	R	Likely
<i>Amytornis modestus</i>	Thick-billed Grasswren	VU		Possible
<i>Amytornis modestus indulkanna</i>	Thick-billed Grasswren (NW)	-	V	Possible
<i>Aphelocephala pectoralis</i>	Chestnut-breasted Whiteface	-	R	Likely
<i>Charadrius veredus</i>	Oriental Plover	Mi	-	Possible
<i>Falco hypoleucos</i>	Grey Falcon	VU	R	Possible
MAMMALS				
<i>Pseudomys australis</i>	Plains Mouse	VU	V	Likely
PLANTS				
<i>Ophioglossum polyphyllum</i>	Large Adder's-tongue	-	R	Possible
<i>Santalum spicatum</i>	Sandalwood	-	V	Possible

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). SA: South Australia (*National Parks and Wildlife Act 1972*). Conservation codes: CE: Critically Endangered. EN/E: Endangered. VU/V: Vulnerable. R: Rare. Mi: Migratory.

6 DISCUSSION

6.1 Option 1 Flora and vegetation condition

The Vegetation Associations present in the Option 1 Kultanaby Area and their condition are representative of those widespread throughout the neighbouring region. Disturbance from light grazing was apparent at the time of the survey, with evidence of heavier grazing pressure in the recent past. This land use history was reflected by the plant species recorded, with non-palatable grasses and shrubs such as *Aristida* spp. and *Atriplex* spp. dominating throughout. The overall lack of regenerating palatable species such as *Maireana* spp. and tussock grasses is also indicative of long-term grazing impact by stock and feral herbivores such as Rabbits (*Oryctolagus cuniculus*).

Vegetation showed a noticeable response to recent climatic and seasonal conditions, with annual forbs and grasses reliant on good winter/spring rainfall recorded throughout the Kultanaby Area.

There was a low percent cover of annual and short-lived perennial grasses at vegetation monitoring sites. It is likely that there is a high variability in vegetative cover that fluctuates due to climatic factors. Although vegetation impact monitoring methods used measure cover of long-lived perennials that are less likely to be influenced by climate, this will be an important factor to consider when monitoring future changes due to mine impact.

6.2 Option 1 Fauna

The most diverse groups of fauna recorded were those that can respond quickly to increased habitat and foraging resources as a result of rainfall. This included reptiles and birds, which are either able to survive less favourable conditions due to low resource requirements, breed quickly and/or are highly mobile.

In contrast, mammals were not diverse, with only three species (one introduced) recorded. Trapping success was also poor, with only three captures throughout the entire survey period. Most small mammal species in the arid zone are known to go through 'boom and bust' cycles in response to rainfall. During unfavourable times populations either contract to areas of refuge or persist in extremely low numbers, only to experience population irruptions and expansion in good seasons.

Trapping results are indicative of exceptionally low mammal populations at the end of an unfavourable period, with insufficient time since rainfall to recover. It is likely that under more favourable conditions, additional species and numbers of mammals would be recorded.

Responses by fauna to climatic variables will be important to consider when analysing long-term impact monitoring results. It may be that detected changes in, particularly mammal, species and populations are the result of fluctuations in response to climate, rather than long-term changes due to the impact of mining activities.

6.3 Option 2 Flora and Vegetation condition

The Vegetation Associations along the Option 2 Kultanaby Area are diverse, represented by nine different vegetation types and conditions. The northern vegetation associations were largely undisturbed by grazing

(VA B1, B3, B4 and B5). In the remaining Vegetation Associations, disturbance from light grazing was apparent at the time of the survey and the grazing impact on the vegetation was more pronounced in the southern section of the project area. In these areas the proportion of modified vegetation increased from north to south and fewer young plants were present, particularly in Vegetation Association B9, the *Atriplex vesicaria* +/- *Sclerolaena* sp. Low Shrubland. At some sites, there was evidence of heavier grazing pressure in the past with the presence of non-palatable grasses and shrubs such as *Aristida* spp. and *Atriplex* spp. and lower than expected species diversity.

6.4 Option 2 Fauna

As trapping was not conducted in this area, birds were the most diverse species observed. The bird species consisted of 26 bird species all birds typically occurring in arid habitats and can react quickly to boom and bust cycles. As mentioned in Option 1, responses by fauna to climatic variables will be important to consider when analysing long-term impact monitoring results. It may be that detected changes in species and populations are the result of fluctuations in response to climate, rather than long-term changes due to the impact of mining activities.

6.5 Legislative compliance

6.5.1 EPBC Act

Three species listed as Vulnerable and one as Migratory under the EPBC Act have been assessed as likely or possibly occurring in the Kultanaby Area. Considering the Significant Impact Guidelines, it is unlikely that any significant impact to these species would result from the proposed mining activities for reasons summarised in Table 30.

As there is unlikely to be a significant impact on any EPBC Act listed species, referral of the Project under the act would not be required.

However, this summary is based on survey results and information available at the time of writing. It does not constitute a full assessment against Significant Impact Criteria or consider future changes to the project design. In particular, for the Option 2 Kultanaby Area, insufficient survey effort was conducted to ensure species, such as the Thick-billed Grasswren (*Amytornis modestus*) and Plains Mouse (*Pseudomys australis*) are present in the area given the presence of suitable habitat.

Further targeted survey work may be required for some species where minimum survey effort requirements have not been met by the scope of this project. In these cases, appropriate recommendations have been made in Section 7.

Table 30. Summary of significance of impact to threatened species.

Species	EPBC Act Status	Assessment
<i>Amytornis modestus</i> Thick-billed Grasswren	Vulnerable	Critical habitat components required by Thick-billed Grasswren includes dense Sandhill Canegrass, saltbush (<i>Atriplex</i> spp.) and bluebush (<i>Maireana</i> spp.) interspersed with open areas for foraging (NSW National Parks and Wildlife Service, 2002). In the HR Project Area, this habitat occurs in run-on areas and near drainage features, where denser, taller <i>Maireana</i> spp. shrubland occurs.
<i>Amytornis modestus indulkanna</i> Thick-billed Grasswren (NW)		This habitat is extensive throughout the Kultanaby Area, particularly the Option 1 area and the southern section in Option 2, with only a limited extent impacted, with current project design mostly avoiding these low-lying features in the landscape. Although survey effort was not sufficient to fulfil minimum survey effort guidelines (Department of the Environment, Water, Heritage and the Arts, 2010), there have been no recent records of the species from within 50 km of the Kultanaby Area.
<i>Falco hypoleucos</i> Grey Falcon	Vulnerable	Typical habitat for the Grey Falcon includes Acacia spp. shrublands that are crossed by tree-lined water courses. Birds hunt over treeless areas, tussock grasslands and in open woodlands. The species requires tall trees along watercourses, usually <i>Eucalyptus camaldulensis</i> (River Red Gum), but also <i>E. coolibah</i> (Coolabah) (Threatened Species Scientific Committee, 2020). Crucial elements of breeding habitat are absent from the Kultanaby Area – tree lined watercourses and tall timber. While shrublands are suitable foraging habitat, this habitat is widespread beyond the Kultanaby Area, with the relatively small extent of impact unlikely to cause habitat loss sufficient to cause a decline in the species or impact any critical breeding habitat. There have been no recent records from within 50 km of the Kultanaby area.
<i>Charadrius veredus</i> Oriental Plover	Migratory	The Oriental Plover is a non-breeding migrant that occurs widely throughout mainland Australia. There are no records within 50 km of the Kultanaby Area and the area is likely only to support vagrant individuals during migration. This indicates that the Kultanaby Area does not support an ecologically significant proportion of the population. The Project will therefore not substantially modify an area of important habitat or seriously disrupt the species' lifecycle.
<i>Pseudomys australis</i> Plains Mouse	Vulnerable	The Kultanaby Area is not within the area mapped as Current and Potential habitat in the <i>National Recovery Plan for the Plains Mouse (Pseudomys australis)</i> (Moseby, 2012). Although there are areas of critical habitat, including run-on areas and cracking clay soils of gilgais in gibber plains, these areas are small in extent, isolated and not impacted by the currently proposed Option 1 Haul Road route, but may be impacted by the Option 2 Haul Road route. Although effort was not sufficient to fulfil minimum survey requirements for the species, habitat in the Kultanaby Area impacted is likely only occupied by the species during population irruptions.

6.5.2 NV Act

Under the NV Act, clearing of native vegetation associated with the haul road can occur under Regulation 12(28) of the *Native Vegetation Regulations 2017*, so long as they are approved under a Mining Act or the *Petroleum and Geothermal Energy Act 2000*.

Given the extent of clearing required, it is likely that it constitutes a Level 4 clearance under the *Native Vegetation Regulations 2017*. For approval, the Proponent will be required to offset the clearance by contributing to a Significant Environmental Benefit (SEB), as either an on-ground offset or payment into the SEB Fund. The SEB can be calculated once final Project design is complete and the extent of impact known. The SEB also accounts for impact to species listed as threatened under the NPW Act.

In addition to offsetting the clearance through achieving the SEB, the Native Vegetation Council will approve the Project only if the Proponent can demonstrate that the Mitigation Hierarchy, as defined in Table 31, has been properly addressed. Approval may also be conditional on other measures, such as long-term impact monitoring.

Table 31. Mitigation Hierarchy for native vegetation clearing applications.

Hierarchy	Definition
Avoidance	Measures must be taken to avoid clearance of native vegetation wherever possible.
Minimisation	If clearance cannot be avoided, measures must be taken to minimise the extent, duration and intensity of impacts to the fullest possible extent.
Rehabilitation or restoration	Measures must be taken to rehabilitate ecosystems that will be degraded/impacted due to clearance that cannot be avoided or minimised.
Offset	Any adverse impacts on native vegetation that cannot be avoided or minimised must be offset by implementing an SEB that outweighs the impact.

7 RECOMMENDATIONS

Recommendations that have been made considering the findings of this report are discussed in Table 32.

Table 32. Table of recommendations.

Recommendation	Discussion
Consider the Mitigation Hierarchy at all stages of Project design.	<p>Although native vegetation cannot be completely avoided in this instance, impact can be minimised by reducing the extent of clearing to the minimum possible and avoiding vegetation of higher diversity and better condition wherever possible. This would include selecting Option 1 as the location of the haul road. Option 1 has fewer vegetation types, less species diversity and is in poorer condition than the majority of the Option 2 vegetation, therefore, it is likely to have a lesser impact on fauna and flora.</p> <p>Minimisation and rehabilitation measures should include clearly defined, measurable and achievable management objectives and strategies.</p>
Habitat avoidance	<p>Wherever possible, avoid the following habitat features:</p> <ul style="list-style-type: none"> - Run-on areas and drainage features that provide potential habitat for Thick-billed Grasswren and Plains Mouse. - Gilgais and areas of cracking clay soils that provide potential critical habitat for Plains Mouse. - Taller shrublands and woodlands that are potential habitat of <i>Santalum spicatum</i> (Sandalwood).
Achieving an SEB	<p>If possible, preference should be given to achieving the SEB through an on-ground offset, at least in part. Grazing and fire management on land managed as an SEB area will be critical for achieving this in this instance.</p>
Further biodiversity survey	<p>Undertake the following when detailed design of the Haul Road is available:</p> <ul style="list-style-type: none"> - Where potential habitat is impacted, targeted survey for Thick-billed Grasswren and Plains Mouse consistent with minimum survey guidelines, including pre-clearing surveys. - Targeted search of tall shrublands and/or woodlands impacted for <i>Santalum spicatum</i> (Sandalwood), including pre-clearing surveys.
Native Vegetation Clearance Data Report	<p>Required as part of an application to clear native vegetation.</p>
EPBC Act self-assessment	<p>When final Project design and results of any recommended future surveys are available, undertaking an EPBC Act self-assessment process to properly address the significance of impact to Thick-billed Grasswren, Plains Mouse and Grey Falcon.</p> <p>Referral under the EPBC Act will be required if impact is significant.</p>

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9 APPENDICES

Appendix 1. Flora species recorded during the survey at Option 1.

