
FLORA AND VEGETATION SURVEY

PINJIN INFRASTRUCTURE CORRIDOR

L31/56, L31/57, L39/185

TROPICANA GOLD PROJECT

OPERATIONAL AREA – PINJIN STATION

Prepared for:

Tropicana Joint Venture

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1. SUMMARY

The Tropicana Joint Venture (TJV) is working through the Western Australian and Commonwealth Environmental Impact Assessment Processes for the proposed Tropicana Gold Project (TGP), which will be an open cut gold operation centred on the Tropicana and Havana gold prospects. The TGP is located approximately 330km east-north-east from Kalgoorlie on the edge of the Great Victoria Desert. As part of the TGP, two infrastructure corridor options are being considered, one via Pinjin Station and one via the existing Trans Australian Railway Line Access Road.

Mattiske Consulting Pty Ltd was commissioned by the TJV to define the flora and vegetation values along the Pinjin Option (L31/57, L39/185) from the operational area of the TGP to Pinjin Station. The infrastructure corridor will contain an access road and / or fibre optical cable for site communications. Four botanists completed the survey during three trips, between the 2nd – 7th December 2007, 9th – 15th March 2008 and 6th – 9th May 2008. The TJV is a joint venture between AngloGold Ashanti Australia (70% shareholder and Manager) and Independence Group (30% shareholder).

The survey was conducted in accordance with the Environmental Protection Guidance Statement No 51.

Flora

A total of 44 families, 122 genera, 260 species and 267 taxa were recorded within the proposed corridor (Appendix B). Species representation was greatest among the Myrtaceae (37 taxa), Chenopodiaceae (25 taxa), Mimosaceae (22 taxa), Myoporaceae (18 taxa), Proteaceae (14 taxa) and Papilionaceae (14 taxa) families.

Rare, Priority and Threatened Flora

One Declared Rare Flora Species, *Conospermum toddii*, pursuant to subsection (2) of section 23F of the *Wildlife Conservation Act 1950* and as listed by the Department of Environment and Conservation (2008a, 2008b) was located during the survey. This taxon is also listed as Endangered pursuant to Schedule 1 of the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (Department of the Environment, Water, Heritage and the Arts 2008b)

Thirteen Priority Flora species as defined by the Department of Environment and Conservation (2008a, 2008b) were located during the survey:

- *Baeckea* sp. Great Victoria Desert (A.S. Weston 14813) (P2);
- *Dicrastylis nicholasii* (P2);
- *Grevillea secunda* (P2);
- *Olearia arida* (P2);
- *Thryptomene eremaea* (P2);
- *Dicrastylis cundeeleensis* (P3);
- *Eucalyptus pimpiniana* (P3);
- *Microcorys macredieana* (P3);
- *Micromyrtus serrulata* (P3);
- *Micromyrtus stenocalyx* (P3);
- *Comesperma viscidulum* (P4);
- *Daviesia purpurascens* (P4); and
- *Lepidobolus deserti* (P4).

Vegetation

Thirty seven plant communities were defined within the survey area. The communities differed in their structure, dominance and range of associated species and geographic factors.

Vegetation community S11 is considered regionally significant, as it supports *Conospermum toddii* (R). It is planned that the proposed infrastructure corridor will avoid the S11 community. Communities E2, E3, E4, E5, E8, E10, E11, E12, E14, A2, A3, S1, S2, S4, S5, S6, S8, S9 and S11 maybe considered locally significant as they support Priority Flora, support potential new taxa, support flora with discovered range extensions, are not significantly replicated within the survey area or maybe associated with the yellow sandplain PEC.

No Threatened Ecological Communities (TEC's) as defined by the EPBC Act (1999) or the Department of Environment and Conservation (2008c) were observed in the survey area

One Priority Ecological Community (PEC) as defined by the Department of Environment and Conservation (2008e) is thought to occur within the survey area. This PEC is Priority 3(ii) described as, "Yellow sandplain communities of the Great Victoria Desert". A Priority 3 PEC is defined as "a poorly known ecological community" and a Priority 3(ii) community is further defined as "known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat". It is likely that this PEC occurs within the survey area, however to date little information is available regarding the definition of this PEC.

There are six sections of the proposed infrastructure corridor that potentially intersect with the PEC. Vegetation communities derived from this survey, that are situated in areas thought to be the PEC include S11 on the yellow and yellow-orange dunes, S8 and S9 on yellow-orange and orange sandy-loams on lower slopes and flats, S5 on yellow to yellow-orange sand on slopes and E4 on yellow and yellow-orange sandy loams on mixed topographies. Another community, not observed from the proposed corridor but observed within the yellow sand region, consists of Low Open Shrubland of *Calothamnus gilesii*, *Persoonia pertinax* and mixed low shrubs with occasional emergent *Eucalyptus youngiana* and *Eucalyptus gongylocarpa* on undulating yellow sandplains. It is thought that this community may also be associated with this PEC. The E4 community covers approximately half of the direct impact area found on yellow or yellow-orange sand in the potential PEC areas. However, this community is unlikely to form part of the PEC, as it is widespread throughout the region. The proposed corridor avoids S11 the community mapped.

The vegetation varied in condition from Pristine, in non-disturbed areas of native vegetation to Good, in areas that have been altered by fire.

2. INTRODUCTION

The Tropicana Joint Venture (TJV) is working through the Western Australian and Commonwealth Environmental Impact Assessment Processes for the proposed Tropicana Gold Project (TGP), which is centred on the Tropicana and Havana gold prospects. The proposed TGP is located approximately 330 km east north-east of Kalgoorlie, and 15 km west of the Plumridge Lakes Nature Reserve, on the western edge of the Great Victoria Desert (GVD) biogeographic region of Western Australia (Figure 3). The Tropicana and Havana prospects represent the first gold resource discovered in this remote portion of Western Australia. The TGP is a joint venture between AngloGold Ashanti Australia Limited (70% stakeholder and Manager) and the Independence Group NL (30% stakeholder).

The TGP consists of three main components (Figure 3):

- Operational Area - This area contains the mine, processing plant, aerodrome, village and other associated infrastructure;
- Water Supply Area - the Minigwal Trough; and
- Infrastructure Corridors - Two options are under consideration (Tropicana-Transline (utilising the existing Trans Australian Railway Line Access Road) and Pinjin Road options). The infrastructure corridor will contain an access road and / or fibre optical cable for site communications

In preparation for the Environmental Impact Assessment, the TJV commissioned Matiske to undertake a baseline biological survey of the vegetation and flora along the Pinjin infrastructure corridor alignment (L31/56, L31/57 and L39/185). The primary objective of this study was to define the flora and vegetation values of the Pinjin infrastructure corridor (proposed corridor) from the proposed operational area of the TGP to Pinjin Station.

Four botanists completed the survey during three trips, between the 2nd – 7th December 2007, 9th – 15th March 2008 and 6th – 8th May 2008. The survey was conducted in accordance with the Environmental Protection Authority Guidance Statement No. 51 – *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in WA*.

2.1 Project Description

The Proposed Corridor traverses approximately 220km, and is located from the south of the operational area of the TGP, located in the Helms Botanical District of the Eremaean Province (Beard, 1990), to Pinjin Station, located in the Austin Botanical District of the Eremaean Province (Figure 3). A 16 km bypass road, to the south of the operational area, was also surveyed.

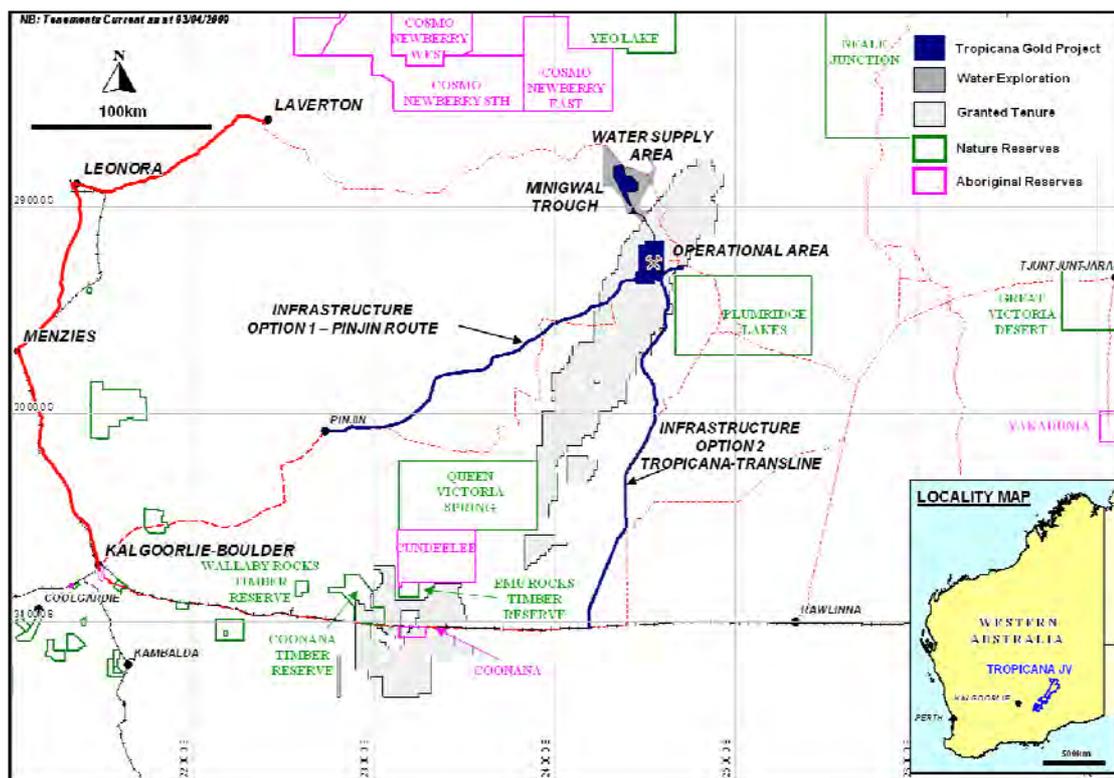


Figure 3: Layout of Proposed Mine Access Road and Infrastructure Corridor – Pinjin Option

2.2 Landforms and Soils

The Helms Botanical District is characterised by undulating topography with longitudinal dunes (Beard (1990). Between the dunes soils are characterised by shallow earthy soils overlying red brown hardpans, while the dunes are red earthy sands or red brown sand (Beard 1990). The geology is characterised by quaternary sand plain over Permian and Mesozoic rocks (Beard 1990).

The Austin Botanical District is characterised by gently undulating topography with occasional ranges of low hills, with extensive sandplains in the east (Beard 1990). The soils are principally shallow earth loam overlying red-brown hardpans, shallow stony loams on hills and red earthy sands on sand plains (Beard 1990). The geology is characterised by Archaean granite with infolded volcanics and greenstones on like ages (Beard 1990).

2.3 Vegetation

The Eremaean Botanical Province is typified by plants from the families Mimosaceae (*Acacia* spp.), Myrtaceae (*Eucalyptus* spp.), Myoporaceae (*Eremophila* spp.), Chenopodiaceae (Samphires, Bluebushes, Saltbushes), Asteraceae (Daisies) and Poaceae (grasses).

Arid shrublands make up the vast majority of vegetation types encountered in the Murchison region. Most landscapes are dominated by mixed shrubland/scrubland, with few or no trees or perennial grasses, with shrubs apparently randomly scattered or loosely aggregated, and with large amounts of bare ground and shallow red soils exposed between the shrubs (Curry *et al.* 1994).

The vegetation of the Helms Botanical District is very consistent and is characterised by tree steppe of *Eucalyptus gongylocarpa* and *Triodia basedowii* (Beard 1974). Overall the sandy areas are a mosaic of tree and shrub communities, however *Eucalyptus gongylocarpa* is dominant on sand dunes only where it occurs locally between them (Beard 1990).

The Austin Botanical District is essentially Mulga (*Acacia aneura*) woodlands associated with red loams over siliceous hardpans on the plains (van Vreeswyk, 1994) reducing to scrub on the rises and hills (Beard, 1990). Mulga and *Eremophila* shrublands dominate on stony plains, whilst chenopod communities are more often associated with duplex soils (Pringle, 1994).

2.4 Climate

Beard (1990) describes the Helms Botanical District as arid with rain during summer and winter producing annual precipitation of 200 mm. The Austin District is characterised by an arid climate with cool winters and hot, dry summers. Rain falls in both the warm and cool seasons (Beard, 1990). Data for the two nearest active Bureau of Meteorology weather stations to the proposed corridor, located at Kalgoorlie–Boulder Airport and Laverton, can be seen in Tables 1 - 2 (BOM, 2009).

