Native Vegetation Clearing Permit Application

Supporting Information

December 2023

Revision	Author	Reviewer	Signed
1.0	A. Tandy	C. Davidson	Chris Davidson

1 Executive Summary

Meeka Metals is seeking approval to clear 570 ha of native vegetation as part of the Murchison Gold Project. The clearing will enable the development of the Gnaweeda Gold Project, which will initially consist of five open pits across the Turnberry and St Annes Mining areas. Ore will be mined and stockpiled before being sent off site for toll treatment. The operation will also require waste dumps, a haul road and other associated disturbance to enable mining.

As part of the approval Meeka has had the area to be disturbed surveyed for flora and vegetation and has undertaken a terrestrial fauna investigation. Due to the extensive pastoral activity of the area the flora values within the region are reduced. There were two priority species identified, *Stenanthemum medale* (P1) and *Gunniopsis propinqu* (P3), which occur along the haul road alignment. These species can be entirely avoided by the haul road alignment and willnot be impacted.

Five broad fauna habitats exist within the proposed clearing area. Thes are widespread outside the Project area and will not be adversely impacted by the clearing. A desktop study of potential conservation significant species that may occur within the study area identified a number of species that had the potential to occur within the clearing area. Of these, only the Long-tailed Dunnart was considered potential likely and would be confined to the break away areas to the north of the Project. These areas will be avoided and therefore will not impact the species if it is present.

Overall the clearing associated with the Project will have limited impact. The clearing will not be at variance with the 10 clearing principles and can be done with no long term impacts to the vegetation communities within the greater region.

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2 Introduction

Meeka Metals (Meeka) is proposing to undertake the development and mining of the Gnaweeda Project, 50km north of Meekatharra in the Murchison Region of WA. The initial operation will be a series of five open pits, where ore is mined and stockpiled before being trucked off site for processing. Following the completion of mining the starter pits, a larger open pit will be mined, before an underground operation commences. The starter operation will involve ore being carted off site for processing, before a process plant and associated infrastructure is established at Turnberry.

The initial operation is intended to generate cash flow and enable the company to further Progress the greater Murchison Gold Project which includes re-starting the Andy Well Gold mine and developing a site-based processing facility at the Turnberry mining area.

The work associated with the initial Gnaweeda operation include;

- The development and installation of five open pits;
- The installation of haul and access roads connecting the five pits to the Andy Well Gold; Mine, enabling ore to be sent off site for processing;
- The installation of waste rock landforms (WRL) adjacent to each mining area;
- The installation of run of mine (ROM) pads adjacent to each mining area;
- Topsoil stockpiles to store striped topsoil and vegetation; and
- Small areas for infrastructure such as site offices and crib rooms, workshops, fuel areas and other miscellaneous clearing.

As the Project expands the following will be installed;

- Larger WRLs to store all waste rock expected to be generated by the Project;
- A ROM pad to treat Turnberry, St Annes and Andy Well ore;
- Tails storage facility;
- Process plant and associated infrastructure;
- Expanded mine village;
- Workshops and administration; and
- Expanded topsoil storage, access road.

Clearing of native vegetation will be required across three tenements. The mine pits are located on M51/882 and this is where the majority of the clearing will be required. A haul road will be installed to connect Gnaweeda to the existing Andy Well Mine. The haul road on this tenement is approximately 10km long and up to 50m wide. The haul road width has been designed to accommodate further power lines and water pipelines.

The Andy Well Mine is located on M51/870. The tenement is largely disturbed and has been granted several clearing permits in the past, which have now all expired. The disturbance on M51/870 will largely be the remainder of the haul road to connect the road to the Great Northern Highway. A small 60-person camp will be installed on the lease, however this disturbance will be in currently disturbed areas as much as possible, and where clearing is required the 10ha exemption will be utilised.

This report has been developed to support a native vegetation clearing permit across the three tenements. The clearing required for the initial operation is 570ha. The report details the areas to be cleared, the vegetation type and any significance of the proposed clearing.

This report presents the following information:

- a description and map of the area of proposed clearing in regard to location, size and purpose;
- a site overview with a brief description of the existing environment including: local climate, biogeographic region, land use, land systems, geology, soil landscapes, hydrology and hydrogeology;
- a description of the area to be cleared in regard to vegetation type, condition and representation in a regional context;
- list of flora species present and their conservation status;
- identification of any Threatened (Declared Rare Flora) or Priority Flora within the Project Area;
- a description of broad fauna habitat;
- a list of conservation significant terrestrial fauna species; and
- a discussion of the proposed vegetation clearing in relation to the Ten Clearing Principles.

3 Site Information

3.1 Ownership

The Project is held by Andy Well Mining Pty Ltd, which is a fully held subsidiary of Meeka Metals (ACN 23 080 939 135). The Project is located across three tenements detailed in the table below.

All correspondence regarding this application should be directed to

Chris Davidson

Chief Development Officer

Meeka Metals

Level 2

46 Ventnor Avenue

West Perth, 6005

Telephone: 0401 535 652

Email: cdavidson@meekametals.com.au

Table 1 Project Tenure

Tenement	Area (ha)	Granted	Expiry	Holder
M51/882	3,475.44	31/08/2020	30/08/2041	Andy Well Mining Pty Ltd
M51/870	1109.50	27/04/2012	26/04/2033	Andy Well Mining Pty Ltd
L51/97	95.36	5/12/2017	04/12/2038	Andy Well Mining Pty Ltd

3.2 Project Description

The MGP is the name allocated to all the mining and exploration areas that form part of the granted tenure owned by Meeka in the Murchison region. Within this broader project description is the existing Andy Well Project (AW) and the new Gnaweeda Project (GP). Within each respective sites exists individual mining areas. This breakdown is shown below:

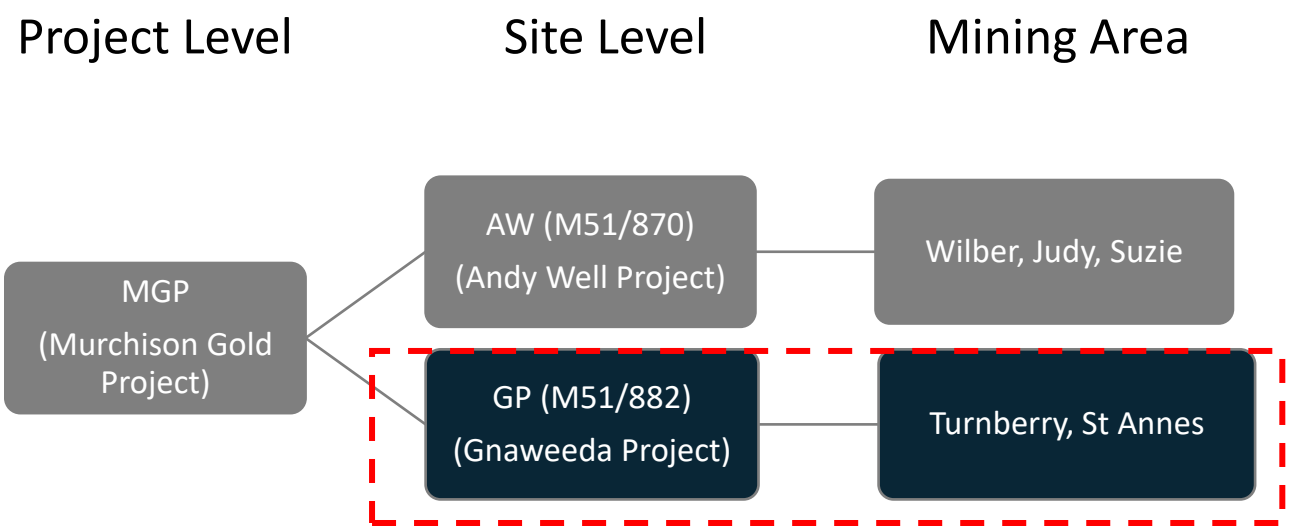

Figure 1 Project Description

3.3 Location and Site Layout

The Murchison Gold Project ("MGP" or "the Project") is located 46 km northeast of Meekatharra and 800 km northeast of Perth, Western Australia. Road access is via the Great Northern Highway which runs through the Project. The Meekatharra aerodrome, a sealed 2,181m runway, is used to commute personnel to and from the Project.

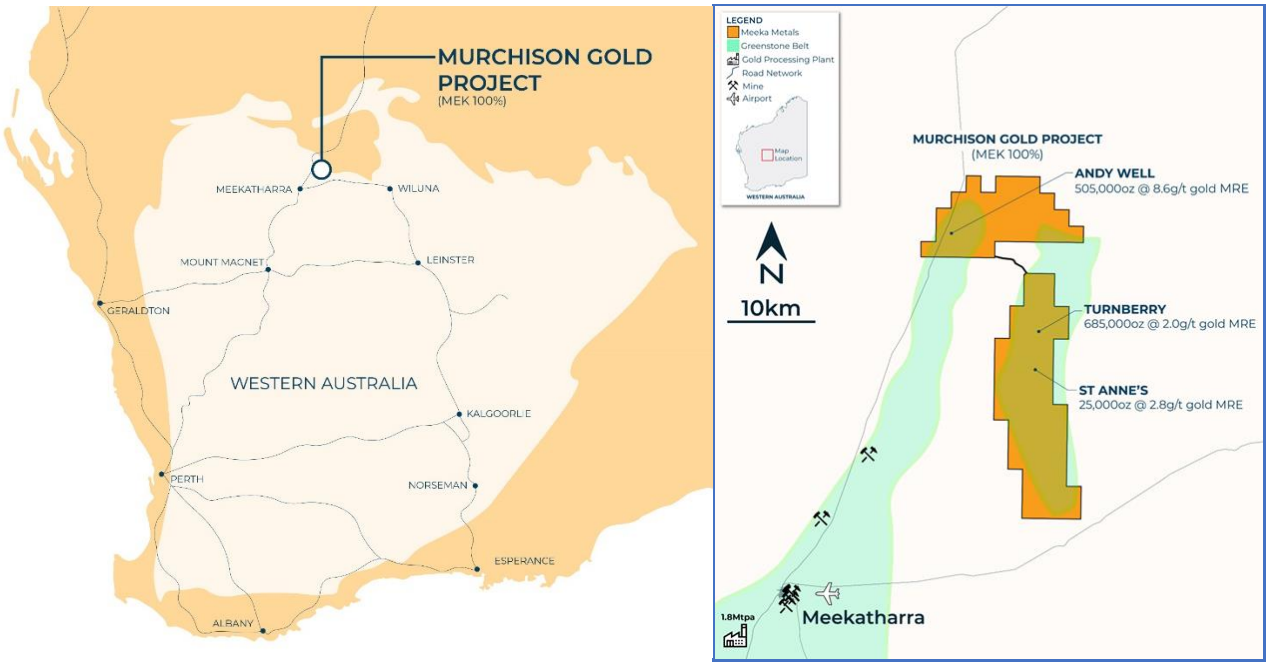

Figure 2 Project Location

The Murchison Gold Project is comprised of three individual mining areas, Andy Well, Turnberry and St Annes. The Andy Well area was a previous mine that was in operation between 2012 to 2017. The mine was placed into care and maintenance in 2017.

