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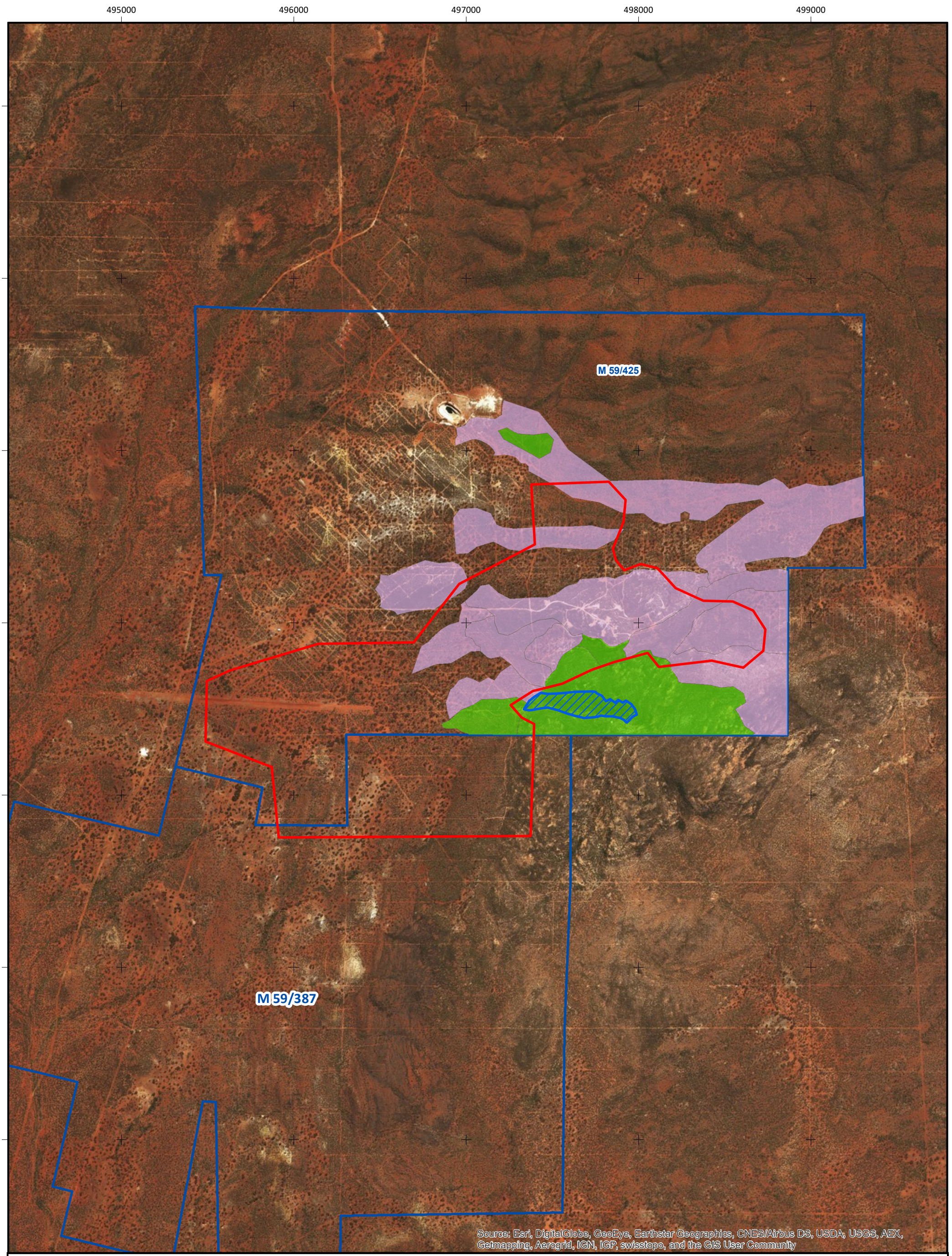

Figure 3-3: Location of Shield-backed Trapdoor Spider Habitat

Legend

- *Development Envelope*
- *Proposed Spider Habitat Conservation Zone*
- Marginal spider habitat
- Suitable spider habitat

0 0.5 1 2 3 4 Kilometers

17/02/2017

GDA 1994 MGA Zone 50 1:20,000 ems@animalplantmineral.com.au / (08) 6296 5155

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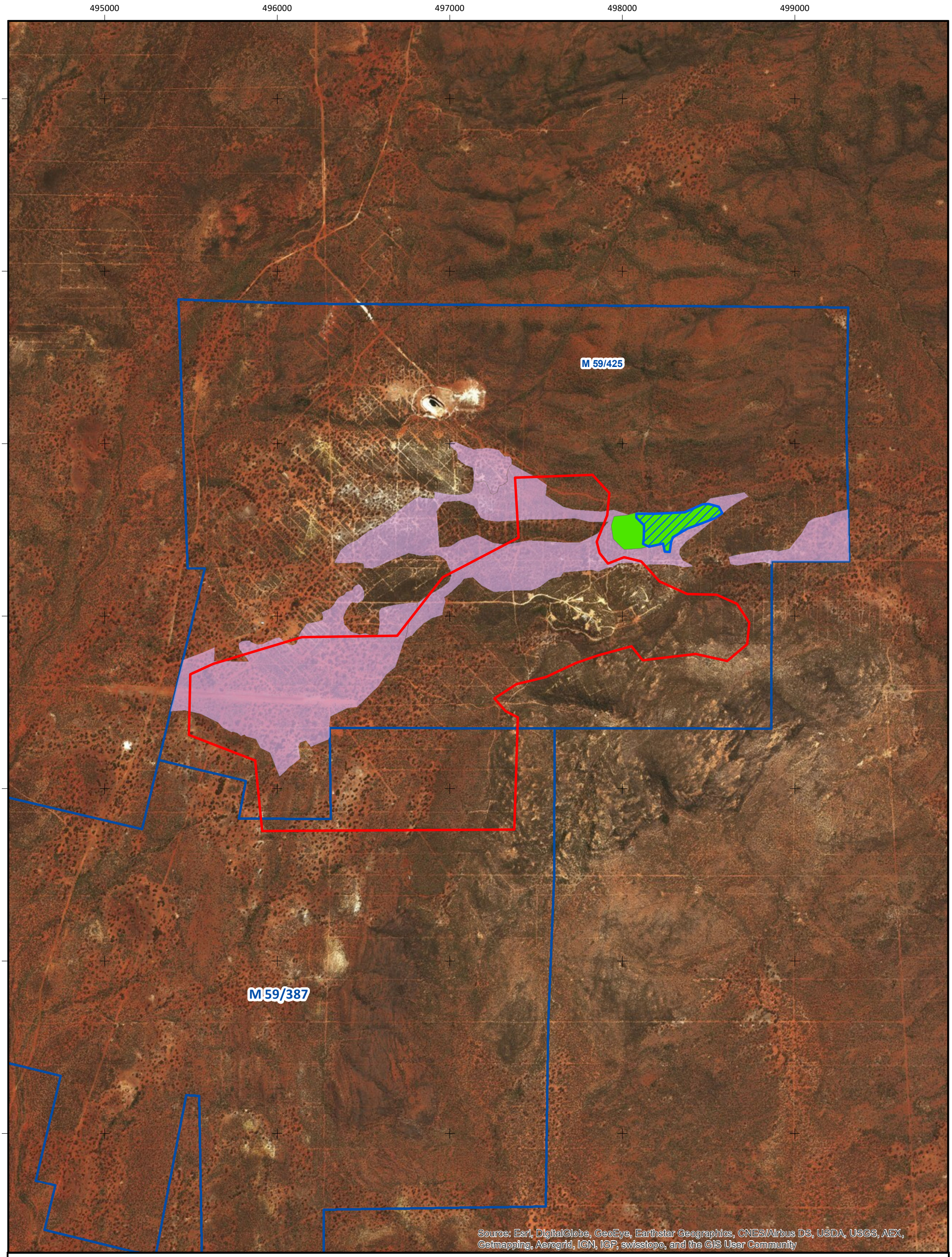

Figure 3-4: Location of Western Spiny-tailed Skink Habitat

Legend

- *Development Envelope*
- Proposed Conservation Zone
- Marginal skink habitat
- Suitable skink habitat

0 0.5 1 2 3 4 Kilometers

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3.6 TERRESTRIAL ENVIRONMENTAL QUALITY

Local and regional environmental values

The MMP is located near the border of the agricultural district in the Murchison region. There are no World Heritage sites or Ramsar wetlands within the MMP area. Further, mining of the Mulgine Hill deposit will not impact on any Commonwealth marine areas, Commonwealth land or conservation reserves or parks.

DPaW's management of the former Warriedar pastoral lease aims to conserve sustainable examples of the region's natural environment.

Current Status

The Project area has been the subject of historical exploration and mining activities. Access tracks and old workings, including some mine shafts, are present on site.

3.6.1 Waste Rock Characterisation

Anticipated PAF material has been determined by TGN based on an analysis of sulphur (S) content and geology. A conservative estimate of approximately 8,267,000 t of PAF material is projected (Table 3-5). However, there is sufficient non-acid forming (NAF) material from lithologies encountered at the Mulgine Hill Project, as well as previously mined oxide material from the adjacent Minjar Gold operation, to contain and buffer PAF material. The PAF material will be managed on site through a PAF management plan.

Table 3-5: Summary of Potentially Acid Forming Lithology Assessment

Lithology	Weathering	Total Material (t)	PAF (%)	PAF Material (t)	NAF Material (t)
Upper Greisen	Oxidised	4,900,000	3%	147,000	4,753,000
	Fresh	10,800,000	50%	5,400,000	5,400,000
Mafic Schist	Oxidised [1]	500,000	20%	100,000	400,000
	Fresh	3,600,000	65%	2,340,000	1,260,000
Ultramafics	Oxidised	0	0%	0	0
	Fresh	0	0%	0	0
Lower Greisen	Oxidised	6,000	0%	0	6,000
	Fresh	400,000	70%	280,000	120,000
Totals	-	20,206,000	-	8,267,000	11,939,000

[1] – Note that some transitional material (generally 1 - 2m) contains pyrite with up to 3% S.

