Siberia Mining Corporation Pty Ltd

A subsidiary of OraBanda Mining Limited

ABN 97 097 650 194

Siberia Gold Operations

Prescribed Premise Licence Application

Category 6 – Mine Dewatering

Sand King to Palmerston, Bewick and Missouri Open Pits

M24/960

May 2025

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Contents

ABBREVIATIONS

Abbreviation	Definition
ARI	Average Recurrence Interval
BOM	Bureau of Meteorology
DBCA	Department of Biodiversity, Conservation and Attractions
DoW	Department of Water
DWER	Department of Water and Environment Regulation
IBRA	Interim Biogeographic Regionalisation for Australia
MNES	Matters of National Environmental Significance
NOI	Notice of Intent
OBM	Ora Banda Mining Ltd
P1	Priority 1
PDWSA	Public Drinking Water Source Area
PMST	Protected Matters Search Tool
PPM	Parts Per Million
TDS	Total Dissolved Solids
Units	
L/sec	Litres per second
k/L	Kilolitre

1. Introduction

Background

The Siberia Gold Operations (SGO) is a satellite mining operation located 80 km northwest of Kalgoorlie and 37 km south east of Davyhurst that is part of the broader Ora Banda Mining Limited (OBM) Davyhurst Gold Project (DGP). The Siberia tenure has been the subject of historic, and more recently, modern mining activity since the 1980's with the current pit mining campaign recommencing in Q3 - 2021. The minesite, which is located north of the historic and abandoned Siberia Townsite on a Crown reserve within the Mt Burgess Pastoral Lease has been extensively disturbed by a combination of pastoral, mining activities and town development over nearly 100 years. Prior to OBM recommencing operations in 2021, the Project had remained on care and maintenance since 2018.

Location, tenure and regional infrastructure are shown on Figure 1.

Permitting and Other Approvals

The Siberia Project tenements are owned and operated by Siberia Mining Corporation Pty Ltd, a subsidiary of Ora Banda Mining Ltd. Approval to recommence pit mining at the Sand King and Missouri deposits (Designated Stage 1) was received on 24 November 2020 (MP Reg ID 89026). Stage 1 involved the recommencement of mining via an extension and deepening of the existing Missouri and Sand King open pits, construction of an additional two waste rock landforms, the establishment of an additional workshop, HDPE lined mine water storage and office complex. The pit stage of the Project was completed in December 2024 and is followed by Stage 2 – underground operations within the Sand King Open Pit with a LOM of 5 years.

Further amendments to the Project were approved in July 2023 (MP Reg Id 118014) to include a small southern extension of the Sand King Southeastern Waste Rock Landform and the establishment of HDPE pipeline infrastructure to recover mixed saline pit waters from the Sand King Pit to the Siberia Operations - Mine Water Dam for dust suppression and haul road maintenance. Groundwater abstraction is licenced under GWL 154498-4, managed in accordance with an approved GLOS (OBM 2024), and reported to DWER in the annual Ground water Monitoring Report lodged in March each year. Clearing is conducted under CPS 6968-4 although it is not required for this Application.

A Works Approval 6904/2024/1 was approved on the 12 June 2024 for the construction of a dewatering pipeline and associated infrastructure to abstract water from the Sand King Underground development and transferring it to the Palmerston, Berwick or Missouri Pit so that Underground mining can proceed and water can be reused for underground development and dust suppression activities. A compliance certificate for the construction of the 160mm pipeline from Sand King to Palmerston was submitted to DWER in November 2024.

Water Supply

The Sand King mine environment has been long regarded as a groundwater poor environment and water supply for dust suppression and mining activities for the Siberia Project is currently provided by limited abstraction from the Missouri and Sand King Pit sumps, with the major supply from the Sand King Borefield production bores, located north of the mines site in a different hydrogeological environment. These bores are operated in accordance with conditions attached to GWL 154498/4.

Groundwater inflows into Missouri and Sand King are estimated at 0.5 -1.5L/s and are sourced from fractured rock aquifer and joint traps. There is no evidence, from recent drilling or historic mining records, that indicates that significant groundwater inflows from the same tight basalt rock lithologies to be accessed during underground development will increase, but a precautionary approach has been adopted as part of the mine's risk assessment in respect to dewatering requirements. Transferring the Sand King underground mine water to either the Palmerston, Bewick or Missouri Pits for storage and mine reuse, all located within 1.0km of the Underground Portal, and within the same geological domain will enable the stored groundwater to be easily recovered as required, and pumped back to the Sand King for mine use.

Development

The Sand King Underground Operations commenced in April 2024, on receipt of the necessary DEMIRS approval for Mining Proposal Amendment (Reg Id 121808). The current Mining Plan has the underground development attaining a depth of 200m below surface (130m below current SK pit floor). Mafic wall rocks in both the Missouri and Sand King Pits have historically produced limited inflows of groundwater from a depth greater than approximately 70m below surface in the pits and historic shafts. No water inflows are recorded for the shallow floored Palmerston or Bewick Pits. The UG Mine Plan requires that the decline and ore drives will be dewatered into designed mine sumps where any required sediment settling will take place, before being pumped to either the Palmerston, Bewick or Missouri Open Pit, depending on current open pit mining schedules, for storage. Stored groundwater will be recovered as required, from the pits into Pit crest tanks for redistribution and reuse underground.

The groundwater review, undertaken as part of mine planning, recommended that during the initial 12 months of mine development, a production allowance of up to 20L/sec (630,000kL/Year) of saline water should be scheduled from the operations.

Detailed resource drill information which recorded groundwater intersections and pit mining monitoring were used as inputs into the Water Balance Studies. No Groundwater Model was deemed necessary due to the anticipated limited scale of the dewatering programme.

Site Water Balance

The updated Mine Water Balance (LOM 5 Years) predicts that after allowing for mine and dust suppression use, and evaporation, the ground water available for disposal to Palmerston Pit is expected to be approximately 54,000kL per annum. With the approved freeboard of 5m from the natural surface the capacity of the Palmerston Pit is 170,000kL.

Purpose of This Document

This document provides supporting information for Category 6 Mine Dewatering Prescribed Premise Licence Application, under Part V, Division 3, s57 (1)(a) of the *Environmental Protection Act* (1986) from the Department of Water, Environment and Regulation (DWER) to authorize excess groundwater disposal from the Sand King Underground into the adjacent Palmerston Pit to allow underground mining to continue.

The same water management infrastructure will be utilized to recover and return water to the Sand King mine as required when anticipated mine water inflows decline during LOM.

1.1 Ownership and Occupier

Siberia Mining Corporation Pty Ltd is a wholly owned subsidiary of Ora Banda Mining Ltd (OBM) and manages the Siberia Gold Operations located 37km southeast of the Davyhurst Gold Project Hub. Ore from the Siberia Mine is trucked on City of Kalgoorlie Boulder and dedicated haul roads and treated at the 1.2mty Davyhurst Mill.

Table 1: Prescribed Premise Licence Application Proponent Details

Proponent Details	
Company or Individual Name	Siberia Mining Corporation Pty Ltd
ACN/ABN	97 097 650 194
Postal Address	[redacted]08
Site Address	[redacted]

1.2 Prescribed Premise Category

The Prescribed Premise Category relevant to the dewatering of saline water from the Sand King Underground and Open Pit and its proposed storage in the Palmerston Pit for planned reuse in mining activities is provided in Table 2.

Table 2: Prescribed Premise Category from Schedule 1 of the Environmental Protection Regulations 1987

Activity	Category Number	Category Production or Design Capacity	Proposed Premises Production or Design Capacity
Mine Dewatering: Premises on which water is extracted and discharged into the environment to allow mining of ore	6	50,000 tonnes or more per year	Up to 630,000 tonnes per annum

The Prescribed Premise Boundary is provided in Figure 2.

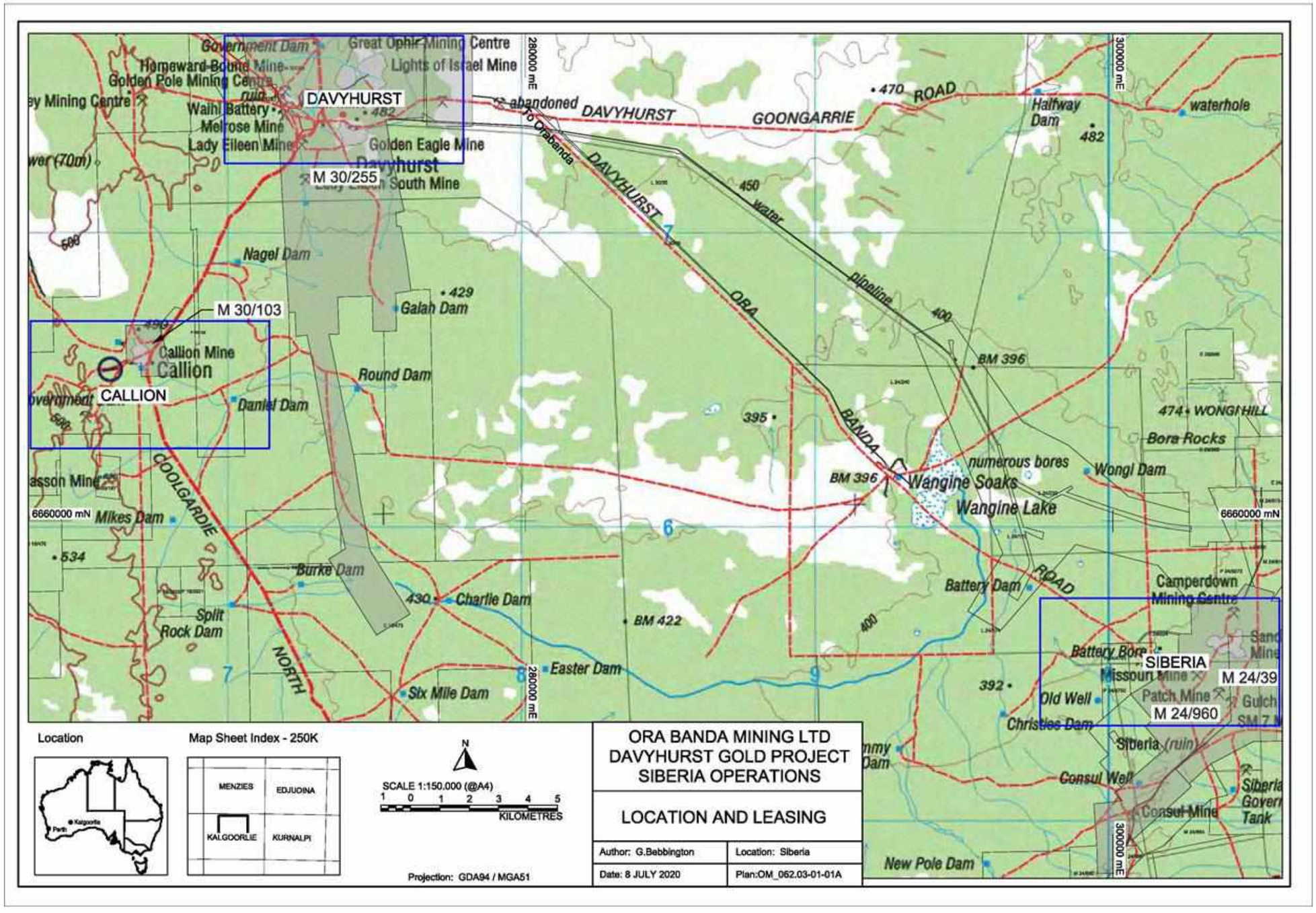
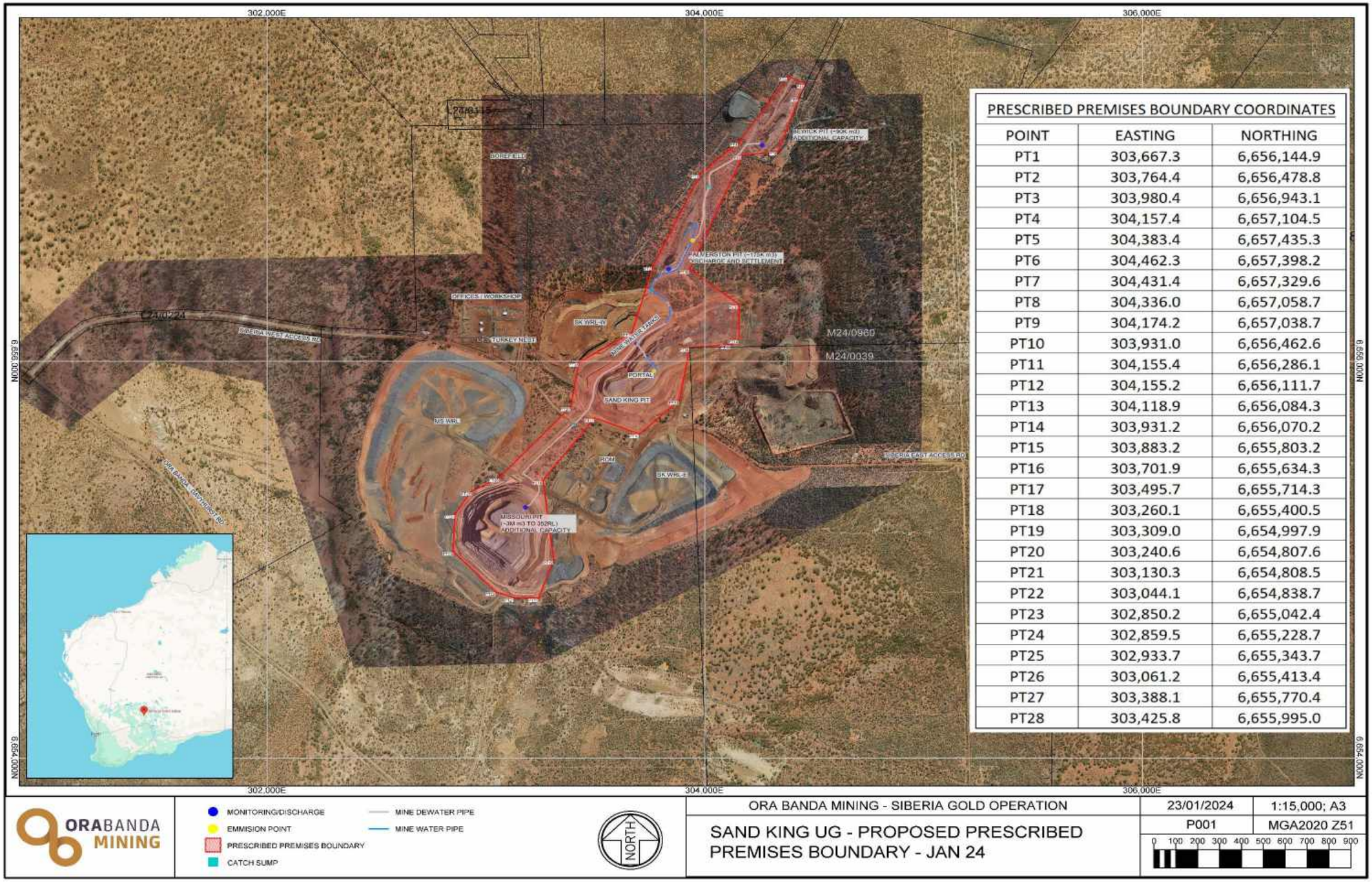


Figure 1: Siberia Gold Operations – Regional Location Plan, Tenure and Regional Infrastructure



PRESCRIBED PREMISES BOUNDARY COORDINATES

POINT	EASTING	NORTHING
PT1	303,667.3	6,656,144.9
PT2	303,764.4	6,656,478.8
PT3	303,980.4	6,656,943.1
PT4	304,157.4	6,657,104.5
PT5	304,383.4	6,657,435.3
PT6	304,462.3	6,657,398.2
PT7	304,431.4	6,657,329.6
PT8	304,336.0	6,657,058.7
PT9	304,174.2	6,657,038.7
PT10	303,931.0	6,656,462.6
PT11	304,155.4	6,656,286.1
PT12	304,155.2	6,656,111.7
PT13	304,118.9	6,656,084.3
PT14	303,931.2	6,656,070.2
PT15	303,883.2	6,655,803.2
PT16	303,701.9	6,655,634.3
PT17	303,495.7	6,655,714.3
PT18	303,260.1	6,655,400.5
PT19	303,309.0	6,654,997.9
PT20	303,240.6	6,654,807.6
PT21	303,130.3	6,654,808.5
PT22	303,044.1	6,654,838.7
PT23	302,850.2	6,655,042.4
PT24	302,859.5	6,655,228.7
PT25	302,933.7	6,655,343.7
PT26	303,061.2	6,655,413.4
PT27	303,388.1	6,655,770.4
PT28	303,425.8	6,655,995.0

Figure 2: Premise Location Plan showing Prescribed Premise Boundary, discharge positions, pipeline infrastructure, and monitoring points.

2. Description of Activity

Approved Infrastructure

Stage 1 Open Pit Mining recommenced at the Siberia Gold Operations in 2020 and is expected to be completed in Q4 FY24. Ore was hauled off site to the OBM operated Davyhurst Processing Plant approximately 37km northwest of the Project, which operates under the *Environmental Protection (Gold Extraction Operations) Exemption Order 1993.*

OBM have commenced the development of the Sand King Stage 2 Underground mine with decline development expected to extend greater than 200m below the natural surface based on current drilling. The underground resource remains open at depth and further exploration will be undertaken during mining. While drill information has provided no information that ground water inflows will be substantial, fractured rock aquifers (FRA) systems are difficult to detect, commonly have short term yields and are recorded from the district, so a precautionary risk assessment approach has been adopted for mine planning and permitting. Initial dewatering rates for the decline and underground stope development have been modelled for up to 20L/sec for Year 1.

Under the approved Works Approval W6904/2024/1 Groundwater is recovered by underground Flygt pumps, stored in the mine storage sumps where any sediment settling occurs before being pumped via PN16 160mm HDPE butt welded pipeline located in a bunded V- notch trench to the adjacent Palmerston Open Pit within existing cleared mine corridors. Water can then be recycled for underground mining and dust suppression by being pumped on demand, from the Palmerston storage pit to four 20,000L transfer tanks situated on the edge of the Sand King Pit Crest. Tank overflow is directed back into the Sand King Pit. Pipe breather valves are installed at the required intervals to maintain internal pipe pressure. Water utilization for dust suppression will vary according to seasonal temperature and rainfall.

Leak Detection

As Palmerston Pit is located along strike from the Sand King Pit and within the approved mining disturbed envelope, no telemetry system or catch pits will be required as any pipeline leaks will report via the v- notch pipe trench into the closest pit. The transfer tanks that supply water from the discharge/storage pit back into underground is fitted with an automatic shut off float switch and an overflow pipe back into the Sand King Pit. The pipeline corridor and discharge pit are inspected every 24 hours. Pipeline switching to an alternative storage pit will be undertaken manually as required.

Mine Water Balance

Mine Planning have conservatively allowed for groundwater inflows of up to 630,000kL (20L/sec) per annum of which approximately 80% will be utilized for mine use, road maintenance and dust suppression. Table 3 outlines the Year 1 provisional water balance for the Siberia Underground Operations. Active storage capacity for of each of the discharge pits with a 5m Freeboard allowance is 170,000kL for Palmerston, 90,000kL for Bewick and 9,780,000kL for Missouri. This capacity equates to over 15 years respectively of discharge at 20L/s without losses or recycle considerations. The LOM is 5 years.

The provisional Mine Water Balance predicts at 20L/s that potential discharge into the Pit Storages totals 630,000kL per annum. After allowing for mine, dust suppression use, and road maintenance and evaporation the residual volume will be approximately 111,250kL per annum.

Monitoring and Reporting

Monitoring will include:

- Monthly field water quality monitoring (EC, pH) will be undertaken from the Sand King Pit sump;
- Monthly flow meter readings will be undertaken from the outlet pipe at the respective storage pit crest;
- Freeboard monitoring at the storage pit will be undertaken by visual inspection of the surveyed freeboard line painted 5m below the pit crest on the pit access ramp wall. Visual freeboard inspection for the Palmerston Pit will be undertaken weekly when discharge is occurring. Inspection frequency will be adaptively managed, based on a 6 monthly review of mine abstraction data.

Pipeline Inspection

The pipelines are located within the near mine environment and the following general principles will be followed to ensure OBM maintain a high standard of environmental management during dewatering activities:

- Managed scheduled service and maintenance of pumps, breathers, float switches, and flow meters;
- Bund inspection and timely maintenance when required following a trench spill or heavy storm event of >20mm;
- 24 hourly pipeline inspections when pumping is occurring, and
- Site training and induction on dewatering activities for all personnel working in the area.

Standard dewatering pipeline used at the Siberia Operations has been constructed of 160mm, PN12.5 & PN16 HDPE piping that meets the following standards:

- AS/NZS 2033:2008: Installation of polyethylene pipe systems;
- AS/NZS 4129:2008 Fittings for polyethylene (PE) pipes for pressure applications;
- AS/NZS 4130:2009 Polyethylene (PE) pipes for pressure applications; and
- AS/NZS 4131:2010 Polyethylene (PE) compounds for pressure pipes and fittings.

Reporting

Regulatory reporting is currently undertaken to DEMIRS and DWER in respect to native vegetation clearing, disturbance, production, resource utilization, waste management, groundwater management, rehabilitation and Incident Reporting via the existing respective Annual Reports. Any additional reporting requirements from this successful dewatering application will be including on the Site Obligation Register.

Groundwater abstraction is licenced under GWL 154498(4) and managed in accordance with an approved GLOS (OBM 2024).

Table 3: Siberia Underground Operations Provisional Water Balance

FACTOR	DESCRIPTION	Make Loss Use kL/day	Interval (Days)	Volume for Storage-Discharge kL/Yr	COMMENTS/ASSUMPTIONS/SOURCE
INPUTS	Annual Rainfall (267.9mm) – 6.4mm/Day	-	42	-	42 rain days year. Annual Evaporation 3208mm; Pan F=0.67
	Groundwater Inflow Allowance -SK UG Dewatering	1,728	365	630,000	Worse case modelling for Licencing purposes 20l/s
	Groundwater Inflow Allowance – Missouri Pit -0.5L/s	43.2	365	15,768	Current estimate – not monitored
	TOTAL INFLOW	**1,771**	**-**	**646,768**	
	Rainfall - Palmerston Pit Catchment (13,710m²)	87	42	3,654	Pit pond is ephemeral – winter months
	Rainfall - Bewick Pit Catchment (12,709m²)	81	42	3,402	Pit pond is ephemeral - winter months
	Rainfall - Missouri Pit Floor Catchment (90,700m²)	580	42	24,360	Limited area pit pond is permanent
	Rainfall - Sand King Pit Floor Catchment (43,500m²)	278	42	11,676	Limited area pit pond is permanent
	Total Pit Catchment Day Input R(6.4)x160,620m²/1000	1028	42	43,176	Low annual rainfall has limited influence on pit water balance
	TOTAL INPUTS	-	-	**689,944**	
LOSS	Pit Evaporation Estimate: Allow 3,208mm per year for 3 Voids (117,120m²). SK not a storage void. No seepage loss considered due to very low HC for basalt.	P/B-136 (M- 467)	365 365	49,694 (170,606)	Total average annual evaporative loss of 220,300kL calculated for continuous discharge into 3 storages. With 14l/s recycle factor only 2 pits(26,419m²) are required for 6l/s storage
	TOTAL LOSSES			**49,694**	
USAGE RECYCLE	Dust Suppression (Mine Environs and ROM) -Tanker	150	220	33,000	25kL Mine Tanker – 6 trips/day - 220days
	Dust Suppression (Sib H/R to DHurst - Tanker	250	220	55,000	50kL Road Tankers, 70km round trip – 5 trips/day-220 days
	Mining Use - Storage Tanks (recycled)	1,209	365	441,500	Wash Down underground workings, Equipment wash down
	TOTAL MINE USAGE			**529,000**	
STORAGE	Year 1 abstraction for storage/reuse @ 20L/s is +ve	-	-	111,250	**Y#1 PWB residual is +111,250kL suggesting that @20L/s**
	Storage capacity (kL) to 5m Freeboard-Berwick	-	-	**90,000**	**supply for UG will not require supplement from SK Borefield**
	Storage (kL) to 5m Freeboard-Palmerston	-	-	**170,000**	**Two Pit Storage capacity is adequate with Pit 3**
	Storage capacity(kL) to 5m Freeboard-Missouri	-	-	**9,780,000**	**Contingency storage.**

Assumptions- Evaporation Annual Mean-Leon-3,473mm/Kal 2,943mm- DoA -Tech Bull 65; Missouri Inflow – Allow 0.5l/s – no usage monitoring data

3. Existing Environment

3.1 Regional Setting

The Siberia district is dominated by granite-greenstone terrains of the Yilgarn Craton, which consists of a series of low ranges separated by flat plains derived from colluvium and alluvium deposition. According to the Interim Biogeographic Regionalisation of Australia (IBRA), the SGO is located north of the boundary between the Murchison Bioregion (Eastern Murchison sub-region) and the Coolgardie Bioregion (Eastern Goldfields sub-region).

The area is dominated by two topographical characteristics: Eucalyptus/mulga woodlands located on small stony rises and Eucalyptus woodlands on sandy clay sheetwash plains The soils of the eastern goldfields have been described in general terms by Beard (1978); comprising sandy loams, although skeletal stony soils occur on the rocky ridges, sands in the dunes, and sandy clays in the bottomlands.

The land is generally of low relief with erosional escarpment (breakaways) north of the Project area (Pringle et. al. 1994), bordering areas of laterite development, stony rises formed by more resistant mafic rocks, dropping down to local increasingly saline drainage bottoms and large playa lake systems.

Drainage systems referred to as paleodrainages extend from the western regional divide and extend easterly into Ponton Creek. These drainages have low gradients, and at intervals daylight as local playas. Calcrete is found exposed in deltaic situations in salinas in the northern part of the Goldfields and have been mapped in some detail for water supplies but are rarely found (Butt et.al. 1977) south of the Menzies Line -30°00´S (Pringle et.al.1994)

The Siberia Operations cover the highly prospective central portions of the Mt Ida Greenstone Belt midway between Mt Ida and Coolgardie on the Mt Burgess Pastoral Station. The area has been degraded locally by historic grazing, timber cutting, township development, exploration and mining activities

3.2 Climate

The Project is located in an arid zone of Western Australia with its hot dry summers and cold winters. The climate of the area is semi-arid, typified by seasonally low and unreliable rainfall with high temperatures, high evaporation and high daily temperature ranges during summer and cool to mild temperatures during winter.

Summer rainfall is dominantly short duration, high intensity summer thunderstorms and can involve degenerating cyclonic depressions that extend into the Kalgoorlie district. In winter there is also rainfall from the remnant of cold fronts moving over the southern area of the state from the southwest. Evaporation greatly exceeds precipitation for all months of the year and is currently assessed as being 3208mm per year for the minesite, based on the mean between Kalgoorlie and Leonora values. Summer winds are dominantly from the east and southeast; winter winds are dominantly from the west and northwest.

Throughout the year the most frequent wind speeds are in the range of 11 to 20kph, with winds in excess of 30kph being more common during winter and spring (Croesus, 2000).

Temperatures are generally hot in summer with a mean daily maximum temperature for Kalgoorlie Boulder Airport (BOM 12038) recorded as 33ºC during the period of December through to February, and cool in the winter with the mean for June and August ranging from 16.9ºC to 18.7ºC. Figure 3

shows the mean maximum and minimum temperatures for the Kalgoorlie Boulder Airport BOM station.

Average annual rainfall recorded at Menzies, 54 km north of Siberia, at 254 mm (Bureau of Meteorology (BOM) Station No. 12052; 1896 – 2020), but has inconsistent data for the last 10 years. More consistent rainfall data from Kalgoorlie Boulder, 75km south of the project, has been included with long term data recorded at BOM Kalgoorlie Boulder Airport (BOM Stn 12038 1939 – 2023) 267.9mm.

The driest period of the year is August to December. Semi-arid areas commonly experience dry periods for 4 – 6 months per year. The climatic conditions were drier in 2022 and 2023, with below average rainfall recorded.

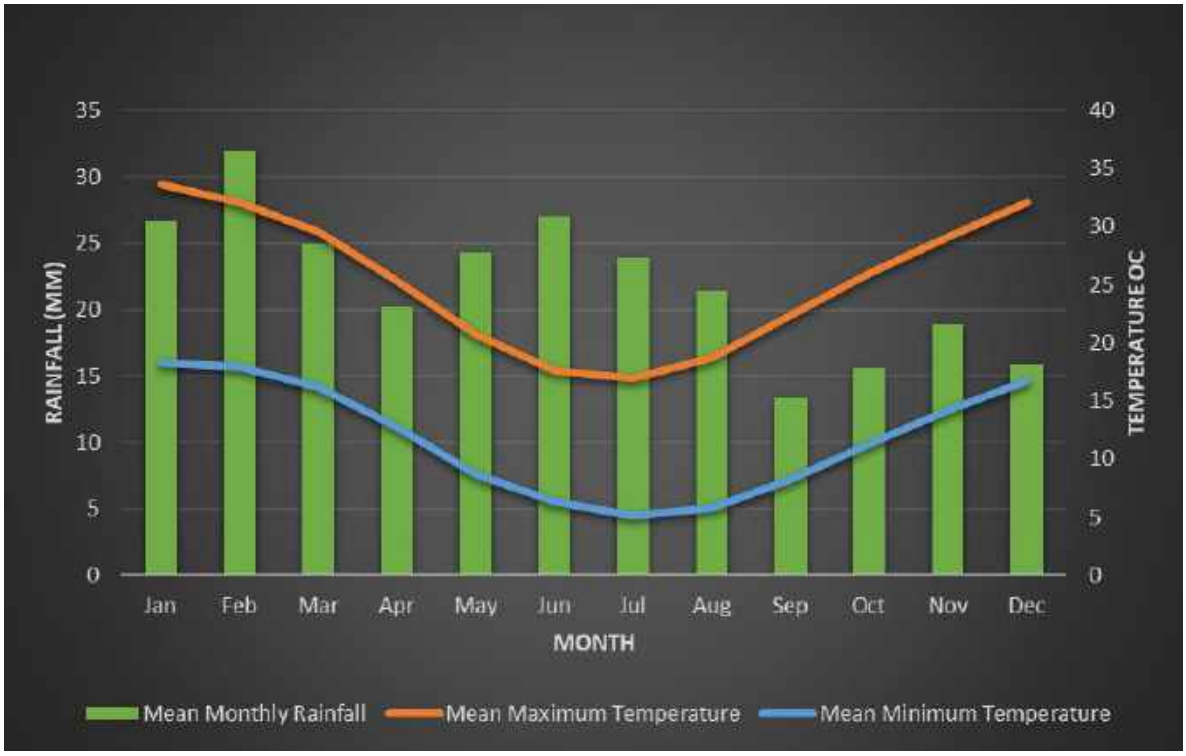


Figure 3: Mean Temperature Range and Rainfall for Kalgoorlie Boulder Airport (BOM 12038) 1939-2023

3.3 Geology

3.3.1 Mine Geology

The granite–greenstone terrains of the Eastern Goldfields Province, Yilgarn Craton, Western Australia, are a major Australian and world gold and nickel source. Deeply weathered granitoid and mafic rocks concealed by an extensive veneer of younger sediments form the basement geological unit.

The Siberia Mining Centre is located within the northern part of the Ora Banda Domain, in the Archaean Kalgoorlie Terrane (Wyche & Witt 1994). Mafic rocks of the Siberia area have been assigned to the Wongi and Missouri Basalt Units of the Pole Group, while the ultramafics to the south and east are assigned to the Walter Williams Formation. Gold mineralisation associated with the Missouri and Sand King deposits is hosted within shears within the pillowed basaltic lavas of the Missouri basalt (en-echelon lodes system), and at the contact (biotite-pyrite alteration haloes around quartz vein arrays) with the komatiite-dominated Walter Williams Formation. Both the basalt and ultramafic are cut by granitic porphyries, some of which are mineralized. Fresh Basalt is the

overwhelmingly dominant mine lithology which reports to the waste rock landforms, followed by smaller volumes of altered ultramafics and transitional and oxidized wastes.

There are two alteration events identified at Missouri and Sand King, including an initial pervasive greenschist alteration event related to metamorphism, and a later hydrothermal alteration event related to shearing. The shears have acted as conduits for hydrothermal fluids causing localised alteration and gold mineralisation. Alteration associated with mineralisation is commonly an assemblage of minerals namely biotite-carbonate-feldspar-with lesser pyrrhotite-pyrite around quartz vein arrays. A sharp transition is evident between altered, mineralised basalt and unaltered, un-mineralised basalt.

3.3.2 Waste Characterization

Extensive waste characterization test work has been undertaken on the various waste lithologies at the Missouri and Sand King mines in addition to comprehensive soil profiling. These results have been reported in the LandLoch Reports (2016 and 2020).

The Waste Characterisation Studies (Landloch 2016) demonstrate that there is a low probability of PAF material being present within the waste rock domains and therefore there is a low risk of AMD generation during waste rock storage. Memorandum Reports detailing the interpretation of the 2016 LandLoch geochemical characterisation program including soils has been provided in Appendix C of MP Reg Id 121808. A brief summary of findings are as follows:

The geochemical characterization and AMD assessment on soils and waste rocks from the SGO development site was based on previous unpublished reports and confirmed by recent testwork undertaken by Landloch (2016a & b;2020). This recent work, has confirmed that the risk of adverse AMD and metalloid leach and release for the proposed recommencement of mining programme is considered low and can be readily managed using available mining and disposal technology currently adopted at gold mines in the Eastern Goldfields of Western Australia.

3.3.3 Land Systems and Soils

The regional landscapes in the Siberia district are generally of undulating, with low relief and characterised by internal draining into saline drainages and playa lakes, occupying broad alluvial valleys between erosional highs. The relief of outcrop areas is closely related to underlying geology with granitoids forming eroded pavements and domes, and basalts and metasedimentary rocks forming elongated, rounded hills and strike ridges (JBBC, 2019).

The topography of the project area is generally subdued, with elevations ranging between about 400 m AHD and 450 m AHD.

The majority of the project area is located within the Moriarty Land System which laps onto the Marmion Land System to the north and west. In general terms the mine landscape is characterised as a low greenstone strike ridge with stony foot plains to the east and south and gently undulating sand plains to the northwest draining into internal terminal ephemeral drainage loci.

Moriarty Land System and Soils

This Land System is extensive in the Menzies region covering 430km^2 and comprising low stony rises up to 20m relief, gently undulating lower plains with pebble mantels, and level to very gently inclined

alluvial plains with poorly defined, sparse drainage patterns. The Siberia mine site is located on a south westerly trending elevated rise above an alluvial plain to the North West containing saline drainage zones. In the mine area vegetation free areas often contain a mantle of quartz or ironstone pebbles and are subject to localized sheet flow. (Pringle et. al. 1994).

Soils in the mine infrastructure areas are typically calcareous red earths on greenstone or sandy-surface saline duplex cracking clays. In some locations, shallow duplex soils have developed and are susceptible to erosion when the cover is removed.

Marmion Land System and Soils

This system forms a minor element of the SGO PDA and lies to the north west of the minesite and contains the borefield infrastructure. It comprises gently undulating sandplains with mixed shrublands. Narrow drainage tracks are common and are susceptible to water erosion, particularly where perennial shrub cover has been substantially reduced.

Soils are typically shallow, consisting of deep earthy red sands and localized red earths.

3.4 Biodiversity

The SGO is a brownfields project and is located in an area that has been subject to historic mining disturbances intermittently since the early 1900's. It is also located within the Mt Burgess Pastoral lease with evidence of pastoral disturbances throughout the Project. A number of environmental surveys have been completed over the Siberia Operations with the most recent being completed in 2019 with a Targeted Vegetation and Flora Survey (JBBC, 2019) and a Targeted Fauna Assessment (BIOSTAT, 2020) to support the NV clearing permit applications, and the recommencement of mining in 2021. .

