



Saracen

Saracen Metals Pty Ltd

North Eastern Goldfields Operations

Clearing Permit Application

Supporting Information

August 2014



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SITE OVERVIEW

GENERAL

The Saracen Metals North Eastern Goldfields Operations consist of the Thunderbox and Bannockburn Gold Projects Areas and the Waterloo Nickel Project. The Thunderbox Project Area consists of an open cut gold operation of two linked pits with associated mine infrastructure, a traditional 2.6mtpa Carbon In Leach Mill with two circular Tails Storage Facilities and a 220 capacity accommodation village. The Bannockburn Project Area consists of an Open Pit with an underground operation and associated mine infrastructure, a three celled TSF and several minor satellite pits. The Bannockburn Mill and accommodation village were removed in 2009.

This Clearing Permit application is to allow clearing associated with the recommencement of mining at Thunderbox and Bannockburn pits through traditional cutbacks and potential underground operations, as well as construction of a haul road linking the Bannockburn and Thunderbox Project Areas. Pre-feasibilities studies into the Thunderbox and Bannockburn project areas are well advanced, as such Saracen are aiming to recommence mining and complete the plant refurbishment during Q3 2015.

The North Eastern Goldfields Operations are owned and managed by Saracen. All leases are owned by Saracen Metals Pty Ltd (Saracen); a wholly owned subsidiary of ASX listed company Saracen Mineral Holdings. Saracen will be the operating company for the project.

LOCATION AND SITE LAYOUT PLANS

The Thunderbox Project area is located approximately 40km south of Leinster adjacent to the Goldfields Highway, on the Weebo Pastoral Lease. The Bannockburn Project area is located a further 40km south of Thunderbox on the Old Agnew road on the Sturt Meadows Pastoral Lease. Both areas fall within the Shire of Leonora (Figure 1). Location of the proposed clearing area is shown in Figure 2.

HISTORY

LionOre Australia commenced mining operations at Thunderbox in March 2002 with commissioning of the plant occurring in November 2002. Mining of the Thunderbox pit continued through to August 2007 and processing finished in September 2007. During operation a total 10,928,022 tonnes of ore was mined to produce 805,854 ounces of gold at 2.4 g/t. Various companies actively mined at Bannockburn and the surrounding satellite pits from 1991 to 1998. Bannockburn has been on care and maintenance since 1998.

In 2008 LionOre's Australian operations were acquired by Norilsk Nickel Australia who kept the site on care and maintenance until the sale of the North East Goldfields Operations to Saracen, which was completed in May 2014. The operation is currently on care and maintenance with the accommodation village at Thunderbox being used to house care and maintenance personnel. The Bannockburn accommodation village and mill were removed in early 2009, after which time care and maintenance duties continued to be carried out by personnel situated at Thunderbox.