3.6.2 Tailings Characterisation.

Processing of ore from the Mulgine Hill deposit will produce a coarse and fine tailings stream. The coarse stream will consist of ROM ore crushed and screened to -40mm+20mm rejected from the x-

ray ore sorting pre-concentration stage. The fine tailings stream will consist of wet (~60% solids) slurry with a < 0.1mm particle size pumped to the TSF.

Based on preliminary metallurgical x-ray ore sorting and gravity test work, the major mineral constituents of both the coarse and fine tailings are;

- Silicon Dioxide (SiO_2) – 55 to 80% (by weight); and
- Aluminium oxide (Al_2O_3) – 10 to 15% (by weight).

Metallurgical test work to date has not progressed sufficiently to quantify the % sulphide mineralisation in the fine tailings.

A thorough tailings characterisation test work program is planned with results expected by end of the second quarter of 2017.

Chemical additives to the process as described in Section 2.3.5.2 are widely used in the mining industry and do not pose an environmental risk. It is foreseeable that they will be easily controlled within a standard site based tailings management plan.

3.7 LANDFORMS

3.7.1 Constructed Landforms

There are numerous existing constructed landforms in the region. WRLs in the vicinity of the Project area contain batter angles of 16° - 18°, are reasonably revegetated and are stable where rock mulching has been applied.

3.7.2 Surface Soil Characteristics Assessment

Soils in the vicinity of the Mt Mulgine Mine site are generally red clay loams and calcareous loams. Soil cover thickness ranges from approximately 20 cm to 110 cm with gravel content varying, up to approximately 45 %.

Soils at the MMP are likely to result in minimal loss of sediment after rainfall events. Structural stability of soils is high and it is unlikely there will be dispersion/hard setting or similar structural problems when soil material is disturbed.

Further, the proposed WRLs are likely to be rock mulched, providing armouring for the surfaces and thereby minimising the potential for erosion.

3.7.3 Geotechnical Assessment

Preliminary geotechnical studies indicate there will be negligible impacts to dump stability. Table 3-6 outlines geotechnical characteristics and stability implications of the WRL materials. TGN will undertake further geotechnical work to ensure the landforms are stable.

Table 3-6: Geotechnical Characteristics and Stability Implications of WRL Materials

Lithology	Fragmentation	Geotechnical Characteristics	Potential Impacts on WRL Stability
Weathered Rock	Fine	Moderately weathered felsic and mafic rock with some development of clay/silt fines fraction	Negligible at an 18° dump face angle
Hangingwall Felsics	Medium	Fresh rock, well jointed with minor clay/silt fraction occurring on joints	Negligible at 18° dump face angle
Mafic (ore zone)	Medium	Fresh rock, moderately jointed with negligible fines	No stability impact
Footwall Felsics	Coarse	Fresh rock, sparsely jointed with negligible fines	No stability impact

Source: MineGeoTech (2017)

3.8 HYDROLOGY

3.8.1 Surface Water

Regional environmental values

The Project area is not within any proclaimed surface water areas, or rivers protected under the *Rights in Water and Irrigation Act 1914 (RIWI Act)*. The MMP is located within the Yarra Yarra surface water allocation area and Yarra Yarra sub-area. The Project is also located within the Yarra Yarra surface water management area. The closest Public Drinking Water Source (PDWS) protection areas (both Priority 1 and 2) are located approximately 140 km south west of the MMP near Carnamah (Landgate, 2016).

The Project is not within a 100 year Average Recurrence Interval (ARI) floodplain development control area (Landgate, 2016).

Local environmental values

The Project is located within the greater Yarra Monger catchment on the Yilgarn Plateau. On a local scale there are two sub-catchments within the Project area, one of which contains the proposed development. Surface drainage within the catchment is ephemeral and internal. Poorly defined drainage lines predominately flow in an easterly direction towards the large salt lake, Monger's Lake (Rockwater, 2012; Soil Water Consultants, 2012).

Surface water within the MMP area generally flows west and north east from Mt Mulgine into broader southern and eastern drainage paths respectively. Incised flow channels are common and the steeper terrain results in less potential for flooding. Sheet flow occurs in upland and slope areas (SWC, 2012).

3.8.2 Groundwater

Local and regional environmental values

Groundwater in the broader area is mostly in unconfined to semi-confined conditions within weathered bedrock and under confined conditions within the underlying variably fractured, fresh bedrock (Rockwater, 2012). The water table typically reflects the topography, shallowest beneath

valley floors and deepest along catchment divides and bedrock ridges. Regional groundwater flow is from catchment divides and bedrock ridges to valley floors. Groundwater in the vicinity of the MMP is reported to be flowing in an east/south-east direction at an anticipated rate of 0.15 m/day. Salt lakes are the main groundwater discharge areas (Rockwater, 2012).

Locally, water levels are approximately 377 metres Australian Height Datum (mAHD), (Rockwater, 2012; 2013).

The closest stock water bore, Corner Bore, is 9.6km south-east of the MMP and is not expected to be impacted by the Project.

The MMP is within the Gascoyne proclaimed groundwater area protected under the *RIWI Act*.

3.8.2.1 Groundwater Monitoring

Salinity of groundwater as total dissolved solids (TDS) ranges from 650 milligrams per litre (mg/L) to 1,400 mg/L. The pH of groundwater is between 6.8 and 8 and metals are generally at or below levels of detection.

Mining below the groundwater table is not expected however further analysis of hydrogeological characteristics of the site will be undertaken.

3.8.2.2 Impact of Final Mine Voids

The final mine void is not expected to intersect the groundwater table. If groundwater is however intersected, it is anticipated that the pit void will act as a groundwater sink; therefore there will be no flow from pit lakes to groundwater around the pits. Water levels in the pits would likely reach an equilibrium from rainfall and evaporation, while salinity of the pit water may increase due to evaporation.

3.9 AIR QUALITY

There will be no emission of hazardous contaminants from MMP activities; however, there may be a small amount of fine particulate and Greenhouse Gas (GHG) emissions generated by Project activities. Sources of emissions from the Project include:

- Combustion of fuel in mining equipment and vehicles; and
- Land use change.

Given the scale of the Project, it is not anticipated that the MMP will contribute significantly to fine particulate or GHG emissions.

Air quality aspects will be managed, monitored and reported if and when required, in accordance with the *National Greenhouse and Energy Reporting Act 2007* (*NGER Act*), and the *National Pollutant Inventory Guidelines (Version 6.1)* (Department of Environment, 2015).

3.10 SOCIAL SURROUNDINGS

Alteration of the physical or biological surroundings from the proposed MMP activities may have subsequent impacts to social surroundings, in particular with respect to:

- Aboriginal heritage and culture; and
- Natural and historical heritage.

Given the relatively remote location of the Project, impacts upon the amenity of the social surrounds are considered highly unlikely. The closest sensitive receptors to the Project area are personnel staying in accommodation facilities at Karara mine located approximately 18 km west of the Project area and Minjar mine camp located approximately 50 km north.

3.10.1 Aboriginal Heritage and Culture

The MMP area lies within the traditional lands of the Badimia People (WAD6123/98, WC96/98).

In 1996 the Badimia People lodged a claim for native title with the federal court (WAD6123/1998). The court determined in 2015 that native title does not exist.

A search of the Department of Aboriginal Affairs (DAA) Aboriginal Heritage Inquiry System (AHIS) did not identify any 'registered' Aboriginal sites within the Project area. Two 'other heritage places' were identified within the Project area. The results are presented in Appendix 5.

The following Aboriginal Heritage reports have been identified as encompassing the MMP area:

- Terra Rosa Cultural Resource Management Pty Ltd (2012) Archaeological & Ethnographic Survey Report
  - Desktop and field assessment of tenement M59/425.
  - The informants identified two isolated artefacts at the Black Dog and Highland Chief deposits. The artefacts are indicative of human presence in the area. The informants cleared the survey area for exploration subject to their recommendation these areas should be avoided.
- Australian Interaction Consultants (2007) Archaeological & Ethnographic Survey Report.
  - Desktop and field assessment of tenement M59/387 and M59/425.
- Two ethnographic sites were identified. A soak was identified near drill peg 13 and granite outcrop and gnamma holes identified near an access track. Yamatji Communications (2008) Ethnographic Survey Report.
  - Field assessment of tenement M59/425.
  - The informants did not identify any ethnographic sites within the proposed exploration area.

The location of 'other heritage places' and archaeological and ethnographic sites are shown in Figure 3-5.

TGN have committed to undertaking an additional survey for aboriginal heritage in the second quarter 2017.

3.10.2 Natural and Historical Heritage

A search of the Department of the Environment's Australian Heritage Database was undertaken in December 2016. The search returned no results in the vicinity of the Project area.

A search of the State Heritage Council inHerit online database was undertaken in January 2017. The search returned one result, Mt Mulgine Tunnel (Place ID 14141). The Mt Mulgine Tunnel is not located within the Project area.

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6775000 6774000 6773000 6772000 6771000 6770000 6769000 6768000

M 59/425

MM02 24589 M

MM01 24588 M

M 59/387

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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Figure 3-5: Location of Aboriginal Heritage Sites

Legend

Heritage Survey findings

- Granite outcrop and gnamma hole
- Quartz flake
- Soak
- *AHIS Database - Other heritage place*
- *Development Envelope*

N

0 0.5 1 2 3 4 Kilometers

17/02/2017

GDA 1994 MGA Zone 50 1:21,652 ems@animalplantmineral.com.au / (08) 6296 5155

3.11 CURRENT LEVEL OF CUMULATIVE IMPACT

The MMP is situated within the MGP tenement package and is in an area where mining is widespread. Other mines within a 50 km radius of the MMP include Golden Grove, Greater Karara Iron Ore Project and Mt Gibson Extension Hill Project.