Scientific name	Common name	Conservation status	
		EPBC Act	NPW Act
<i>Aristida contorta</i>	Curly Wire-grass	-	-
<i>Atriplex fissivalvis</i>	Gibber Saltbush	-	-
<i>Atriplex holocarpa</i>	Pop Saltbush	-	-
<i>Atriplex vesicaria</i>	Bladder Saltbush	-	-
<i>Austrostipa nitida</i>	Balcarra Spear-grass	-	-
<i>Calandrinia eremaea</i>	Dryland Purslane	-	-
<i>Convolvulus remotus</i>	Grassy Bindweed	-	-
<i>Cynanchum viminale ssp. australe</i>	Caustic Bush	-	-
<i>Daucus glochidiatus</i>	Native Carrot	-	-
<i>Dissocarpus biflorus</i>		-	-
<i>Dissocarpus paradoxus</i>	Ball Bindyi	-	-
<i>Enneapogon avenaceus</i>	Common Bottle-washers	-	-
<i>Erodium cygnorum</i>	Blue Heron's-bill	-	-
<i>Euphorbia tannensis ssp. eremophila</i>	Desert Spurge	-	-
<i>Frankenia serpyllifolia</i>	Bristly Sea-heath	-	-
<i>Gnephosis arachnoidea</i>	Spidery Button-flower	-	-
<i>Gnephosis sp.</i>		-	-
<i>Ixiochlamys filicifolia</i>		-	-
<i>Leiocarpa tomentosa</i>	Woolly Plover-daisy	-	-
<i>Lepidium phlebopetalum</i>	Veined Peppercross	-	-
<i>Lotus cruentus</i>	Red-flower Lotus	-	-
<i>Maireana aphylla</i>	Cotton-bush	-	-
<i>Maireana appressa</i>	Pale-fruit Bluebush	-	-
<i>Maireana astrotricha</i>	Low Bluebush	-	-
<i>Maireana erioclada</i>	Rosy Bluebush	-	-
<i>Maireana georgei</i>	Satiny Bluebush	-	-
<i>Maireana pentagona</i>	Slender Fissure-plant	-	-
<i>Maireana pyramidata</i>	Black Bluebush	-	-
<i>Maireana sp.</i>	Bluebush/Fissure-plant	-	-
<i>Medicago polymorpha*</i>	Burr-medic	-	-
<i>Minuria cunninghamii</i>	Bush Minuria	-	-
<i>Nicotiana velutina</i>	Velvet Tobacco	-	-
<i>Panicum decompositum var. decompositum</i>	Native Millet	-	-
<i>Plantago drummondii</i>	Dark Plantain	-	-
<i>Ptilotus gaudichaudii</i>	Paper Fox-tail	-	-
<i>Ptilotus obovatus</i>	Silver Mulla Mulla	-	-
<i>Roepera apiculate</i>	Pointed Twinleaf	-	-
<i>Salsola australis</i>	Buckbush	-	-
<i>Sarcosoma praecox</i>	Sarcosoma	-	-
<i>Sclerolaena brachyptera</i>	Short-wing Copperburr	-	-

Buzzard (Kultanaby Haul Road) Baseline Flora and Fauna Assessment

<i>Scientific name</i>	Common name	Conservation status	
		EPBC Act	NPW Act
<i>Sclerolaena divaricata</i>	Tangled Bindyi	-	-
<i>Sclerolaena eriacantha</i>	Silky Bindyi	-	-
<i>Sclerolaena ventricosa</i>	Salt Bindyi	-	-
<i>Senecio glossanthus</i>	Slender Groundsel	-	-
<i>Sida corrugata</i> var.	Corrugated Sida	-	-
<i>Solanum quadriloculatum</i>	Plains Nightshade	-	-
<i>Sonchus oleraceus</i> *	Common Sow-thistle	-	-
<i>Tetragonia eremaea</i>	Desert Spinach	-	-

Conservation status

Conservation Codes: CE: Critically Endangered. ENE/E: Endangered. VU/V: Vulnerable. R: Rare. ssp.: the conservation status applies at the sub-species level. An asterisk denotes an introduced species.

Appendix 2. Fauna species recorded during the survey at Option 1.

Scientific name	Common name	Conservation status		Method
		EPBC Act	NPW Act	
REPTILES				
<i>Ctenophorus nuchalis</i>	Central Netted Dragon			P F
<i>Ctenotus strauchii</i>	Short-legged Ctenotus			P
<i>Diplodactylus conspicillatus</i>	Variable Fat-tailed Gecko			P F
<i>Eremiascincus richardsonii</i>	Broad-banded Sandswimmer			P
<i>Heteronotia binoei</i>	Bynoe's Gecko			P
<i>Lerista labialis</i>	Eastern Two-toed Slider			P
<i>Lialis burtonis</i>	Burton's Snake-lizard			P
<i>Menetia greyii</i>	Dwarf Skink			P
<i>Morethia boulengeri</i>	Common Snake-eye			AS
<i>Pseudonaja mengdeni</i>	Mengden's Brown Snake			O
<i>Tiliqua rugosa</i>	Sleepy Lizard			P
<i>Underwoodisaurus milii</i>	Common Barking Gecko			P
BIRDS				
<i>Anas gracilis</i>	Grey Teal			O
<i>Anthus australis</i>	Australasian Pipit			O
<i>Calamanthus campestris</i>	Rufous Fieldwren			O
<i>Cinchoramphus cruralis</i>	Brown Songlark			O
<i>Cinclosoma cinnamomeum</i>	Cinnamon Quailthrush			O
<i>Corvus coronoides</i>	Australian Raven			O
<i>Euseyonis melanops</i>	Black-fronted Dotterel			O
<i>Epthianura aurifrons</i>	Orange Chat			O
<i>Epthianura tricolor</i>	Crimson Chat			O
<i>Falco cenchroides</i>	Nankeen Kestrel			O
<i>Gavicalis virescens</i>	Singing Honeyeater			O
<i>Himantopus leucocephalus</i>	Black-winged Stilt			O
<i>Hirundo neoxena</i>	Welcome Swallow			O
<i>Malurus leucopterus</i>	White-winged Fairywren			O
<i>Melopsittacus undulatus</i>	Budgerigar			O
<i>Milvus migrans</i>	Black Kite			O
<i>Peltohyas australis</i>	Inland Dotterel			O
<i>Petroica goodenovii</i>	Red-capped Robin			O
<i>Psophodes occidentalis</i>	Chiming Wedgebill			O
<i>Taeniopygia guttata</i>	Zebra Finch			O
<i>Vanellus tricolor</i>	Banded Lapwing			O
MAMMALS				
<i>Ovis aries*</i>	Sheep*			O
<i>Pseudomys bolami</i>	Bolam's Mouse			P
<i>Sminthopsis macroura</i>	Stripe-faced Dunnart			P

Conservation status

Conservation Codes: CE: Critically Endangered. EN/E: Endangered. VU/V: Vulnerable. R: Rare. ssp.: the conservation status applies at the sub-species level. An asterisk denotes an introduced species. Method: P: Pit trap. F: Funnel trap. E: Elliott trap. O: Observed. AS: Active search.

Appendix 3. Flora species recorded during the survey at Option 2.

Scientific name	Common name	Conservation status	
		EPBC Act	NPW Act
<i>Abutilon halophilum</i>	Plains Lantern-bush	-	-
<i>Acacia aneura complex</i>	Mulga	-	-
<i>Acacia ayersiana</i>	Blue mulga	-	-
<i>Acacia oswaldii</i>	Umbrella Wattle	-	-
<i>Acacia papyrocarpa</i>	Western Myall	-	-
<i>Acacia tetragonophylla</i>	Dead Finish	-	-
<i>Alectryon oleifolius ssp. canescens</i>	Bullock Bush	-	-
<i>Aristida contorta</i>	Curly Wire-grass	-	-
<i>Atriplex holocarpa</i>	Pop Saltbush	-	-
<i>Atriplex vesicaria</i>	Bladder Saltbush	-	-
<i>Austrostipa nitida</i>	Balcarra Spear-grass	-	-
<i>Brachyscome ciliaris var. ciliaris</i>	Variable Daisy	-	-
<i>Calotis hispidula</i>	Hairy Burr-daisy	-	-
<i>Dissocarpus paradoxus</i>	Ball Bindyi	-	-
<i>Dodonaea viscosa ssp. angustissima</i>	Narrow-leaf Hop-bush	-	-
<i>Einadia nutans ssp.</i>	Climbing Saltbush	-	-
<i>Enchylaena tomentosa var.</i>	Ruby Saltbush	-	-
<i>Enneapogon avenaceus</i>	Common Bottle-washers	-	-
<i>Enneapogon nigricans</i>	Black-head Grass	-	-
<i>Enneapogon polyphyllus</i>	Leafy Bottle-washers	-	-
<i>Eragrostis dielsii</i>	Mulka	-	-
<i>Eragrostis eriopoda</i>	Woollybutt	-	-
<i>Eremophila alternifolia</i>	Narrow-leaf Emubush	-	-
<i>Eremophila duttonii</i>	Harlequin Emubush	-	-
<i>Eremophila latrobei ssp. latrobei</i>	Grey-leaf Crimson Emubush	-	-
<i>Eremophila scoparia</i>	Broom Emubush	-	-
<i>Erodium cygnorum</i>	Blue Heron's-bill	-	-
<i>Euphorbia drummondii group</i>		-	-
<i>Euphorbia tannensis ssp. eremophila</i>	Desert Spurge	-	-
<i>Exocarpos aphyllus</i>	Leafless Cherry	-	-
<i>Frankenia foliosa</i>	Leafy Sea-heath	-	-
<i>Gnephosis arachnoidea</i>	Spidery Button-flower	-	-
<i>Gnephosis tenuissima</i>	Dwarf Golden-tip	-	-
<i>Lepidium phlebopetalum</i>	Veined Peppergrass	-	-
<i>Lycium australe</i>	Australian Boxthorn	-	-
<i>Maireana appressa</i>	Pale-fruit Bluebush	-	-
<i>Maireana astrotricha</i>	Low Bluebush	-	-
<i>Maireana coronata</i>	Crown Fissure-plant	-	-
<i>Maireana erioclada</i>	Rosy Bluebush	-	-
<i>Maireana georgei</i>	Satiny Bluebush	-	-
<i>Maireana pentatropis</i>	Erect Mallee Bluebush	-	-

Buzzard (Kultanaby Haul Road) Baseline Flora and Fauna Assessment

Scientific name	Common name	Conservation status	
		EPBC Act	NPW Act
<i>Maireana pyramidata</i>	Black Bluebush	-	-
<i>Maireana sedifolia</i>	Bluebush	-	-
<i>Maireana triptera</i>	Three-wing Bluebush	-	-
<i>Melaleuca glomerata</i>	Inland Paper-bark	-	-
<i>Melaleuca lanceolata</i>	Dryland Tea-tree	-	-
<i>Myoporum platycarpum</i> ssp.	False Sandalwood	-	-
<i>Panicum decompositum</i> var. <i>decompositum</i>	Native Millet	-	-
<i>Pittosporum angustifolium</i>	Native Apricot	-	-
<i>Podolepis capillaris</i>	Wiry Podolepis	-	-
<i>Portulaca oleracea</i>	Common Purslane	-	-
<i>Ptilotus exaltatus</i>	Pink Mulla Mulla	-	-
<i>Ptilotus obovatus</i>	Silver Mulla Mulla	-	-
<i>Ptilotus polystachyus</i>	Long-tails	-	-
<i>Rhagodia spinescens</i>	Spiny Saltbush	-	-
<i>Rhagodia ulicina</i>	Intricate Saltbush	-	-
<i>Rhodanthe floribunda</i>	White Everlasting	-	-
<i>Salsola australis</i>	Buckbush	-	-
<i>Santalum acuminatum</i>	Quandong	-	-
<i>Sclerolaena bicornis</i> var. <i>bicornis</i>	Goat-head Bindyi	-	-
<i>Sclerolaena brachyptera</i>	Short-wing Bindyi	-	-
<i>Sclerolaena brevifolia</i>	Small-leaf Bindyi	-	-
<i>Sclerolaena divaricata</i>	Tangled Bindyi	-	-
<i>Sclerolaena obliquicuspis</i>	Oblique-spined Bindyi	-	-
<i>Sclerolaena ventricosa</i>	Salt Bindyi	-	-
<i>Senna artemisioides</i> ssp. <i>filifolia</i>	Fine-leaf Desert Senna	-	-
<i>Senna artemisioides</i> ssp. <i>petiolaris</i>		-	-
<i>Senna cardiosperma</i> ssp. <i>gawlerensis</i>	Gawler Ranges Senna	-	-
<i>Setaria constricta</i>	Knotty-butt Paspalidium	-	-
<i>Sida corrugata</i> var.	Corrugated Sida	-	-
<i>Sida petrophila</i>	Rock Sida	-	-
<i>Solanum ellipticum</i>	Potato Bush	-	-
<i>Solanum lasiophyllum</i>	Flannel Bush	-	-
<i>Sporobolus actinocladus</i>	Ray Grass	-	-
<i>Stenopetalum</i> sp.	Thread-petal	-	-
<i>Swainsona formosa</i>	Sturt Pea	-	-
<i>Tecticornia indica</i> ssp. <i>leiostachya</i>	Samphire	-	-
<i>Tetragonia eremaea</i>	Desert Spinach	-	-
<i>Vittadinia eremaea</i>	Desert New Holland Daisy	-	-
<i>Zygophyllum ovatum</i>	Twinleaf Family	-	-
<i>Zygophyllum compressum</i>	Twinleaf Family	-	-
<i>Zygophyllum aurantiacum/eremaeum</i>	Shrubby Twinleaf	-	-

Conservation status

Conservation Codes: CE: Critically Endangered. EN/E: Endangered. VU/V: Vulnerable. R: Rare. ssp.: the conservation status applies at the sub-species level. An asterisk denotes an introduced species.

Appendix 4. Fauna species recorded during the survey at Option 2.