Table 1: Mean Climatic Data for Kalgoorlie-Boulder Airport (BOM, 2009)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Maximum Temperature (°C)	33.6	32.1	29.5	25.1	20.6	17.5	16.7	18.5	22.3	25.7	29.0	31.9	25.2
Mean Min Temperature (°C)	18.2	17.8	16.0	12.6	8.7	6.2	5.0	5.5	8.0	11.0	14.1	16.5	11.6
Mean Rainfall (mm)	23.0	31.6	24.2	21.5	26.7	28.7	24.9	21.4	14.0	14.9	17.6	16.2	264.9

Table 2: Mean Climatic Data for Laverton (BOM, 2009)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Maximum Temperature (°C)	35.8	34.8	31.9	27.2	22.1	18.5	17.8	20.0	24.5	28.0	32.1	34.9	27.3
Mean Min Temperature (°C)	20.5	20.0	18.0	13.9	9.5	6.6	5.2	6.4	9.5	12.8	16.6	19.3	13.2
Mean Rainfall (mm)	24.1	30.2	30.4	22.5	23.7	24.0	16.4	13.5	8.1	8.3	13.6	17.5	231.9

2.5 Clearing of Native Vegetation

The *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* dictate that any clearing of native vegetation in Western Australia requires a permit to do so from the Department of Environment and Conservation. Native vegetation includes aquatic and terrestrial vegetation indigenous to Western Australia, and intentionally planted vegetation declared by regulation to be native vegetation, but not vegetation planted in a plantation or planted with commercial intent (*Environmental Protection Act, 1986*). The *Environmental Protection Act 1986* Section 51A, defines clearing as: “the killing or destruction of; the removal of; the severing or ringbarking of trunks or stems of; or the doing of substantial damage to some or all of the native vegetation in an area, including the flooding of land, the burning of vegetation, the grazing of stock or an act or activity that results in the above”

Under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004 - Regulation 6 – Environmentally sensitive areas* are “the area covered by vegetation within 50 m of Rare Flora, to the extent to which the vegetation is continuous with the vegetation in which the Rare Flora is located”. Ministerial approval must be granted prior to any clearing of Declared Rare Flora, including a minimum of 50 m surrounding all populations of Rare Flora. The area covered by a threatened ecological community is also considered an environmentally sensitive area and therefore non-permitted, unless Ministerial approval is granted.

2.6 Rare and Priority Flora

Species of flora are defined as Rare or Priority conservation status where their populations are restricted geographically or threatened by local processes. The Department of Environment and Conservation recognises these threats of extinction and consequently applies regulations towards population and species protection.

Rare Flora species are gazetted under subsection 2 of section 23F of the *Wildlife Conservation Act 1950* [WA] and therefore it is an offence to “take” or damage rare flora without Ministerial approval. Section 23F of the *Wildlife Conservation Act 1950* [WA] defines “to take” as “... to gather, pick, cut, pull up, destroy, dig up, remove or injure the flora to cause or permit the same to be done by any means.”

Priority Flora are under consideration for declaration as ‘Rare Flora’, but are in urgent need of further survey (Priority One to Three) or require monitoring every 5-10 years (Priority Four). Appendix A1 presents the definitions of Declared Rare and the four Priority ratings under the *Wildlife Conservation Act 1950* [WA], defined by the Department of Environment and Conservation (2008a).

The *Environment Protection and Biodiversity Conservation Act 1999* [Commonwealth] lists Threatened Flora species which are considered of national environmental significance (Department of Environment, Water, Heritage and the Arts 2008a). A person must not take an action that has, will have, or is likely to have a significant impact on a listed threatened species or an ecological community, without approval from the Commonwealth Minister for the Environment, Water, Heritage and the Arts. Appendix A2 presents the definitions of the categories of Threatened Flora Species, defined by the *Environment Protection and Biodiversity Conservation Act 1999* [Commonwealth].

2.7 Threatened Ecological Communities (TEC’s)

Communities in Western Australia can be listed as ‘Threatened Ecological Communities’ (TEC’s) (Department of Environment and Conservation 2008c) once they have been defined by the Western Australian Threatened Ecological Communities Scientific Advisory Committee. TEC’s are listed under four categories; Presumed Totally Destroyed (PD), Critically Endangered (CR), Endangered (EN) or Vulnerable (VU) (Department of Environment and Conservation 2008d). Appendix A3 presents a summary of the definitions of Threatened Ecological Communities as extracted from the Department of Environment and Conservation (2008d). Some Western Australian TEC’s are also listed under the *Environment Protection and Biodiversity Conservation Act 1999* [Commonwealth] (Department of the Environment, Water, Heritage and the Arts 2008b).

Possible Threatened Ecological Communities can be listed as Priority Ecological Communities (PEC’s) by the Department of Environment and Conservation (2008e). PEC’s are listed under five categories based on survey criteria and current knowledge, Priority 1, 2, 3, 4 and 5 Department of Environment and Conservation (2008b). Appendix A4 presents a summary of the definitions of Priority Ecological Communities as extracted from the Department of Environment and Conservation (2008d).

2.8 Local and Regional Significance

Flora or vegetation may be locally or regionally significant in addition to statutory listings by the State or Federal Government.

In regards to flora; species, subspecies, varieties, hybrids and ecotypes may be significant other than as Declared Rare Flora or Priority Flora, for a variety of reasons, including:

- “ a keystone role in a particular habitat for threatened species, or supporting large populations representing a significant proportion of the local regional population of a species;
- . relic status;
- . anomalous features that indicate a potential new discovery;
- . being representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);

- . the presence of restricted subspecies, varieties, or naturally occurring hybrids;
- . local endemism/a restricted distribution;
- . being poorly reserved” (Environmental Protection Authority 2004).

The Environmental Protection Authority (2004) in Guidance Statement 51 states that Vegetation may be significant because the extent is below a threshold level and a range of other reasons, including:

- “
- . scarcity;
 - . unusual species;
 - . novel combinations of species;
 - . a role as a refuge;
 - . a role as a key habitat for threatened species or large populations representing a significant proportion of the local to regional total population of a species;
 - . being representative of the range of a unit (particularly, a good local and/or regional example of a unit in “prime” habitat, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
 - . a restricted distribution”

Vegetation communities are locally significant if they contain Priority Flora species or contain a range extension of a particular taxon outside of the normal distribution. They may also be locally significant if they are very restricted to one or two locations or occur as small isolated communities. In addition, vegetation communities that exhibit unusually high structural and species diversity are also locally significant.

Vegetation communities are regionally significant where they are limited to specific landform types, are uncommon or restricted plant community types within the regional context, or support populations of Declared Rare Flora.

Determining the significance of flora and vegetation may be applied at various scales, for example, a vegetation community may be nationally significant and governed by statutory protection as well as being locally and regionally significant.

3. OBJECTIVES

The general objective was to define the flora and vegetation values within the proposed corridor.

The specific objectives were to:

- Collect and identify the vascular plant species present within the proposed corridor;
- Review the conservation status of the vascular plant species by reference to current literature and listings [Department of Environment and Conservation (2008a), Department of the Environment, Water, Heritage and the Arts (2008a) and plant collections held at the Western Australian State Herbarium (Department of Environment and Conservation 2008a);
- Define and map the native vegetation communities and their condition;
- Provide recommendations on the local and regional significance of the vegetation communities; and
- Prepare a report summarising the findings.

4. METHODS

4.1 Desktop Survey

Prior to undertaking survey work, a desktop search for Rare and Priority flora that may occur within the proposed corridor was undertaken using Florabase and Department of Environment and Conservation records.

4.2 Survey Timing

The assessment of the flora and vegetation of the proposed corridor was undertaken by four Botanists from Mattiske Consulting Pty Ltd during three trips, between the 2nd – 7th December 2007, 9th – 15th March 2008 and 6th – 9th May 2008.

4.3 Site Selection

Prior to undertaking field work, aerial photographs of the proposed corridor were supplied by the TJV. Sampling sites were selected along the entire route to sample representative vegetation types within the proposed corridor. Site locations are presented in Appendix D.

4.4 Sampling Methods

The flora and vegetation was described and sampled systematically at each survey site in accordance with Environmental Protection Authority (2004) Guidance Statement 51. The survey consisted of sampling and recording all flora occurring within a 50 x 50m area. Where sites occurred on sand dunes, the quadrat shapes was changed to reflect the topography (ie. 100 x 25m). 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
- 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. The number of plants of Priority Flora and unknown species were also recorded.

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 (2008a).

4.5 *Eucalyptus articulata* Search

Eucalyptus articulata is a Declared Rare mallee species, located adjacent to the PNC access track, approximately 30km east of Ponton Creek. This species was identified in the Desktop search. A targeted search was conducted outside of, and within the proposed Pinjin infrastructure corridor route, focusing on areas that matched the known soil, topography and vegetation characteristics derived from other research (Appendix E).

4.6 Survey Constraints

It is recommended that flora and vegetation surveys are conducted after significant rainfall events in the Eremaean Province (EPA, 2004). Mean yearly rainfall for Kalgoorlie (Figure 4) has been slightly lower than average (241mm compared to an average of 265mm) whilst Laverton (Figure 5) has experienced significantly lower rainfall (166mm compared to average of 232mm). Kalgoorlie experienced rainfall from only one significant cyclonic event, February 2008, whilst Laverton experienced two significant cyclonic events, December 2007 and February 2008. The second field trip (9th – 15th March 2008) is considered to have been undertaken during an optimum time.

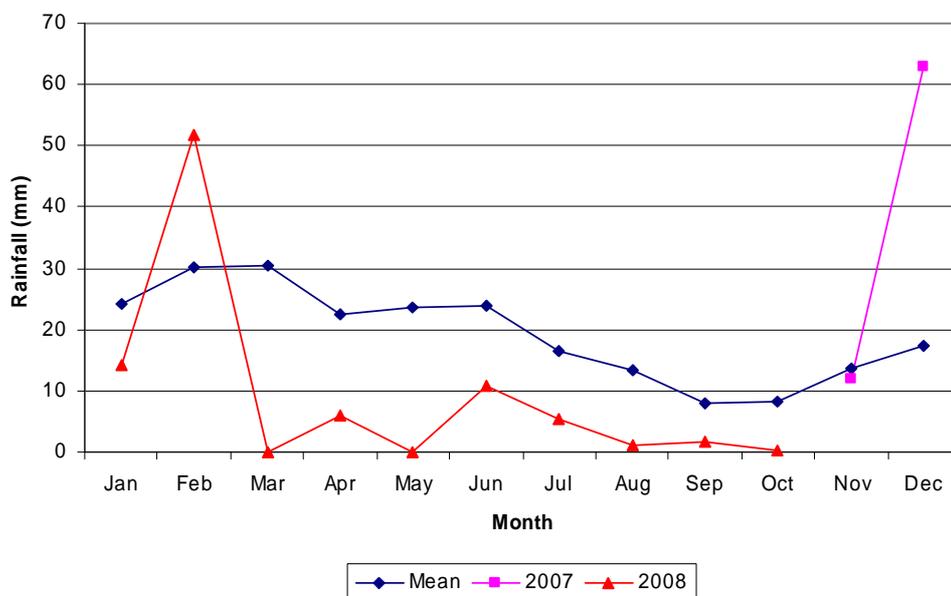


Figure 4: Rainfall comparison of long term mean and past 12 months, Kalgoorlie-Boulder (BOM 2009)

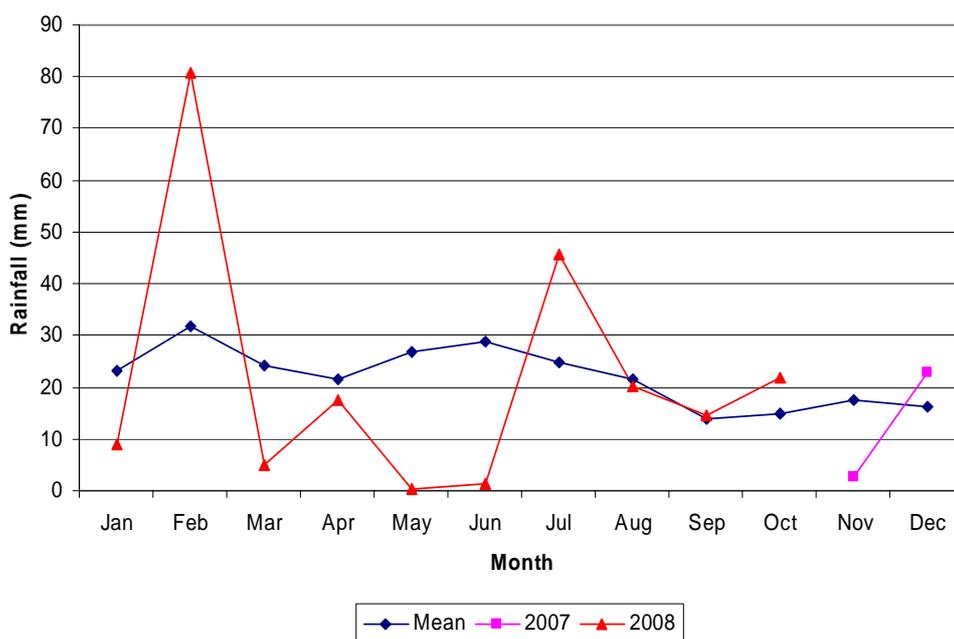


Figure 5: Rainfall comparison of long term mean and past 12 months, Laverton (BOM 2009)

The vegetation within the proposed infrastructure corridor was affected by recent fire in November 2007. In order to map areas exposed to higher intensity of fire (completely burnt), sites were situated in representative less affected areas, along the infrastructure corridor (Photo 1) or in unburnt areas (within similar vegetation communities as determined from aerial photography) within 5km, outside of the infrastructure corridor. Where sites were situated in less affected areas, the quadrat shapes were occasionally changed in size (eg. 100 x 25m) to fit into the unburnt patches of vegetation.



Photo 1: Illustrating vegetation less affected by fire at 525526E, 6685190N (MGA94, 51J)

5. RESULTS

5.1 Desktop Survey for Potential Rare and Priority Flora Species in the Survey Area

The results of a desktop search for rare and priority flora, which may occur within the survey area, are listed in Table 3 (DEC, 2008a).