At the time the operation was placed into C&M the mine consisted of;

- Open pits and underground workings
- Waste dumps, including a PAF waste cell
- A TSF with two operational cells
- Topsoil stockpiles
- ROM pad
- Process Area
- Mine administration and workshops
- Other associated mining activities

3.4 Site Layout

This NVCP application of for clearing at the Gnaweeda Project only. A layout of the Proposed operation is shown below in Figures 3 and 4.

Figure 3 shows the layout of the proposed mining operation where much of the disturbance will occur.

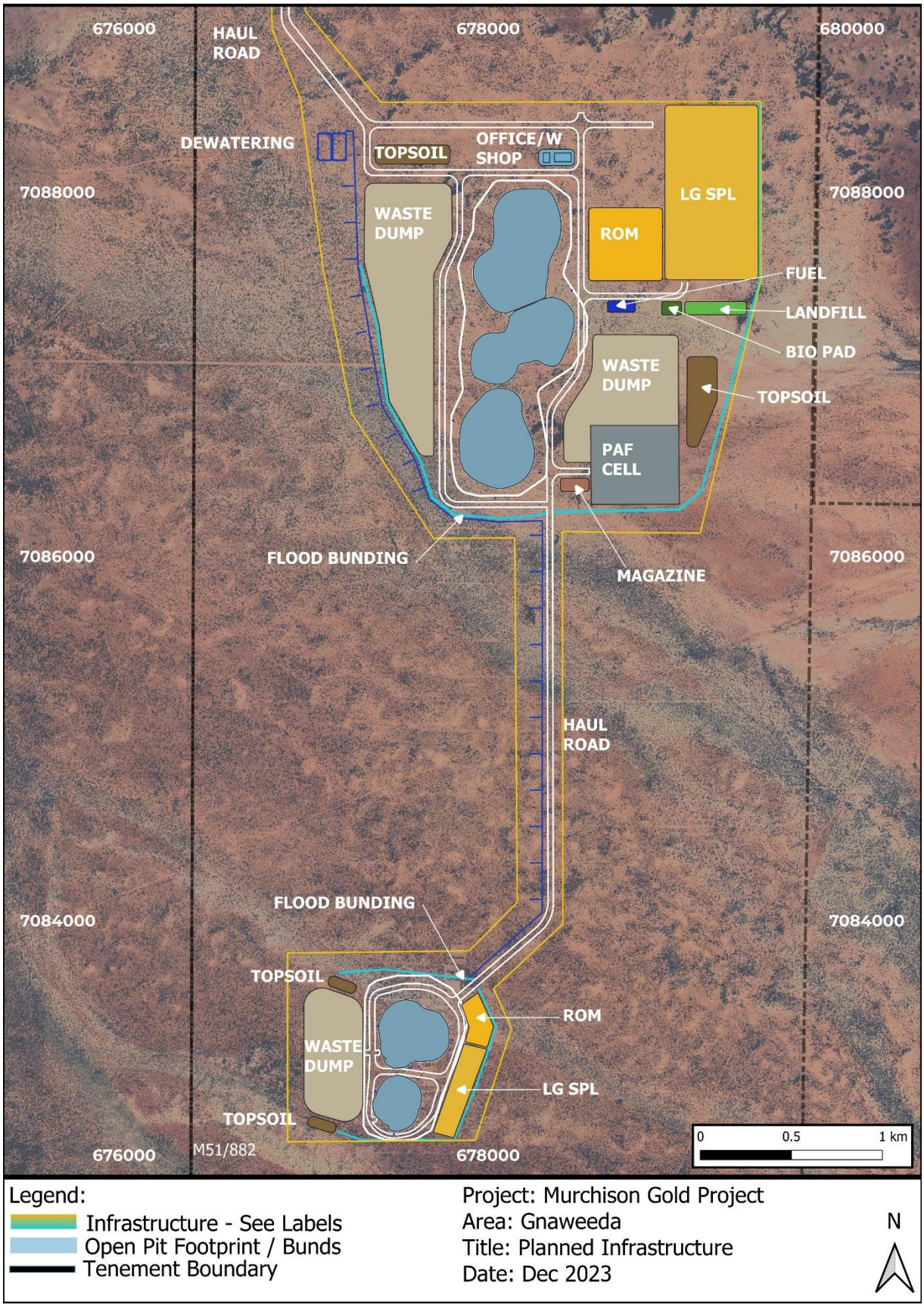

Figure 3 Gnaweeda Project Layout (Turnberry and St Annes)

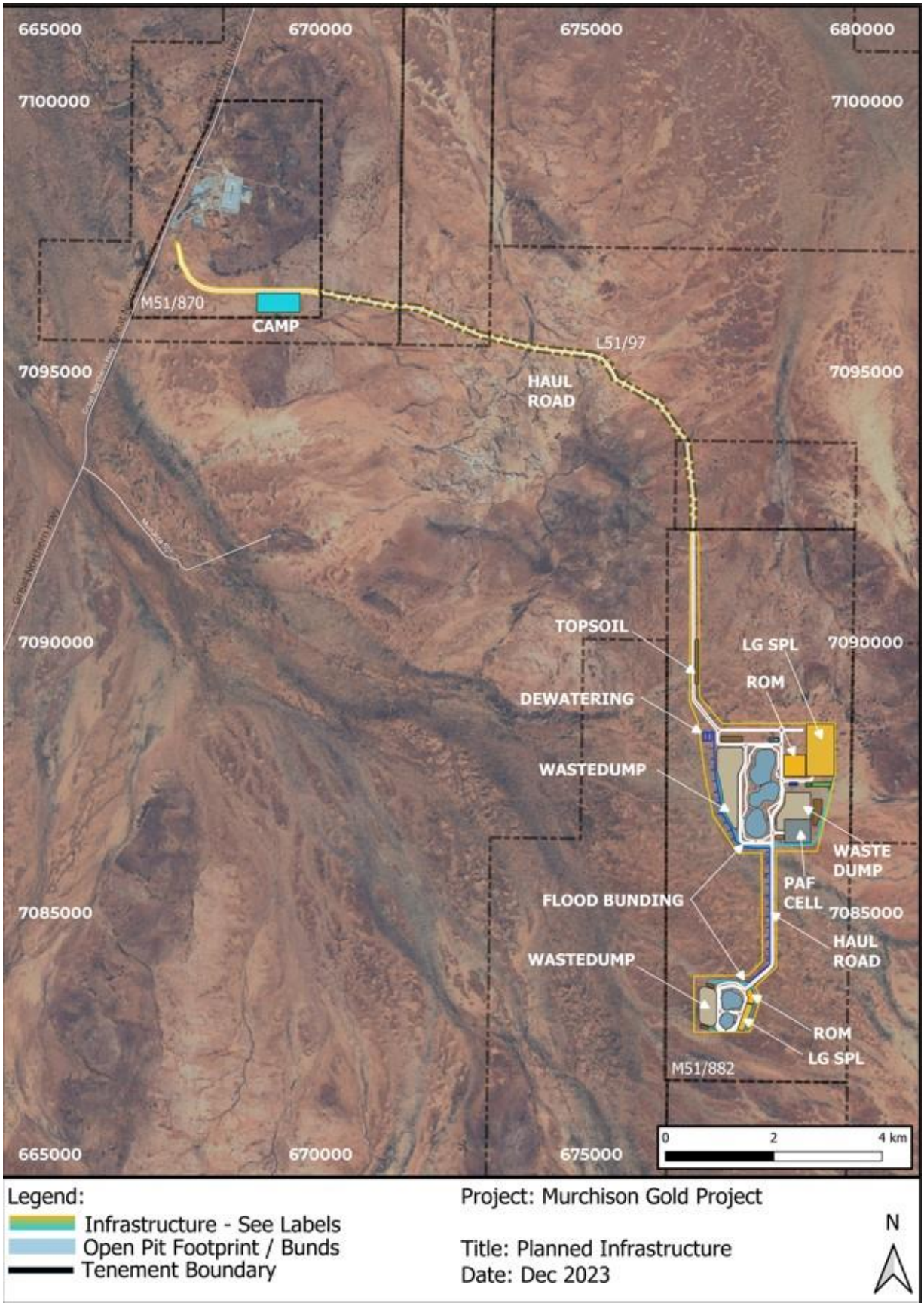

Figure 4 Gnaweeda Project Overview

The Gnaweeda Operation will consist of;

- Five open pits at St Annes and Turnberry
- Waste rock landforms associated with the two mining areas, including a dedicated PAF cell
- Haul and access roads
- Low grade stockpiles
- ROM pads at the two mining areas
- Supporting infrastructure such as offices, administration buildings, a fly camp, laydowns and workshops.

3.5 Project Objectives

The Project is seeking to clear up to 570 ha across the three tenements to enable mining of the two areas to commence. The Project will seek to minimise disturbance where possible and will undertake progressive rehabilitation where possible.

3.6 Project Footprint

The proposed clearing associated with the operation is summarised in the table below.

Table 2 Project Disturbance Footprint

Proposed Activity	Area of Disturbance (ha)
Key Mining Activities	
Open pits M51/882	90
ROM Pads on M51/882	19
Waste Rock Dumps on M51/882	115
Low Grade Ore Stockpile	56
PAF Cell	20
Other Mining Activities	
Landfill	
Fuel storage	
Workshops and administration buildings	
Freshwater dams	
Camp site	
Haul roads and power corridor	
Topsoil stockpile	
Laydown area	282
Total	**570ha**

3.7 Premises History

The Andy Well Mine was in operation from 2012 until it was placed in care and maintenance in 2017. While in operation the mine was located on tenement M51/870 and was a stand-alone operation that mined and processed gold ore. In 2017 the site was placed into care and maintenance and was sold shortly after.