Scientific name	Common name	Conservation status		Method
		EPBC Act	NPW Act	
REPTILES				
<i>Varanus gouldii</i>	Sand Goanna			O
BIRDS				
<i>Australian Magpie</i>	<i>Gymnorhina tibicen</i>			O
<i>Australian Pipit</i>	<i>Anthus australis</i>			O
<i>Australian Raven</i>	<i>Corvus coronoides</i>			O
<i>Banded Lapwing</i>	<i>Vanellus tricolor</i>			O
<i>Black-faced Woodswallow</i>	<i>Artamus cinereus</i>			O
<i>Brown Songlark</i>	<i>Cincloramphus cruralis</i>			O
<i>Budgerigar</i>	<i>Melopsittacus undulatus</i>			O
<i>Chiming Wedgebill</i>	<i>Psophodes occidentalis</i>			O
<i>Crested Bellbird</i>	<i>Oreoica gutturalis</i>			O
<i>Crested Pigeon</i>	<i>Ocyphaps lophotes</i>			O
<i>Crimson Chat</i>	<i>Epthianura tricolor</i>			O
<i>Eastern Bluebonnet (eastern and central SA)</i>	<i>Northiella haematogaster haematogaster</i>			O
<i>Galah</i>	<i>Eolophus roseicapilla</i>			O
<i>Grey Butcherbird</i>	<i>Cracticus torquatus leucopterus</i>			O
<i>Masked Woodswallow</i>	<i>Artamus personatus</i>			O
<i>Nankeen Kestrel</i>	<i>Falco cenchroides</i>			O
<i>Orange Chat</i>	<i>Epthianura aurifrons</i>			O
<i>Rufous Songlark</i>	<i>Cincloramphus mathewsi</i>			O
<i>Singing Honeyeater</i>	<i>Gavicalis virescens</i>			O
<i>Southern Whiteface</i>	<i>Aphelocephala leucopsis leucopsis</i>			O
<i>Spiny-cheeked Honeyeater</i>	<i>Acanthagenys rufogularis</i>			O
<i>Wedge-tailed Eagle</i>	<i>Aquila audax</i>			O
<i>White-browed Babbler</i>	<i>Pomatostomus superciliosus</i>			O
<i>White-winged Fairywren</i>	<i>Malurus leucopterus</i>			O
<i>Yellow-throated Miner</i>	<i>Manorina flavigula</i>			O
<i>Zebra Finch</i>	<i>Taeniopygia guttata castanotis</i>			O

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). SA: South Australia (*National Parks and Wildlife Act 1972*). Conservation codes: CE: Critically Endangered. EN/E: Endangered. VU/V: Vulnerable. R: Rare. *: Introduced.

Appendix 5. Likelihood of occurrence assessments.

Species (common name)	**Conservation status		*Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat - Comment
	NPW Act	EPBC Act				
<i>Acanthiza iredalei iredalei</i> Slender-billed Thornbill – western)	R	-	2	2007	Low, dense saltbush and Bluebush (<i>Maireana</i> spp.) (Pizzey & Knight, 2007).	Likely – Maireana shrublands in the Kultanaby Area are likely habitat for this species.
<i>Actitis hypoleucos</i> (Common Sandpiper)	R	Mi	1	-	Shallow, pebbly or muddy edges of rivers, dams, lakes, saltmarsh and wetlands (Pizzey & Knight, 2007).	Unlikely – No suitable wetland habitat.
<i>Amytornis modestus</i> (Thick-billed Grasswren)	-	VU	1, 2	2014	The Thick-billed Grasswren occurs in chenopod shrublands (which occur in the arid and semi-arid zones), especially shrublands dominated by saltbush <i>Atriplex</i> spp. and bluebush <i>Maireana</i> spp., sometimes with widely scattered trees. During a survey of the Mount Eba and Millers Creek Stations, South Australia, the subspecies was recorded in chenopod shrubland with gilgais supporting large chenopods such as Oodnadatta Saltbush <i>Atriplex nummularia omissa</i> , Blackbush <i>Maireana pyramidata</i> , and Spiny Saltbush <i>Rhagodia spinescens</i> (Department of Agriculture, Water and the Environment, 2020a).	Possible – Recorded since 1995, however habitat for the species is limited low-lying, run-on areas where taller, denser shrubs occur. These areas are largely avoided by the haul road.
<i>Amytornis modestus indulkanna</i> (Thick-billed Grasswren (NW))	-	SP	2	2016	As for <i>Amytornis modestus</i> .	Possible – As for <i>Amytornis modestus</i> .
<i>Aphelocephala pectoralis</i> (Chestnut-breasted Whiteface)	R	-	2	2016	Tablelands with bare ground and gibber, sparsely vegetated with <i>Maireana</i> spp., <i>Acacia tetragonophylla</i> , <i>Eremophila</i> spp. and <i>Acacia aneura</i> (Pizzey & Knight, 2007).	Likely – recent record within 50 km of the Kultanaby Area. The entire Kultanaby Area is suitable habitat for the species.
<i>Apus pacificus</i> (Fork-tailed Swift)	-	Mi	1	-	In Australia, aerial over open country from semi-arid areas to forests and coasts (Pizzey & Knight, 2007).	Unlikely – There are no records of the species within 50 km of the Kultanaby Area and the species is not likely to use terrestrial habitat available.

Species (common name)	**Conservation status		*Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat - Comment
	NPW Act	EPBC Act				
<i>Bizuria lobate menziesi</i> (Musk Duck)	R	-	2		Well-vegetated swamps and wetlands (Pizzey & Knight, 2007).	Unlikely – No suitable wetland habitat.
<i>Calidris acuminata</i> (Sharp-tailed Sandpiper)	-	Mi	1	-	Shallow fresh, brackish or saline inland wetlands; Tidal mudflats, saltmarshes and mangroves (Pizzey & Knight, 2007).	Unlikely – No suitable wetland habitat.
<i>Calidris ferruginea</i> (Curlew Sandpiper)	E	CE	1	-	Tidal mudflats, saltmarshes and brackish and saline wetlands (Pizzey & Knight, 2007).	Unlikely – No suitable wetland habitat.
<i>Calidris melanotos</i> (Pectoral Sandpiper)	R	Mi	1	-	Shallow fresh water swamps, often with low grass and other herbage (Pizzey & Knight, 2007).	Unlikely – No suitable wetland habitat.
<i>Charadrius veredus</i> (Oriental Plover, Oriental Dotterel)	-	Mi	1	-	Open plains and bare, open rolling country often far from water (Pizzey & Knight, 2007).	Possible – No recent records, but sparse shrublands and grasslands in the KultanabyArea provides suitable habitat.
<i>Falco hypoleucos</i> (Grey Falcon)	R	VU	1	-	Lightly treed inland plains, gibber deserts, sandridges and pastoral lands. Breeds in timbered watercourses (Pizzey & Knight, 2007).	Possible – No recent records, but the area is suitable habitat for the species.
<i>Leipoa ocellata</i> (Malleefowl)	V	VU	1	-	Mallee, Acacia, Eucalyptus woodlands and coastal heath on sandy soils (Pizzey & Knight, 2007).	Unlikely – No recent records within 50 km and the Kultanaby Area does not provide suitable habitat.
<i>Lophochroa leadbeateri mollis</i> (Major Mitchell's Cockatoo (NW, EP))	SP	-	2	2014	Uses open, sparsely timbered grassland, farmlands with well-treed paddocks, as well as mulga and similar open scrub, open mallee country, callitris and casuarina country. Also utilises watercoursed trees (Pizzey & Knight, 2007).	Likely – suitable habitat, recent records nearby.
<i>Motacilla cinerea</i> (Grey Wagtail)	-	Mi	1	-	Near running water in sandy and rocky streams in escarpments and rainforests (Pizzey & Knight, 2007).	Unlikely – No recent records and no suitable habitat.
<i>Motacilla flava</i> (Yellow Wagtail)	-	Mi	1	-	Short grass and bare ground around swamp margins, sewage ponds and saltmarshes (Pizzey & Knight, 2007).	Unlikely – No recent records and no suitable habitat.
<i>Myiagra inquieta</i> (Restless Flycatcher)	R	-	2	2001	Open forests and woodlands (Pizzey & Knight, 2007).	Unlikely. There is no suitable woodland habitat in the Kultanaby Area.

Species (common name)	**Conservation status		*Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat - Comment
	NPW Act	EPBC Act				
<i>Pachycephala inornata</i> (Gilbert's Whistler)	R	-	2	2002	Tall woodland with dense understorey, mallee-spinifex associations, Cypress Pine and Mulga (Pizzey & Knight, 2007).	Unlikely. There is no suitable woodland or mallee habitat in the Kultanaby Area.
<i>Pezoporus occidentalis</i> Night Parrot	E	EN	1	-	<i>Triodia</i> spp. grasslands and chenopod shrublands (Threatened Species Scientific Committee, 2016).	Unlikely – No records of the species within 50 km of the Project Area and only limited habitat in poor condition.
<i>Polytelis alexandrae</i> (Princess Parrot, Alexandra's Parrot)	V	VU	1	-	Sand dunes and sand flats in open woodlands consisting of <i>Eucalyptus</i> spp., <i>Corymbia</i> spp. and <i>Allocasuarina</i> spp. (Department of Agriculture, Water and the Environment, 2020b).	Unlikely – No records of the species within 50 km and no suitable habitat.
<i>Tringa nebularia</i> (Common Greenshank)	-	Mi	1	-	Mudflats, estuaries, saltmarshes and margins of lakes and wetlands (Pizzey & Knight, 2007).	Unlikely – No suitable wetland habitat.
Mammals						
<i>Notomys fuscus</i> (Dusky Hopping-mouse, Wilkiniti)	V	VU	1	-	In SA, the species is found in areas of continuous sand dune habitat. The species is predominantly restricted to the dune crests. <i>Nitraria billardierei</i> and Sandhill Cane-grass (<i>Zygochloa paradoxa</i>) may be important in supporting persistent populations. After seasons of good rainfall the species may occur in atypical habitat such as chenopod (e.g. Black Bluebush (<i>Maireana pyramidata</i>)) shrubland on gibber plains, acacia shrubland and sandy creek lines (Department of Agriculture, Water and the Environment, 2020c).	Unlikely – unsuitable habitat, no recent records nearby.
<i>Pseudomys australis</i> (Plains Rat, Palyoora, Plains Mouse)	V	VU	1, 2	2013	Primarily found in gibber plains and mid slopes with boulders, small stones and gilgais, with vegetation dominated by <i>Atriplex-Maireana</i> open shrubland. In years of very good rainfall, this species occurs on adjoining sandy plains. During poor conditions, core refuge areas may occur on low-lying gilgais and watercourses of	Likely – The Kultanaby Area provides suitable habitat for the species during population irruptions, with core refuge areas very limited to drainage lines and areas of cracking clay not impacted by the Project. Although none were captured, survey effort was not sufficient to indicate that the species is absent, particularly

Species (common name)	**Conservation status		*Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat - Comment
	NPW Act	EPBC Act				
					gibber plains, with populations maintained in drainage depressions and areas of cracking clays (Department of Agriculture, Water and the Environment, 2020d).	considering the species is known to undergo significant population fluctuations and range expansions related to rainfall.
<i>Sminthopsis psammophila</i> (Sandhill Dunnart)	V	EN	1	-	Low, open mallee woodland over a diverse shrub layer and relatively dense spinifex (<i>Triodia</i> spp.) (Department of Environment and Water, 2019)	Unlikely – there is no suitable habitat in the Kultanaby Area.
Plants						
<i>Austrostipa nullanulla</i> (Club Spear-grass)	V	-	2	2010	In South Australia, occurs on gypseous soils on the outskirts of salt lakes (Office of Environment and Heritage, 2020).	Unlikely – Although there are records within 50 km of the Kultanaby Area, there is no suitable habitat for the species.
<i>Frankenia plicata</i>	V	EN	1	-	Small hillside drainage channels and, in the Simpson Desert, sandy to clay swales between dunes (Threatened Species Scientific Committee, 2008).	Unlikely – no records within 50 km and habitat is unsuitable.
<i>Hibbertia crispula</i> (Ooldea Guinea Flower)		VU	1	-	Found only in two locations one at Ooldea, the other at Lake Everard. At both locations, the plant grows in deep, red sand (Botanic Gardens of South Australia, 2020a).	Unlikely – the Kultanaby Area is not within the known distribution of the species and there is no suitable sand dune habitat.
<i>Ophioglossum polyphyllum</i> (Large Adder's-tongue)	R	-	2	2013	Sandy soils which remain damp during cool months of the year. The plant has been recorded from sandy flats in areas of rock outcrop and deep sands of sand dunes (Cunningham, Mulham, Milthorpe, & Leigh, 1992).	Possible – Limited habitat where sandy flats occur amongst gibber.
<i>Santalum spicatum</i> (Sandalwood)	V	-	2	2007	Arid shrublands in central South Australia including ridges, hill crests and plains with loam to clay-loam soils (Pobke, 2007).	Possible – limited habitat in the Kultanaby Area. Not recorded during the survey, but effort has been insufficient.
<i>Swainsona dictyocarpa</i>	V	-	2	2010	Known only from a single location at Bitter Well on Coondambo Station. The species occurs on a red sandy plain (Botanic Gardens of South Australia, 2020b)	Unlikely – Kultanaby Area is not within the known distribution of the species and there is no suitable sand plain habitat.