3.4.1 Flora and Vegetation

Jenny Borger Botanical Consulting (JBBC) completed a flora and vegetation survey of the areas proposed for clearing, project expansion and rehabilitation as part of the recommencement of mining operations at the Siberia Deposit in 2019

The study area reported a total of 75 native taxa from 22 families. The majority of taxa were recorded within Fabaceae (15) Scrophulariaceae (8 taxa) and Cheopodiaceae (11 taxa) families (JBBC, 2019). Two sandalwood trees (*Santalum spicatum)*, a registered species, were recorded near quadrat Q4 of the recent survey by JBBC, 2019. Six vegetation types were described and mapped. Some of the vegetation on the greenstone hills was closely representative of vegetation communities described in DPAW greenstone ranges surveys on ex-Credo Station (Meissner & Coppen 2013).

No Threatened Flora species pursuant to Schedule 1 of the *Biodiversity Conservation Act 2016* and as listed by the DBCA in December 2018 were recorded within the Siberia survey area. No Priority Flora species as listed by the DBCA (2018) were recorded within the survey area.

Two introduced (exotic) taxa were recorded within the Siberia survey area. Of these, none are Declared Plants species pursuant to Section 22 of the Biosecurity and Agriculture Management Act (2007) according to the Western Australian Department of Primary Industries and Regional Development.

No Threatened Ecological Communities as defined by the DBCA and the EPBC Act (1999) were recorded within the survey area. No Priority Ecological Community as listed by the DBCA was recorded

within survey area. Pedestrian searches by the Flora survey teams and OBM Environmental Personnel with extensive Malleefowl experience, did not locate any evidence of the birds' presence.

Current desktop and field survey evidence, suggests no floral habitat of regional significance will be permanently impacted by the proposed mining activities or dewatering activities.

Recommendations in respect to the management of weed spread, minimisation of disturbance to natural runoff flow patterns, and confirmation of taxa suitable for use in minesite rehabilitation trials, were identified in the recent field work and these will be incorporated where appropriate, into the proposed Site Environmental Management Plan and Mine Closure Plan revisions. Further flora and vegetation information is referenced in Appendix 2.

3.5.2 Weeds

During the targeted flora survey in 2019 by JBBC, one weed species was identified within the Siberia disturbance envelope, *Nicotina glauca* (Wild Tabacco). No Weeds of National Significance (WoNS) were identified within the disturbance area.

3.5.3 Fauna

Biostat Pty Ltd (BIOSTAT) were commissioned in December 2019 to undertake a desktop and field study of the Investigation Area Project area in accordance with the requirements documented in *EPA Guidance Statement No 56 and Position Statement No. 3.* The BIOSTAT (2020) report is referenced in Appendix 3.

The focus of this study was to investigate the likelihood of malleefowl *(Leipoa ocellata)* occurring in the PDA disturbance envelope and the value of the vegetation delineated for clearing, to this species. However, the investigations also required an assessment of habitats and their value to other gazetted threatened fauna such as the (Curlew Sandpiper- *Calidris ferruginea*), Night Parrot *(Pezoporus* occidentalis), Princess Parrot *(Polytelis alexandrae)* and the Chuditch *(Dasyurus geoffroii)* and the likelihood of occurrence of other conservationally significance species in general.

The Report found that the PDA areas surveyed, is dominated by two topographical characteristics: Eucalyptus/mulga woodlands located on small stony rises and Eucalyptus woodlands on medium to heavy clay sheetwash plains. The stony rises support a different substrate which is likely to benefit a slightly different faunal assemblage to that found on the plains. For the most part, differences are likely to exist in ground dwelling fauna between the two topographic areas. Similarly, the taller trees are more likely to be found on the plains and these are more likely to support hollow nesting bird species. Generally, the fauna likely to be found in this area is not restricted to any specific habitat type and is likely to be found in most.

The area is highly disturbed across all habitat types. There is substantial fragmentation with haul roads and tracks throughout. There is substantial level of infrastructure still in place in the area and combined with the presence of tracks/roads, the area is likely to support the cat and fox including providing denning sites for these species. The quality of habitat in the Siberia area was judged overall as degraded and less likely to support a high degree of biodiversity, including MNES species.

In summary five plant communities were identified based on information provided by JBBC (2019). A summary of the plant community types identified in the broader area includes:

- Mulga Woodand over shurbs on low stony hillw
- Eucalyptus Mallee over shrublands on low stony hills

- Eucalyptus woodlands over shrubs on stony hills
- Eucalyptus woodland on sheetwash plains
- Degraded/cleared areas with some regrowth

Malleefowl (*Leipoa occellata*) is listed as Vulnerable under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and Schedule 3 of the Western Australian Biodiversity Conservation Act 2016 (BC Act).

Pedestrian searches by the Fauna and Flora survey team in November 2019, and by members of the OBM Environmental Team in 2022 during recent surveys for WRL extensions, did not locate any evidence of their presence.

Curlew Sandpiper- (*Calidris ferruginea).* Status - Critically Endangered. The Curlew Sandpiper is associated with coastal mudflat areas but can sometimes be observed at inland ephemeral lakes (fresh or saline). No suitable habitat for this species is present in the mine environment.

Night Parrot (*Pezoporus occidentalis*). Status - Endangered. The night parrot has only recently been "rediscovered" through its historical distribution. It prefers areas of large spinifex hummocks in long unburnt grassland habitats. Although small patches of similar habitat are present in the northern and western edges of the Investigation Area at Siberia, much of the spinifex grassland plains encountered in the assessment consisted of small clumping Triodia species rather than the large hummocks more commonly associated with Night Parrot habitat. The likelihood of this nomadic species being present in the Siberia PDA is ranked as low.

Princess Parrot (*Polytelis alexandrae*). Status – Vunerable. This species is restricted to the central arid interior of South Australia, Northern Territory and Western Australia. It is unlikely to be recorded in any of the Project areas.

Chuditch (*Dasyurus geoffroii*). Status – Vunerable. Historical records exist from the eastern portion of the Greater Western Woodlands and Goldfields region. Much of the habitats that supported these species in the past has been highly modified or cleared. If they have persisted, the species is likely to be found in very low densities.

A total of seven introduced mammals could potentially occur in the habitats of the Siberia Project Area; of most concern within the Murchison bioregion are the introduced herbivores; the european rabbit, feral goat, donkey and camel which have the most widespread impact on fauna habitats through grazing. Feral cats and foxes are present and these represent a threat to ground dwelling fauna.

A series of recommendations were provided in the BIOSTAT (2020) report that will assist in minimising the impact on the habitats of a range of animals during clearing and mining operations.

BIOSTAT (2020) concludes that none of the areas investigated are of sufficiently high quality and of importance to any of the listed threatened species for the area. In most cases, remnant habitats and areas are poor in quality and would not present a significant loss to the populations nor impact on local populations if they exist in the area.

3.5 Hydrology

3.5.1 Surface Hydrology

The Siberia area was settled after payable alluvial gold was discovered in the 'Pearling Patch' in 1893, however the lack of a water supply became the greatest problem faced by prospectors and early settlers. Between 1902 and 1912, the Mines Water Supply Branch (Department of Mines) constructed a series of wells and dams to meet the water demands of town residents, prospectors and pastoralists in the region. Today, water for mining and mineral processing in the Davyhurst and Siberia areas is based on abstraction from the main saline aquifers accessed the Sand King Borefield and the palaeochannel aquifers underlying the Battery Dam Borefield further north.

The Mine area is located on an interfluve characterised by two north-south trending drainage divides, the more eastern of which passes between the Sand King and Missouri open pits (Figure 4). Due to the placement of mine landforms, near mine surface runoff in the Project area generally flows north or south, via ephemeral streams and tributaries into large, low-lying flood plains and eventually into Wangine Lake, some 12 km north west of the Sand King borefield, or east into Lake Owen, or other smaller low-lying depressions in the area (AquaTerra 2003). There are no permanent watercourses or other surface water features in the Project area. Stream flows occurs only after heavy storms or after persistent low intensity rainfall. The area has long term low erratic rainfall and high evaporation and risks associated with flooding are considered very low.

Mine Environments

The Sand King, Missouri, Palmerston and Bewick Pits are located on elevated stony rises and are surrounded by historic built infrastructure, that includes Waste Rock Landforms, Tailings Storage Facilities, open pits and several roads and abandonment bunding, such that near mine surface catchments are limited in extent and drainage in the mine environment from these catchment is diverted around the operations, or contained within the landforms, with low volumes presenting into the mine voids.

Surface waters on the northern outer perimeter(420m AHD) of the mine site generally move by shallow sheet flow over low ground slopes into ephemeral drainage lines, that in turn flow into large low lying flood plains and depressions, and eventually into Wangine Lake (386m AHD), some 12 km north west of the mine. Drainage on the southern side of the Project areas flows south east then north into braided stream networks before entering a medium sized salina Lake Owen (363m AHD).

There are no known beneficial users of surface water within the disturbance envelope of the SGO. Surface water dams adjacent to the Project area are utilised by the pastoralist to provide seasonal water for stock purposes and these will not be disturbed by the mining operations. All bores within the disturbance envelope are managed under GWL 154498(4).

The Project area is not located in a *Rights in Water Irrigation Act 1914* Surface Water Proclamation Area, Irrigation District, Water Management Zone or Waterway Management Area.

The SGO is located within the Goldfields Proclaimed Groundwater Management Area (DWER, 2020).

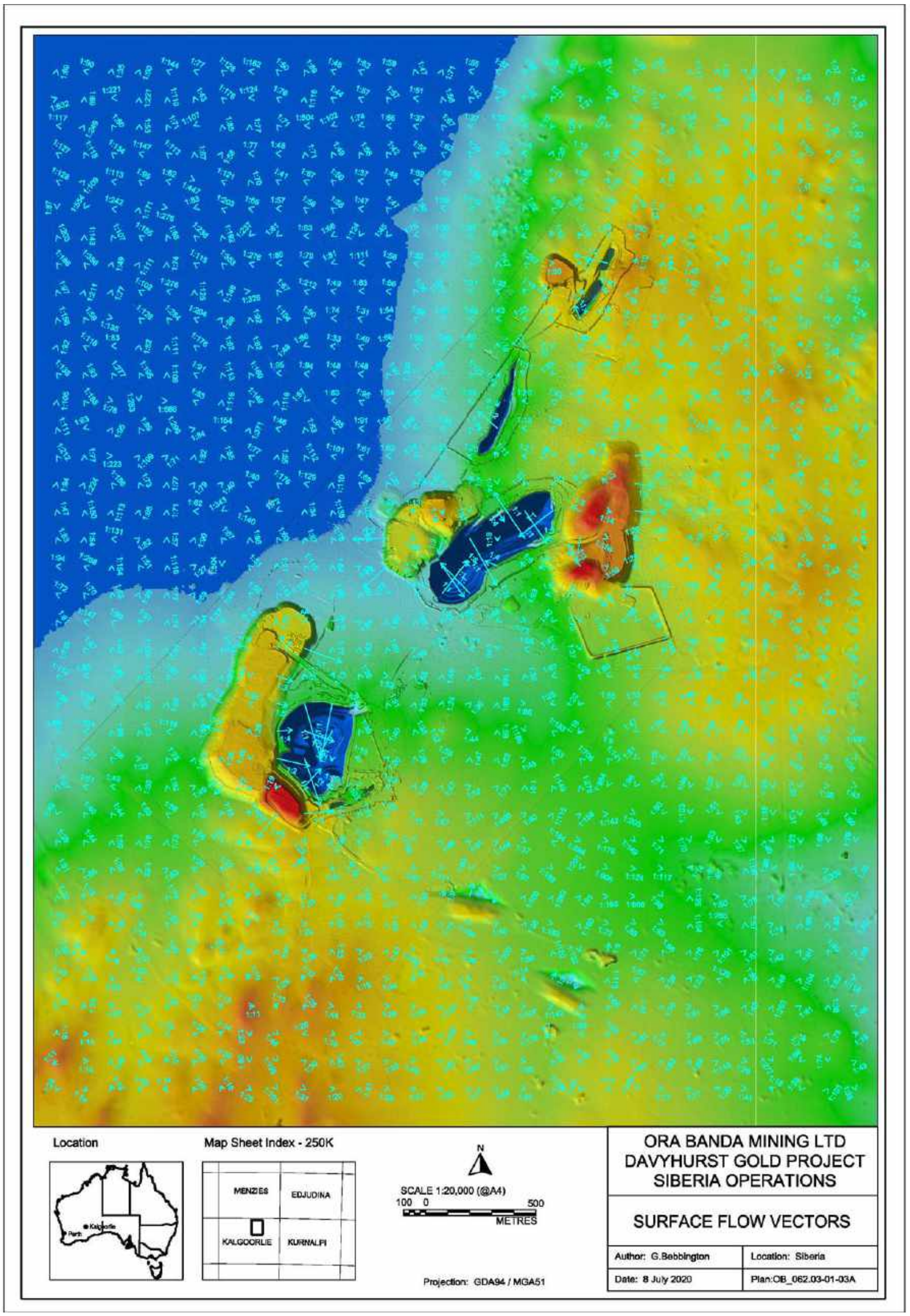


Figure 4: Siberia Gold Operations – Surface Water Catchment and Flow Vectors

3.5.2 Groundwater

The project area lies within the Kalgoorlie Hydrogeological Series (SH51-9) 1:250,000 scale map sheet. The major aquifers in the region are present in (a) palaeodrainage channels, (b) within low yielding fractured rock aquifers present in deeper structural positions and in topography controlled alluvium aquifers. Regional groundwaters are typically saline to hypersaline. Historically, water abstraction for mining and mineral processing in the Davyhurst - Siberia area has drawn upon the main aquifers underlying the Sand King Borefield, the palaeochannel aquifers underlying the Battery Dam Borefield to the north and localized, low yielding fractured rock saline aquifers associated with shear zones within the pit environments.

The Sand King borefield is underlain by two aquifers, the lower and upper. The lower aquifer consists of semi-consolidated fine to coarse angular quartz sands and sandy clay overlying oxidised granite. The upper aquifer comprises fairly homogenous siliceous magnesite and carbonate, with poorly developed sandy lenses. Overlying the upper aquifer is a clay unit consisting of puggy clay, chert, minor sand lenses and ironstone. The clay unit is overlain by approximately 10 m of alluvial sand and soil.

Mine environment Fractured Rock Aquifers (FRA) store ground water in fractures systems, joints, bedding planes and dissolution cavities in the rock mass and storage capacity, rate of movement and yield can be highly variable. Recharge into FRA's is usually local and ground water quality can vary significantly.

Rockwater (2024) described the groundwater in the area as predominantly saline to hyper saline 11,000 - 38,000 mg/L TDS. Salinity generally increases in a northerly and easterly direction towards the drainage sinks. The aquifers in the Mine area are associated with the limited low yield fractured rock aquifers in the basalt pile and the Sand King Borefield. The SK bores, installed by WMC in 1987 are located on mining leases now owned by OBM, and are utilized for dust suppression and mining uses when inpit waters are exhausted.

Recent sampling of the Siberia Project Pit void storages suggests that the groundwater at both these pits are brackish to saline with Total Dissolved Solids (TDS) ranging from 13,000mg/L to 37,000mg/L. The major ionic composition of the groundwater is salts of sodium and chloride with minor levels of sulphate, magnesium and calcium present. Most other ions are by comparison in low total concentration, a copy of the water quality analysis is provided in Appendix 4. Testing of the Sand King Borefield as part of Groundwater Licencing Reporting (OBM 2024) showed that pH's ranged from 5.3 (acidic) to 7.8 (alkaline) and the pH of the water pumped from the Sand King Mine in December 2023 was 6.86. Total Dissolved Solids were hypersaline (35,000mg/L – 42,000mg/L), Sodium, magnesium, chloride and sulphate are the predominate ions, with chloride, manganese and total iron exceeding the drinking water and irrigation water guidelines (ANZECC/ARMCANZ Water Quality Guidelines 2000).

Table 4: Groundwater Parameters of the Sand King, Missouri, Palmerston and Bewick Pits

Pit Name	Date of Sample	pH	Total Dissolved Solids (mg/L)
Sand King Pit	30.04.2025	7.41	29,285
Palmerston Pit	30.04.2025	7.41	29,285
Bewick Pit	Dry	-	-
Missouri Pit	19.07.2023	7.5	21,000

3.6 Heritage

All Aboriginal heritage sites are protected under the Aboriginal Heritage Act 1972, whether or not they have been previously identified or registered, provided that the site can meet the Section 5 definitions of the Act. The then Department of Aboriginal Affairs and the Department of the Premier and Cabinet developed the Aboriginal Heritage Due Diligence Guidelines (2013) to assist land users in dealing with heritage matters. Compliance with the Guidelines reduces the risk that Aboriginal sites will be harmed as a result of proposed activities.

The proposed Sand King underground development will not result in the disturbance of land not previously included in the existing mine disturbance footprint, with all proposed pipelines and dewatering infrastructure located in extensively disturbed near mine environments. In addressing Aboriginal heritage matters, OBM has reviewed previous Aboriginal heritage surveys in the Siberia areas (O'Connor, 2003, Brad Good and Associates 2020) and applied the Aboriginal Heritage Due Diligence Guidelines (DAA/DPC 2013) to identify the risks of impacts to Aboriginal Heritage Sites in mine areas and corridors, conducted searches of the AHIS Data for registered sites and other heritage places covering lodged information that has not been assessed to determine if it meets Section 5 of the Act.

Recent searches of the Aboriginal Heritage Inquiry System was conducted in November 2023, with no known registered sites identified for M24/960. Copies of these searches are provided in Appendix 5.

European mining activity in the Siberia District can be traced back to the late 1800's, commencing with alluvial discoveries in 1893. The level of mining activity was severely restricted by the lack of water and a Government Dam was constructed south of the settlement, which was gazetted as Waverley Township in 1898. The name was later changed to Siberia in 1914. It is located south of the minesite adjacent to the intersection of the Goongarrie and Ora Banda Road. The State Register of Heritage Places is a statutory list of places that represent the story of Western Australia's history and development. There are no known European heritage sites within the Siberia Project Development Area listed on the State Register and no other Heritage Agreements or Conservation Orders covering European heritage were identified.

The historic Siberia Townsite and Cemetery are recorded to the south east of the OBM PDA, however little physical evidence remains. The historic location will not be impacted by OBM's mining activities.

3.7 Sensitive Receptors

The nearest sensitive receptors to the Siberia Operations are the OBM Davyhurst Mine Camp, located approximately 35km west of Siberia, and the towns of Menzies, located 58km north of the Sand King Pit and Ora Banda locate approximately 20 km south east. Due to the distance to the nearest sensitive receptor (Ora Banda), OBM believe the dewatering activity will pose no environmental risk to the residents. No documented Aboriginal Heritage receptor are recorded for the near mine area and the abandoned Sibera townsite will remain unaffected by the dewatering and discharge activities. No Public Drinking Water Source Areas, Environmentally Sensitive Areas, Nationally Important Wetlands or Threatened or Priority Environmental Communities are located within 10km of the Siberia Project.

Stakeholder Consultation

Ora Banda Mining Limited is committed to undertaking ongoing engagement with Stakeholders to ensure its mining activities meet community and regulatory expectations. Detailed Summaries of recent Stakeholder Consultation are referenced in Mining Proposal Reg Id 121808.

4. Assessment of Environmental Risks from Emissions

4.1 Risk Identification

From the risk identification process, four potential emissions were identified associated with the proposed Sand King mine dewatering and storage into either Palmerston, Bewick or Missouri open pits. These are:

- Saline water (spill from the dewatering storage system, breach of pipeline bunding, exceedance of pit freeboard);
- Hydrocarbon spill (spill from water pump/generator);
- Noise (from water pump and pipeline inspection vehicles); and
- Dust (from discharge points and pipeline inspection vehicles).

The likelihood of an event happening where the emissions affect the environment is detailed in Section 4.3.

4.2 Risk Assessment

To identify the risks associated with the mine abstraction and discharge of mine dewater to Palmerston, Bewick or Missouri Pit, each component of the dewatering task was assessed to identify any risks that may occur. Risks that were identified are summarised below:

- A saline water spill occurring is considered a moderate risk without management measures and a low risk after management measures are put in place. Storage tank rupture is also considered a low risk. The dewatering infrastructure is located in the near mine environment that has been cleared of vegetation and any spill runoff would be directed back into the nearest pit. The consequences of a pipeline spill outside bunded containment may result in potential impact to growth medium or topsoil stockpiles from salt water contamination and pipeline placement has been factored to minimize this risk. No significant impacts to fauna would be anticipated.
- Hydrocarbon contamination from equipment servicing and the refuelling of Generator pumps is possible but considered a low risk. The consequences would be water and soil contamination localized around surface pumping infrastructure which could lead to local habitat decline. This level of impact is readily remediated. Limited fuel supplies will be stored with generators operating the transfer pumps, as refuelling will usually be undertaken by Service Trucks.
- Noise impacts are unlikely and not expected. The consequence of residential disturbance to members of the Public would not occur as there are no permanent residents within 20km of the mine sites. There is also a low risk of noise impact on local terrestrial fauna populations as they would if present, would generally have moved to lower noise environments as mining has been undertaken for 3 years. It is highlighted that neither of these are likely to be greater than noise impacts from current mining operations (excavators, dump trucks, dozers, graders, service trucks, drill rigs and rock breakers).
- Dust generation from pipeline inspection vehicles is possible and considered a low risk.

4.3 Risk Management

The risk matrix detailed in Table 7 combines the level of likelihood and consequence to determine the associated risk level. A risk priority is assigned to each of the 25 possible outcomes and risks are categorised as Critical (Red), High (Orange), Moderate (Yellow) and Low (Green). As different activities differ in scale and nature of impact, control measures are tailored to ensure they are relevant and effective in mitigating the identified risk. Detailed management plans may be required for critical or high-level risks while routine procedures are considered sufficient to adequately manage low level risks.

Table 5: Likelihood Categories

Level	Likelihood	Frequency	Description
a	Almost Certain	Occurs more than once per year	The event is common or frequent occurrence or an ongoing impact.
b	Likely	Typically occurs once or twice per year	The event is expected to occur under some conditions or has occurred more than once.
c	Possible	Typically occurs in 1-3 years	The event will probably occur or has occurred under some conditions.
d	Unlikely	Typically occurs in 3-10 years	Known to have occurred but not often.
e	Rare	Typically occurs in 10 – 100 years	Very unlikely/may occur in exceptional circumstances.

Table 6: Consequence Categories

Environmental Factor	Insignificant (1)	Minor (2)	Moderate (3)	Major (4)	Catastrophic (5)
Biodiversity / Flora / Fauna / Ecosystem	None or insignificant impact to ecosystem component (physical, chemical or biological) expected with no effect on ecosystem function. Impact confined to immediate area.	Moderate to minor impact to ecosystem component (physical, chemical or biological). Impact confined to a linear isolated area.	Minor and short-term impact to high value or sensitive ecosystem expected. Impact confined to the Project Corridor.	Long term impact to significant high value or sensitive ecosystem expected. Impact extends beyond Project site.	Irreversible impact to significant high value or sensitive ecosystem expected. Impact occurs on a wide scale.
Water Resources	Low impact to isolated area without affecting any use of the water.	Contained low impact with negligible effect on the use of water.	Uncontained impact with will materially affect the use of the water, but able to be rectified in the short-term.	Extensive hazardous impact requiring long-term rectification.	Uncontained hazardous impact with residual effect.
Land Degradation	Negligible impact to isolated area.	Contained low impact, not impacting on any environmental value.	Uncontained impact, able to be rectified in short-term without causing pollution or contamination.	Extensive hazardous impact requiring long-term rectification.	Uncontained hazardous impact with residual effect.
Air Quality	No detectable impact.	Contained low impact not impacting on any environmental value.	Uncontained impact that will materially affect an environmental value, but able to be rectified in short-term.	Extensive hazardous impact on an environmental value requiring long-term rectification.	Uncontained hazardous impact with residual effect.
Social	No institutional, community or social impacts.	Inconvenience to a small sector of the community. Some communication and education required involving local community	Considerable disruption or inconvenience to isolated sectors of the community. Prior consultation required.	Long term social disruption, quality of life for large sector of the community. Potential significant change to community function. Loss of local support networks, services and/or heritage. Community consultation critical.	Significant community impact. Community outrage leading to breakdown of company relations with local community. Future approvals extremely difficult

Table 7: Risk Rating Matrix

Risk Matrix		Consequence				
		Insignificant	Minor	Moderate	Major	Catastrophic
Likelihood	(a) Almost Certain	Moderate	High	High	Extreme	Extreme
	(b) Likely	Moderate	Moderate	High	High	Extreme
	(c) Possible	Low	Moderate	Moderate	High	High
	(d) Unlikely	Low	Low	Moderate	Moderate	High
	(e) Rare	Low	Low	Low	Moderate	Moderate

Table 8: OBM Siberia Operations Dewatering Pipeline Risk Identification, Analysis and Management

Risk Identification				Risk Analysis			Risk Management	Residual Risk Analysis		
Issue	Unwanted Event	Potential Impact	Causes	Consequences	Likelihood	Risk Ranking	Management/Control Measures	Consequence	Likelihood	Risk Ranking
Brackish to saline water	Release of brackish to saline water into the environment	Soil, surface water contamination causing impacts to vegetation and erosion	• Pipeline Failure. • Saline Water Tank Overflow. • Failure or erosion of bunding along pipeline route. • Failure of pipeline management procedures. • Exceedance of bunded trench containment freeboard • Failure of manual cut off device on the standpipe	Minor	Likely	Moderate	• Pipeline inspections once every 24 hours. • Automatic pressure shutoff switch fitted to staging tanks. • Scheduled pipeline maintenance • Adequate and maintained V containment bunds. • Water pressure will not exceed the design criteria for the pipeline sections. • Water flow meters fitted on Tank/ pit discharge locations. • Transfer tanks within disturbance envelope. • Storage Tanks with overflow pipes directed back into mine voids • Pipeline bunds direct flow back into Pit Voids	Minor	Possible	Moderate

Risk Identification				Risk Analysis			Risk Management	Residual Risk Analysis		
Issue	Unwanted Event	Potential Impact	Causes	Consequences	Likelihood	Risk Ranking	Management/Control Measures	Consequence	Likelihood	Risk Ranking
Saline Water – Pit Freeboard Breach	Exceed the water holding capacity of the Discharge Pit	Soil, surface water contamination causing vegetation deaths	• Failure of Pit inspections • Large rainfall event	Moderate	Unlikely	Moderate	• Dewatering Pipeline Management Procedure • Monthly water volume and visual pit level monitoring • Installation of freeboard markers on the discharge pit ramps • Freeboard of 300mm on staging tanks maintained via overflow pipe back into Sand King Pit	Moderate	Rare	Low

Risk Identification				Risk Analysis			Risk Management	Residual Risk Analysis		
Issue	Unwanted Event	Potential Impact	Causes	Consequences	Likelihood	Risk Ranking	Management/Control Measures	Consequence	Likelihood	Risk Ranking
Saline mine water impacting on receiving waters	The Discharge Pit Lake receiving waters are adversely affected by the discharge and mixing of the saline Sand King Pit and Underground waters	Discharge Pit waters naturally increase in salinity due to evapo-concentration during summer. Pit water has no beneficial uses apart from mining. Contamination of local groundwater risk low as pits display similar chemistry.	• Lack of groundwater monitoring prior to deposition • Lack of ongoing water monitoring	Moderate	Unlikely	Moderate	• Baseline water monitoring conducted which confirms pit waters have similar compositions. • Monthly field water monitoring conducted (Ph, EC, and TDS) at active Storages with Quarterly major anions and cations, TPH analysis. • Hydrology and groundwater studies are completed no beneficial resource identified. • Adherence to RIWI Act groundwater licence GWL180490 Operating Strategy and abstraction volumes at Siberia • Cumulative water abstraction volumes are tracked monthly during operations.	Moderate	Rare	Low

Risk Identification				Risk Analysis			Risk Management	Residual Risk Analysis		
Issue	Unwanted Event	Potential Impact	Causes	Consequences	Likelihood	Risk Ranking	Management/Control Measures	Consequence	Likelihood	Risk Ranking
Hydrocarbons	Release of hydrocarbons into the environment or dewatering network	Soil, surface water contamination causing reduced vegetation health	• Use of non bunded fuel pod • Absence of fuel and oil storage and handling procedures • Lack of adequate training to service personnel on equipment.	Moderate	Possible	Moderate	• Appropriately designed and maintained service truck for infrastructure servicing and maintenance. • Hydrocarbon management and spill procedure included as part of employee induction. • Collection of waste oil and grease as per Site Waste Management Plan. • Hydrocarbon spill kits readily available at generator refuelling site.	Moderate	Unlikely	Moderate
Noise – pumps and engines	Adverse impact to local fauna species	Disturbance to habitats and local fauna populations	• Poor pump maintenance	Minor	Possible	Moderate	• Adherence to equipment maintenance schedules. • Utilization of modern silenced equipment.	Minor	Unlikely	Low
Dust	Dust accumulation on vegetation	Vegetation decline causing reduced vegetation health	• Excessive speed of vehicles on track to during pipeline checks.	Minor	Possible	Moderate	• Establish vehicle speeds to fit environmental and road conditions on Pipeline Inspection Track as required.	Minor	Unlikely	Low

5. Environmental Performance Objectives, Standards and Measurement Criteria

5.1 Objectives and Standards

Table 9: Environmental Performance Objectives and Standards

Environmental Performance Objectives	Standards	Measurement Criteria
Saline water emissions: ensure all saline water is contained within surface storages, the pipeline bund and open pits	• Environmental Protection Act Regulations 1986 • Compliance required in respect to Mining Proposal Reg Id 121808 Environmental Outcomes and Performance Criteria • Environmental Protection (Unauthorised Discharges) Regulations 2004 • Mine Dewatering Procedure and Spill Management Procedure	• Pipeline inspection undertaken on a 24 hourly basis when pumping is active. • Storage Tanks fitted with automatic shut off float switch and functionality tested monthly. • Isolation and breather valves installed and inspected monthly. • Weekly visual freeboard and monthly survey of water level in pits
Dewatering: ensure GWL abstraction allocation is not exceeded	• Groundwater Licence GWL 154498-4 Conditions and Groundwater Operating Strategy • Water and Irrigation Regulations 1914. • Environmental Protection Act Regulations 1987. • Mine Dewatering Procedure	• Flow Meters installed as per the Rights in Water and Irrigation (Approved Meters) Order 2009. • Abstraction recorded on a monthly basis. • Abstraction reported in Annual Groundwater Monitoring Summary
Hydrocarbon emissions: ensure hydrocarbons loss into the environment is minimized	• Hydrocarbon Management Procedure and Spill Management Procedure • Groundwater Operating Strategy Management Conditions	• Small quantities of hydrocarbons stored within active machinery. Waste hydrocarbons are stored and removed off site for reuse/disposal. • Stored hydrocarbons are bunded. • Education of all personnel to manage hydrocarbon spills. • Hydrocarbon Spill Kit readily available • Annual water monitoring
Noise emissions: ensure noise is kept at a suitable level to avoid nuisance noise.	• Environmental Protection (Noise) Regulations 1997	• Nil required
Dust accumulation: ensure dust is managed in Pipeline corridor and minesites so it does not affect vegetation.	• Dust Suppression Procedure for minesite and corridor	• Visual dust monitoring to ensure workplace is not impacted • Follow Dust Suppression Procedure

6. Implementation Strategy

6.1 Construction and Commissioning

The pipeline between Sand King and the Mine Water Dam was constructed under Mining Proposal Registration ID 89026 for pit water and borefield water storage. The proposed dewatering pipeline to the Palmerston Pit has been constructed under Works Approval W6904/2024/1 and is established in a v notch drain within a bunded road corridor. The 160mm HDPE pipe is butt welded with pressure release air valves positioned at relevant high points and positioned in the 700m long bunded corridor to Palmerston Pit, 900m bunded corridor to Bewick Pit and the 1.1km bunded corridor to Missouri Pit. No telemetry system or catch pits will be required as pipeline spills from the bunded v drain will report to either Sand King or the nearest storage pit. Each discharge pipeline is fitted with an inline flow meter.

A return water pipeline is also be placed in the bunded corridor from the Palmerston pit to the four 20,000L transfer tanks situated on the western crest of the Sand King Pit for use in underground and dust suppression. The transfer tanks are fitted with automatic shut off float switches and an overflow pipe back into the Sand King Pit.

Works were completed under the approved Works Approval W6904/2024/1 and a compliance certificate submitted to DWER in November 2024. Dewatering operations then commenced under section 6 of the works approval.

6.2 Clearing

The dewatering infrastructure is located within the approved mine disturbance envelope. The pipelines and transfer tanks are situated on existing disturbed area and no further clearing is required.

6.3 Monitoring

- Visual monitoring of the pipeline is scheduled to occur every twenty four hours when pumping is active;
- The pipeline flow meter will be recorded on a monthly basis;
- Monthly water level survey of active discharge pit;
- The water quality will be field monitored monthly for pH, EC and TDS from the Sand King sump;
- Quarterly water quality monitoring will include pH, EC, TDS, major anions and cations, selected heavy metals and hydrocarbon analysis.
- Dust observations are carried out regularly as part of normal mine activities and are not specifically related to dewatering.

6.4 Rehabilitation

The pipeline and transfer tank infrastructure will be recovered and the mine disturbance rehabilitated with local species during the rehabilitation programme for the Siberia Project as outlined in the approved Mine Closure Plan Reg Id 114018. Rehabilitation is supported and guided by the following principles

- Ensure that vegetation clearing is kept to a minimum;
- Establish rehabilitation prescriptions for areas impacted by pipe spills as informed from monitoring data;

- Collect and correctly stockpile vegetative material and available topsoil for later use as part of corridor rehabilitation;
- Progressively rehabilitate completed areas as soon as practicable;
- Only use local native plant species for seeding;
- Undertake decommissioning and closure of the site in accordance with industry leading practices and to statutory requirements; and
- Establish photo-monitoring sites in the corridor to inform completion criteria.

To assist with ongoing review of the rehabilitation and environmental management at the Siberia Project, OBM will include information on the Sand King Pipeline performance in the Annual Environmental Report (AER) submitted to DMIRS in March each year.

6.5 Contingencies

6.5.1 Hypersaline Spill Event

In an event of a hypersaline spill, bunding will assist to contain the spill and the isolation valves will be turned on by the pipeline inspector. Repairs will be carried out on the pipeline and any bunding that may have been damaged will be reconstructed to standard by the service crew. Soil sampling will be carried out by the Environment Department to assess the extent of the contamination. Reports will be included in the Annual Environmental Report in March

6.5.2 Hydrocarbon Spill

Hydrocarbon losses will only occur where pumping gensets are established and will be low order spills because of the scale of the equipment. In an event of a spill, the source will be shut down, and the spill contained with additional absorbent materials from the Spill Kit. Any contaminated soil will be removed and disposed in the Site Biopad by the Service Crew. Soil and water sampling will be carried out as required, by the Environment Department to assess the extent of the contamination. Reports provided in accordance with Section 72 of the Environmental Protection Act 1986. Rehabilitation of the affected area will be carried out by Environmental Department if required.

6.5.3 Dewatering Exceedance

To ensure the pit volume discharge does not exceed the nominated freeboard, monthly water flow metre readings from the Sand King Pit to the discharge pit/s will be collected. In addition, surveyors will measure the water levels in discharge pit/s on a monthly basis to ensure the water holding capacity is not exceeded. The Environment Department will check this data on a monthly basis and examine any inconsistencies or unusual readings. When dewatering volumes exceed the allowed amount, relevant authorities will be notified by the Environmental Department and pumping volumes will be reduced to prevent exceedance of the agreed limit. A free board trigger level has been set at 5m below natural crest level.