The Project was acquired by Meeka in 2019 and significant exploration was undertaken at the Gnaweeda Project. The site is considered a greenfields site and has had limited disturbance across it to date. The main disturbance has been low impact clearing for drilling and exploration associated activities.

3.8 Existing Facilities

The Andy Well Mine on M51/870 was in operation until 2017 and consisted of all the facilities required to mine and process gold ore. Since its closure and subsequent sale, much of the infrastructure has been removed, with only limited infrastructure remaining. At the Gnaweeda Project there is no current infrastructure.

4 Existing Environment

4.1 Climate

The Murchison region is described as an arid climate characterised by summer and winter rainfall with annual totals rarely exceeding 200 millimetres (mm) (Beard 1990, Desmond et al. 2001). The climate is typical of a semi-desert tropical climate characterised by hot summers and relatively warm, dry winters (BoM 2023).

Meekatharra Airport (station number 007045), approximately 40 km south west of the Study Area, is the nearest Bureau of Meteorology (BoM) weather station, which documents long term climate data (BoM 2023). The mean annual rainfall recorded at Meekatharra Airport is 239 mm with the majority received between January and March each year, with a secondary peak between May and July. Peak rainfall is recorded in February with a secondary peak in June (BoM 2023). The hottest maximum temperatures occur between November and March, with the coldest minimums occurring between May and August (BoM 2023).

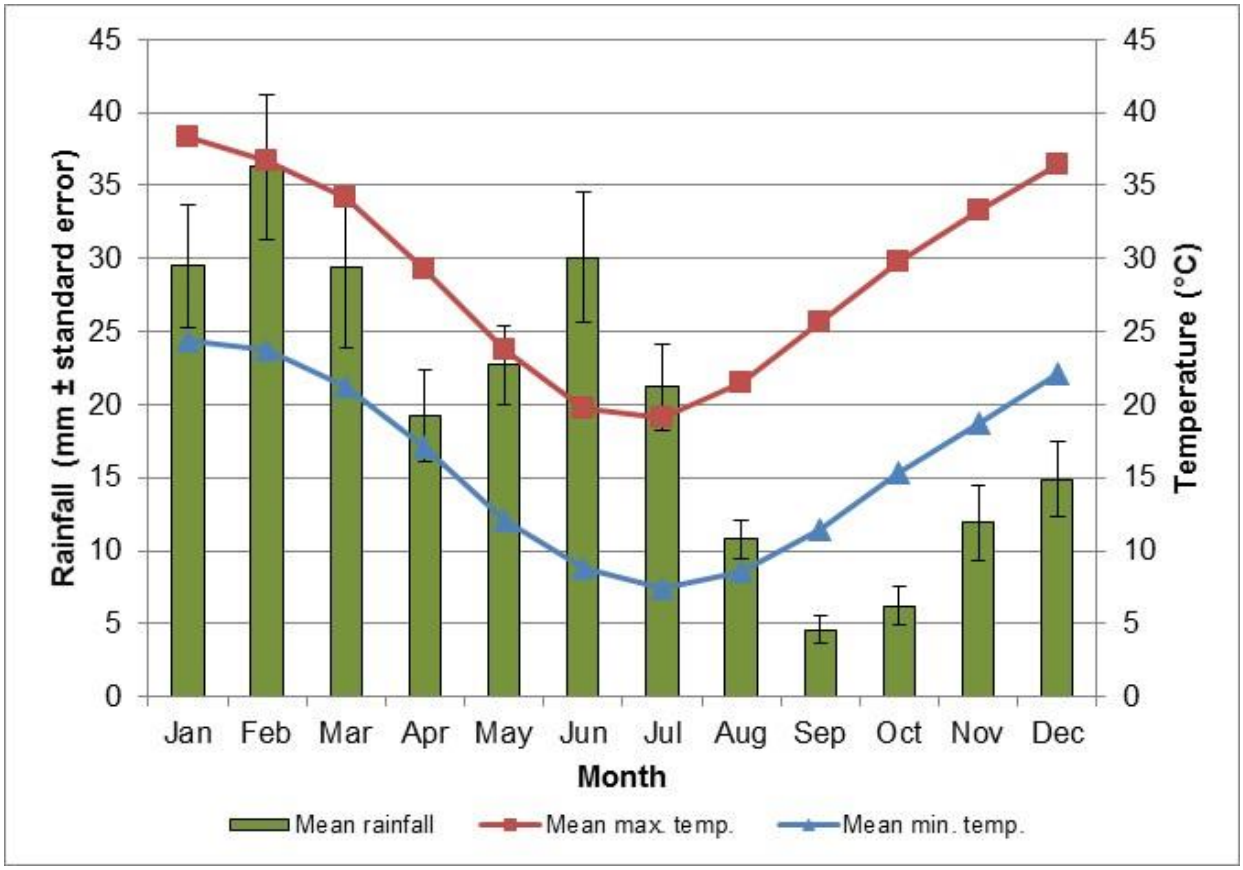

Figure 5 Gnaweeda Project Overview

4.2 Regional Setting

The Project is located in the Murchison bioregion in WA, which covers an area of 278,360 km^2 with mining and grazing as the two main land uses (Desmond *et al*. 2001). The Murchison bioregion encompasses the transitional zone between the Eucalypt dominated environs of southwest WA and the Mulga/Spinifex dominated areas of central Australia (Morton *et al.* 1995). The bioregion contains several large ephemeral wetlands, providing refuge for waterbirds. The vegetation in the bioregion is closely correlated with geology, soils and climate. Areas of outcropping rock with skeletal soils support Mulga low woodlands. Hummock grassland grows predominately on calcareous soils and samphire (*Halosarcia* sp.) low shrubland mostly on the saline alluvium areas. In the east of the bioregion, the red sand plains support Mallee-Mulga parkland over hummock grassland (Thackway and Cresswell 1995).

The Murchison bioregion includes two major components: the Murchison 1 (MUR1 East Murchison) subregion, and the Murchison 2 subregion (MUR2 – Western Murchison). The Project lies on the eastern fringe of the Western Murchison subregion. The subregion is characterised by low Mulga woodlands rich in ephemerals and bunch grasses on granitic outcrops and extensive hardpan washplains. The landscape comprises low hills and mesas of duricrust, separated by flat colluvium and alluvial plains. The region contains the headwaters of the Murchison and Wooramel Rivers which drain the subregion westwards towards the ocean (Desmond *et al.* 2001).

The Project is remote with no mine sites nearby. The Karalundi Aboriginal Education Community is located approximately 10 km to the north of the Project area and the Killara Homestead is approximately 5 km south-east of the Project.

4.2.1 Biogeographically Zones and Natural Features

Thackway and Cresswell (1995) describe a refined system of 85 ‘biogeographic regions’ (bioregions) and 403 biological subregions covering the whole of Australia; resulting from a collaboration between all state conservation agencies and coordinated by the Commonwealth Department of the Environment (DoE). Bioregions are defined on the basis of climate, geology, landforms, vegetation and fauna. The Project lies on the eastern fringe of the Western Murchison subregion of the Murchison Bioregion of the Interim Biogeographical Regionalisation for Australia (IBRA) classification system (Bamford 2012).

The Murchison Bioregion falls within the Bioregion Group 2 classification of EPA (2004). Bioregions within Group 2 have “native vegetation that is largely contiguous but is used for commercial grazing (Bamford 2012)”.

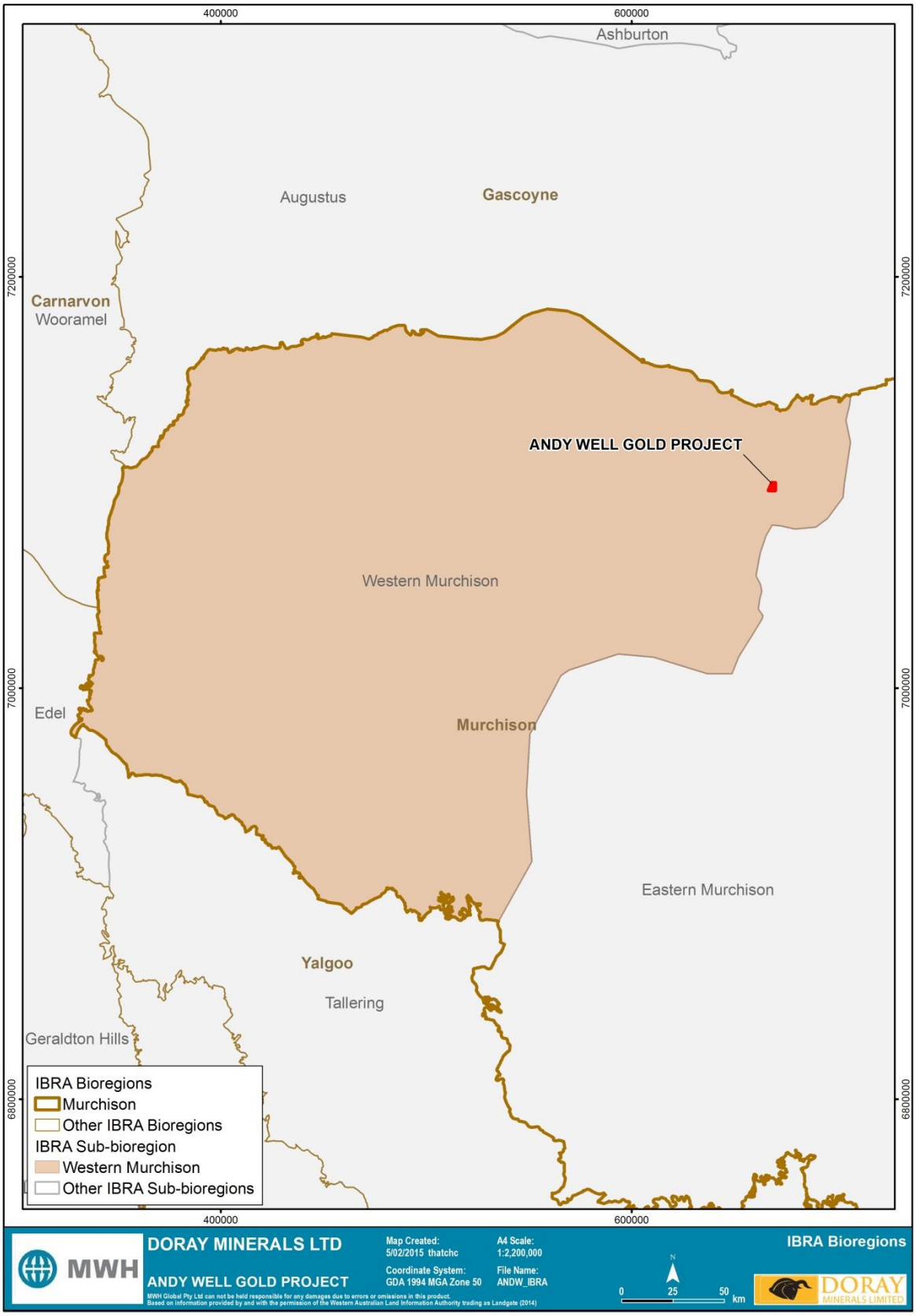

Figure 6 Gnaweeda Project Bioregions

The general features of the Western Murchison subregion are summarised by Desmond, Cowan and Chant (2001). The subregion is characterised by low mulga woodlands rich in ephemerals and bunch grasses on granitic outcrops and extensive hardpan washplains. It contains the headwaters of the Murchison and Wooramel Rivers. The landscape comprises low hill and mesas of duricrust, separated by flat colluvium and alluvial plains (Bamford 2012).