Species (common name)	**Conservation status		*Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat - Comment
	NPW Act	EPBC Act				
<i>Swainsona fuscoviridis</i> (Dark Green Swainson-pea)	R	-	2	1998	Regionally extinct in the Eyre Yorke Block, occurring only in an area west of Broken Hill (Botanic Gardens of South Australia, 2020c).	Unlikely – Kultanaby Area is not within the known distribution of the species.
<i>Swainsona microcalyx</i> (Wild Violet)	R	-	2	2010	Flat, sandy margins of salt lakes (Botanic Gardens of South Australia, 2020d).	Unlikely – there is no suitable habitat for the species in the Kultanaby Area.



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Buzzard (Kultanaby) Haul Road
Targeted Threatened Species Survey

Buzzard (Kultanaby) Haul Road Targeted Threatened Species Survey

4 June 2021

Version 2

Prepared by EBS Ecology for Peak Iron

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Cover photograph: *Ptilotus obovatus* flowering in *Acacia aneura* Open Woodland.

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GLOSSARY AND ABBREVIATION OF TERMS

Central	Central Iron Pty Ltd
cm	centimetre/s
EBS	Environmental and Biodiversity Services Pty Ltd, trading as EBS Ecology
EML	extractive mineral lease
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
GDA94	Geocentric Datum of Australia 1994
ha	hectare/s
km	kilometre/s
m	metre/s
MGA	Map Grid of Australia
MPL	miscellaneous purposes licence
NPW Act	<i>National Parks and Wildlife Act 1972</i>
Project	Buzzard Iron Ore Project
Project Area	The proposed MPL and haul road corridor
RAM	Rangelands Assessment Method

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1 INTRODUCTION

1.1 Background

EBS Ecology (EBS) was contracted by Central Iron Pty Ltd (Central Iron) to provide environmental services for the Buzzard Iron Ore Project (the Project), an undeveloped haematite deposit 120 kilometres (km) south of Coober Pedy. The Project consists of the mine development and associated infrastructure, including haul road from near Glendambo to the trans-Australia railway line and construction of a rail siding and loading facility at Kultanaby.

Baseline flora and fauna surveys undertaken in October and December 2020 indicated that habitat on the proposed haul road alignment was suitable for the three threatened species listed under the *Environment Protection and Biodiversity Conservation Act 1999* and/or the *National Parks and Wildlife Act 1972* (Table 1). As baseline surveys did not fully meet minimum survey effort guidelines for detecting these species, EBS recommended that additional targeted surveys be undertaken.

Table 1. Threatened species targeted by the survey.

Scientific Name	Common Name	EPBC Act*	NPW Act*
<i>Amytornis modestus</i>	Thick-billed Grasswren	VU	E
<i>Pseudomys australis</i>	Plains Mouse	VU	V
<i>Santalum spicatum</i>	Sandalwood		V

*EPBC Act/NPW Act: VU/V = Vulnerable, ENE = Endangered

1.2 Scope and Objectives

Targeted surveys and the resulting report were undertaken to achieve the following objectives:

- Based on EPBC Act guidelines, undertake targeted survey for Plains Mouse and Thick-billed Grasswren in areas of suitable habitat.
- Survey the entire haul road route and associated impact areas for *Santalum spicatum*.
- Refine existing vegetation and habitat mapping to cover the proposed extent of the miscellaneous purposes licence (MPL) and potential extractive mineral leases (EMLs).
- Provide a report detailing methodology and results in a suitable format to inform an EPBC Act self-assessment process to determine the significance of impact on EPBC listed species.

1.3 Project area

Baseline surveys investigated two proposed options for a haul road corridor alignment (Figure 1). Following further background work and recommendations made by EBS, Central has prioritised Option 1 as the preferred route. Option 1 is a 100 metre (m) wide, 11 kilometre (km) long link between the Glendambo – Tarcoola Road and the Trans-Australia railway line. The Project Area includes the proposed MPL of the haul road corridor and potential EMLs to support construction (Figure 1).

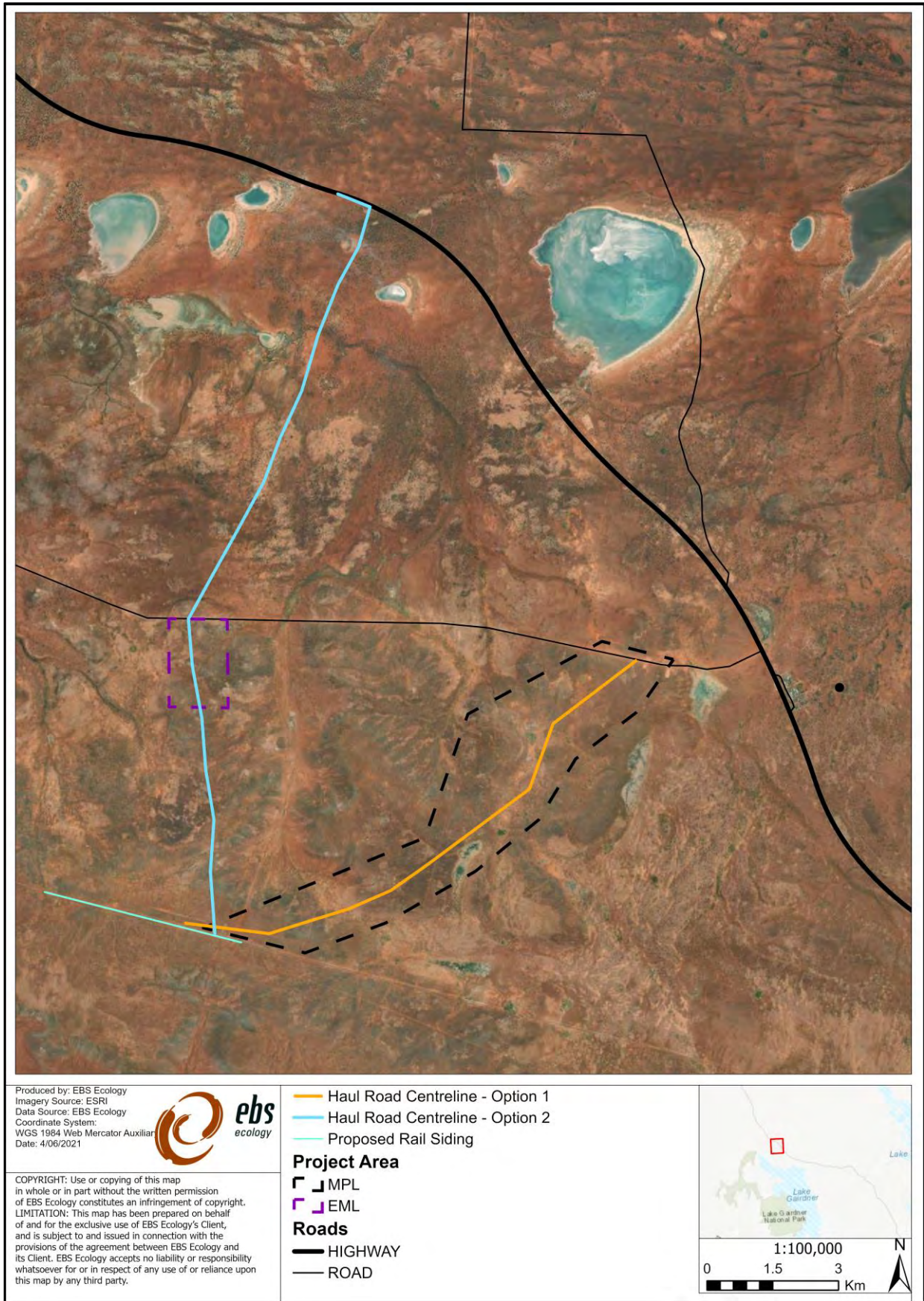


Figure 1. The location of the Project Area.

2 METHODS

2.1 Survey timing and duration

Surveys were undertaken over a five-day period from the 12th through 16th April 2021. This coincided with a period of average rainfall, following two-to-three years of below average rainfall.

Available rainfall records from Coondambo Station indicate that at least five of the last 10 years have recorded below average rainfall. This includes the second lowest annual rainfall on record of 43.9 mm in 2019 (Figure 2). Above average rainfall was recorded only in 2011 and 2017 (Bureau of Meteorology, 2021).

Prevailing dry conditions are important to note in the context of survey results. Many arid-zone mammals are known to undergo population increases following periods of high rainfall. During intervening dry conditions, many can persist at very low population levels and can be difficult to detect despite intensive trapping effort.

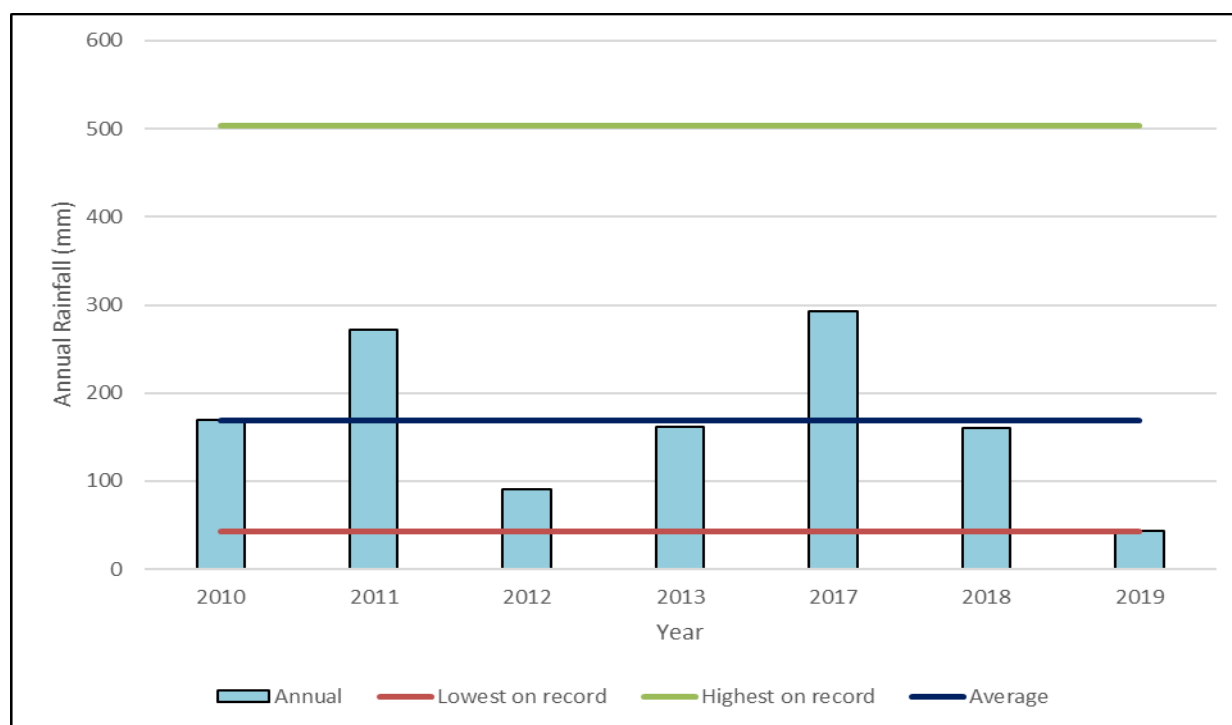


Figure 2. Annual rainfall since 2010 recorded at Coondambo, the closest Bureau of Meteorology rain recording station to the Project Area (Bureau of Meteorology, 2021). The figure also shows the average, highest and lowest annual rainfall on record. Note that data does not exist for all years.

2.2 Thick-billed Grasswren (*Amytornis modestus*)

The *Survey Guidelines for Australia's threatened birds* (Department of the Environment, Water, Heritage and the Arts, 2010) recommends using the methods and minimum survey effort summarised in Table 2 to detect Thick-billed Grasswren. This survey employed area searches and transect searches only, as ethics permits did not allow the use of alternative methods such as broadcast surveys.

Using these two methods, a combined total of approximately 20 hours of survey effort was undertaken over five days, as further described in Sections 2.2.1 and 2.2.2. Any bird species observed opportunistically while carrying out other targeted survey work was also recorded.

Table 2. Recommended survey methods and effort for Thick-billed Grasswren (Department of the Environment, Water, Heritage and the Arts, 2010).

Methods	Survey Effort	
	Hours	Days
Area searches or transect surveys	15	3
Broadcast surveys	15	3
Mist-netting	15	3

2.2.1 Area searches

Area searches were undertaken in 2 hectare (ha) plots within suitable habitat along the haul road alignment. Four morning and four afternoon one-hour surveys were carried out at each plot, with two observers meandering randomly through the 2 ha area.

Previous vegetation mapping and survey indicated that suitable habitat occurred within one Vegetation Association:

- *Maireana pyramidata* +/- *Maireana erioclada* +/- *Maireana aphylla* Shrubland over *Atriplex holocarpa* and *Austrostipa nitida*.