6.5.4 Records

All records pertaining to the dewatering of the Sand King Underground are maintained by OBM and include:

- Flow Meter Log Book
- Pipeline Inspection Log Book
- Groundwater Monitoring Database
- Environmental Incident Report Database
- Groundwater Licence Reports

- Groundwater Operating Strategy

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Appendix 1: Groundwater Licence 154498/4

Government of Western Australia
Department of Water and Environmental Regulation

LICENCE TO TAKE WATER

Granted by the Minister under section 5C of the Rights in Water and Irrigation Act 1914

Licensee(s)	Siberia Mining Corporation Pty Ltd		
Description of Water Resource	Goldfields Combined - Fractured Rock West - Fractured Rock	**Annual Water Entitlement**	630,000kL
Location of Water Source	L24/115 L24/224 M24/39 M24/960		

Authorised Activities	**Taking of water for**	**Location of Activity**
	Dewatering for mining purposes	L24/115 L24/224 M24/39 M24/960
	Dust suppression for earthworks and construction purposes	L24/115 L24/224 M24/39 M24/960
	Mining camp purposes	L24/115 L24/224 M24/39 M24/960
Duration of Licence	From 9 July 2021 to 22 July 2030	

This Licence is subject to the following terms, conditions and restrictions:

1. The annual water year for water taken under this licence is defined as 1 January to 31 December.

End of terms, conditions and restrictions

Appendix 2: Flora Report

Targeted Vegetation and Flora Survey of the Siberia Gold Operations Tenements M24/290 and M24/39

November 2019

Ora Banda Mining Ltd,

Level 1, 2 Kings Park Road, WEST PERTH WA 6005

[redacted]

Executive Summary

The Siberia Mining Corporation Pty Ltd (SMC), a wholly owned subsidiary of Ora Banda Mining Ltd (OBM) proposes to recommence mining operations at the Siberia mine site in the vicinity of the historic Missouri and Sand King gold mines. The previous owner of the tenements, Eastern Goldfields Limited (EGS), commissioned flora and fauna surveys in 2015 (Piacentini & Son 2016; Plant Ecology Consulting 2015) prior to proposed mining activities. Jenny Borger Botanical Consulting (JBBC) was commissioned by EGS to establish analogue and rehabilitation monitoring sites in the Missouri and Sand King area in 2017 (JBBC 2017 unpublished). Following regulatory assessment in 2016/17, open pit mining briefly recommenced at both the Sand King and Missouri minesites following approval in January 2017. Mining and processing operations were suspended on the 3rd September 2018 and the site has remained in care and maintenance since that time.

Minor changes to the previously approved project description require updated flora and fauna surveys to support an amendment to the current Clearing Permit (6968/3) issued by the Department of Mining, Industry Regulation and Safety (DMIRS). The proposal area has been surveyed on three other occasions prior to 2015. No threatened or priority flora or ecological communities were identified during previous surveys.

OBM commissioned JBBC to undertake a flora and vegetation survey of the proposed development area (PDA) in 2019 covering an area of 52 ha between the former WMC (now decommissioned) TSF and the Missouri Open pit and smaller northern areas for infrastructure. Based on previous survey results and the current level of disturbances in a near mine environment, a targeted survey was deemed appropriate.

The desktop assessment identified the following relevant aspects:

- The proposal occurs on two soil map units BB5 and Mx43. BB5 consists of greenstone ranges and hills with shallow calcareous loamy soils, shallow brown and grey-brown calcareous earths. Mx43 consists of gently undulating valley plains and pediments with alkaline red earths with limestone nodules (calcrete) at shallow depths
- The proposal is mapped as pre-European Vegetation Association 468 – medium woodland: salmon gum and Goldfields blackbutt
- Based on Bureau of Meteorology records the overall interpretation of the climate in 2019 was warmer and drier than average
- 21 priority flora have been recorded within 20 km of the proposal, none have been recorded within the proposal area
- No threatened or priority ecological communities or environmentally sensitive areas are recorded near the proposal

The field survey, conducted on the 3rd November 2019 identified the following:

- A total of 73 native taxa from 22 families and 40 genera, and 2 weeds were recorded

- Six vegetation types were mapped ranging from *Eucalyptus* woodland, open woodland and open mallee woodland; and *Acacia* tall shrublands
- The vegetation condition was mostly good to very good
- Included in the scope of works was a requirement to report on the presence of mallee fowl (Leipoa occellata). No signs were observed in the Proposal area during the survey.

Assessment against DWER's 10 clearing principles indicates that none are at variance or likely to be at variance in relation to the proposed works.

The Siberia proposal was surveyed by Jenny Borger (botanist), Jeremy Shepherdson (ecologist) and Sam Rees (graduate ecologist). Borger and Shepherdson have a combined experience in Western Australian ecological/ botanical surveys of more than 40 years.

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1. Introduction

1.1 Background

Orabanda Mining Ltd (OML) intends to recommence mining operations at the Siberia Project on tenements held by the Siberia Mining Corporation Pty Ltd (SMC), located in the Eastern Goldfields of Western Australia. The site has been in care and maintenance since 2018 when mining operations ceased when Eastern Goldfields Ltd (EGL) went into voluntary administration.

The mine complex is located 20 km north west of Orabanda, east of the Davyhurst – Orabanda Road (Figures 1 & 2) on unallocated crown land (UCL) within the boundary of Mt Burgess Station. The area to be impacted (the Project Development Area - PDA or Proposal) is mostly located on the south eastern side of the current disturbance area, between Sand King waste dump and Missouri pit and is adjacent to an existing haul road and administration area. Smaller infrastructure areas totalling 4.75 ha (Figure 8) are located around the Camperdown Pit and the proposed Contractor laydown. The Proposal is located within mining tenements M24/ 290, M24/ 39 and L24/224. A flora and vegetation assessment of the site is required for environmental impact assessment (EIA) under Part IV of the *Environmental Protection Act 1986* (EP Act). A Technical Guidance for Flora and Vegetation surveys for EIA was published by the EPA in 2016 under which a targeted survey was deemed appropriate to address the objectives of the survey (EPA 2016). The proposal covers an area of 53 ha, 48.25 ha of which occurs in the environmental survey area (ESA) of 52 ha (Figure 2).

The objectives of the survey were to:

- Undertake a desktop study of the PDA and surrounding areas;
- Undertake a pedestrian survey and Identify and describe the vegetation types present;
- Record the presence of any Threatened Ecological or Priority Ecological Communities (TEC, PEC);
- Record the presence of any threatened or priority conservation flora occurring in the area;
- Record the condition of the site and threats;
- Assess the proposal against the 10 clearing principles, and
- Observe and report on the presence of Malleefowl*(Leipoa occellata)*

1.2 Climate

The Eastern Goldfields region experiences a semi-arid climate with hot summers and cool winters and receives a mean annual rainfall of 266 mm at the Kalgoorlie Boulder Airport(KBA) - Bureau of Meteorology (BOM) Station 12038, 1939 – 2019). KBA is the closest monitoring station with long term data, and is located 70 km south east of the proposal. Rainfall has been recorded at Credo Station (BOM 012259) from 2011 – 2019; however this is not sufficiently long term to determine a long term mean. Monthly rainfall records for Credo and Kalgoorlie Boulder are presented in Table 1 and Figure 3 and show that rainfall is received throughout the year with no particular drier or wetter periods. Significant falls have been recorded during the summer period in some years resulting from ex-tropical lows/ cyclones moving over the region. Significant falls were recorded in October and November during 2018. Rainfall recorded for 2019 up to the time of survey (2nd November) show the region had a wet summer, average winter period and below average spring (August to October). December and August have been close to average for the last two years.

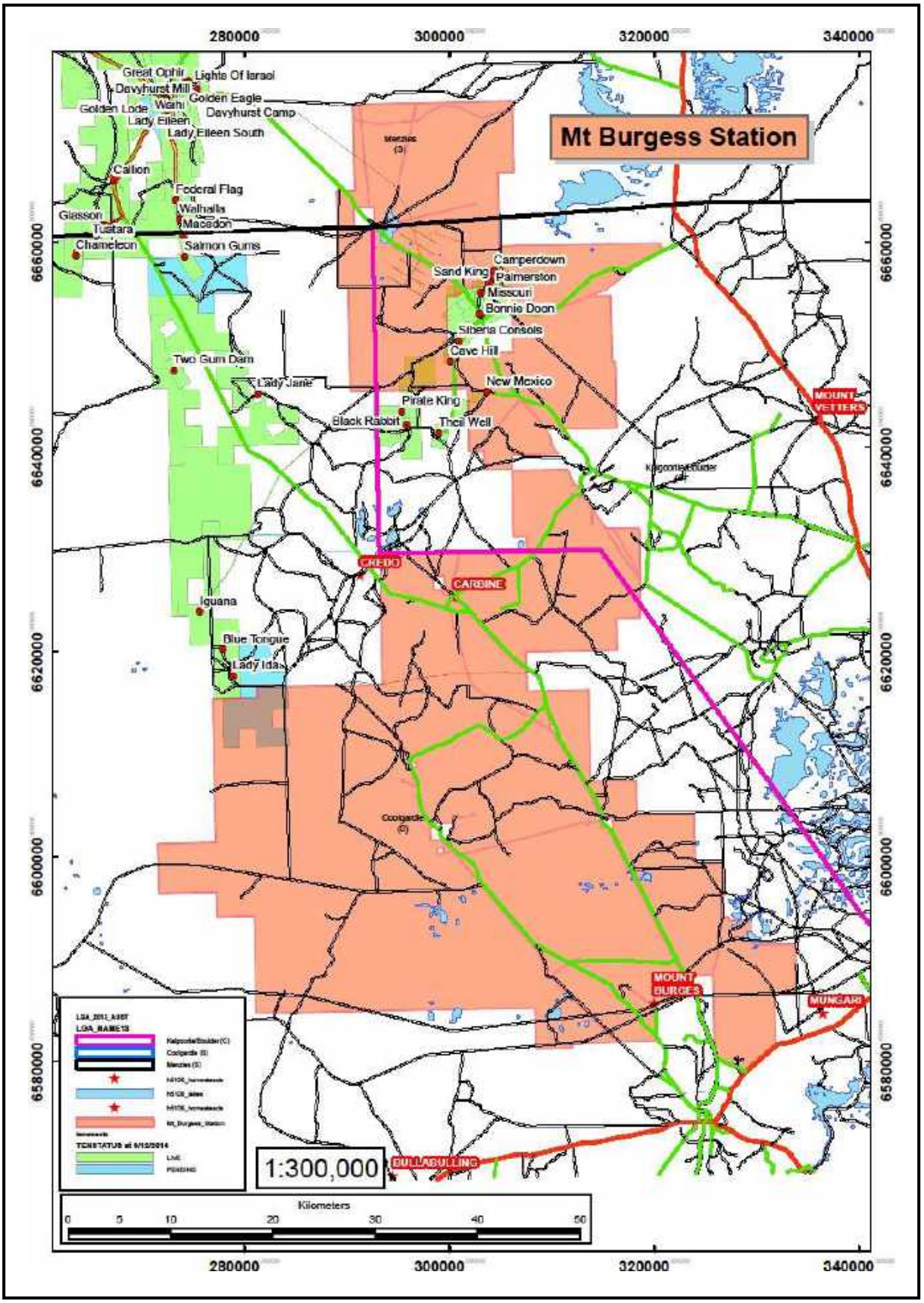


Figure 1: The Siberia Project is located 20 km NW of Ora Banda and 35 km SE of Davyhurst within the boundary of Mt Burgess Station.

Figure 2: Siberia mining proposal environmental survey area. The Missouri pit is located west of the proposal (red highlighted area) and the Sand King waste dump is located on the NE side.

Table 1: Monthly rainfall data for Credo Station and Kalgoorlie Boulder (KB) Airport.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
KB Mean	27.5	31.2	25.2	20.5	24.9	27.3	24.2	21.3	13.7	15.8	18.7	16.5	266.1
Credo 2018	81.9	117.5	17.9	2.2	2.8	8.6	10*	19.1	2.9	37.7	124	19.8	444.4*
Credo 2019	0.5	13	36.8	18.3	11.6	20.2	46.4	19	0.3	3.2	0.6	18.5	188.4
KB 2018	45.4	65.2	7.4	11.4	1.2	11.6	7.8	29.8	2.8	68.8	62	14.4	327.8
KB 2019	8	7.2	0	36.2	9.8	41.2	3.8	20.6	0.4	2.2	0.2	13.6	143.2

*Some data missing for July 2018

The highest maximum temperatures occur during the summer with the long term mean January temperature of 33.7°C (Figure 4). The coolest month is July with a long term mean monthly maximum of 16.8°C. The mean monthly maximum temperatures recorded during January to March 2019 were all above average, followed by a slightly cooler than average autumn and warmer than average winter/ spring period. Minimum temperatures have also been above average for much of the year with the exception of May to July. The overall interpretation of the climate in 2019 was warmer and drier than average.

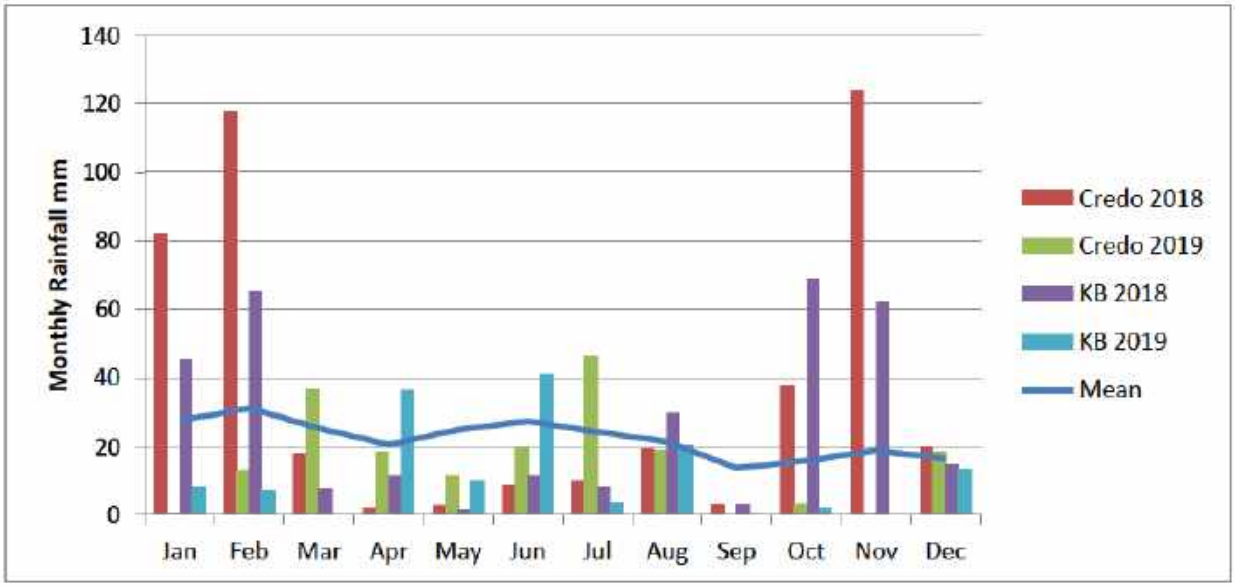


Figure 3: Monthly rainfall data for Kalgoorlie and Credo Station with the long term mean recorded at Kalgoorlie.

Figure 4: Mean monthly maxima and minima temperatures recorded at Kalgoorlie with the long term means.

1.3 Geology & Hydrology

Siberia lies within the Yilgarn Craton, east of the Ida Fault in the Kalgoorlie geological terrane. A number of mafic and ultramafic greenstone belts occur within the terrane and are composed of older Archaean basalts and komatiite units. Tertiary weathering has resulted in the presence of laterite in some areas. The proposal occurs on two soil map units BB5 and Mx43. BB5 consists of greenstone ranges and hills with shallow calcareous loamy soils, shallow brown and grey-brown calcareous earths. Mx43 consists of gently undulating valley plains and pediments with alkaline red earths with limestone nodules (calcrete) at shallow depths.

The proposal is located in the lower catchment and supports no major drainage lines. The area has been heavily disturbed as a result of past mining operations which may have changed some of the minor drainage aspects. Low hills are located on the eastern side, with one low hill having a laterite cap. A gently sloping valley is located between the hills.

1.4 Regional vegetation and condition

Pre-European mapping of the proposal area places it within the Eremaean Province in Beard Vegetation Association 468 – medium woodland: salmon gum and Goldfields blackbutt (Beard 1978). The Interim Biogeographical Regionalisation for Australia (IBRA) (Thackway and Cresswell 2017) places the proposal on the eastern boundary of the Coolgardie Bioregion (COO-03), adjacent to the Murchison Bioregion (MUR -01) which was described by Cowan (2001).

The Eastern Goldfields sub-region of the Coolgardie Bioregion is characterised as supporting diverse Eucalypt woodlands on low greenstone hills, valley floors, broad plains and salt lake surrounds; samphire shrublands on saline valley floors; and mallees, *Acacia* thickets and shrub-heaths on sand plains, playas, laterite areas and granite outcrops. Vegetation of the project area is also likely to be influenced by the East Murchison sub-region which lies less than 5km to the east. The East Murchison sub-region is characterised by elevated red desert sand plains, internal drainage and salt lake systems. Mulga woodlands (often with a rich ephemeral understorey), hummock grasslands, saltbush shrublands and samphire shrublands comprise the dominant vegetation units.

The region has been prospected and mined since the late 1890s which has impacted the vegetation through timber cutting (for mining and housing structures, and firewood) and clearing for mining, access tracks/ roads and towns. A pastoral industry was established from the early 1900's which has resulted in clearing, passive clearing, erosion and the introduction of weeds. The proposal is located within unallocated crown land (UCL) within the boundary of Mt Burgess Station (Figure 1), and Credo Station (ex-pastoral lease) is located to the west; however the area is subject to grazing and trampling by cattle, donkeys and rabbits which has resulted in the removal of grasses and forbs and likely impacted on recruitment and survival of tree and shrub species.

Meissner and Coppen (2013) undertook a survey of the flora and vegetation of the greenstone ranges occurring on Credo Station in 2011 from which six community groups were described. Sites 34 – 38, representative of community groups 2, 3 and 4, are located west of Siberia on mafic greenstone and ultramafic greenstone which are similar geology to the low hills at Siberia. The communities are described in Table 2 with updated species names. Communities 1 – 4 occurred on basalt geology, and 5 and 6 occurred on laterised or ironstone geology. *Senna artemisioides* subsp. *filifolia, Austrostipa nitida* and *Eriochiton sclerolaenoides* were all indicator species for communities 1 – 4.

Plant Ecology Consulting (PLEC 2015) were commissioned by Piacentini & Sons for EGS to undertake a flora and vegetation survey in the Siberia area in 2015 and described ten vegetation types (Table 3).

Results from the current survey will be compared against previous surveys to determine similarities between vegetation types over a broader area.

Table 2: Greenstone range communities described by Meissner & Coppen (2013).

VC	Description
1	Open woodlands to open forest of *Eucalyptus oleosa* subsp. *oleosa, E. clelandiorum or E. dundasii* over open to sparse shrublands of *Eremophila* sp. Mt Jackson and *Senna artemisioides* subsp. *filifolia* over low sparse shrubland of *Ptilotus obovatus, Acacia erinacea* and *Olearia muelleri* or isolated *Roepera ovata*. Gentle or lower slopes of basalt hills. IS* = 0
2	Open woodlands of either *Eucalyptus griffithsii* or *E. celastroides* over sparse shrubland of *Eremophila* sp. Mt Jackson and other *Eremophila* spp. (*E. interstans* subsp. *interstans or E. scoparia*), over low sparse shrubland of *Olearia muelleri*. Gentle slopes of basalt. IS = 0
3	Open to sparse woodlands of *Casuarina pauper* or *Eucalyptus griffithsii* over shrubland to open shrubland of *Dodonaea lobulata, Eremophila oldfieldii* subsp. *angustifolia, Senna artemisioides* subsp. *filifolia and Scaevola spinescens* over open to sparse low shrublands of *Ptilotus obovatus*. Crests and slopes of basalt hills. IS: *Enchylaena tomentosa*
4	Open forests to open woodlands of *Eucalyptus* spp. (*E. clelandiorum, E. celastroides, E. griffithsii*) and occasional Casuarina pauper, over shrublands to sparse shrublands of Eremophila spp. (*E. oldfieldii, E. interstans* and *E. scoparia*), *Senna artemisioides* subsp. *filifolia* and *Dodonaea lobulata* over open to sparse low shrublands of *Acacia erinacea, Olearia muelleri* and *Ptilotus obovatus* and isolated *Roepera ovata* forbs. Slopes and crests of the basalt hills. IS = 0
5	Open forest to open woodland of several dominant taxa *(Acacia burkittii, Allocasuarina eriochlamys, Grevillea oligomera, Eucalyptus oleosa*) over shrublands of to open shrublands of *Philotheca brucei* subsp. *brucei, Prostanthera grylloana* and *Dodonaea microzyga* subsp. *acrolobata*. Laterised basalt within the greenstone hills. IS = *Eremophila clarkei, Grevillea oligomera, Prostanthera grylloana, Allocasuarina eriochlamys* and *Dodonaea microzyga*; *Philotheca brucei* subsp. *brucei* and *Acacia burkittii* (Com. 5 & 6)
6	Either open tall shrubland or woodland of *Acacia burkittii* or *Allocasuarina dielsiana* over open to sparse shrublands of *Philotheca brucei* subsp. *brucei, Prostanthera althoferi* subsp. *althoferi* over sparse to isolated forbland or grassland of *Ptilotus helipteroides* and *Aristida contorta*. Ironstone geology. IS = *Cheilanthes sieberi* subsp. *sieberi; Philotheca brucei* subsp. *brucei* and *Acacia burkittii* (Com. 5 & 6)

IS = Indicator species; no IS were confined to communities 1, 2 and 4.

Table 3: Vegetation types described by Plant Ecology Consulting (PLEC) in the proposal area (2015).

Code	Description	Landform
Sc1	*Acacia incurvaneura, A. mulganeura, A. ramulosa* var. *ramulosa* tall open shrubland	Red sandy loams on flats
Sc2	*Acacia quadrimarginea* tall open shrubland over low open shrubland of *Dodonaea lobulata, Scaevola spinescens* and *Senna artemisioides* subsp. *filifolia*	Red loams on low stony rises
Sc3	*Allocasuarina eriochlamys* subsp. *eriochlamys* open shrubland over open scrub of *Allocasurina eriochlamys* subsp. *eriochlamys, Alyxia buxifolia, Acacia ramulosa* var. *ramulosa* over *Dodonaea microzyga, Phebalium lepidotum, Philotheca brucei* subsp. *brucei*	Shallow red earths on ironstone outcrop
Sc4	*Acacia acuminata, A. mulganeura, A. ramulosa* var. *ramulosa, Grevillea nematophylla* subsp. *supraplana, Eremophila ionantha, Prostanthera grylloana* closed scrub	Red sandy loam on flats

Table 3 continued

Code	Description	Landform
Sr1	*Atriplex bunburyana, A. nummularia* subsp. *nummularia* and *Senna artemisioides* subsp. *filifolia* low open shrubland over *Sclerolaena diacantha, Eriochiton sclerolaenoides* with occasional *Casuarina obesa* and *Eucalyptus griffithsii* trees	Brown sandy loam on flats
Sr2	Open shrubland of *Acacia hemiteles* with emergent *Casuarina obesa* and scattered groves of Eucalyptus spp. over low open shrubland of *Acacia erinacea, Eremophila scoparia* and *Senna artemisioides* subsp. *filifolia*	Red brown silty loams on broad flats
Sr3	Shrubland of *Dodonaea lobulata, Scaevola spinescens* and *Senna artemisioides* subsp. *filifolia* over *Ptilotus obovatus* with emergent *Casuarina obesa* and *Eucalyptus salubris*	Red brown loams on low stony rises
Sr4	High shrubland of *Acacia burkittii, A. incurvaneura* and *A. ramulosa* var. *ramulosa*	Red brown silty loams on flats
W1	Low open woodland of *Eucalyptus griffithsii* over tall open shrubland of *Acacia burkittii, A. ramulosa* var. *ramulosa* over a low open hummock grassland of *Triodia scariosa*	Red brown sandy loam on flats
W2	Low open woodland of *Eucalyptus lesouefii* over open shrubland of *Eremophila scoparia, E. ionantha* and *Dodonaea lobulata* over *Olearia muelleri*	Red brown loams on flats and simple slopes

1.5 Conservation significant flora

Threatened, extinct and specially protected flora are species which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such. The Wildlife Conservation (Specially Protected Fauna) Notice 2018 and the Wildlife Conservation (Rare Flora) Notice 2018 have been transitioned under regulations 170, 171 and 172 of the *Biodiversity Conservation Regulations 2018* to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the *Biodiversity Conservation Act 2016.*

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora. Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring. The codes are described in Appendix 7. Conservation significant flora (threatened and priority) that may occur in the area are listed in Table 4 (NatureMap 2019; FloraBase 2019; Meissner & Coppen 2013; Gibson & Langley 2012).

Table 4: Threatened and priority taxa which have the potential to occur in the Siberia area.

Taxon	Code	Habit and habitat	<20 km
Calandrinia quartzitica	P1	Semi-erect to erect perennial herb; usually scrambling through other plants; grows on the edges of salt lakes	N
Ptilotus chortophytus	P1	Erect perennial herb; yellow flowers; areas of dense quartz, disturbance areas; variety of vegetation types	N
Ptilotus procumbens	P1	Spreading, procumbent annual herb; gravelly plain; broad flats; Red clay/ gravelly sandy loam; flowers Sept – Nov	N
Ptilotus rigidus	P1	Rigid sub-spinescent shrub to 25 cm; associated with salt lakes	N
Rhodanthe uniflora	P1	Herb; erect woolly annual herb; flowers yellow – Aug to Oct; open Eucalyptus woodlands	N
Ricinocarpos sp. Eastern Goldfields (A. Williams 3)	P1	Shrub; 2 m high x 2 m wide. Flowers yellow. Rocky hillslope. Rocky surface. Red-brown sand-loam over felsic and mafic volcanics	Y
Rumex crystallinus	P2	Annual herb; arid & semi-arid areas; very few collections; found at edge of Rowles Lagoon in ti-tree thicket	N
Eucalyptus educta	P2	Mallee; straggly and spreading; minni-ritchi bark; granite hills	Y
Austrostipa blackii	P3	Grass; tufted perennial	N
Acacia eremophila var. variabilis	P3	Shrub; sandy or sandy loam soils; widespread	N
Alyxia tetanifolia	P3	Shrub; sandy clay, loam, concretionary gravel; drainage lines; near lakes; flowers May to June, Nov	N
Atriplex lindleyi subsp. *conduplicata*	P3	Short lived annual or perennial herb; crabhole plains; Rowles Lagoon	N
Eleocharis papillosa	P3	Annual herb (rush); red clay over granite; claypans	N
Eutaxia rubricarina	P3	Shrub; Variety of habitats, more commonly on flats and valley floors; recorded flowering August and October	N
Homalocalyx grandiflorus	P3	Spreading shrub, pink – purple flowers (Oct – Dec) on yellow sand; sandplains	N
Hysterobaeckea ochropetala subsp. cometes	P3	Erect shrub to 2 m high; flowers white; opposite leaves with pedicles up to half the length of the leaf blade; sandy soils in mallee over Acacia species with an understorey of spinifex	N
Lepidium fasciculatum	P3	Erect annual herb to 60 cm, basal leaves pinnatisect to bipinnate with linear dentate lobes; isolated occurrences over wide area in WA; more common in eastern state; very few details on habitat	N
Notisia intonsa	P3	Prostrate herb on red loam clays and associated with greenstone	Y
Menkea draboides	P3	Herb; annual prostrate, spreading herb	N
Philotheca coateana	P3	Shrub; pink – white flowers (Aug – Sep) on red sand	N
Eucalyptus jutsonii subsp. *jutsonii*	P4	Mallee; 4 – 7 m high; bark rough over most stems; red to pale orange deep sands; undulating areas and on dunes	Y

1.6 Threatened and priority ecological communities

Conservation significant plant communities are described as a naturally occurring assemblage of species which occurs in a particular type of habitat. A Threatened Ecological Community (TEC) is one that has declined in area or had a limited original distribution; is subject to processes which that threaten to destroy or significantly modify it across most of its range, and has been endorsed by the Environment Minister. A Priority Ecological Community (PEC) is one that is uncommon but do not meet criteria for TECs, or is inadequately defined. Searches of databases found no TECs or PECs are

likely to occur in the area and none were recorded in previous surveys of the proposal and adjacent areas.

2. Methods

2.1 Desktop survey

2.1.1 Previous surveys in the proposal area

Four surveys have been undertaken in the proposal area (Outback Ecology Services (OES) 2003 & 2007; G & G Environmental (GGE) 2007; and Plant Ecology Consulting (PLEC) 2015 for Piacentini & Son 2016). In 2003 OES recorded three structural vegetation types – Eucalypt woodlands, *Acacia* shrublands and *Casuarina* woodland which were divided into 13 associations and 77 taxa. An additional area adjacent to the Missouri and Sand King pits was surveyed in March 2007 which recorded 3 Eucalypt woodlands and an *Acacia* shrubland with 33 taxa. No conservation significant flora or vegetation were recorded.

GGE surveyed an area near Sand King pit in September 2007 which recorded one Eucalypt woodland and a mixed *Acacia* thicket with 28 taxa. In 2015 PLEC surveyed areas around Missouri and Sand King with some sites adjacent to the current proposal. Ten vegetation associations/ communities were mapped including low Eucalypt woodlands; *Acacia* dominated shrubland to *Allocasuarina* open scrub. Plant communities adjacent to the current proposal included W1: *Eucalyptus griffithsii* low open woodland with *Triodia scariosa* (south side of Sand King waste dump); W2: *Eucalyptus lesouefii* woodland (east of Missouri pit); Sc1: *Acacia incurvaneura* tall open shrubland; and Sc4: *Acacia incurvaneura, A. mulganeura* and *A. ramulosa* subsp. *ramulosa* tall open shrubland. A total of 88 taxa and 2 introduced species were recorded. No conservation significant flora or vegetation were recorded.

2.1.2 Limitations

Various factors can limit the effectiveness of a vegetation and flora survey. Seven potentially limiting factors have been identified in the Technical Guidance (EPA 2016) and are addressed in Table 5. The main limiting factors are related to disturbances and climate which are outside the control of the survey. The impact of a dry year is likely to have been exacerbated by pastoral activities.

Table 5: Survey limitations.

Potential Limitation	Extent
Contextual information at a regional and local scale	Not limiting The results of four surveys in or near the proposal area were available for study prior to the field survey. Regional surveys of the greenstone hills were undertaken by the Department of Parks and Wildlife in 2011 (Meissner and Coppen). Several other surveys within the region were also available. Species listed in Table 2 were researched prior to the survey with photographs taken of specimens at the Western Australian Herbarium, as well descriptions and imagery contained in published documents (Nuytsia Journal for example).

Table 5 continued

Potential Limitation	Extent
Competency/ experience	Not limiting The survey team included a botanist and an ecologist who have undertaken surveying and monitoring work in the Ora Banda – Davyhurst area over several years, with at least 15 years' experience in vegetation surveys in the state. A recent graduate was employed to assist with the surveys and was given specific tasks to do which were within his capabilities, as well as training in identification and description of the vegetation.
Proportion of flora recorded and/ or collected, any identification issues	Partly limiting The area was walked over with the three personnel 20 m apart and parallel. Annual species and grasses were mostly absent due climatic conditions and historical impacts from pastoral and feral grazers. Some grasses were present as grazed off tussocks which were not identifiable. Some perennial species were vegetative so identification was based on leaf/ phyllode and other characteristics.
Was the appropriate area fully surveyed	Not limiting JBBC was provided with maps and GPS coordinates of the area which were referred to during the field survey.
Access restrictions within the survey area	Not limiting. Vehicle access was available to the edge of the site on the north side. Several old exploration tracks and cleared areas were present within the proposal which allowed easy access to all areas of the site.
Survey timing, rainfall, season	Partly limiting The timing of the survey towards the end of spring should have allowed most species to be present; however due to below average rainfall and warmer than normal temperatures most annuals were not present. Ground cover was usually less than 1 %.
Disturbance that may have affected the results such as fire, flood or clearing	Limiting The area has been subject to multiple disturbances from mining and pastoral activities over several decades which have resulted in clearing and partial clearing as well as poor recruitment and survival. Some areas were in better condition than others.

2.2 Field survey

The field survey was conducted by an experienced botanist (J Borger) and an ecologist (J Shepherdson) on the 2nd November 2019 with assistance from a new graduate (S. Rees). The site was searched on foot with sampling of the vegetation at appropriate points to record the species present. Four quadrats were established and described as well as a number of relevés. Changes in vegetation types were also recorded by GPS. Evidence for the presence for Malleefowl was noted during traverses.

Data from two quadrats established in February 2017 were also used (Borger; unpublished data for Eastern Goldfields Ltd). Conditions were wetter in 2017 and more annual species were present in the area. Most taxa were identified in the field. Specimens and photographs were taken of plants not verified in the field and identified using taxonomic keys and/ or compared against reference specimens at the WA Herbarium. Land surface information (soil type; litter, fallen timber, surface rock, cryptogam and bare ground cover) was recorded as well as threats and condition. The vegetation condition was rated according to categories described by Keighery and Trudgen (EPA 2016) and is presented in Table 6.

Table 6: Vegetation Condition (adapted from Keighery 1994 and Trudgen 1988; EPA 2016).

Condition	Description
Pristine	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement.
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.
Very Good	Vegetation structure altered obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing
Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees and shrubs.

The vegetation was described based on floristic and structural information following the National Vegetation Information System (NVIS 2017) and Bushland survey methodology (Keighery 1994).

3. Results

3.1 Summary

Four quadrats were established during the survey and two existing quadrats established in 2017 were also included. Seven relevés were described plus opportunistic records were made of other finds, which often included disturbance species occurring along access tracks or other areas of more recent disturbance closer to the pits and waste dumps. A total of seventy five taxa were recorded from 22 families of which 73 are native and 2 are weeds. *Nicotiana glauca** was present outside the proposal and has not been included in the records. The most diverse families were Fabaceae (15 species from 3 genera (12 *Acacia*)); Chenopodiaceae (11 species from 7 genera); Scrophulariaceae (8 taxa from 1 genus – *Eremophila*); and Myrtaceae (5 species from 1 genus – *Eucalyptus*). No

threatened or priority taxa were recorded. Two sandalwood trees (*Santalum spicatum*, a registered species) were recorded near quadrat Q4. Groundcover was very sparse to isolated for much of the area, and many of the grasses had been grazed. Signs of cattle and donkeys were common in the woodland areas and a donkey was observed during the day. No evidence of Malleefowl were observed.

3.2 Vegetation types

3.2.1 Vegetation type descriptions

Six vegetation types were identified from the survey which are summarised in Table 8 and mapped in Figure 6. No vegetation types are representative of TEC's or PEC's. Three vegetation types of Plant Ecology Consulting (PLEC; 2015) align with the current survey (SC1, SC4 and W1) (Table 7). W2 (*Eucalyptus lesouefii* woodland) is mapped as occurring adjacent to Unit 6 of the current survey but on lower slopes and outside the current proposal. The PLEC report also included results of Outback Ecology Services (OES) 2003 survey. Vegetation types were determined from the statistical analysis of species presence/ absence as well as structural and topographical features. VT1 is more representative of the Murchison bioregion. It is located within a few km of the boundary between the Coolgardie and Murchison bioregions. VT3 only occupies a small area of the proposal; however it is quite distinct from the other vegetation communities and the only location where *Philotheca brucei, Eremophila clarkei* and *Phebalium filifolium* were recorded. It had an extensive cover of rocks and boulders and was located on a crest.