The Project area is located within the Yalgoo Bioregion, which is host to rangeland grazing and more recently, mining. As at 2006, 61 % of Yalgoo's 50,575 km^2 was under pastoral lease, and as of 2008 22.8 % was under conservation.

A major cause of vegetation clearing in the region is from mining, and from a regional perspective, these areas are very small. For example, of the 1,400 km^2 of mining tenements held by Minjar in the region, only 0.5% has been cleared for mining activities.

The area proposed to be cleared for the MMP is not considered significant from a regional perspective. Vegetation of the MMP area is likely to be well represented in the region due to the same landforms occurring on neighbouring pastoral leases (Woodman Environmental Consulting Pty Ltd., 2003).

Activities proposed for the Project will result in the disturbance of approximately 146.21 ha, constituting less than 0.003% of the Yalgoo Bioregion. Further, the MMP is situated within an existing mine site that also contains the remnants of historical mining and exploration activities. Thereby cumulative impact upon the regional value of vegetation in the area will be negligible.

4 STAKEHOLDER CONSULTATION

TGN is committed to an open and transparent approach to stakeholder consultation. The term 'stakeholders' refers to both internal and external parties that are likely to affect, be affected by, or have an interest in the proposed Project. TGN has established communications with key stakeholders to ensure that any potential issues and concerns are raised and appropriately addressed.

4.1 STAKEHOLDER IDENTIFICATION

A variety of stakeholders may have interest in the MMP. Key stakeholders for the Project have been identified and are listed in Table 4-1.

Table 4-1: Stakeholder Register for the Mt Mulgine Tungsten Project

Stakeholder Group	Specific Stakeholder
Community and Industry Groups and Organisations	Heritage Link on behalf of the Badimia People
Government Regulators	EPA
	DMP
	DPaW
	DER
	DoW
Local Government and Government Agencies	DAA
	Shire of Perenjori

4.2 RECENT CONSULTATION

TGN will engage key stakeholders of the MMP, including government regulators, to provide updates and receive feedback on proposed activities. A register of consultation undertaken with key stakeholders is provided in Table 4-2. The register will be updated as further consultation takes place.

Table 4-2: Mt Mulgine Project Stakeholder Engagement Register

Date	Description of Engagement	Stakeholders	Stakeholder type	Tungsten representatives	Stakeholder Comments / Issue	Tungsten Response and /or Resolution	Stakeholder Response
8/07/2016	Telephone and Email	Heritage Link	Heritage representative for Badimia - traditional owners	Ken Redwood	Introduction and update regarding planned work programs and potential requirement in future for heritage surveys	Provision of information for future reference	Discussed requirements if surveys required in future.
16/08/2016	Telephone and Email	Ali Mills	Shire of Perenjori	Craig Ferrier	Project update and proposed presentation to Council	Plan to schedule meeting and presentation to Council	Schedule of future meeting dates provided
03/11/2016	Meeting	Murray Baker Sandra Thomas	DPaW	Dr Mitch Ladyman (APM)	Biological survey methodology		Survey methodology was agreed upon.
15/09/2016	Email	David Rose Alanna Chant	DPaW	Leigh Wardell-Johnson	Authority to use the airstrip on M59/425	Initial contact regarding who to direct enquiry to.	Jamie Conway-Physick is the contact person for the enquiry.
20/09/2016	Email	Jamie Conway-Physick	DPaW	Leigh Wardell-Johnson	Authority to use the airstrip on M59/425	Authorisation is requested to develop plant and infrastructure on the airstrip situated on M59/425.	
20/09/2016	Email	Jamie Conway-Physick	DPaW	Leigh Wardell-Johnson	Authority to use the airstrip on M59/425		Subject to Minjar's written approval as the lease holder, DPaW is willing to grant permission.
3/11/2106	Meeting	Sandra Thomas & Murray Baker	DPaW	Leigh Wardell-Johnson & Craig Ferrier	Introduce project to DPaW and receive direction on biological survey requirements.	Engaged APM to complete flora and fauna surveys based on the advice from DPaW	
10/11/2016	Letter	Anthony Desmond	DPaW	Leigh Wardell-Johnson	Authority to use the airstrip on M59/425		DPaW grants approval for Tungsten to use the

Date	Description of Engagement	Stakeholders	Stakeholder type	Tungsten representatives	Stakeholder Comments / Issue	Tungsten Response and /or Resolution	Stakeholder Response
							disused airstrip subject to conditions listed. Initial agreement is for two years.
17/11/2016	Email	Jamie Conway-Physick	DPaW	Leigh Wardell-Johnson	Authority to use the airstrip on M59/425	Tungsten requests an extension to the terms of agreement.	
06/12/2016	Email	Jamie Conway-Physick	DPaW	Leigh Wardell-Johnson	Authority to use the airstrip on M59/425		Right of access agreement is extended a further three years.
09/02/2016	Meeting	Robert Hughes & Helen Butterworth	EPA	Leigh Wardell-Johnson & Craig Ferrier (TGN) Sharon Arena & Mitch Ladyman (APM)	Project Overview and discussion on approval pathway	EPA Referral to be submitted as a precautionary measure	
14/02/2016	Meeting	Ryan Mincham & Jeremy Quartermaine	DMP	Leigh Wardell-Johnson & Craig Ferrier (TGN) Sharon Arena (APM)	Project Overview and discussion on approval pathway		

5 ASSESSMENT OF ENVIRONMENTAL FACTORS

5.1 EPA PRINCIPLES OF ENVIRONMENTAL PROTECTION

There are five principles which guide the overall application of the powers of the *EP Act*. TGN has considered these principles during planning and feasibility studies for the Project with details provided in **Error! Reference source not found.**.

Table 5-1: Principles of Environmental Management

Principle	Proposal Application
1. Precautionary principle *Where there are threats of serious or irreversible damage, lack of scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.* *In the application of the precautionary principle, decision should be guided by:* *(a) Careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and* *(b) An assessment of the risk-weighted consequences of various options.*	TGN has made use of existing environmental surveys and investigations to identify likely impacts and assess potential risks to the environment that may result from activities proposed for the Project. Further surveys will be conducted as required and identified risks will be considered when finalising mine site plans and landform designs. As a function of the recent biological survey work the waste dump and mineralised oxide landform designs have been reconsidered and re-positioned to reduce impacts on conservation significant fauna habitat. TGN will develop and implement site-specific management measures to mitigate potential impacts to the environment.
2. Intergenerational equity *The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.*	TGN will implement suitable management measures for all environmental factors that may be impacted by the proposed activities, to ensure adverse impacts are minimised and wherever possible the quality of the environment is maintained or enhanced. A MCP will be prepared for the Project in consultation with regulatory bodies and traditional owners of the land, to ensure that post mining land use is consistent with agreed stakeholder objectives. Rehabilitation will be undertaken progressively where possible.
3. Conservation of biological diversity and ecological integrity *Conservation of biological diversity and ecological integrity should be a fundamental consideration.*	The records of conservation significant flora *Drummondita fulva* (P1) and *Grevillea scabrida* (P3) have the potential to be disturbed by the proposed activities. TGN commit to undertaking more intensive surveys for flora species of conservation significance following significant effective rainfall in 2017, which will enable TGN to better refine the site layout to reduce the potential for impact. Although conservation significant fauna and fauna habitat have been identified in the MMP area, the impacts from the proposed projects are not likely to be significant. Waste dump mineralised oxide landform locations have been altered so as not to

	directly impact areas which contain habitat likely to support conservation significant fauna. With these measures in place TGN are confident that the current level of biological diversity and ecological integrity is maintained.
4. Improved valuation, pricing and incentive mechanisms • *Environment factors should be included in the valuation of assets and services.* • *The polluter pays principle – those who generate pollution and waste should bear the cost of containment, avoidance or abatement.* • *The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any wastes.* *Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solutions and responses to environmental problems.*	The proposed processing and mining activities will be continuously evaluated for efficiency and potential improvement. Improving efficiencies across the Project will reduce ongoing costs, as well as the overall impact on the environment. Where possible requirements for consumables will be minimised and materials will be recycled. TGN is assessing the feasibility of installing a solar power generation plant to supplement/provide an alternate power source for the Project. TGN has considered potential closure costs associated with the Project. More detailed closure cost estimates will be calculated as part of the approvals process prior to commencement of mining.
5. Waste minimisation *All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.*	Waste minimisation principles have been considered in the design of the MMP and key landforms. Measures of waste minimisation and management include but are not limited to the following: • Disposal of general domestic waste within an integrated landfill WRL facility; • Minimise chemicals and chemical packaging products by importing in bulk and returning to suppliers if possible, or triple rinsing before deposition to the landfill facility; • Establish waste recycling programs to reduce the volume of materials disposed; • Recycle dewater for use in processing and dust suppression; • Recycling waste water from the TSF for re-use in the processing plant; • All PAF material will be selectively handled and encapsulated within WRL's or the TSF embankment such that these materials are isolated from oxygen and rainfall; • Storage of hydrocarbons on site in suitably bunded areas; • Servicing and maintenance of vehicles, plant and equipment will occur preferentially within designated service and wash down bays at workshop area.

5.2 ASSESSMENT OF RELEVANT ENVIRONMENTAL FACTORS

Assessment of environmental factors relevant to the MMP and proposed activities is provided in Table 5-2. Environmental statements and bulletins used to guide the significance assessment are also listed. An assessment of potential impacts follows in Table 5-3, with targeted management measures to mitigate these impacts provided in Table 5-4. Lastly an assessment of residual impacts and the significance of these impacts is provided in Table 5-5.