Ephemeral swamps within the proposed MPL also represented suitable, albeit marginal, habitat for the species and these areas were also searched. Swamp vegetation associations were not mapped previously, but were found to consist of the following Vegetation Association by this study:

- *Chenopodium nitrariaceum* +/- *Muehlenbeckia florulenta* Shrubland to Open Shrubland over *Eragrostis australasica*, *Eragrostis setifolia* and *Eleocharis pallens*.

Seven plots were surveyed using this method, with survey effort summarised in Table 3 and Figure 3, Figure 4 and Figure 5. Photographs of the survey sites are provided in Appendix 1.

Table 3. Location of Thick-billed Grasswren survey plots.

Plot/Site Name	Location (GDA 94 MGA 53)		Vegetation Association
	Easting	Northing	
GW001	562742.65	6569394.09	<i>Maireana pyramidata</i> +/- <i>Maireana erioclada</i> +/- <i>Maireana aphylla</i> Shrubland over <i>Atriplex holocarpa</i> and <i>Austrostipa nitida</i> .
GW002	564055.18	6569883.86	
GW003	568271.61	6573937.09	
GW004	565209.73	6570531.00	<i>Chenopodium nitrariaceum</i> +/- <i>Muehlenbeckia florulenta</i> Shrubland to Open Shrubland over <i>Eragrostis australasica</i> , <i>Eragrostis setifolia</i> and <i>Eleocharis pallens</i> .
GW005	566595.41	6572758.49	
GW006	565492.51	6572660.03	<i>Maireana pyramidata</i> +/- <i>Maireana erioclada</i> +/- <i>Maireana aphylla</i> Shrubland over <i>Atriplex holocarpa</i> and <i>Austrostipa nitida</i> .
GW007	565199.12	6572028.45	

2.2.2 Transect surveys

The haul road route between the Glendambo – Tarcoola Road and Kultanaby rail siding was used as a pre-determined transect. The entire 11 km was driven a total of eight times, four in the morning and four in the afternoon. The transect was driven at speeds of 15 km/h or less, with the average time taken to complete the route 45 minutes.

Each time a bird was flushed or observed, the vehicle was stopped, the bird located and watched until at least one of two observers had identified the species. The transect crossed two Vegetation Associations as listed below, although only the former is considered suitable habitat for Thick-billed Grasswren.

- *Maireana pyramidata* +/- *Maireana erioclada* +/- *Maireana aphylla* Shrubland over *Atriplex holocarpa* and *Austrostipa nitida*.
- *Atriplex vesicaria* / *Sclerolaena ventricosa* Low Shrubland over *Austrostipa nitida* and annual forbs.

2.3 Plains Mouse (*Pseudomys australis*)

The Survey *Guidelines for Australia's threatened mammals* (Department of the Environment, Water, Heritage and the Arts, 2011) recommends the methods and minimum survey efforts required to detect Plains Mouse. These methods are listed below:

- 1) Daytime searches for potentially suitable habitat resources such as gilgai habitats associated with drainage features in gibber plains, but also sand dunes after rainfall.
- 2) Daytime searches for signs, including burrows, tracks and scats.
- 3) Collection of predator scats, owl casts or remains in predatory bird/mammal nests/dens.
- 4) Elliott trapping surveys.
- 5) Hair sampling device survey.
- 6) Possibly pitfall trap surveys.

This survey employed four survey methods to detect Plains Mouse: methods 1), 2) and 4) above, and camera trapping. Methods are discussed further in Sections 2.3.1, 2.3.2, 2.3.3 and 2.3.4.

2.3.1 Daytime searches for potential habitat

Previous surveys indicated that suitable Plains Mouse habitat occurred in areas mapped as the Vegetation Association *Maireana pyramidata* +/- *Maireana erioclada* +/- *Maireana aphylla* Shrubland over *Atriplex holocarpa* and *Austrostipa nitida*.

These areas were visited during the survey and searched to determine if habitat characteristics known to be important for Plains Mouse were present, including gilgai and drainage habitats in gibber plains and areas of cracking clay soils.

The location of these features influenced the position of Elliott trap sites.

2.3.2 Daytime searches for signs (burrows, tracks and scats)

While carrying out other survey activities, sites were searched for signs that might indicate the presence of Plains Mice, particularly burrows.

2.3.3 Elliott trapping

Four Elliott trap sites were set in areas of suitable habitat, with one site set in marginal habitat at the edge of *Acacia aneura* Woodland. Traps were set according to the following:

- 30 Elliott traps placed at each site.
- Traps placed 10 metres (m) apart in two parallel straight lines separated by 20 m.
- Traps were set for four consecutive nights.
- Traps were baited with a mixture of peanut butter and oats.

All traps were checked each morning, with the bait removed and traps closed for the duration of the day. They were opened and re-baited in the late afternoons. Where ants were a problem, the respective traps were removed from the trapline and not reset.

This trapping effort represents a total of 120 trap nights per site and 840 trap nights across the Project Area. The locations of trap lines are listed in Table 4 and indicated on Figure 3, Figure 4 and Figure 5. Site photographs are provided in Appendix 1.

Table 4. Location of Plains Mouse trap sites.

Plot/Site Name	Trap line Start (GDA 94 MGA 53)		Trap line End (GDA 94 MGA 53)		Vegetation Association
	Easting	Northing	Easting	Northing	
BHR005	568271.61	6573937.09	568345.52	6573840.86	<i>Maireana pyramidata</i> +/- <i>Maireana erioclada</i> +/- <i>Maireana aphylla</i> Shrubland over <i>Atriplex holocarpa</i> and <i>Austrostipa nitida</i> .
BHR006	567343.49	6573224.36	567227.57	6573299.57	
BHR007	567358.57	6573231.23	567425.00	6573154.63	
BHR008	565103.04	6570792.90	565175.04	6570676.07	
BHR009	565191.70	6570585.51	565249.19	6570483.31	<i>Chenopodium nitriaceum</i> +/- <i>Muehlenbeckia florulenta</i> Shrubland to Open Shrubland over <i>Eragrostis australasica</i> , <i>Eragrostis setifolia</i> and <i>Eleocharis pallens</i>
BHR010	559936.68	6574806.12	559790.59	6574810.83	<i>Acacia aneura</i> / <i>Acacia tetragonophylla</i> Low Open Woodland over <i>Maireana triptera</i> and <i>Ptilotus obovatus</i> .
BHR011	561250.22	6569008.72	561286.20	6569132.34	<i>Maireana pyramidata</i> +/- <i>Maireana erioclada</i> +/- <i>Maireana aphylla</i> Shrubland over <i>Atriplex holocarpa</i> and <i>Austrostipa nitida</i> .

2.3.4 Camera trapping

Four camera traps were set at Elliott trap lines located in the most suitable Plains Mouse habitat. Camera traps were positioned in areas clear of vegetation to limit misfire and fastened to a dropper at 20 centimetres (cm) above ground level. Each trap was baited with a mixture of peanut butter and oats, with

the bait positioned at 1.5 m from the camera. Baits were checked each morning and afternoon and replaced if necessary, with cameras set for four nights duration. The location of each camera trap is listed in Table 5 and shown in Figure 3, Figure 4, Figure 5.

Table 5. Location of camera traps.

Camera Number	Location (GDA 94 MGA 53)		Vegetation Association
	Easting	Northing	
Camera 2	561217	6569019	<i>Maireana pyramidata</i> +/- <i>Maireana erioclada</i> +/- <i>Maireana aphylla</i> Shrubland over <i>Atriplex holocarpa</i> and <i>Austrostipa nitida</i> .
Camera 3	565099	6570671	<i>Atriplex vesicaria</i> / <i>Sclerolaena ventricosa</i> Low Shrubland over <i>Austrostipa nitida</i> and annual forbs.
Camera 5	567341	6573244	<i>Maireana pyramidata</i> +/- <i>Maireana erioclada</i> +/- <i>Maireana aphylla</i> Shrubland over <i>Atriplex holocarpa</i> and <i>Austrostipa nitida</i> .
Camera 6	567378	6573216	<i>Maireana pyramidata</i> +/- <i>Maireana erioclada</i> +/- <i>Maireana aphylla</i> Shrubland over <i>Atriplex holocarpa</i> and <i>Austrostipa nitida</i> .

2.4 Sandalwood (*Santalum spicatum*)

The entire 11 km haul road alignment was driven a total of eight times to search for Sandalwood by four observers. As the species is distinctive and few trees or large shrubs occur in the Project Area, any within 100 m of the line of travel would be easily observed.

Any trees or large shrubs that could not be identified from the vehicle were identified by closer inspection on foot.

2.5 Vegetation Associations and Mapping

2.5.1 Vegetation survey

Vegetation was surveyed using the Rangelands Assessment Method (RAM). This method aligns the assessment of vegetation (and land) condition with the method developed by Natural Resources South Australian Arid Lands for the rapid assessment of pastoral properties. It has been adapted for use for the assessment of native vegetation clearing proposals in the arid rangelands of South Australia.

Details of site selection/stratification and assessment protocols, the biodiversity components assessed, factors that influence these components and field procedures are outlined in the *Rangelands Assessment Manual* (Native Vegetation Council, 2020).

Data collected using the field methods is used to calculate a Vegetation Condition Score (VCS) and Unit Biodiversity Score (UBS) that are used as an expression of vegetation condition. When the extent of impact to vegetation is known, the Unit Biodiversity Score is then used to determine the Total Biodiversity Score (TBS) and the Significant Environmental Benefit (SEB) required to offset any proposed vegetation clearing.

For the purposes of this report, while the VCS and UBS have been calculated to assess vegetation condition, the TBS and SEB requirement has not been calculated, since the final proposed impact extent is not known.

Plant species were identified in the field wherever possible. Where plants could not be identified, voucher specimens were collected for identification at a later stage. Voucher specimens of threatened species were also collected to confirm identification using appropriate field guides and identification keys.

The vegetation survey was undertaken to support work carried out in October and December 2020 and documented in *Buzzard (Kultanaby Haul Road) Baseline Flora and Fauna Assessment* (EBS Ecology, 2021). For this purpose, additional RAM survey sites were established to better represent the vegetation of the current Project Area.

The location of RAM sites established during this survey are listed in Table 6 and shown in the Vegetation Association mapping provided as Figure 6.

Table 6. The location of Rangeland Assessment Method survey sites.

RAM Site	Location (GDA 94 MGA 53)	
	Easting	Northing
BHR012	565205	6570524
BHR012a	566590	6572755
BHR013	565523	6572587
BHR014	565168	6572023
BHR015	559800	6574805
BHR015a	560190	6574759
BHR016	559605	6574656

2.5.2 Vegetation mapping

Based on previous mapping undertaken by EBS 2021 and the results of this survey, Vegetation Associations of the Project Area were described and mapped. Mapping was aided using aerial imagery and ground-truthing while in the field.

Spatial data was collected in the field using ArcGIS Collector, with data captured using GDA94 MGA Zone 53 coordinate system. Mapping was prepared using the ArcGIS Pro package.

2.6 Limitations

The survey was undertaken in autumn under average rainfall conditions that followed a prolonged dry period.

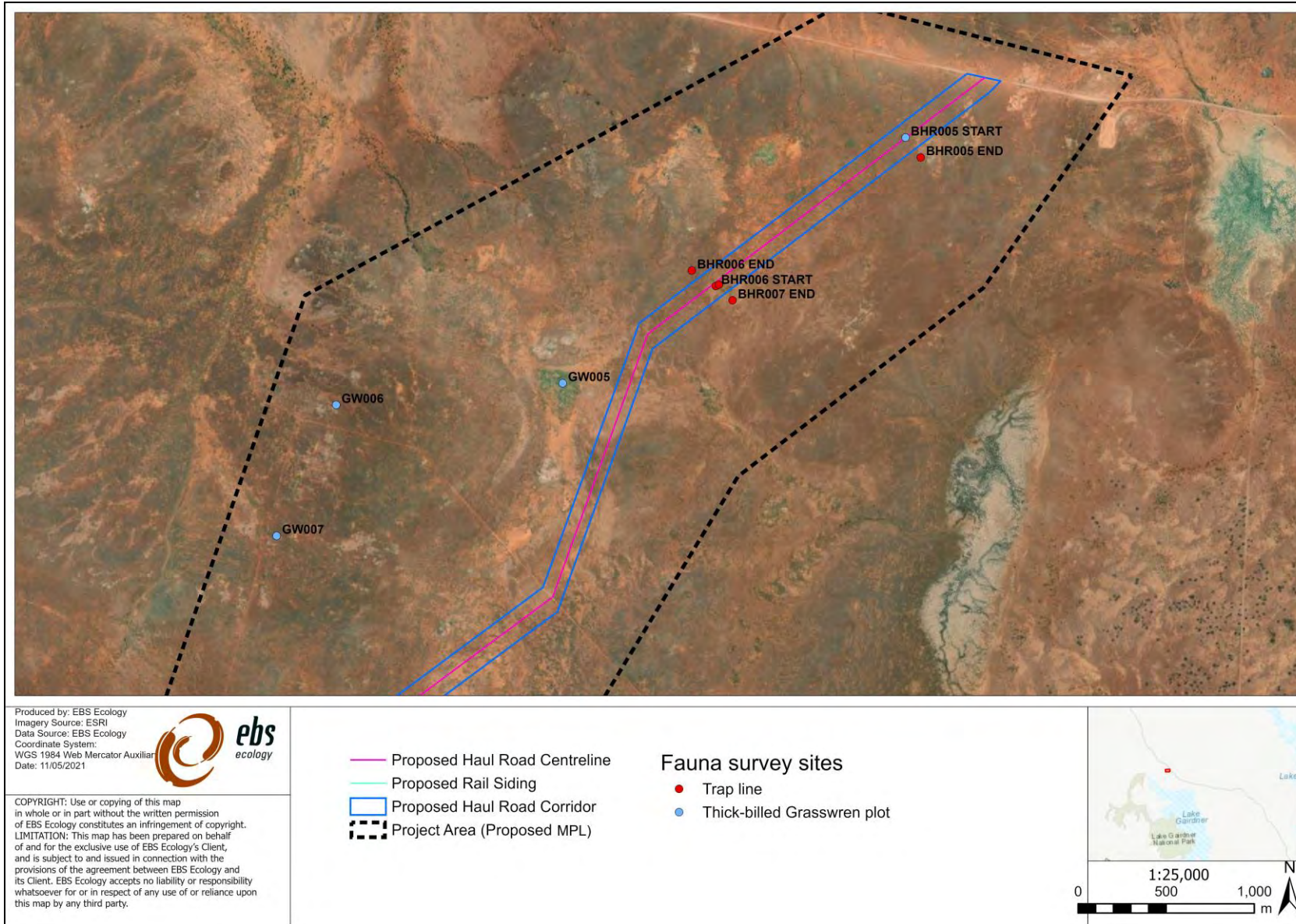


Figure 3. Location of fauna survey sites, northern Project Area.