Table 7: Comparison of vegetation types with previous surveys within the proposal area.

JBBC 2019	PLEC 2015	OES 2003 mapping*
1	Sc1/ Sc4	1c/ 1d/ 2c
2		1c/ 3a
3	Sc3 - moderate	1c
4	W1, SR2**	1c
5		1e
6	Sr3	3a/ 1a

* Described in Appendix 8

** Sr2 is possibly degraded W1

Site descriptions are presented in Appendices 3 and 4.

Table 8: Summary of vegetation descriptions for each of the vegetation types.

Unit	Landform	Description	
1	Area: 21.1 ha	*Eucalyptus oleosa* isolated mallee over *Acacia caesaneura, A. incurvaneura* tall shrubland on low hills	
Low hill Q2, R2, R2A, R3 PLEC – SC1/ SC4		*Eucalyptus oleosa* subsp. *oleosa isolated* mallee trees in *Acacia ramulosa* var. *ramulosa, A. caesaneura, A. incurvaneura, A. aneura, Grevillea nematophylla* subsp. *nematophylla, A. burkittii* tall shrubland/ low woodland over *Eremophila granitica, E. eriocalyx, Prostanthera grylloana, Grevillea didymobotrya subsp. didymobotrya, Dodonaea lobulata* open shrubland over *Eremophila granitica, E. eriocalyx, Prostanthera grylloana, Acacia ramulosa* var. *ramulosa, Scaevola spinescens, Dodonaea lobulata* low sparse shrubland over *Waitzia acuminata* low isolated forbs and low grass tussocks (dried off/ grazed)	
2	Area: 7.1 ha	*Eucalyptus griffithsii, E. oleosa* low open mallee woodland over *Acacia* and *Grevillea* open shrubland on low hills	
Low hill; mid to upper slopes R4, R6, R7		*Eucalyptus griffithsii, E. oleosa* low open mallee woodland (8 – 9 m)over *Acacia aneura, Grevillea nematophylla* subsp. *nematophylla, Casuarina pauper, Acacia ramulosa var. ramulosa* tall open shrubland (2 – 5 m) over *Acacia tetragonophylla, Grevillea nematophylla* subsp. *nematophylla, Scaevola spinescens, Dodonaea lobulata, Acacia aneura, Eremophila eriocalyx* open shrubland (1 – 2 m) over *Scaevola spinescens, Dodonaea lobulata* low sparse shrubland	

Unit	Landform	Description	
3	Area: 0.7 ha	*Acacia aneura* shrubland over *Grevillea, Phebalium, Philotheca* and *Prostanthera* shrubland on rocky outcrop on hills	
Hill crest; rock outcrop R5 DPAW Greenstone Community 5		*Acacia aneura* tall open shrubland (4 – 6 m) over *Grevillea nematophylla* subsp. *nematophylla, Phebalium filifolium, Philotheca brucei* subsp. *brucei, Exocarpos aphyllus, Prostanthera grylloana and Dodonaea lobulata, Eremophila clarkei* shrubland	
4	Area: 11.2 ha	*Eucalyptus griffithsii* low open woodland over *Acacia and Grevillea tall open shrubland* on plains	
Plain Q1, Q5 PLEC W1		*Eucalyptus griffithsii* and *Casuarina pauper* low open forest to open woodland over *Acacia caesaneura, Acacia hemiteles, Acacia colletioides, nematophylla* subsp. *nematophylla, Acacia burkittii* tall open shrubland over *Acacia hemiteles, Acacia burkittii, Senna artemisioides* subsp. *filifolia, A. ramulosa* var. *ramulosa, Eremophila scoparia, Dodonaea rigida, D. lobulata* open shrubland over *Acacia hemiteles, A. ramulosa* var. *ramulosa, Scaevola spinescens, Eremophila scoparia, A. colletioides, Senna artemisioides* subsp. *filifolia* low open shrubland over *Triodia scariosa* and *Austrostipa elegantissima* low isolated tussock grasses	

Unit	Landform	Description	
5	Area: 2.06 ha	*Eucalyptus salmonophloia* open woodland over *Eremophila, Acacia* and *Exocarpos* sparse shrubland on plains	
Plain Q3		*Eucalyptus salmonophloia* open woodland over *Eremophila interstans* subsp. *interstans* tall sparse shrubland over *Eremophila interstans* subsp. *interstans*, *Exocarpos aphyllus*, *Eremophila scoparia*, *Acacia hemiteles* sparse shrubland over *Acacia erinacea, Sclerolaena cuneata, Scaevola spinescens, Dissocarpus paradoxus, Sclerolaena diacantha* low sparse shrubland over *Roepera ovata* low isolated forbs	
6	Area: 5.2 ha	Eucalyptus woodlands over Eremophila, Dodonaea and Acacia open to sparse shrublands on hills	
Hill Q04, Q06 PLEC Sr3 DPAW Community 4		Q4: *Eucalyptus clelandiorum, E. griffithsii, E. salubris* woodland over *Eremophila* sp. Mt Jackson, *E. scoparia, Dodonaea lobulata, Senna artemisioides subsp. filifolia, Casuarina pauper, Exocarpos aphyllus, Acacia effusifolia, A. tetragonophylla, A. burkittii* open shrubland over *Eremophila* sp. Mt Jackson, *Casuarina pauper, Olearia muelleri, Scaevola spinescens, Dodonaea lobulata, Ptilotus obovatus* low open shrubland over *Austrostipa nitida, Roepera aurantiaca, Sclerolaena spp., Sida calyxhymenia* low isolated grass tussocks and forbs	
D	Various areas Area: 4.7 ha	Degraded/ cleared areas; some with regrowth or isolated trees or shrubs remaining	

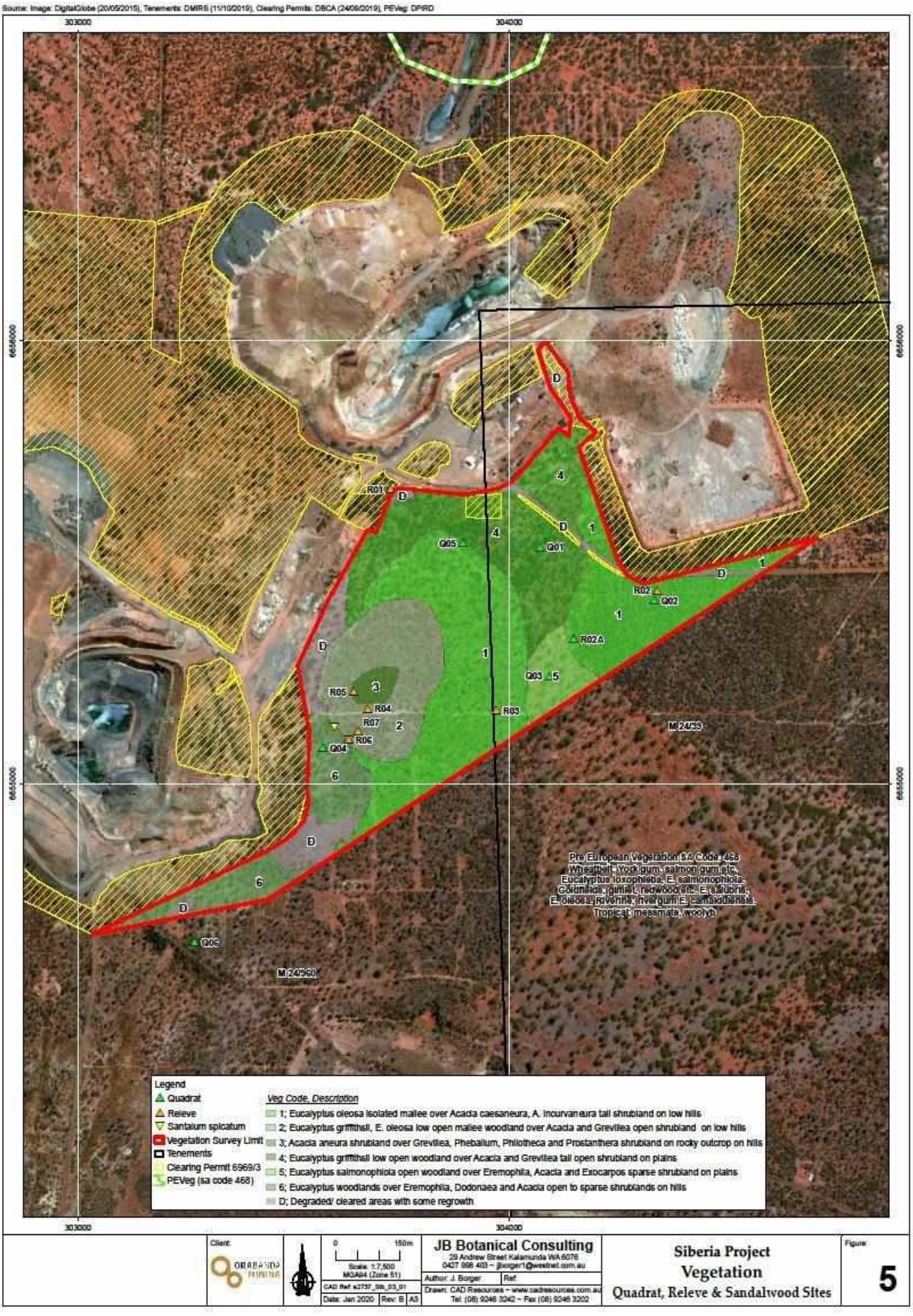


Figure 5: Vegetation mapping of the Siberia ESA

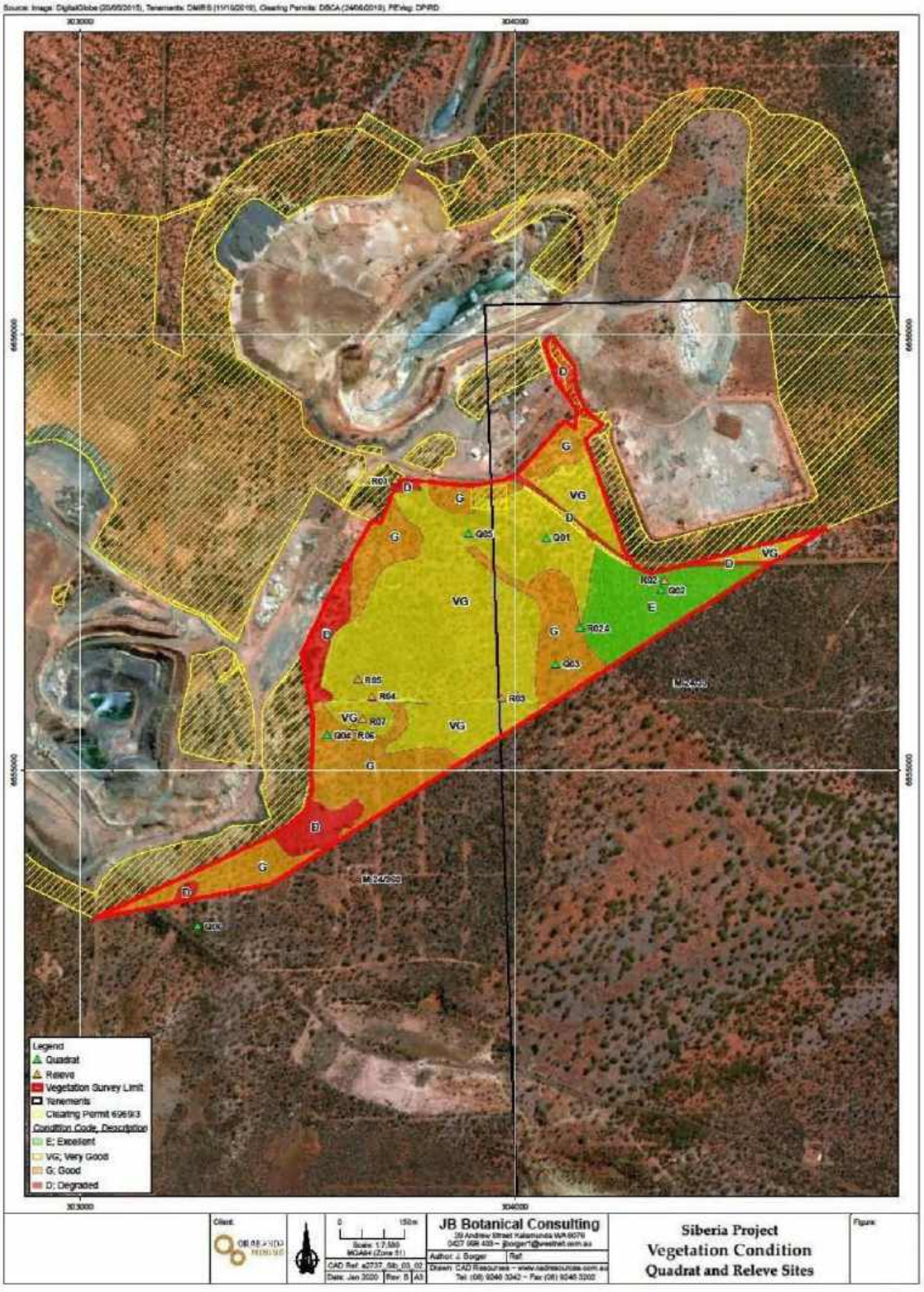
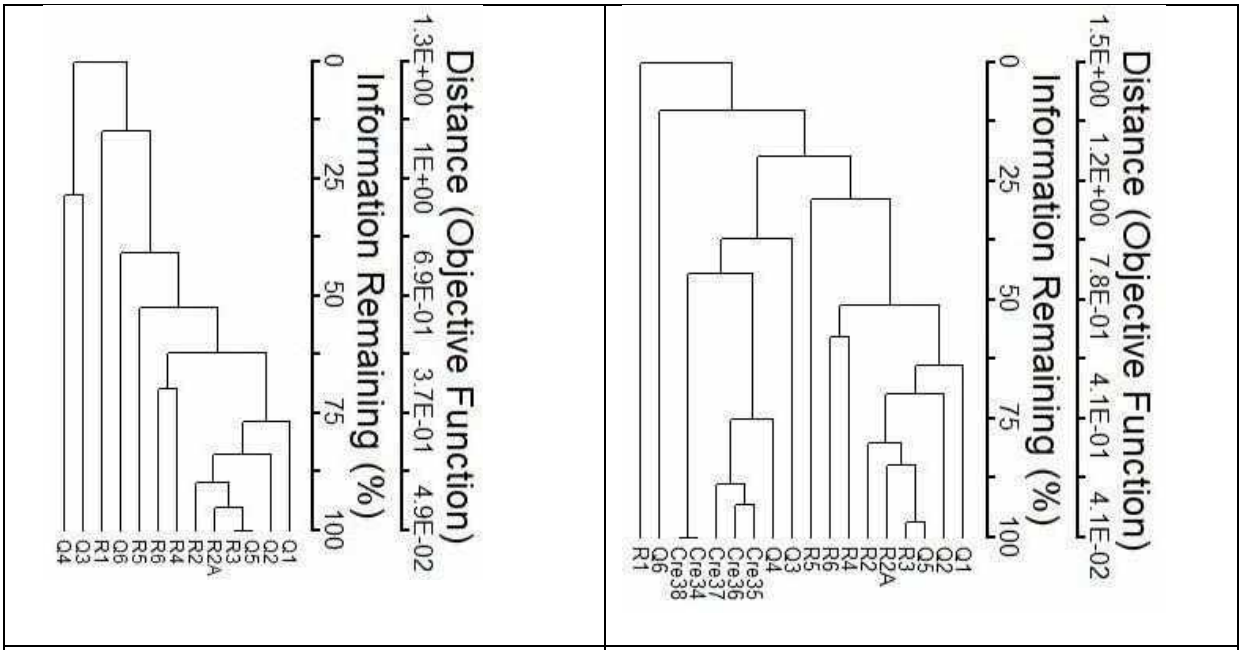


Figure 6: Vegetation condition of the Siberia ESA

3.2.2 Statistical Analysis

A two-way hierarchical cluster analysis was performed on species presence/ absence from the sites at Siberia, as well as against some Greenstone survey sites (Figure 7). Annual species were not included in the analysis as their occurrence is dependent on climatic conditions as well as grazing impacts and will vary between years. Q2, Q5, R3, R2, R2A and Q1 have a similarity > 75%. Q1 and Q5 were separated from the others for vegetation mapping as they are located on a plain, whereas the other sites are on low rises.

The Greenstone survey sites (Cre34 – 38) are located 14 to 16 km south west of the proposal with sites 34 and 35 on ultramafic greenstone, and 36, 37 and 38 on mafic greenstone. Siberia Q4 has a similarity within 75 % to Credo sites 35, 36 and 37 (Community 4 - open forests to open woodlands of *Eucalyptus* spp). Due to the high levels of impacts on some of the areas it is likely that some species are absent from the proposal area.



Siberia sites only	Siberia and Greenstone survey sites

Figure 7: Dendrograms produced from two way Bray-Curtis cluster analysis of the Siberia sites; and the Siberia sites against come of the DPAW Credo Greenstone survey sites. Siberia Q4 was statistically the closest to the Credo surveys.

3.3 Vegetation condition

Vegetation condition was rated from excellent (5.42 ha) to degraded (4.7 ha), with most areas rated as good (15.45 ha) or very good (26.46 ha) (Figure 6). The area around Q02 (VT1) was rated as excellent as all strata were present and current impacts were low. The area had historic mining impacts – old drill lines and pads – which were overgrown and no weeds were present in the area, and there was minimal impact from current cattle and donkey grazing. The woodland areas had the highest levels of impact and many signs were observed of cattle and donkeys.

4. Discussion

A total of 73 native taxa were recorded in the ESA over 52 hectares with Fabaceae (15), Chenopodiaceae (11), Scrophulariaceae (8) and Myrtaceae (5) being the most common families. PLEC (2015) surveyed 107 ha around Missouri and Sand King which recorded 88 native taxa with Fabaceae (18), Chenopodiaceae (12), Scrophulariaceae (10) and Myrtaceae (10) being the most common families. The results of the current survey are comparable with the PLEC survey. No threatened or priority taxa were recorded from either survey. The diversity of annuals and grasses was low which was expected due to climatic conditions and the levels of disturbances at the site.

The six vegetation types are consistent with previous surveys of the area, with the exception of VT3 which is similar to DEC greenstone ranges community 5 (Meissner & Coppen 2013). VT3 occurred on a laterite cap/ mafic greenstone which have a limited occurrence in the area being the remnants of weathered hills. No defined drainage lines were identified within the ESA. The vegetation communities are representative of the Coolgardie and Murchison regions which could be expected as the proposal is located very close to the mapped boundary.

An updated clearing proposal was received from OBM in March 2020 (Figure 8) which proposes to impact 53 ha on the southern side of the mining proposal, which includes 52 ha of the ESA and 1 ha under an existing clearing application CPA 6968/3. Two small areas (A & B) are also proposed on the northern side which were not surveyed. PLEC surveyed areas adjacent to site A which is described as Sr2 – *Acacia hemiteles* open shrubland (Figure 9).

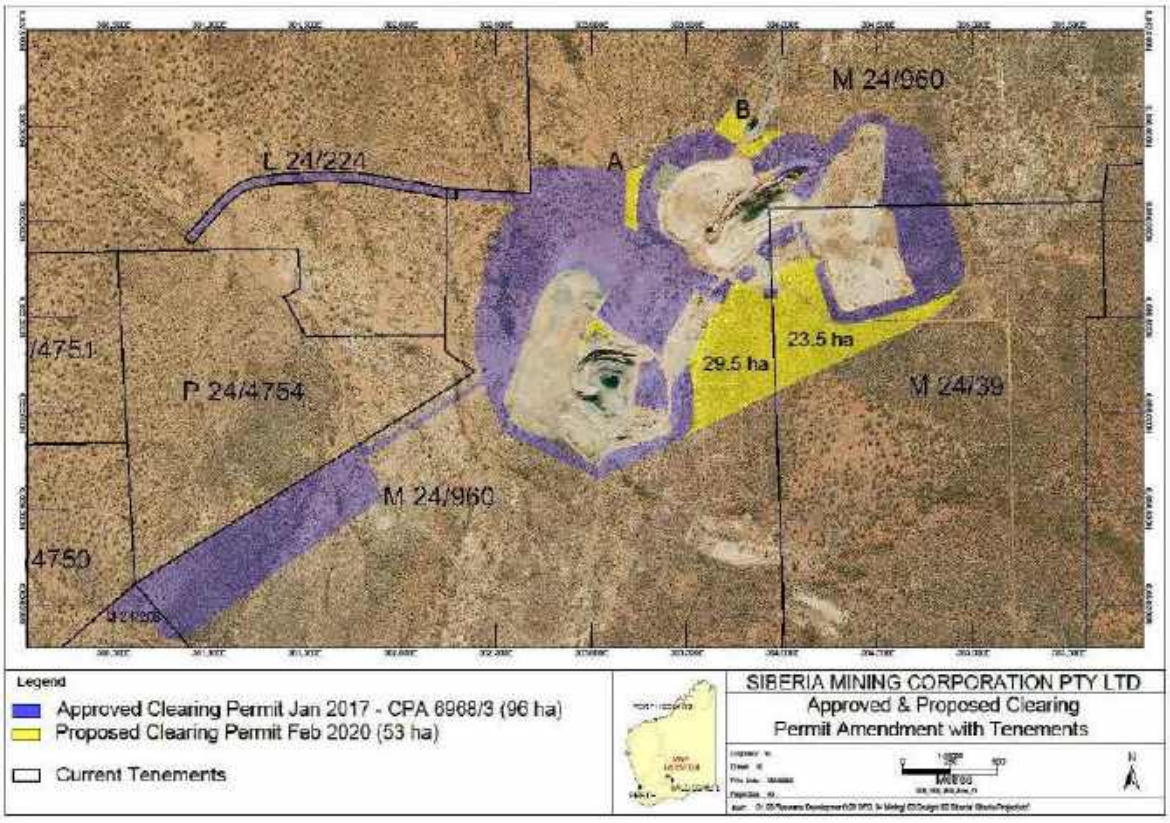


Figure 8: The proposed disturbance areas at Siberia (provided by SMC 2020).

Figure 9: Vegetation mapping undertaken by PLEC in the northern area of the Siberia site. Site A is located adjacent to areas mapped as plant community SR2 and likely to support similar vegetation.

SR2 - Open shrubland of *Acacia hemiteles* with emergent *Casuarina obesa* and scattered groves of *Eucalyptus* spp. over low open shrubland of *Acacia erinacea, Eremophila scoparia* and *Senna artemisioides* subsp. *filifolia* which is possibly an impacted community close to VT4 of the current survey.

Figure 10: Vegetation mapping undertaken by OES (2007) on the western side of Sand King. Area B is located on the north side of western mapped area SE.

Area B is adjacent to mapping on the western side of Sand King which was surveyed by OES in March 2007 which was mapped as SE – Low *Eucalyptus oleosa* subsp. *oleosa* Woodland over Open Low Scrub A of *Acacia hemiteles, Dodonaea viscosa* subsp. *angustissima* and *Eremophila scoparia* over Open Low Scrub B of *Senna artemisioides* subsp. *filifolia* and *Acacia* sp. It is possibly representative of VT4 within the current ESA.

No conservation taxa were recorded in either survey of these areas, and it is highly unlikely that any will be present now.

The vegetation condition is close to what was recorded in previous surveys. The *Eucalyptus salmonophloia* woodland area extends further to the east from the site, and much of this has semi-mature stands of trees, indicative of either regrowth following a fire, or following a reduction in grazing impact and timber cutting. The understorey is in much better condition further away from the mining area as well. Weeds were sparse and mostly occurred at the edges of the area or on vehicle tracks which are still currently used. Groundcover (grasses and forbs) were very sparse or not present in much of the area which is likely to be a result of climate and pastoral impacts, including feral grazing. Surface erosion is occurring as sheet wash in some of the areas. No gully erosion was noted. The amount of fallen timber was lower than what would be expected pre-disturbance, thus impacting on potential fauna habitat and land surface protection. It is likely much of the timber would have been used during earlier mining activities for firewood.

*Nicotiana glauca** is present in the area west of the proposal and is likely to invade the area after disturbance. Control needs to be undertaken prior to and during the next phase of mining.

Proposed actions include:

- Weed control at the edges of the proposal and areas west of the site to reduce the likelihood of weed invasion
- Seed collection from the proposed clearing area prior to clearing if possible. This will be dependent on climatic conditions.
- Stockpiling of topsoil and plant material to be used for future rehabilitation
- Liaise with other stakeholders in the region (e.g. DBCA, Local Governments, mining companies, station owners/ leaseholders) to control feral animals – cattle, donkeys, camels and rabbits – to reduce the impact on vegetation and land surfaces.

A Native vegetation clearing permit will be required prior to any clearing and the proposal has been assessed the 10 clearing principles in Table 9.

5. Conclusions

The current survey supports findings from previous surveys and there were no range extensions, threatened or priority flora or ecological communities. Species diversity was also similar to earlier surveys. Grasses and annuals were very isolated due to climatic and pastoral effects. The proposed recommencement of mining operations at Siberia is highly unlikely to have a major impact on any vegetation community types or the environment as the condition of the site already has many impacts from previous mining and pastoral activities and the vegetation types are well represented in the region. SMC could take the opportunity to assist in future successful rehabilitation of the area by collecting and storing seed prior to commencement of the current project as well as by controlling weeds in surrounding areas so that there is less chance of invasion into an area which has quite a low weed burden at present.

Table 9: Assessment of the proposal against the Department of Water and Environmental Regulation's 10 clearing principles (EPA 1986)

Clearing Principle		Comment
1	Native vegetation should not be cleared if it comprises a high level of biological diversity.	**Proposal is unlikely to be at variance with this principle** The 73 taxa recorded from an area of 52 ha do not represent an unusually high degree of species richness for the area. It is likely that some annuals and grasses may have been absent due to climatic and grazing pressures.
2	Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a significant habitat for fauna indigenous to Western Australia.	**Proposal is unlikely to be at variance with this principle** The vegetation types present in the area are not restricted to the proposal area, and none are representative of TEC or PEC assemblages. The regional extent of Beard's vegetation is still mostly intact; with > 98 % remaining. No mallee fowl or active mounds were located when walking through the area. Rainbow bee-eaters were recorded during the survey. The amount of fallen timber and litter is likely to be less than expected pre-disturbance (historical). This would impact to some degree on the value of the site as fauna habitat. One restricted landform was the laterite outcrop on the crest of the hill at R5. This is likely to provide habitat for ground dwelling fauna such as reptiles and insects.
3	Native vegetation should not be cleared if it includes, or is necessary, for the continued existence of rare flora	**Not at variance with this principle** No rare flora have been recorded from the proposal area during surveys over a period of 15 years. No rare plants were recorded during the current survey. Many of the conservation listed flora within 30 km have been recorded from landforms or habitat not present within the proposal.
4	Native vegetation should not be cleared if it compromises the whole or part of, or is necessary for the maintenance of a threatened ecological community	**Not at variance with this principle** No plant assemblages representing threatened or priority ecological communities were recorded within the proposal.
5	Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.	**Not at variance with this principle** The region in which the proposal occurs has not been extensively cleared. The proposal is entirely within Vegetation Association 468: Medium woodland – Salmon gum and Goldfields blackbutt, which has 98.63 % (575,360 ha) of its mapped original extent (583,360 ha) remaining. Within the IBRA subregion Coolgardie – Eastern Goldfields 474364 ha (98.34 %) of the pre-European extent (482,361 ha) remains.

Table 9 continued

Clearing Principle		Comment
6	Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.	**Not at variance with this principle** No watercourses or wetlands occur within the proposal.
7	Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	**Not at variance with this principle** Ex-Credo Station is being managed for conservation; however it is not formally recognised as a reserve at the moment. The nearest reserves are Clear and Muddy Lakes Nature Reserve and Rowles Lagoon Conservation Park, approximately 30 km south of the proposal. Ex-Credo Station covers an area of approximately 212,000 ha and includes the Clear and Muddy Lakes Nature Reserve (R7634) and Rowles Lagoon Conservation Park (R4274) within the boundary.
8	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation	**Unlikely to be at variance with this principle** The Siberia area has a high level of mining and pastoral disturbance which has occurred over many decades. The current proposal which covers an area of 53 ha which includes some areas which have already been disturbed and not likely to contribute to appreciable land degradation. Much of the area is flat to undulating and will pose a low erosion risk.
9	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	**Unlikely to be at variance with this principle** Drainage in the area is ephemeral with surface water present for limited times during the year. Groundwater in the mine environs are confined to fractured rock aquifers, are typically saline to hypersaline and have limited beneficial uses.
10	Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.	**Unlikely to be at variance with this principle** The proposal is located in the lower catchment area with low rises and plains and drains north into the mining area. The area would be subject to occasional flooding events most likely following high rainfall events associated with ex-tropical depressions during the summer period. It is unlikely that the land clearing associated with the proposal would increase the incidence of flooding.

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Appendix 1: Species list

Family	Scientific Name	Code
Amaranthaceae	*Ptilotus obovatus*	
Apocynaceae	*Vincetoxicum lineare*	
Asteraceae	*Cratystylis subspinescens*	
	Olearia muelleri	
	Vittadinia dissecta var. *hirta*	
	Waitzia acuminata	
Casuarinaceae	*Allocasuarina acutivalvis* subsp. *acutivalvis*	
	Allocasuarina dielsiana	
	Casuarina pauper	
Chenopodiaceae	*Atriplex vesicaria*	
	Dissocarpus paradoxus	
	Enchylaena lanata	
	Maireana georgei	
	Maireana sedifolia	
	Maireana trichoptera	
	Rhagodia drummondii	
	Salsola australis	
	Sclerolaena cuneata	
	Sclerolaena diacantha	
	Sclerolaena fusiformis	
Cucurbitaceae	*Cucumis myriocarpus**	Alien
Euphorbiaceae	*Euphorbia drummondii*	
Fabaceae	*Acacia aneura*	
	Acacia burkittii	
	Acacia caesaneura	
	Acacia colletioides	
	Acacia craspedocarpa	
	Acacia effusifolia	
	Acacia erinacea	
	Acacia hemiteles	
	Acacia incurvaneura	
	Acacia mulganeura	
	Acacia ramulosa var. *ramulosa*	
	Acacia tetragonophylla	
	Bossiaea walkeri	
	Senna artemisioides subsp. *filifolia*	

Family	Scientific Name	Code
Fabaceae	*Senna cardiosperma*	
Goodeniaceae	*Scaevola spinescens*	
Gyrostemonaceae	*Codonocarpus cotinifolius*	
Lamiaceae	*Prostanthera grylloana*	
	*Salvia verbenaca**	Alien
	Westringia cephalantha var. *cephalantha*	
Loranthaceae	*Amyema gibberula var. gibberula*	
Malvaceae	*Brachychiton gregorii*	
	Radyera farragei	
	Sida calyxhymenia	
	Sida spodochroma	
Myrtaceae	*Eucalyptus clelandiorum*	
	Eucalyptus griffithsii	
	Eucalyptus oleosa subsp. *oleosa*	
	Eucalyptus salmonophloia	
	Eucalyptus salubris	
Poaceae	*Austrostipa elegantissima*	
	Austrostipa nitida	
	Triodia scariosa	
Proteaceae	*Grevillea nematophylla* subsp. *nematophylla*	
Rutaceae	*Phebalium filifolium*	
	Philotheca brucei subsp. *brucei*	
Santalaceae	*Exocarpos aphyllus*	
	Santalum spicatum	Registered
Sapindaceae	*Alectryon oleifolius* subsp. *canescens*	
	Dodonaea lobulata	
	Dodonaea rigida	
Scrophulariaceae	*Eremophila clarkei*	
	Eremophila decipiens subsp. *decipiens*	
	Eremophila eriocalyx	
	Eremophila granitica	
	Eremophila interstans subsp. *interstans*	
	Eremophila oldfieldii subsp. *angustifolia*	

Family	Scientific Name	Code
Scrophulariaceae	*Eremophila scoparia*	
	Eremophila sp. Mt Jackson (G J Keighery 4372)	
Solanaceae	*Solanum lasiophyllum*	
	Solanum plicatile	
Zygophyllaceae	*Roepera aurantiaca*	
	Roepera ovata	

Appendix 2: GPS locations of *Santalum spicatum*

Scientific Name	Easting	Northing	No.
Santalum spicatum	303595	6655128	1
Santalum spicatum	303628	6655098	1

Appendix 3: Site descriptions

3.1 Siberia Quadrat Q1

Date: 3rd November 2019	Location: East of ROM
NW: 304072/ 6655534	Landform: Plain; lower catchment
	Elevation: 423 m a s l
Land surface: Red (2.5 YR 5/8) sandy clay loam, dry; litter 50 %, 2 – 4 cm deep; fallen timber 15 – 20 %; cryptogam cover 50 % (lichen); bare ground 30 %	
Disturbance: Nearby disturbances (mining activities – old tracks, drilling); rabbits, drought impacts > decline in recruitment and understorey	
Condition: Very good to excellent	
NVIS – VI: U+^ *Eucalyptus griffithsii\Eucalyptus\^tree\6\i; U2^ Acacia caesaneura, Acacia hemiteles, Acacia colletioides, Eremophila scoparia, Acacia burkittii\Acacia\^shrub\4\i; M1^Acacia hemiteles, Acacia burkittii, Senna artemisioides subsp. filifolia, Acacia ramulosa var. ramulosa, Eremophila scoparia\Acacia\^shrub\3\i; M2^Acacia hemiteles, Acacia colletioides, Acacia ramulosa var. ramulosa, Scaevola spinescens, Senna artemisioides subsp. filifolia\Acacia\^shrub\2\i; G^ Triodia scariosa\Triodia\^hummock grass\1\bi*	

Height m	% cover	Habit	Species	No.
2 – 10	15	Tree	*Eucalyptus griffithsii*	4
>2	20 – 30	Shrub	*Acacia caesaneura (6), Acacia hemiteles (3); Acacia colletioides (2); Eremophila scoparia (2); Acacia burkittii (2); Grevillea nematophylla* subsp. *nematophylla (1)*	16
1 – 2	20	Shrub	*Acacia hemiteles (10); Acacia burkittii (5); Senna artemisioides* subsp. *filifolia (19); A. ramulosa var. ramulosa (3); Eremophila scoparia (3); Acacia tetragonophylla (1); A. colletioides (1), Dodonaea lobulata (1)*	43
0.5 – 1	10	Shrub	*Acacia hemiteles (4); A. colletioides (2); Scaevola spinescens (2); Eremophila scoparia (3); Senna artemisioides subsp. filifolia (2); Eremophila sp. Mt Jackson (1)*	15
<0.5	5	Shrub	*Acacia ramulosa var. ramulosa (3); Scaevola spinescens (1); Eremophila scoparia (1)*	5
<0.5	<1	Tussock grass	*Triodia scariosa (1)*	1
		Forbs	Not present	

Other species: *Westringia cephalantha, Eucalyptus oleosa* subsp. *oleosa*

Eucalyptus griffithsii low open woodland over *Acacia caesaneura, Acacia hemiteles, Acacia colletioides, Grevillea nematophylla* subsp. *nematophylla, Acacia burkittii* tall open shrubland over *Acacia hemiteles, Acacia burkittii, Senna artemisioides* subsp. *filifolia, A. ramulosa var. ramulosa, Eremophila scoparia open shrubland over Acacia hemiteles, A. ramulosa var. ramulosa, Scaevola spinescens, Eremophila scoparia, A. colletioides low opens shrubland over Triodia scariosa low isolated tussock grasses*