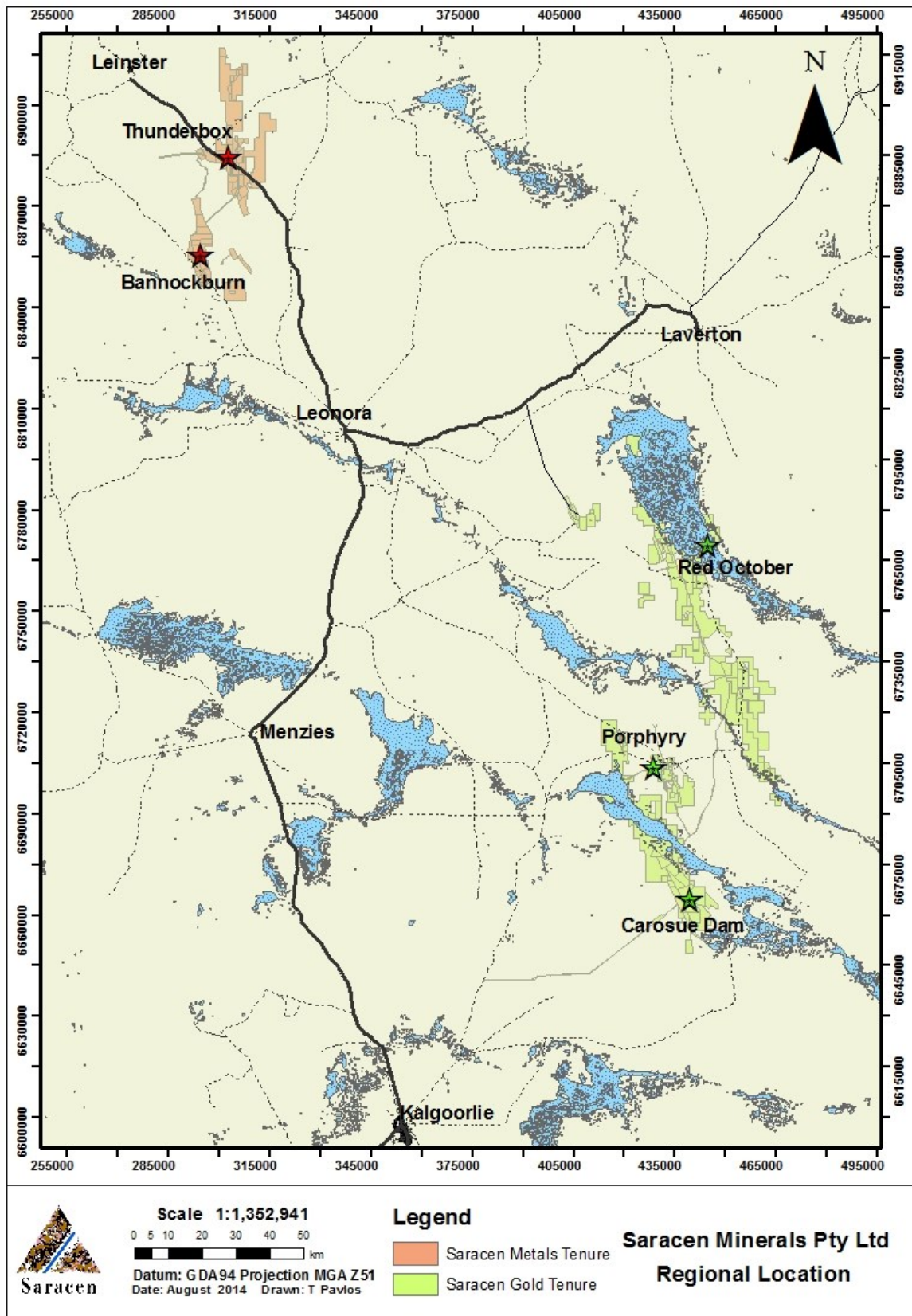


Figure 1: Regional location of the North Eastern Goldfields Operations

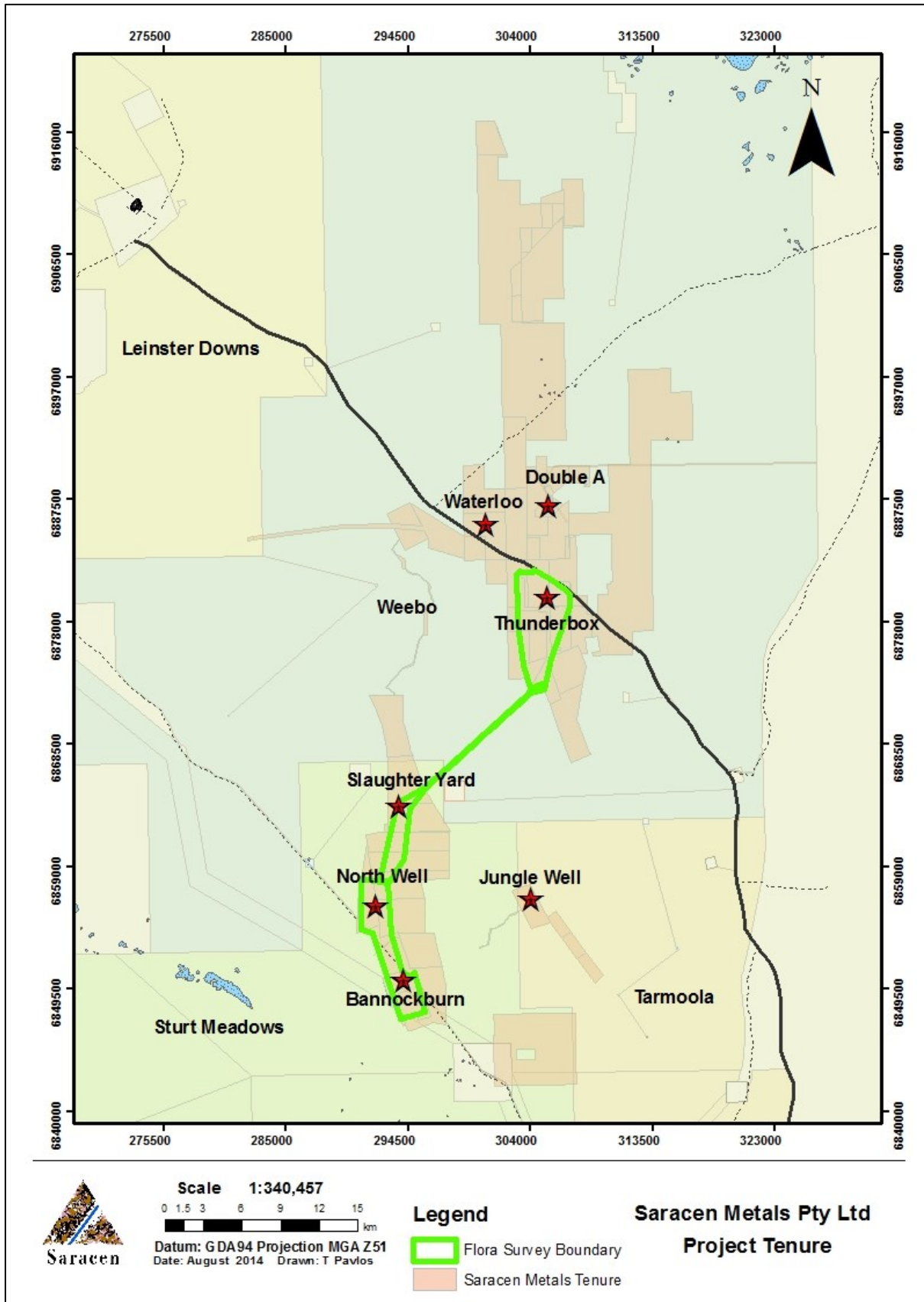


Figure 2: Layout of the proposed clearing area and NEGO tenements

CLIMATE

The Goldfields region is arid to semi-arid with average annual rainfall decreasing from about 250mm in the south-west (Kalgoorlie) to 200mm in the north-east (Laverton). Rainfall varies widely between years and droughts are common. Remnants of tropical cyclones occasionally bring heavy summer rain. The area is transitional between summer and winter dominated rainfall and desert: non-seasonal bioclimatic (Beard, 1990).

Rainfall data for the Leinster and Leonora weather stations, located approximately 40km north and 90km south of Thunderbox respectively is shown in Figure 3.

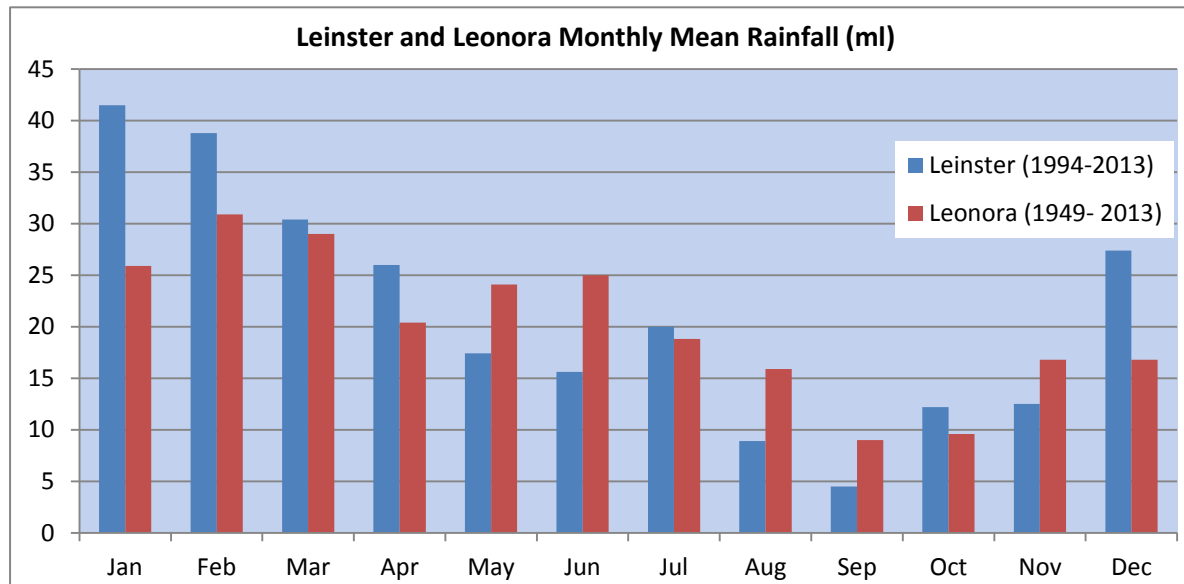


Figure 3: Mean rainfall comparison for Leinster and Leonora.

GEOMORPHOLOGY

The Thunderbox open pit occurs on a narrow, subdued interfluvium that is partly dissected by second and third order tributaries of Wilson Creek. The open pit lies at the confluence of two stream channels fed by a catchment extending towards the northwest. A flood levy to the south east was established to divert water around the pit.

The Bannockburn area comprises of broad alluvial flood plains associated with the Marshall and nearby Cody Creeks, with bedrock occurring on the catchment divide between the creeks and to the north-east towards the regional divide of the Raeside Paleodrainage. Creeks generally flow to the south west of the site and temporary pools of water occur in the creek after rainfall events.

LAND USE

The major land use in the area is pastoralism, with over 80% of this region covered by pastoral leaseholds. Most of the remainder is unallocated crown land at 11% and 1% is set aside for nature conservation. Pastoral activities are predominantly confined to the grazing of cattle, the recent influx of wild dogs into the region has decimated goat numbers and made sheep grazing unviable, most pastoralists supplement their income by providing services to mining industry.

Prospecting, exploration and mining, particularly for gold, is an established land use in the area.

REGIONAL GEOLOGY

The Saracen Metals North Eastern Goldfields Operations lie in the Murchison IBRA bioregion which comprise of low hills, mesas of duricrust separated by flat colluvium and alluvial plains (Cowan, 2001). It is dominated by the Archaean granite greenstone terrain of the Yilgarn Craton. Alluvial soils and sands mantle the granitic and greenstone units of the Yilgarn Craton. These soils are shallow, sandy

and infertile. Underlying the soils in low areas is a red-brown siliceous hard pan. The soils in the eastern half of the bioregion are typically red sands, lithosoils, calcareous red earth soil, duplex soil and clays.

SURFACE WATER

The Thunderbox Mining Area occurs on a narrow, subdued interfluvium that is partially dissected by second and third order tributaries of Wilson Creek. The Thunderbox Creek is about 200m wide and strongly braided. During peak flows the current drainage tract is exceeded. There are minor temporary pools in the creek after rain events but no substantial water features. The area is fed by a catchment extending 4.9km² to the northwest.

The Bannockburn Mining Area lies within a disorganised endoreic drainage system of Salina-land, and in the flood plains of the Marshall and Cody Creeks which flow in a south westerly direction towards Lake Raeside. These creeks have common head waters but at Bannockburn they are separated by the mine site and an extensive area of weathered basalt which occurs to the east.

Surface water flows within the North Eastern Goldfield Operations are shown in Figure 4.

GROUNDWATER

The North Eastern Goldfields Operations are located in a broad north trending shear zone containing an Achaean mafic rock suite. This zone is bounded to the west by the Mt McClure shear and to the east by the Mt Joel shear.

The regional northwest trending Perseverance Fault joins the mineralised zone immediately south of the mine area. A set of northeast trending faults conjugate to the major northerly faults resulting in a dextral dislocation of the regional north-northwest Achaean sequence.

The Achaean crystalline rocks generally have a low permeability and are commonly not recognised as a significant groundwater resource. However, weathered zones and fractures within the basement rocks can offer greater permeability and the presence of locally significant groundwater volumes. Shallow alluvial cover and deeper paleochannels overlying the basement rocks are recognised as locally important aquifers.

Groundwater recharge occurs mainly along creek lines as direct infiltration through alluvial sediments. Groundwater within the North Eastern Goldfields Operations ranges from fresh (400 mg/L TDS) to brackish (1500 mg/L TDS).

ARCHAEOLOGICAL AND ABORIGINAL HERITAGE

A number of archaeological and ethnographic surveys have been conducted in the North Eastern Goldfields Operations. These surveys have all been registered with the Department of Indigenous Affairs and the located sites registered on the DIA website.

Sites associated with the proposed clearing include;

- A Pleiades complex to the south east of the Thunderbox pit.
- Cody Creek which flows to the east of the North Well area.
- Koara Camp located to the east of the Bannockburn pit.

It is highly unlikely that these sites will be required to be disturbed during mining operations; however, a notice under Section 18 of the Aboriginal Heritage Act will be lodged should further development have potential to disturb a site. If required, written reports will be provided annually describing impacts on heritage sites to comply with Section 18 requirements.