Table 3: Rare or Priority Flora with potential to occur in survey area

Species	Family	Conservation Status
<i>Acacia eremophila</i> numerous-nerved variant	Mimosaceae	P3
<i>Baeckea</i> sp. Great Victoria Desert (A.S. Weston 14813)	Myrtaceae	P2
<i>Caesia rigidifolia</i>	Anthericaceae	P1
<i>Calandrinia porifera</i>	Portulacaceae	P3
<i>Comesperma viscidulum</i>	Polygalaceae	P4
<i>Conospermum toddii</i>	Proteaceae	R
<i>Dampiera eriantha</i>	Goodeniaceae	P1
<i>Daviesia purpurascens</i>	Papilionaceae	P4
<i>Dicrastylis nicholasii</i>	Lamiaceae	P2
<i>Eucalyptus articulata</i>	Myrtaceae	R
<i>Eucalyptus pimpiniana</i>	Myrtaceae	P3
<i>Grevillea secunda</i>	Proteaceae	P2
<i>Isotropis canescens</i>	Papilionaceae	P2
<i>Lepidobolus deserti</i>	Restionaceae	P4
<i>Malleostemon</i> sp. Officer Basin (D. Pearson 350)	Myrtaceae	P2
<i>Microcorys macredieana</i>	Lamiaceae	P3
<i>Micromyrtus serrulata</i>	Myrtaceae	P2
<i>Micromyrtus stenocalyx</i>	Myrtaceae	P3
<i>Olearia arida</i>	Asteraceae	P2
<i>Physopsis chrysotricha</i>	Lamiaceae	P2
<i>Thryptomene eremaea</i>	Myrtaceae	P2
<i>Trachymene pyrophila</i>	Apiaceae	P2

Mattiske Consulting have previously conducted botanical work in the south-western corner of the Great Victoria Desert and have recorded the following Rare and Priority Flora species [Mattiske Consulting (2000), Mattiske Consulting (2007), Mattiske Consulting (2008a), Mattiske Consulting (2008b)].

- *Conospermum toddii* (R)
- *Baeckea* sp. Great Victoria Desert (A.S. Weston 14813) (P2)
- *Grevillea secunda* (P2)
- *Malleostemon* sp. Officer Basin (D. Pearson 350) (P2)
- *Olearia arida* (P2)
- *Acacia eremophila* numerous-nerved variant (P3)
- *Dicrastylis cundeeleensis* (P3)
- *Microcorys macredieana* (P3)

- *Micromyrtus stenocalyx* (P3)
- *Comesperma viscidulum* (P4)
- *Lepidobolus deserti* (P4)
- *Daviesia purpurascens* (P4)

5.2. Flora

A total of 44 families, 122 genera, 260 species and 267 taxa were recorded within the proposed corridor (Appendix B). Species representation was greatest among the Myrtaceae (37 taxa), Chenopodiaceae (25 taxa), Mimosaceae (22 taxa), Myoporaceae (18 taxa), Proteaceae (14 taxa) and Papilionaceae (14 taxa) families.

5.3 Declared Rare Flora

One Declared Rare Flora species, *Conospermum toddii*, pursuant to subsection (2) of section 23F of the *Wildlife Conservation Act 1950* and as listed by the Department of Environment and Conservation (2008a, 2008b) was located during the survey. This taxon is also listed as Endangered pursuant to Schedule 1 of the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (Department of the Environment, Water, Heritage and the Arts 2008a)

Conospermum toddii F. Muell PROTEACEAE (Declared Rare Flora)

This species is a spreading shrub to 100-200cm tall that produces white or yellow flowers from July to October (DEC, 2008a). It has been recorded as occurring on yellow sand dunes. The Western Australian State Herbarium has 29 records in its collections.

This species was observed on yellow sand dunes from five sites adjacent to the proposed corridor during the survey (Table 4, Photos 2 - 3) from the following locations:

Table 4: GPS locations of *Conospermum toddii* (R)

Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
539 [REDACTED]	6703 [REDACTED]	12-15 within 30m. Burnt, but recognisable. Larger potential (burnt) population to the north, > ?100
618 [REDACTED]	6739 [REDACTED]	50-100 plants
619 [REDACTED]	6739 [REDACTED]	1 plant
618 [REDACTED]	6738 [REDACTED]	10-25 plants
618 [REDACTED]	6738 [REDACTED]	To 618302mE, 6738766mN, 100-150 plants on both sides of dune.



Photo 2: Illustrating likely habitat of *Conospermum toddii* (R) (*Conospermum toddii* (R) at front left)



Photo 3: Close up of *Conospermum toddii* (R)

5.4 Priority Flora

Thirteen Priority Flora species as defined by the Department of Environment and Conservation (2008a, 2008b) were recorded during the survey:

***Baeckea* sp. Great Victoria Desert (A.S. Weston 14813) MYRTACEAE (Priority 2)**

This species has been described as a shrub to 100cm that flowers white or pink from April to June (DEC, 2008a). It has been recorded as occurring on red sand or yellow sandy loams on undulating plains and gentle slopes. The Western Australian State Herbarium has seven records in its collections.

This species was recorded growing on yellow, yellow-orange and orange sand and sandy loams on flat, undulating, lower slope, mid slope and upper slope topographies in the following locations (Table 5):

Table 5: GPS locations of *Baeckea* sp. Great Victoria Desert (A.S. Weston 14813) (P2)

Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
596	6729	
598	6729	
635	6751	3 plants within 20m
623	6739	10-20 plants within 15m
616	6738	4-10 plants within 20m
615	6737	25-50 plants within 20m
613	6735	25-50 plants within 20m
613	6734	25-50 plants within 20m
624	6740	1 plant within 20m
530	6692	
530	6692	
531	6696	
590	6724	
591	6724	
594	6728	
595	6728	

***Dicrastylis nicholasii* F.Muell. LAMIACEAE (Priority 2)**

This species has been described as an erect, woolly shrub to 60cm tall (DEC, 2008a). It has been recorded as occurring on red sandy loam. The Western Australian State Herbarium has eight records in its collections.

This species was recorded growing on red and red-orange sandy loam and loamy-clay on flat topography, from the following locations (Table 6):

Table 6: GPS locations of *Dicrastylis nicholasii* (P2)

Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
650	6752	25-50 plants within 20m
647	6752	
644	6752	
638	6752	
590	6724	1 plant. Seasonally wet area. There was some degree of uncertainty regarding this specimen (<i>D. nicholasii</i>)

***Grevillea secunda* McGill PROTEACEAE (Priority 2)**

This species is a low spreading shrub, 30-80cm tall that produces red flowers from September to October (DEC, 2008a). It has been recorded as occurring on yellow or red sands on sand dunes and sandplains. The Western Australian State Herbarium has 16 records in its collections.

This species was recorded growing on yellow-orange sandy loams on flat, lower slope, mid slope and upper slopes topographies as well as dunes, from the following locations (Table 7):

Table 7: GPS locations of *Grevillea secunda* (P2)

Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
597	6729	
594	6728	5-10 plants within 20m
594	6728	5-10 plants within 20m
597	6729	5-10 plants within 20m
598	6729	5-10 plants within 20m
599	6730	2-5 plants within 20m
533	6696	
594	6725	
595	6728	

***Olearia arida* E.Pritz. ASTERACEAE (Priority 2)**

This species is an erect shrub to 40cm tall that produces white flowers from July to September (DEC, 2008a). It has been recorded as occurring on red or yellow sands on undulating low rises. The Western Australian State Herbarium has seven records in its collections.

This species was recorded growing on orange, orange-yellow and red-orange sand and sandy loams on flat, undulating and upper slope topographies from the following locations (Table 8):

Table 8: GPS locations of *Olearia arida* (P2)

Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
586	6721	
645	6752	4-10 plants within 20m
642	6752	1 plant within 20m
613	6735	6 plants within 20m
613	6734	1 plant within 20m

***Thryptomene eremaea* Rye & Trudgen MYRTACEAE (Priority 2)**

This species has been described as an erect, open shrub, 50-150cm tall that produces pink or white flowers from July to September (DEC, 2008a). It has been recorded as occurring on red or yellow sand on sandplains. The Western Australian State Herbarium has nine records in its collections.

This species was recorded growing on orange sandy loams on lower slopes with some granite outcropping from the following locations (Table 9):

Table 9: GPS locations of *Thryptomene eremaea* (P2)

Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
496[REDACTED]	6672[REDACTED]	20-40 plants within 30m
496[REDACTED]	6672[REDACTED]	40-60 plants within 30m
501[REDACTED]	6674[REDACTED]	500+ plants. Population boundaries: NW: 501781E, 6674070N NE: 501899E, 6674079N SW:501910E, 6673623N SE: 502076E, 6673860N

***Dicrastylis cundeeleensis* Rye LAMIACEAE (Priority 3)**

This species has been described as a woolly shrub 20-50cm tall that flowers white during April and October to December (DEC, 2008a). It has been recorded as occurring on yellow, red or reddish yellow sand on sandplains. The Western Australian State Herbarium has 11 records in its collections.

This species was recorded growing on orange and red-orange sandy loam and sand on flat, lower slope and mid slope topographies from the following locations (Table 10):

Table 10: GPS locations of *Dicrastylis cundeeleensis* (P3)

Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
644[REDACTED]	6752[REDACTED]	2-4 plants within 20m
642[REDACTED]	6752[REDACTED]	25-50 plants within 20m
631[REDACTED]	6746[REDACTED]	25 plant (very stressed)
630[REDACTED]	6746[REDACTED]	50-100 plants within 20m. Near side of track.
626[REDACTED]	6742[REDACTED]	40-60 plants within 20m. Also ~10 dead plants
626[REDACTED]	6742[REDACTED]	10-25 plants with 15m
625[REDACTED]	6740[REDACTED]	2 plants
616[REDACTED]	6738[REDACTED]	2 - 4alive plants, 10 dead plants
616[REDACTED]	6737[REDACTED]	2-4 plants
615[REDACTED]	6737[REDACTED]	2 plants, recently dead.
630[REDACTED]	6745[REDACTED]	15-25 plants within 10m
630[REDACTED]	6745[REDACTED]	50-100 plants
626[REDACTED]	6742[REDACTED]	25-50 plants within 15m
625[REDACTED]	6742[REDACTED]	200+ plants within 50m of
625[REDACTED]	6740[REDACTED]	~15 plants within 10m
625[REDACTED]	6740[REDACTED]	6-15 plants within 15m
624[REDACTED]	6740[REDACTED]	10-25 plants all very stressed
624[REDACTED]	6740[REDACTED]	75-125 plants
622[REDACTED]	6739[REDACTED]	5-10 plants
621[REDACTED]	6739[REDACTED]	10-25 plants within 10m
620[REDACTED]	6739[REDACTED]	10-25 plants within 10m
616[REDACTED]	6737[REDACTED]	25 plants within 10m

***Eucalyptus pimpiniana* Maiden MYRTACEAE (Priority 3)**

This species has been described as a straggly, shrubby mallee, 70-200cm tall, that flowers white from May to October (DEC, 2008a). It has been recorded as occurring on red sand on sand dunes and plains. The Western Australian State Herbarium has 20 records in its collections.

This species was recorded growing on orange, red-orange and light brown/red sandy loam and sand on flat topographies from the following locations (Table 11):

Table 11: GPS locations of *Eucalyptus pimpiniana* (P3)

Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
514	668	~20 plants within 30m
514	668	5 plants
569	671	200+ in unburnt 300x300m area
586	672	~50 plants
514	668	10-20 plants adjacent to track
514	668	
515	668	
523	668	
523	668	~20 plants in burnt area
575	671	20-40 plants
583	672	>100 plants extending ~200m south east
584	672	~ 50 plants
588	672	20-30 plants
566	671	10-20 plants, burnt
567	671	30-50 plants
575	671	~ 35 plants
514	668	5 plants

***Microcorys macredieana* F.Muell. LAMIACEAE (Priority 3)**

This species has been described as a broom like shrub, 20-150cm tall, that flowers white (DEC, 2008a). It has been recorded as occurring on yellow sand on dunes and sandplains. The Western Australian State Herbarium has 26 records in its collections.

This species was recorded growing on yellow, yellow orange and orange sandy loam and sand on flat, mid slope and upper slope topographies as well as dunes from the following locations (Table 12):

Table 12: GPS locations of *Microcorys macredieana* (P3)

Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
532	669	
634	670	
636	675	4-10 plants within 20m
634	675	10-25 plants within 20m
619	673	25-40 plants within 20m
618	673	2-5 plants within 20m
616	673	1 plant
615	673	20-30 plants within 20m
645	675	~40 plants within 15m
617	673	25-50 plants within 20m

***Micromyrtus serrulata* J.W.Green LAMIACEAE (Priority 3)**

This species has been described as an erect or spreading shrub, 40-150cm tall, that produces white flowers from June to November (DEC, 2008a). It has been recorded as occurring on brownish sandy and clayey soils over granite. The Western Australian State Herbarium has 14 records in its collections.

This species was recorded growing on orange sandy loam lower slopes with some granite outcropping from the following locations (Table 13):

Table 13: GPS locations of *Micromyrtus serrulata* (P3)

Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
497	6672	
496	6672	1 plant
497	6672	~ 40 plants within 30m
497	6673	60 - 80 plants, slightly stressed, within 30m
497	6673	60 - 80 plants within 30m
497	6673	60 - 80 plants (most < 40cm) within 20m
497	6673	50 plants within 15m
497	6673	30 plants, edge of population

***Micromyrtus stenocalyx* (F.Muell.) J.W.Green (Priority 3)**

This species is a straggly or widely spreading shrub, 30-150cm tall, that produces white flowers in April and from July to December (DEC, 2008a). It has been recorded as occurring on yellow or rarely red soils on sand dunes and undulating sandplains. The Western Australian State Herbarium has 17 records in its collections.

This species was recorded growing on yellow, yellow-orange and orange sandy loam and sand on flat, lower slope, mid slope and upper slopes topographies as well as dunes from the following locations (Table 14):

Table 14: GPS locations of *Micromyrtus stenocalyx* (P3)

Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
539	6703	
597	6729	
530	6692	20-50 plants within 30m
531	6696	
532	6697	5-10 plants within 20m
634	6701	5-10 plants within 20m
594	6728	20-50 plants within 30m
595	6728	5-10 plants within 20m
561	6707	
636	6752	10-25 plants within 20m
533	6696	
595	6728	
556	6704	~30 plants

***Comesperma viscidulum* F.Muell. POLYGALACEAE (Priority 4)**

This species is a shrub to 70cm tall that has been reported as flowering cream, purple (DEC, 2008a). It has been recorded as occurring on red or yellow sands on sands dunes and undulating sandplains. The Western Australian State Herbarium has ten records in its collections.