Table 5-2: Environmental Factors Relevant to the Mt Mulgine Project and Guidance used for the Significance Assessment

Theme	Factor	EPA Objective	Environmental Guidance
Land	Flora and Vegetation	To protect flora and vegetation so that biological diversity and ecological integrity are maintained.	KEY DOCUMENTS - *Statement of Environmental Principles, Factors and Objectives.* - *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2016.* - *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual 2016.* RELEVANT FACTOR GUIDELINE - Environmental Factor Guideline: *Flora and Vegetation.* RELEVANT TECHNICAL GUIDANCE - Technical Guidance: *Flora and Vegetation Surveys for Environmental Impact Assessment*. OTHER POLICY & GUIDANCE - Government of Western Australia (2011) *WA Environmental Offsets Policy.* - Government of Western Australia (2014) *WA Environmental Offsets Guidelines.* - DoE. How to use the Offsets Assessment Guide: http://www.environment.gov.au/system/files/resources/12630bb4-2c10-4c8e-815f-2d7862bf87e7/files/offsets-how-use.pdf. - DMP and EPA (2015) *Guidelines for Preparing Mine Closure Plans*. Environmental Protection Bulletin No. 20: *Protection of Naturally Vegetated Areas Through Planning and Development* Guidance Statement No. 6: *Rehabilitation of Terrestrial Ecosystems*

	Terrestrial Fauna	To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.	KEY DOCUMENTS - *Statement of Environmental Principles, Factors and Objectives.* - *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2016.* - *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual 2016.* RELEVANT FACTOR GUIDELINE - Environmental Factor Guideline: *Terrestrial Fauna.* RELEVANT TECHNICAL GUIDANCE - Technical Guidance – *Sampling methods for terrestrial vertebrate fauna.* - Technical Guidance – *Terrestrial fauna surveys.*
	Terrestrial Environmental Quality	To maintain the quality of land and soils so that environmental values are protected.	KEY DOCUMENTS - *Statement of Environmental Principles, Factors and Objectives.* - *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2016.* - *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual 2016.* RELEVANT FACTOR GUIDELINE - Environmental Factor Guideline: *Terrestrial Environmental Quality.* OTHER GUIDANCE - DER (2015) *Notification of waste discharges – Reporting requirements and responsibilities for notifications under the Environmental Protection Act 1986*. - DER (2016) *Environmental Standards for Part V, Division 3 Environmental Protection Act 1986*.

			- DER (2017) *Decision Making - Part V, Division 3 Environmental Protection Act 1986*. - DER (2016) Environmental *Siting - Part V, Division 3 Environmental Protection Act 1986*. DER (2017) *Risk Assessments - Part V, Division 3 Environmental Protection Act 1986*.
Water	Hydrological Processes	To maintain the hydrological regimes of groundwater and surface water so that environmental values are protected.	KEY DOCUMENTS - *Statement of Environmental Principles, Factors and Objectives.* - *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2016.* - *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual 2016.* RELEVANT FACTOR GUIDELINE - Environmental Factor Guideline – *Hydrological Processes.* OTHER (non EPA) GUIDANCE - Department of Water (2013) - *Western Australian water in mining guideline*. Report no.12. Government of Western Australia. Department of Water (2011) - *Operational Policy 5.08: Use of operating strategies in the water licensing process.* Government of Western Australia.
	Inland Waters Environmental Quality	To maintain the quality of groundwater and surface water so that environmental values are protected.	KEY DOCUMENTS - *Statement of Environmental Principles, Factors and Objectives.* - *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2016.* - *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual 2016.* RELEVANT FACTOR GUIDELINE

			- Environmental Factor Guideline – *Inland Waters Environmental Quality.* OTHER (non EPA) GUIDANCE Department of Water (2013) - *Western Australian water in mining guideline*. Report no.12. Government of Western Australia.
People	Social Surroundings	To protect social surroundings from significant harm.	KEY DOCUMENTS - *Statement of Environmental Principles, Factors and Objectives.* - *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2016.* - *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual 2016.* RELEVANT FACTOR GUIDELINE - Environmental Factor Guideline – *Social Surroundings* OTHER GUIDANCE Guidance Statement No. 41: *Assessment of Aboriginal Heritage.*

Table 5-3: Assessment of Potential Impacts upon Relevant Environmental Factors by the Mt Mulgine Project

Environmental Factor	Potential Impact
Flora and Vegetation	**Potential impacts from proposed activities to flora and vegetation are likely to include the following:** 1. *Disturbance of Individual Plants* During the 2016 APM vegetation survey Priority flora *Drummondita fulva* (P1) and *Grevillea scabrida* (P3) were recorded. There is unlikely to be a significant regional impact to the populations of any Priority flora species identified in the development area as none are restricted to the project area or habitats specific to the project area. Impacts from the proposed project are unlikely to affect the conservation status of these flora taxa. 2. *Spread of Weeds* Increased vehicular activity and disturbance of soils may result in an increase in the diversity and distribution of weeds. However, impacts are likely to be minimal if weed management measures are adhered to over the life of the project. 3. *Increased Frequency and Intensity of Fire Events* Based on BoM 2016 *Climate Overview* (BoM, 2017), the Rothsay area experienced 'average' rainfall and 'average' temperatures in 2016. The Landgate *My Fire Watch* (Landgate, 2017) mapping tool indicates no fires occurred within 50 km of the Project area within the last two years. Proposed operations are considered unlikely to increase the risk of fire with the implementation of strict fire management measures. Better constructed and managed access roads around site will also better enable the control of wild fires in summer months. 4. *Degradation of native vegetation within the MMP area* The proposed disturbance of approximately 146.21 ha will impact ten vegetation communities of the MMP area. An estimate of disturbance from clearing to vegetation associations within the MMP area is provided as Appendix 6. In addition to impacts from clearing, native vegetation may also suffer secondary impacts from dust generated by movement of vehicles, removal of topsoil, digging and dumping of overburden and the ore extraction process. If infrastructure routes are adequately watered and mining is suspended in excessively windy conditions, the impact of dust is going to be significantly reduced. 5. *Death of Vegetation by Dust* The major impact of dust will be to local vegetation, whereby smothering of vegetation can result in death of individual plants. Potential emissions sources include:

<table>
<tr><th>Environmental Factor</th><th>Potential Impact</th></tr>
<tr><td></td><td>

Dust generation on unsealed haul roads.
Dust generation during movement of topsoil and overburden material.
Dust generation during blasting and loading of waste rock and ore.
Potential dust generation from WRLs.

</td></tr>
<tr><td>Terrestrial Fauna</td><td>
Potential conservation significant fauna which may be impacted by the proposed Project include the Western Spiny-tailed Skink, Shield-backed Trapdoor Spider and Malleefowl.

Potential impacts from proposed activities to fauna are likely to include the following:

1. <u>Clearing of Fauna Habitat</u>

Up to 146.21 ha is proposed to be disturbed within the MMP area. However, the general fauna habitats are well represented in the local area. Those fauna habitats with specific value to fauna of conservation significance have been identified and buffered against disturbance.

2. <u>Direct and Indirect Loss of Individuals, Populations and Species Including Short Range Endemics</u>

Clearing fauna habitat and mining associated activities may impact fauna. DPaW and APM records of conservation significant fauna in the area indicate the following fauna have been recorded within and outside of the MMP area (Table 5a).

Table 5a – Conservation Significant Fauna Records
<table>
<tr><th>Fauna</th><th>APM records in the Project Area</th><th>DPaW records in MMP Tenements</th><th>DPaW records in the Region (Outside Project Area)</th></tr>
<tr><td>Common Slender Blue-tongue</td><td>0</td><td>0</td><td>2</td></tr>
<tr><td>Malleefowl</td><td>0</td><td>0</td><td>116</td></tr>
<tr><td>Night Parrot</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>Peregrine Falcon</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>Rainbow Bee-eater</td><td>0</td><td>0</td><td>4</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Environmental Factor</th><th>Potential Impact</th></tr>
<tr><td>Terrestrial Fauna</td><td>
<table>
<tr><td>Shield-backed Trapdoor Spider</td><td>24</td><td>12</td><td>275</td></tr>
<tr><td>Western Brush Wallaby</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>Western Spiny-tailed Skink</td><td>0</td><td>0</td><td>54</td></tr>
</table>
Given the extent of similar habitat outside the MMP area and lack of conservation significant fauna recorded in the MMP area, it is unlikely the Project will have a significant impact on populations of these species, particularly as habitat for Shield-backed Trapdoor Spider and the Western Spiny-tailed Skink has been partitioned off as areas of no disturbance.

3. <u>Changed Fire Regimes</u>

Mining activities have the potential to increase spot fires from heavy machinery and equipment operation. Changed fire regimes at the MMP can reduce the amount of habitat available to fauna. Strict fire management measures, including training employees in fire-fighting and the use of emergency response equipment, will however improve overall fire management at the site.

4. <u>Impacts to Fauna from Dust</u>

Dust impacting upon vegetation adjacent to unsealed roads and mining operations can have a secondary impact upon fauna by reducing the value of habitat in these areas. Dust management strategies will be implemented to reduce the impact of dust generation.

5. <u>Impacts to Fauna from Light (i.e. processing activities)</u>

Light emitted from mining operations has the potential to impact upon nocturnal fauna species by deterring them from using habitats adjacent to such operations that would normally be available to them. However, there are no nocturnal conservation significant fauna that may be impacted from light generated from the project.</td></tr>
<tr><td>Terrestrial Environmental Quality</td><td>Potential impacts from proposed activities to the existing quality of the terrestrial environment are likely to include the following:

1. <u>Contamination by Hydrocarbons and Dangerous Goods</u>

Processing reagents, diesel fuel, oil, lubricants, explosives and miscellaneous cleaning products will be required for Project mine site operations. There is potential for contamination of soils to occur if hydrocarbons and other dangerous goods are not appropriately stored and managed.

Strict management measures will be implemented to ensure that impacts from hydrocarbons and dangerous goods are minimised throughout the life of the Project.