4.2.2 Land Use

The dominant land use is grazing (of native pastures) and there are several mining interests in the subregion (Bamford 2012). There are no other mining operations within 20km of the proposed operation.

4.2.3 Land Systems

Speck *et al*. (1963) classified and mapped the land systems of the Meekatharra region including the Project survey area. Land Systems are classified according to similarities in landform, soil, vegetation, geology and geomorphology. The survey area contains four land systems (**Table 3**).

Table 3 Land systems underlying the Andy Well Gold Project

Code	Land System	Landform
YN	Yandil	Wash plains on hardpan with Mulga shrublands - almost flat uniform drainage plains with very occasional sandy banks and groves.
VI	Violet	Irregular plains on laterite and parent rock, with Mulga, Bowgada and halophytic shrublands. Stony rises - dense Mulga and shrubs, lower slopes and drainage – Mulga groves with dense shrubs and grasses.
Cu	Cunyu	Valley fills with non-saline alluvium. Open Mulga with abundant annuals.
Be	Belele	Almost flat wash plains and sandy banks on hardpan with Wanderrie and Mulga shrublands

4.2.4 Beard vegetation Mapping

The Murchison region of the Eremaean Botanical Province (Beard 1976) is typified by plants from the families *Fabaceae (Acacia* spp.), *Myrtaceae (Eucalyptus* spp.), *Scrophulariaceae (Eremophila* spp.), *Chenopodiaceae* (samphires, bluebushes, saltbushes), *Asteraceae* (daisies) and *Poaceae* (grasses) (Mattiske 2011).

The region is characterised by the widespread presence of mulga (*Acacia aneura*) communities (Beard 1). *Acacia aneura*, which thrives in harsh environments, is a variable species, forming woodlands on the plains and reducing to scrub on the rises and hills (Beard 1990).

The vegetation of the convergence of the West and East Murchison subregions is dominated by Mulga woodland and Mulga shrubland, with *Eremophila* spp being the most abundant species of undershrub (Beard 1990). These woodlands and shrublands are often rich in ephemeral species (plants with short life cycles that are very dependent on favourable conditions such as rainfall) and may also support perennial and annual grasses. Hummock grasslands and chenopod communities associated with salt lake systems are less frequently present (Cowan 2001, Desmond et al. 2001).

4.3 Geology

4.3.1 Regional Geology

The regional geology of the area extends to the northern margin of the Yilgarn Craton. The Yilgarn Craton is composed of Archaean rocks, predominantly granitoids, which are crossed by north-northwest trending belts of greenstones. Archaean and the overlying Proterozoic strata of the Yilgarn Craton have been extensively oxidised to depths up to 120 m, possible since the pre-cretaceous during formation of the WA Plateau (Doray 2012).

The area has been subject to a wide range of climates during its history and the regolith has formed a complexly layered structure as a result of leaching of mineral components during wet cycles and precipitation of mineral matter to form ferricrete, silcrete and calcrete during dryer cycles. Carbonate deposits in the form of groundwater calcretes in ancient drainage lines are widespread throughout the Yilgarn Craton (Doray 2012).

The Yilgarn Craton comprises elongate north-northwest-south-southeast-striking belts of sedimentary and volcanic rock (i.e. greenstones) that are enclosed by large areas of granite and granitic gneiss. These rocks formed principally between c. 3.05 and 2.62 Giga annum (Ga), with a minor older component (>3.7 Ga). The Yilgarn is divided into four broad tectonic units: the Narryer Terrane, Youanmi Terrane, Southwest Terrane and Eastern Goldfields Superterrane (Doray 2012).

Exploration lease E51/1217 covers a portion of the Meekatharra-Wydgee Greenstone Belt north of Meekatharra and is contained within the Youanmi Terrane. The north-notheasterly trending Archaean Meekatharra-Wydgee Greenstone Belt, comprises a succession of metamorphosed mafic to ultramafic and felsic and sedimentary rocks belonging to the Luke Creek and Mount Farmer Groups. Over the northern extensions of the belt, sediments belonging to the Proterozioc Yerrida Basin unconformably overlie Archaean granite-greenstone terrain. Structurally, the belt takes the form of a syncline known as the Polelle syncline (Doray 2012).

Younger Archaean granitoids have intrusive contacts with the greenstone succession and have intersected several zones. Within E51/1217, a largely concealed portion of the north-north-easterly trending Greenstone Belt is defined, on the basis of drilling and airborne magnetic data, to underlie the area over a maximum strike distance of some 9 km and a width of up to 4 km. At surface this area includes subcrops of weathered schistose sedimentary and felsic rocks including quartz-sericite schist cut by quartz veins and metamorphosed porphyry. Narrow northerly trending and steeply dipping banded iron formation (BIF) also crops out (Doray 2012).

Superficial cover includes degraded laterite profiles and ferruginised rubble and colluvium over areas of subdued relief which grade into sheetwash deposit five to eight metres thick and alluvium in surrounding watercourse related to north-westerly flowing tributaries to the Yalgar drainage system. Alluvial cover over the Yalgar drainage system ranges up to 30 m thick, overlying channel clays up to 100 m thick. The greenstone succession is tightly folded into a south plunging syncline and is cut by an easterly trending Proterozoic dolerite dykes (Doray 2012).

4.3.2 Local Geology

Turnberry and St Anne's are located within the Gnaweeda greenstone belt, a narrow belt of Archaean volcano-sedimentary rocks up to 10km wide in the northern half and decreasing to less than 1km in the south, situated at the northernmost margin between the Achaean Murchison, Southern Cross, and Yeelirrie Provinces. The Gnaweeda greenstone belt is sub-parallel and ~7km to the southeast of the Meekatharra-Widgie greenstone belt, separated by an envelope of gneiss and massive granitoid. The belt comprises a succession of metamorphosed mafic to ultramafic, felsic and metasedimentary rocks with minor felsic to intermediate intrusives interpreted as belonging to the Norie Group, formerly Luke Creek, within the Murchison Supergroup. Structurally the Gnaweeda greenstone belt is situated along the northernmost extent of two main structural lineaments bounding the Murchison and Southern Cross Domains, the Evanstone-Edale and the Youanmi shear zones. Regionally both lineaments are associated with several other gold occurrences in the Sandstone greenstone belt sequence.

At Turnberry the geological package is largely comprised of fractionated dolerite with an ultramafic base, basalt, felsic volcaniclastic and porphyry surrounded by a package of siliciclastic sediments and shales. Stratigraphy is steeply East to sub-vertically dipping. Mineralisation at Turnberry forms a 1.7km north-north easterly trending gold anomalous corridor, which is broadly defined into three zones, Turnberry South, Central and North. Mineralisation is widespread and occurs within multiple mineralised envelopes but predominantly concentrated in interpreted fold closures and has a probable sub-vertical plunge (Figure 5).

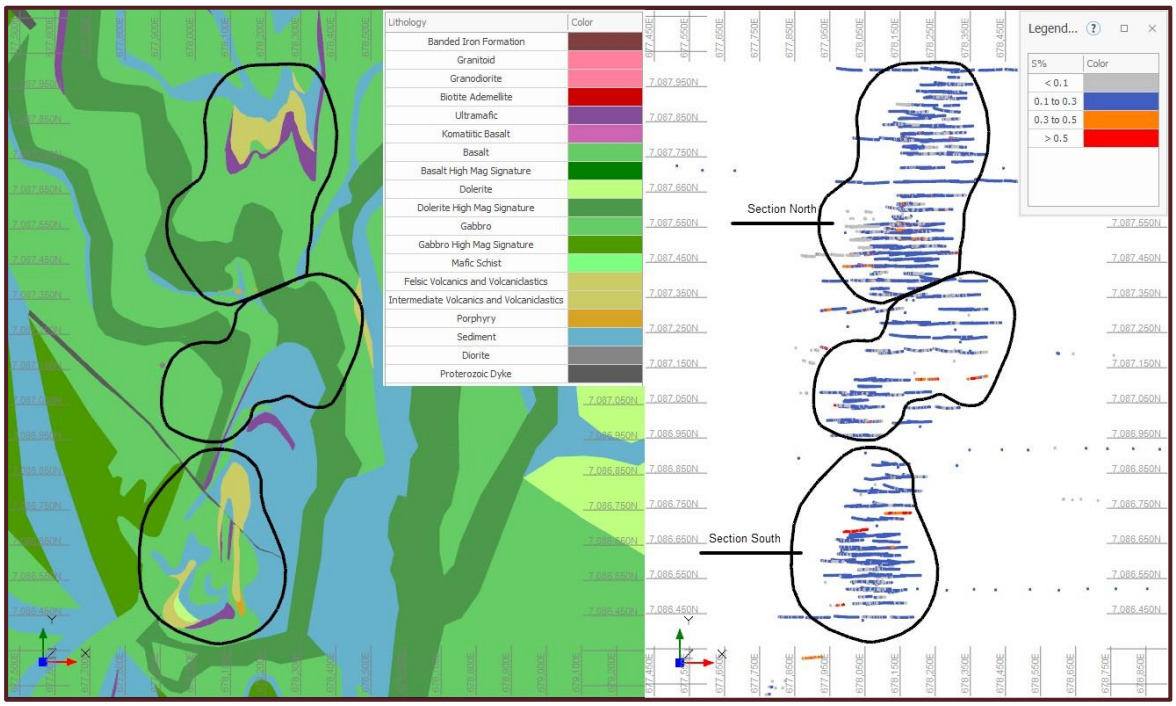

Figure 7 Turnberry Geology

Mineralisation at St Anne's forms an 800m north-northeast trending series of lodes. Structural interpretation suggests that the mineralisation is aligned along a north-northeast trending shear zone. Several northwest-southeast structures are interpreted from geophysics to crosscut the stratigraphy and appear to off-set stratigraphy regionally and mineralisation locally. Mineralisation is widespread and occurs within multiple mineralised envelopes but predominantly concentrated within the mafic rocks proximal to lithology contacts (Figure 7).