This species was recorded growing on orange and orange yellow sandy loam and sand flats, undulating plains and upper slopes topographies from the following locations (Table 15):

Table 15: GPS locations of *Comesperma viscidulum* (P4)

Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
594	6728	~15 plants within 20m
580	6717	2 plants within 20m
586	6721	
607	6732	1 plant within 20m
594	6725	
556	6704	~ 3 plants within 20m
581	6718	
580	6718	1 plant within 20m
580	6717	2 plants within 20m

***Daviesia purpurascens* Crisp PAPILIONACEAE (Priority 4)**

This species has been described as an erect shrub to 100cm tall that flowers yellow, red and brown during October (DEC, 2008a). It has been recorded as occurring on sandy or loamy soils over laterite on flats and ridges. The Western Australian State Herbarium has 50 records in its collections.

This species was recorded growing on orange and orange yellow sandy loam and sand on flat topographies as well as undulating plains from the following locations (Table 16):

Table 16: GPS locations of *Daviesia purpurascens* (P4)

Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
554	6704	
561	6707	
575	6714	
580	6717	
586	6721	
586	6721	
618	6738	5-10 plants within 20m
616	6737	1 plant
615	6737	4 plants
612	6734	15-25 plants within 20m
609	6733	6 –10 plants
606	6732	1 plant
626	6742	3 plants within 10m
619	6738	~10 plants within 30m
618	6738	10-15 plants within 20m
612	6734	4-10 plants within 15m
600	6730	1 plant
594	6728	5-10 plants within 20m. There was some degree of uncertainty regarding this specimen.
507	6674	There was some degree of uncertainty regarding this specimen (<i>Daviesia ?purpurascens</i>)
504	6674	There was some degree of uncertainty regarding this specimen (<i>Daviesia ?purpurascens</i>)

***Lepidobolus deserti* Gilg RESTIONACEAE (Priority 4)**

This species is a rhizomatous, caespitose perennial, herb (sedge-like), 15-45cm tall (DEC, 2008a). It has been recorded as occurring on yellow or orange sand on sand dunes. The Western Australian State Herbarium has 19 records in its collections.

This species was recorded growing on yellow, yellow orange and orange sandy loam and sand on flat, lower slope, mid slope and upper slope topographies as well as dunes from the following locations (Table 17):

Table 17: GPS locations of *Lepidobolus deserti* (P4)

Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
636	6752	10-25 plants within 20m
634	6751	25-50 plants within 20m
619	6739	>200 plants within 20m
618	6738	>200 plants within 20m
539	6703	
597	6729	
529	6687	
532	6695	50-100 plants within 20m
531	6696	50-100 plants within 20m
532	6697	50-100 plants within 20m
634	6701	
594	6728	
594	6728	50-100 plants within 20m
597	6729	
504	6674	
528	6687	
528	6688	50-100 plants within 20m
529	6689	
561	6707	50-100 plants within 20m
580	6718	
528	6687	
533	6696	
594	6725	
595	6728	
617	6738	

One potentially new species of *Hibbertia* was recorded during the survey. Specimens collected do not match the only known species from the Great Victoria Desert Region, *Hibbertia exasperata*, nor any other species of *Hibbertia* from surrounding regions. This species has been lodged with the Western Australian State Herbarium.

This species was recorded from a large yellow-orange sand dune (Table 18):

Table 18: GPS location of potentially new *Hibbertia* species

Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
619	6739	10 – 25 plants

5.5 Range Extensions

The following species were recorded outside of their known distributions:

Acacia xerophila var. *brevior* (E.Pritz.) Maslin MIMOSACEAE

This species is a spreading, pungent shrub that has records from the Coolgardie region of the Eremaean Botanical Province, predominantly to the south of Kalgoorlie (DEC, 2008a). This collection represents an approximate 150km range extension to the north east.

Beyeria brevifolia var. *robustior* Airy Shaw EUPHORBIACEAE

This species is a shrub that has been recorded from the west of the Coolgardie region of the Eremaean Botanical Province as well as the eastern regions of the Southwest Botanical Province (DEC, 2008a). *Beyeria brevifolia* has been recorded from the area before, however these herbarium collections have not been identified down to variation level. This collection represents an approximate 400km range extension to the east.

Dampiera ramosa Rajput & Carolin GOODENIACEAE

This species is a tufted perennial herb that has been recorded from the Great Victoria Desert, Central Ranges, Little Sandy Desert and Murchison regions of the Eremaean Botanical Province (DEC, 2008a). This collection represents an approximate 200km range extension to the south west.

Eucalyptus ?lucasia Blakely MYRTACEAE

This species is a mallee or tree that has many Western Australian Herbarium records from the Great Victoria Desert and Murchison regions of the Eremaean Botanical Province (DEC, 2008a). This collection represents an approximate 100km range extension to the south.

?Jacksonia nematochlada F.Muell. PAPILIONACEAE

This species is a low, spreading shrub that has been recorded from the west of the Coolgardie region of the Eremaean Botanical Province, the eastern regions of the Southwest Botanical Province and two records from the north west of the Great Victoria Desert of the Eremaean Botanical Province (DEC, 2008a). This collection represents an approximate 200km range extension to the south.

Rhagodia spinescens R.Br CHENOPODIACEAE

This species is a divaricately branched, often spinescent shrub that has scattered Western Australian Herbarium records, particularly from the Nullarbor region of the Eremaean Botanical Province (DEC, 2008a). This collection represents an approximate 100km range extension to the north west.

Solanum ellipticum R.Br SOLANACEAE

This species is a sprawling, perennial herb that has scattered Western Australian Herbarium records from most regions within the Eremaean Botanical Province (DEC, 2008a). This collection represents an approximate 100km range extension to the north west.

5.6 Introduced Flora

One introduced (weed) species, **Salvia verbenaca* was recorded from the proposed corridor. This species was recorded from five locations (Table 19), all within the Pinjin Pastoral Station.

Table 19: GPS locations of **Salvia verbenaca*

Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
472	6668	100 + plants
472	6669	50-100 plants
475	6669	50-100 plants
477	6670	50-100 plants
484	6672	50-100 plants

5.7 Vegetation

Thirty seven plant communities were defined within the survey area and are presented in Figures 1.00 to 1.12 (refer to the back of the report for the figures). Vegetation condition was assessed based on the criteria as developed by Keighery (1994), and is presented in Figures 2.01-2.12 (refer to the back of the report for the figures).

Eucalypt Woodlands

- E1 – Low Woodland of *Eucalyptus oleosa* over *Senna artemisioides* subsp. *filifolia*, *Exocarpos aphyllus*, *Eremophila* spp., *Scaevola spinescens*, *Acacia hemiteles* and mixed shrubs over *Triodia scariosa* and *Olearia muelleri*. This community occurs on orange-red sandy loam on flats.
- E2 – Low Woodland of *Eucalyptus gracilis* over mixed shrubs. This community occurs on red-orange sandy loams on minor drainage lines.
- E3 – Low Woodland of *Eucalyptus trivalva* and *Eucalyptus concinna* over mixed shrubs over *Triodia* spp. This community occurs on red sandy loam on flats.
- E4 – Low Woodland to Low Open Woodland of *Eucalyptus gongylocarpa* with *Callitris preissii* and *Eucalyptus* spp. over mixed shrubs over *Triodia* spp. This community occurs on orange, red-orange, yellow-orange and yellow sandy loams on mixed topographies.
- E5 – Low Woodland to Low Open Woodland of *Eucalyptus concinna* over *Acacia sibina*, *Acacia hemiteles* and mixed shrubs over *Triodia* spp. This community occurs on orange sandy loam on flats.
- E6 – Low Woodland to Low Open Woodland of *Eucalyptus transcontinentalis* over *Melaleuca eleuterostachya*, *Melaleuca hamata*, *Eremophila dempsteri*, *Acacia colletioides* with mixed shrubs over *Triodia scariosa*. This community occurs on orange sandy loams on flats.
- E7 – Low Open Woodland of *Eucalyptus salubris* and *Casuarina pauper* over *Eremophila scoparia*, *Cratystylis subspinescens*, *Scaevola spinescens*, *Acacia colletioides*, *Acacia hemiteles* over *Ptilotus obovatus* and *Maireana* spp. This community occurs on red sandy loams on flats.
- E8 – Low Open Woodland of *Eucalyptus oleosa* with *Acacia ayersiana* over mixed open shrubs over *Triodia* spp. This community occurs on red sandy loam with occasional calcrete outcropping.
- E9 – Low Open Woodland of *Eucalyptus concinna* with *Eucalyptus* spp. over *Eremophila scoparia*, *Acacia hemiteles*, *Acacia colletioides*, *Scaevola spinescens* and *Eremophila caperata* over *Triodia scariosa*. This community occurs on orange sandy loams on flats.
- E10 – Low Open Woodland of *Eucalyptus ?ebbanoensis* and *Eucalyptus salicola* with *Callitris preissii* over *Allocasuarina helmsii*, *Allocasuarina acutivalvis* subsp. *acutivalvis* and *Dodonaea stenozyga*. This community occurs on white sand with quartz rock cover on mid slopes.
- E11 – Low Open Woodland of *Eucalyptus gongylocarpa* with *Callitris preissii* over *Bertya dimerostigma*, *Dicrasyllis cundeleeensis* (P3), *Lomandra leucocephala*, *Dodonaea viscosa* subsp. *angustissima* and mixed low shrubs. This community occurs on orange sand dunes.
- E12 – Open Shrub Mallee to Very Open Shrub Mallee of *Eucalyptus platycorys*, *Eucalyptus oleosa*, *Eucalyptus horistes* and other *Eucalyptus* spp. over *Westringia cephalantha*, *Acacia sibina*, *Acacia hemiteles* over *Triodia* spp. This community occurs on orange sandy loam on flats.

- E13 – Open Shrub Mallee to Very Open Shrub Mallee of *Eucalyptus leptophylla* with *Eucalyptus trivalva*, *Eucalyptus youngiana* and *Callitris preissii* over *Acacia helmsiana*, *Hakea francisiana* over *Triodia rigidissima*. This community occurs on orange-yellow sandy loam on flats and undulating plains.
- E14 – Very Open Shrub Mallee of *Eucalyptus rosacea* with *Callitris preissii* over *Acacia sibina*, *Phebalium laevigatum* and low Myrtaceous shrubs over *Triodia* spp. This community occurs on orange sandy loams on flats.
- E15 – Very Open Shrub Mallee of *Eucalyptus youngiana* and mixed *Eucalyptus* spp. over *Acacia desertorum* var. *desertorum*, *Bertya dimerostigma*, *Westringia cephalantha*, *Cryptandra distigma* with mixed shrubs over *Triodia desertorum*. This community occurs on orange sandy loams on lower slopes.

Casuarina Woodlands

- C1 – Low Open Woodland of *Casuarina pauper* over *Eremophila* spp., *Senna artemisioides* subsp. *filifolia*, *Dodonaea lobulata* and *Acacia* spp. over *Scaevola spinescens*, *Ptilotus obovatus* and *Olearia muelleri*. This community occurs on red sandy loams with quartz rock cover.
- C2 – Low Open Woodland of *Casuarina pauper* with *Acacia aneura* var. *aneura* over *Dodonaea lobulata*, *Acacia burkittii*, *Scaevola spinescens*, *Maireana sedifolia*, *Senna artemisioides* subsp. *filifolia* and *Ptilotus obovatus*. This community occurs on red-orange sandy loam on low rocky rises.
- C3 – Low Open Woodland of *Casuarina pauper* with *Acacia aneura* var. *aneura* and *Acacia aneura* var. *conifera* over *Acacia burkittii*, *Dodonaea lobulata*, *Senna artemisioides* subsp. *filifolia* and *Scaevola spinescens* with mixed shrubs. This community occurs on red-orange sandy loams on flats.

Acacia Woodland

- A1 – Low Woodland of *Acacia ayersiana* and *Acacia aneura* var. *aneura* over *Ptilotus obovatus* with mixed low shrubs. This community occurs on red-orange sandy loam on flats.
- A2 – Low Woodland to Tall Shrubland of *Acacia ayersiana* and *Acacia aneura* var. *aneura* with *Acacia aneura* var. *argentea* over *Eremophila* spp., *Aluta maisonneuvei* subsp. *auriculata* and *Prostanthera* spp. This community occurs on orange sandy loam with a covering of gravel on lower slopes or flats.
- A3 – Low Open Woodland to Tall Open Shrubland of *Acacia ayersiana* and *Acacia aneura* var. *aneura* over *Acacia* spp. and mixed shrubs. This community occurs on orange sandy loams.
- A4 – Low Open Woodland to Tall Open Shrubland of *Acacia aneura* var. *aneura* over *Maireana sedifolia* with *Ptilotus obovatus* and *Enneapogon caeruleus*. This community occurs on orange-red sandy loams on flats.
- A5 – Tall Shrubland of *Acacia ayersiana* and *Acacia aneura* var. *aneura* with *Eucalyptus trivalva* over mixed shrubs over *Triodia* spp. with *Eragrostis eriopoda*. This community occurs on red sandy loams on flats.

Shrubland

- S1 – Tall Open Scrub of *Callistemon phoeniceus*. This community occurs on pink-brown clay adjacent to a seasonally wet area.
- S2 – Tall Shrubland of *Allocasuarina acutivalvis* subsp. *acutivalvis* with *Callitris preissii* over low mixed shrubs with emergent *Eucalyptus* spp.