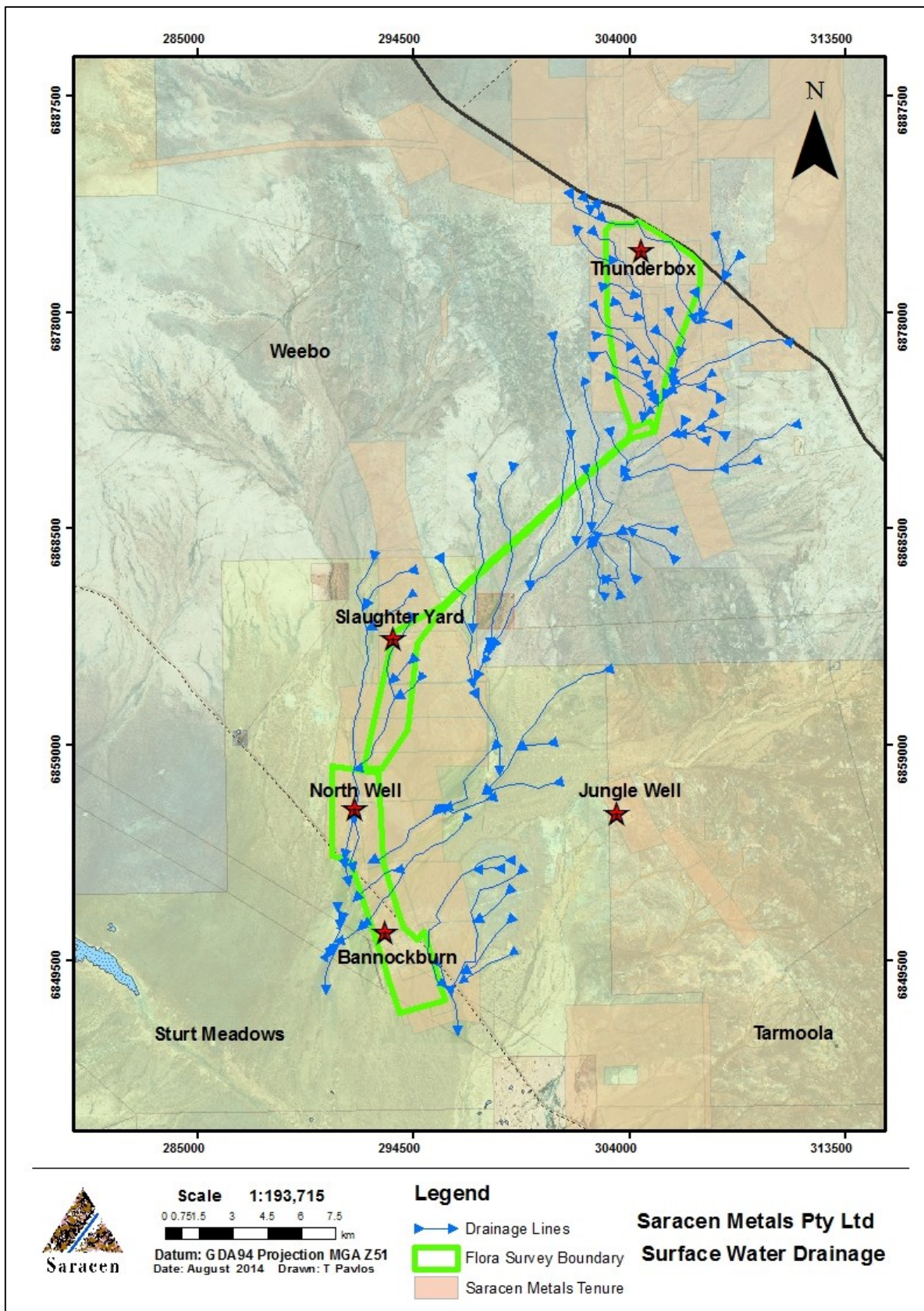


Figure 4: Surface water catchment and flow directions

BIO-GEOGRAPHIC REGION

The North Eastern Goldfields Operations are located in the north-eastern Goldfields region and the south-east of the Eastern Murchison (MUR 1) bio-geographic subregion and adjacent to Great Victoria Desert Shield and Eastern goldfields bio-geographic subregions (Desmond et al., 2002).

FLORA AND FAUNA

LANDFORM, SOILS AND VEGETATION

The proposed clearing area is located on an extensive range of land systems (Figure 5) as identified by Pringle et al (1994). Associated land systems are described below.

Bevon Land System

This land system is dominated by irregular hills and ridges capped with limonite, plateaus and minor breakaways with very stony short colluvial foot slopes, extensive lower colluvial foot slopes, very gently inclined hardpan plains with mantles of ferruginous gravel, and narrow drainage tracts. The breakaways generally consist of duricrust of silcrete or ferricrete.

Shallow red earths dominate the soils of this land system. These very shallow stony soils have low infiltration rates and produce high rates of run off. However, erosion on the hills and ridges is generally not a problem as an extensive stony mantle protects the soil surfaces. The hardpan plains are subject to intermittent sheet flow but are generally relatively level and have shallow soils that reduce erosion impacts.

Duketon Land system

This land system is characterised by generally level to very gently inclined stony wash plains with ironstone mantle, subject to sheet flow, irregular sandy banks and occasional clay pans in lower areas. Mulga shrublands and wanderrie banks are located within this land system.

Soils are shallow red earth (with a stony mantle) on hardpan with a minor area of red clay. Soil mantles, gently slopes and diffuse sheet flow render this land system generally not susceptible to soil erosion.

Gundockerta Land System

Extensive, gently undulating, calcareous, stony plains and less extensive, lower alluvial plains with narrow central zones receiving more run-on and supporting bluebush shrublands represent this land system.

Soils are dominated by calcareous red earth or duplex on greenstone, or red clay with a stony mantle. Where not protected by a stony mantle, saline plains and adjacent lower alluvial tracts are susceptible to water erosion.

Jundee Land System

This system is typified by gently inclined to level hardpan plains with fine ironstone gravel mantles and supporting mulga shrublands.

Dominant soils may be red earth or red sand, on hardpan with deep red earth, occasionally on hardpan in groves. This land system is subject to sheet flow and impedance to natural sheet flows can initiate soil erosion.

Laverton Land System

This land system is dominated by greenstone hills and banded ironstone ridges with acacia shrublands and sparse narrow drainage tracts, which are mildly susceptible to water erosion.

Soils tend to be lithosoils or shallow duplex on greenstone with some shallow red earth on greenstone.

Leonora Land System

This land system is characterised by low greenstone hills with fringing stony plains and narrow, generally unincised tributary drainage tracts, supporting mixed stony chenopod shrublands.

Calcareous red earth on greenstone or red sand on calcrete dominates this land system. Shallow duplex soils on greenstone are also present. Drainage tracts are highly susceptible to water erosion. Stony lower foot slopes rely on mantles for soil protection against erosion.

Monk Land System

This land system is characterised by hardpan plains subject to sheet flow with generally sparse sub-parallel unincised drainage zones with occasional sandy banks in lower areas. This system supports mulga tall shrublands and wanderrrie grasses.

Soils are mainly red earth on hardpan or deep red earth. Drainage tracts are mildly susceptible to water erosion; this system is susceptible to water starvation and consequent loss of vigour in vegetation if natural water flow is impeded.

Monitor Land System

This land system is dominated by extensive distributary alluvial fans receiving run-on from dispersing channels emerging from greenstone hills, and drainage tracts receiving concentrated flow and alluvial plains subject to more dispersed sheet flow. Mulga – chenopod shrublands are supported within this land system.

Shallow red earth (and to a lesser extent, red clay) on hardpan and shallow red earth with or without a stony mantle on hardpan dominate the soils. Sandy-surfaced saline duplex soils on hardpan are also present in the land system. Alluvial fans, drainage tracts and hardpan plains are highly susceptible to soil erosion. Proportional to its area, this is the most degraded land system in the project area.

Nubev Land System

Gently undulating stony plains, minor limonitic low rises and level alluvial plains receiving concentrated flow off adjacent uplands, supporting mulga and halophytic shrublands are characteristic of this land system.

Soils are dominated by shallow red earth or duplex on greenstone or red sand on hardpan. Drainage zones are moderately susceptible to soil erosion. Disturbance of the protective stone mantle on saline stony plains is also likely to initiate water erosion.

Rainbow Land System

This land system is typified by alluvial hardpan plains subject to sheet flow; frequently with fine ironstone gravel mantles and sparse, generally narrow and unincised concentrated drainage tracts. Mulga shrublands are supported by this system.

Shallow red earth or red sand on hardpan are characteristic of this land system with minor areas of deep red earth. This system is generally not susceptible to soil erosion.

Violet Land System

This land system is characterised by undulating stony and gravelly plains and low rises with mantles of ironstone gravels, supporting mulga shrublands.

Abundant mantles of ironstone provide effective protection against soil erosion over most of this land system, except where the soil surface has been disturbed. Erosion hazard in this landform system is likely to be moderate.

Wilson Land System

Dominated by large creeks with extensive lower distributary fans subject to diffuse sheet flow, this land system supports mulga and halophytic shrublands.

This land system is second only to Monitor land system in terms of the proportion of its area that is now severely degraded and eroded. The drainage tracts, alluvial fans and hardpan plains are most extensively eroded.

FLORA

Botanica Consulting was commissioned by Saracen Metals to conduct a Level 1 flora and vegetation survey of the Thunderbox and Bannockburn Project areas. The fieldwork was conducted from the 16th to the 18th June 2014, and encompassed an area of 5,543 hectares.

Eighteen broad vegetation communities were identified within the project area. These communities were represented by a total 32 Families, 74 Genera and 136 taxa, (including sub-taxa and variants). No Threatened taxa, pursuant to subsection (2) of section 23F of the Wildlife Conservation Act (1950), the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 and as listed by the Department of Parks and Wildlife were identified within the project area. One Priority Flora taxa, *Calytrix uncinata* (P3), as listed by the Department of Parks and Wildlife was identified within the proposed clearing area.

None of the vegetation communities within the Thunderbox and Bannockburn Project Areas were found to have National Environmental Significance as defined by the Commonwealth Environment Protection and Biodiversity Conservation Act 1999. No Threatened Ecological Communities pursuant to Commonwealth legislation or Priority Ecological Communities as listed by the Department of Parks and Wildlife were recorded.