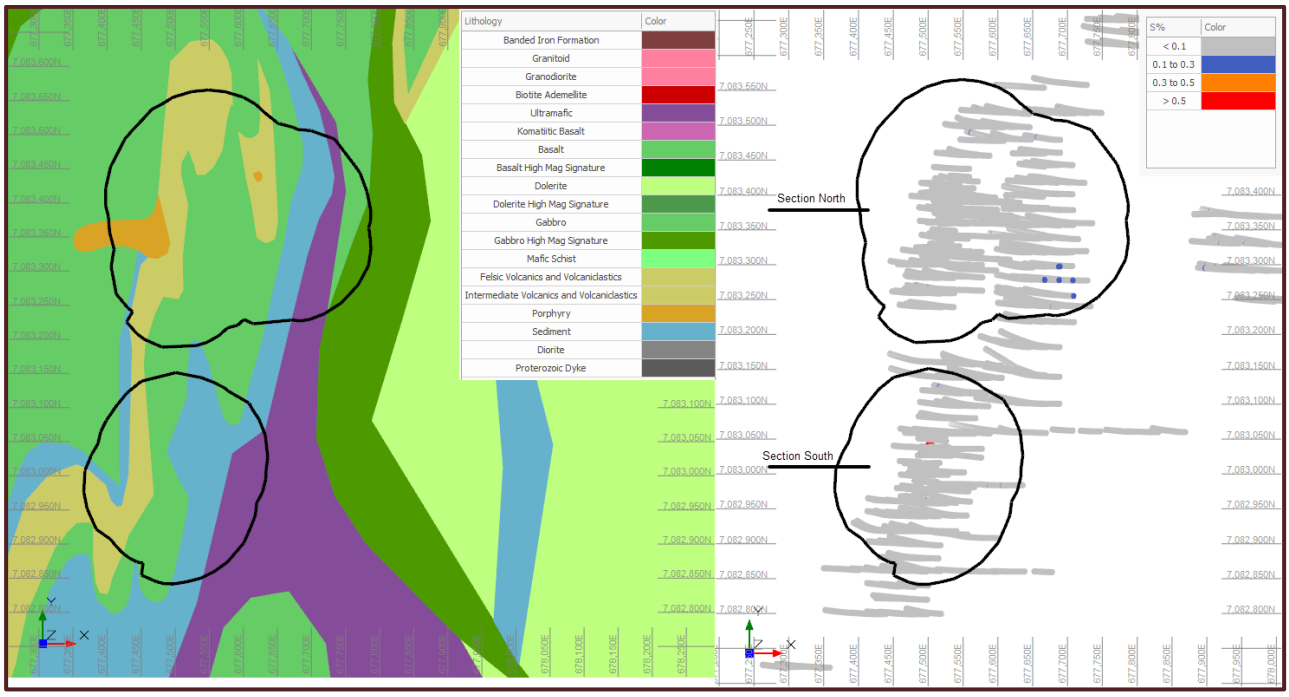

Figure 8 St Annes Geology

4.4 Soils and Soil Profiles

Soils across the Project area have been mapped at the 1:250,000 scale by the Department of Agricuture diring the Murchison River catchment and surrounds survey. At this scale there are 4 major soil and land systems across the Project area;

- (272Be) - Reddish brown hardpan with shallow loams associated with hardpan wash plains and low sandy banks on flat alluvial plains of the Belele land system - this soil is typically shallow (< 1m) underlain by a red brown hardpan of cemented alluvium (Curry et al., 1994).

- (272/293Sh) – Red shallow loam, shallow sandy duplex & shallow sands all occurring in areas of breakaways, kaolinised footslopes and extensive gently sloping plains on granite of the Sherwood land system.

- (272Yg) – - Reddish brown hardpan with shallow loams associated with almost flat wash plains of the Yanganoo land system - this soil is typically shallow (< 1m) underlain by a red brown hardpan of cemented alluvium (Curry et al., 1994).

- (272Yn) – Reddish brown shallow loam over hardpan on flat colluvial plains of the Yandil land system – these soil types are commonly referred to as “flat hardpan wash plains” (Curry et al., 1994) consisting of a shallow loamy surface mantle of quartz or ironstone pebbles and gravels.

Soils are typically shallow throughout the Project area, and are predominantly sandy. Erosion modelling shows that the soils are generally unsusceptible to erosion and will be suitable for the rehabilitation of built landforms (Soils and Water, 2017). Soils sit atop a reddish brown sandy loam to clay loam which shows no great different to the soils above, the only difference been the accumulated seedbank in the soils. The sandy loam and clayey loam is still considered suitable for rehabilitation purposes (Soil and Water, 2017).

Underlying all of the soil groups is a regionally extensive Quaternary hardpan feature colloquially known as the Wiluna Hardpan (Bettenay and Churchward, 1974) which occurs from north of Mundiwindi to south of Paynes Find. The hardpan layer is typically between 40 to 110cm thick and exists across the entire M51/882 tenement.

Figure 8 below shoes the soils mapping undertaken as part of the approvals investigations.

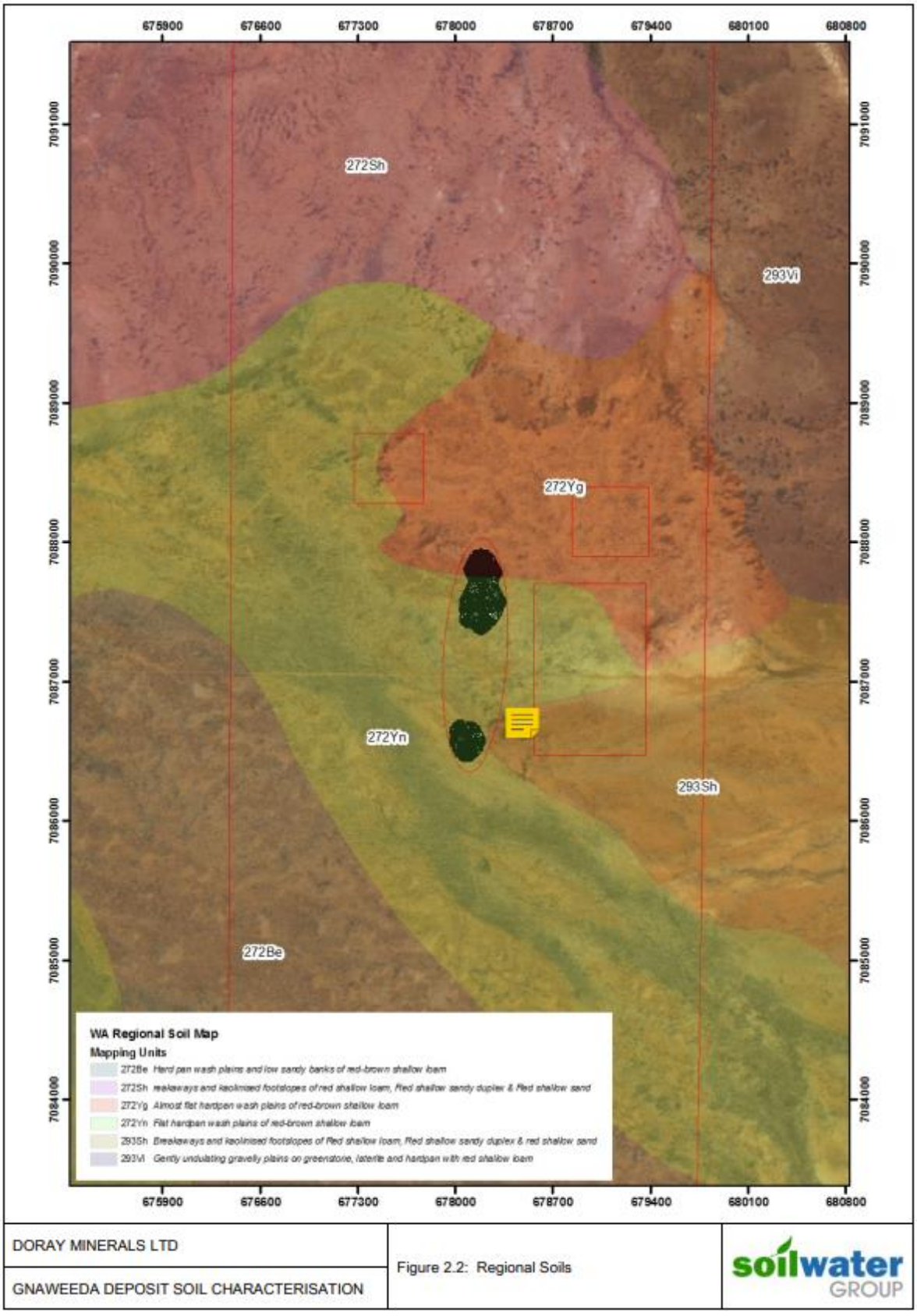

Figure 9 Regional Soils Mapping

4.5 Waste Rock Characterisation

The Gnaweeda Project is targeting shallow oxide mineralisation that extends to a depth of approximately 120m. In 2023 Pendragon Environmental Solutions were commissioned to review the existing geochemical and PXRF data on the waste rock to inform the Project if there were any hostile materials that required management.

Across both deposits the sulphide levels are generally low, as expected in a weathered material (Pendragon, 2023). One sample at Turnberry was classified as PAF, while the 19 samples analysed were considered to be non-acid forming. At St Annes the material has an average sulphur concentration of 0.001% with a maximum concentration of 0.791%. This material is classified as non-acid forming.

The Project has committed to building a PAF cell as part of the development. While not a major requirement with this stage of the development, the potential to target deeper ores hosted in fresh rock does raise the potential for PAF to be encountered in the future, and if not build early on in the development, the material required for the cell will be lost. The cell will be constructed from clays and other weathered materials, that will provide a buffering capacity for any future PAF material. Should unmineralized PAF material be encountered during the grade control drilling process, this will be sent to the PAF cell for appropriate management.