Siberia Quadrat 1 site photo

3.2 Siberia Quadrat Q2

Date: 3rd November 2019	Location: SE of Sand King Waste Dump
NW: 304337/ 6655413	Landform: Low rise
	Elevation: 427
Land surface: Yellowish red (5YR 5/8) fine sandy clay loam; surface rock – ironstone gravel, 5 – 25 mm, 50 – 60 %; litter 60 % 1 – 5 cm deep; fallen timber 20 %; cryptogam cover (lichen) 70 – 80 %; surface dry	
Disturbance: historic timber harvesting; some loss of understorey likely (grasses); rabbits sighted nearby; old drought impacts; old overgrown drill tracks and locations	
Condition: very good to excellent in broader area; most areas in excellent condition	
NVIS – VI: U1+^ *Acacia ramulosa* var. *ramulosa*, ^*Acacia caesaneura*, ^*Grevillea nematophylla* subsp. *nematophylla*, *Acacia incurvaneura*, *Acacia burkittii\Acacia\^shrub, tree\4\c; M1^ ^Eremophila granitica*, *Eremophila eriocalyx*, *Grevillea nematophylla* subsp. *nematophylla*, *Prostanthera grylloana\Eremophila\^shrub\3\i; M2^Eremophila granitica*, *Eremophila eriocalyx*, *Prostanthera grylloana*, *Acacia ramulosa var. ramulosa\Eremophila\^shrub\2\r; G1^Waitzia acuminata\Waitzia\^forb\1\bi*	

Height m	% cover	Habit	Species	No.
2 – 10	< 1	Tree	*Brachychiton gregorii*	1
2 – 10	35 – 40	Shrub, tree	*Acacia ramulosa* var. *ramulosa (7), A. caesaneura (7), A. incurvaneura (4), Grevillea nematophylla* subsp. *nematophylla (7), A. burkittii (2), A. tetragonophylla (1), Eremophila eriocalyx (6)*	34
1 – 2	15 – 20	Shrub	*Eremophila granitica (41), E. eriocalyx (30), Grevillea nematophylla* subsp. *nematophylla (2), Prostanthera grylloana (2)*	75
0.5 – 1	8 – 10	Shrub	*Eremophila granitica (32), E. eriocalyx (10), Prostanthera grylloana (13)*	55
<0.5	< 1	Shrub	*Acacia ramulosa var. ramulosa (3), Prostanthera grylloana (2), Eremophila eriocalyx (4), E. granitica (9)*	18
<0.2	<1	Forb	*Waitzia acuminata*	
Aerial	<1	Mistletoe	*Amyema gibberula var. gibberula (on Grevillea)*	2

Other species: *Acacia aneura, A. mulganeura, Eucalyptus oleosa* subsp. *oleosa*

Eucalyptus oleosa subsp. *oleosa isolated* mallee trees over *Acacia ramulosa* var. *ramulosa, A. caesaneura, A. incurvaneura, Grevillea nematophylla* subsp. *nematophylla, A. burkittii* tall shrubland over *Eremophila granitica, E. eriocalyx, Prostanthera grylloana, Grevillea nematophylla* subsp. *nematophylla* open shrubland over *Eremophila granitica, E. eriocalyx, Prostanthera grylloana, Acacia ramulosa* var. *ramulosa* low sparse shrubland over *Waitzia acuminata* low isolated forbs

Siberia Quadrat 2 site photo (NW)

3.3 Siberia Quadrat Q3

Date: 3rd November 2019	Location: East of ROM and southern waste dump
NW: 304094/ 6655243	Landform: Plain; broad flood plain; flat
	Elevation: 423
Land surface: Yellowish red (5YR 4/6) clay loam; surface rock ironstone gravel, 2 – 40 mm, 70 – 80 %; litter 15 – 20 % 1 – 4 cm deep; fallen timber 10 %; cryptogam cover (lichen) < 5 %; bare ground 15 – 20 %	
Disturbance: decline in understorey (mid stratum); historic clearing; evidence of grazing; signs of cattle, donkeys and rabbits in area; evidence of sheet wash; ironstone gravel provides some protection	
Condition: Good to very good – significant areas of recent regrowth of *Eucalyptus salmonophloia* adjacent to site; high counts of ground cover species – recruitment occurring; tree hollows present in Salmon gum	
NVIS – VI: U1+^*Eucalyptus salmonophloia\Eucalyptus\^tree\7\i; M1^ Eremophila interstans subsp. interstans\Eremophila\^shrub\4\bi; M2^ Eremophila interstans subsp. interstans, Exocarpos aphyllus, Eremophila scoparia, Senna cardiosperma, Casuarina pauper\Eremophila\^shrub\3\r; M3^ ^Acacia hemiteles, ^Eremophila scoparia, ^ Eremophila interstans subsp. interstans, Scaevola spinescens, Acacia tetragonophylla\Acacia\^shrub\2\r; G ^Sclerolaena cuneata, Acacia erinacea, Dissocarpus paradoxus, Scaevola spinescens, Sclerolaena diacantha\Sclerolaena\^chenopod shrub, shrub\1\r*	

Height m	% cover	Habit	Species	No.
> 10	25	Tree	*Eucalyptus salmonophloia*	1
>2	1 – 2	Shrub	*Eremophila interstans* subsp. *interstans*	5
1 – 2	5 – 10	Shrub	*Eremophila interstans* subsp. *interstans (5), Exocarpos aphyllus (1), Eremophila scoparia (2), Senna cardiosperma (2), Acacia hemiteles (2), Casuarina pauper (1)*	13
0.5 – 1	5 – 10	Shrub	*Eremophila scoparia (5), Acacia hemiteles (7), Eremophila interstans* subsp. *interstans (5), Acacia tetragonophylla (2), A. erinacea (1), Scaevola spinescens (2), Cratystylis subspinescens (2), Senna artemisioides* subsp. *filifolia (2), Exocarpos aphyllus (1), Atriplex vesicaria (2)*	29
<0.5	5 – 10	Shrub	*Sclerolaena cuneata (226), Acacia erinacea (23), Dissocarpus paradoxus (14), Scaevola spinescens (6), Sclerolaena diacantha (18), Atriplex vesicaria (7), Maireana georgei (6), Acacia tetragonophylla (2), Senna cardiosperma (1), Enchylaena lanata (1), Senna artemisioides* subsp. *filifolia (1), Ptilotus obovatus (2), Rhagodia drummondii (1), Maireana trichoptera (2)*	311
<0.5	<1	Grass tussock	*Austrostipa elegantissima (2)*	
<0.2	<1	Forb	*Roepera ovata* (tentative; sterile)	

Other species: *Bossiaea walkeri, Eremophila* sp. Mt Jackson, *Olearia muelleri, Solanum lasiophyllum*; calcrete present at the surface in some areas

Eucalyptus salmonophloia open woodland over *Eremophila interstans* subsp*. interstans* tall sparse shrubland over *Eremophila interstans* subsp*. interstans*, *Exocarpos aphyllus*, *Eremophila scoparia, Acacia hemiteles* sparse shrubland over *Acacia erinacea, Sclerolaena cuneata, Scaevola spinescens, Dissocarpus paradoxus*, *Sclerolaena diacantha* low sparse shrubland over *Roepera ovata* low isolated forbs

Siberia Quadrat 3 site photo

	
North side of quadrat > east	*Dissocarpus paradoxus* growing near fallen timber.

3.4 Siberia Quadrat Q4

Date: 3rd November 2019	Location: East of Missouri Waste Dump; north of Ora Banda
NW: 303568	Landform: Low hill; ridge
	Elevation: 429
Land surface: brown (7.5 YR 5/4) clay loam; surface rock ironstone gravel and calcrete 70 – 80 %, 5 – 50 mm; litter 60 – 70 %, 1 – 5 cm deep; fallen timber 20 %; cryptogam cover (lichen) ~ 10 %; bare ground 20 – 30 %; land surface dry	
Disturbance: Timber harvesting; mining exploration disturbances; rabbits, cattle; grazing obvious on Scaevola, Acacia and Casuarina.	
Condition: Good	
NVIS – VI: U1+ ^ *Eucalyptus clelandiorum\Eucalyptus\^tree\7\c; M1 ^ Eremophila sp. Mt Jackson\Eremophila\^shrub\4\bi;* M2 ^ *Eremophila sp. Mt Jackson, Dodonaea lobulata, Senna artemisioides subsp. filifolia, Casuarina pauper, Exocarpos aphyllus\Eremophila\^shrub\3\i; M3 ^ Eremophila sp. Mt Jackson, Scaevola spinescens, Casuarina pauper, Olearia muelleri, Ptilotus obovatus\Eremophila\^shrub\2\i; G1^Maireana georgei, Maireana sedifolia, Roepera aurantiaca, Austrostipa nitida, Sida spodochroma\Maireana\^chenopod shrub, forb, grass, shrub\1\bi*	

Height m	% cover	Habit	Species	No.
> 10	20	Tree	*Eucalyptus clelandiorum*	2
2 – 10	30	Tree	*Eucalyptus clelandiorum*	8
>2	< 1	Shrub	*Eremophila* sp. Mt Jackson	2
1 – 2	10 – 15	Shrub	*Eremophila* sp. Mt Jackson *(24), Dodonaea lobulata (4), Senna artemisioides* subsp. *filifolia (3), Casuarina pauper (3), Exocarpos aphyllus (1), Acacia effusifolia (1)*	36
0.5 – 1	10 – 15	Shrub	*Eremophila* sp. Mt Jackson *(15), Casuarina pauper (8), Dodonaea lobulata (4), Olearia muelleri (2), Ptilotus obovatus (2), Scaevola spinescens (1)*	32
<0.5	2 – 5	Shrub	*Scaevola spinescens (13), Eremophila* sp. Mt Jackson *(18), Casuarina pauper (6), Olearia muelleri (7), Ptilotus obovatus (8), Senna artemisioides subsp. filifolia (7), Acacia erinacea (2), Solanum lasiophyllum (4), Maireana georgei (3), M. sedifolia (1), Sida spodochroma (2)*	70
<0.3	<1	Grass tussock	*Austrostipa nitida*	
<0.1	<1	Forb	*Roepera aurantiaca*	

Eucalyptus clelandiorum woodland over *Eremophila* sp. Mt Jackson, *Dodonaea lobulata, Senna artemisioides subsp. filifolia, Casuarina pauper, Exocarpos aphyllus, Acacia effusifolia* open shrubland over *Eremophila* sp. Mt Jackson, *Casuarina pauper, Olearia muelleri, Scaevola spinescens, Dodonaea lobulata, Ptilotus obovatus* low open shrubland over *Austrostipa nitida, Roepera aurantiaca* low isolated grass tussocks and forbs

Siberia Quadrat 4 (NW)

3.5 Siberia Quadrat Q5
(Missouri Analogue AMQ02)

Date: 15th February 2017	Location: South of Missouri Waste Dump; east of Ora Banda – Davyhurst Road
NW: 303894/6655543	Landform: Plain; flat
	Elevation: 423
Land surface: Yellowish red clay loam; surface rock 40 – 50 % ironstone gravel < 3mm; litter 40 – 50 % ^ 20 cm; fallen timber 3 – 5 %; cryptogam cover 15 – 20 % (lichen); bare ground < 10 %; surface dry, damp at depth	
Disturbance: low level of disturbance; old exploration tracks nearby; echidna diggings; some grazing on *Acacia* spp.	
Condition: Excellent; very healthy, all strata present; recruitment occurring	
NVIS – VI: U1+ ^ *Eucalyptus griffithsii , Casuarina pauper\Eucalyptus\^tree\6\c; M1^ Acacia burkittii, Acacia incurvaneura, Grevillea nematophylla* subsp. *nematophylla, Acacia ramulosa var. ramulosa, Acacia tetragonophylla\Acacia\^shrub, tree\4\i; M2 ^ Acacia ramulosa var. ramulosa, ^Acacia tetragonophylla, Acacia burkittii, Acacia incurvaneura, Senna artemisioides subsp. filifolia\Acacia\^shrub\3\i; M3 ^ Dodonaea rigida, Acacia tetragonophylla, Dodonaea lobulata, Senna artemisioides* subsp. *filifolia, Acacia incurvaneura\Dodonaea\shrub\2\r; ^Austrostipa elegantissima, Sida calyxhymenia, Solanum lasiophyllum\Austrostipa\^tussock grass, forb, shrub\1\bi*	

Height m	% cover	Habit	Species	No.
4 – 8	30 – 40	Tree, mallee	*Eucalyptus griffithsii (12), Casuarina pauper (2)*	12
>2	20 – 25	Shrub, tree	*Acacia burkittii (8), Acacia incurvaneura (6), Grevillea nematophylla* subsp. *nematophylla (4), Acacia ramulosa var. ramulosa (2), A. tetragonophylla (1)*	19
1 – 2	10 – 15	Shrub	*Acacia ramulosa var. ramulosa (8), A. tetragonophylla (9), A. burkittii (5), A. incurvaneura (5), Senna artemisioides subsp. filifolia (13), Acacia hemiteles (1), Dodonaea lobulata (2)*	43
0.5 – 1	3 – 5	Shrub	*Dodonaea rigida (17), Acacia tetragonophylla (8), Dodonaea lobulata (4), Senna artemisioides* subsp. *filifolia (2), Acacia incurvaneura (1)*	32
<0.5	1 – 2	Shrub, vine	*Dodonaea rigida (5), Acacia tetragonophylla (3), A. ramulosa var. ramulosa (2), A. incurvaneura (1), Senna artemisioides subsp. filifolia (1), Scaevola spinescens (1), Vincetoxicum lineare (3), Sida calyxhymenia (3), Solanum lasiophyllum (5; seedlings), seedlings (10; unknown; possibly Proteaceae)*	34
<0.5	< 1	Tussock grass	*Austrostipa elegantissima*	1

Other species: *Bossiaea walkeri*

Eucalyptus griffithsii and *Casuarina pauper* low open forest over *Acacia burkittii, A. incurvaneura*, *Grevillea nematophylla* subsp. *nematophylla, Acacia ramulosa var. ramulosa, Acacia tetragonophylla* tall open shrubland over *Acacia ramulosa* var. *ramulosa, A. tetragonophylla, Dodonaea rigida, Senna artemisioides* subsp. *filifolia, Acacia burkittii, Dodonaea lobulata* open shrubland over *Dodonaea rigida, Acacia tetragonophylla, Acacia ramulosa* var. *ramulosa, Senna artemisioides* subsp. *filifolia* low isolated shrubs over *Austrostipa elegantissima* low isolated tussock grasses

Siberia Quadrat 5 site photo

3.6 Siberia Quadrat Q6
(Missouri Analogue Quadrat 1)

Date: 14th February 2017		Location: South of waste dump
NW: 303271/ 6654641	NE: 303288/ 6654651	Landform: Low hill, gentle slope
SW: 303283/ 6654626	SE: 303300/ 6654638	Elevation: 421 m a s l
Land surface: Yellowish red (5YR 5/8) clay loam to fine sandy clay loam; moist at depth Litter 20 – 30 % ^ 6cm; fallen timber < 2 % - few old large branches, stems; Cryptogams lichen < 1%; surface rock ironstone, calcrete (from old diggings) > 70 % 0.5 (1 – 2) > 5 cm, with a few larger rocks > 20 cm in SE corner		
Disturbance: Historic mining impacts – old access tracks, drill locations and minor diggings; current – goats (grazing obvious on Allocasuarina) and rabbits		
Condition: very good – some clearing in understorey; semi mature regrowth *Eucalyptus* spp.		
NVIS VI: U1+ ^ *Eucalyptus griffithsii , Allocasuarina acutivalvis* subsp. *acutivalvis, Eucalyptus salubris\^mallee, tree\Eucalyptus\6\i; M1^ Eremophila scoparia, Alectryon oleifolius* subsp. *canescens, Acacia tetragonophylla\Eremophila\^shrub\4\r; M2 ^ Dodonaea lobulata, Acacia tetragonophylla, Eremophila scoparia, Scaevola spinescens, Allocasuarina acutivalvis* subsp. *acutivalvis\Dodonaea\^shrub\3\r; M3 ^ Eremophila scoparia, Olearia muelleri, Acacia tetragonophylla, Dodonaea lobulata, Senna artemisioides subsp. filifolia\Eremophila\^shrub\2\r; ^ Olearia muelleri, Sclerolaena fusiformis, Ptilotus obovatus, Dodonaea lobulata, Sclerolaena fusiformis\Olearia\^shrub, forb\1\r		

Height m	% cover	Habit	*Species*	No.
2 – 8	2 – 3	Tree	*Allocasuarina acutivalvis* subsp. *acutivalvis (2), Eucalyptus salubris (2)*	4
<8	20 – 25	Mallee	*Eucalyptus griffithsii (4)*	4
>2	8 – 10	Shrub	*Eremophila scoparia (4), Alectryon oleifolius* subsp. *canescens (1), Acacia tetragonophylla (1)*	6
1 – 2	5 – 10	Shrub	*Dodonaea lobulata (8), Acacia tetragonophylla (1), Eremophila scoparia (3), Scaevola spinescens (2), Allocasuarina acutivalvis* subsp. *acutivalvis (2), Senna artemisioides subsp. filifolia (1), Eremophila oldfieldii subsp. angustifolia (1)*	18
0.5 – 1	5 – 7	Shrub	*Eremophila scoparia (43), Olearia muelleri (2), Acacia tetragonophylla (7), Dodonaea lobulata (5), Senna artemisioides* subsp. *filifolia (1)*	58
<0.5	4 – 5	Shrub	*Olearia muelleri (24), Eremophila scoparia (10), Allocasuarina acutivalvis* subsp. *acutivalvis (6), Ptilotus obovatus (4), Dodonaea lobulata (8)*	52
<0.2	<1	Forb	*Sclerolaena fusiformis, S. diacantha, Sida calyxhymenia*	
	<1	Vine	*Rhyncharrhena linearis*	1

Other species: *Acacia burkittii* – part crown in quadrat

Eucalyptus griffithsii, Allocasuarina acutivalvis subsp*. acutivalvis, Eucalyptus salubris* mallee woodland over *Eremophila scoparia, Alectryon oleifolius* subsp. *canescens, Acacia tetragonophylla, A. burkittii* tall sparse shrubland over *Dodonaea lobulata, Acacia tetragonophylla, Eremophila scoparia, Scaevola spinescens, Allocasuarina acutivalvis* subsp*. acutivalvis* sparse shrubland over *Eremophila scoparia, Olearia muelleri, Dodonaea lobulata, Acacia tetragonophylla, Allocasuarina acutivalvis* subsp. *acutivalvis* low sparse shrubland over *Sclerolaena fusiformis, S. diacantha, Sida calyxhymenia* low isolated forbs

Siberia Quadrat 6 site photo

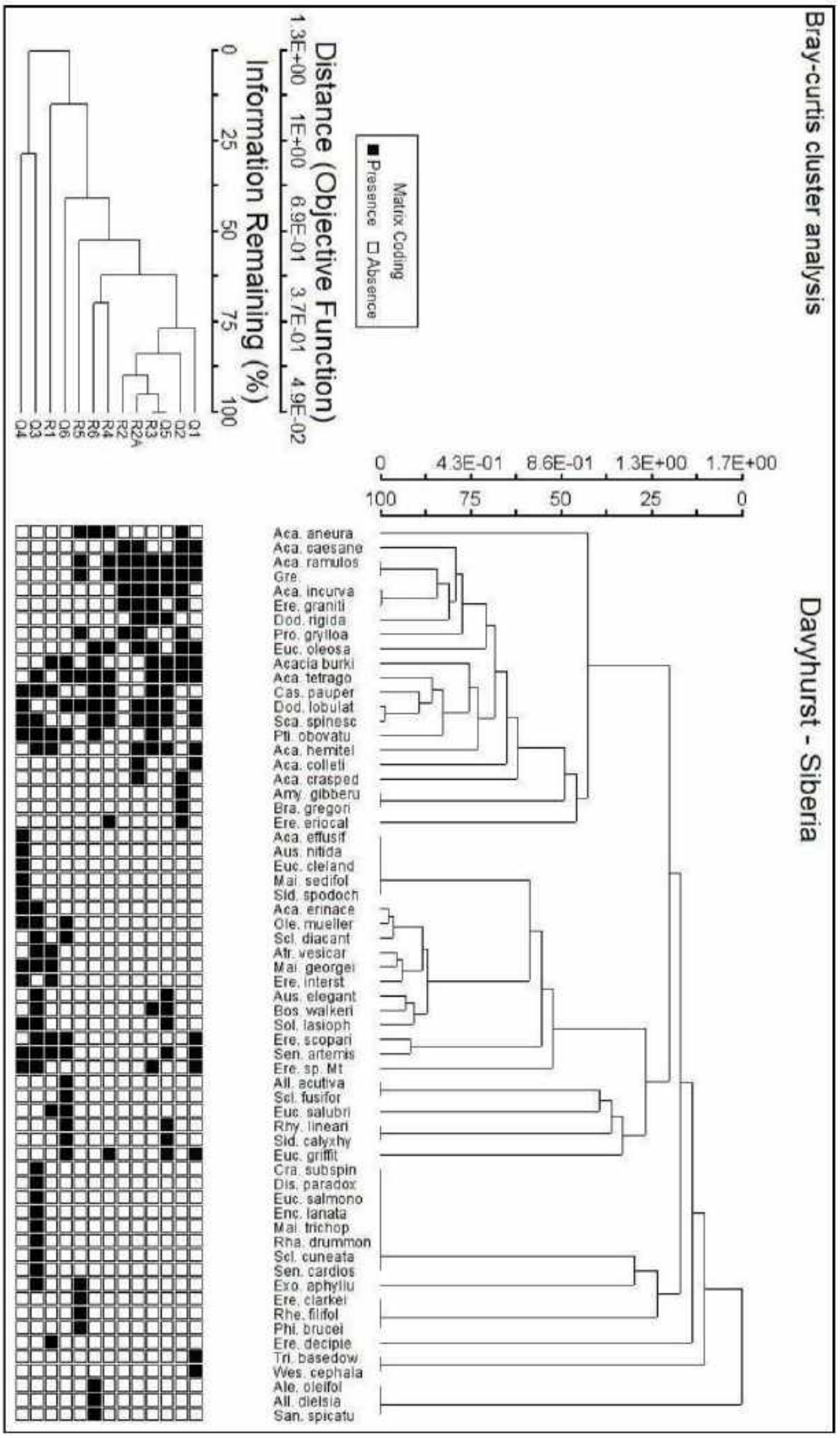
Appendix 4: Relevé descriptions and photos

Relevé R01	**GPS: 303725/ 6655665**
High level of disturbance; adjacent to ROM and access tracks; regrowth; Condition: good – structure compromised; mid to upper strata not present in much of the area; signs of cattle and donkeys	Plain; broad flat valley Condition: Degraded to good in area
Vegetation: *Eucalyptus salubris, Acacia burkittii, A. hemiteles* open shrubland over *Casuarina pauper, Ptilotus obovatus, Maireana georgei, Eremophila scoparia, E. interstans, E. decipiens* subsp. *decipiens, Atriplex vesicaria* and *Senna artemisioides* subsp. *filifolia* low open mixed shrubland	
Relevé R02 (Near Q2)	**304344/ 6655459**
Condition: very good to excellent; low level of disturbance	Low hill; gentle slope
Acacia caesaneura, A. incurvaneura, Grevillea nematophylla subsp. *nematophylla, Acacia ramulosa* var. *ramulosa* tall shrubland over *Prostanthera grylloana, Eremophila granitica* low open shrubland	
Relevé R02A Q2 to vegetation change at 304150/ 6655346	
Historic disturbances – exploration tracks and drill locations overgrown	Low hill; condition very good to excellent
Eucalyptus oleosa subsp. *oleosa* mallee (8 – 9 m) isolated in *Acacia caesaneura, A. incurvaneura, A. craspedocarpa, Grevillea nematophylla* subsp. *nematophylla* tall shrubland/ low woodland over *Acacia ramulosa* var. *ramulosa*, Grevillea *nematophylla* subsp. *nematophylla, Acacia colletioides, A. hemiteles, Dodonaea lobulata, D. rigida, Scaevola spinescens* shrubland to open shrubland over *Prostanthera grylloana, Eremophila granitica, Scaevola spinescens, Dodonaea lobulata* low open shrubland over isolated *Waitzia acuminata* low forbs and low grass tussocks (dried off/ grazed)	
Relevé 03 (SW of Q3)	**303970/ 6655164**
Lower slope; gently sloping; calcrete at surface Condition: good to very good Various levels of disturbances in area – old tracks, historic clearing (mining, pastoral); semi-mature regrowth Rainbow bee-eaters present in area	
Casuarina pauper, Eucalyptus oleosa low open woodland over *Eremophila* sp. Mt Jackson, *Acacia ramulosa* var. *ramulosa, A. burkittii, A. hemiteles, Dodonaea rigida, Acacia tetragonophylla* open shrubland over *Scaevola spinescens, Dodonaea lobulata, Grevillea* sp., and *Bossiaea walkeri* low open shrubland over *Sida calyxhymenia, Ptilotus obovatus* low sparse shrubs Other species: *Eremophila granitica, Acacia incurvaneura, Codonocarpus cotinifolius*	

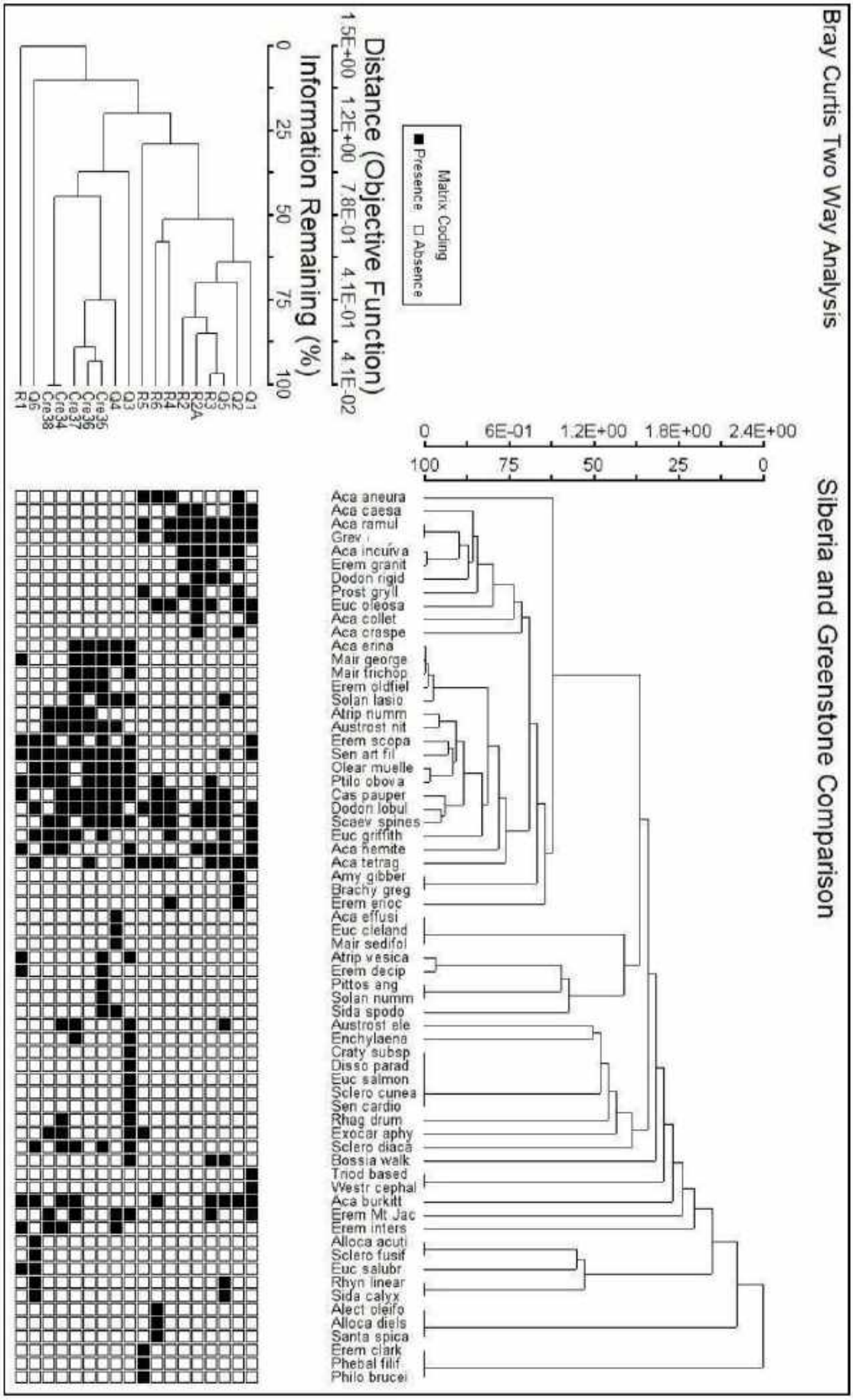
Relevé 04	**303672/ 6655169**
Low stony rise; midslope Condition: very good; old tracks in area; some drought impacts – old deaths; isolated ground cover (< 1 %) Rainbow bee-eaters in area	
Eucalyptus griffithsii, E. oleosa low open mallee woodland (8 – 9 m)over *Acacia aneura, Grevillea didymobotrya subsp. didymobotrya, Casuarina pauper, Acacia ramulosa var. ramulosa* tall open shrubland (2 – 5 m) over *Acacia tetragonophylla, Grevillea nematophylla* subsp. *nematophylla, Scaevola spinescens, Dodonaea lobulata, Acacia aneura, Eremophila eriocalyx* open shrubland (1 – 2 m) over *Scaevola spinescens, Dodonaea lobulata* low sparse shrubland	
Relevé 05	**303639/ 6655520**
Stony hill; crest; > 80% rock – hematite/ ironstone large rocks to boulders Condition: excellent – good cover of litter; basically undisturbed	
Acacia aneura tall open shrubland (4 – 6 m) over *Grevillea nematophylla* subsp. *nematophylla, Phebalium filifolium, Philotheca brucei* subsp. *brucei, Exocarpos aphyllus, Prostanthera grylloana and Dodonaea lobulata, Eremophila clarkei* shrubland Other species: *Acacia tetragonophylla, A. ramulosa* var. *ramulosa*	
Existing track – partly overgrown	**303584/ 6655151**
Recent and historic disturbances	
Opportunistic records Perennials: *Radyera farragei, Solanum plicatile, Ptilotus obovatus, Salsola australis,* *Annuals: Euphorbia drummondii, Salvia verbenaca** (Wild sage), *Vittadinia dissecta var. hirta, Cucumis myriocarpus**, unidentified grass tussocks – grazed	

Relevé 06/ 07	303628/ 6655098 – 303650/ 6655118
Low stony rise; ironstone gravel surface rock; indications of sheet erosion; historic disturbances – mining exploration and more recently cattle and donkeys Condition: mostly very good	
Eucalyptus oleosa, Allocasuarina dielsiana, Casuarina pauper open woodland to isolated trees over *Allocasuarina dielsiana, Acacia tetragonophylla, A. aneura, A. burkittii, Alectryon oleifolius subsp. canescens, Santalum spicatum* tall open shrubland (with denser patches) over *Dodonaea lobulata, Acacia tetragonophylla, Scaevola spinescens, Acacia burkittii* open shrubland over *Ptilotus obovatus, Solanum plicatile* low sparse shrubland	

Appendix 5: Bray-Curtis analysis of sites in the proposal



Appendix 6: Bray-Curtis analysis comparing the proposal sites with DPAW Greenstone range surveys



Appendix 7: Conservation codes for Western Australian flora and fauna (DBCA 2019)

Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

CONSERVATION CODES

For Western Australian Flora and Fauna

Threatened, Extinct and Specially Protected fauna or flora[1] are species[2] which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.

The *Wildlife Conservation (Specially Protected Fauna) Notice 2018* and the *Wildlife Conservation (Rare Flora) Notice 2018* have been transitioned under regulations 170, 171 and 172 of the *Biodiversity Conservation Regulations 2018* to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the *Biodiversity Conservation Act 2016*.

Categories of Threatened, Extinct and Specially Protected fauna and flora are:

T **Threatened species**

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 28(2) of the *Biodiversity Conservation Act 2016* (BC Act).

Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for Threatened Fauna.

Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the *Wildlife Conservation (Rare Flora) Notice 2018* for Threatened Flora.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

CR **Critically endangered species**

Threatened species considered to be *"facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines"*.

Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for critically endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for critically endangered flora.

EN **Endangered species**

Threatened species considered to be *"facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines"*.

Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for endangered flora.

VU **Vulnerable species**

Threatened species considered to be *"facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines"*.

Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for vulnerable fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for vulnerable flora.

Extinct species

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.

EX **Extinct species**

Species where *"there is no reasonable doubt that the last member of the species has died"*, and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

Published as presumed extinct under schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for extinct flora.

EW **Extinct in the wild species**

Species that *"is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form"*, and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Specially protected species

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

MI **Migratory species**

Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).

Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.

Published as migratory birds protected under an international agreement under schedule 5 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

CD **Species of special conservation interest (conservation dependent fauna)**

Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).

Published as conservation dependent fauna under schedule 6 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

OS **Other specially protected species**

Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Published as other specially protected fauna under schedule 7 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

P **Priority species**

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

1 **Priority 1: Poorly-known species**

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

2 **Priority 2: Poorly-known species**

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

3 **Priority 3: Poorly-known species**

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

4 **Priority 4: Rare, Near Threatened and other species in need of monitoring**

(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.
(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.
(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

[1]The definition of flora includes algae, fungi and lichens
[2]Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

Last updated 3 January 2019

Appendix 8: Corresponding vegetation Communities described by Outback Ecology Services (2003) as reported in PLEC 2015.

OES 2003	JBBC 2019	Description
1a	6	Open mixed woodland of *Eucalyptus lesouefii, E. griffithsii* and *Casuarina pauper* over an open mixed shrubland of *Dodonaea lobulata, Atriplex nummularia* and *Ptilotus obovatus*
1c	1, 2, 3, 4, 5	Open woodland of *Eucalyptus griffithsii* over open shrubland *of Acacia burkittii* and *Acacia hemiteles* over a mixed shrubland understorey. (This vegetation community varied in regard to the density and diversity of the understorey across the surveyed area.)
1d	1	Open woodland of *Eucalyptus griffithsii* over an open mixed *Acacia shrubland* of *Acacia burkittii, Acacia murrayana* and *Acacia tetragonophylla* over an open hummock grassland of *Triodia scariosa*
2c	1	Woodland of *Acacia aneura* with a limited understorey
3a	6	Open woodland of *Casuarina pauper* over an open understorey of *Acacia murrayana* and *Dodonaea lobulata*

Appendix 3: Fauna Report

Vegetation Clearing - Fauna Assessment

(Davyhurst, Callion, Waihi, Siberia, Riverina Clearance Areas)

Prepared for: Ora Banda Mining

By BIOSTAT Pty Ltd

March 2020

BIOSTAT Pty Ltd

ABN 87 092 767 032
39 Doris St
[redacted]

REVISION SCHEDULE

Rev. No.	Date	Description
A	19/2/2020	Draft provided as starter for Leanne. Does not include Davyhurst discussion.
1	6/3/2020	Final report
2		Includes changes to Riverina boundaries and review of comments

[redacted]

STATEMENT OF LIMITATIONS

This report and the associated services performed by BIOSTAT Pty Ltd were undertaken to satisfy the requirements of Ora Banda Mining (the 'Client') as set out in the scope of services defined in the contract agreed to between BIOSTAT Pty Ltd and the Client. That scope of services was defined by the Client's requests, by the time and budgetary constraints imposed by the Client, the availability of information and by the availability of access to the site defined by the Client.

BIOSTAT Pty Ltd derived the data in this report primarily from site observations, information provided by the Client and an examination of records in the public domain as described in the scope of services. The passage of time, manifestation of latent conditions, additional information or impacts of future events may require further consideration of the Project and its scope and may require further subsequent data analysis and re-evaluation of the findings, observations and conclusions expressed in this report.