- S3 Tall Shrubland of *Acacia burkittii* and *Acacia tetragonophylla* with emergent *Casuarina pauper*. This community occurs on red-orange clay loams on minor drainage lines and seasonally wet areas.
- S4 – Open Heath of *Melaleuca hamata* over *Aluta maisonneuvei* subsp. *auriculata* with *Grevillea acuaria*. This community occurs on orange sandy clay in low lying seasonally wet areas.
- S5 – Open Shrubland of *Grevillea juncifolia*, *Cryptandra distigma*, *Acacia desertorum* var. *desertorum* and mixed low shrubs over *Triodia desertorum*, *Lepidobolus deserti* (P4) and *Chrysitrix distigmata* with occasional emergent *Eucalyptus gongylocarpa*. This community occurs on yellow to yellow-orange sand on slopes.
- S6 – Open Mixed Shrubland with occasional emergent *Acacia* spp. This community occurs on orange sandy loams with granite outcropping.
- S7 – Low Shrubland of *Cratystylis subspinescens* with *Tecticornia undulata*, *Tecticornia* spp., *Atriplex nummularia* and mixed low shrubs. This community occurs on orange clay sands in low lying saline flats.
- S8 – Low Shrubland of *Acacia desertorum* var. *desertorum* with *Grevillea juncifolia*, low Myrtaceous shrubs and mixed low shrubs with occasional emergent *Eucalyptus youngiana* and *Eucalyptus* spp. This community occurs on pale orange sandy loams on flats and lower slopes.
- S9 – Low Shrubland of *Leptosema chambersii*, *Baeckea* sp. Great Victoria Desert (A.S. Weston 14813) (P2), *Homalocalyx thryptomenoides*, *Enekbatus eremaeus*, *Cryptandra distigma* with mixed low shrubs and occasional emergent *Eucalyptus* spp. This community occurs on yellow-orange sandy loams on lower and mid slopes.
- S10 – Low Open Shrubland of *Maireana pyramidata* and *Cratystylis spinescens* with mixed low shrubs and occasional emergent *Hakea preissii*, *Eremophila scoparia* and *Dodonaea lobulata*. This community occurs on red sandy loams with some quartz rock cover on flats.
- S11 – Low Open Shrubland of *Thryptomene biseriata*, *Lomandra leucocephala*, *Pityrodia lepidota*, *Scaevola basedowii*, *Chrysocephalum puteale* with mixed low shrub over *Triodia* spp. and *Lepidobolus deserti* (P4) with occasional emergent *Eucalyptus* spp. This community occurs on yellow or yellow-orange sand dunes

Grassland

- G1 – Open Grassland of *Eragrostis eriopoda*, *Aristida contorta* and *Enneapogon caeruleus* with occasional emergent *Senna artemisioides* subsp. *petiolaris*, *Dodonaea viscosa*, *Acacia aneura* var. *aneura* and *Acacia ayersiana*. This community occurs on red sandy loam on flats.

Chenopod Shrubland

- CH1 – Low Open Chenopod Shrubland of *Atriplex ?vesicaria* with *Frankenia setosa* and *Frankenia ?cinerea* with low mixed shrubs and Chenopods. This community occurs on orange sands on flats, adjacent to weathered calcrete outcropping.
- CH2 – Low Chenopod Shrubland of *Tecticornia* spp. with *Frankenia setosa*, *Hemichroa diandra*, *Lawrenzia squamata* and *Eragrostis pergracilis*. This community occurs on orange sandy clays in low lying saline flow areas.

5.8 Condition of Vegetation

The vegetation varied in condition from Pristine, in non-disturbed areas of native vegetation to Good, in areas that have been altered by fire (based on the criteria as developed by Keighery 1994, Figures 2.01 – 2.12)

5.9 Vegetation of Conservation Significance

No Threatened Ecological Communities (TEC's) as defined by the EPBC Act (1999) or the Department of Environment and Conservation (2008c) were observed in the survey area.

One Priority Ecological Community (PEC) as defined by the Department of Environment and Conservation (2008e) is likely to be within the survey area. This PEC is described as “Yellow sandplain communities of the Great Victoria Desert”, which contains very diverse mammalian and reptile fauna, with distinctive plant communities and has threats from mining activities. It has been classified as Priority3 (ii). A Priority 3 PEC is defined as “a poorly known ecological community” and a Priority 3(ii) community is further defined as “known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat”.

To date, little information is available about the plant assemblages of this PEC (J. Pryde, DEC, pers. comm.). In order to determine the risk to any vegetation associated with the PEC, a conservative approach was taken by identifying the extent and type of communities found on yellow and yellow-orange sand in areas thought to be the PEC (Table 20).

Table 20: Summary of Direct Impact within Communities found on Yellow and Yellow-Orange Sand within the Potential PEC

Vegetation Community	Yellow and yellow-orange sand within survey area (ha.)	Yellow and yellow-orange sand within proposed corridor (ha.)	Percentage impacted by proposed corridor
E4	1170.70	62.97	5.38
S5	771.62	32.34	4.19
S8	168.09	16.27	9.68
S9	204.83	12.17	5.94
S11	69.12	0.00	0.00
Total	2384.36	123.75	5.19

5.10 Vegetation of Regional and Local Significance

Community S11 supports *Conospermum toddii* (R) and can be considered regionally significant. Communities E2, E3, E4, E5, E8, E10, E11, E12, E14, A2, A3, S1, S2, S4, S5, S6, S8, S9 and S11 maybe considered locally significant as they supported Priority Flora, support potential new taxa, support flora with discovered range extensions, are not significantly replicated within the survey area or maybe associated with the yellow sandplain PEC.

The direct impact on all vegetation communities and each community's significance is summarised in Table 21.

Table 21: Summary of the extent and impact to Vegetation Communities within the survey area

Vegetation Community	Significance	Area Surveyed (ha.)	Percent of community surveyed within proposed corridor
E1		618.13	5.23
E2	Local	10.94	0.12
E3	Local	589.02	6.02
E4	Local	4107.78	21.14
E5	Local	116.41	1.07
E6		330.91	1.74
E7		19.54	0.15
E8	Local	65.09	0.61
E9		2480.45	7.23
E10	Local	14.53	0.00
E11	Local	2.64	0.00
E12	Local	439.08	3.48
E13		48.89	0.41
E14	Local	223.38	1.99
E15		160.67	0.58
C1		125.78	1.18
C2		176.50	0.54
C3		134.16	0.53
A1		192.81	0.47
A2	Local	1882.36	13.98
A3	Local	4474.61	14.06
A4		1710.73	6.33
A5		76.49	2.61
S1	Local	9.85	0.00
S2	Local	9.33	0.09
S3		26.11	0.06
S4	Local	6.69	0.11
S5	Local	855.20	3.38
S6	Local	61.22	0.00
S7		245.28	0.43
S8	Local	168.09	1.43
S9	Local	306.09	1.63
S10		420.20	1.66
S11	Regional, Local	70.62	0.00
G1		34.76	1.16
CH1		91.60	0.51
CH2		96.30	0.07
Total		20402.23	5.58

6. DISCUSSION

6.1 Declared Rare Flora

Conospermum toddii (R) is commonly found upon large yellow sand dunes within the yellow sand plain region. The central and eastern areas of the proposed route pass through, or adjacent to, this region. Targeted surveys for *Conospermum toddii* (R) were conducted on, and in areas adjacent to, yellow and yellow orange sand dunes within and adjacent to the proposed route. *Conospermum toddii* (R) was only observed within vegetation community S11. The proposed infrastructure corridor avoids S11 (Figures 1.05, 1.07, 1.10 and 1.11), passing through lower lying areas, predominantly on orange or red sands, within the yellow sand plain region. This includes a 50m buffer. Therefore, it is unlikely that *Conospermum toddii* (R) will be affected by the route, regardless of previous bushfires. Additional field studies, and/or genetic studies, should not be required to further confirm the absence of *Conospermum toddii* (R) within the proposed route.

Eucalyptus articulata, which is known to occur east of Ponton Creek, was not observed within the proposed corridor. A targeted search, to attempt to determine the regional context, was conducted outside of the proposed corridor by botanists from Matiske Consulting during March and May 2008 (Appendix E). In addition assistance was provided in the collection of material for DNA studies in August 2008.

Eucalyptus articulata has been observed from dull orange-brown or deep red-orange sandy loams with arkose rock cover and occasional weathered granite outcropping on upper or mid slopes (Appendix E). *E. articulata* was recorded from the following vegetation types, approximately 20 kms south of the proposed corridor (known DEC locations):

- Low Open Woodland of *Eucalyptus concinna* with *Acacia ayersiana* and *Acacia aneura* over *Acacia burkittii*, *Eremophila oldfieldii* and *Scaevola spinescens* and other mixed shrubs over *Triodia* spp;
- Low Open Woodland of *Eucalyptus articulata* and mixed *Eucalyptus* spp. over *Triodia* spp. with mixed low shrubs.

These vegetation communities were not observed within the proposed infrastructure corridor, particularly Figures 1.03 to 1.05 (closest to known populations of *E. articulata*), nor was the combination of dull orange-brown or deep red-orange sandy loams with arkose rock cover and occasional weathered granite outcropping on upper or mid slopes.

A lack of suitable habitat and absence of this species during targeted field surveys suggests that *E. articulata* is unlikely to be located within the proposed infrastructure corridor. The potential occurrence of this species has been discussed with I. Kealley (DEC, Kalgoorlie).

6.2 Priority Flora

Thirteen Priority Flora species as defined by the Department of Environment and Conservation (2008a, 2008d) were located during the survey. An attempt should be made to minimise the clearance or disturbance of Priority Flora species.

Seven Priority Flora Species highlighted by the Desktop Survey were not recorded during the survey:

- *Acacia eremophila* numerous-nerved variant (A.S. George 11924) (P3) is a dense spreading shrub that has previously been found near Plumridge Lakes, hence may occur within the proposed corridor.

- *Caesia rigidifolia* (P1) is a rhizomatous tufted perennial that has one potential collection recorded from on a sand dune within Plumridge Lakes Nature Reserve. Sand dunes adjacent to the proposed corridor, at the north-east end were checked for *Caesia rigidifolia*, hence it is unlikely to occur within the proposed corridor.
- *Calandrinia porifera* (P3) is a prostrate annual that has been recorded within and to the south of Queen Victoria Springs previously. This species may occur near granite rocks, potentially near Kirgella Rocks in the south west end of the proposed corridor.
- *Dampiera eriantha* (P1) is an erect perennial that has previously been collected on yellow sand dunes near the PNC Baseline and West of Plumridge Nature Reserve. It is possible that this species may occur on yellow dunes adjacent to the proposed corridor. It is likely that this species will not be affected if the yellow sand dunes are avoided.
- *Isotropis canescens* (P2) is a prostrate perennial that has only been recorded from within the Queen Victoria Spring Nature Reserve, however has potential to occur within the central areas of the proposed corridor.
- *Physopsis chrysotricha* (P2) is a shrub that has one record from the north of the Queen Victoria Spring Nature Reserve in red sand over calcrete. It is unlikely to occur within the proposed corridor.
- *Trachymene pyrophila* (P2) is an annual that has been recorded from the Queen Victoria Springs Nature Reserve, Ponton Creek and PNC area. However it reportable germinates after fire or other ground disturbances such as mining, hence the proposed corridor is unlikely to negatively affect this species distribution.

Targeted field surveys for Priority Flora, known to occur within the region, have been conducted, to locate additional populations of Priority Flora outside of the proposed route. It is expected that these surveys will increase the known distribution, number of populations and number of known plants of Priority Flora species within the area (Appendix F).

6.3 New Species and Range Extensions

One potentially new species of *Hibbertia* was recorded during the survey. Further work is needed to establish its taxonomic status. This species should be avoided

Seven taxa defined in this survey have not previously been recorded as occurring in this region. Extensions from known locations ranged from 100km to 400km. This is most likely a reflection of the lack of botanical work in the region.

6.4 Vegetation

Thirty seven vegetation communities were recorded within the survey area, comprising fifteen eucalypt woodland-shrub mallee, three *Casuarina* woodlands, five *Acacia* woodlands-shrubland, eleven shrublands, one grassland and two chenopod shrublands. Communities E4, A3 and S11 had higher species richness than other communities. E4 and A3 were sampled at a higher frequency, due to their spatial extent (Table 21). Compared to E4 and A3, the high species richness observed in S11 is significant because species richness does not appear to be related to the spatial extent.

Vegetation community S11 is considered regionally significant, as it supports *Conospermum toddii* (R). It is planned that the proposed infrastructure corridor will avoid this community. Communities E2, E3, E4, E5, E8, E10, E11, E12, E14, A2, A3, S1, S2, S4, S5, S6, S8, S9 and S11 maybe considered locally significant as they supported Priority Flora, support potential new taxa, support flora with discovered range extensions, are not significantly replicated within the survey area or maybe associated with the yellow sandplain PEC.

6.4.1 Vegetation of Conservation Significance

One Priority Ecological Community (PEC), “Yellow sandplain communities of the Great Victoria Desert”, is thought to occur within the survey area. However this PEC is not well understood, and little information is available (J. Pryde, DEC, pers. comm.). The Department of Environment and Conservation has supplied the southern boundaries of this PEC, however little information is known about the northern boundaries, nor the plant assemblages that distinguishes the PEC.

Figure 6.1 illustrates the location of the proposed infrastructure corridor and the supplied southern boundary of the PEC. The southern boundary is situated at its closest point 20km to the south-east of the proposed infrastructure corridor. The PEC appears to be widespread throughout the surrounding area.

There are six sections of the proposed infrastructure corridor that potentially intersect with the PEC (Figure 6.2 & 7.1 – 7.6, refer to the back of the report for the figures). These areas are generally adjacent to the yellow sand dune region.