The water material was also assessed for naturally occurring radioactive material (NORM) and any potential fibrous minerals. These were determined not to be present and therefore no management is required.

4.6 Surface Hydrology

Water within the Project area is accepted to flow from southwest to the north east. There are no significant water ways within the Project are, and there are no permanent water bodies in the Project area. The Project has analysed the local topography maps and looks at the surface drainage maps and has identified that some surface waters will flow past the Gnaweeda Project. The Project will implement a flood band around each project to prevent surface water ingress and to redirect surface water flows around the Project and reinstate them down stream.

4.6.1 Regional Hydrology

Surface drainage features of the region can be divided into two broad groups: the external drainage provided by the catchment areas of rivers that flow into the ocean, and the internal drainage of water courses that drain into salt lakes. To the east of a line running generally north to south, located between Meekatharra and Wiluna, lays the area of the internal drainage. Here, creeks and internal rivers drain surface water into numerous salt lakes. External surface water drainage is provided by a number of intermittent rivers (RPS Aquaterra 2012b).

The Project is located within the Murchison River catchment, which supplies the second longest river in Western Australia. Other major rivers draining this area into the Murchison River include the Yalgar River, Whela Creek and the Sandford and Roderick Rivers. The catchment area of the Murchison River comprises an area of approximately 104,000 km^2 as defined by the Department of Water (DoW) however, this reduces to an effective catchment of around 89,000 km^2 when the Lake Austin sub-catchment is excluded (inward draining catchment) (RPS Aquaterra 2012b).

Rain generally only falls in the upper basin during summer cyclones, so for much of the year, the Murchison River does not flow, having dry sandy river beds with occasional permanent pools. The eastern reaches of the catchment contain large chains of salt lakes, which flow only intermittently. Water quality during floods is fresh, but turbid, while low flows are brackish and saline (RPS Aquaterra 2012b).

Streamflow is directly in response to rainfall and flows are ephemeral. Streamflow in the smaller creeks is typically of short duration, and ceases soon after the rainfall passes. In the larger rivers, which drain the larger catchments, runoff can persist for several weeks and possibly months, following major rainfall events, such as those resulting from tropical cyclones (RPS Aquaterra 2012b).

The Project lies within a catchment of approximately 520 km^2 that crosses the Great Northern Highway (GNH) at a series of floodway/culvert arrangements. Bunds constructed parallel to the GNH channel local flow towards each respective floodway/culvert. The culverts generally comprise single 400 mm diameter concrete pipes, and as such only have capacity for small flows. Larger flow events cross the GNH via the floodways. The majority of the catchment flows over the southern series of floodways (RPS Aquaterra 2012b).

Average bed gradients upstream of the GNH are around 0.2%, draining in a north-westerly direction towards the mining area. There are no defined incised creek beds in the catchment draining toward the mining area, and as such, flow through the catchment is more likely to be in the form of sheet flow and with flow only during major rainfall events (RPS Aquaterra 2012b).

Once across the GNH, the general direction of flow is in a north-westerly direction towards the Yalgar River. The Yalgar River is a 120 km long tributary of the Murchison River. It arises near the GNH about 50 km north of Meekatharra, flowing about 80 km westward to a junction with its tributary, the Hope River. From there it flows north-northwesterly for about 40 km, before disgorging itself into the upper reaches of the Murchison River near the Carnarvon Meekatharra Road (RPS Aquaterra 2012b).

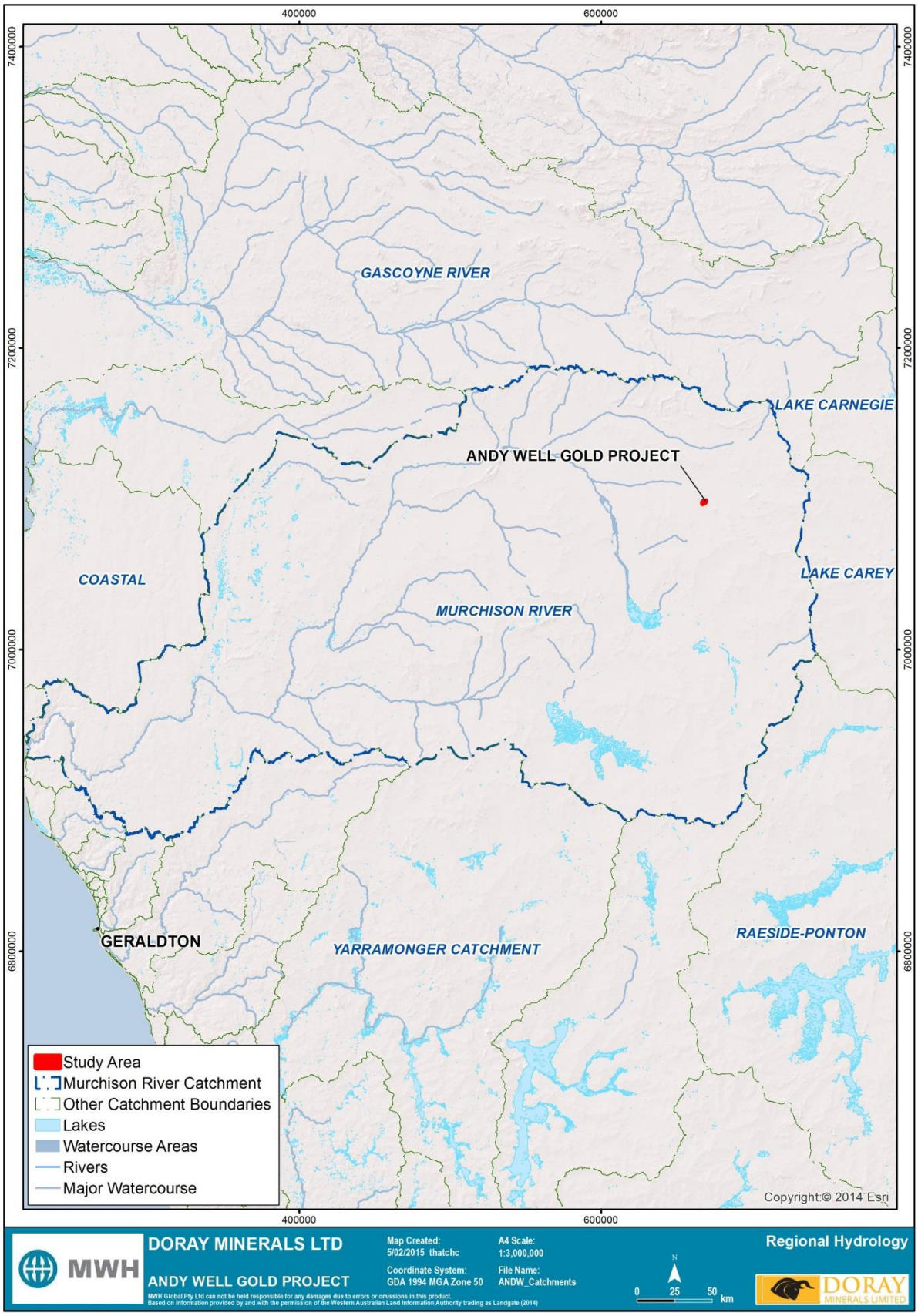

Figure 10 Project Regional Hydrology

4.6.2 Local Hydrology

Local surface water drainage patterns are generally in a westerly and north-westerly direction. There are no defined flow paths of significance. Surface water flows will be intercepted by proposed bunding diverting flows around the outside of the Project site.

Consistent with surface water quality in nearby catchments following rainfall events, it is expected that surface water run-off would generally be of potable quality, though turbid (RPS Aquaterra 2012b). The interruption of surface water flow patterns has the potential to reduce and in some cases increase surface water run-off volumes. Surface water management infrastructure including bunding and minor diversion drains will be constructed to limit the impacts on natural surface water flows. Drains and bunds have been designed based for a flood event selected with consideration to the expected life and consequences of failure. Diversion modifications have been designed to re-route flows back to their original drainage paths downstream of the development, or via minor channels and overland flow.

4.7 Groundwater

4.7.3 Groundwater Abstraction and Disposal

Groundwater abstraction is required as part of mining operations. Initial investigations have identified that dewatering across the two deposits will be approximately 20L/s while mining waste and up to 50L/s when mining ore. Estimates of annual dewatering range between 630,000KL and 1, 600,000KL.

4.7.4 Groundwater Quality

The depth to groundwater at Turnberry is generally 9 to 13 mbgl, and the results from the hydrogeological drilling and testing program conducted in late January and early February 2017, indicate that the groundwater is fresh (total dissolved solids, TDS average of 600 mg/L) and slightly alkaline (pH average of 8.1). This is consistent with historical hydrogeological investigations in the area which suggest the quality of the groundwater in the area is relatively fresh and potable (Ray and Teakle, 2011).

Sampling of groundwater in the two Project areas was undertaken as part of the approvals process. Four bores at Turnberry and one at St Annes were sampled, after hydrogeological testing, and analysed for basic chemistry. The water is of high quality with low dissolved metals and does not contain any problematic solutes. The results from the testing are presented in the Table X below.

Table 4 Groundwater Quality

Analyte	Bore ID				
	SABS001	TBPB001	TBPB002	TBPB003	TBPB004
pH	7.6	8.0	8.2	8.0	8.1
Conductivity (µS/cm)	1600	1600	880	1100	1300
TDS (mg/L)	1000	1000	550	680	840

Ca (mg/L)	59	85	36	53	91
Mg (mg/L)	42	50	11	29	27
Na (mg/L)	180	140	110	110	120
K (mg/L)	22	8.9	9.2	7.2	6.6
Total Alkalinity (mg/L)	180	110	20	110	94
Carbonate Alkalinity (mg/L)	<1	<1	2	<1	<1
Bicarbonate Alkalinity (mg/L)	220	130	20	130	110
Cl (mg/L)	280	240	160	170	180
SO4 (mg/L)	190	300	120	160	270
As (mg/L)	0.006	0.009	0.006	0.010	0.047
Cd (mg/L)	<0.0001	0.0001	<0.0001	<0.0001	<0.0001
Cr (mg/L)	<0.001	0.001	0.003	0.001	<0.001
Co (mg/L)	0.003	<0.001	<0.001	<0.001	<0.001
Cu (mg/L)	0.004	<0.001	<0.001	<0.001	<0.001
Fe (mg/L)	0.21	<0.005	<0.005	<0.005	<0.005
Pb (mg/L)	<0.001	<0.001	<0.001	<0.001	<0.001
Ni (mg/L)	0.002	<0.001	<0.001	<0.001	<0.001
Se (mg/L)	0.002	0.016	0.001	<0.001	0.001
Zn (mg/L)	0.023	<0.005	<0.005	<0.005	0.011

4.8 Flora and Vegetation

Desktop Assessment

A desktop assessment was conducted using Department of Parks and Wildlife (DPaW) and DoE databases to identify the possible occurrence of Declared Threatened Priority Flora Species and Threatened and Priority Ecological Communities within the survey area:

- EPBC Protected Matters (DoE 2013) (20km radius);

- DPaW Priority and Threatened Flora (DPaW 2013e) (20km radius);
- DPaW Threatened and Priority Ecological Communities (DPaW 2013c) (50km radius);
- NatureMap (DPaW 2013b) (20km radius).