Based on the Keighery vegetation health rating scale (1994) ten of the eighteen vegetation communities were rated as being in 'Very Good' health. The remaining eight vegetation communities were rated as being in 'good' health. However two of the vegetation communities, despite having an overall 'very good' health rating, had large areas of vegetation that had deteriorated to 'degraded' health due to mining activities. Nine introduced taxa were identified within the project areas:

1. *Acetosa vesicaria* (Ruby Dock);
2. *Cenchrus ciliaris* (Buffel Grass);
3. *Citrullus lanatus* (Pie Melon);
4. *Cucumis myriocarpus* (Prickly Paddy Melon);
5. *Emex australis* (Prickly Paddy Melon);
6. *Lysimachia arvensis* (Blue Pimpernel);
7. *Salvia verbenaca* (Wild Sage);
8. *Solanum nigrum* (Nightshade); and
9. *Sonchus oleraceus* (Common Sowthistle).

Areas and descriptions of Vegetation Communities described by Botanica (2014) are shown in Tables 1 and 2. The locations of the Vegetation Communities are shown in Figures 6-8.

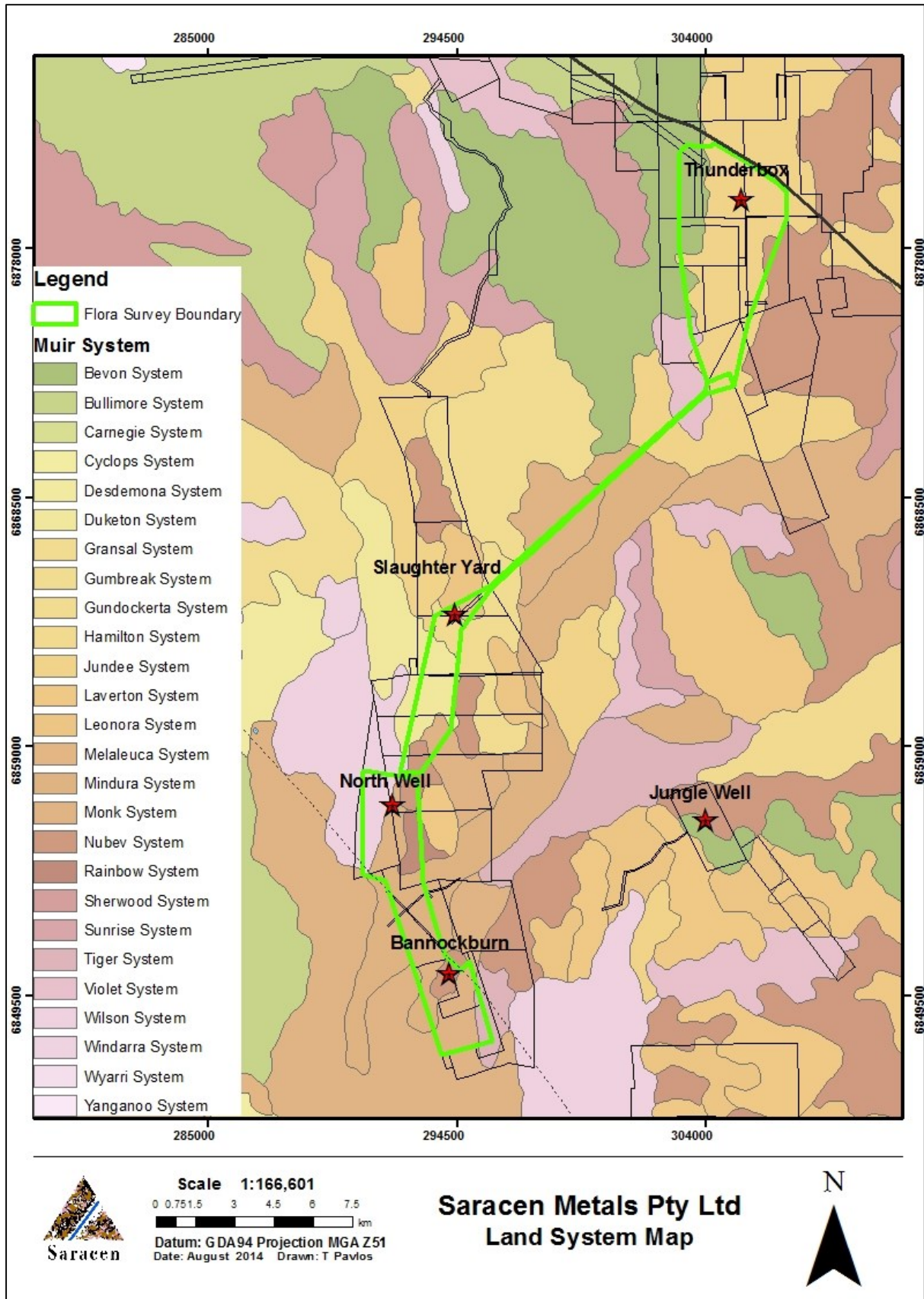


Figure 5: NEGO Proposed Clearing Area Land Systems

Table 1: Area of each Vegetation Community within the proposed clearing permit area.

Vegetation Community	Description	Hectares	%
TBA_01	Low woodland over open low scrub and dwarf scrub	10.2	0.18
TBA_02	Open low woodland over dwarf scrub and very open low grass	63.6	1.14
TBA_03	Open low woodland over open scrub and very open low grass	10.1	0.18
TBA_04	Open low woodland over dwarf scrub and low grass	941.7	16.99
SY_01	Open low woodland over dwarf scrub and low grass	185.2	3.34
SY_02	Open low woodland over open low scrub and dwarf scrub	182.4	3.29
SY_03	Open low woodland over low scrub and open dwarf scrub	35.7	0.64
SY_04	Open low woodland over low scrub and open dwarf scrub	39.5	0.71
SY_05	Thicket over low scrub and open dwarf scrub	6.2	0.11
SY_06	Open low woodland over open low scrub and open low grass/open dwarf scrub	36.1	0.65
PHR_01	Open low woodland over open scrub and open low grass/open dwarf scrub	12.1	0.22
WS_01	Low woodland over open low scrub and open low grass/ very open herbs	819	14.77
WS_02	Low woodland over open low scrub and very open low grass in creek line	276.7	4.99
WS_03	Open low woodland over dwarf scrub and herbs	144.6	2.61
WS_04	Low woodland over open low scrub and very open low grass in floodplain	1113	20.01
WS_05	Forrest over low scrub and low grass	667.8	12.05
WS_06	Low woodland and open scrub and low grass	184.0	3.32
WS_07	Open low woodland over scrub and open dwarf scrub /very open low grass	8.4	0.15
	Cleared Vegetation	806.7	14.55
Total		5,543	100

Botanica (2014) recommended that in planning and implementing mining operations within the proposed area, the proponent considers:

- Disturbance to Priority Flora Taxa identified within the proposed area should be avoided. Prior to clearing within the mining disturbance footprint, targeted priority flora searches should be conducted in the vegetation community;
 - Low woodland of *Acacia aptaneura* over open low scrub of *Thryptomene decussata* and open dwarf scrub of *Ptilotus obovatus*, very open low grass of *Monachather paradoxus* on break away.
- If disturbance is unavoidable an application to impact Priority Flora must be submitted to the Department of Parks and Wildlife (DPaW).
- It is recommended that culverts be implemented on the two roads that dissect the floodway in the northern section of the Bannockburn Project Area to reintroduce natural water flows to vegetation on the western side of the road.
- Consultation with DPaW is recommended prior to any disturbance to creek lines within the proposed area.
- Prior to any clearing within the proposed area, implementation of a weed management plan is recommended to control and prevent further spread of weeds.