2. <u>Metalliferous Drainage from PAF and Mineralised Materials</u></td></tr>
</table>

Environmental Factor	Potential Impact
Terrestrial Environmental Quality	Analysis of lithologies at the Project has indicated there is potential for PAF materials to occur within transitional and primary ore extracted from the open pits. If these materials are not appropriately contained, acid metalliferous drainage (AMD) may occur. Regular testing of waste rock materials will ensure PAF materials are identified early and contained appropriately. *3. Contamination by General Domestic Waste* Various forms of non-mining wastes will be produced by all phases (construction, operation and closure) of the operation. Wastes include: • Putrescibles, plastics, glass and aluminium from the office and crib room facilities. • General litter from human presence. • Paper and cardboard from office and crib activities. • Incidental tyres. • Hydrocarbon wastes, in particular waste oil. • Laboratory wastes. • Packaging wastes. • Sewage related wastes. Inappropriate handling and disposal of waste products can impact the receiving environment. *4. Sediment Erosion and Transport* Clearing and construction of landforms will reduce the stability of soils, increasing the potential erosion and transport of unstable sediments with surface water flows. Artificially constructed water storage facilities and sediment traps will assist with containing surface water flows across the Mt Mulgine Mine Site.
Hydrological Processes	**Proposed activities are considered likely to have a localised impact upon hydrological processes in the following ways:** *1. Altered Drainage Patterns* Constructed landforms such as mine pits, WRLs and ROM pad may alter drainage patterns at a localised scale. However, the use of diversion structures to redirect surface water flows around constructed landforms will enable flows to re-join natural drainage lines, minimising the overall impact.

Environmental Factor	Potential Impact
	2. <u>Altered Groundwater Levels</u> Dewatering from open pits, if required, will result in a short term decrease in groundwater levels or a 'cone of depression' surrounding open pits, which will operate as groundwater sinks.
Inland Waters Environmental Quality	**Potential impacts to inland waters will be caused by pit dewatering and contamination from mining operations. Potential impacts include the following:** **1.** *<u>Impacts to Surface Water Quality</u>* There is potential for surface water quality within downstream salt lakes to be impacted by the proposed activities. In particular clearing and construction of landforms may reduce the stability of soils and increase susceptibility of erosion and transport of these sediments into tributaries feeding into Lake Moore. Management measures will ensure the risk of impact to surface water quality of downstream waterways is minimised. **2.** *<u>Salinisation of Groundwater</u>* The salinity of groundwater is fresh to brackish. If mine dewater is used preferentially in processing and conservatively for dust suppression, impacts from salinity are expected to be negligible. Evaporation from open pit voids filled with groundwater may cause small increases in salinity in the pit lakes. 3. *<u>Contamination of Groundwater</u>* There is potential for adverse impacts to groundwater quality from spillage of hydrocarbons and chemicals during mine operation and subsequent seepage to the groundwater table. There is also potential for AMD and mobilisation of metals to groundwater if PAF and other mineralised materials are not contained appropriately.
Social Surroundings	**Aboriginal Heritage and Culture** Aboriginal Heritage sites may be impacted by the proposed Project. Potential impacts include the following: *1. <u>Disruption to Aboriginal Heritage Sites</u>* Operational activity by the MMP may disturb the archaeological and ethnographic Indigenous heritage sites identified within the MMP area if appropriate measures, including consideration of heritage values during siting of mine site infrastructure, are not implemented.

Table 5-4: Mitigation Measures to Minimise Impacts to Relevant Environmental Factors

Environmental Factor	Mitigation Measures		
	Avoidance	**Minimisation**	**Rehabilitate**
Flora and Vegetation	Infrastructure and landforms have been repositioned where possible to avoid habitat of conservation species.	**Degradation of Native Vegetation within the Project Area** • Areas that have already been cleared will be utilised as much as possible to avoid clearing native vegetation. • Existing roads will be utilised where possible to reduce the amount of clearing required for the Project and reduce impacts from dust. • A Ground Disturbance Permit (GDP) will be utilised prior to the commencement of clearing works; GDP records will be maintained. • Areas to be cleared will be clearly delineated. • Prior to commencement of mining, topsoil will be stripped and stockpiled for use in rehabilitation works. **Disturbance of Individual Plants** • Identified Priority flora within the MMP area will be clearly demarcated on project drawings and, where it is possible to do so, avoided.	**Degradation of Native Vegetation within the Project Area** • Topsoil will be stockpiled for as short a time as possible and used for progressive rehabilitation works throughout the LOM. • Surface water drainage patterns will be reinstated to reduce risk of water ponding and/or erosion. • Rehabilitation will be undertaken with local provenance seeds representative of the local vegetation. • Rehabilitation and revegetation will be incorporated into the MCP. **Disturbance of Individual Plants** • Rehabilitate all disturbed areas within the MMP area utilising the return of stockpiled vegetation and topsoil, to facilitate plant establishment and growth. • Rehabilitation will be undertaken with local provenance seeds representative of the local vegetation.

Environmental Factor	Mitigation Measures		
	Avoidance	Minimisation	Rehabilitate
Flora and Vegetation		**Spread of Weeds** • Vegetation shall be progressively cleared to prevent weed introduction and colonisation. • All earthmoving, drilling and construction equipment or machinery that could potentially have collected weed seeds or matter will be cleaned of soil and vegetation matter and be inspected prior to mobilisation for works. • All vehicles and equipment will be restricted to designated mine areas and roads. • All employees and contractors will be required to participate in the site induction which will provide an awareness of weeds. All vehicles, plant and equipment will be restricted to within clearing limits. **Death of Vegetation by Dust** • Progressive clearing will be undertaken to minimise dust generation from exposed surfaces. • Water carts and other methods will be utilised for dust suppression.	• Rehabilitation and revegetation will be incorporated into the MCP. **Death of Vegetation by Dust** • Bare surfaces no longer required will be progressivity rehabilitated as soon as possible including seeding with local provenance native species.

Environmental Factor	Mitigation Measures		
	Avoidance	Minimisation	Rehabilitate
Flora and Vegetation		• Water, or where appropriate dust suppressants, will be used to minimise dust generation from cleared areas where fugitive dust is recognised as a problem. • Vehicle speeds on site will be controlled to minimise dust generated. • Monitoring of vegetation in areas likely to be impacted by dust (i.e. beside haul roads and unsealed tracks). • Drop heights between excavators and trucks will be reduced to minimise dust creation. **Increased Frequency and Intensity of Fire Events** • A Fire Contingency Plan shall be prepared, detailing measures to preserve undisturbed habitat and to prevent loss of leaf litter in bush greater than 15 years old.	
	Direct and Indirect Loss of Individuals, Populations and Species Including Short Range Endemics • TGN has moved WRL locations to avoid impacting Western Spiny-tailed Skink and Shield-backed Trapdoor Spider habitat	**General management measures which apply to all identified impacts to fauna** • Fauna injuries and fatalities of fauna of conservation significance will be recorded.	**Clearing of Fauna Habitat** • Stockpile habitat logs and branches from clearing and replace during rehabilitation to provide fauna habitat.

Environmental Factor	Mitigation Measures		
	Avoidance	Minimisation	Rehabilitate
Terrestrial Fauna Terrestrial Fauna	• Known Malleefowl mound locations have been avoided during Project design.	• All employees will be encouraged to complete a sighting form for the recording of Malleefowl **Clearing of Fauna Habitat** • Where possible, activities will be undertaken in previously disturbed areas to reduce the amount of clearing required. • Barriers to native fauna movement will be kept to a minimum. **Direct and Indirect Loss of Individuals, Populations and Species Including Short Range Endemics** • Where possible, activities will be undertaken in previously disturbed areas to reduce the amount of clearing required to reduce impacts to conservation significant fauna. • Other than formal monitoring and fauna relocation undertaken by specialist consultants, native fauna will not be captured or intentionally handled. • Employees are to understand native fauna have right of way, where possible and safe to do so.	**Direct and Indirect Loss of Individuals, Populations and Species Including Short Range Endemics** • Minimise clearing where practical. • Incorporate fauna mosaics in the construction and rehabilitation of waste dumps to increase potential refuge for fauna species of conservation significance. To be included in the MCP. • Contribute to the undertaking of a post graduate Masters level research program to investigate the use of cleared material to improve nesting potential of Malleefowl.

Environmental Factor	Mitigation Measures		
	Avoidance	Minimisation	Rehabilitate
Terrestrial Fauna		• Firearms and pets will be prohibited within the Project area • Foodstuffs will be stored and disposed of appropriately to avoid scavenging. Native or feral animals are not to be fed foodstuffs. • Road kills will be removed from the road to a minimum of 10m into the adjoining vegetation to avoid further impacts to fauna feeding on carcasses. • Fauna egress ramps will be installed on all excavations i.e. sumps and trenches. **Impacts to Fauna from Dust** • Dust suppression will be used on internal haul and access roads. **Impacts to Fauna from Light** • Inwards facing lights will be used to prevent light from being projected into the surrounding vegetation. • Light emissions will be managed in accordance with Australian Standard AS 4282-1997 *Control of Obtrusive Effects of Outdoor Lighting*.	