The desktop survey identified a total of 250 vascular plant taxa from 107 plant genera and 43 plant families as possibly occurring within the survey area. Seven of these plant taxa are listed as Priority species by the then Department of Environment and Conservation, now DPaW (2011a).

No Declared Threatened Flora species pursuant to subsection (2) of section 23F of the *Wildlife Conservation Act* (1950) [WA] and as listed by the Department of Environment and Conservation (2011a) have been recorded previously near the Andy Well Survey area.

The Priority 1 Wiluna West Vegetation Complex (banded ironstone formation) Priority Ecological Community (PEC) could also possibly occur in the Andy Well Survey area (Department of Environment and Conservation, 2011f).

Field Investigations

The flora and vegetation survey was conducted by four botanists from 11th to 14th April 2011. A total of 69 sampling sites were surveyed, covering the greater Doray exploration tenement to include the proposed mining areas and associated haul roads, processing and storage facilities and accommodation camp (Mattiske 2011). The survey effort after reasonable rains was considered more than adequate to meet the EPA Guidance Statement 51 standards (EPA 2004).

The flora and vegetation was described and sampled systematically at each survey site, and additional opportunistic collecting was undertaken wherever previously unrecorded plants were observed. At each site the following floristic and environmental parameters were noted: GPS location, topography, percentage litter cover, soil type and colour, percentage of bare ground, outcropping rocks and their type, gravel type and size, time since fire and the percentage cover and average height of each vegetation stratum. For each vascular plant species, the average height and percent cover (both live and dead material) were recorded (Mattiske 2011).

All plant specimens collected during the field surveys were dried and fumigated in accordance with the requirements of the Western Australian Herbarium. The plant species were identified through comparisons with pressed specimens housed at the Western Australian Herbarium. Where appropriate, plant taxonomists with specialist skills were consulted. Nomenclature of the species recorded is in accordance with the Department of Environment and Conservation (2011c, 2011d).

PRIMER (Plymouth Routines in Multivariate Ecological Research) v6 statistical analysis software was used to analyse species-by-site data and discriminate sites on the basis of their species composition (Clarke and Gorley, 2006). To down weight the relative contributions of quantitatively dominant species a presence/absence transformation was applied to the data set. Transformed data were analysed using a series of multivariate analysis routines including Hierarchical Clustering (CLUSTER), Nonmetric Multidimensional Scaling (MDS) and Similarity Percentages (SIMPER). Results were used to inform and support interpretation of aerial photography and delineation of individual plant communities (Mattiske 2011).

The survey identified a total of 172 vascular plant taxa from 77 plant genera and 29 plant families. The dominant families were Fabaceae (29 taxa) and Poaceae (22 taxa) with Scrophulariaceae (17 taxa), Chenopodiaceae (16 taxa) and Amaranthaceae (13 taxa) also contributing a large proportion of taxa identified (Mattiske 2011).

A total of ten vegetation associations were identified during the survey (Figure 12). The Project is dominated by the S1 and S2 shrubland communities interspersed with pockets of W1 woodland communities (Mattiske 2011). The proposed Suzie Deposit is largely on S3 while the proposed WRL expansion is on S2.

4.8.5 Gnaweeda

A level 2 Flora and Vegetation Assessment has been undertaken across the Turnberry project area (Stantec, 2017) and further survey was carried out across the St Annes Area (Native Vegetation Solutions, 2023). The surveys identified a total of 151 vascular flora across the survey sites. No threatened or rare flora were present, however two priority species were identified; *Stenanthemum medale* (P1) and *Gunniopsis propinqu* (P3), within the proposed haul road area (L51/97).

4.8.1 Conservation Significant Flora

No Threatened Flora species pursuant to subsection (2) of section 23F of the *Wildlife Conservation Act* 1950 or as listed by the Department of Parks and Wildlife (DPaW) (formerly DEC) were recorded within the survey area. No plant species listed under the EPBC Act were found within the survey areas.

4.8.2 Conservation Significant Vegetation

4.8.3 Vegetation Units

The vegetation associations and habitats recorded within the survey area were not analogous to any Threatened Ecological Communities (TECs) under the Wildlife Conservation Act (WC Act) or Environmental Protection and Biodiversity Act (EPBC Act) or any Priority Ecological Communities listed by the DPaW (Mattiske 2011).

4.8.4 Vegetation Condition

The condition of the vegetation ranged from degraded (in localised areas) to excellent based on the scale as defined by Keighery. The degradation was a result of previous grazing activities, mineral exploration and proximity to the GNH and associated disturbances (Mattiske 2011).

4.8.5 Introduced Species

Three introduced (exotic) taxa were recorded within the Andy Well area: *Portulaca oleracea* (Common Purslane), *Bidens bipinnata* (Bipinnnate Beggartick), and *Oxalis corniculata* (Yellow Wood Sorrel). None of these are Declared Plants species pursuant to section 37 of the Agricultural and Related Resources Protection Act 1976. The *P. oleracea* was widespread across the survey area and found in 40 sites; *B. bipinnata* and *O. corniculata* were more restricted within the survey area and were found at two and four sites respectively (Mattiske 2011). A recent inspection of the Andy Well area has identified that there has been a significant Ruby Dock infestation across disturbed areas that was not present during previous investigations.

4.9 Terrestrial Fauna

4.9.1 Terrestrial Fauna Investigations

Several fauna studies have been undertaken across the Turnberry mining area since its discovery. In 2023 Terrestrial Fauna mobilised to site to undertaken a fauna assessment for the St Annes area

and produce a summary report of all the work undertaken as part of the Project (Terrestrial Fauna, 2023).

Fauna habitat mapping identified five broad habitats within the study area:

- Drainage
- Sheet flow areas
- Mulga woodland
- Shrublands on stoney plains
- Breakaway areas.

In addition to these areas there are areas of heavy disturbance due to mining and pastoral activities. The habitat mapping is shown in Figure 18 below.

The Terrestrial Ecosystems report details the findings of other surveys undertaken by past holders of the tenure and lists the species found. In terms of conservation significant species the report concludes that with the exception of the Long-Tailed Dunnart, no conservation significant species will be impacted by the Project. In the case of the Dunnart the report recommends that the break way country to the north of the Project be avoided (Terrestrial Ecosystems, 2023). This area has been avoided by the Project at the request of both the traditional owners and the station. The haul road has been designed to avoid these areas by at least 500m meaning there will be no impacts to fauna in these areas.

The Terrestrial Ecosystems report makes a number of recommendations to limit the impacts on the receiving environment due to mining. Of main concern is the management of proposed excess mine dewatering. The report suggests that surface water can be disposed of by discharge to the environment if the following recommendations are implemented:

- Water is discharged via a spray field
- The spray field is intermittently used to avoid groundwater ponding and also saturation
- Discharge is moved to prevent excess loading in one particular area
- The sprayfield is utilised in the morning mainly to allow water to evaporate during the day and avoid saturation of the soil profile.
- Drainage lines and sheet flow areas be avoided where possible.

The Project intends to manage the discharge in a similar manner as described by the Terrestrial Ecosystems report. The discharge will be actively managed to prevent excess discharge in one area and the Project will have multiple discharge points over an extensive discharge pipeline to prevent excess discharge in one area.