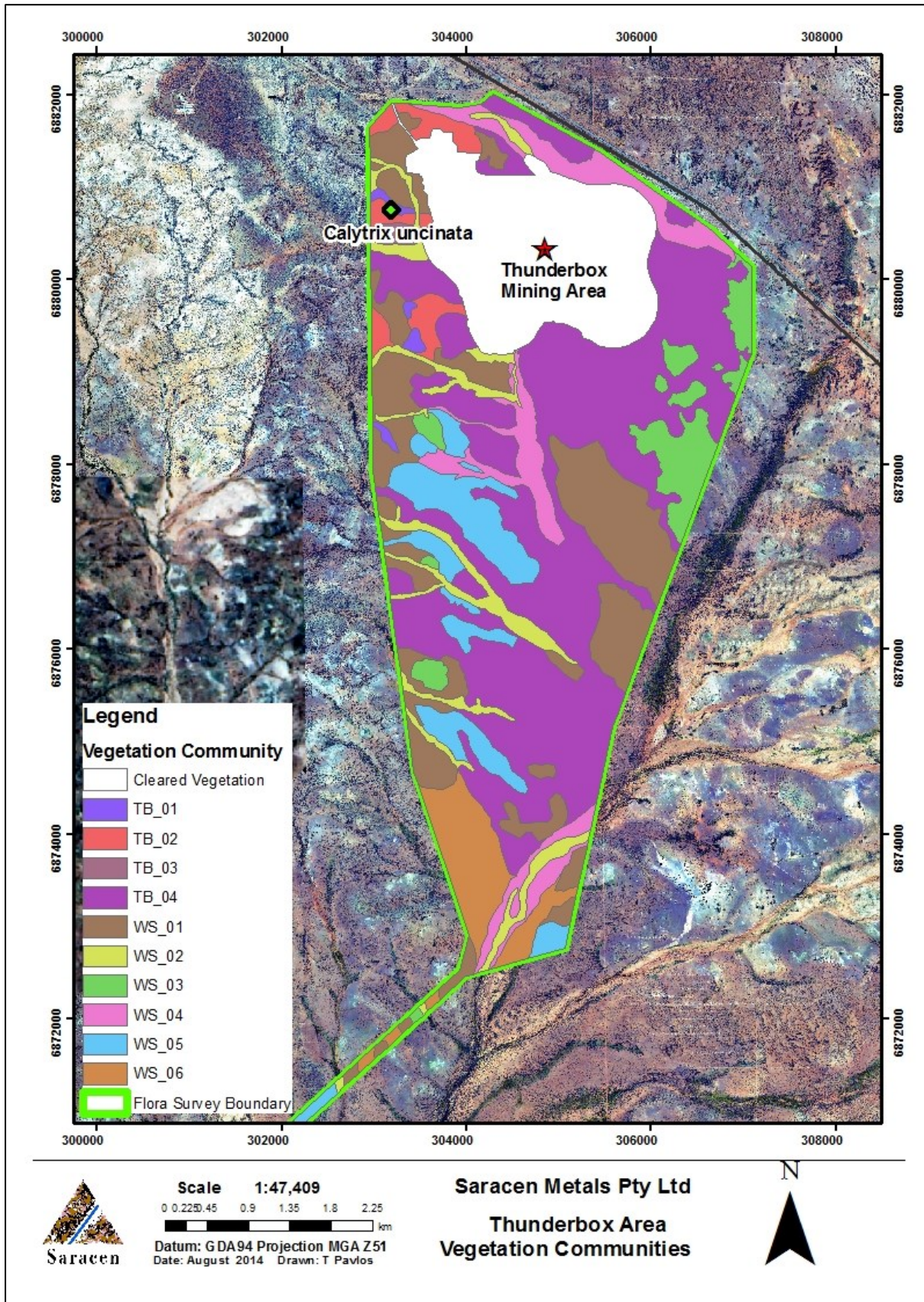


Figure 6: Thunderbox Area Vegetation Communities of Botanica (2014) and location of Priority flora Species

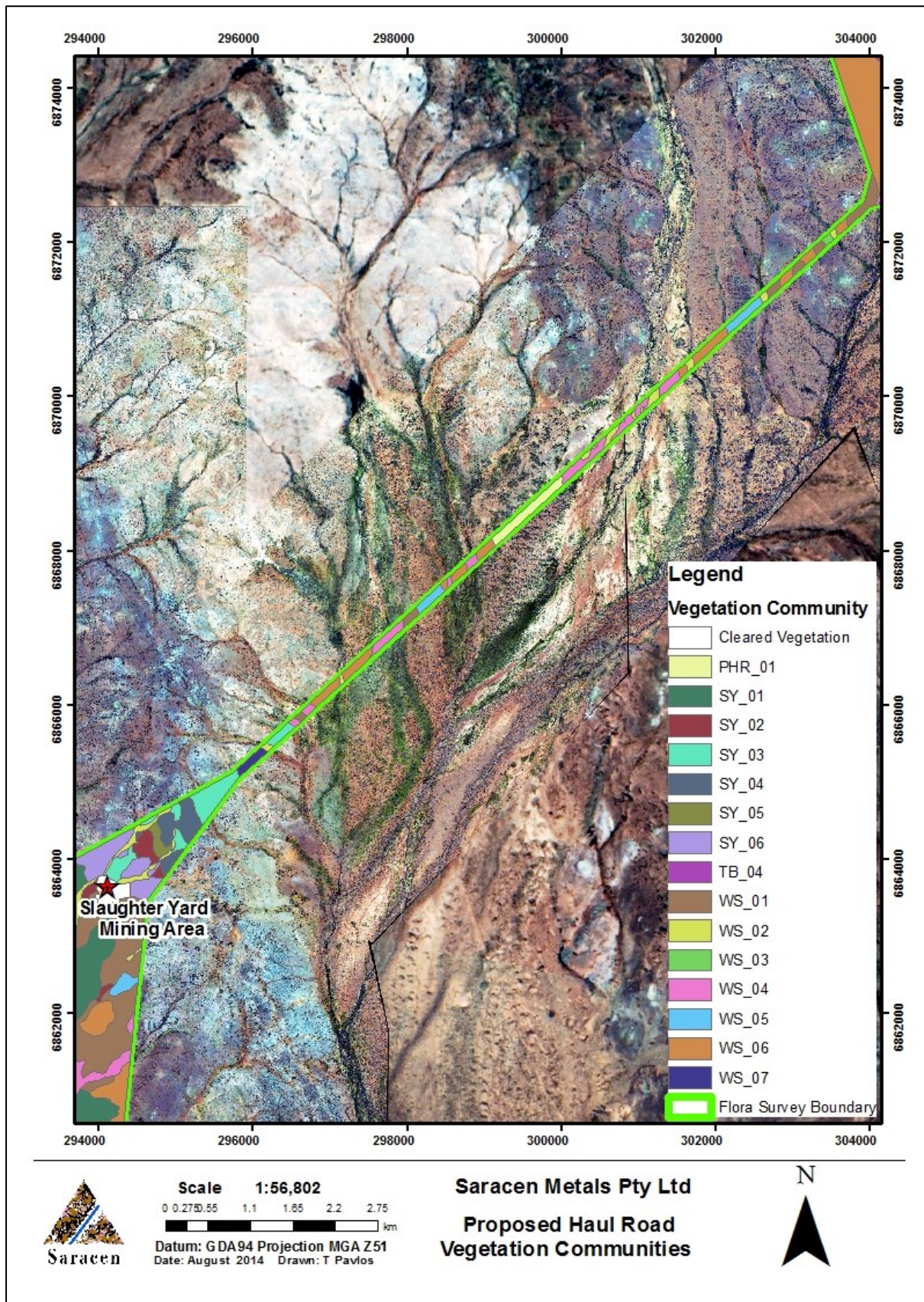


Figure 7: Proposed Haul Road Area Vegetation Communities of Botanica (2014)

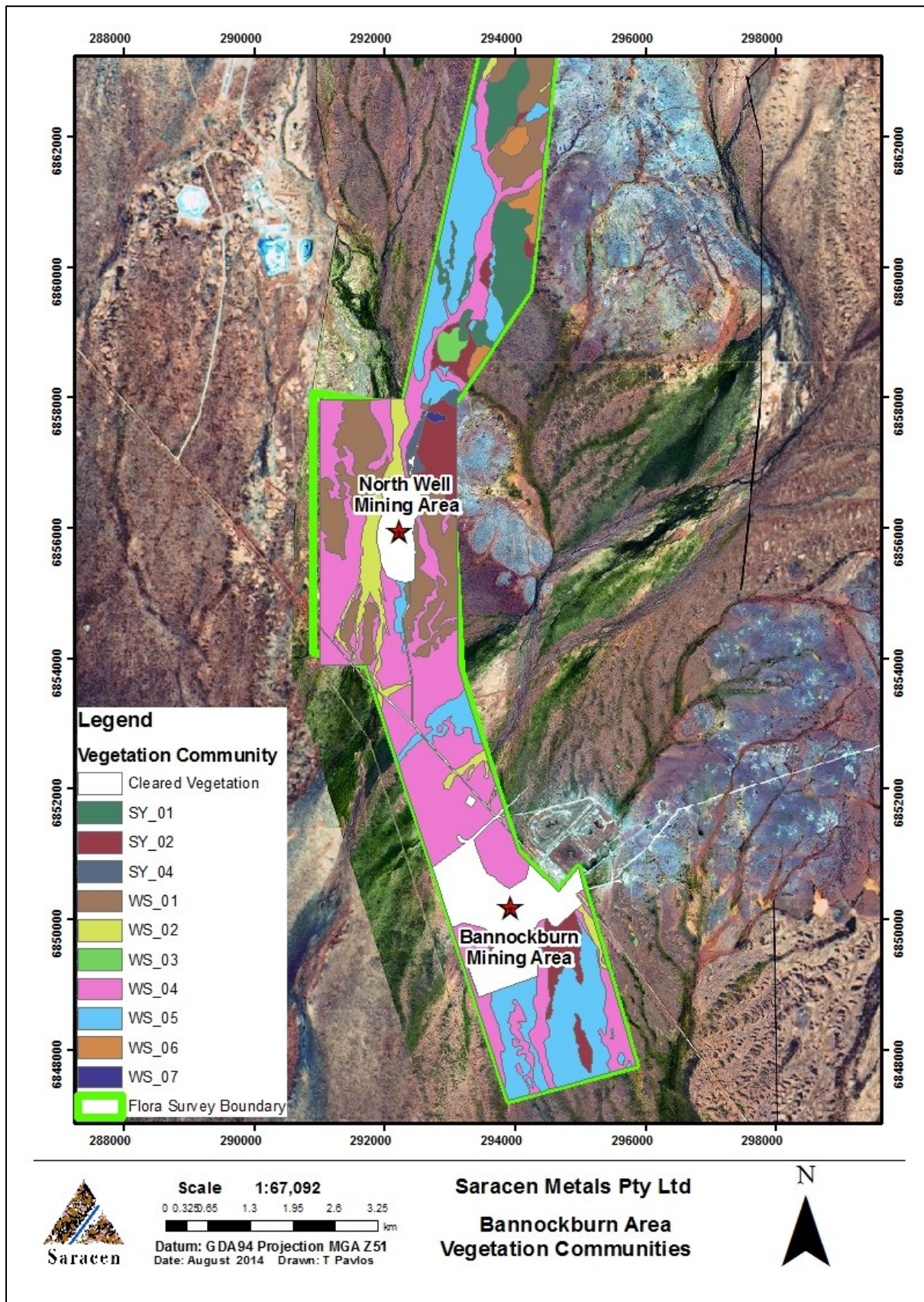








Figure 8: Bannockburn Area Vegetation Communities of Botanica (2014)

Table 2: Vegetation Community descriptions (Botanica 2014).