BIOSTAT Pty Ltd has relied upon and presumed accurate certain information (or absence thereof) relative to the site provided by government officials and authorities, the Client and others identified herein, in the preparation of this report. BIOSTAT Pty Ltd has not attempted to verify the accuracy or completeness of any such information except where stated otherwise in this report.

No warranty or guarantee, whether express or implied, is made with respect to the data reported or to the findings, observations and conclusions expressed in this report. Further, such data findings, observations and conclusions are based solely upon site conditions and information provided by the Client at the time of the investigation.

This report has been prepared on behalf of and for the exclusive use of the Client and is subject to and issued in connection with the provision of the agreement between BIOSTAT Pty Ltd and the Client. BIOSTAT Pty Ltd accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report by any third party.

(The 'Project' is defined as the scope of services as set out in the contract and agreed to by BIOSTAT Pty Ltd and the Client.)

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1 INTRODUCTION

Biostat Pty Ltd (Biostat) was engaged to undertake a fauna habitat assessment as part of a vegetation clearing submission of five Ora Banda Mining Pty Ltd (OBM) leases located in the northern Goldfields, Western Australia approximately 110km north-west of Kalgoorlie (Figure); Riverina, Davyhurst, Waihi, Callion, Siberia (Figures 2 – 5, respectively). Each of these Investigation Areas (IA) contain historical mine workings, including 19th and early 20th century prospecting shafts and working, larger more modern mine voids and associated infrastructure and areas of native vegetation of varying quality. These areas are also within pastoral leases many of which are still operating. These IAs represent the area of interest for clearing but do not denote the total area proposed for clearing. Within each area, smaller areas (disturbance envelopes) will be identified for clearing and development. Overall, these 5 areas represent a total 1,482.8 ha, and includes areas already cleared, pasture lands, and existing mine voids.

The focus of this study was to investigate the likelihood of malleefowl (*Leipoa ocellata*) occurring in these areas and the value of the vegetation delineated for clearing to this species. However, the investigations also required an assessment of habitats and their value to fauna in general. Formally, the objectives for this study:

- Undertake a visual inspection of areas identified for vegetation clearing and determine quality of habitat for malleefowl.
- Assess the quality of habitat for any other threatened species that is likely to occur in the area.
- Report on the findings from the survey and produce likelihood of occurrence tables for threatened species.

The sites are located in the confluence between Coolgardie and Murchison bioregions (V7, Thackway & Cresswell 1995) with Siberia, Waihi and Callion in the former, and Davyhurst and Riverina in the latter. The Murchison region is regarded as being under-represented in conservation areas, i.e., less than 10% in protected (Cowan 2003).

2 METHODS

Database search from the DBCA NatureMap database and for threatened species records were undertaken using -30.03562°, 120.65771° (WGS84) as the centre point with a 39km radius buffer applied to give a search area of approximately 4,778 km^2. A search using the same coordinates and buffer zone was made of Matters of National Environmental Significance (MNES) (Appendix 1).

It should be noted that ecological processes and species distributions do not recognize artificial boundaries (i.e., administrative boundaries such as local government boundaries, development envelopes, etc.) and assessments are undertaken on a local and regional basis. This is an important aspect of determining the applicability of the information in relation to the landscapes being assessed.

Where available, survey reports relating to the assessment area were reviewed as background reference for this study. Other material relevant to this study were also included in the desktop assessment.

A reconnaissance of the sites was undertaken by an experienced zoologist from 9/12/2019 – 11/12/2019. The weather during the reconnaissance was generally warm although intermittent thunderstorm and rain featured on 11/12/2019.

3 NOMENCLATURE, TAXONOMY AND DISTRIBUTION PATTERNS

The following literature sources have been employed to discuss fauna distribution patterns and ecology in the preparation of this report:

Birds: Barrett et al. 2003; Johnstone & Storr 1998, 2004.

Mammals: Churchill 2008; Jackson & Groves 2015; eds Van Dyck, Gynther & Baker 2013; eds Van Dyck & Strahan 2008.

Amphibians: Tyler & Doughty 2009; Tyler & Knight 2011.

Reptiles: Wilson & Swan 2013.

The nomenclature in this report follows the references listed and more recent taxonomic revisions.

Species listed in this report will adhere to strict taxonomic order as outlined in the references above. The taxonomic order tends to reflect broad guild commonality between species. The more familiar alphabetical listing of species is ecologically irrelevant and hides much of this broader information.

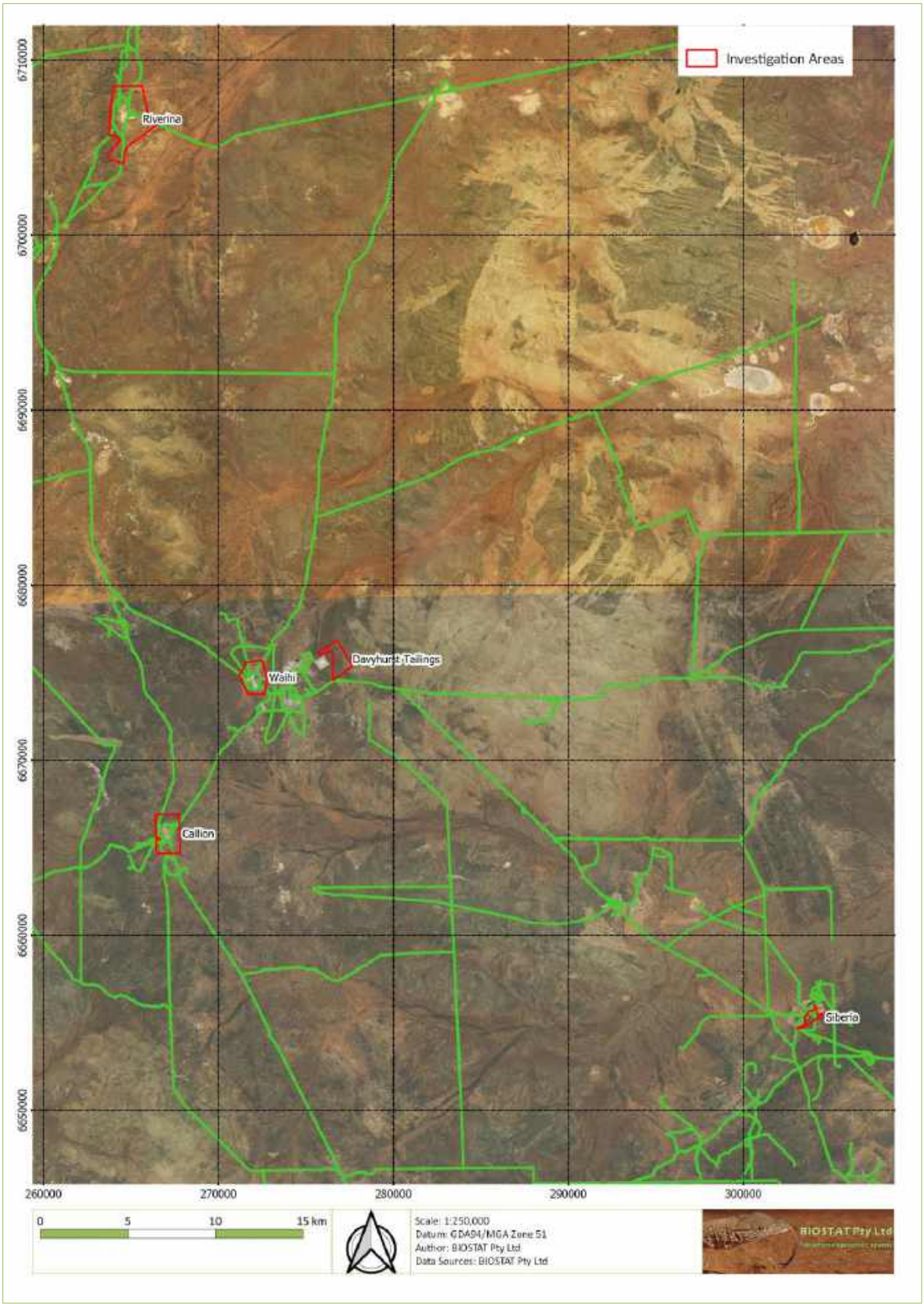

Figure 1 Locations of investigation areas.

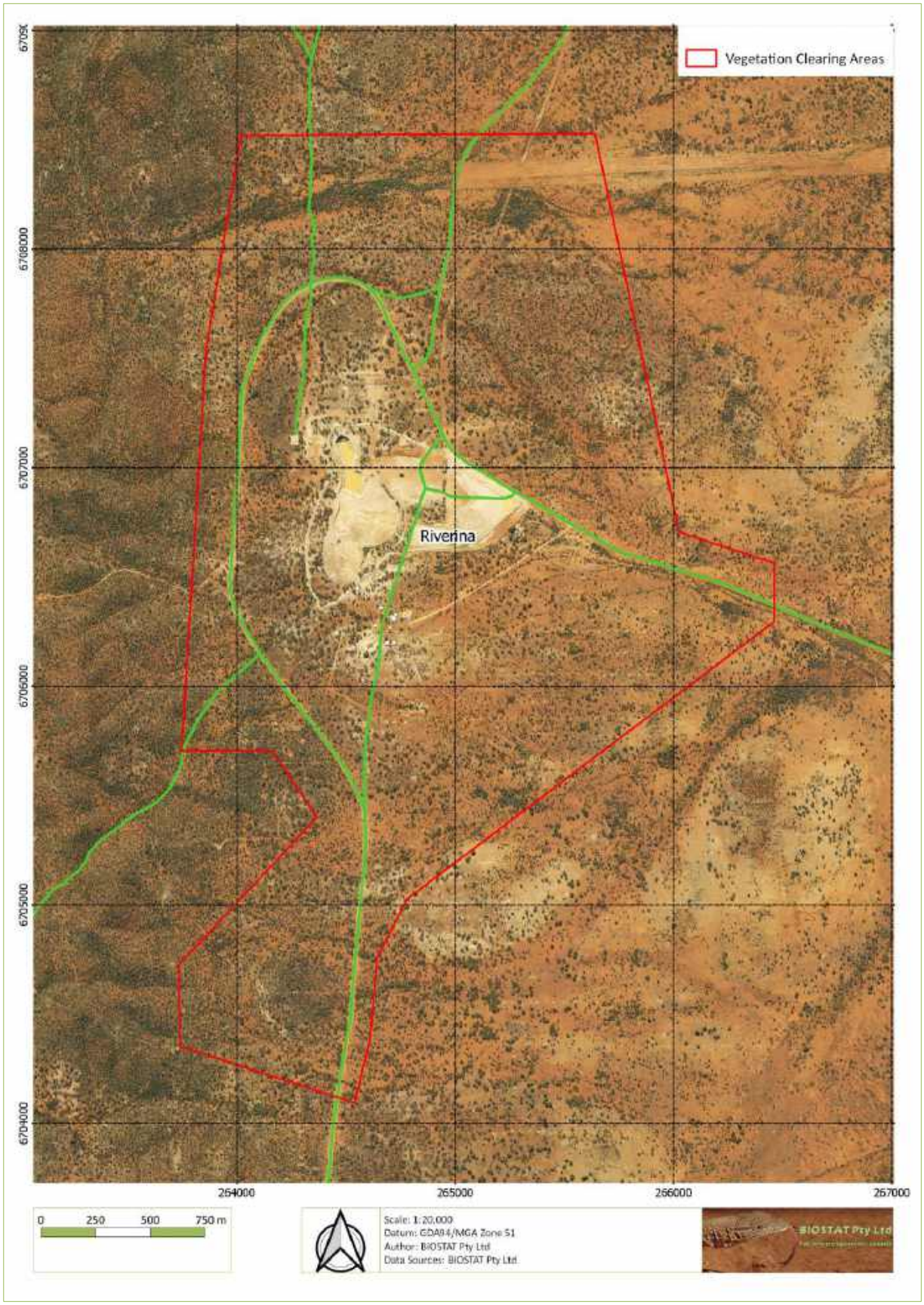

Figure 2 Riverina investigation area.

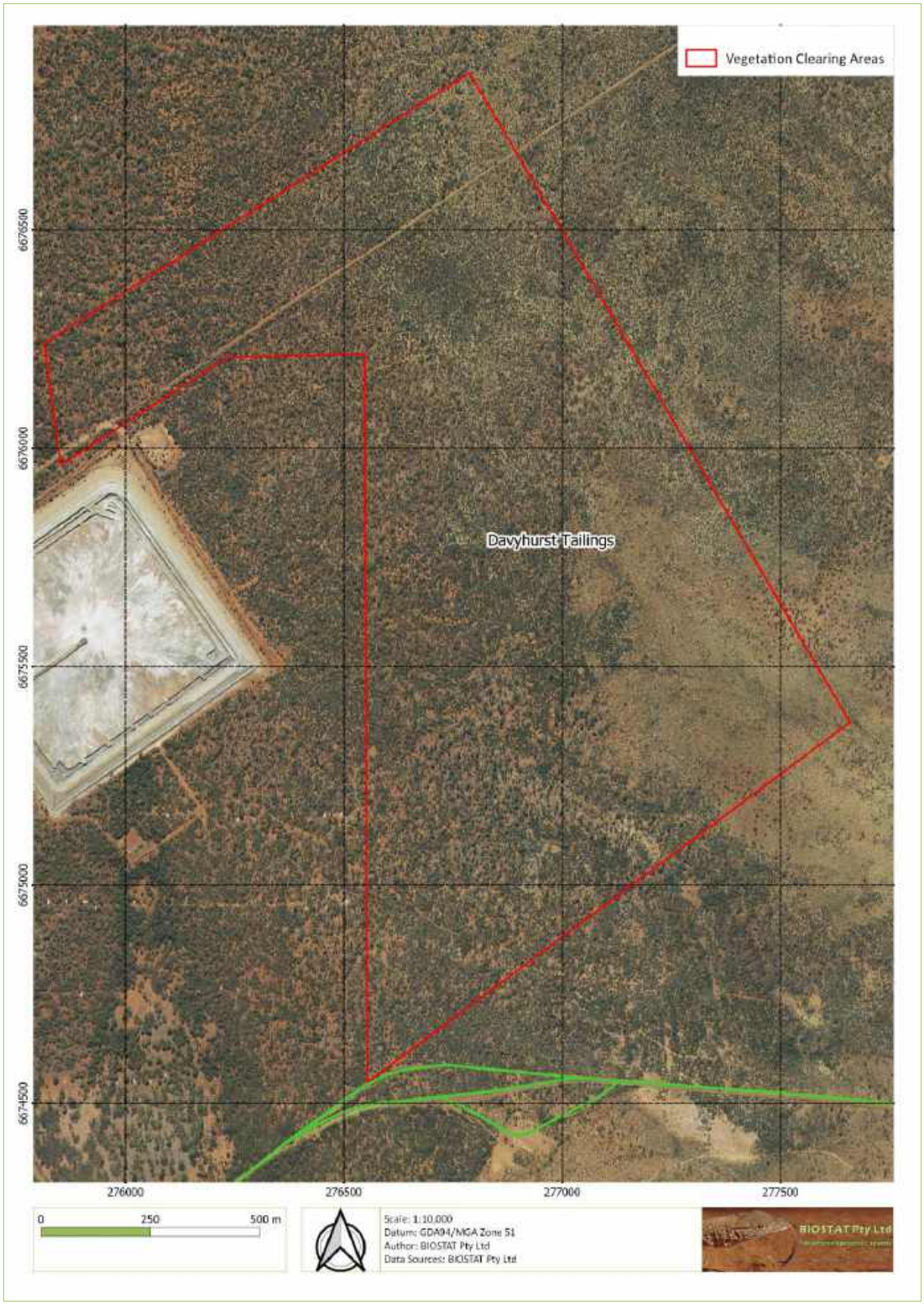

Figure 3 Davyhurst investigation area.

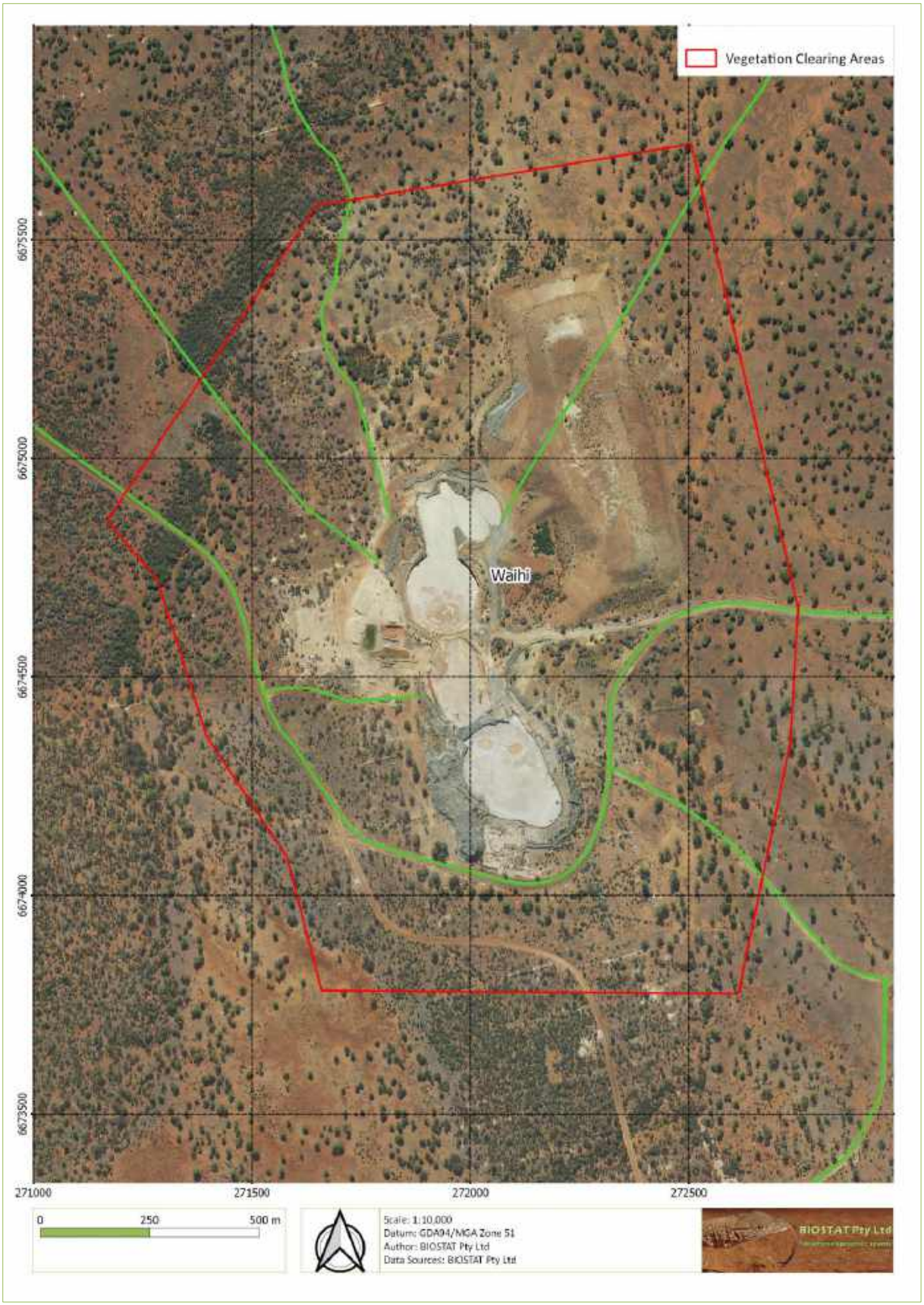

Figure 4 Waihi investigation area.

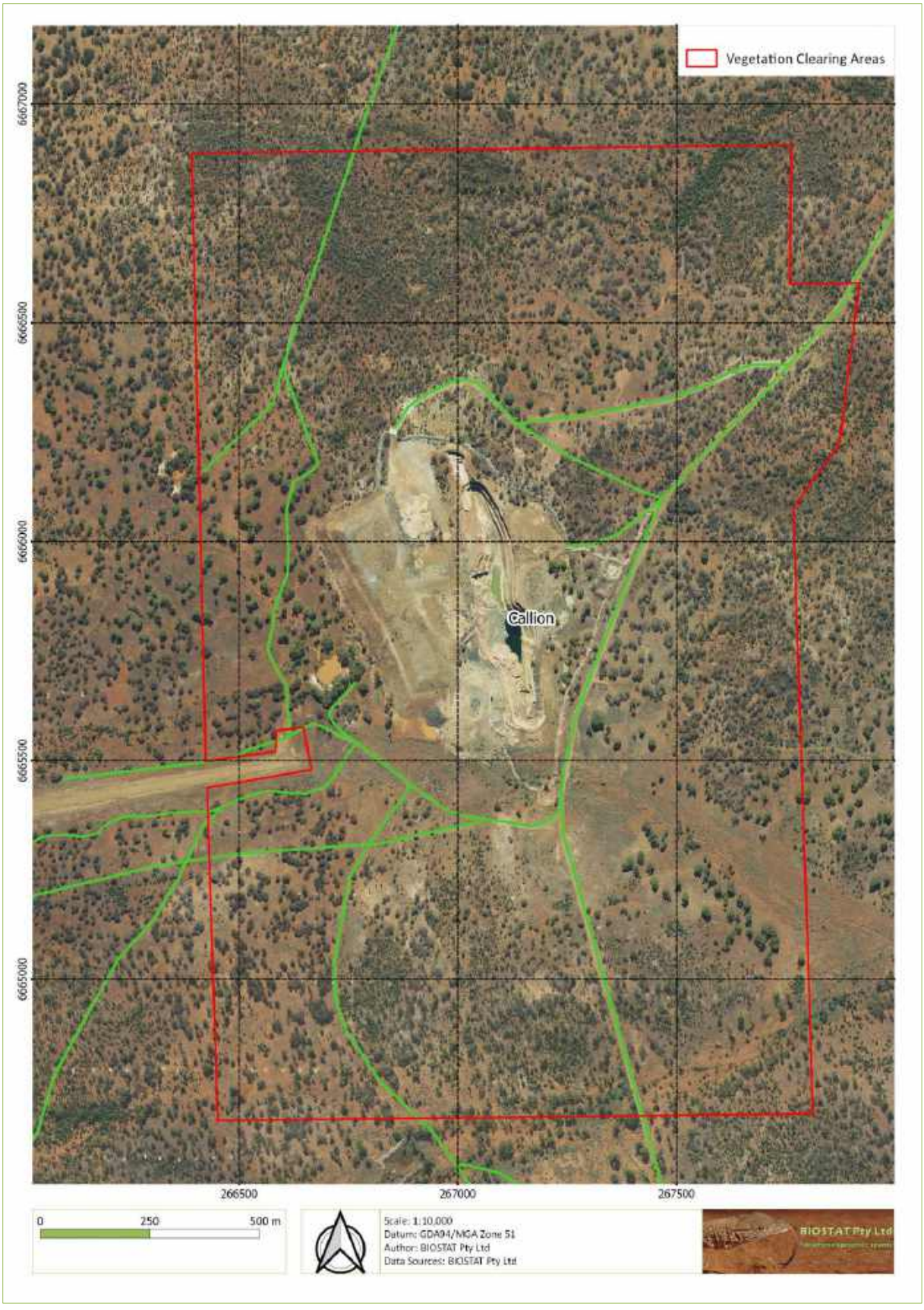

Figure 5 Callion investigation area.

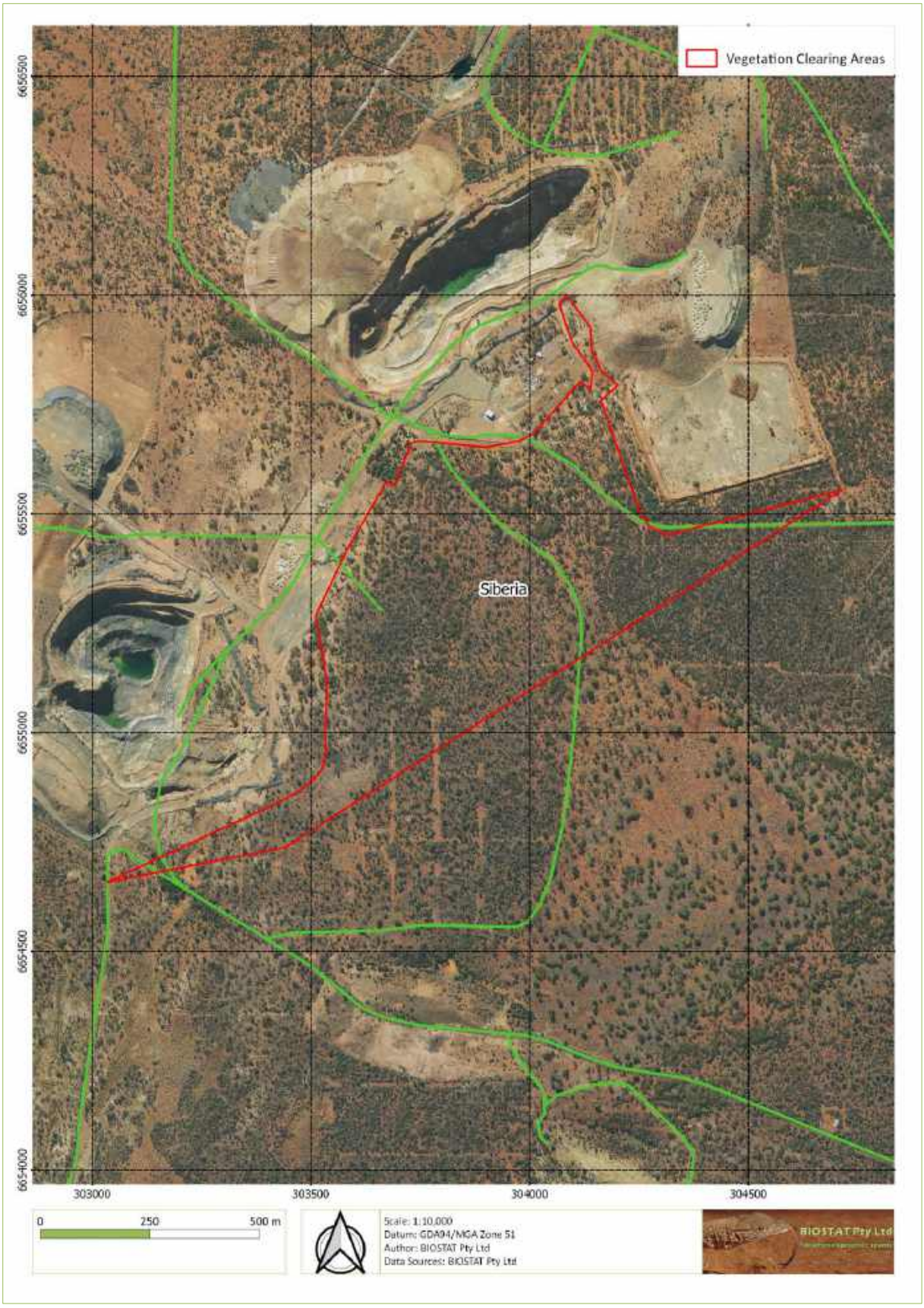

Figure 6 Siberia investigation area.

4 RESULTS AND DISCUSSION

The site reconnaissance provided an overview of the quality of habitats present in each of the areas of the project. They ecological value of habitats within areas and between areas varied from highly disturbed/poor to excellent/high. The confounding factor is the level of historical disturbance in many of these sites from mining and agricultural activities, and with the constant pressures from cattle, feral predators and herbivores.

The reconnaissance survey of Riverina and Siberia was hampered by weather events which restricted on-foot surveys due to lightning storms in the area. However, it was possibly to use existing tracks in these areas to assess habitat values.

Background material was sourced from fauna surveys undertaken in surrounding areas including Goongarrie (BIOSTAT Pty Ltd 2000) and Credo Station Reserve (Credo Station Reserve WA 2015).

The likelihood of occurrence of species is a subjective assessment reliant on an understanding of available habitat, quality of habitat, and historical and current records (Table 1). The quantification of occurrence for most species would require longer term monitoring which, in many cases, has been carried out for much of the area being assessed. Although, due to changes in species distributions brought on by climatic and habitat changes there is future possibility of species, which currently may exist on the fringes of the areas, becoming more common. The high mobility of many species of fauna, particularly migratory and nomadic birds, may require a combination of two or more categories.

This following will describe the results in two sections. The first will discuss the fauna habitat characteristics of each of the areas within the project. It will provide a preliminary determination of the quality of those habitats.

The second, will discuss the attributes of each of the species of conservation significance listed under the Federal and State government acts (see Table 2 for status descriptions) and determine their likelihood of occurrence in each of the areas.

Table 1 Likelihood assessment categories.

Likelihood	Description
Extremely Unlikely	no suitable habitat appears to be present, the species is known to be locally extinct.
Unlikely	preferred habitat does not appear to be present, the species may be vagrant in the area.
Low	has not been recorded in the general area (i.e., within the regional search area) in the recent past but suitable viable[1] habitats are present.
Moderate	has been recorded in the general area (i.e., within the regional search area) in the past and/or preferred viable habitat is present.
High	has been recorded near or in the project area in the recent past and preferred viable habitat is present.
Seasonally -high - moderate -low	a seasonal migrant or nomadic species that has a widespread distribution and few specific habitat requirements.
Recorded	Observed during the assessment or in other surveys.

[1] Viable habitat is defined as habitat with characteristics that would sustain a viable population of the species in the longer term (e.g., contiguous habitats vs fragmented habitats, undisturbed vs disturbed, etc.).

The database searches identified 5 MNES species; 4 bird and 1 mammal (Appendix 1). Each of these species will be considered in the following pages.

Table 2 Conservation status codes used in text.

Status – Australian Government (EPBC Act 1999)	
CR	Critically Endangered
EN	Endangered
VU	Vulnerable
MI	Migratory species
IA	JAMBA, CAMBA, ROKAMBA international agreements
Status – Western Australia (BC Act 2016 and DBCA Priority Listing)	
CR	Critically Endangered
EN	Endangered
VU	Vulnerable
EX	Extinct
MI	Migratory Species
CD	Conservation Dependent
OS	Other Specially Protected Fauna
XW	Extinct in the Wild
P1	Poorly-known species with few, poorly known populations on threatened lands
P2	Poorly-known species with few, poorly known populations on conservation lands
P3	Poorly-known species with several, poorly known populations, some on conservation lands
P4	Rare, Near Threatened and other species in need of monitoring

4.1 Fauna Habitat Characteristics

4.1.1 Riverina

The Riverina site is the largest of the areas investigated for this assessment at 614.7 ha (Figure 7). The landscape is characterised by incised low hills to the west and broad valleys and washout areas alongside broad drainage lines.

The areas bounded by the Evanston-Menzies road which include the open mine pit, station homestead and stock yards are degraded, lacking substantial understorey cover and sparse upper storey vegetation (Figure 8). Highly disturbed habitat also occurs around the airstrip at the north-eastern corner of the Riverina site. These degraded areas represent the lowest value to fauna.

Bordering the more highly disturbed habitats, and to the east of the Evanston-Menzies road, are areas of consisting of mosaics of Eucalyptus woodlands and acacia shrublands on incised drainage areas and washout slopes as well as some stony hills (Table 3). These areas are also within the field of disturbance resulting from livestock impacts and historical mining operations. However, they do represent habitats which are more structurally complex than the highly disturbed sites and, as such, are likely to provide some useful level of resource use for fauna. In total degraded areas make up approximately 76% of the land area within the clearance boundaries.

Better quality habitat exists to the west of the Evanston-Menzies road (Figure 9). It consists of a mosaic of Eucalyptus woodland on plains or stony rises, Acacia woodlands on stony rises and washouts, and shrublands on broad drainage lines. The varied topography of the area, including stony rises, incised drainage lines, washout valleys and larger drainage systems, provide the habitat variability that is likely to support a relatively higher fauna diversity. This area provides the relatively highest level of complexity in fauna habitats within the clearance envelope.

Table 3 Fauna habitat areas identified at Riverina.

Fauna Habitat Code	Description	Condition	Area (ha)
ACP	**Acacia/Casuarina woodland on plains**	Good	0.5
		Degraded	83.7
ACS	**Acacia/Casuarina on slopes**	Good	66.9
		Degraded	34.9
ECV	**Eucalyptus/Casuarina woodlands in valleys**	Good	13.5
		Degraded	33.1
EH	**Eucalyptus woodlands on hills**	Good	5.0
		Degraded	40.1
EP	**Eucalyptus woodland on plains**	Good	43.6
		Degraded	139.7
SD	**Tall shrublands on drainage lines**	Good	17.9
		Degraded	9.1
D	**Degraded**		126.7
		Total Degraded Area	*467.3*
		Total Area	**614.7**

The Riverina investigation area was increased by approximately 104 ha after the completion of the site investigation. This was to accommodate a mine camp and access walking track of approximately 3ha. Field assessments of vegetation communities and fauna habitats for this additional area are yet to be undertaken, although it is likely that they will contain fauna habitats common to the investigation area. A field vegetation and fauna assessment are recommended prior to any ground disturbance.

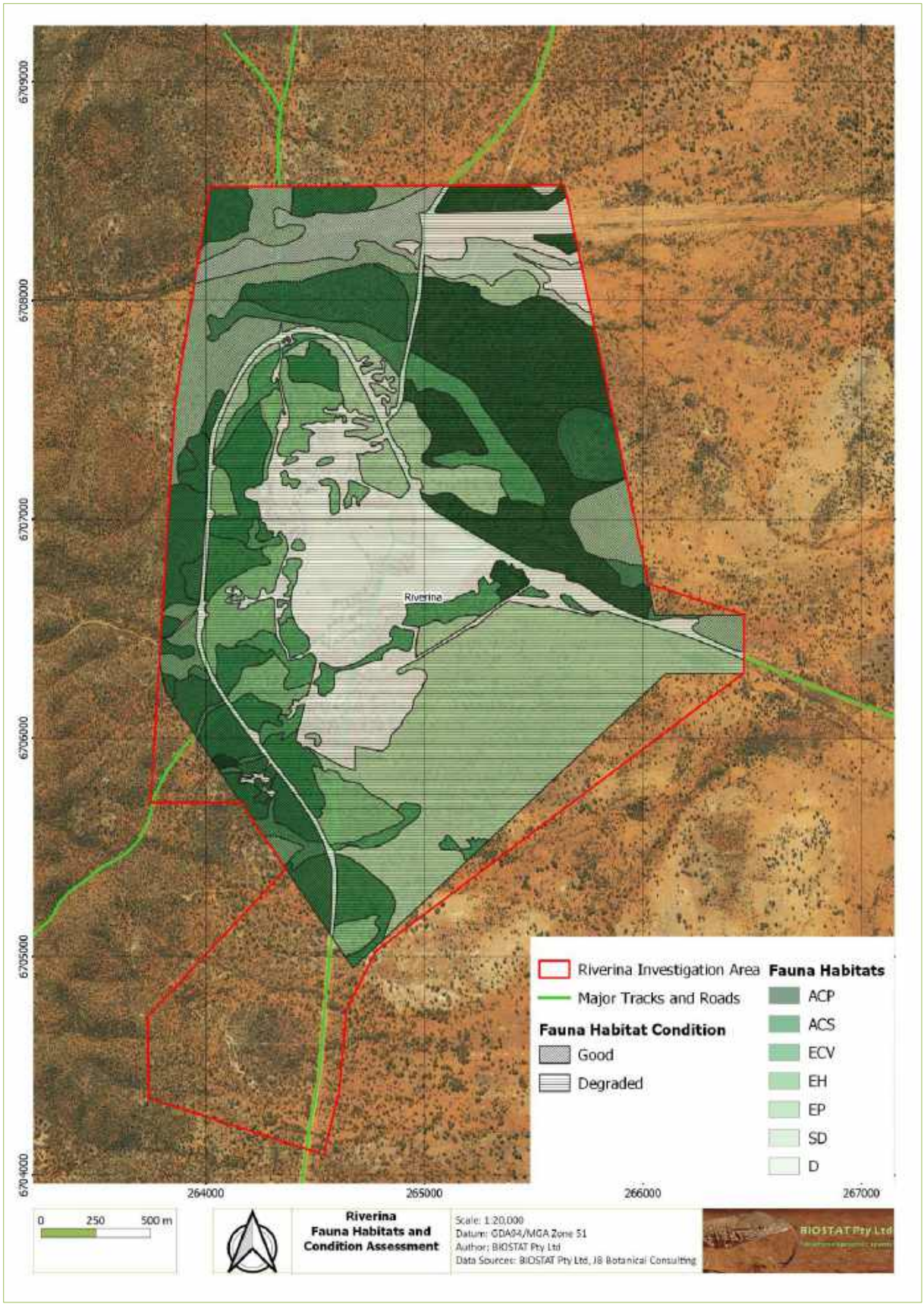

Figure 7 Fauna habitats and condition for Riverina.