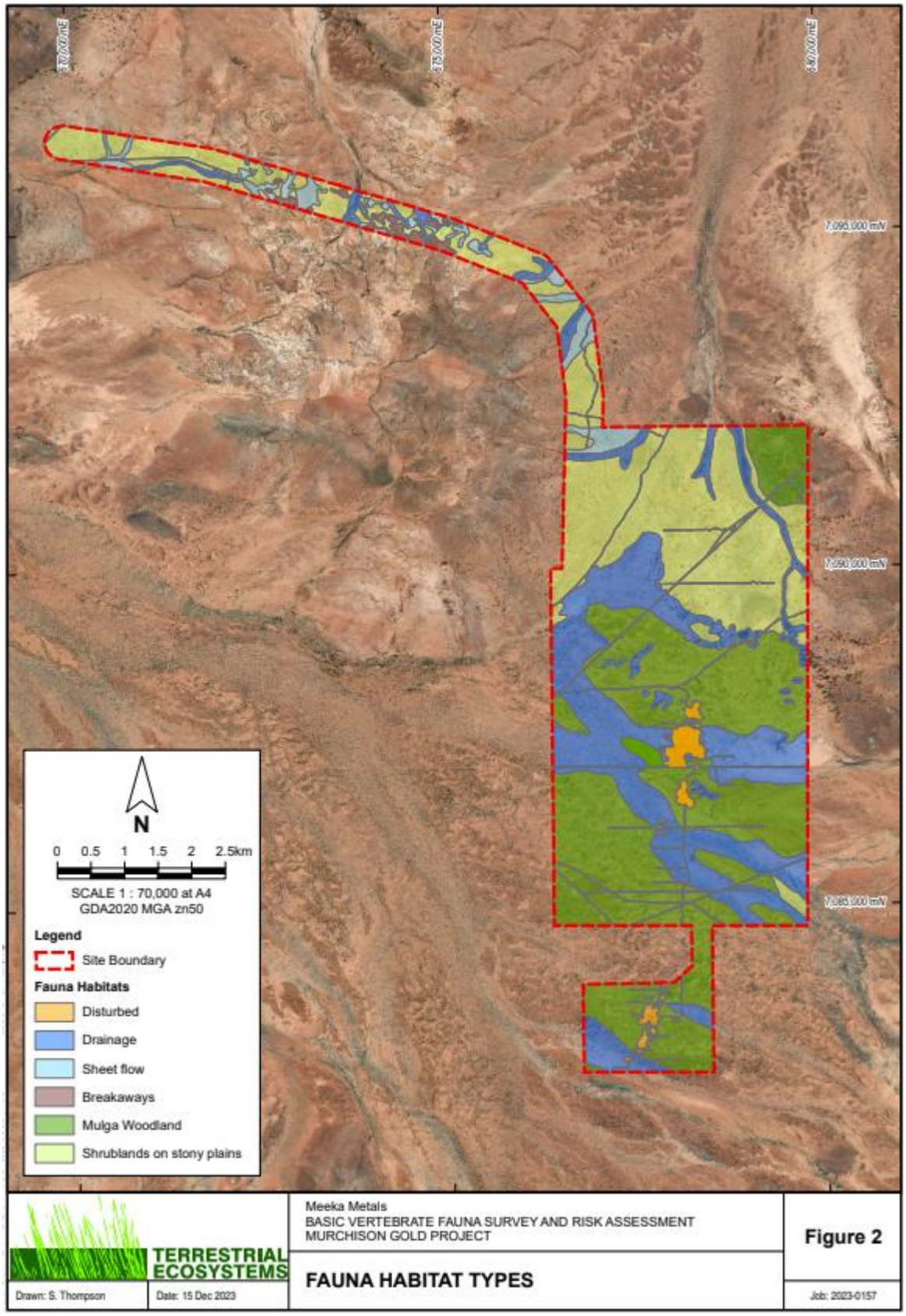

Figure 11 Fauna Habitat Mapping

4.9.2 Conservation Significant Fauna Species

Surveys undertaken by Terrestrial Ecology in 2023, undertook further reconnaissance and updated some of the habitat mapping. The survey concluded that there was a low possibility of Malleefowl in the project area, as well as the possibility that the Long-Tailed Dunnart may be present within the breakaway region.

No Malleefowl mounds have been identified during the drilling at either deposit, or along the proposed haul road. While the repot acknowledges a low possibility of the Malleefowl being present, there is no evidence on the ground that the species is present.

The Long-Tailed Dunnart was determined as possibly utilising the breakaway country to the west of the Project. This habitat is outside of the disturbance envelope and has been avoided for a range of reasons including the condition of the terrain, the likelihood of heritage sites being present and the likelihood of conservation flora and fauna being present. The Project will not impact the break away areas.

4.10 Subterranean Fauna

A subterranean fauna assessment has been undertaken (Bennelongia, 2023). There are no species of conservation significance present within the study area. Impacts to subterranean fauna will be confined to dewatering and will not extend to clearing.

4.11 Heritage

Turnberry heritage surveys were completed for exploration, mine development and haulage routes. Two heritage surveys (2016 and 2017) were undertaken Yungunga-Nya Native Title claimants in conjunction with the Yamatji Marlpa Aboriginal Corporation. The following two heritage survey reports were produced:

- 2016 Yamatji Marlpa Aboriginal Corporation – Preliminary advice of a Yugunga-Nya heritage survey with Doray Minerals Limited. For L51/97. prepared December 2016
- 2017 Yamatji Marlpa Aboriginal Corporation – Preliminary advice of a Yugunga-Nya heritage survey with Doray Minerals Limited. For sections of M51/870, E51/1217 and E51/1491. Prepared May 2017.

The follow up 2017 heritage survey was undertaken to cover a haulage deviation within L51/97 and a small additional area within M51/870.

All sites have been identified and the Project has been designed to avoid these. There will be no impacts to heritage as part of the proposed clearing and ground disturbance.

5 Assessment Against the Clearing Principles

5.1 Clearing Principle A

Native vegetation should not be cleared if it comprises a high level of biological diversity.
A total of 172 vascular plant taxa from 77 plant genera and 29 plant families were recorded in the flora survey area (Native Vegetation Solutions, 2023). No threatened flora (WC Act) or plant species listed under the EPBC Act 1999 were found within the survey area. No threatened or priority ecological communities were found within the survey area.
The flora communities in the proposed impact area are well represented outside the proposed impact area (Mattiske 2011). The fauna habitat in the proposed impact area is widespread and common outside the Project area (Bamford 2012).

Given the above, **the proposed clearing associated works is not considered to be at variance to Clearing Principle A.**

5.2 Clearing Principle B

Native vegetation should not be cleared if it compromises the whole or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.
The Fauna habitat that is to be cleared as part of the Project is considered widespread within the Project region (Bamford, 2012). The habitat is not considered to be significant for fauna indigenous to Western Australia.
Given the above, **the proposed clearing associated works is not considered to be at variance to Clearing Principle B.**

5.3 Clearing Principle C

Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.
No threatened or rare flora were located within the study area. 3 priority species are located within the tenure for the haul road, but this habitat is well represented outside the tenement area and it is likely the species range extends outside the tenure. Therefore, **the proposed clearing associated works is not considered to be at variance to Clearing Principle C.**

5.4 Clearing Principle D

Native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of a threatened ecological community.

The Project area does not contain any Threatened Ecological Communities or Priority Ecological communities as listed by DPaW and the EPBC Act 1999.
Given the above, **the proposed clearing associated works is not considered to be at variance to Clearing Principle D.**

5.5 Clearing Principle E

Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.
The vegetation within the proposed disturbance area consists of Beard vegetation associations 29 and 39 which are considered common and widespread through the Murchison region, with almost 100% of the pre-European vegetation remaining (Shepherd et al. 2002).
Given the above, **the proposed clearing associated works is not considered to be at variance to Clearing Principle E.**

5.6 Clearing Principle F

Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.
There are no water courses or wetlands within the Project area. The vegetation surveys did not identify any plant communities growing in, or in association with, an environment associated with a watercourse or wetland (Native Vegetation Solutions,2023) and therefore **the proposed Suzie Deposit and associated works is not considered to be at variance to Clearing Principle F.**

5.7 Clearing Principle G

Native vegetation should not be cleared if the clearing of vegetation is likely to cause appreciable land degradation.
The process that can potentially negatively impact land quality include erosion from modified surface water flows, poor rehabilitation of disturbed area, the introduction of weeds and and poorly closed engineered structures. Meeka is in the process of developed a Mine Closure Plan for the new Operation and will address all these potential impacts with the plan. The Plan will be approved by DMIRS as part of the Mining Proposal application and no activities will commence before approval is received. The plan will outline the proposed risks and how these will be mitigated, and an approved MCP is an endorsement from the regulator that the Project can be implemented and closed with no residual impacts to the receiving environment.
Given the above, **the proposed clearing associated works is not considered to be at variance to Clearing Principle G**

5.8 Clearing Principle H

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 areas.
There are no conservation estates within the immediate vicinity of the Project that could be potentially negatively impacted by the proposed operation. Given the above, **the proposed clearing associated works is not considered to be at variance to Clearing Principle H.**

5.9 Clearing Principle I

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.
The removal of vegetation has the potential to increase erosion and therefore increase sediment loading in surface waters and turbidity. The Project has mapped surface water flows and will install a diversion bund around the project to direct surface water flows around the disturbance areas and to reinstate flows downstream of the project.
Groundwater within the Project area is of high quality with low levels of TDS and a slight alkalinity. Groundwater levels will be reduced locally during dewatering, but modelling has shown that the low permeability of the host rocks leads to a very localised drawdown that extends mostly in a north south direction. A 1m drawdown contour extends approximately XX m from the open pits.

The depth to groundwater is generally between 10 to 15 MBGL, with no groundwater dependant ecosystems identified during the flora surveys. Flora within the project area is mostly sheet flow dependant and will therefore not be impacted by dewatering activities.
Given the above, **the proposed clearing associated works is not considered to be at variance to Clearing Principle I.**

5.10 Clearing Principle J

Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.
The area to be cleared is not prone to flooding. The minor clearing associated with the Project will not increase the potential for flooding**.** Given the above, **the proposed clearing associated works is not considered to be at variance to Clearing Principle J.**

6 Conclusion

The proposed clearing will impact up to 570ha of native vegetation. The vegetation has been surveyed and there are no conservation significant species that will be impacted by the clearing.

The clearing is not likely to be at variance to any of the ten clearing principles and all impacts can be appropriately managed.

7 References

Bennelongia 2017. Gnaweeda Project: Subterranean Fauna Assessment. Unpublished report for Doray Minerals Limited.

Bennelongia 2023. Gnaweeda Project: Subterranean Fauna Assessment. Unpublished report for Doray Minerals Limited.

BoM, Bureau of Meteorology (2023) Climate Data Online (custom Search). Commonwealth of Australia. Available online at www.bom.gov.au/climate/date/index.shtml.

Curry, P.J., Payne, A,L., Leighton, K.A., Henning, P. and Blood, D.A. (1994) An inventory and condition survey of the Murchison River catchment, Western Australia. Department of Agriculture Western Australia, Perth, W.A.

Department of Industry and Regulation 1997. Guideline: Safety Bund Walls Around Abandoned Open Pit Mines.

Department of Water and Environmental Regulation 2020. Policy: Use of Mine Dewatering Surplus.

Native Vegetation Solutions, 2023b. Gnaweeda Project Flora Survey. Unpublished report for Andy Well Mining Pty Ltd. Unpublished report for Andy Well Mining Pty Ltd.

Pendragon Environmental Solutions, 2023a. Turnberry and St Annes Open Pits, Surface Water Assessment. Unpublished report for Andy Well Mining Pty Ltd.

Pendragon Environmental Solutions, 2023b. Technical Memorandum Waste Rock Characterisation. Unpublished report for Andy Well Mining Pty Ltd.

Rockwater, 2023. Hydrogeological Investigations of the Gnaweeda Project. Unpublished report for Andy Well Mining Pty Ltd.

Soilwater Consultants, 2017: Gnaweeda Deposit Waste Characterisation, a report prepared for Doray Minerals Ltd.

Stantec, 2018. Gnaweeda Project: Flora Vegetation and Fauna Impact Assessment. Unpublished report for Doray Minerals Limited.

Terrestrial Ecosystems 2023. Vertebrate Fauna Assessment, Murchison Gold Project. Unpublished report for Andy Well Mining Pty Ltd.

MWH, 2017. Gnaweeda Level 2 Flora and Vegetation Assessment. Unpublished report for Doray Minerals Limited.