Land unit	Vegetation community
<p>TB_01</p> 	<p>Low woodland of <i>Acacia aptaneura</i> over open low scrub of <i>Thryptomene decussata</i> and open dwarf scrub of <i>Dodonaea microzyga</i>, dwarf scrub of <i>Ptilotus obovatus</i>, very open low grass of <i>Monachather paradoxus</i> on breakaway.</p> <p>The total flora recorded within this vegetation community was represented by a total of 12 Families, 16 Genera and 25 Taxa. One Priority Flora taxa, <i>Calytrix uncinata</i> (P3), was identified within this vegetation community. No introduced taxa were recorded in this vegetation community.</p>
<p>TB_02</p> 	<p>Open low woodland of <i>Acacia aptaneura</i>, <i>Acacia mulganeura</i> over open dwarf scrub of <i>Eremophila conglomerata</i> and very open low grass of <i>Monachather paradoxus</i> on hill slope.</p> <p>The total flora recorded within this vegetation community was represented by a total of 11 Families, 15 Genera and 24 Taxa. No Priority Flora taxa were identified within this vegetation community. No introduced taxa were recorded in this vegetation community.</p>

Land unit	Vegetation community
<p data-bbox="168 268 264 300">TB_03</p> 	<p data-bbox="824 303 2016 363">Open low woodland of <i>Acacia aptaneura</i>, <i>Acacia mulganeura</i> over open scrub of <i>Acacia ramulosa</i> and very open low grass of <i>Monachather paradoxus</i>.</p> <p data-bbox="824 383 2016 529">The total flora recorded within this vegetation community was represented by a total of 12 Families, 16 Genera and 28 Taxa. No Priority Flora taxa were identified within this vegetation community. One introduced taxa, <i>Acetosa vesicaria</i> (Ruby dock), was recorded in this vegetation community. According to the DAFWA this taxa is not listed as a Declared Plant under Section 22 of the BAM Act 2007.</p>
<p data-bbox="168 750 264 782">TB_04</p> 	<p data-bbox="824 801 2016 861">Open low woodland of <i>Acacia aptaneura</i>, <i>Acacia mulganeura</i> over dwarf scrub of <i>Eremophila spectabilis subsp. brevis</i> and low grass of <i>Monachather paradoxus</i>.</p> <p data-bbox="824 880 2016 970">The total flora recorded within this vegetation community was represented by a total of 18 Families, 23 Genera and 38 Taxa. No Priority Flora taxa were identified within this vegetation community. No introduced taxa were recorded in this vegetation community.</p>

Land unit	Vegetation community
<p>SY_01</p> 	<p>Open low woodland of <i>Acacia aptaneura</i>, <i>Acacia mulganeura</i> over dwarf scrub of <i>Eremophila margarethae</i> and low grass of <i>Monachather paradoxus</i>.</p> <p>The total flora recorded within this vegetation community was represented by a total of 18 Families, 23 Genera and 38 Taxa. No Priority Flora taxa were identified within this vegetation community. No introduced taxa were recorded in this vegetation community.</p>
<p>SY_02</p> 	<p>Open low woodland of <i>Hakea preissii</i> over open low scrub of <i>Senna sp. Meekatharra</i> (E. Bailey 1-26) and dwarf scrub of <i>Maireana glomerifolia</i> and <i>Tecticornia disarticulate</i>.</p> <p>The total flora recorded within this vegetation community was represented by a total of 11 Families, 20 Genera and 28 Taxa. No Priority Flora taxa were identified within this vegetation community. No introduced taxa were identified within this vegetation community.</p>

Land unit	Vegetation community
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SY_03



Open low woodland of *Acacia aptaneura* over low scrub of *Hakea preissii* and open dwarf scrub of *Maireana triptera*.

The total flora recorded within this vegetation community was represented by a total of 12 Families, 16 Genera and 24 Taxa. No Priority Flora taxa were identified within this vegetation community. No introduced taxa were recorded in this vegetation community.

SY_04



Open low woodland of *Acacia aptaneura* over low scrub of *Senna artemisioides subsp. helmsii* and open dwarf shrub *Ptilotus obovatus*, *Maireana triptera* on hill slope.

The total flora recorded within this vegetation community was represented by a total of 8 Families, 12 Genera and 20 Taxa. No Priority Flora taxa were identified within this vegetation community. No introduced taxa were found within this vegetation community.

Land unit	Vegetation community
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SY_05



Thicket of *Acacia burkittii* over open low scrub of *Senna artemisioides subsp. filifolia* and open dwarf scrub of *Ptilotus obovatus* and *Sida sp. Excedentifolia*.

The total flora recorded within this vegetation community was represented by a total of 8 Families, 11 Genera and 18 Taxa. No Priority Flora taxa were identified within this vegetation community. No introduced taxa were recorded in this vegetation community.

SY_06



Open low woodland of *Acacia aptaneura* over open low scrub of *Senna artemisioides subsp. filifolia* and open low grass of *Enneapogon caerulescens*, open dwarf scrub of *Ptilotus obovatus* and *Solanum lasiophyllum*.

The total flora recorded within this vegetation community was represented by a total of 9 Families, 12 Genera and 17 Taxa. No Priority Flora taxa were identified within this vegetation community. No introduced taxa were recorded in this vegetation community.

Land unit	Vegetation community
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PHR_01



Open low woodland of *Acacia aptaneura*, *Acacia mulganeura* over open scrub of *Acacia tetragonophylla*, *Acacia craspedocarpa* and open dwarf scrub of *Ptilotus obovatus*, open low grass *Aristida contorta*.

The total flora recorded within this vegetation community was represented by a total of 10 Families, 13 Genera and 25 Taxa. No Priority Flora taxa were identified within this vegetation community. No introduced taxa were found within this vegetation community.

WS_01



Low woodland of *Acacia aptaneura* over open low scrub of *Eremophila platycalyx*, *Senna sp. Meekatharra* (E. Bailey 1-26) and open low grass *Aristida contorta*, very open herbs of *Cheilanthes sieberi subsp. Sieberi*.

The total flora recorded within this vegetation community was represented by a total of 14 Families, 21 Genera and 37 Taxa. No Priority Flora taxa were identified within this vegetation community. No introduced taxa were recorded in this vegetation community.

Land unit	Vegetation community
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WS_02



Low woodland of *Acacia aptaneura*, *Acacia mulganeura* over low scrub *Acacia tetragonophylla* and very open low grass of *Monachather paradoxus* in creekline.



The total flora recorded within this vegetation community was represented by a total of 22 Families, 31 Genera and 38 Taxa. No Priority Flora taxa were identified within this vegetation community. Six introduced taxa were recorded in this vegetation community; *Sonchus oleraceus* (Common Sowthistle), *Citrullus lanatus* (Pie Melon), *Cucumis myriocarpus* (Prickly Paddy Melon), *Salvia verbenaca* (Wild Sage), *Acetosa vesicaria* (Ruby Dock) and *Lysimachia arvensis* (Blue Pimpernel). According to the DAFWA none of these taxa are listed as a Declared Plant under Section 22 of the BAM Act 2007.

WS_03



Open low woodland of *Acacia aptaneura* over open dwarf scrub of *Eremophila pantonii* and herbs of *Sclerolaena densiflora*.

The total flora recorded within this vegetation community was represented by a total of 10 Families, 12 Genera and 23 Taxa (Appendix 4). No Priority Flora taxa were identified within this vegetation community. No introduced taxa were recorded in this vegetation community.

Land unit	Vegetation community
<p data-bbox="168 268 268 300">WS_04</p> 	<p data-bbox="824 316 2007 379">Low woodland of <i>Acacia aptaneura</i> over open low scrub of <i>Eremophila platycalyx</i> and very open low grass <i>Aristida contorta</i> in flood plain.</p> <p data-bbox="824 395 2029 547">The total flora recorded within this vegetation community was represented by a total of 15 Families, 26 Genera and 38 Taxa. No Priority Flora taxa were identified within this vegetation community. Three introduced taxa were recorded in this vegetation community; <i>Sonchus oleraceus</i> (Common Sowthistle), <i>Cenchrus ciliaris</i> (Buffel Grass) and <i>Acetosa vesicaria</i> (Ruby Dock). According to the DAFWA none of these taxa are listed as a Declared Plant under Section 22 of the BAM Act 2007.</p>
<p data-bbox="168 782 268 813">WS_05</p> 	<p data-bbox="824 829 2011 893">Forest of <i>Acacia aptaneura</i> over heath of <i>Eremophila forrestii</i>, low scrub of <i>Eremophila conglomerata</i> and low grass of <i>Monachather paradoxus</i>.</p> <p data-bbox="824 909 2000 1002">The total flora recorded within this vegetation community was represented by a total of 8 Families, 9 Genera and 14 Taxa. No Priority Flora taxa were identified within this vegetation community. No introduced taxa were found within this vegetation community.</p>

Land unit	Vegetation community
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WS_06



Open low woodland of *Acacia incurvaneura*, *Acacia aptaneura*, / *Acacia mulganeura* and open scrub of *Acacia ramulosa* and low grass of *Aristida contorta*.