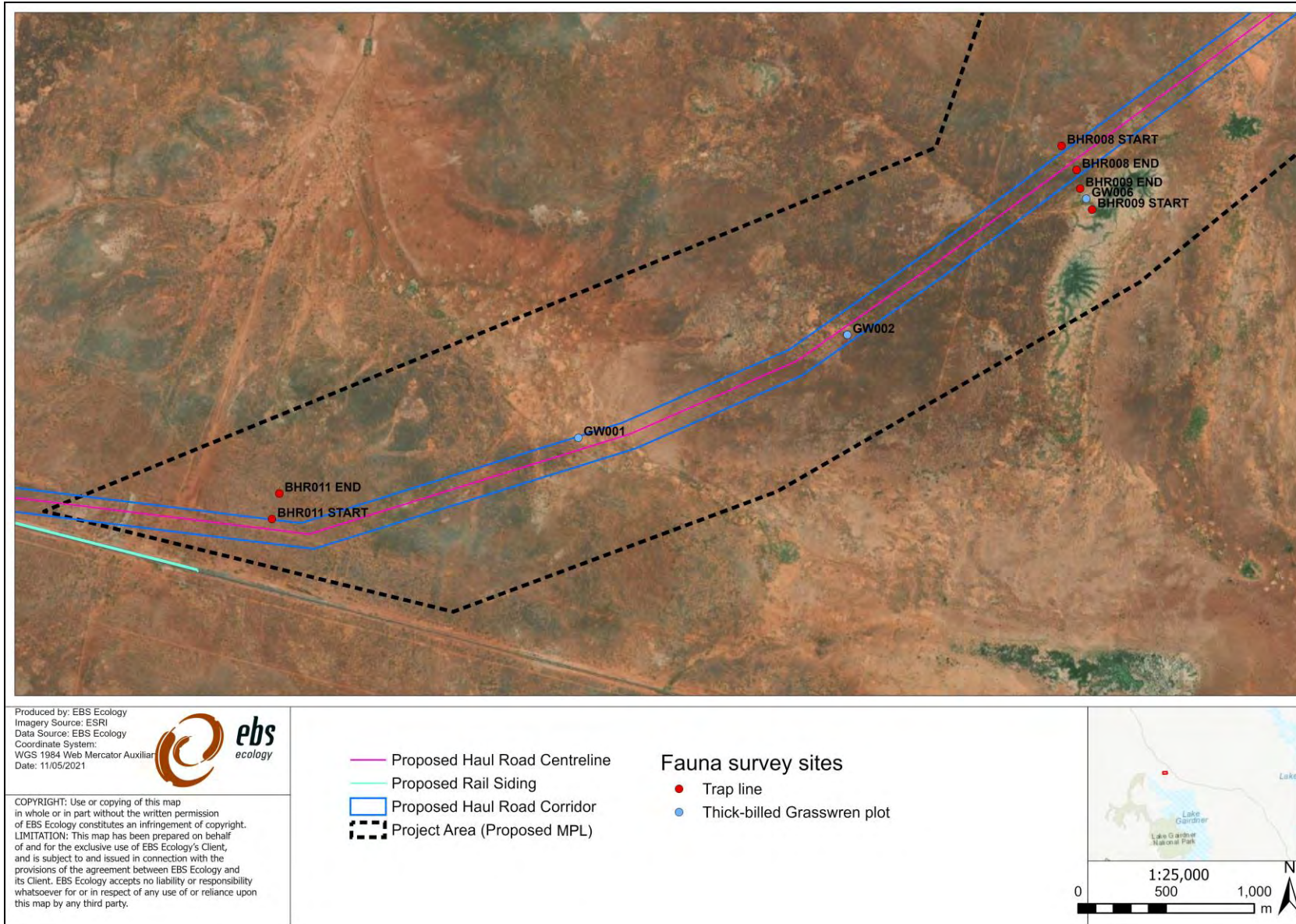


Figure 4. Location of fauna survey sites, southern Project Area.

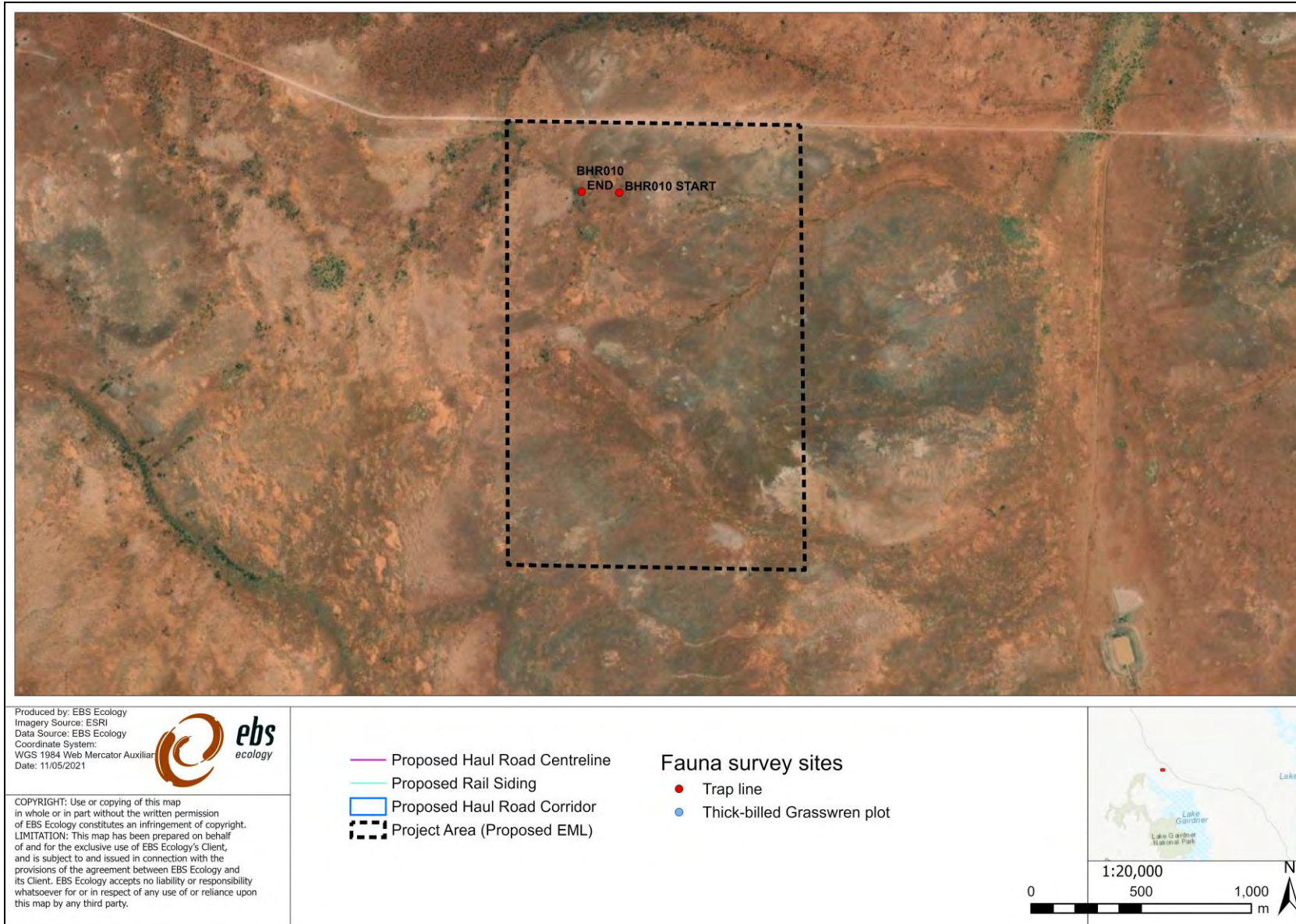


Figure 5. Location of fauna survey sites, western Project Area.

3 RESULTS

3.1 Thick-billed Grasswren (*Amytornis modestus*)

3.1.1 Survey results

No Thick-billed Grasswrens were located by the survey. Twelve bird species were recorded and are listed in Table 7. Four species, Southern Whiteface, Wedge-tailed Eagle, Black-faced Woodswallow and Crested Pigeon, were not recorded in the Project Area during previous surveys in October 2020.

Including results from the October 2020 survey, 25 bird species have been recorded in the Project Area (Table 7).

Table 7. Bird species recorded during Thick-billed Grasswren surveys, opportunistically and in October 2020.

Scientific Name	Common Name	Thick-billed Grasswren site	Opportunistic Record	Recorded Oct 2020
<i>Anus gracilis</i>	Grey Teal			✓
<i>Anthus australis</i>	Australasian Pipit			✓
<i>Aphelocephala leucopsis</i>	Southern Whiteface	✓		
<i>Aquila audax</i>	Wedge-tailed Eagle		✓	
<i>Artamus cinereus</i>	Black-faced Woodswallow		✓	
<i>Calamanthus campestris</i>	Rufous Fieldwren	✓		✓
<i>Cincloramphus cruralis</i>	Brown Songlark			✓
<i>Cinclosoma cinnamomeum</i>	Cinnamon Quailthrush	✓		✓
<i>Corvus coronoides</i>	Australian Raven	✓		✓
<i>Elseyornis melanops</i>	Black-fronted Dotterel			✓
<i>Epthianura aurifrons</i>	Orange Chat	✓		✓
<i>Epthianura tricolor</i>	Crimson Chat			✓
<i>Falco cenchroides</i>	Nankeen Kestrel		✓	✓
<i>Gavicalis virescens</i>	Singing Honeyeater			✓
<i>Himantopus leucocephalus</i>	Black-winged Stilt			✓
<i>Hirundo neoxena</i>	Welcome Swallow			✓
<i>Malurus leucopterus</i>	White-winged Fairy-wren	✓		✓
<i>Melopsittacus undulatus</i>	Budgerigar			✓
<i>Milvus migrans</i>	Black Kite			✓
<i>Ocyphaps lophotes</i>	Crested Pigeon		✓	
<i>Peltohyas australis</i>	Inland Dotterel	✓		✓
<i>Petroica goodenovii</i>	Red-capped Robin			✓
<i>Psophodes occidentalis</i>	Chiming Wedgebill			✓
<i>Taeniopygia guttata</i>	Zebra Finch	✓		✓
<i>Vanellus tricolor</i>	Banded Lapwing			✓

3.1.2 Likelihood of occurrence

Critical habitat for Thick-billed Grasswren includes areas of tall, dense Bluebush (*Maireana* spp.) and gibber plains with chenopod shrubs growing along watercourses, with the species known to favour drainage lines where shrubs tend to be thicker and taller (NSW National Parks and Wildlife Service, 2002). This habitat occurs in three Vegetation Associations in the Project Area, as shown in Table 8, with 553.23 ha of habitat in the Project Area. Only 68.42 ha of this occurs within the proposed haul road corridor.

Within the Project Area, this habitat heavily grazed by sheep, with chenopod shrubs heavily utilised and lacking height and density as a result. This offers limited nesting and shelter sites for Thick-billed Grasswren, with grazing understood to be one of the key threatening processes for the species (NSW National Parks and Wildlife Service, 2002).

Although none were recorded during the survey, survey limitations and suitability of habitat indicate that it is possible Thick-billed Grasswren occur in the Project Area. However, habitat attributes known to be critical to the species survival are lacking due to the impact of current land use practices (i.e. sheep grazing).

Table 8. Extent of suitable Thick-billed Grasswren habitat within the Project Area and proposed haul road corridor.