Vegetation communities derived from this survey, that are situated in areas thought to be the PEC include S11 on the yellow and yellow-orange dunes, S8 and S9 on yellow-orange and orange sandy-loams on lower slopes and flats, S5 on yellow to yellow-orange sand on slopes and E4 on yellow and yellow-orange sandy loams on mixed topographies. Another community, not observed from the proposed corridor but observed within the yellow sand region, consists of Low Open Shrubland of *Calothamnus gilesii*, *Persoonia pertinax* and mixed low shrubs with occasional emergent *Eucalyptus youngiana* and *Eucalyptus gongylocarpa* on undulating yellow sandplains. It is thought that this community may also be associated with this PEC.

In the six sections of the proposed infrastructure corridor thought to intersect with the PEC, vegetation community E4 covers approximately half of the direct impact area (Table 20). Although this vegetation community extends upon yellow or yellow-orange sand, Low Woodland to Low Open Woodland of *Eucalyptus gongylocarpa* with *Callitris preissii* and *Eucalyptus* spp. over mixed shrubs over *Triodia* spp. is widespread throughout the region (Table 21), and is unlikely to form part of this PEC.

It is more likely that the PEC relates to S11, S8, S9, S5 and Low Open Shrubland of *Calothamnus gilesii*, *Persoonia pertinax* and mixed low shrubs with occasional emergent *Eucalyptus youngiana* and *Eucalyptus gongylocarpa* on undulating yellow sandplains. It is possible that the PEC is characterised by species such as *Logania nuda*, *Pityrodia lepidota*, *Acacia fragilis*, *Calothamnus gilesii*, *Anthotroche pannosa*, *Microcorys macredieana*, *Xanthorrhoea thorntonii*, *Micromyrtus stenocalyx* and *Caustis dioica* (Appendix C) which from this survey, were generally restricted to the yellow sand.

6.5 Survey Adequacy and Limitations

For the conditions encountered during the three surveys, it is likely that adequate sampling was conducted (Figure 8). However due to a lack of annual or biennial species recorded, further collections of annual or biennial species, especially in areas affected by the November 2007 fire, should be undertaken following higher seasonal rainfall events (e.g. post cyclonic rainfall).

Bush fires of various ages have recently and historically burnt through large areas within the proposed corridor. Fires during November 2007 significantly altered the condition of flora and vegetation in some sections in the proposed corridor (Photo 4). As a result, plant identification in some sections of the proposed corridor was unfeasible.

In some areas, recent fires have burnt vegetation on the yellow dunes where *Conospermum toddii* (R) has the potential to occur (Photo 5). As a result, it is possible that *Conospermum toddii* (R) was not observed on some yellow dunes due to intensive fires making plant identification unfeasible. However, as the proposed route has been designed to avoid the yellow sand dunes, *Conospermum toddii* (R) is unlikely to be negatively affected.

It is unlikely that *Eucalyptus articulata* would occur within the proposed corridor in the recently burned areas, due to its known habitat not occurring in this area.

Future surveys in area that were severely burnt by the November 2007 fires may be required when the vegetation has recovered to locate Priority Flora species.

Large areas of community E4 have been affected by recent and historical fires. It is recommended to minimise impacts upon the E4 community that are rated as pristine (Figures 1.00 – 1.12 and 2.01 – 2.12)

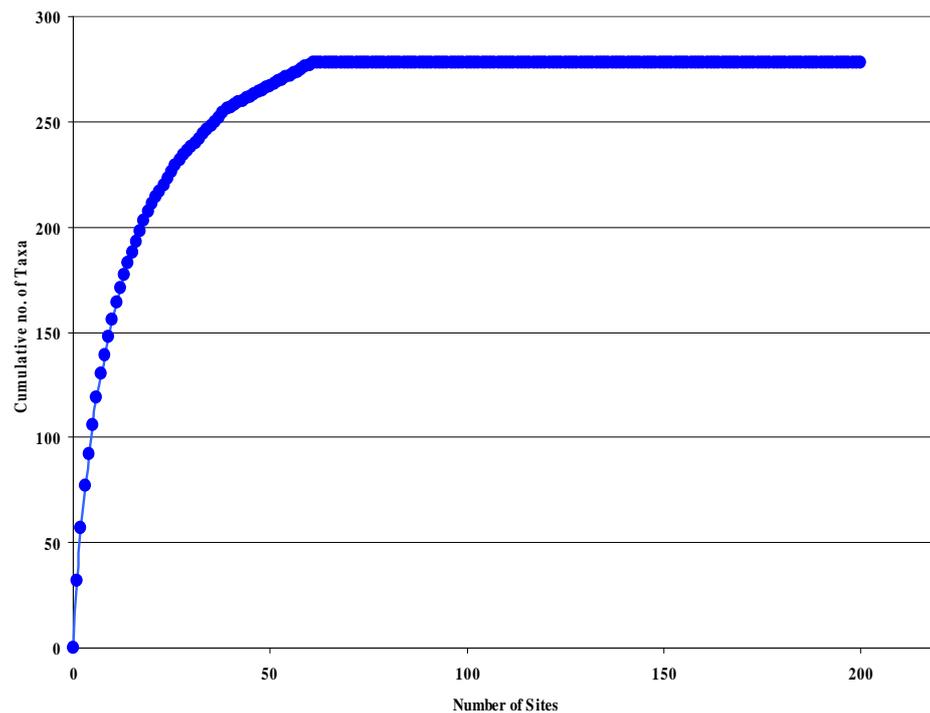


Figure 8: Species Area Curve



Photo 4: Example of intensively burnt vegetation from November 2007 bush fire.



Photo 5: Intensively burnt yellow sand dune, potentially supporting *Conospermum toddii* (R)

7. RECOMMENDATIONS

On the basis of these findings, it is recommended to:

- Avoid all known locations of *Conospermum toddii* (R), including 50m buffer zones;
- Avoid all yellow and yellow-orange sand dunes;
- Avoid the potentially new species of *Hibbertia*;
- Minimise clearing of Priority Flora Species;
- Minimise clearing of Potential PEC (represented by S8, S9, S5, S11);
- Avoid community S11;
- Avoid or minimise clearing of restricted communities E10, E11, S1 and S4;
- Minimise impacts upon community E4, rated as pristine;
- Conduct future surveys for annual or biennial species following higher seasonal rainfall events, especially in areas affected by November 2007 fires,
- Avoid the unnecessary clearing of vegetation beyond that strictly required;
- Collect any viable native seed for future rehabilitation works;
- Minimise soil disturbance during clearing and practice vehicle hygiene to ensure introduced (weed) species do not become established within the proposed corridor.

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9. LIST OF PERSONELL:

The following personnel of Mattiske Consulting Pty Ltd were involved in this project:

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FIGURES

Vegetation Legend

- E1 Low Woodland of *Eucalyptus oleosa* over *Senna artemisioides* subsp. *filifolia*, *Exocarpos aphyllus*, *Eremophila* spp., *Scaevola spinescens*, *Acacia hemiteles* and mixed shrubs over *Triodia scariosa* and *Olearia muelleri*. This community occurs on orange-red sandy loam on flats.
- E2 Low Woodland of *Eucalyptus gracilis* over mixed shrubs. This community occurs on red-orange sandy loams on minor drainage lines.
- E3 Low Woodland of *Eucalyptus trivalva* and *Eucalyptus concinna* over mixed shrubs over *Triodia* spp. This community occurs on red sandy loam on flats.
- E4 Low Woodland to Low Open Woodland of *Eucalyptus gongylocarpa* with *Callitris preissii* and *Eucalyptus* spp. over mixed shrubs over *Triodia* spp. This community occurs on orange, red-orange, yellow-orange and yellow sandy loams on mixed topographies.
- E5 Low Woodland to Low Open Woodland of *Eucalyptus concinna* over *Acacia sibina*, *Acacia hemiteles* and mixed shrubs over *Triodia* spp. This community occurs on orange sandy loam on flats.
- E6 Low Woodland to Low Open Woodland of *Eucalyptus transcontinentalis* over *Melaleuca eleuterostachya*, *Melaleuca hamata*, *Eremophila dempsteri*, *Acacia colletioides* with mixed shrubs over *Triodia scariosa*. This community occurs on orange sandy loams on flats.
- E7 Low Open Woodland of *Eucalyptus salubris* and *Casuarina pauper* over *Eremophila scoparia*, *Cratystylis subspinescens*, *Scaevola spinescens*, *Acacia colletioides*, *Acacia hemiteles* over *Ptilotus obovatus* and *Maireana* spp. This community occurs on red sandy loams on flats.
- E8 Low Open Woodland of *Eucalyptus oleosa* with *Acacia ayersiana* over mixed open shrubs over *Triodia* spp. This community occurs on red sandy loam with occasional calcrete outcropping.
- E9 Low Open Woodland of *Eucalyptus concinna* with *Eucalyptus* spp. over *Eremophila scoparia*, *Acacia hemiteles*, *Acacia colletioides*, *Scaevola spinescens* and *Eremophila caperata* over *Triodia scariosa*. This community occurs on orange sandy loams on flats.
- E10 Low Open Woodland of *Eucalyptus ?ebanoensis* and *Eucalyptus salicola* with *Callitris preissii* over *Allocasuarina helmsii*, *Allocasuarina acutivalvis* subsp. *acutivalvis* and *Dodonaea stenozyga*. This community occurs on white sand with quartz rock cover on mid slopes.
- E11 Low Open Woodland of *Eucalyptus gongylocarpa* with *Callitris preissii* over *Bertya dimerostigma*, *Dicrasyllis cundeeleensis* (P3), *Lomandra leucocephala*, *Dodonaea viscosa* subsp. *angustissima* and mixed low shrubs. This community occurs on orange sand dunes.
- E12 Open Shrub Mallee to Very Open Shrub Mallee of *Eucalyptus platycorys*, *Eucalyptus oleosa*, *Eucalyptus horistes* and other *Eucalyptus* spp. over *Westringia cephalantha*, *Acacia sibina*, *Acacia hemiteles* over *Triodia* spp. This community occurs on orange sandy loam on flats.
- E13 Open Shrub Mallee to Very Open Shrub Mallee of *Eucalyptus leptophylla* with *Eucalyptus trivalva*, *Eucalyptus youngiana* and *Callitris preissii* over *Acacia helmsiana*, *Hakea francisiana* over *Triodia rigidissima*. This community occurs on orange-yellow sandy loam on flats and undulating plains.
- E14 Very Open Shrub Mallee of *Eucalyptus rosacea* with *Callitris preissii* over *Acacia sibina*, *Phebalium laevigatum* and low Myrtaceous shrubs over *Triodia* spp. This community occurs on orange sandy loams on flats.
- E15 Very Open Shrub Mallee of *Eucalyptus youngiana* and mixed *Eucalyptus* spp. over *Acacia desertorum* var. *desertorum*, *Bertya dimerostigma*, *Westringia cephalantha*, *Cryptandra distigma* with mixed shrubs over *Triodia desertorum*. This community occurs on orange sandy loams on lower slopes.
- C1 Low Open Woodland of *Casuarina pauper* over *Eremophila* spp., *Senna artemisioides* subsp. *filifolia*, *Dodonaea lobulata* and *Acacia* spp. over *Scaevola spinescens*, *Ptilotus obovatus* and *Olearia muelleri*. This community occurs on red sandy loams with quartz rock cover.
- C2 Low Open Woodland of *Casuarina pauper* with *Acacia aneura* var. *aneura* over *Dodonaea lobulata*, *Acacia burkittii*, *Scaevola spinescens*, *Maireana sedifolia*, *Senna artemisioides* subsp. *filifolia* and *Ptilotus obovatus*. This community occurs on red-orange sandy loam on low rocky rises.
- C3 Low Open Woodland of *Casuarina pauper* with *Acacia aneura* var. *aneura* and *Acacia aneura* var. *conifera* over *Acacia burkittii*, *Dodonaea lobulata*, *Senna artemisioides* subsp. *filifolia* and *Scaevola spinescens* with mixed shrubs. This community occurs on red-orange sandy loams on flats.