Environmental Factor	Mitigation Measures		
	Avoidance	Minimisation	Rehabilitate
Terrestrial Environmental Quality	**Contamination by Hydrocarbons and Dangerous Goods** • All hydrocarbons will be stored on site in suitably bunded areas in accordance with AS/NZS 1940:2004. • Storage vessels will be fit for purpose, waterproof and display clear labelling specific to their contents. • Drip trays or alternative spill capture devices will be installed at refuelling points. • Waste hydrocarbons will be stored in bunded storage containers and/or holding tanks until collection and disposal offsite by a licenced contractor. **Metalliferous Drainage from PAF Materials** • Low grade ore stockpiles will be bunded to contain runoff and avoid impacts which could result from solubilisation and mobilisation of enriched metals potentially present in low grade ore materials.	**Contamination by Hydrocarbons and Dangerous Goods** • Servicing and maintenance of vehicles, plant and equipment will occur preferentially within designated service and wash down bays. • Spill kits will be provided and personnel are to be familiar with their use. • Storage and transport of chemicals throughout the Project area will be undertaken in accordance with the *Dangerous Goods Regulations*. • Waste oil filters, rags, contaminated absorbent, containers and soil will be disposed in designated bins. • Contaminated soil will be treated within IBCs. • The tailings and return water pipelines will be frequently inspected for leaks and will be bunded to avoid an unexpected spill entering the surrounding environment. **Metalliferous Drainage from PAF Materials** • Analyse waste rock for PAF material during grade control sampling. • All PAF material will be selectively handled and encapsulated in accordance with the PAF management plan.	**Contaminated Sites** • As part of closure contaminated sites will be identified and remediated where required in consultation with regulatory authorities. **Sediment Erosion and Transport** • Bare, compacted soils and previously disturbed areas that are not required will be progressively rehabilitated to minimise erosion. **Soil Management** • Soils will be stripped and stockpiled during clearing activities and subsequently used during closure to enhance soil health and integrity in rehabilitated areas.

Environmental Factor	Mitigation Measures		
	Avoidance	Minimisation	Rehabilitate
Terrestrial Environmental Quality Terrestrial Environmental Quality		• Oxidised material will be stockpiled and processed at completion of mining for use as a capping if necessary. • An appropriately designed, constructed and monitored TSF will be utilised to contain tailings material, reducing contamination risks. **Contamination by General Domestic Waste** • General domestic waste (i.e. food scraps and non-recyclable crib room and office rubbish), as well as wood from pallets and packaging will be disposed in the integrated WRL landfill facility. • **Sediment Erosion and Transport**Runoff and erosion control measures will be installed for all cleared areas to maintain soil structure and integrity of adjacent areas.	
	Altered Drainage Patterns • Stockpiles will be located to avoid impeding on critical surface drainage lines.	**Altered Drainage Patterns** • Diversion structures will be constructed around pits, WRL's and the TSF such that surface water flows can be diverted.	**Altered Drainage Patterns** • Surface flows from the rehabilitated land surface will be integrated with flows from the adjacent native (undisturbed) land

Environmental Factor	Mitigation Measures		
	Avoidance	Minimisation	Rehabilitate
Hydrological Processes		**Altered Groundwater Levels and Flow** • Shallow open pits will be progressively backfilled above the water table where possible to avoid impacts to groundwater levels and flows.	surface to ensure continuity of surface hydrology across the disturbance.
Inland Waters Environmental Quality		**Salinisation of Groundwater** • Mine dewater, if intersected, will be preferentially used in processing and dust suppression on haul roads in preference to direct discharge. **Contamination of Groundwater** • Hydrocarbons will be stored on site in suitably bunded areas in accordance with AS/NZS 1940:2004. • Equipment servicing will take place in the workshop areas where practicable. • If field servicing is required, it will be undertaken in a manner that meets best practice guidelines. • Chemicals will be stored and transported in the mining area in accordance with *Dangerous Goods Regulations*.	**Impacts to Surface Water Quality** • PAF and adverse materials will not be placed on the outer batters of rehabilitated landforms. • Water quality monitoring will continue to be undertaken post closure until acceptable levels are reached. **Sediment Erosion and Transport** • Erosion and sediment control measures will be incorporated into rehabilitated landforms to minimise sedimentation of surface waters. • Progressive rehabilitation will be undertaken throughout the life of the Project to reduce the total exposed area susceptible to erosion.

Environmental Factor	Mitigation Measures		
	Avoidance	Minimisation	Rehabilitate
		• All PAF material will be appropriately contained in accordance with the PAF management plan. • The TSF will be engineered, constructed and operated in accordance with DER and DMP requirements. Groundwater quality will be monitored throughout the mine life and continue post mining until results are consistently at or below target levels. **Impacts to Surface Water Quality** • Erosion and sediment transport from operational areas will be minimised through the construction of surface water diversion bunds and sediment settling ponds to reduce surface water quality impacts.	
Social Surroundings	**Disruption to Aboriginal Heritage Sites** • Aboriginal heritage sites will be avoided so as not to impact them. • Employees will be made aware of the sites.	• All actions will be undertaken in accordance with the *Aboriginal Heritage Act 1972*. **Dust impacts to amenity** • Progressive clearing will be undertaken to minimise dust generation from exposed surfaces. • Water carts and other methods will be utilised for dust suppression.	**Dust impacts to amenity** • Bare surfaces no longer required will be progressivity rehabilitated as soon as possible including seeding with local provenance native species.

Environmental Factor	Mitigation Measures		
	Avoidance	Minimisation	Rehabilitate
		• Water, or where appropriate dust suppressants, will be used to minimise dust generation from cleared areas where fugitive dust is recognised as a problem. • Vehicle speeds on site will be controlled to minimise dust generated. • Drop heights between excavators and trucks will be reduced to minimise dust creation.	

Table 5-5: Significance of Impact to Environmental Factors from the Mt Mulgine Project

Factor	EPA Objective	Estimated Residual Impact	Does the Proposal Meet the EPA's objective?
Flora and Vegetation	To protect flora and vegetation so that biological diversity and ecological integrity are maintained.	The proposed activities will require the disturbance of up to 146.21 ha of native vegetation within the Project area. During the 2016 APM survey *Drummondita fulva* (P1) and *Grevillea scabrida* (P3) were recorded. Desktop and field studies have identified 35 other species of Threatened and Priority flora that may occur within the Project area. However, numerous records of conservation significant flora exist in the MMP area and other Minjar tenements. There is unlikely to be a significant regional impact to the populations of any Priority flora species identified in the development area and any impact is unlikely to affect their conservation status. Conservation significant species likely to be impacted by the proposed development will be confirmed during the 2017 spring survey. ***Expected residual impact*** With the implementation of the above mitigation measures (Table 5-4), impacts to known conservation significant flora will be minimised and impact upon regional flora diversity is expected to be negligible.	Yes. With the implementation of the above mitigation measures, impacts to flora and vegetation are expected to be negligible.
Terrestrial Fauna	To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.	The disturbed mining landscape and early post-rehabilitation landscape can offer highly suitable habitat for fauna. Buildings and old mine shafts provide an excellent refuge for fauna. Excess soil material pushed up during construction of roads, is highly suitable for use in the construction of nests (mounds) by Malleefowl. These are just some examples of niche environments for fauna resulting from mining related activities. The identification and protection of Shield-backed Trapdoor Spider and Wester Spiny-tailed Skink habitat will ensure that the impact on conservation significant fauna distribution will be negligible. ***Expected residual impact***	Yes. Implementation of the above mitigation measures will ensure the residual impact on fauna from proposed mining activities is negligible.

Factor	EPA Objective	Estimated Residual Impact	Does the Proposal Meet the EPA's objective?
		With the implementation of the above mitigation measures, the residual impact on fauna is considered to be minimal at a local scale and negligible at a regional scale.	
Terrestrial Environmental Quality	To maintain the quality of land and soils so that environmental values are protected.	Potential impacts from contamination by hydrocarbons, dangerous goods, general domestic waste and AMD will be mitigated through effective management as detailed above. Early detection of contamination (in particular from seepage from tailings) will be possible through comprehensive monitoring. There may be localised changes to soil structure and soil chemistry from proposed activities and from the transport of sediment in surface water flows. Surface water diversion structures and water storage facilities will be closely monitored to ensure they are effectively controlling flows and therefore sediment erosion. Management measures, in particular for the preservation of topsoil, will enable rehabilitated areas to regain their former soil structure and stability post closure. ***Expected residual impact*** Following completion of mining there are not expected to be significant residual impacts to terrestrial environmental quality.	Yes. Implementation of the above mitigation measures will ensure impacts to terrestrial environmental quality from proposed mining activities is negligible.
Hydrological Processes	To maintain the hydrological regimes of groundwater and surface water so that environmental values are protected.	Disruption to local surface water and groundwater flows within the Project area will be minor. Appropriate placement of diversion structures will ensure surface water flows are diverted around mining landforms and back into natural drainage lines. Interception of groundwater is expected to be minimal. If groundwater is intercepted it is anticipated groundwater levels will recover to natural levels post-mining. Mitigation measures will ensure impacts to hydrological processes are minimised as much as possible. ***Expected residual impact*** Following completion of mining, residual impacts from changed hydrological processes is anticipated to be minor at a local scale and insignificant at a regional scale.	Yes. Implementation of the above mitigation measures will ensure impacts to surface water quality from proposed mining activities are negligible.
Inland Waters Environmental Quality	To maintain the quality of	Potential impacts to inland waters from hydrocarbon/chemical contamination, sedimentation and AMD can be mitigated through effective management as described	Yes.

Factor	EPA Objective	Estimated Residual Impact	Does the Proposal Meet the EPA's objective?
	groundwater and surface water so that environmental values are protected.	above. Early detection of contamination will be possible through comprehensive monitoring and the establishment of baseline groundwater quality data for comparison. Mitigation measures combined with a water quality monitoring program will ensure the quality of inland waters is maintained to an acceptable standard. ***Expected residual impact*** Implementation of the above mitigation measures and a groundwater monitoring programme will ensure impacts to inland waters environmental quality are minimal.	Implementation of the above mitigation measures will ensure impacts to groundwater quality from proposed mining activities are negligible.
Social Surroundings	To protect social surroundings from significant harm.	Implementation of the above mitigation measures will ensure Aboriginal heritage sites are not impacted by the proposed development. Amenity impacts from dust to be mitigated to ensure minimal residual impacts. ***Expected residual impact*** Following completion of mining it is expected there will no impact to Aboriginal heritage sites. Dust impacts are expected to cause no impacts to social surroundings.	Yes. All actions will be undertaken in accordance with the *Aboriginal Heritage Act 1972*. Actions undertaken in accordance with dust mitigation measures above will ensure objectives are met.