The total flora recorded within this vegetation community was represented by a total of 13 Families, 17 Genera and 28 Taxa (Appendix 4). No Priority Flora taxa were identified within this vegetation community. No introduced taxa were found within this vegetation community.

WS_07



Open low woodland *Acacia aptaneura* over scrub of *Eremophila fraseri* and open dwarf scrub *Ptilotus obovatus*/ very open low grass of *Aristida contorta*.

The total flora recorded within this vegetation community was represented by a total of 8 Families, 11 Genera and 14 Taxa. No Priority Flora taxa were identified within this vegetation community. No introduced taxa were recorded in this vegetation community.

FAUNA

A fauna survey of the Thunderbox Project Area was completed by Bamford Consulting Ecologists for Keith Lindbeck and Associates in 2001. The assessment of fauna values was based upon a site inspection and a review of published and unpublished information on fauna in the region of the site. The study concluded that vertebrate fauna within the project area is likely to be typical of a broad area of the North Eastern Goldfields, with an assemblage of species containing a strong representation from the inland and arid zones, but with some southern elements. The fauna is expected to be unusually rich of reptiles and birds because of the diversity of soil and vegetation types present. The mammal fauna is likely to be depauperate with an estimated 10 locally extinct species of an original native mammal fauna of about 30 species.

As a result of the fauna assessment, the following points should be considered as ways of minimising the impact of the project on local fauna:

- Areas of disturbance should be minimised and distinctive vegetation patches should be avoided where possible;
- Areas of Mulga woodland over dense understorey patches appear to be of particular importance to birds. This needs to be considered when planning infrastructure and rehabilitation;
- Old Boodie mounds appear to be utilised by several other species. As such, mounds are often large and distinctive and should be avoided if possible;
- Alteration to drainage patterns should be as conservative as possible;
- Any development in the project areas should aim not to encourage the proliferation of introduced species.

MALLEEFOWL

Although a moribound mound had previously been reported in the Thunderbox area, no further signs of Malleefowl were recorded in the 2001 Fauna Assessment. However, in August 2014 there was a confirmed sighting of a mature bird in open Acacia woodland approximately 200m to the south of the Thunderbox TSF. This area is included in the Clearing Permit Application but is highly unlikely to be disturbed during the pit cut back or the construction of the proposed haul road. If mine plans change and encroach on the area where the bird was sighted Saracen will commit to undertaking a targeted Malleefowl survey. Malleefowl awareness will be conveyed through the Thunderbox environmental induction and all personnel will be encouraged to report sightings.

STYGOFAUNA

A targeted stygofauna survey of the Thunderbox Project Area was completed by Biota in 2002 for LionOre. The study sampled 9 bores out of a possible 30, with the reduced number mostly due to access issues or lack of water.

No stygofauna were collected from within the Thunderbox Project Area bores. Only a single stygofauna specimen (Order: Copepoda) was collected from a local stock bore used to supplement the sampling program and to provide regional context.

With the available data, it is difficult to be conclusive as to whether the lack of stygofauna on the tenements is genuine or is an artefact of sampling effort, bore design or history. Stygofauna occurrence can be temporarily and spatially variable, and repeated null results are normally required before some certainty can be achieved that stygofauna are absent from the area.

ENVIRONMENTAL MANAGEMENT MEASURES

All Saracen operations will be conducted in accordance with the Saracen Environmental Management Policy (EMP) and Environmental Management System (EMS). Saracens EMS and associated training are designed to minimise the impacts of Saracen's operations on the environment.

PRE-MINING

Saracen has reviewed existing and historic data for the NEGO areas to determine gaps in knowledge requiring additional work and to understand the impact of past mining activities on area. Information on flora was found to be insufficient.

The level one Flora Survey (Botanica, 2014) has been conducted to understand the environment and support Clearing Permit and future Mining Proposal applications. An in-depth Remedial Action Plan for the remediation of high density dust accumulation beyond the Thunderbox TSF facility is being developed by Jacobs (2014).

Mine infrastructure will be designed to avoid sensitive areas such as creek lines, priority species and to minimise impacts on the environment (i.e. via construction of diversion bunds to redirect clean runoff away from mine area). Mine infrastructure and clearing will be limited to what is absolutely necessary for safe mining.

CONSTRUCTION

Topsoil and vegetation will be cleared and stockpiled in accordance with the Control of Clearing Management Plan, Topsoil Management Plan and supporting procedures.

To ensure that vegetation clearing will be controlled and monitored:

- No clearing will occur without a site clearing permit authorised by the site Environmental Officer and Department Manager.
- The area to be cleared will be surveyed and pegs installed prior to commencement of clearing to ensure only the approved area is cleared.

Key Performance indicators for the Topsoil Management plan are:

- Topsoil stockpiles less than 2m vertical height.
- Topsoil stockpiles show seed viability and biotic activity.
- Topsoil stockpiles show no erosion or salt water contamination.
- All topsoil stockpile locations shown on site plans.
- All topsoil stockpile volumes and date of storage recorded in a database.

OPERATION

Waste Rock Characterisation and TSF Design

Jacobs SKM (Jacobs) were engaged by Norilsk Nickel Australia to undertake a Preliminary Site Materials Characterisation Investigation including testing and reporting for the North Eastern Goldfields. Characterisation of site materials (including soils and waste rock) is critical to the development of final landform designs.

The investigation was undertaken in three phases; namely:

Phase 1- Desktop Review and Sampling and Analyses Plan Development

Phase 2- Field Sampling and Analysis

Phase 3- Data Interpretation and Reporting

During the desktop study, current mine closure reports and existing characterisation reports and analytical data were reviewed for the North Eastern Goldfields Operations. The desktop review formed the basis for completing a high level qualitative Risk and Opportunity Assessment to inform which mine landforms have sufficient information to fulfil project objectives. Sites that did not have

existing information were targeted within the Site Action Plan so that information on the mined materials could be obtained.

68 samples were identified in the field-sampling program and collected during the site visit from all mining areas within the North Eastern Goldfields Operations. Determination of the number of samples collected at each site was guided by:

- The outcome of the data review;
- The mining activity/process;
- Site layouts;
- The areas of disturbance; and
- Visual observations of potential issues (salt scalds containing sulfosalts, acid mine drainage (AMD) precipitates, presence of sulphide materials or minerals likely to contribute to acid neutralising capacity).

Of the 68 samples collected, 39 samples were issued for laboratory analyses. A number of analytical parameters were analysed, with the laboratory results being used to form the basis for data interpretation and reporting at each of the NEGO sites.

In summary, the key conclusions from the Preliminary Materials Characterisation Investigation found that:

- That in most instances the potential for mine features (e.g. WRD and TSF's) within the NEGO group of mines to produce acid drainage is considered to be low;
- Across the sites the potential for waste rock, ore, low grade ore and tailings to contain elevated concentrations of salts such as sulphate, chloride, sodium, calcium and magnesium, metals such as nickel, and metalloids such as arsenic, is considered to be high;
- Fibrous materials were not found to be present in any of the samples analysed;

A key environmental requirement of the mining operation will be to construct the waste rock dumps outer batters in accordance with the design criteria specified in the Mining Proposal (in preparation). Key performance indicators for the Shift Supervisors will include:

- Construction of the batters in accordance with design, i.e. oxide and transitional material encapsulated;
- No over tipping of surveyed tip to points;
- Pushing down of batter surface;
- Respreading of topsoil; and
- Cross ripping on the contour (with survey control).

Opportunities for progressive rehabilitation will be incorporated into the mining schedule. Rehabilitation work will be scheduled to take advantage of machinery down time in the pit and to ensure optimal usage of machinery, while achieving the required rehabilitation outcomes.

Surface Water

Surface water will be managed in accordance with the Surface Water Management Plan.

The Thunderbox mining areas is currently protected from sheet flow by a waste dump and diversion bund along the south eastern margins and the Bannockburn mining area is protected by a diversion bund to the west. The proposed haul road will contain culverts to reintroduce natural water flows to the vegetation on the western side of the road.

Groundwater

The borefields associated with the North Eastern Goldfield Operations comprise of a network of both monitoring and production bores. 27 production bores are spread over five borefields (Rogan Josh, Madras, Thunderbox, Roadside, Double A and Bannockburn). Only two bores are currently in operation: Camp Production Bore and Rogan Josh 8. Water supply from these bores is used for dust suppression and potable water. The monitoring network comprises of 37 monitoring bores located

within the borefields and a series of monitoring bores around the Thunderbox and Bannockburn TSF's.

The majority of bores have indicated either a stable or rising groundwater level trend, showing groundwater levels have recovered since the cessation of mining 2008. Declining levels have been recorded around the Thunderbox TSF area which is due to decreased groundwater mounding.

There is potential for new production and monitoring bores to be added to the network depending on the mine plan.

Hydrocarbon Management

While the site is on care and maintenance the only hydrocarbons stored on site will be at the bulk fuel farm facility. When the site is in operation types and volumes of hydrocarbons used on site will be dependent on mining operations.

The majority of hydrocarbons on site will be used by Saracen's mining contractors (yet to be determined). Contractors will be required to comply with Saracen's Hazardous Materials Management Plan which includes hydrocarbon management plans and spill response procedures. Saracen environmental personnel will inspect all site workshops on a regular basis and maintain a register of compliance actions required to meet government standards for hydrocarbon management.