- A1 Low Woodland of *Acacia ayersiana* and *Acacia aneura* var. *aneura* over *Ptilotus obovatus* with mixed low shrubs. This community occurs on red-orange sandy loam on flats.
- A2 Low Woodland to Tall Shrubland of *Acacia ayersiana* and *Acacia aneura* var. *aneura* with *Acacia aneura* var. *argentea* over *Eremophila* spp., *Aluta maisonneuvei* subsp. *auriculata* and *Prostanthera* spp. This community occurs on orange sandy loam with a covering of gravel on lower slopes or flats.
- A3 Low Open Woodland to Tall Open Shrubland of *Acacia ayersiana* and *Acacia aneura* var. *aneura* over *Acacia* spp. and mixed shrubs. This community occurs on orange sandy loams.
- A4 Low Open Woodland to Tall Open Shrubland of *Acacia aneura* var. *aneura* over *Maireana sedifolia* with *Ptilotus obovatus* and *Enneapogon caeruleus*. This community occurs on orange-red sandy loams on flats.
- A5 Tall Shrubland of *Acacia ayersiana* and *Acacia aneura* var. *aneura* with *Eucalyptus trivalva* over mixed shrubs over *Triodia* spp. with *Eragrostis eriopoda*. This community occurs on red sandy loams on flats.
- S1 Tall Open Scrub of *Callistemon phoeniceus*. This community occurs on pink-brown clay adjacent to a seasonally wet area.
- S2 Tall Shrubland of *Allocasuarina acutivalvis* subsp. *acutivalvis* with *Callitris preissii* over low mixed shrubs with emergent *Eucalyptus* spp.
- S3 Tall Shrubland of *Acacia burkittii* and *Acacia tetragonophylla* with emergent *Casuarina pauper*. This community occurs on red-orange clay loams on minor drainage lines and seasonally wet areas.
- S4 Open Heath of *Melaleuca hamata* over *Aluta maisonneuvei* subsp. *auriculata* with *Grevillea acuraria*. This community occurs on orange sandy clay in low lying seasonally wet areas.
- S5 Open Shrubland of *Grevillea juncea*, *Cryptandra distigma*, *Acacia desertorum* var. *desertorum* and mixed low shrubs over *Triodia desertorum*, *Lepidobolus deserti* (P4) and *Chrysitrix distigmata* with occasional emergent *Eucalyptus gongylocarpa*. This community occurs on yellow to yellow-orange sand on slopes.
- S6 Open Mixed Shrubland with occasional emergent *Acacia* spp. This community occurs on orange sandy loams with granite outcropping.
- S7 Low Shrubland of *Cratystylis subspinescens*, with *Tecticornia undulata*, *Tecticornia* spp., *Atriplex nummularia* and mixed low shrubs. This community occurs on orange clay sands in low lying saline flats.
- S8 Low Shrubland of *Acacia desertorum* var. *desertorum* with *Grevillea juncea*, low Myrtaceous shrubs and mixed low shrubs with occasional emergent *Eucalyptus youngiana* and *Eucalyptus* spp. This community occurs on pale orange sandy loams on flats and lower slopes.
- S9 Low Shrubland of *Leptosema chambersii*, *Baeckea* sp. Great Victoria Desert (P2), *Homalocalyx thryptomenoides*, *Enekbatus eremaeus*, *Cryptandra distigma* with mixed low shrubs and occasional emergent *Eucalyptus* spp. This community occurs on yellow-orange sandy loams on lower and mid slopes.
- S10 Low Open Shrubland of *Maireana pyramidata* and *Cratystylis spinescens* with mixed low shrubs and occasional emergent *Hakea preissii*, *Eremophila scoparia* and *Dodonaea lobulata*. This community occurs on red sandy loams with some quartz rock cover on flats.
- S11 Low Open Shrubland of *Thryptomene biseriata*, *Lomandra leucocephala*, *Pityrodia lepidota*, *Scaevola basedowii*, *Chrysocephalum puteale* with mixed low shrub over *Triodia* spp. and *Lepidobolus deserti* (P4) with occasional emergent *Eucalyptus* spp. This community occurs on yellow or yellow-orange sand dunes.
- G1 Open Grassland of *Eragrostis eriopoda*, *Aristida contorta* and *Enneapogon caeruleus* with occasional emergent *Senna artemisioides* subsp. *petiolaris*, *Dodonaea viscosa*, *Acacia aneura* var. *aneura* and *Acacia ayersiana*. This community occurs on red sandy loam on flats.
- CH1 Low Open Chenopod Shrubland of *Atriplex ?vesicaria* with *Frankenia setosa* and *Frankenia ?cinerea* with low mixed shrubs and Chenopods. This community occurs on orange sands on flats, adjacent to weathered calcrete outcropping.
- CH2 Low Chenopod Shrubland of *Tecticornia* spp. with *Frankenia setosa*, *Hemichroa diandra*, *Lawrenzia squamata* and *Eragrostis pergracilis*. This community occurs on orange sandy clays in low lying saline flow areas.

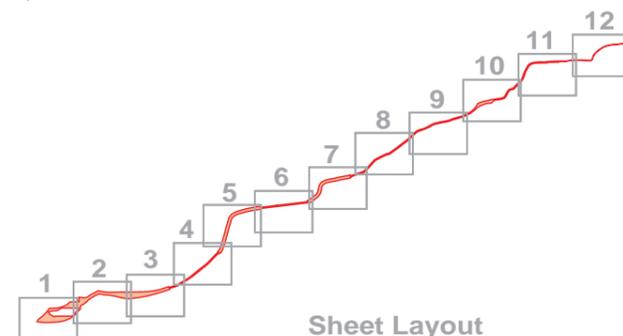
RARE AND PRIORITY SPECIES

Priority	DEC	Herbarium	EMM	TEC
Rare	●	■	▲	★
1	●	■	▲	
2	●	■	▲	
3	●	■	▲	
4	●	■	▲	

Condition Legend

RATING	DESCRIPTION
1	Pristine
2	Excellent
3	Very Good
4	Good
5	Degraded
6	Completely Degraded

Condition rating scale from Bush Forever (Government of Western Australia 2000 based on Keighery 1994)



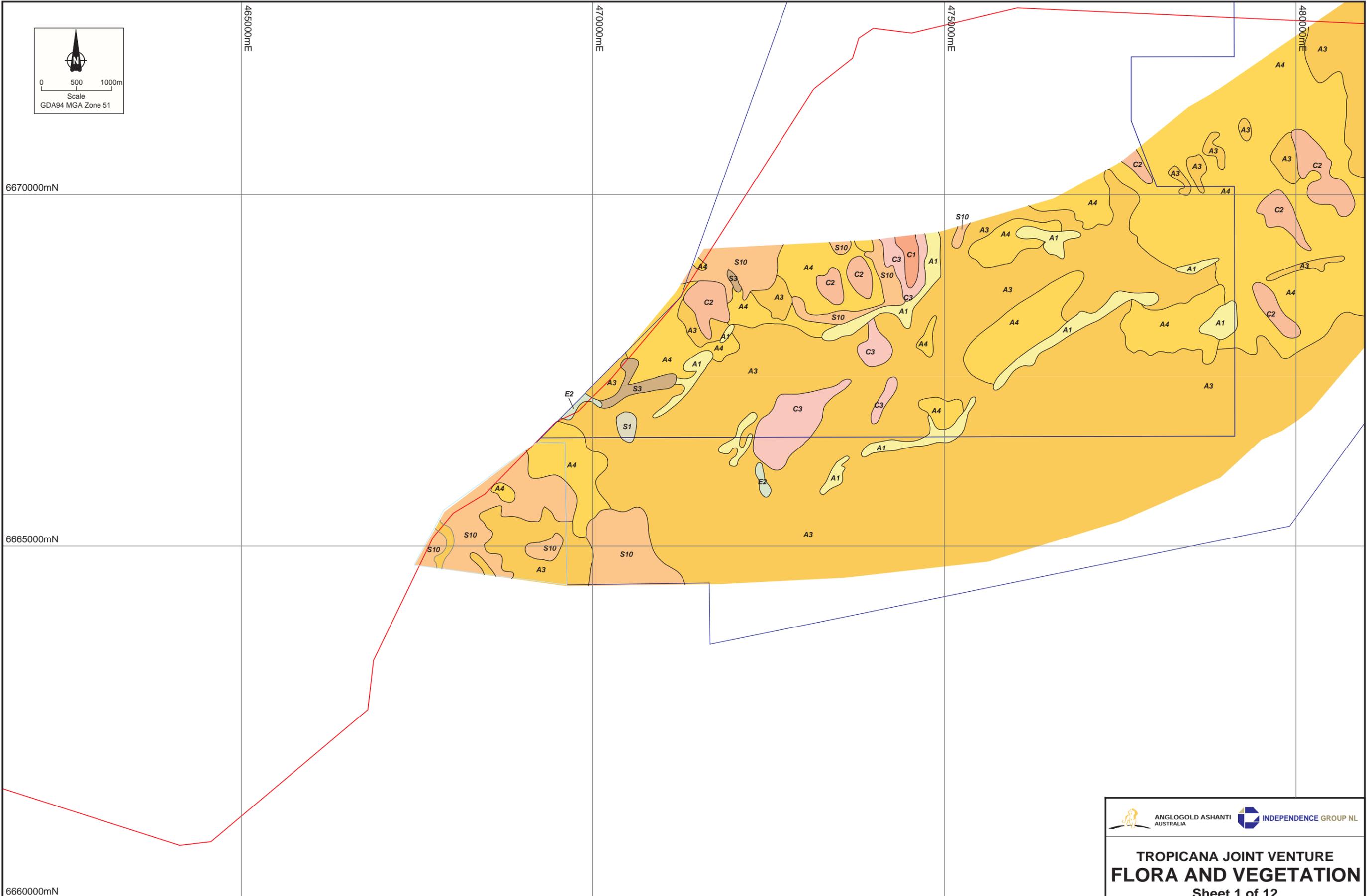
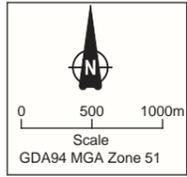
Sheet Layout

TROPICANA JOINT VENTURE

LEGEND

MATTISKE CONSULTING PTY LTD
 28 Central Road, Kalamunda ACN 063 507 175
 Phone: 9257 1625 Fax: 9257 1640

Author: E M Mattiske	MCPL Ref: AGA0703/061/08	Scale: 1:50,000
Drawn: CAD Resources - www.cadresources.com.au	Tel: (08) 9246 3242 - Fax: (08) 9246 3202	Figure: 1.00
CAD Ref: g1550_V_100.dgn	Date: Jan 2009	Rev: B A3



Note: For legend refer figure 1.00

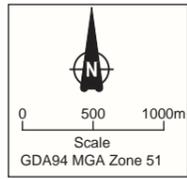
TROPICANA JOINT VENTURE FLORA AND VEGETATION Sheet 1 of 12			
MATTISKE CONSULTING PTY LTD 28 Central Road, Kalamunda ACN 063 507 175 Phone: 9257 1625 Fax: 9257 1640			
Author: E M Mattiske	MCPL Ref: AGA0703/061/08	Scale: 1:50,000	
Drawn: CAD Resources - www.cadresources.com.au		Figure:	
Tel: (08) 9246 3242 - Fax: (08) 9246 3202		1.01	
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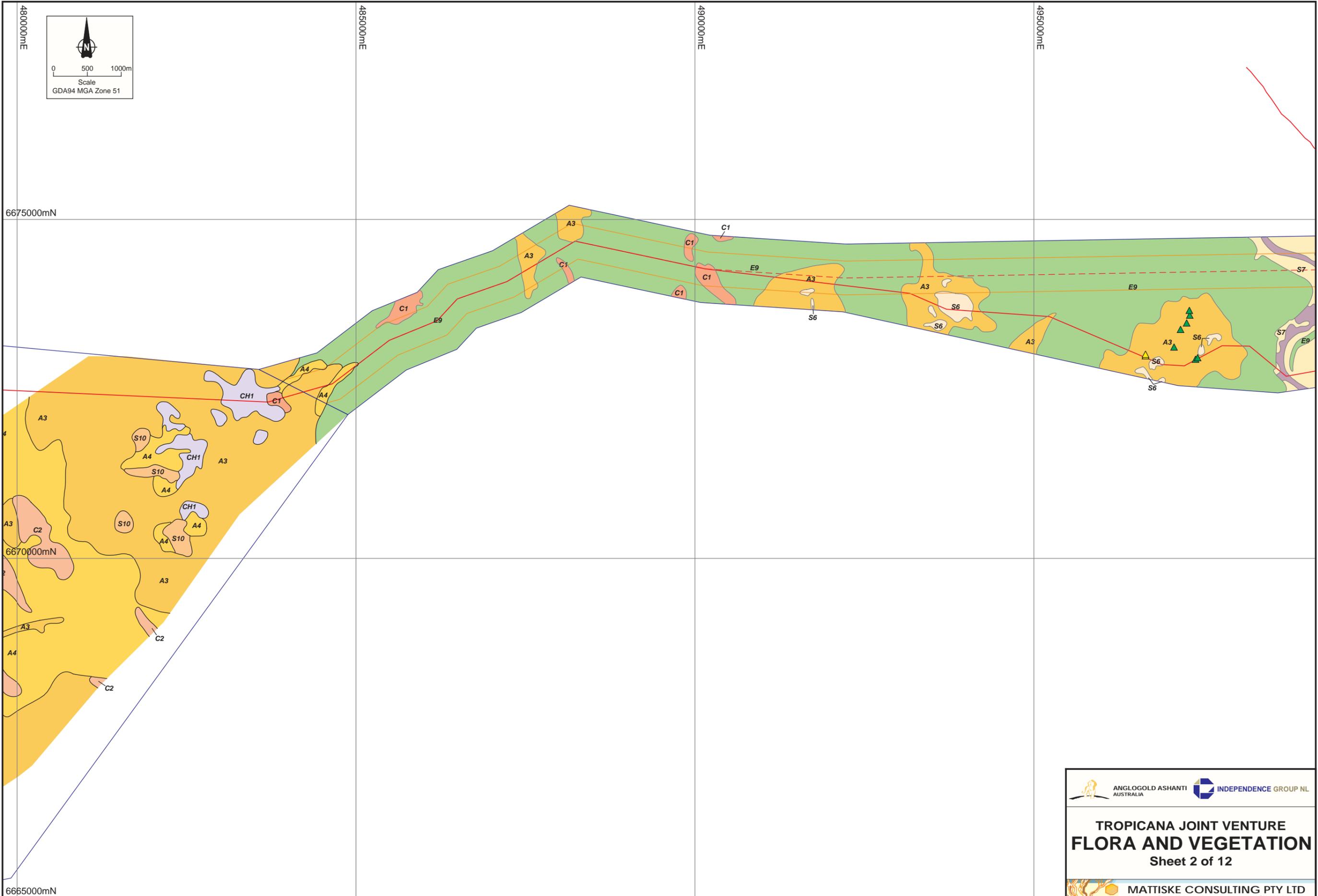
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Note: For legend refer figure 1.00



**TROPICANA JOINT VENTURE
FLORA AND VEGETATION**
Sheet 2 of 12

MATTISKE CONSULTING PTY LTD
28 Central Road, Kalamunda ACN 063 507 175
Phone: 9257 1625 Fax: 9257 1640