6 REFERENCES

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7 APPENDICES

APPENDIX 1: MINJAR CONSENT TO ENVIRONMENTAL REFERRALS FOR PROPOSED MINING AND PROCESSING ACTIVITIES

tungsten mining NL

ABN 67 152 084 403

13 February 2017

Mr Michael Ji
Chief Executive Officer
Minjar Gold Pty Ltd
Level 4
66 Kings Park Road
West Perth
WA 6005

Dear Michael

CONSENT TO ENVIRONMENTAL REFERRALS FOR PROPOSED MINING AND PROCESSING ACTIVITIES

Purpose
The letter serves to set out information concerning the ownership of the Mt Mulgine Project tenements and certain mineral rights and to evidence the consent of Minjar Gold Pty Ltd, in its capacity as the registered tenement holder, to the submission of environmental referral documents.

Background
Minjar Gold Pty Ltd ("Minjar") is the registered holder of Mining Leases 59/386-I, 59/387-I and 59/425-I ("Tenements") located 13 km north northeast of the Rothsay town site in the mid-west region of Western Australia. Mid-West Tungsten Pty Ltd, a wholly owned subsidiary of Tungsten Mining NL ("MWTPL"), holds the rights to all tungsten and molybdenum minerals on the Tenements ("Mineral Rights").

Exploration has delineated the Mulgine Hill and Mulgine Trench deposits of tungsten and molybdenum mineralisation. MWTPL is actively progressing a strategic development plan for the Mt Mulgine Tungsten Project, directed towards the production of tungsten concentrate within two years.

The Mineral Rights were granted pursuant to a series of agreements collectively referred to herein as the Mineral Rights Agreements comprising:

a. Heads of Agreement Mt Mulgine Joint Venture Agreement dated 20 May 2005 between Gindalbie Metals Ltd and Vital Metals Limited;
b. Deed of Variation dated 24 May 2006 between Gindalbie Metals Limited and Vital Metals Limited;
c. Deed of Assignment and Assumption dated 8 September 2010 between Gindalbie Metals Limited, Vital Metals Limited and Hazelwood Resources Limited;
d. Deed of Assumption dated 21 August 2013 between Gindalbie Metals Limited and Hazelwood Resources Limited;
e. Deed of Covenant dated 2013 between Gindalbie Metals Limited, Minjar Gold Pty Ltd and Hazelwood Resources Limited; and
f. Sale of Mining Interests Agreement dated 3 December 2015 between Hazelwood Resources Limited, Bighill Resources Limited, Tungsten Mining NL, Pilbara Tungsten Pty Ltd and Mid-West Tungsten Pty Ltd.

On 15 December 2015 Minjar executed a Deed of Acknowledgement acknowledging the transfer of the Mineral Rights to MWTPL and consenting to MWTPL lodging caveats against the Tenements.

Project Development and Approvals
MWTPL is currently progressing feasibility studies for the Mt Mulgine Tungsten Project and as part of this process is looking to advance the relevant project approvals required for future mining and mineral processing activities.

As the Mt Mulgine Project tenements are partially located within the former Warriedar pastoral station, now managed by the Department of Parks and Wildlife, the development plan is a proposal that requires referral to the Environmental Protection Authority under section 38 of the Environmental Protection Act 1986. In addition, a referral may also be submitted under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 ("Environmental Referrals").

MWTPL wishes to record the formal consent of Minjar, in its capacity as the registered tenement holder, to the submission of the aforementioned Environmental Referrals. Accordingly, please signify your consent by signing below and returning the letter to me as soon as possible.

Yours sincerely

Craig Ferrier
Chief Executive Officer

Acknowledgement:

We hereby consent to Mid-West Tungsten Pty Ltd submitting the Environmental Referrals described in this letter dated 13 February 2017.

For and on behalf of Minjar Gold Pty Ltd

Michael Ji
CEO/Director

APPENDIX 2: AUTHORITY TO DEVELOP THE PROJECT ON THE AIRSTRIP – DPAW (2017)

Government of **Western Australia**
Department of **Parks and Wildlife**

Your ref:
Our ref: 2010/010462
Enquiries: [redacted]
Phone: 08 9964 [redacted]
Mobile: [redacted]
Email: [redacted]@dpaw.wa.gov.au

Tungsten Mining
Attn: Leigh Wardell-Johnson
Manager – Technical Development
97 Outram Street
West Perth WA 6872

16 NOV 2016

Dear Leigh

Thank you for your email received on the 31 November 2016.

I refer to your earlier correspondence and the discussions between Jamie Conway – Physick from this office and yourself in relation to the proposed use of the disused air strip on mining lease M59/425.

Parks and Wildlife acknowledges Minjar Golds consent for Tungsten Mining to operate within their lease and hereby grants approval to Tungsten Mining to use of the disused airstrip subject to the conditions listed below.

- All structures will be contained within the existing footprint of the disused airstrip.
- No permanent structures will be erected on the site.
- All refuse is to be removed from the site. No burial of refuse on site will be permitted.
- Upon completion of the project, all structures and materials are to be removed from the site.
- The site is to be rehabilitated upon completion of the project.

The proposed term for this agreement is to be 24 months commencing 10 November 2016. An extension to this agreement will be considered if required.

Please indicate your acknowledgement of this letter in writing giving confirmation that Tungsten Mining will abide by the conditions listed above.

Yours sincerely,

Anthony Desmond
ACTING DISTRICT MANAGER
Midwest Region

10 November 2016

Midwest Region
PO Box 72, Geraldton WA 6530
Phone: (08) 9964 0901 Fax (08) 9964 0988
www.dpaw.wa.gov.au

Loren Kavanagh

From: Leigh Wardell-Johnson <leigh@tungstenmining.com>
Sent: Wednesday, 25 January 2017 12:26 PM
To: sharon@animalplantmineral.com.au; Tony Smith
Subject: FW: Letter - Approval to Access Disused Air Strip on M59/425

From: [redacted] [mailto:[redacted]@DPaW.wa.gov.au]
Sent: Tuesday, 6 December 2016 9:10 AM
To: Leigh Wardell-Johnson
Subject: RE: Letter - Approval to Access Disused Air Strip on M59/425

Hi Leigh,

My apologies for the delayed response, I have been out of the country.

In regards to your email sent on the 17 November 2016 seeking an extension to the right of access to the term of the existing mining lease, I have discussed the matter with my senior staff and wish to advise as follows. Parks and Wildlife is happy to extend the right of access for another three years over and above the initial 2 years. Beyond this period, we would need to renegotiate the right of access and consider any impacts to internal projects or developments that may have unfolded between now and then. Should there be no impacts, I see no reason why a further extension to the right of access could not be approved.

Regards,

[redacted]
Geraldton District
Department of Parks and Wildlife
ph: (08) 9964 [redacted] | fax: (08) 9964 0988 |mob: [redacted]
email: [redacted]@dpaw.wa.gov.au

From: Leigh Wardell-Johnson [mailto:leigh@tungstenmining.com]
Sent: Wednesday, 30 November 2016 10:05 AM
To: [redacted]
Subject: FW: Letter - Approval to Access Disused Air Strip on M59/425

Hi [redacted]

Hope you are going well.

Just wondering of there has been any progress on amending the previous letter to reflect the tenement expiry (see below).

APPENDIX 3: WASTE ROCK LANDFORM SCOPING STUDY – MINEGEOTECH (2017)

MINEGEOTECH

MINING AND GEOTECHNICAL CONSULTANTS

Mulgine Hill Scoping Study Waste Storage Facility

Date 12 January 2017

The Waste Rock Landforms (WRLs) proposed for Tungsten Mining Mulgine Hill Scoping Study are based on the Department of Mines and Petroleum (DMP) Minerals environmental guidelines and information sheet, Waste Rock Dumps September 2009.

The objective is to determine suitable WRL locations and shapes that allow for operationally efficient, cost effective rehabilitation of a final landform that is safe, stable and not prone to erosion.

The WRL site selection was based on:

- Tenement boundaries,
- Natural landform features,
- The ability to blend the dumps into the natural hill sides,
- Avoiding significant drainage lines,
- Avoiding rare, endangered or vulnerable flora and fauna,
- Reducing the footprint of the disturbed area and minimising the destruction of existing vegetation,
- Visual aesthetics and noise screening ability to reduce impact on nearby communities,
- Away from future pit cut backs or other development to reduce resource sterilisation,
- Away from the pit abandonment bund, and
- Backfilling previously mined pits where possible.

The WRL design criteria are:

- 18 degree overall angle of the rehabilitated shape,
- Blend in with the natural hill sides to a maximum height of 40m,
- Minimise transport distance from the pit crest
- Ensure the toe of the WRL isn't within the abandonment bund,
- Approximate setback from identified *Egernia stokesii badia* Habitat of 50m,
- Approximate setback from identified Shield-backed Trapdoor Spider Habitat of 50m, and
- Approximate setback from identified Heritage Site of 50m.

The WRL locations are shown in Figure 1. They are capable of containing all waste mined from the project based on the upside selling price used in the Scoping Study, Run8a Shell 20. The required capacity is 14.9Mt, 5.6Mbcm or 7.3Mlcm (at 30% swell).

Each area holds:

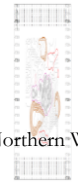
Kalgoorlie Office
PO Box 8054
Kalgoorlie WA 6433
Phone 08 9091 6204

MineGeoTech Pty Ltd
ABN 16 088 105 168

Perth Office
508 Hay St
Subiaco WA 6008
Phone 08 9381 3215

- The eastern dump has a capacity of 0.80Mm³ (mh_d52c.dxf)
- The northern dump has a capacity of 0.95Mm³ (mh_d56c.dxf)
- The southern dump has a capacity of 5.96Mm³ (mh_d53c.dxf)
- Total 7.71Mm³

Figure 1 – Waste Rock Landform for Mulgine Hill



At this stage, limited sulfur assay data indicate that 10-40% of the rock within the open pit may be Potentially Acid Forming (PAF) with greater than 0.3% sulfur. Additional drilling is planning to define the PAF material and allow for detailed design work that will determine how to encapsulate within the WRL.