Correct hydrocarbon management is to be included in the site environmental induction which will be completed by all personnel working on site.

Dangerous Goods and Hazardous Substances

Dangerous goods and hazardous substances will be stored, handled and used according to product and statutory outlined in the Saracen Hazardous Materials Management Plan. Any inadvertent spillage of material will be retained, collected and removed according to the procedures contained in the EMP.

Atmospheric Pollution and Noise

Dust

Potential sources of dust are dumping and pushing of waste material and vehicle movements along haul roads and other hardstand areas. The dust has the potential to create on and offsite pollution effects, visual impact and effect on vegetation.

Water trucks will be utilised within the mining operations and along haul roads, to place water on operational surfaces to minimise dust.

Brackish water used for this purpose has the potential to adversely affect vegetation if plants are exposed to contained salt through over-spraying or runoff into vegetated areas.

The following management practices will be implemented to minimise the impact on surrounding vegetation:

- Bunds will be constructed along haul roads to prevent saline water from draining into the surrounding environment;
- Table drains and sumps will be constructed along haul roads to collect saline water runoff;
- Dribble bars will be used on water trucks; and
- Water truck operators will be educated to avoid over spraying and report the need to repair bunding and drainage sumps.

In an effort to stop the dusting at the Thunderbox TSF, the final application of the Vital Bond-Matt Stonewall dust control agent will be completed during August 2014. If this application is unsuccessful then Saracen will flood the TSF using water from the pit void. Dusting at the TSF will not be an issue once milling has recommenced.

Noise

The closest residence to the proposed area is the Thunderbox accommodation village located to 3km north of the proposed area. The camp is protected from potential noise from the mining and processing operations by breakaways. Noise was not an issue during previous mining operations from 2002-2007.

REHABILITATION

Waste Dumps

The surface of the waste dumps will be covered with competent material before being battered down to gradient of less than 18°. A back sloping 10m wide berm will be installed at 10m vertical height. A layer of topsoil no greater than 100mm will be spread over the reshaped batters before they are ripped to a depth of approximately 1m and spread with seed stock from the local area. Any stockpiled vegetation from previous clearing will be respread over the rehabilitated areas.

The top surface of the waste dumps will be made concave in shape to encourage water to be directed back towards the centre of the waste dump. The surface will be deep ripped and seeded.

TSF

The outer walls of the Thunderbox TSF will be rehabilitated in similar fashion to the waste dumps, with the exception of the berm at 10m. The surface of the TSF's will be covered in 0.5m of competent rock before being lightly ripped and seeded.

Exploration

All areas disturbed by exploration activities on Saracen tenements will be rehabilitated to DMP standards (pegs removed, collars cut/plugged, bags removed, sumps filled, area scarified, vegetation spread and access blocked). This will be completed within 6 months of the drilling program being finished.

ASSESSMENT AGAINST CLEARING PRINCIPLES

This clearing proposal is assessed against the ten clearing principles as follows.

(a) Native vegetation should not be cleared if it comprises a high level of biological diversity.

Vegetation of the East Murchison subregion in the Austin Botanical District is predominately Mulga low woodlands on plains, often rich in ephemerals, which reduce to scrub on hills. It is also characterised by hummock grasslands, saltbush shrublands and halosarcia shrublands.

Botanica (2014) commented that although the survey area sustains diverse flora, this is not restricted to the survey area and occurs within the surrounding regions.

Proposal is not at variance to this principle.

(b) Native vegetation should not be cleared if it comprises the whole, or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

It has been confirmed that Malleefowl are active in the proposed clearing area with a sighting of a live bird to the south of the Thunderbox TSF in vegetation community TBA_04. Although the area where the Malleefowl was spotted is included within the clearing area it is unlikely to be disturbed. No active mounds have been recorded to date.

Saracen will implement controls (checking areas prior to clearing, implementing 100m buffer zones around known active mounds and educating operators to cease clearing and report sightings if birds or mounds are sighted during clearing operations, reporting sightings to DER and DPaW (where required) and Malleefowl Preservation Group. If mine plans change and encroach on the area where the bird was sighted Saracen will commit to undertaking a targeted Malleefowl survey

Proposal may be at variance to this principle.

(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.

No listed species of rare or critically endangered flora were found during this survey.

A search of the Department of Environment and Conservation's Rare and Priority Flora Database revealed no records of Declared Rare Flora (DRF) in or nearby the survey area.

Proposal is unlikely to be at variance to this 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.

There are no Threatened Ecological Communities (TEC's) within the northeast Goldfields subregion (Cowan, 2001).

There are no Priority Ecological Communities within or adjacent to the survey area.

Proposal is unlikely to be at variance to this 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 DAFWA GIS file (2011) indicates that the Saracen North Eastern Goldfields Operations are within Pre-European Beard vegetation associations Laverton 18, 28 and 39. The extent of these associations as described by the DAFWA is shown below in Table 3.

Table 3: Pre-European Beard Vegetation Associations

Veg association	Pre- European Extent (Ha)	Current Extent (Ha)	Pre-European Extent Remaining (%)	% of current extent within DPaW managed lands	Vegetation Description
Laverton 18**	2536021.06	2520869.47	99.4	1.52	Low woodland; mulga (Acacia aneura)
Laverton 28***	133739.72	131531.31	98.35	0	Open low woodland; mulga
Laverton 39*	155416.64	151580.18	97.53	0	Shrublands; mulga scrub

*Low reservation priority according to the International Union for Conservation of Nature (IUCN)

**Medium reservation priority according to the IUCN

***High reservation priority according to the IUCN

None of these vegetation communities have been extensively cleared and clearing within this survey area will have minimal effect on the extent of these vegetation communities.

Proposal is unlikely to be at variance to this 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.

Only two vegetation communities associated with ephemeral watercourses were identified by Botanica within the survey area:

- Low woodland of *A. aptaneural* *A. mulganeura* over low scrub *A. tetragonophylla* and very open low grass of *M. paradoxus* in creekline (WS_02);
- Low woodland of *A. aptaneura* over open low scrub of *E. platycalyx* and very open low grass *A. contorta* in flood plain (WS_04).

Proposal is unlikely to be at variance to this principle.

(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

Large portions of the survey area have been disturbed by recent mining activity, are mostly within pastoral leases and have been grazed. Vehicle tracks and pastoral fences cross the area. Based on the Keighery vegetation health rating scale ten of the eighteen vegetation communities were rated as being in “very good” health. The remaining eight communities were rated as being in “good” health. Although, sections of two vegetation communities around the Thunderbox TSF had areas where the health condition had deteriorated to degraded.

Vegetation communities associated with the proposed clearing area are susceptible to different levels of erosion, particularly in the lower alluvial tracts. As such water flows will be managed to minimise disturbance to creek lines.

Water tables in the areas most likely to be cleared are below rooting depth of vegetation and groundwater ranges in salinity levels from fresh to brackish. Therefore it is considered unlikely that ground water tables will rise and lead to secondary salinity in surrounding landscapes. Standing water levels of groundwater monitoring bores are recorded quarterly as per DER Licence 7815/2001/10

The proposed clearing area is largely surrounded by native vegetation and clearing will be localised and restricted to what is required for safe mining operations.

Proposal is unlikely to be at variance to this 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 area.

No conservation areas are nearby.

Proposal is not at variance with this 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 Thunderbox Mining Area occurs on a narrow, subdued interfluvium that is partially dissected by second and third order tributaries of Wilson Creek. The Thunderbox Creek is about 200m wide and strongly braided. During peak flows the current drainage tract is exceeded. There are minor temporary pools in the creek after rain events but no substantial water features. The area is fed by a catchment extending 4.9km² to the northwest.

The Bannockburn Mining Area lies within a disorganised endoreic drainage system of Salinaland, and in the flood plains of the Marshall and Doyle's Well Creeks which flow in a south westerly direction towards Lake Raeside. These creeks have common head waters but at Bannockburn they are separated by the mine site and an extensive area of weathered basalt which occurs to the east.

Vegetation communities associated with the proposed clearing area are susceptible to different levels of erosion, particularly in the lower alluvial tracts. As such disturbance to these drainage tracts will be minimised and measures will be put in place to ensure surface water flow is as natural as possible.

The climate is arid to semi-arid with 230mm of annual rainfall and annual evaporation rates are about 3200mm. Natural recharge to groundwater is limited to years of extreme rainfall. Also, Water tables in the areas most likely to be cleared are below rooting depth of vegetation and range in salinity levels from fresh to brackish. Therefore it is considered unlikely that ground water tables will rise and lead to secondary salinity in surrounding landscapes.

Proposal is unlikely to be at variance with this principle.

(j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.

The climate is arid to semi-arid with about 230mm of annual rainfall. Rain falls on an average of 43 days a year.

Most rainfall events will cause little runoff, however extreme rainfall events such as those recorded in summers of 1984 and 1967 will result in significant runoff and flooding.

The proposed clearing area is largely surrounded by native vegetation and clearing will be localised and restricted to what is required for safe mining operations

Clearing in this proposal will have negligible effect on the volume of runoff discharged.

Proposal is unlikely to be at variance with this principle.

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APPENDIX A

Level 1 Flora and Vegetation Survey of the Thunderbox and Bannockburn Project Areas

Report prepared for Saracen Metals Pty Ltd by
Botanica, August 2014.