Figure 8 Degraded habitat showing lack of ground cover and sparse shrubs.

Figure 9 A more structurally complex habitat present to the west of the Evanston-Menzies road.

4.1.2 Waihi

The Waihi is a highly degraded area with limited variation in fauna habitats (Table 4). Most of the site consists of lowland and washout areas of salmon gum (*Eucalyptus salmonophloia*) and gimlet (*E. salubris*) woodlands over chenopods although much of this area is considerably degraded. Impacts from mining activities, introduced grasses and weed, and the impact of cattle and other herbivores have reduced the vegetation to an open woodland system with extensive bare patches. A drainage line in the north-west corner of the IA boundary supports a variety of fauna habitats of relatively good quality although understory degradation was evident. Additional reasonably good fauna habitat exists to the west of the main access road. Waihi is overall of low-level fauna habitat quality with 88% of the area degraded to varying degrees.

The site is within a relatively degraded landscape suggesting long history of disturbance. Habitats within the greater area display similar levels of disturbance to much of Waihi clearance envelope. None of the habitats are critical to any of the listed threatened species that may occur in the local area. The loss of habitats from Waihi is likely to have minimal impact on fauna in the envelope and in surrounding areas.

Table 4 Fauna habitat areas identified at Waihi.

Fauna Habitat Code	Description	Fauna Habitat Condition	Area (ha)
ASH	**Acacia shrubland**	Good	6.8
ECW	**Eucalyptus/chenopod woodland**	Good	3.3
		Degraded	98.4
EW	**Eucalyptus woodland**	Good	17.4
		Degraded	28.0
D	**Degraded**		75.6
		Total Degraded Area	*202.0*
		Grand Total	**229.5**

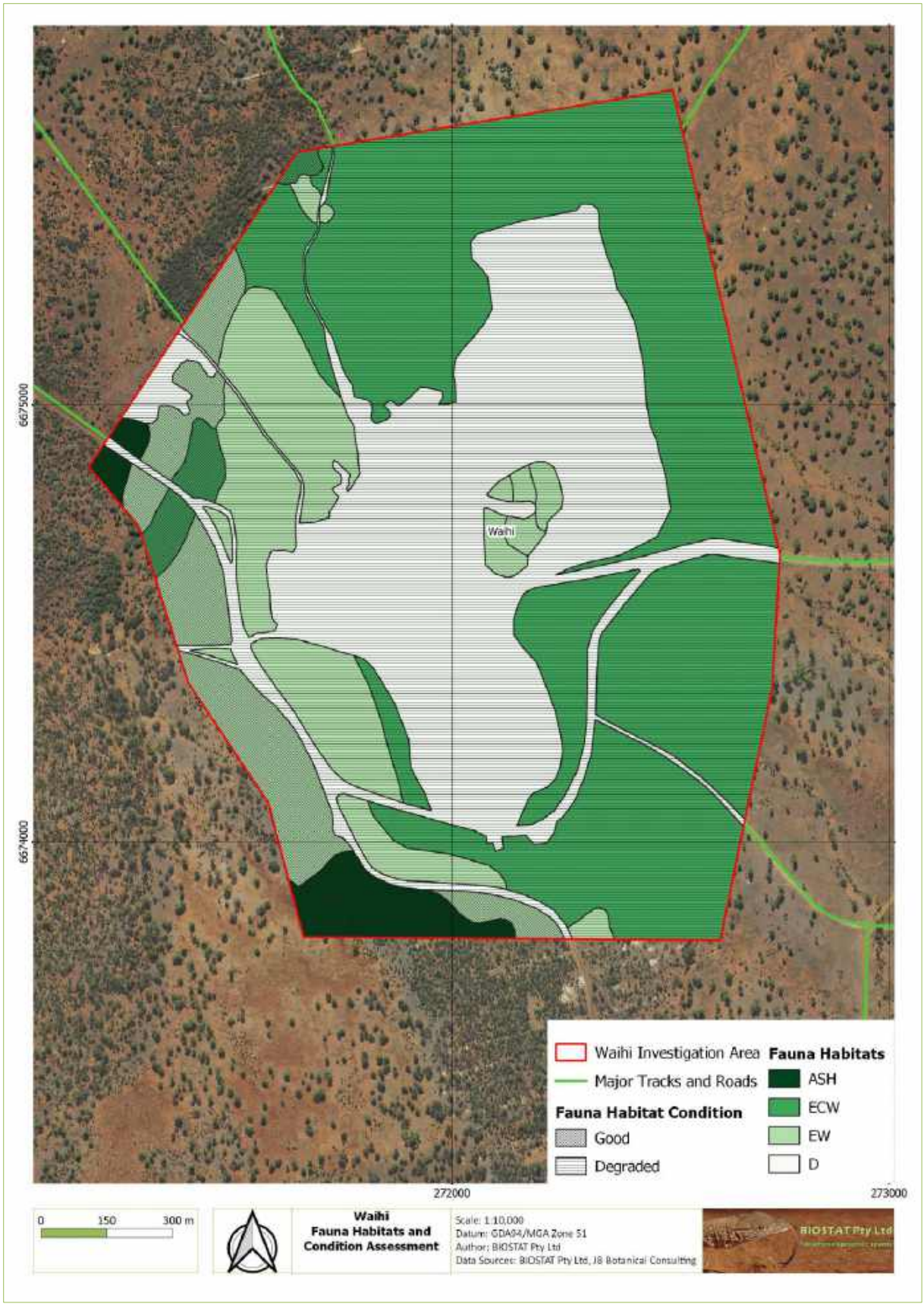

Figure 10 Fauna habitats and condition for Waihi.

4.1.3 Callion

As with Waihi, the Callion area is located on a drainage plain of sheetwash areas and drainage lines primarily of Eucalyptus woodlands over chenopods and saltbush (Figure 11). There are low rises within the landscape that support a drier habitat type of Acacia dominated shrubland or Eucalyptus dominated shrubland (Table 5). Remnant vegetation is mostly in fair condition (Figure 12). Although the vegetation is relatively dense and has an established lower storey and ground storey in patches, it was downgraded to fair due to the obvious signs of perturbations such as old mine workings and shafts as well as the persistent signs of cattle grazing impacts. The more recent mined area in the centre of the clearance envelope has changed surface water flows evident from the surface erosion to the south-east of the void.

The Eucalyptus woodlands and Acacia shrublands of the northern section do provide suitable habitat for native fauna but signs of fox were also identified during the reconnaissance. Two very old malleefowl mounds (>20 years) were located within this northern section indicating some level of suitability for nesting at some time.

Table 5 Fauna habitat areas identified at Callion.

Fauna Habitat Code	Description	Fauna Habitat Condition	Area (ha)
AS	Acacia shrubland	Fair	45.7
BR	Acacia shrubland on breakaways		1.8
EC	Eucalyptus woodland over chenopods and saltbush		117.6
ER	Eucalyptus drainage line		3.3
ES	Eucalyptus woodland with shrubland on slopes		22.6
D	Degraded		114.2
		Grand Total	305.2

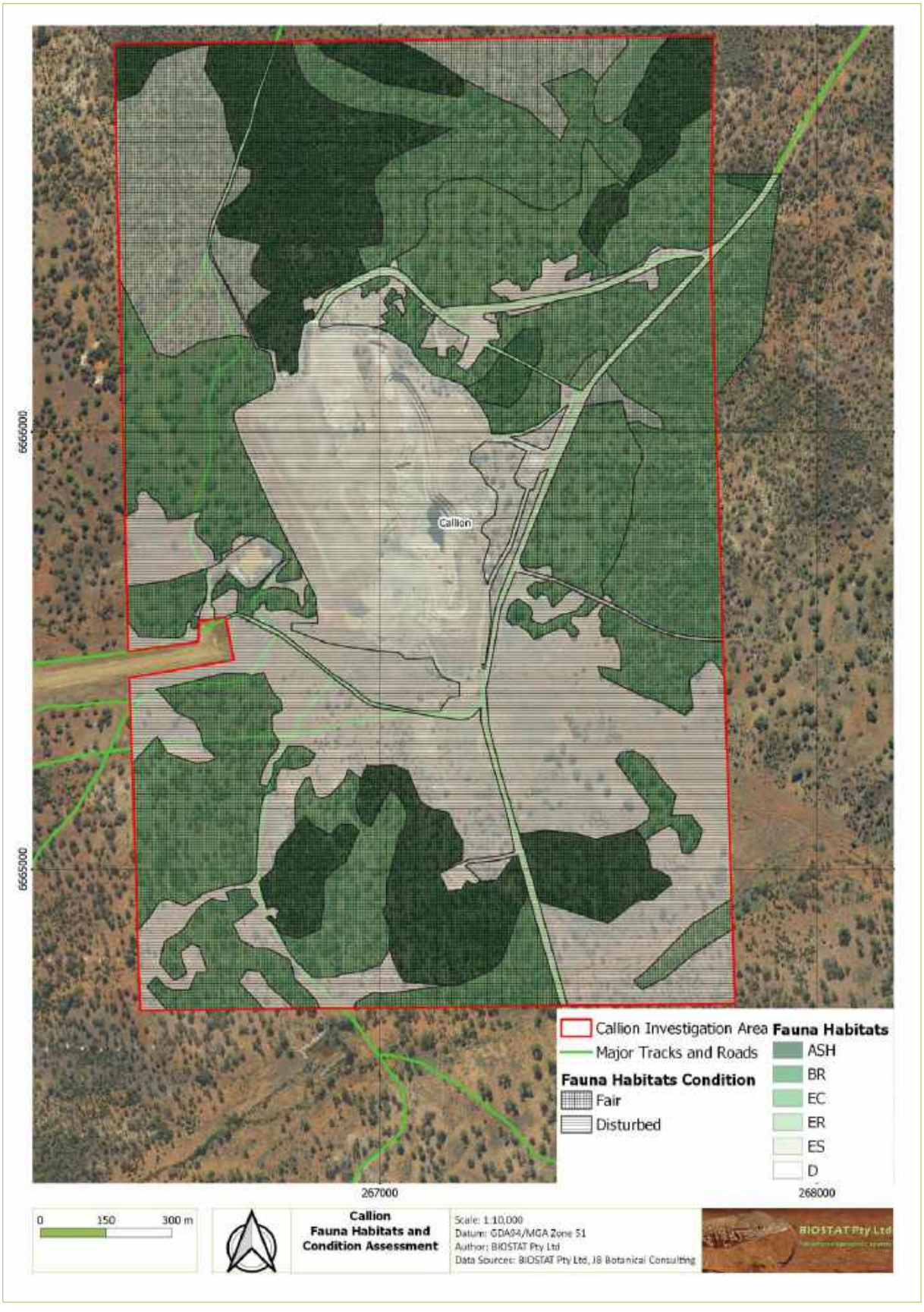

Figure 11 Fauna habitats and condition for Callion.

Figure 12 Typical habitats located in Callion.

Figure 13 One of several fox scats located at Callion.

4.1.4 Davyhurst

The Davyhurst site supports some of the higher quality habitat for any of the areas in this project (Figure 14). The habitats present in the area are all in very good condition with only very limited signs of the impact of grazing by introduced herbivores (including livestock).

The clearing area supports tall Eucalypt woodland over shrubland and tall Eucalypt mallee over spinifex or over shrubland with all forming a mosaic, transitioning from one habitat to the other (Figure 15). The Eucalypt habitat makes up 107.3 ha of the clearance area (Table 6). Certain *Eucalyptus* sp, such as *E. griffithsii* and *E. salmonophloia*, can support hollows used by birds, reptiles, and mammals. Spinifex hummock grasslands often support a very different ground-dwelling fauna assemblage in comparison to the open shrubland systems. It is likely this mosaic of systems supports a relatively high fauna biodiversity.

The complex structures created by the presence of taller trees and shrublands provide suitable nesting habitat for malleefowl. One individual was observed by an employee just outside the clearing area boundary during the reconnaissance survey and a further 5 old mounds identified within or just outside the clearance boundary.

Table 6 Fauna habitat areas identified at Davyhurst.

Fauna Habitat Code	Description	Fauna Habitat Condition	Area (ha)
CW	Casuarina woodland	Very Good	27.4
ML	*Eucalyptus* sp mallee over shrubland		20.2
MS	*Eucalyptus* sp mallee over spinifex		4.9
TE	Tall Eucalyptus sp woodland over shrubland		82.2
SH	Shrubland		34.3
		Degraded	*0*
		Grand Total	**169.1**

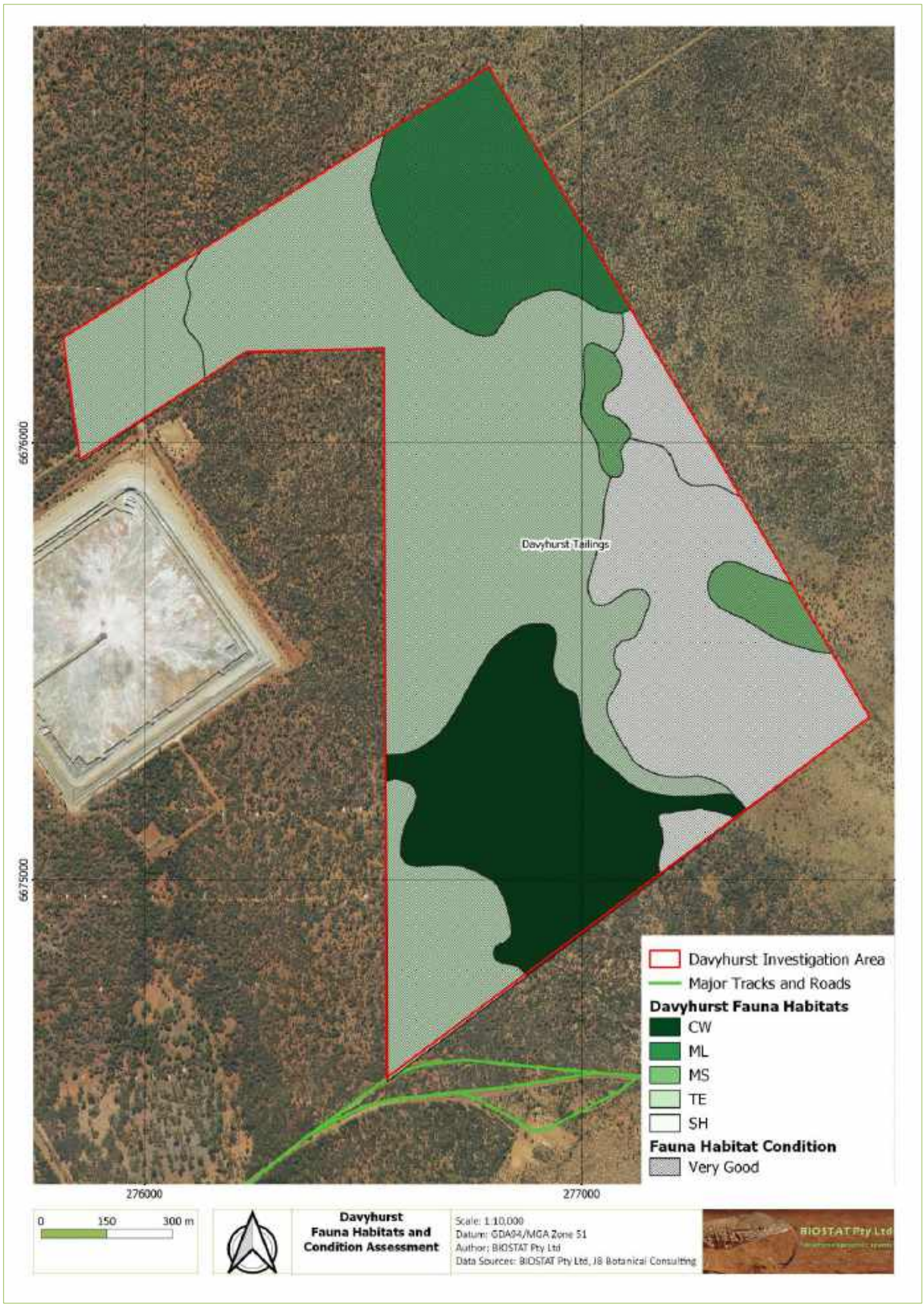

Figure 14 Fauna habitats and condition for Davyhurst.

Figure 15 Typical habitats found within Davyhurst.

4.1.5 Siberia

The Siberia area is located to the south of the other sites and is closer to settlement of Ora Banda. The area identified for clearing is approximately 52.1 ha in size consisting of four identifiable fauna habitats and highly degraded areas (Table 7).

The area is dominated by two topographical characteristics: Eucalyptus/mulga woodlands located on small stony rises and Eucalyptus woodlands on medium to heavy clay sheetwash plains. The stony rises support a different substrate which is likely to benefit a slightly different faunal assemblage to that found on the plains. For the most part, differences are likely to exist in ground dwelling fauna between the two topographic areas. Similarly, the taller trees are more likely to be found on the plains and these are more likely to support hollow nesting bird species. Generally, the fauna likely to be found in this area is not restricted to any specific habitat type and is likely to be found in most.

The area is highly disturbed across all habitat types. There is substantial fragmentation with haul roads and tracks throughout. There is substantial level of infrastructure still in place in the area and combined with the presence of tracks/roads, the area is likely to support the cat and fox including providing denning sites for these species. The quality of habitat in the Siberia area was judged overall as degraded and less likely to support a high degree of biodiversity, including MNES species.

Table 7 Fauna habitats identified in Siberia

Fauna Habitat Codes	Description	Fauna Habitat Condition	Area (ha)
EH	**Eucalyptus woodland over shrubs on low stony/rocky hills**	Degraded	12.3
EMH	**Eucalyptus mallee over shrublands on low stony hills**	Degraded	21.1
EP	**Eucalyptus woodland over low shrubs on sheetwash plains**	Degraded	13.3
MH	**Mulga woodland on low stony hills**	Degraded	0.7
D	**Degraded/ cleared areas with some regrowth**	Degraded	4.7
		Grand Total	**52.1**

Figure 16 Fauna habitats and condition for Siberia.

4.2 MNES Species

4.2.1 *Leipoa ocellata*, malleefowl

Status: VU, VU (EPBC and BC WA respectively)

Description: Malleefowl distributions have been generally restricted to the lower rainfall areas (<600mm isohyet) and predominantly absent from the higher rainfall areas (Saunders & Ingram 1995). Malleefowl have been impacted by loss of habitat and introduced predators, specifically fox, *Vulpes vulpes* (Bode & Brennan 2011; Priddel, Wheeler & Copley 2007). The loss of habitats, as with all fauna species under review here, is the major impact. Malleefowl also show a preference for long unburnt habitats with current agroforestry and fire protection practices impacting on the viability of habitats for this species (Parsons & Gosper 2011). It is likely that this species will utilise remnant vegetation corridors to allow them to move in highly modified landscapes such as agricultural areas. However, the persistence of this species in modified environments and in habitats not previously associated with their biology suggests a level of resilience.

The species will utilise broad habitats including shrublands, forests and woodland systems. It is a long-lived (~30 years) mobile species with a relatively large home range. However, there is a degree of fidelity to suitable nesting habitat and they may build several mounds as part of the breeding season but will only lay and tend one "chosen" as suitable by the breeding pair. Being a long-lived species, the study of this species requires long-term data collection to provide confidence in results. They are a relatively difficult species to observe and their presence is often only recorded by the location of nesting mounds. More intensive forms of surveying for malleefowl are available, for example, transect searches or lidar analysis. In all cases they are logistically complicated requiring large teams over long periods, are technically complex, and all are relatively costly. These methods are best employed where there is a need to identify and define populations within areas and are not appropriate for this level of assessment requested for this project.

The species is listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*) and Schedule 3 of the Western Australian *Biodiversity Conservation Act 2016* (*BC Act*).

Sightings of malleefowl in the broader area were compiled from a search of the DBCA threatened species database and Atlas of Living Australia online database (Figure 18). The data resulting from the searches does not provide additional information relating to each record displayed on the map such as the type of observation (individual, mound or sign).

The searches of Davyhurst and Callion did locate nesting mounds (Figure 17) and an individual malleefowl was observed at Davyhurst by one of the mine personnel during the reconnaissance. All the mounds had not been used in the last 20 years and were showing signs of erosion and some were characteristic extinct mounds (i.e., >50 years of age) and had almost eroded completely. Foot searches of Riverina could not be undertaken due to safety concerns for personnel resulting from a persistent overhead lightning storm, however detailed foot searches by the Flora survey team, which included an Arid Ecologist with extensive malleefowl experience did not locate any evidence of their presence.

However, during the survey a feral cat was sighted crossing the track near the administration building at Davyhurst. Although feral cats are not considered predators of adult malleefowl, they are known to take chicks and smaller juveniles. The presence of cattle in all areas is likely to have impacted on nesting success with cattle often disturbing mounds as well as trampling vegetation.

Likely Habitat Use: Open woodland, open forests, mallee, tall shrublands, rocky vegetated hills.

Threatening Processes: Loss of habitat. Habitat fragmentation. Predation by fox, wild dog, cat.

Likelihood of Occurrence: Highly Likely across all areas. An individual has been recorded at Davyhurst. The recording of mounds would suggest they are also likely to utilise less disturbed habitats for breeding.

Data Adequacy: Limited but sufficient for assessing the likelihood of occurrence of this species on a broader scale.

Figure 17 Old malleefowl mound located at Callion.

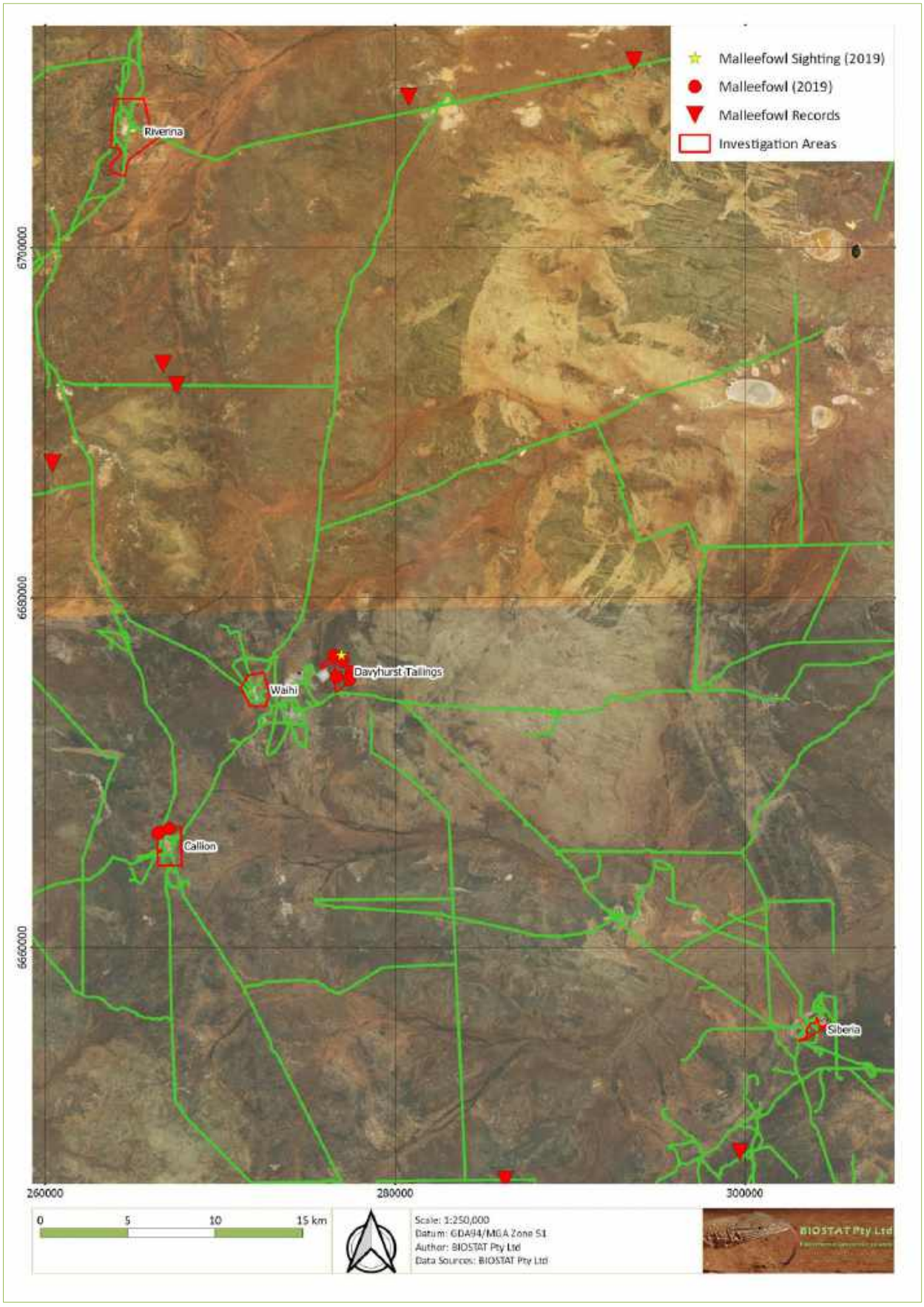

Figure 18 Records of Malleefowl with dates of records.

4.2.2 *Calidris ferruginea*, curlew sandpiper

Status: CR/MI, CR
Description: The curler sandpiper is associated with coastal mudflat areas but can sometimes be observed at inland ephemeral lakes (fresh or saline).

The species are under threat resulting from impacts on their coastal inter-tidal habitats in both the southern and northern hemispheres. They are regarded as vagrant in the interior and will utilise water bodies as short-term roosting areas (Garnett, Szabo & Dutson 2011). However, these are transient species and unlikely to be resident and their potential use of the project area habitats would be regarded as opportunistic.

No suitable habitat for this species was encountered during the reconnaissance survey. It is likely to only ever be observed as a vagrant to each of the five sites investigated, possibly as a result of being blown off course by storms.

Likely Habitat Use: Large open water sources and riparian systems.

Threatening Processes: Loss of habitat. Habitat fragmentation. Predation by cat, fox, dog, rat.

Likelihood: Unlikely in all areas. Transient and opportunistic.

4.2.3 *Pezoporus occidentalis*, night parrot

Status: EN, CR
Description:

The night parrot has only recently been "rediscovered" through its historical distribution. It prefers areas of large spinifex hummocks in long unburnt grassland habitats. Recent sightings of this species suggest that they have a broader habitat preference including chenopod shrublands (Gailberger 2017; Hamilton et al. 2017; Murphy et al. 2017).

The night parrot is a cryptic species and nomadic associated with changes in availability in water and food resources (Garnett, Szabo & Dutson 2011). It is often encountered opportunistically. Due to its enigmatic nature, surveying for this species is difficult, relying on the use of audio-recording devices established in suitable habitats over a lengthy period (10-12 months).

Much of the spinifex grassland plains encountered in the assessment consisted of small clumping *Triodia* species rather than the large hummocks more commonly associated with Night Parrot habitat. The most likely habitat for this species occurs in the eastern portions of Davyhurst which is a mosaic of tall mallee over shrubs or spinifex with areas of low shrubland with spinifex. These areas provide cover but also a foraging source for this species. Other areas of suitable habitat exist at Riverina on the western and northern fringes of the clearance area. The vegetation complexes at Callion may prove suitable for foraging for this species.

Likely Habitat Use: Open woodlands with relatively dense hummock and tussock grasses understorey, chenopod shrublands, salt-lake fringes, spinifex shrublands. Long unburnt habitats.

Threatening Processes: Loss of habitat. Habitat fragmentation. Changes in fire regimes. Introduced herbivores (cattle and other feral herbivores). Predation by cat, fox, dog.

Likelihood: Low in all areas. Nomadic.

4.2.4 Polytelis alexandrae, princess parrot

Status: VU, P4

Description: Princes Parrots are considered as an eruptive species with population numbers increasing rapidly during favourable seasons (Pavey et al. 2014). Habitat preference is for open woodlands of marbled gum (*Eucalyptus congylocarpa*), river red gum (*E. camaldulensis*) and desert oak (*Allocasuarina decaisneana*), and mallee over spinifex.

This species is restricted to the central arid interior of South Australia, Northern Territory and Western Australia. It is unlikely to be recorded in any of the project areas.

Likely Habitat Use: Open woodlands over spinifex and mallee over spinifex in the arid interior.

Threatening Processes: Changes in fire regimes, habitat clearing and fragmentation, introduced predators and herbivores.

Likelihood: Unlikely.

4.2.5 *Dasyurus geoffroii*, chuditch

Status: VU, VU

Description: This species had a much greater pre-European settlement distribution across Australia including the semi-arid and central regions (Woinarski, Burbidge & Harrison 2014). The chuditch suffered a sharp decline with the clearing of habitat and the introduction of herbivores and predators and is restricted to south-west Western Australia although it has been reintroduced into several sites across South Australia, New South Wales and Victoria. Translocations and reintroductions have also been undertaken in Western Australia with a focus to extend the current range of this species into semi-arid areas such as Lorna Glen in the Murchison district (Morris et al. 2015).

Historical records exist from the eastern portion of the Greater Western Woodlands and Goldfields region. There is also an unverified sighting of chuditch from the Goongarrie area from 2008 (NatureMap search 24/1/2020: source Record ID 15808). Much of the habitats that supported these species in the past has been highly modified or cleared. If they have persisted, the species is likely to be found in very low densities.

Likely Habitat Use: Woodland systems with well-established understory.

Threatening Processes: Habitat clearing and fragmentation, changed fire regimes, introduced predators and herbivores.

Likelihood: Unlikely.

5 GENERAL CONCLUSIONS AND RECOMMENDATIONS

The reconnaissance survey provided an overview of the fauna habitats present at each of the areas identified for clearing. It also provided a brief assessment of habitat values in relation to threatened fauna, especially malleefowl.

All the areas visited showed some degree of anthropogenic disturbances in the form of historical mine operations. Some of these mine workings were at least 90 years or older, with lower levels of associated impact. The more modern workings were on a larger scale and had more noticeable and extensive impacts.

With few exceptions the impact of livestock was also noticeable through the presence of individuals or signs such as footprints, scats and trampling of vegetation. The survey also located evidence of introduced predators including fox and feral cat. These existing factors will have impacted on the native fauna and on the habitats present within all sites.

The ecological value of habitats found within each of the sites are highly variable. The ecological values are a composite of the quality of habitats but also the complexity of the habitats. For example, the area chosen for clearing at Siberia is very much degraded and is of limited value for fauna. It is highly incised with tracks and earthworks highly fragmenting any remnant vegetation. In contrast, the Davyhurst area contains a variety of habitats with coherent structure and minimal fragmentation. This area was regarded as being in very good condition and likely to support a higher fauna biodiversity. Smaller section within the other areas also provide relatively good habitats for fauna. However, in all cases the area of degraded habitat comfortably exceeds any better-quality habitat.

All habitats have a value, even degraded habitats, as they provide varying levels of resources for different groups and species within fauna assemblages. The major impacts on habitats derive from:

1) total loss of habitats,

The total loss of habitats is the most immediate and severe impact. Total loss of habitat effectively ensures localised extirpation of fauna.

2) isolation of habitats,

The isolation of habitats would occur if areas are retained but surrounded by cleared landscape. These “islands”, if too small and too isolated, are likely to become less and less viable over time. It is likely this will occur in several of these projects as the areas will not be fully cleared and small stands may be retained.

3) fragmentation of habitats, and

Fragmentation of habitats occurs if areas, usually small, are randomly distributed in the landscape with some level of connectivity but not enough to provide contiguity. This impacts by reducing available viable habitat for fauna which, in turn, reduces survivability of populations.

4) secondary impacts on adjacent habitats.

Changes in habitats such as clearing will impact on surrounding habitats in a variety of ways. These are considered secondary impacts and include changes to surface hydrology, erosion, salination, silting, the creation of new edge effects, the introduction of weeds and the facilitation of access by introduced predators and herbivores.

The areas defined for clearing are likely to fall within categories 1 and 2 where the entire site is to be cleared (Siberia) or partially cleared (Riverina, Callion, Waihi and Davyhurst). It is, therefore, important the secondary impacts are avoided, mitigated or managed.

It is unlikely that clearing of Siberia will have any major secondary impacts as it supports a very low quality of habitat. Similarly, with most of Waihi also degraded, its value to native fauna is also considered low. However, it is important to consider the changes to surface hydrology at both sites as a result of clearing. This is especially important at Waihi due to the presence of the drainage line in the north-western corner of the clearing boundary. In addition, erosion and silting could be exacerbated due to the lack of vegetation cover and with changes in topography due to infrastructure.

Similarly, most of the area at Waihi has been highly disturbed and lack any coherent fauna habitat quality factors such as contiguity and structure. Areas to the north and west of the site, and adjacent areas outside the clearing envelope are of better fauna habitat quality. As with all clearing, the secondary and downstream impacts are of concern. However, in the case of the proposed clearing of Waihi, these impacts would be minimal.

Callion is in a landscape dominated by a sheetwash drainage plain with small areas of rises supporting open woodlands. The vegetation in the plains is relatively sparse but adapted to ephemeral flooding. Clearing the area is likely to impose surface hydrology impacts unless managed through the implementation of drainage mitigation measures (e.g., construction of channels, contour flow management). Other issues such as erosion and top-soil loss may also arise.

Riverina has sections of good quality habitat west and north of the Evanston-Menzies road. These are relatively intact vegetation communities on rises and along a drainage line. They are impacted by livestock and it is likely they also support introduced predators. The Evanston-Menzies road would act as a minor barrier to some of the smaller fauna (herpetofauna, small mammals, etc) but the lack of high-quality habitat to the east of the road would limit movement. The loss of the section to the west of the Evanston-Menzies road would impact on existing environment by creating a new edge-effect impact area. Furthermore, impacts on the drainage line to the north of the Evanston-Menzies road will potentially have downstream impacts outside the vegetation clearing boundaries.

The Davyhurst clearing envelope contains the largest area of very good quality habitat. The overall impact of the clearing is on adjacent habitats, mostly also of very good quality, through the creation of new edge effects, the facilitation of the movement of introduced predators (tracks), and changes in surface hydrology. These factors must be considered in the planning for the area to mitigate and manage downstream and secondary impacts.

None of the areas represent critical habitat for fauna, including malleefowl. Although an individual of this species was observed at Davyhurst, the available habitats outside the clearing areas are likely to be sufficient to support the local populations. This is especially relevant to areas such as Siberia where the habitats within the clearing envelope are degraded and unlikely to support nothing more than the occasional transient individual. The likelihood of other threatened species in the area is low. However, the cryptic and enigmatic night parrot may exist in the area, especially in the sheetwash plains of Callion and the low shrublands of Davyhurst. From available information on its biology, the habitats in these areas are not high value but mobile species can be found in many areas as transients. In summary, while most birds, larger mammals and reptiles will be able to avoid the impact of clearing, most small mammals, reptiles and burrowing frogs will be unavoidably killed by the large machinery used for vegetation removal and ground preparation. While the impact on individual animals is high, the clearing will have very little impact on the species overall.