It is envisaged that long-term stability and erosion control of the WRL will include:

- Understanding of the physio-chemical and geochemical properties or ore and waste types prior to pit development to ensure inert or non-erodible material is utilised preferentially during construction,
- The incorporation of erosion control measures,
- Stripping and storage of subsoil and topsoil to allow for preservation of identified growth media for use in WRL rehabilitation, and
- Effective and early revegetation using appropriate (where possible endemic) native species that will imbibe in the growth media.

The geotechnical characteristics of the waste rock materials which will be disposed of on the dumps are as detailed in Table 1.

Table 1 - Geotechnical characteristics and stability implications of the materials comprising the waste dumps

	Fragmentation	**Geotechnical Characteristics**	**Potential impacts on dump stability**
Weathered Rock	Fine	Moderately weathered felsic and mafic rock with some development of clay/silt fines fraction	Negligible at an 18deg face angle
Hangingwall Felsics	Medium	Fresh rock, well jointed with minor clay/silt fraction occurring on joints	Negligible at 18deg dump face angle
Mafic (ore zone)	Medium	Fresh rock, moderately jointed with negligible fines	No stability impact
Footwall Felsics	Coarse	Fresh rock, sparsely jointed with negligible fines	No stability impact

Due to the absence of a saprolite horizon and thus negligible clay/silt fractions, the dumped waste rock material is anticipated to be free-draining and thus dry for all but cyclonic episodes. Due to the low dump face angle of 18 degrees (considerably less than the marginally stable repose angle of 37 degrees), even full saturation of the dump is unlikely to result in conditions which would lead to instability.

Natural water courses are affected by the construction of the WRL. Installation of diversion bunds above and around the WRL locations will redirect water flows over the natural topography, minimising contamination.

APPENDIX 4: BIOLOGICAL SURVEY OF THE MT MULGINE PROJECT – ANIMAL PLANT MINERAL (2017)

February 2017

MT MULGINE PROJECT
Biological Survey

Rothsay, WA

Prepared on behalf of Tungsten Mining NL by:

Animal Plant Mineral Pty Ltd

Tenement M59/425

TUN003 – Tungsten Mining NL –Biological Assessment Survey

Completed by: Animal Plant Mineral Pty Ltd

ABN: 86 886 455 949

Tel: (08) 6296 5155

Fax: (08) 6296 5199

Address : 68 Westgrove Drive Ellenbrook,

Western Australia 6069

Website: www.animalplantmineral.com.au

For further information on this report please contact:

Dr Mitchell Ladyman

Tel: 0437 307 008

Email: mitch@animalplantmineral.com.au

Disclaimer

EXECUTIVE SUMMARY

Mid-West Tungsten Pty Ltd, a wholly owned subsidiary of Tungsten Mining NL, propose to develop the Mt Mulgine Project located in the Murchison region of Western Australia approximately 330 kilometres northeast of Perth near Rothsay. Minjar Gold Pty Ltd is the holder of all tenements associated with the Project. Mid-West Tungsten Pty Ltd has 100 percent of the tungsten and molybdenum rights on a contiguous group of tenements.

Animal Plant Mineral Pty Ltd was engaged by Tungsten Mining NL to provide a Level 2 fauna and Level 2 vegetation survey in the Mt Mulgine Project area to inform and assist environmental approvals for a Tungsten mining operation.

The vegetation survey was undertaken over five days in November 2017. The survey recorded ten vegetation communities in the Project area. The condition of the vegetation was predominately 'Very Good', with one area considered to be of 'Good' condition.

As a result of the survey, two conservation significant flora species were identified in the Project area; *Drummondita fulva* listed as Priority 1 under the *Wildlife Conservation Act 1950*, and *Grevillea scabrida* .

Three confirmed annual and one perennial weed species were recorded: *Bromus rubens**, *Silene nocturna**, and *Vulpia myuros** and *Solanum nigrum** respectively.

The fauna survey was undertaken over five days in November 2016. The survey identified four fauna habitat types within the Project area, the majority being dominated by tall shrublands. Some tracts of *Eucalyptus* woodland occurred in a lowland valley. The fauna habitats identified include:

- *Eucalyptus* open woodland on mixed shrubland over *Austrostipa variabilis* and/or *Austrostipa elegantissima* grassland over sandy loam soil;
- Mixed shrubland over *Austrostipa scabra* grassland over sandy loam soil;
- *Acacia ramulosa and or Acacia latiora* woodland over mixed shrubland over sandy loam soils and/or E*riachne benthamii* grass with exposed aggregate; and
- *Allocasuarina dielsiana* and/or *Allocasuarina acutivalvis* subsp. *prinsepiana* open woodland over mixed shrubland, and in some cases *Eriachne pulchella* low open grassland over sandy loam soils with large coarse fragments.

As a result of highly variable soil types the Project area is host to a diversity of fauna across a mosaic of micro habitats.

The broad fauna assemblages of the Project area are expected to be moderately diverse based on the quality of the vegetation and the diversity of habitats available. However, the focus of the present survey was on species of conservation significance. One fauna species of conservation significance was recorded in the Project area: *Idiosoma nigrum,* Shield-backed Trapdoor Spider, listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* and *Wildlife Conservation Act 1950*. A total of 24 active burrows were recorded. Intensive searches for other conservation significant fauna known to occur in the area, Western Spiny-tailed Skink and Malleefowl, did not result in any individuals being recorded. However, suitable Western Spiny-tailed Skink habitat was identified. One Malleefowl track was observed near the abandoned air strip. Impacts to local fauna of conservation significance have been mitigated to a large extent via the designation of 'no disturbance' areas in habitats that are of specific value to the Shield-backed Trapdoor Spider and the Western Spiny-tailed Skink.

Mid-West Tungsten Pty Ltd provided Animal Plant Mineral Pty Ltd with three site layout options prior to the undertaking of the biological survey and the final locations of infrastructure have since been selected following the current surveys, with consideration to those ecological values reducing the overall net environmental impact of the Project.

The Project impact footprint is relatively small, in an area of the mid-west that has been significantly disturbed over the last 100 years. Though the proposed new Project will result in the clearing of approximately 146.21 ha, this disturbance will not compromise regional flora, vegetation, fauna and fauna habitat values. Impacts to local fauna of conservation significance have been mitigated to a large extent via the designation of 'no disturbance' areas in habitats that are of specific value to the Shield-backed Trapdoor Spider and the Western Spiny-tailed Skink. Although the Priority flora taxa *D. fulva* was found within the proposed development footprint it is a commonly recorded priority species in the area, detected in a number of searches undertaken by Minjar in recent years. Further flora survey work to be undertaken following significant rainfall in Spring 2017 will make a significant contribution to the local knowledge of flora of conservation significance in the area. Fundamental environmental management practices such as fire, weed and feral fauna control that forms an integral part of the commencement of mining operations should improve habitat values and increase the integrity of the native flora and fauna populations on site.

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LIST OF ABBREVIATIONS

Symbols and Units	Meaning
%	Percent
°C	Degrees Celsius
km	kilometres
m	Metres
mm	Millimetres

Abbreviations	Meaning
ANZECC	Australian and New Zealand Environment Conservation Council
AoLA	Atlas of Living Australia
APM	Animal Plant Mineral Pty Ltd
BAM Act	*Biosecurity and Agriculture Management Act 2007* (WA)
BIF	Banded ironstone formation
BoM	Bureau of Meteorology
CAMBA	China and Australian Migratory Bird Agreement 1986
CCA	Canonical correspondence analyses
CSIRO	Commonwealth Science and Industrial Research Organisation
Cth	Commonwealth
DoE	Department of Environment
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
DPaW	Department of Parks and Wildlife
IBRA	Interim Biogeographic Regionalisation for Australia
JAMBA	Japan and Australian Migratory Bird Agreement 1974
M	Mining tenement
Mattiske	Mattiske Consulting Pty Ltd
Minjar	Minjar Gold Pty Ltd
MNES	Matters of National Environmental Significance
NASA	National Aeronautics and Space Administration
RC	Reverse Circulation
ROKAMBA	The Republic of Korea-Australian Migratory Bird Agreement 2007
PMST	Protected Matters Search Tool
QGIS	Quantum Geographic Information System
SAGA	System for Automated Geoscientific Analyses
SBTS	Shield-backed Trapdoor Spider
SRTM	Shuttle Radar Topography Mission
TERN	Terrestrial Ecosystem Research Network
Terratree	Terratree Pty Ltd.

Abbreviations	Meaning
TGN	Mid-West Tungsten Pty Ltd
WA	Western Australia
WC Act	*Wildlife Conservation Act 1950* (WA)
Woodman	Woodman Environmental Consulting Pty Ltd

1 INTRODUCTION

1.1 PROJECT AND LOCATION

Mid-West Tungsten Pty Ltd (TGN), a wholly owned subsidiary of Tungsten Mining NL propose to develop Mulgine Hill Prospects of the Mt Mulgine Project (MMP) (the Project) in the Murchison region of Western Australia (WA) (Figure 1-1). The majority of the Project impact footprint is located on mining tenement M59/425 with a very small amount of infrastructure located on M59/387. The Project is located 330 kilometres (km) north east of Perth and 15 km north east of Rothsay. TGN has 100 percent (%) of the tungsten and molybdenum rights on a number of tenements held by Minjar Gold Pty Ltd (Minjar).

The proposal includes the following:

- Open pit mining of the Mulgine Hill Prospect;
- Construction of Waste Rock Landforms and a Tailings Storage Facility;
- Construction of processing facilities; and
- Construction of support facilities (offices, workshops).