Vegetation Association	Project Area Extent (ha)	Haul Road Corridor Extent (ha)
<i>Maireana pyramidata</i> +/- <i>Maireana erioclada</i> +/- <i>Maireana aphylla</i> Shrubland over <i>Atriplex holocarpa</i> and <i>Austrostipa nitida</i> .	488.33	68.42
<i>Chenopodium nitrariaceum</i> +/- <i>Muehlenbeckia florulenta</i> Shrubland to Open Shrubland over <i>Eragrostis australasica</i> , <i>Eragrostis setifolia</i> and <i>Eleocharis pallens</i> .	30.23	0
<i>Maireana sedifolia</i> +/- <i>Atriplex vesicaria</i> Low Shrubland.	34.67	0
TOTAL EXTENT (ha)	553.23	68.42

3.2 Plains Mouse (*Pseudomys australis*)

3.2.1 Survey results

No Plains Mice were located during the survey, which recorded five small mammal species (Table 9). A total of 111 captures were made, with the introduced House Mouse (*Mus musculus*) the most common species trapped, followed by Stripe-faced Dunnart (*Sminthopsis macroura*), Sandy Inland Mouse (*Pseudomys hermannsburgensis*) and Bolam's Mouse (*Pseudomys bolami*).

Three of the four cameras were triggered, recording all five species listed in Table 9. Interestingly, the Fat-tailed Dunnart (*Sminthopsis crassicaudata*) was only recorded using this method. Due to the over-exposure of some images, not all animals that triggered the cameras could be positively identified. However, all photographs taken were of animals smaller in size than Plains Mouse.

The survey recorded three mammal species not recorded in the October 2020 survey; House Mouse, Sandy Inland Mouse and Fat-tailed Dunnart. All species captured in 2020 were caught again during the current survey.

Table 9. Elliott and camera trap capture records from this survey and pit trap records from October 2020.

Scientific name	Common name	Survey Site										Captures Oct 2020	Method	Total Captures
		BHR005	BHR006	BHR007	BHR008	BHR009	BHR010	BHR011	Camera 2	Camera 5	Camera 6			
<i>Mus musculus*</i>	House Mouse	15	5	6	6	4	13	20	8	8	4	0	E, C	89
<i>Pseudomys bolami</i>	Bolam's Mouse	0	0	0	0	0	2	0	0	0	0	1	E, P	3
<i>Pseudomys hermannsburgensis</i>	Sandy Inland Mouse	0	0	0	0	0	4	0	0	0	0	0	E	4
<i>Sminthopsis crassicaudata</i>	Fat-tailed Dunnart	0	0	0	0	0	0	0	2	4	0		C	6
<i>Sminthopsis macroura</i>	Stripe-faced Dunnart	2	2	0	0	0	0	0	3	6	4	2	E, C, P	19

Method: E = Elliott trap capture, C = Camera trap capture, P = Pit trap (used only during October 2020 survey).

3.2.2 Likelihood of occurrence

Plains Mouse populations are known to undergo regular fluctuations based on rainfall, with irruptions following wetter-than-average conditions. During these periods, the species distribution and habitat use also expands, with animals likely to be recorded beyond their core range and in otherwise marginal or unsuitable habitat, such as sand dunes. Recent records of the species beyond known core populations are likely one-off records due to this temporary spread of the species during times of favourable conditions (Moseby, 2012).

While no Plains Mouse were recorded by the survey, habitat may be broadly capable of supporting the species during population irruptions. This is particularly the case in areas providing foraging and shelter resources where cracking clay soils and gilgai occur. These habitat characteristics are limited to the Vegetation Associations listed in Table 10. A total of 488.33 ha of suitable habitat occurs within the Project Area, of which 68.42 ha occurs within the proposed haul road corridor.

While it is possible that the Plains Mouse occasionally occurs during population irruptions, it is unlikely that the species maintains a permanent population in the Project Area.

Table 10. Extent of suitable Plains Mouse habitat within the Project Area and proposed haul road corridor.

Vegetation Association	Project Area Extent (ha)	Haul Road Corridor Extent (ha)
<i>Maireana pyramidata</i> +/- <i>Maireana erioclada</i> +/- <i>Maireana aphylla</i> Shrubland over <i>Atriplex holocarpa</i> and <i>Austrostipa nitida</i> .	488.33	68.42
<i>Chenopodium nitrariaceum</i> +/- <i>Muehlenbeckia florulenta</i> Shrubland to Open Shrubland over <i>Eragrostis australasica</i> , <i>Eragrostis setifolia</i> and <i>Eleocharis pallens</i> .	30.23	0
TOTAL EXTENT (ha)	518.56	68.42

3.3 Sandalwood (*Santalum spicatum*)

3.3.1 Survey results

No Sandalwood trees were located during the survey in the Project Area. The proposed haul road follows an alignment that avoids areas of larger shrubs and trees, with vegetation limited to low shrublands of *Maireana* spp. and *Atriplex* spp.

3.3.2 Likelihood of occurrence

Sandalwood is absent from the proposed haul road alignment and MPL. The entire alignment was driven twice each day throughout the duration of the survey by four experienced observers. It is unlikely that any trees would have been missed or mis-identified.

Sandalwood was located in *Acacia papyrocarpa* Woodland to the north and west of the Project Area and is likely wherever that Vegetation Association occurs. There is no *Acacia papyrocarpa* Woodland in the Project Area.

3.4 Vegetation Associations and Mapping

3.4.1 Flora species observed

Sixty-five flora species were recorded in the Project Area during the survey, including 47 species not recorded by EBS Ecology in 2021. No threatened flora species were located. Plant species recorded are listed in Appendix 2.

3.4.2 Vegetation Associations

Vegetation within the larger survey area was found to be consistent with mapping undertaken by EBS 2021 for the original Haul Road corridor. This consisted of only two Vegetation Associations. Within the additional extent covered by the larger MLP and proposed EMLs, three Vegetation Associations not previously surveyed were mapped.

Five Vegetation Associations have now been mapped within the proposed MLP and EMLs:

- *Maireana sedifolia* +/- *Atriplex vesicaria* Low Shrubland (Table 11).
- *Atriplex vesicaria* +/- *Sclerolaena* sp. Low Shrubland over *Aristida contorta* and annual forbs (Table 12).
- *Chenopodium nitrariaceum* +/- *Muehlenbeckia florulenta* Shrubland to Open Shrubland over *Eragrostis australasica*, *Eragrostis setifolia* and *Eleocharis pallens* (Table 13).
- *Acacia aneura* +/- *Acacia tetragonophylla* Open Woodland over *Maireana triptera*, *Atriplex vesicaria* and *Aristida contorta* (Table 14).
- *Maireana pyramidata* Low Shrubland over *Atriplex vesicaria*, *Sclerolaena* spp. and *Enneapogon polyphyllus* (Table 15).

The entire Project Area is utilised for sheep grazing, with vegetation throughout the Project Area impacted moderately by grazing. Impact extends to low trees and shrubs, as well as palatable grasses and forbs in ground stratum vegetation.

There are no watering points within the Project Area, however natural ephemeral swamps and gilgais occur throughout that would hold water for longer periods following sufficient rainfall. Consequently, grazing impacts are relatively homogenous throughout, with no noticeable increase in impact closer to artificial watering points.

Vegetation Associations of the Project Area are mapped in Figure 6.

Table 11. Description of *Maireana sedifolia* +/- *Atriplex vesicaria* Low Shrubland (EBS Ecology, 2021).


<i>Maireana sedifolia</i> +/- <i>Atriplex vesicaria</i> Low Shrubland					
					
General Description	Very low open dominated by <i>Maireana sedifolia</i> and <i>Atriplex vesicaria</i> . Occurs on a level plain on sandy soils.			Survey Sites	Site B8
Threatened Species or Ecological Community	Possible: <ul style="list-style-type: none"> - Thick-billed Grasswren (<i>Amytornis modestus</i>) - Slender-billed Thornbill (<i>Acanthiza iredalei iredalei</i>) - Grey Falcon (<i>Falco hypoleucos</i>) - <i>Ophioglossum polyphyllum</i> (Large Adder's Tongue) 				
Landscape Context Score	1.18	Vegetation Condition Score	58.52	Conservation Significance Score	1.12
Unit Biodiversity Score	77.34	Condition category	Medium-High		

Table 12. Description of *Atriplex vesicaria* +/- *Sclerolaena* sp. Low Shrubland over *Aristida contorta* and annual forbs (EBS Ecology, 2021).

***Atriplex vesicaria* +/- *Sclerolaena* sp. Low Shrubland over *Aristida contorta* and annual forbs.**



General Description	Very low open dominated by <i>Maireana sedifolia</i> and <i>Atriplex vesicaria</i> . Occurs on a level plain on sandy soils.		Survey Sites	Site B9	
Threatened Species or Ecological Community	Likely: <ul style="list-style-type: none"> - Slender-billed Thornbill (<i>Acanthiza iredalei iredalei</i>) - Chestnut-breasted Whiteface (<i>Aphelocephala pectoralis</i>) Possible: <ul style="list-style-type: none"> - Grey Falcon (<i>Falco hypoleucos</i>) - <i>Ophioglossum polyphyllum</i> (Large Adder's Tongue) - <i>Santalum spicatum</i> (Sandalwood) 				
Landscape Context Score	1.18	Vegetation Condition Score	48.50	Conservation Significance Score	1.16
Unit Biodiversity Score	66.39	Condition category	Medium		

Table 13. Description of *Chenopodium nitrariaceum* +/- *Muehlenbeckia florulenta* Shrubland to Open Shrubland over *Eragrostis australasica*, *Eragrostis setifolia* and *Eleocharis pallens*.

Chenopodium nitrariaceum +/- *Muehlenbeckia florulenta* Shrubland to Open Shrubland over *Eragrostis australasica*, *Eragrostis setifolia* and *Eleocharis pallens*.



<p>General Description</p>	<p>Low-lying swamps on cracking clay soils surrounded by stony undulating plains that are infrequently inundated. Vegetation consists of sparse to mid-dense <i>Chenopodium nitrariaceum</i> and <i>Eragrostis australasica</i> over annual or short-lived perennial grasses, forbs and sedges. Weeds including <i>Malvastrum americanum</i> are sparse with only light grazing pressure impacting vegetation. It is likely that grazing pressure is higher when water is present.</p>		<p>Survey Sites</p>	<p>BHR012 BHR012a</p>	
<p>Threatened Species or Ecological Community</p>	<p>Possible:</p> <ul style="list-style-type: none"> - Plains Mouse (<i>Pseudomys australis</i>) - Thick-billed Grasswren (<i>Amytornis modestus</i>) - Grey Falcon (<i>Falco hypoleucos</i>) 				
<p>Landscape Context Score</p>	<p>1.14</p>	<p>Vegetation Condition Score</p>	<p>46.58</p>	<p>Conservation Significance Score</p>	<p>1.1</p>
<p>Unit Biodiversity Score</p>	<p>58.41</p>	<p>Condition category</p>	<p>Low – Medium</p>		

Table 14. Description of *Acacia aneura* +/- *Acacia tetragonophylla* Open Woodland over *Maireana triptera*, *Atriplex vesicaria* and *Aristida contorta*.

***Acacia aneura* +/- *Acacia tetragonophylla* Low Open Woodland over *Maireana triptera*, *Atriplex vesicaria* and *Aristida contorta*.**



General Description	Low Open Woodland of <i>Acacia aneura</i> (Mulga) over a mixed Chenopod understorey and annual grasses such as <i>Aristida</i> spp. and <i>Enneapogon</i> spp. The Vegetation Association occurs in drainage lines and floodouts that dissect stony, undulating plains. Condition of the overstorey is poor, with many trees dead or dying. However, some regeneration is present, particularly understorey shrub species.		Survey Sites	BHR015 BHR015a	
Threatened Species or Ecological Community	Possible: <ul style="list-style-type: none"> - Grey Falcon (<i>Falco hypoleucos</i>) - Chestnut-breasted Whiteface (<i>Aphelocephala pectoralis</i>) 				
Landscape Context Score	1.14	Vegetation Condition Score	47.46	Conservation Significance Score	1.04
Unit Biodiversity Score	56.63	Condition category	Medium		

Table 15. Description of *Maireana pyramidata* +/- *Maireana erioclada* +/- *Maireana aphylla* Shrubland over *Atriplex holocarpa* and *Austrostipa nitida*.

Maireana pyramidata +/- *Maireana erioclada* +/- *Maireana aphylla* Shrubland over *Atriplex holocarpa* and *Austrostipa nitida*.