In conclusion, none of the areas investigated are of sufficiently high quality and of importance to any of the listed threatened species for the area. In most cases, remnant habitats and areas are poor in quality and would not present a significant loss to the populations nor impact on local populations if they exist in the area. The greatest concern are secondary and downstream impacts resulting from the clearing of vegetation. It is recommended:

- The areas added to the project after the site reconnaissance should be assessed for fauna habitat and fauna quality prior to any ground disturbance.

- A search of areas to be cleared for malleefowl nests be conducted by an experienced zoologist prior to any activity.
- Avoidance of unnecessary clearing of vegetation beyond that strictly required.
- Windrows of topsoil, log debris and leaf litter formed during clearing should be retained, as they create extremely good microhabitat for a large range of fauna, particularly reptiles (see comment below).
- Rapid rehabilitation of cleared areas such as laydown sites and access tracks which are no longer required after construction.
- Rehabilitation should be structured to encourage the return of fauna by providing micro-relief and dense vegetation cover. This may be achieved, particularly in temporary laydown areas, by:
    - leaving patches or strips of vegetation;
    - placing equipment on flattened shrubbery rather than clearing;
    - retention of root stock in the ground by shallow scraping during essential clearing; and,
    - retaining stockpiled vegetation debris in windrows.
- Consideration is given to feral predator control (cat and fox) program.

Windrows and flattened vegetation provide substantial microhabitat and increased humidity for small vertebrates. They also provide a trap for windblown seed and protection for seedlings following germination. Placement of windrows across the prevailing wind direction may reduce erosion and facilitate rehabilitation success.

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Appendix 1. Database Searches Results

Appendix 4: Water Quality Analysis Results

Envirolab Services (WA) Pty Ltd trading as MPL Laboratories
ABN 53 140 099 207
16-18 Hayden Court Myaree WA 6154
ph +61 8 9317 2505
lab@mpl.com.au
www.mpl.com.au

Certificate of Analysis PGE0120

Client Details

Client	Ora Banda Mining Ltd
Contact	[redacted]
Address	[redacted]

Sample Details

Your Reference	Quarterly Palmerston Pit WQ Sample - W6904
Number of Samples	1 Water
Date Samples Received	02/05/2025
Date Instructions Received	02/05/2025

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for soils and on an as received basis for other matrices.

Report Details

Date Results Requested by	09/05/2025
Date of Issue	09/05/2025

Accredited for compliance with ISO/IEC 17025. Tests not covered by NATA are denoted with *.

Authorisation Details

[redacted]

Certificate of Analysis PGE0120

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PGE0120-01	Palmerston Pit Discharge Point	Water	01/05/2025	02/05/2025

Volatile TRH and BTEX (Water)

Envirolab ID	Units	PQL	PGE0120-01
Your Reference			Palmerston Pit Discharge Point
Date Sampled			01/05/2025
TRH C6-C9	µg/L	10	<10
TRH C6-C10	µg/L	10	<10
TRH C6-C10 less BTEX (F1)	µg/L	10	<10
Methyl tert butyl ether (MTBE)	µg/L	1.0	<1.0
Benzene	µg/L	1.0	<1.0
Toluene	µg/L	1.0	<1.0
Ethylbenzene	µg/L	1.0	<1.0
meta+para Xylene	µg/L	2.0	<2.0
ortho-Xylene	µg/L	1.0	<1.0
Total +ve Xylenes	µg/L	1.0	<1.0
Naphthalene (value used in F2 calc)	µg/L	1.0	<1.0
Total +ve BTEX	µg/L	1.0	<1.0
Surrogate Dibromofluoromethane	%		96.7
Surrogate Toluene-D8	%		88.9
Surrogate 4-Bromofluorobenzene	%		105

Semi-volatile TRH (Water)

Envirolab ID	Units	PQL	PGE0120-01
Your Reference			Palmerston Pit Discharge Point
Date Sampled			01/05/2025
TRH C10-C14	µg/L	50	<50
TRH C15-C28	µg/L	100	<100
TRH C29-C36	µg/L	100	<100
Total +ve TRH C10-C36	µg/L	50	<50
TRH >C10-C16	µg/L	50	<50
TRH >C10-C16 less Naphthalene F2	µg/L	50	<50
TRH >C16-C34 (F3)	µg/L	100	<100
TRH >C34-C40 (F4)	µg/L	100	<100
Total +ve TRH >C10-C40	µg/L	50	<50
Surrogate o-Terphenyl	%		87.3

Dissolved Low Level Metals (Water)

Envirolab ID	Units	PQL	PGE0120-01
Your Reference			Palmerston Pit Discharge Point
Date Sampled			01/05/2025
Arsenic	µg/L	1.0	<1.0
Cadmium	µg/L	0.10	0.50
Cobalt	µg/L	1.0	17
Chromium	µg/L	1.0	<1.0
Copper	µg/L	1.0	6.1
Iron	µg/L	10	25
Mercury	µg/L	0.050	<0.050
Lithium	µg/L	1.0	130
Molybdenum	µg/L	1.0	68
Nickel	µg/L	1.0	60
Lead	µg/L	1.0	<1.0
Antimony	µg/L	1.0	2.9
Selenium	µg/L	1.0	23
Titanium	µg/L	1.0	<1.0
Zinc	µg/L	1.0	40

Inorganics - Physical Parameters (Water)

Envirolab ID	Units	PQL	ADWG	PGE0120-01
Your Reference			Health	Palmerston Pit Discharge Point
Date Sampled			Value	01/05/2025
pH	pH units		6.5-8.5	7.8
Electrical Conductivity	µS/cm	2.0		46000
Total Dissolved Solids	mg/L	5.0	600	**32000**

Inorganics - Ionic Balance and Indexes (Water)

Envirolab ID	Units	PQL	PGE0120-01
Your Reference			Palmerston Pit Discharge Point
Date Sampled			01/05/2025
Bicarbonate Alkalinity as CaCO3	mg/L as CaCO3	5.0	260
Carbonate Alkalinity as CaCO3	mg/L as CaCO3	5.0	<5.0
Hydroxide OH- as CaCO3	mg/L as CaCO3	5.0	<5.0
Total Alkalinity as CaCO3	mg/L as CaCO3	5.0	260
Chloride	mg/L	1.0	16000
Sulfate	mg/L	1.0	3000
Calcium	mg/L	0.50	540
Magnesium	mg/L	0.50	1500
Potassium	mg/L	0.50	120
Sodium	mg/L	0.50	8000
Hardness (calc) equivalent CaCO3	mg/L	3.0	7700
Ionic Balance	%		-2.5
Total Anions	mg/L	7.0	19000
Anions as meq	meq/L	0.59	520
Total Cations	mg/L	2.0	10000
Cations as meq	meq/L	0.10	510

Inorganics - Nutrients (Water)

Envirolab ID	Units	PQL	ADWG	PGE0120-01
Your Reference			Health	Palmerston Pit Discharge Point
Date Sampled			Value	01/05/2025
Nitrate as N	mg/L	0.0050		130
Nitrate as NO3 by calculation	mg/L	0.020	50	**570**

Method Summary

Method ID	Methodology Summary
Calc - ION	Calculation
INORG-001	pH Measured using pH meter and electrode. Please note that the results for water analyses are indicative only, as analysis can be completed outside of the recommended holding times. Solids are reported from a 1:5 water extract unless otherwise specified. Alternatively, pH is determined in a 1:5 extract using 0.01M calcium chloride or a solid is extracted at a ratio of 1:2.5 (AS1289.4.3.1), pH is measured in the extract.
INORG-002	Conductivity and Salinity - measured using a conductivity cell at 25°C. Soil results reported from a 1:5 Soil:Water extract unless otherwise specified. Please note Resistivity is estimated by calculation and may not correlate with results otherwise obtained using the Resistivity current method (based on AS 1289.4.4.1), depending on the nature of the soil being analysed.
INORG-006	Alkalinity - determined titrimetrically based on APHA latest edition 2320-B. Solids reported from a 1:5 water extract unless otherwise specified. Total Carbon Dioxide - determined by calculation in accordance with APHA latest edition,4500-CO2 D.
INORG-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180±10°C. NOTE: Where the EC of the sample is <100µS/cm, the TDS will typically be below 70mg/L (as the sample is very likely to be at least drinking water quality). Therefore to ensure data quality for TDS, the TDS is typically calculated as per the equation: TDS = EC*0.6
INORG-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 15% i.e. total anions = total cations +/-15%.
INORG-055	Nitrate/Nitrite/NOx/TKN - determined colourimetrically. Waters samples are filtered on receipt prior to analysis. Soils/solids are analysed following a water extraction.
INORG-081	Anions determined by Ion Chromatography. Waters samples are filtered on receipt prior to analysis. Solids are analysed from a water extract. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
METALS-020	Determination of various metals by ICP-OES. Where salts (oxides, chlorides etc.) are calculated from the element concentration stoichiometrically there is no guarantee that the salt form is completely soluble in the acids used in the preparation.
METALS-021	Determination of Mercury by Cold Vapour AAS.
METALS-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Where salts (oxides, chlorides etc.) are calculated from the element concentration stoichiometrically there is no guarantee that the salt form is completely soluble in the acids used in the preparation.
ORG-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
ORG-023_F1_TOT	Determination of volatile organic compounds (VOCs) by P&T-GC-MS. Water samples are analysed directly by purge and trap GC-MS. Solids are extracted with Methanol, diluted and analysed by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volumes are typically provided by customers (often as flow rate(s) and sampling time(s) and/or simply volume(s) sampled or exposure times (determines 'volume' passive badges are exposed to)). Hence in such circumstances the volume measurement is inevitably not covered by Envirolab's NATA accreditation. An exception may occur where Envirolab Newcastle does the sampling where accreditation exists for certain types of sampling and hence volume determination(s). Note air volumes are often used to determine concentrations for dust and/or analyses on filters, sorbents and in impingers. For canister sampling, the air volume is covered by Envirolab's NATA accreditation.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from the latest "Australian Drinking Water Guidelines", published by NHMRC. No guideline values have been set for Total Coliforms in drinking water. Increased concentrations should be investigated. Total Coliforms are not considered useful as indicators of the presence of faecal contamination.

Where we have provided guideline values eg. ADWG Health Value, it is the responsiblity of the reader to decide if the water is fit for consumption. Please note that the tests we have conducted are just a selection of common tests to give you a general idea of drinking water quality. There are many other tests included in the ADWG that we have not tested for.

Data Quality Assessment Summary PGE0120

Client Details

Client	Ora Banda Mining Ltd
Your Reference	Quarterly Palmerston Pit WQ Sample - W6904
Date Issued	09/05/2025

Recommended Holding Time Compliance

Recommended holding time exceedances exist - See detailed list below

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	No	LCS Outliers Exist - See detailed list below
Duplicates	Yes	No Outliers
Matrix Spike	No	Matrix Spike Outliers Exist - See detailed list below
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	Yes	No Outliers

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PGE0120

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
vTRH&MBTEXN | Water	1	01/05/2025	02/05/2025	03/05/2025	Yes
sTRH | Water	1	01/05/2025	05/05/2025	06/05/2025	Yes
Dissolved Metals (LL) | Water	1	01/05/2025	06/05/2025	07/05/2025	Yes
Dissolved Metals (LL)-Hg | Water	1	01/05/2025	06/05/2025	07/05/2025	Yes
EC | Water	1	01/05/2025	05/05/2025	05/05/2025	Yes
pH | Water	1	01/05/2025	05/05/2025	05/05/2025	No
TDS | Water	1	01/05/2025	05/05/2025	06/05/2025	Yes
Alkalinity Suite | Water	1	01/05/2025	05/05/2025	05/05/2025	Yes
Chloride | Water	1	01/05/2025	05/05/2025	06/05/2025	Yes
Dissolved Cations | Water	1	01/05/2025	06/05/2025	07/05/2025	Yes
Ion Balance | Water	1	01/05/2025	06/05/2025	07/05/2025	Yes
	1	01/05/2025	07/05/2025	09/05/2025	Yes
Sulfate | Water	1	01/05/2025	05/05/2025	06/05/2025	Yes
Nitrogen - Nitrate | Water	1	01/05/2025	05/05/2025	05/05/2025	Yes

Outliers: Laboratory Control Samples

ORG-020|Semi-volatile TRH (Water)| Batch BGE0649

Sample ID	Analyte	% Limits	% Recovery
BGE0649-BS1	o-Terphenyl	60 - 140	##[2]

Outliers: Matrix Spike

INORG-055|Inorganics - Nutrients (Water)| Batch BGE0602

Sample ID	Analyte	% Limits	% Recovery
BGE0602-MS2#	Nitrate as N	70 - 130	##[1]

METALS-022|Dissolved Low Level Metals (Water)| Batch BGE0849

Sample ID	Analyte	% Limits	% Recovery
BGE0849-MS1#	Iron	70 - 130	##[1]

ORG-020|Semi-volatile TRH (Water)| Batch BGE0649

Sample ID	Analyte	% Limits	% Recovery
BGE0649 MS1#	o-Terphenyl	60 - 140	##[2]

Quality Control PGE0120

ORG-023_F1_TOT|Volatile TRH and BTEX (Water) | Batch BGE0504

Analyte	Units	PQL	Blank	DUP1 BGE0504-DUP1# Samp | QC | RPD %	LCS %	Spike % BGE0504-MS1#
TRH C6-C9	µg/L	10	<10	<50 | <50 | [NA] [3]	97.4	99.2
TRH C6-C10	µg/L	10	<10	<50 | <50 | [NA] [3]	97.8	100
Methyl tert butyl ether (MTBE)	µg/L	1.0	<1.0	<5.0 | <5.0 | [NA] [3]	[NA]	[NA]
Benzene	µg/L	1.0	<1.0	<5.0 | <5.0 | [NA] [3]	99.4	99.6
Toluene	µg/L	1.0	<1.0	<5.0 | <5.0 | [NA] [3]	102	103
Ethylbenzene	µg/L	1.0	<1.0	<5.0 | <5.0 | [NA] [3]	101	99.6
meta+para Xylene	µg/L	2.0	<2.0	<10 | <10 | [NA] [3]	98.7	99.7
ortho-Xylene	µg/L	1.0	<1.0	<5.0 | <5.0 | [NA] [3]	101	101
Naphthalene (value used in F2 calc)	µg/L	1.0	<1.0	34.1 | 32.7 | 4.07	[NA]	[NA]
Surrogate Dibromofluoromethane	*%*		*92.1*	*94.3 / 92.8*	*96.8*	*99.8*
Surrogate Toluene-D8	*%*		*90.2*	*88.8 / 88.7*	*96.8*	*97.0*
Surrogate 4-Bromofluorobenzene	*%*		*101*	*101 / 101*	*97.0*	*98.5*

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

ORG-020|Semi-volatile TRH (Water) | Batch BGE0649

Analyte	Units	PQL	Blank	DUP1 BGE0649-DUP1# Samp | QC | RPD %	DUP2 BGE0649-DUP2# Samp | QC | RPD %	LCS %	Spike % BGE0649-MS1#
TRH C10-C14	µg/L	50	<50	<50 | <50 | [NA]	<50 | <50 | [NA]	71.1	88.4
TRH C15-C28	µg/L	100	<100	<100 | <100 | [NA]	<100 | <100 | [NA]	70.7	90.1
TRH C29-C36	µg/L	100	<100	<100 | <100 | [NA]	<100 | <100 | [NA]	65.3	85.9
TRH >C10-C16	µg/L	50	<50	<50 | <50 | [NA]	<50 | <50 | [NA]	71.0	89.6
TRH >C16-C34 (F3)	µg/L	100	<100	<100 | <100 | [NA]	<100 | <100 | [NA]	71.0	90.5
TRH >C34-C40 (F4)	µg/L	100	<100	<100 | <100 | [NA]	<100 | <100 | [NA]	68.4	87.1
Surrogate o-Terphenyl	*%*		*104*	*88.3 / 87.1*	*90.3 / 76.0*	*## [2]*	*##[2]*

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

METALS-022|Dissolved Low Level Metals (Water) | Batch BGE0849

Analyte	Units	PQL	Blank	DUP1 BGE0849-DUP1# Samp | QC | RPD %	DUP2 BGE0849-DUP2# Samp | QC | RPD %	LCS %	Spike % BGE0849-MS1#
Antimony	µg/L	1.0	<1.0	<1.0 | 1.17 | [NA] [4]	<1.0 | <1.0 | [NA]	101	101
Arsenic	µg/L	1.0	<1.0	4.33 | 4.80 | [NA]	<1.0 | <1.0 | [NA]	101	107
Cadmium	µg/L	0.10	<0.10	3.58 | 3.51 | 1.97	<0.10 | <0.10 | [NA]	105	104
Chromium	µg/L	1.0	<1.0	1.61 | 1.84 | [NA]	<1.0 | <1.0 | [NA]	102	105
Cobalt	µg/L	1.0	<1.0	2.69 | 2.89 | [NA]	<1.0 | <1.0 | [NA]	104	106
Copper	µg/L	1.0	<1.0	17.4 | 18.0 | 3.22	<1.0 | <1.0 | [NA]	105	107
Iron	µg/L	10	<10	72.1 | 72.1 | 0.0277	<10 | <10 | [NA]	103	##[1]
Lead	µg/L	1.0	<1.0	<1.0 | <1.0 | [NA]	<1.0 | <1.0 | [NA]	103	98.2
Lithium	µg/L	1.0	<1.0	296 | 294 | 0.861	2.52 | 2.52 | [NA]	98.2	95.3
Molybdenum	µg/L	1.0	<1.0	46800 | 47800 | 2.23	<1.0 | <1.0 | [NA]	98.6	101
Nickel	µg/L	1.0	<1.0	3.43 | 3.45 | [NA]	<1.0 | <1.0 | [NA]	104	106
Selenium	µg/L	1.0	<1.0	1.80 | 1.94 | [NA]	<1.0 | <1.0 | [NA]	107	106
Titanium	µg/L	1.0	<1.0	46.7 | 48.6 | 3.88	<1.0 | <1.0 | [NA]	102	101
Zinc	µg/L	1.0	<1.0	<1.0 | <1.0 | [NA]	<1.0 | <1.0 | [NA]	102	106

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

METALS-021|Dissolved Low Level Metals (Water) | Batch BGE0853

Analyte	Units	PQL	Blank	DUP1 BGE0853-DUP1# Samp | QC | RPD %	DUP2 BGE0853-DUP2# Samp | QC | RPD %	LCS %	Spike % BGE0853-MS1#
Mercury	µg/L	0.050	<0.050	<0.050 | <0.050 | [NA]	<0.050 | <0.050 | [NA]	100	100

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

Quality Control PGE0120

INORG-018 | Inorganics - Physical Parameters (Water) | Batch BGE0588

Analyte	Units	PQL	Blank	DUP1 BGE0588-DUP1# Samp | QC | RPD %	DUP2 BGE0588-DUP2# Samp | QC | RPD %	LCS %
Total Dissolved Solids	mg/L	5.0	<5.0	102 | 108 | 5.71	454 | 461 | 1.53	97.6

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

INORG-001 | Inorganics - Physical Parameters (Water) | Batch BGE0656

Analyte	Units	PQL	Blank	DUP1 BGE0656-DUP1# Samp | QC | RPD %	DUP2 BGE0656-DUP2# Samp | QC | RPD %	LCS %
pH	pH units		6.0	7.4 | 7.4 | 0.00	7.9 | 8.0 | 0.126	102
Electrical Conductivity	µS/cm	2.0	<2.0	1380 | 1380 | 0.0289	740 | 740 | 0.0270	108

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

INORG-006 | Inorganics - Ionic Balance and Indexes (Water) | Batch BGE0656

Analyte	Units	PQL	Blank	DUP1 BGE0656-DUP1# Samp | QC | RPD %	DUP2 BGE0656-DUP2# Samp | QC | RPD %	LCS %
Bicarbonate Alkalinity as CaCO3	mg/L as CaCO3	5.0	<5.0	603 | 622 | 3.22	86.1 | 83.6 | 2.95	[NA]
Carbonate Alkalinity as CaCO3	mg/L as CaCO3	5.0	<5.0	<5.0 | <5.0 | [NA]	<5.0 | <5.0 | [NA]	[NA]
Hydroxide OH- as CaCO3	mg/L as CaCO3	5.0	<5.0	<5.0 | <5.0 | [NA]	<5.0 | <5.0 | [NA]	[NA]
Total Alkalinity as CaCO3	mg/L as CaCO3	5.0	<5.0	603 | 622 | 3.22	86.1 | 83.6 | 2.95	100

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

INORG-081 | Inorganics - Ionic Balance and Indexes (Water) | Batch BGE0663

Analyte	Units	PQL	Blank	DUP1 BGE0663-DUP1# Samp | QC | RPD %	DUP2 BGE0663-DUP2# Samp | QC | RPD %	LCS %	Spike % BGE0663-MS1#
Chloride	mg/L	1.0	<1.0	89.7 | 86.6 | 3.50	223 | 222 | 0.491	90.2	127
Sulfate	mg/L	1.0	<1.0	48.9 | 49.4 | 1.01	119 | 121 | 1.38	87.0	118

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

METALS-020 | Inorganics - Ionic Balance and Indexes (Water) | Batch BGE0851

Analyte	Units	PQL	Blank	DUP1 BGE0851-DUP1# Samp | QC | RPD %	DUP2 BGE0851-DUP2# Samp | QC | RPD %	LCS %	Spike % BGE0851-MS1#
Calcium	mg/L	0.50	<0.50	186 | 187 | 0.328	49.8 | 50.0 | 0.355	86.4	82.7
Magnesium	mg/L	0.50	<0.50	132 | 132 | 0.387	43.0 | 42.7 | 0.579	91.5	95.5
Potassium	mg/L	0.50	<0.50	46.2 | 45.9 | 0.547	8.45 | 8.44 | 0.124	90.7	92.4
Sodium	mg/L	0.50	<0.50	1070 | 1070 | 0.289	67.3 | 66.7 | 0.925	90.5	99.5
Hardness (calc) equivalent CaCO3	mg/L	3.0	<3.0	1010 | 1010 | 0.0574	301 | 301 | 0.192	[NA]	[NA]

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

INORG-055 | Inorganics - Nutrients (Water) | Batch BGE0602

Analyte	Units	PQL	Blank	DUP1 PGE0120-01 Samp | QC | RPD %	LCS %	Spike % BGE0602-MS2#
Nitrate as N	mg/L	0.0050	<0.0050	128 | 130 | 1.71	85.6	##[1]
Nitrate as NO3 by calculation	mg/L	0.020	<0.020		[NA]	[NA]

QC Comments

Identifier	Description
[1]	Spike recovery is not applicable due to the relatively high analyte background in the sample (>3* spike level). However, the LCS recovery is within acceptance criteria.
[2]	Surrogate recovery is outside routine acceptance criteria (60-140%) as a result of the high concentration of analyte(s) in the sample.
[3]	PQL(s) has/have been raised as the sample(s) was/were foamy and therefore required dilution.
[4]	Duplicate %RPD may be flagged as an outlier to routine laboratory acceptance, however, where one or both results are <10*PQL, the RPD acceptance criteria increases exponentially.

Appendix 5: Aboriginal Heritage Inquiry System Search Results

Aboriginal Cultural Heritage Inquiry System

List of Aboriginal Cultural Heritage (ACH) Lodged

Search Criteria

No Aboriginal Cultural Heritage (ACH) Lodged in Mining Tenement - M 24/960

Disclaimer

Aboriginal heritage holds significant value to Aboriginal people for their social, spiritual, historical, scientific, or aesthetic importance within Aboriginal traditions, and provides an essential link for Aboriginal people to their past, present and future. In Western Australia Aboriginal heritage is protected under the *Aboriginal Heritage Act 1972*.

All Aboriginal cultural heritage in Western Australia is protected, whether or not the ACH has been reported or exists on the Register.

The information provided is made available in good faith and is predominately based on the information provided to the Department of Planning, Lands and Heritage by third parties. The information is provided solely on the basis that readers will be responsible for making their own assessment as to the accuracy of the information. If you find any errors or omissions in our records, including our maps, it would be appreciated if you provide the details to the Department via https://achknowledge.dplh.wa.gov.au/ach-enquiry-form and we will make every effort to rectify it as soon as possible.

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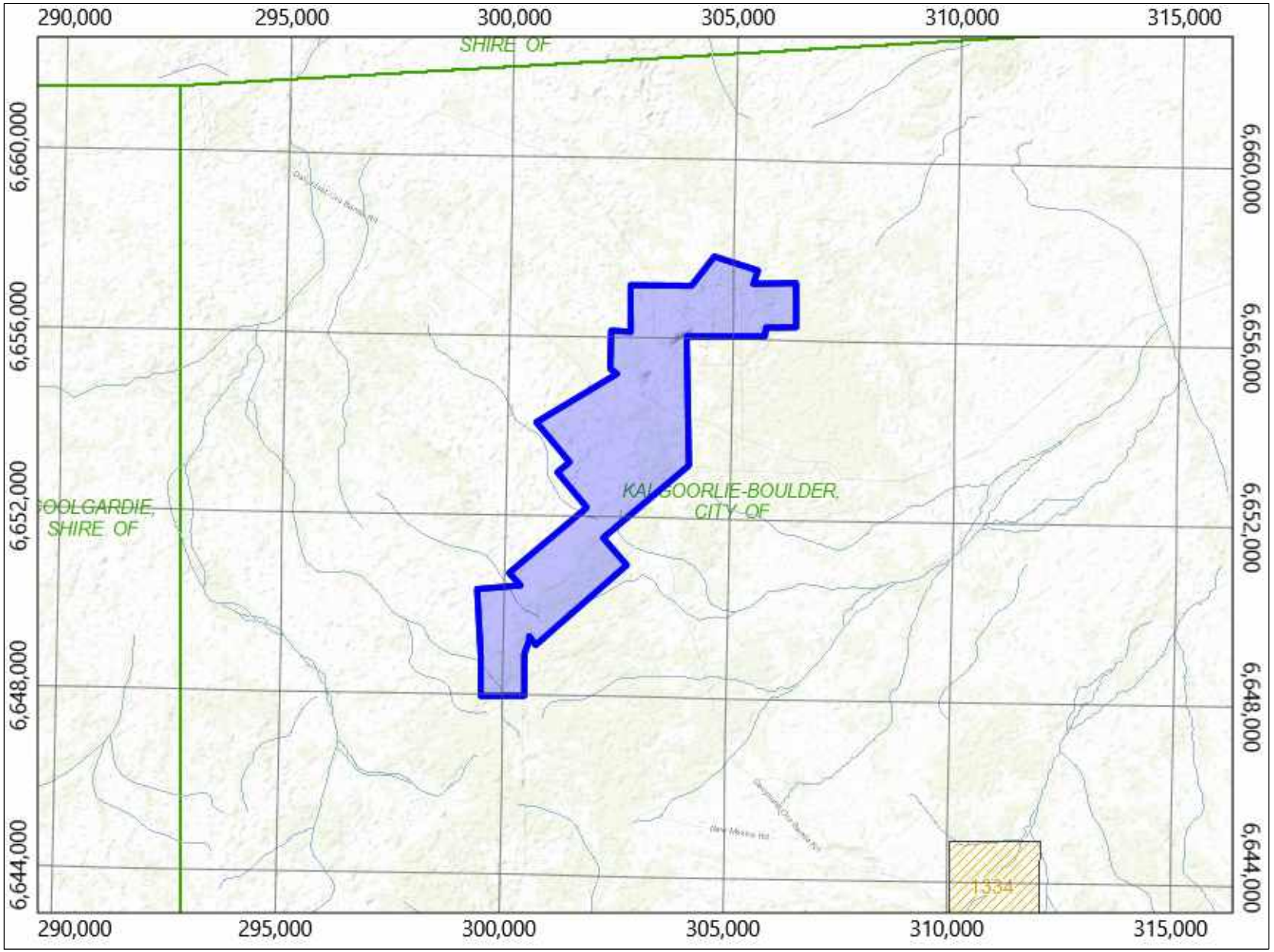
Map coordinates are based on the GDA 2020 Datum.

Basemap Copyright

Department of Planning, Lands and Heritage

Aboriginal Cultural Heritage Inquiry System

Map of Aboriginal Cultural Heritage (ACH) Lodged



Legend

- Aboriginal Cultural Heritage (ACH) Lodged
- Search Area
- Aboriginal Community
  - *Permanent*
  - *Seasonal*
  - *Town Based*
- Town
- Road
- River
- Local Government Authority

4.94 kilometres

Map Scale 1 : 150,000

MGA Zone 51 (GDA2020)

Search Criteria

No Aboriginal Cultural Heritage (ACH) Register in Mining Tenement - M 24/960

Disclaimer

Aboriginal heritage holds significant value to Aboriginal people for their social, spiritual, historical, scientific, or aesthetic importance within Aboriginal traditions, and provides an essential link for Aboriginal people to their past, present and future. In Western Australia Aboriginal heritage is protected under the Aboriginal Heritage Act 1972.

All Aboriginal cultural heritage in Western Australia is protected, whether or not the ACH has been reported or exists on the Register.

The information provided is made available in good faith and is predominately based on the information provided to the Department of Planning, Lands and Heritage by third parties. The information is provided solely on the basis that readers will be responsible for making their own assessment as to the accuracy of the information. If you find any errors or omissions in our records, including our maps, it would be appreciated if you provide the details to the Department via https://achknowledge.dplh.wa.gov.au/ach-enquiry-form and we will make every effort to rectify it as soon as possible.

Copyright

Coordinates

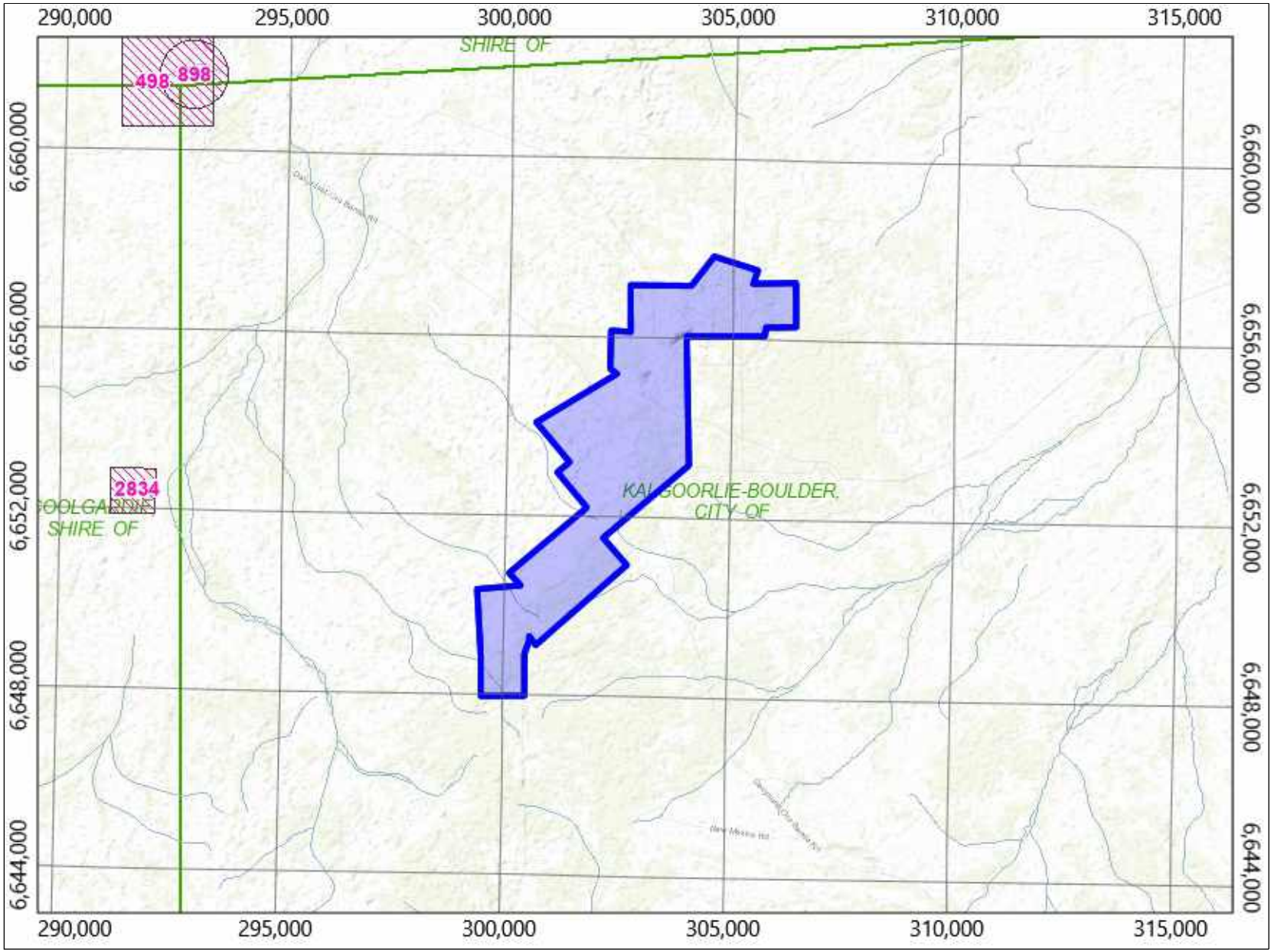
Map coordinates are based on the GDA 2020 Datum.

Basemap Copyright

Department of Planning, Lands and Heritage

Aboriginal Cultural Heritage Inquiry System

Map of Aboriginal Cultural Heritage (ACH) Register



Legend

- Aboriginal Cultural Heritage (ACH) Register
- Search Area
- Aboriginal Community
  - *Permanent*
  - *Seasonal*
  - *Town Based*
- Town
- Road
- River
- Local Government Authority

4.94 kilometres

Map Scale 1 : 150,000

MGA Zone 51 (GDA2020)

Appendix 6: Prescribed Premise Licence Application Form

Attachment 2: Premise Map

PRESCRIBED PREMISES BOUNDARY COORDINATES		
PT1	303,667.3	6,656,144.9
PT2	303,734.4	6,656,472.8
PT3	303,945.6	6,656,920.2
PT4	304,157.4	6,657,104.5
PT5	304,383.4	6,657,435.3
PT6	304,462.3	6,657,398.2
PT7	304,431.4	6,657,329.6
PT8	304,336.0	6,657,058.7
PT9	304,174.2	6,657,038.7
PT10	303,931.0	6,656,462.6
PT11	304,155.4	6,656,286.1
PT12	304,155.2	6,656,111.7
PT13	304,118.9	6,656,084.3
PT14	303,931.2	6,656,070.2
PT15	303,883.2	6,655,803.2
PT16	303,701.9	6,655,634.3
PT17	303,488.8	6,655,669.2
PT18	303,350.6	6,655,324.3
PT19	303,309.0	6,654,997.9
PT20	303,240.6	6,654,807.6
PT21	303,130.3	6,654,808.5
PT22	303,044.1	6,654,838.7
PT23	302,850.2	6,655,042.4
PT24	302,859.5	6,655,228.7
PT25	302,933.7	6,655,343.7
PT26	303,061.2	6,655,413.4
PT27	303,388.1	6,655,770.4
PT28	303,390.6	6,655,985.3

ORABANDA MINING

- MONITORING/DISCHARGE
- MINE DEWATER PIPE
- PRESCRIBED PREMISES BOUNDARY
- CATCH SUMP
- TENEMENT BOUNDARY

NORTH

ORA BANDA MINING - SIBERIA GOLD OPERATION

SAND KING UG - PROPOSED PRESCRIBED PREMISES BOUNDARY - MAY 2024

27/05/2024	1:15,000; A3
P003	MGA2020 Z51

0 100 200 300 400 500 600 700 800 900