<p>General Description</p>	<p>A Low Shrubland on stony clay soils of the upper reaches of ill-defined drainage lines. Vegetation consists of a low shrub overstorey of <i>Maireana pyramidata</i> over <i>Atriplex vesicaria</i> and annual forbs and grasses. Gilgai are infrequently distributed throughout. Weeds are sparse to absent, with palatable shrubs lightly grazed.</p>		<p>Survey Sites</p>	<p>BHR014</p>	
<p>Threatened Species or Ecological Community</p>	<p>Possible:</p> <ul style="list-style-type: none"> - Plains Mouse (<i>Pseudomys australis</i>) - Thick-billed Grasswren (<i>Amytornis modestus</i>) - Grey Falcon (<i>Falco hypoleucos</i>) 				
<p>Landscape Context Score</p>	<p>1.14</p>	<p>Vegetation Condition Score</p>	<p>51.56</p>	<p>Conservation Significance Score</p>	<p>1.1</p>
<p>Unit Biodiversity Score</p>	<p>64.66</p>	<p>Condition category</p>	<p>Medium</p>		

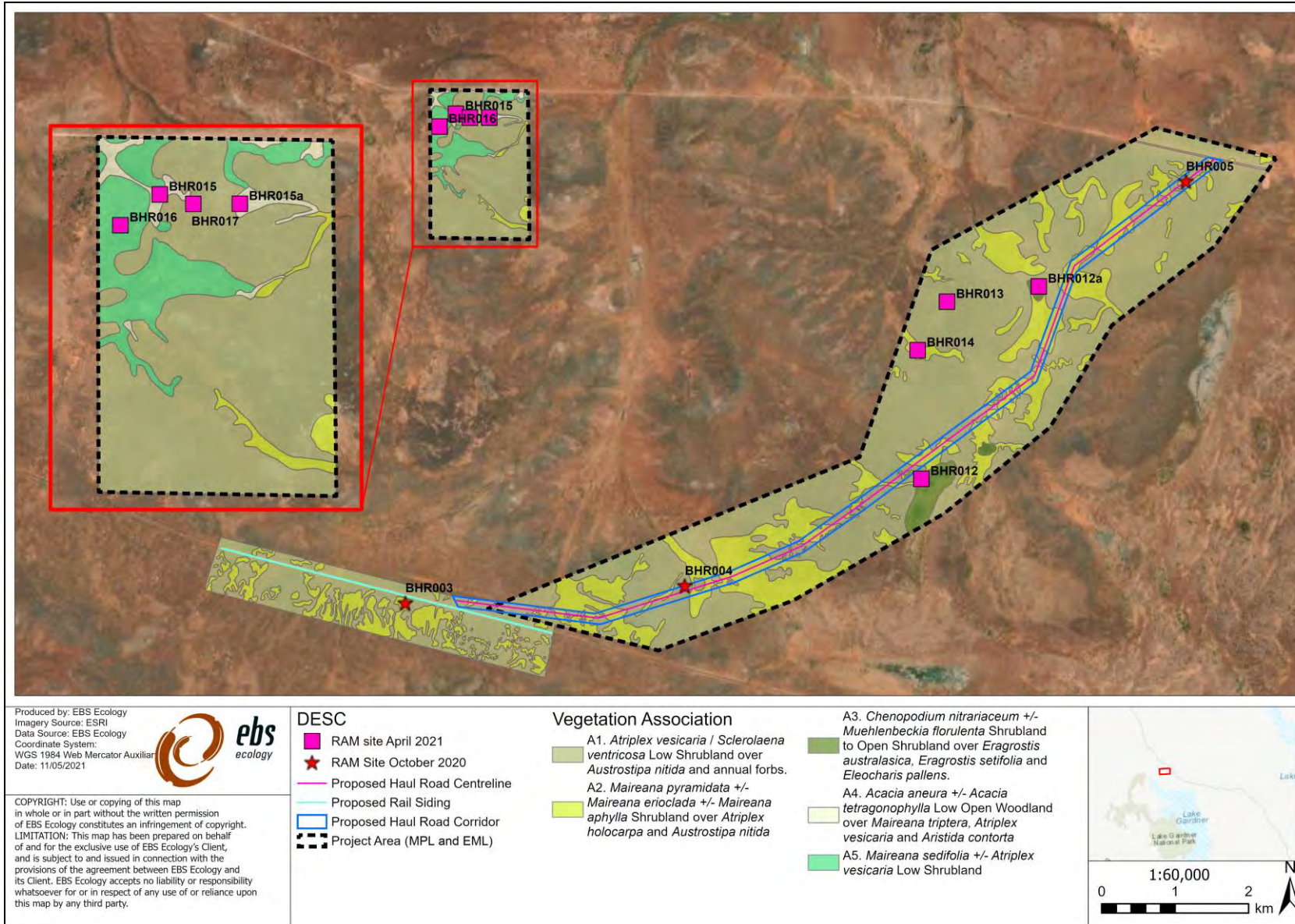


Figure 6. Vegetation Associations of the Project Area, showing the locations of RAM sites surveyed in October 2020 and April 2021.

4 DISCUSSION

Targeted surveys undertaken in April 2021 have resulted in the following conclusions:

- *Santalum spicatum* (Sandalwood) does not occur within the current Project Area and proposed haul road corridor. However, it is present in *Acacia papyrocarpa* woodland north and west of the Project Area.
- Plains Mouse was not recorded during the survey. While characteristic attributes of Plains Mouse habitat occur in the haul road corridor, it is not likely to sustain a permanent population, although may provide temporary habitat during population irruptions. Similar habitat is widespread throughout the Project Area and surrounding landscape, with the haul road corridor only likely to impact a small proportion.
- Thick-billed Grasswren was not recorded during the survey. While limitations and habitat mean that the presence of the species remains possible, notable habitat characteristics critical to the survival of the species are lacking due to current land use practices. Similar habitat is widespread throughout the Project Area and surrounding landscape, with the haul road corridor only likely to impact a small proportion.

5 REFERENCES

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6 APPENDICES

Appendix 1. Fauna survey site photographs.

BHR005 and GW003.



BHR006



BHR007



BHR009



BHR010



BHR011



GW001



GW002



GW004



GW005



GW006



GW007



Appendix 2. Plant species recorded by the survey.

*	Scientific name	Common name	Conservation status	
			Aus	SA
	<i>Acacia aneura</i>	Mulga		
	<i>Acacia papyrocarpa</i>	Western Myall		
	<i>Acacia tetragonophylla</i>	Dead Finish		
	<i>Aristida contorta</i>	Curly Wire-grass		
	<i>Atriplex vesicaria</i>	Bladder Saltbush		
	<i>Austrostipa sp.</i>	Spear-grass		
	<i>Brachyscome ciliaris var.</i>	Variable Daisy		
	<i>Chenopodium nitrariaceum</i>	Nitre Goosefoot		
	<i>Convolvulus erubescens</i>			
	<i>Convolvulus sp.</i>	Bindweed		
	<i>Crassula colorata var.</i>	Dense Crassula		
	<i>Dissocarpus paradoxus</i>	Ball Bindyi		
	<i>Dodonaea microzyga var. microzyga</i>	Brilliant Hop-bush		
	<i>Eleocharis pallens</i>	Pale Spike-rush		
	<i>Enchylaena tomentosa</i>	Ruby Saltbush		
	<i>Enneapogon avenaceus</i>	Common Bottle-washers		
	<i>Enneapogon polyphyllus</i>	Leafy Bottle-washers		
	<i>Eragrostis australasica</i>	Cane-grass		
	<i>Eragrostis dielsii</i>	Mulka		
	<i>Eragrostis setifolia</i>	Bristly Love-grass		
	<i>Eremophila longifolia</i>	Weeping Emubush		
	<i>Eremophila rotundifolia</i>	Round-leaf Emubush		
	<i>Eriochlamys behrii</i>	Woolly Mantle		
	<i>Eulalia aurea</i>	Silky Brown-top		
	<i>Euphorbia drummondii</i>			
	<i>Gnephosis arachnoidea</i>	Spidery Button-flower		
	<i>Hibiscus sturtii var.</i>	Sturt's Hibiscus		
	<i>Lawrenzia squamata</i>	Thorny Lawrenzia		
	<i>Leiocarpa leptolepis</i>	Pale Plover-daisy		
	<i>Maireana aphylla</i>	Cotton-bush		
	<i>Maireana astrotricha</i>	Low Bluebush		
	<i>Maireana georgei</i>	Satiny Bluebush		
	<i>Maireana pyramidata</i>	Black Bluebush		
	<i>Maireana sedifolia</i>	Bluebush		
	<i>Maireana triptera</i>	Three-wing Bluebush		

Buzzard (Kultanaby) Haul Road Targeted Threatened Species Survey

*	Scientific name	Common name	Conservation status	
			Aus	SA
*	<i>Malvastrum americanum</i> var. <i>americanum</i>	Malvastrum		
	<i>Marsilea</i> sp.	Nardoo		
	<i>Monachather paradoxus</i>	Bandicoot Grass		
	<i>Osteocarpum dipterocarpum</i>	Two-wing Bonefruit		
	<i>Oxalis perennans</i>	Native Sorrel		
	<i>Panicum decompositum</i> var. <i>decompositum</i>	Native Millet		
	<i>Portulaca oleracea</i>	Common Purslane		
	<i>Ptilotus exaltatus</i>	Pink Mulla Mulla		
	<i>Ptilotus obovatus</i>	Silver Mulla Mulla		
	<i>Rhagodia spinescens</i>	Spiny Saltbush		
	<i>Salsola australis</i>	Buckbush		
	<i>Scaevola spinescens</i>	Spiny Fanflower		
	<i>Sclerolaena brachyptera</i>	Short-wing Bindyi		
	<i>Sclerolaena eriacantha</i>	Silky Bindyi		
	<i>Sclerolaena intricata</i>	Tangled Bindyi		
	<i>Sclerolaena obliquicuspis</i>	Oblique-spined Bindyi		
	<i>Sclerolaena patenticuspis</i>	Spear-fruit Bindyi		
	<i>Sclerolaena tricuspis</i>	Three-spine Bindyi		
	<i>Sida corrugata</i> var.	Corrugated Sida		
	<i>Sida cunninghamii</i>	Ridge Sida		
	<i>Sida fibulifera</i>	Pin Sida		
	<i>Sida intricata</i>	Twiggy Sida		
*	<i>Sisymbrium</i> sp.	Wild Mustard		
	<i>Solanum cleistogamum</i>	Shy Nightshade		
	<i>Solanum lasiophyllum</i>	Flannel Bush		
	<i>Sporobolus actinocladus</i>	Ray Grass		
	<i>Teucrium racemosum</i>	Grey Germander		
	<i>Triraphis mollis</i>	Purple Plume Grass		
	<i>Vittadinia cuneata</i> var.	Fuzzy New Holland Daisy		
	<i>Vittadinia</i> sp.	New Holland Daisy		

Aus: Australia (*Environment Protection and Biodiversity Conservation Act 1999*). SA: South Australia (*National Parks and Wildlife Act 1972*). Conservation codes: CE: Critically Endangered. EN/E: Endangered. VU/V: Vulnerable. R: Rare. *: Introduced.

Buzzard (Kultanaby) Haul Road Targeted Threatened Species Survey



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t. 08 7127 5607



Appendix 7: Search of the Register of Aboriginal Sites and Objects

Provide a copy of the letter from Aboriginal Affairs and Reconciliation as a separate document to the MP. The letter must be dated no more than 3 months before the time of application.

It is a legislative requirement to not allow the publication of Aboriginal heritage matters.

Tegan Stehbens
Peak Iron Mines
Level 12, 33 King William St
Adelaide 5000 South Australia

Dear Tegan

Thank you for your request dated 17 Aug 2022. The search was based on the coordinates provided: 565657 E, 6571644 N, Zone 53, in GDA94 with a 560m buffer. Your reference is 3846.

I advise that the central archive, which includes the Register of Aboriginal Sites and Objects (the Register), administered by Aboriginal Affairs and Reconciliation (AAR), has no entries for Aboriginal sites within 560m of this location.

The applicant is advised that sites or objects may exist in the proposed development area, even though the Register does not identify them. All Aboriginal sites and objects are protected under the *Aboriginal Heritage Act 1988* (the Act), whether they are listed in the central archive or not. Land within 200 metres of a watercourse (for example the River Murray and its overflow areas) in particular, may contain Aboriginal sites and objects.

Pursuant to the Act, it is an offence to damage, disturb or interfere with any Aboriginal site, object or remains (registered or not) without the authority of the Premier. If the planned activity is likely to damage, disturb or interfere with a site, object or remains, authorisation of the activity must be first obtained from the Premier under Section 23 of the Act. Section 20 of the Act requires that any Aboriginal sites, objects or remains, discovered on the land, need to be reported to the Premier. Penalties apply for failure to comply with the Act. It should be noted that this Aboriginal heritage advice has not addressed any relevant obligations pursuant to the *Native Title Act 1993*.

Please be aware in this area there are Aboriginal groups/organisations/traditional owners that may have an interest. These may include:

Gawler Ranges Aboriginal Corporation

Chairperson: John Reid

Address: Suite 13 15-15A Darling Terrace WHYALLA SA 5600

Telephone: 1300764200

Email: GRACcontact@gmail.com

Contact Officer:

Telephone:

Email:

If you require further information, please contact the Aboriginal Heritage Team on telephone (08) 8303 0738 or send to our generic email address dpc-aar.heritagesites1@sa.gov.au

Yours sincerely,

**HERITAGE INFORMATION TEAM
ABORIGINAL AFFAIRS & RECONCILIATION**

19 August 2022