Author: E M Mattiske	MCPL Ref: AGA0703/061/08	Scale: 1:50,000
Drawn: CAD Resources - www.cadresources.com.au	Tel: (08) 9246 3242 - Fax: (08) 9246 3202	Figure: 1.02
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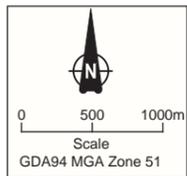
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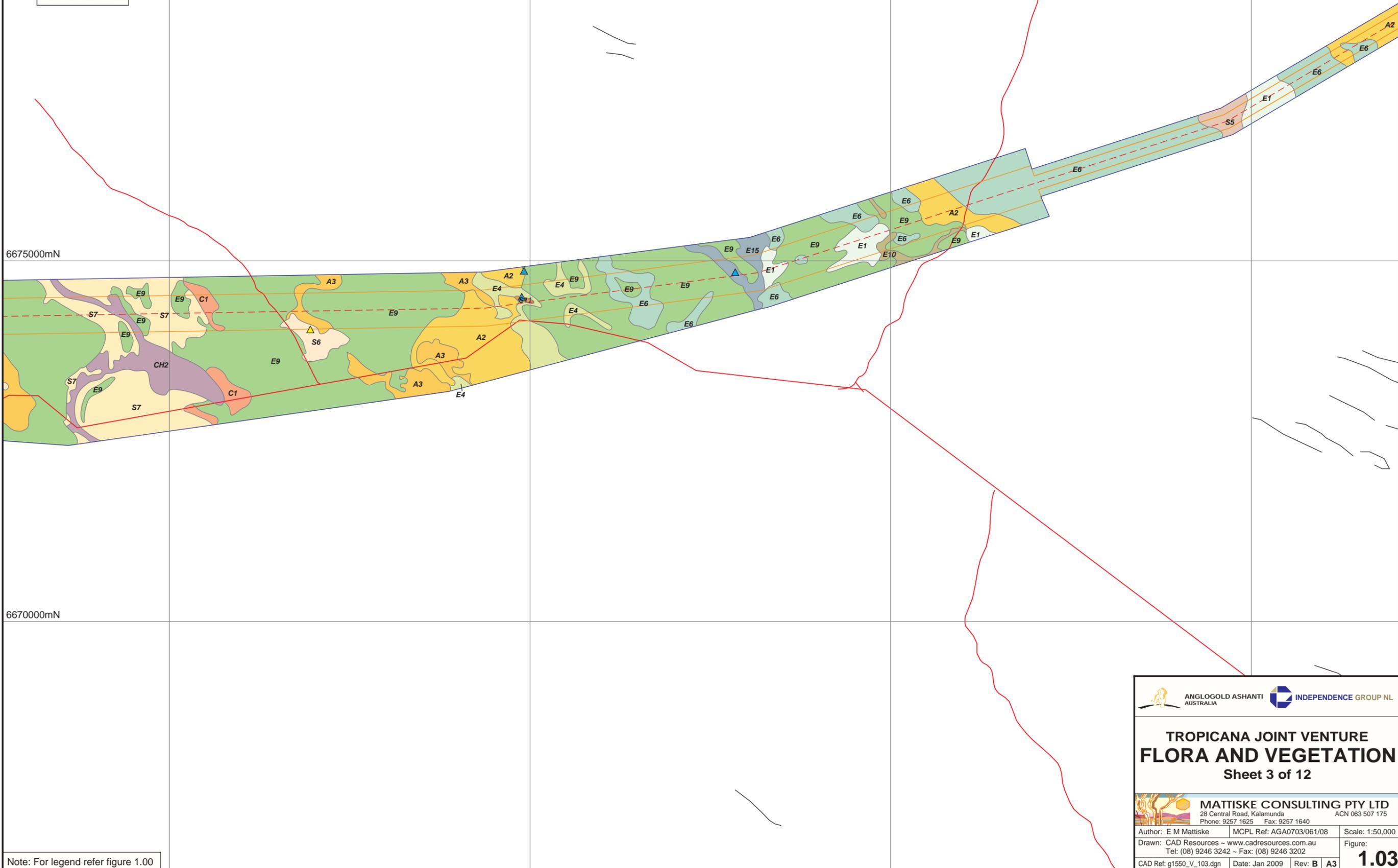
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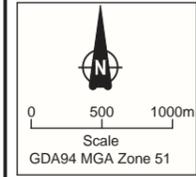
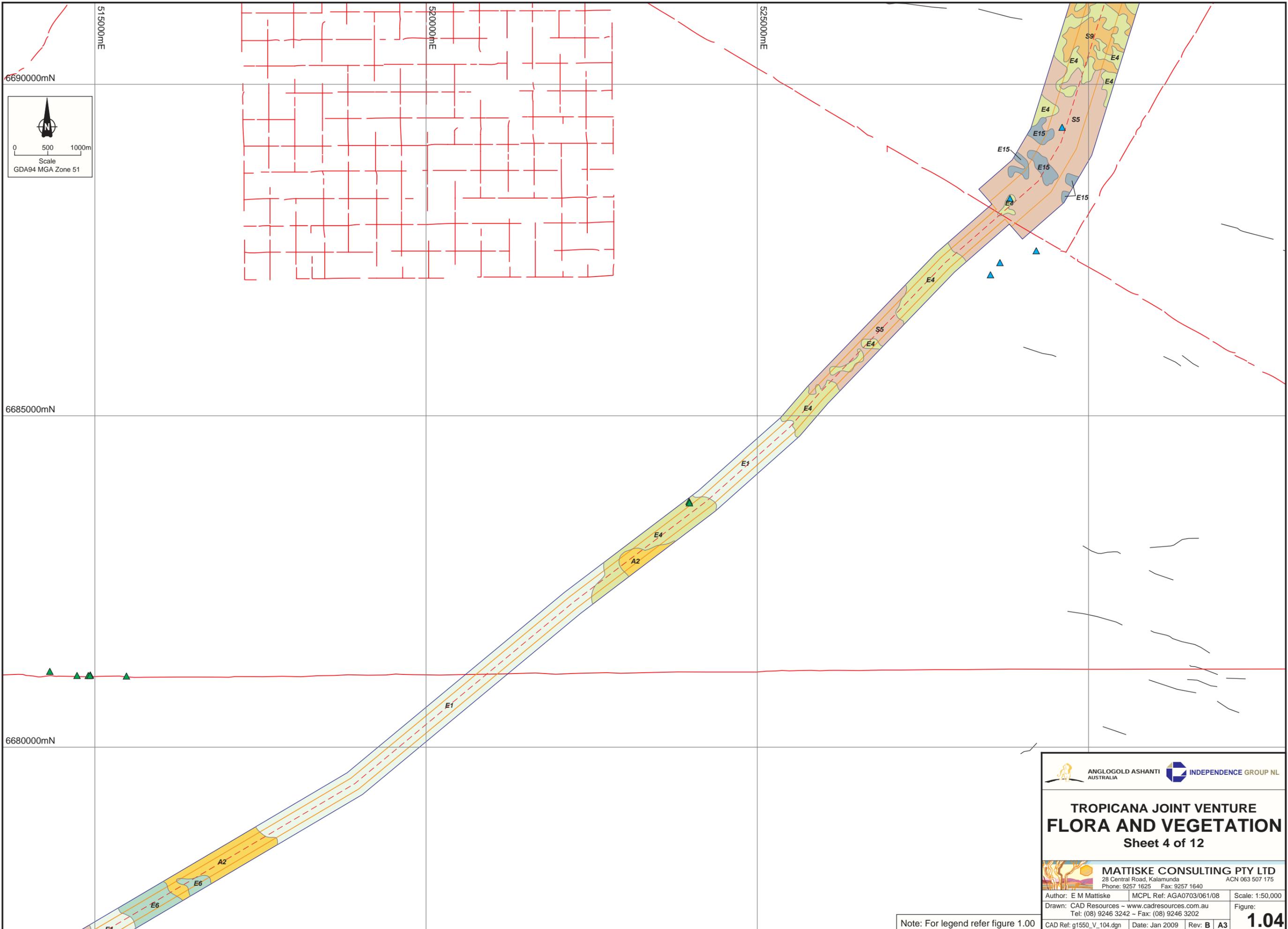
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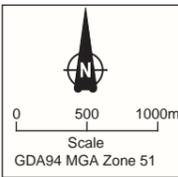
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 ANGLOGOLD ASHANTI AUSTRALIA		 INDEPENDENCE GROUP NL	
TROPICANA JOINT VENTURE FLORA AND VEGETATION Sheet 3 of 12			
 MATTISKE CONSULTING PTY LTD 28 Central Road, Kalamunda ACN 063 507 175 Phone: 9257 1625 Fax: 9257 1640			
Author: E M Mattiske	MCPL Ref: AGA0703/061/08	Scale: 1:50,000	
Drawn: CAD Resources - www.cadresources.com.au		Figure:	
Tel: (08) 9246 3242 - Fax: (08) 9246 3202		1.03	
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TROPICANA JOINT VENTURE FLORA AND VEGETATION Sheet 4 of 12			
MATTISKE CONSULTING PTY LTD 28 Central Road, Kalamunda ACN 063 507 175 Phone: 9257 1625 Fax: 9257 1640			
Author: E M Mattiske	MCPL Ref: AGA0703/061/08	Scale: 1:50,000	
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Note: For legend refer figure 1.00



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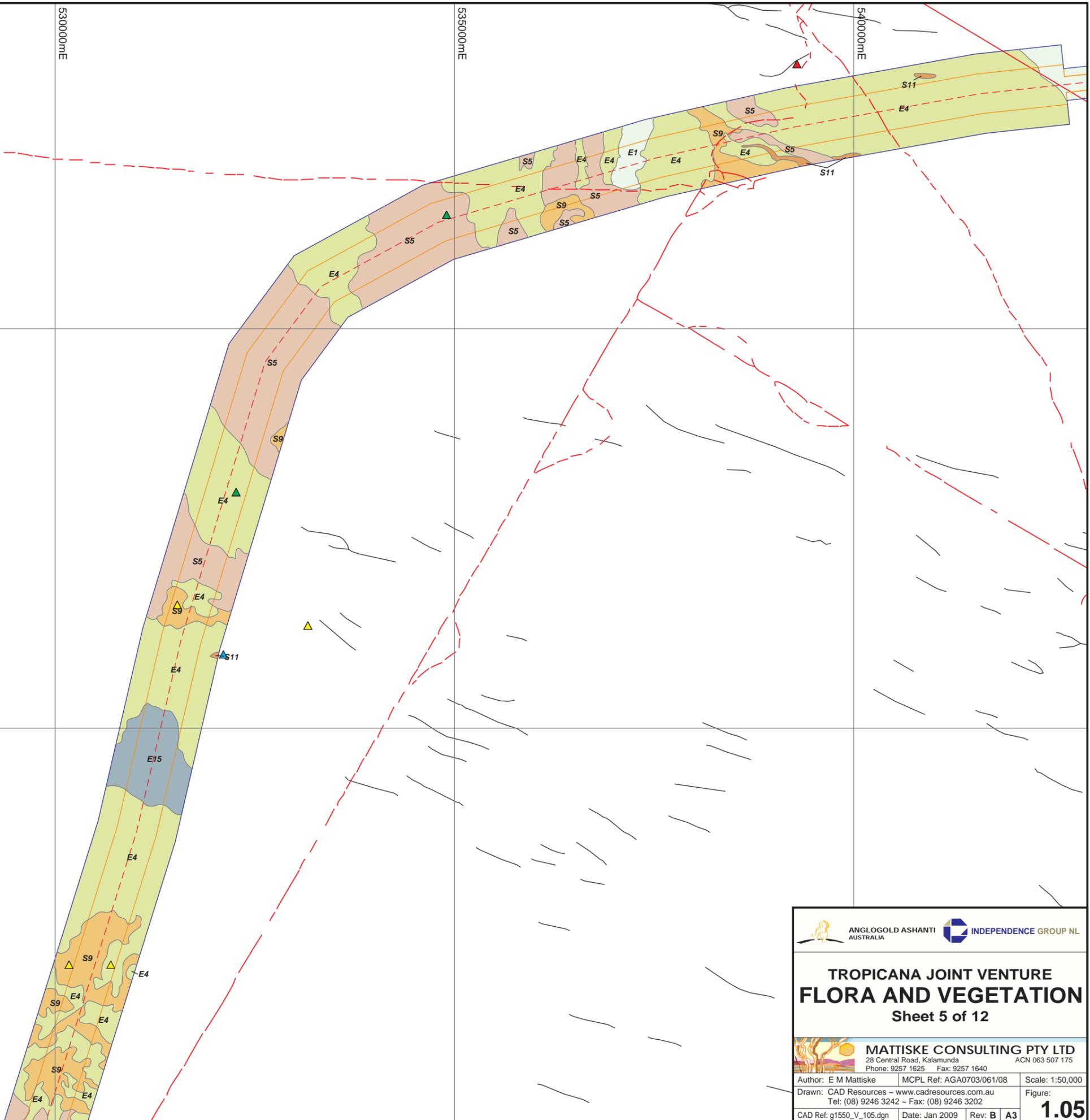
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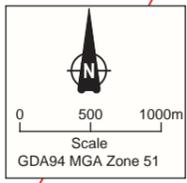
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Note: For legend refer figure 1.00

TROPICANA JOINT VENTURE FLORA AND VEGETATION Sheet 5 of 12		
 MATTISKE CONSULTING PTY LTD 28 Central Road, Kalamunda ACN 063 507 175 Phone: 9257 1625 Fax: 9257 1640		
Author: E M Matiske	MCPL Ref: AGA0703/061/08	Scale: 1:50,000
Drawn: CAD Resources - www.cadresources.com.au	Tel: (08) 9246 3242 - Fax: (08) 9246 3202	Figure: 1.05
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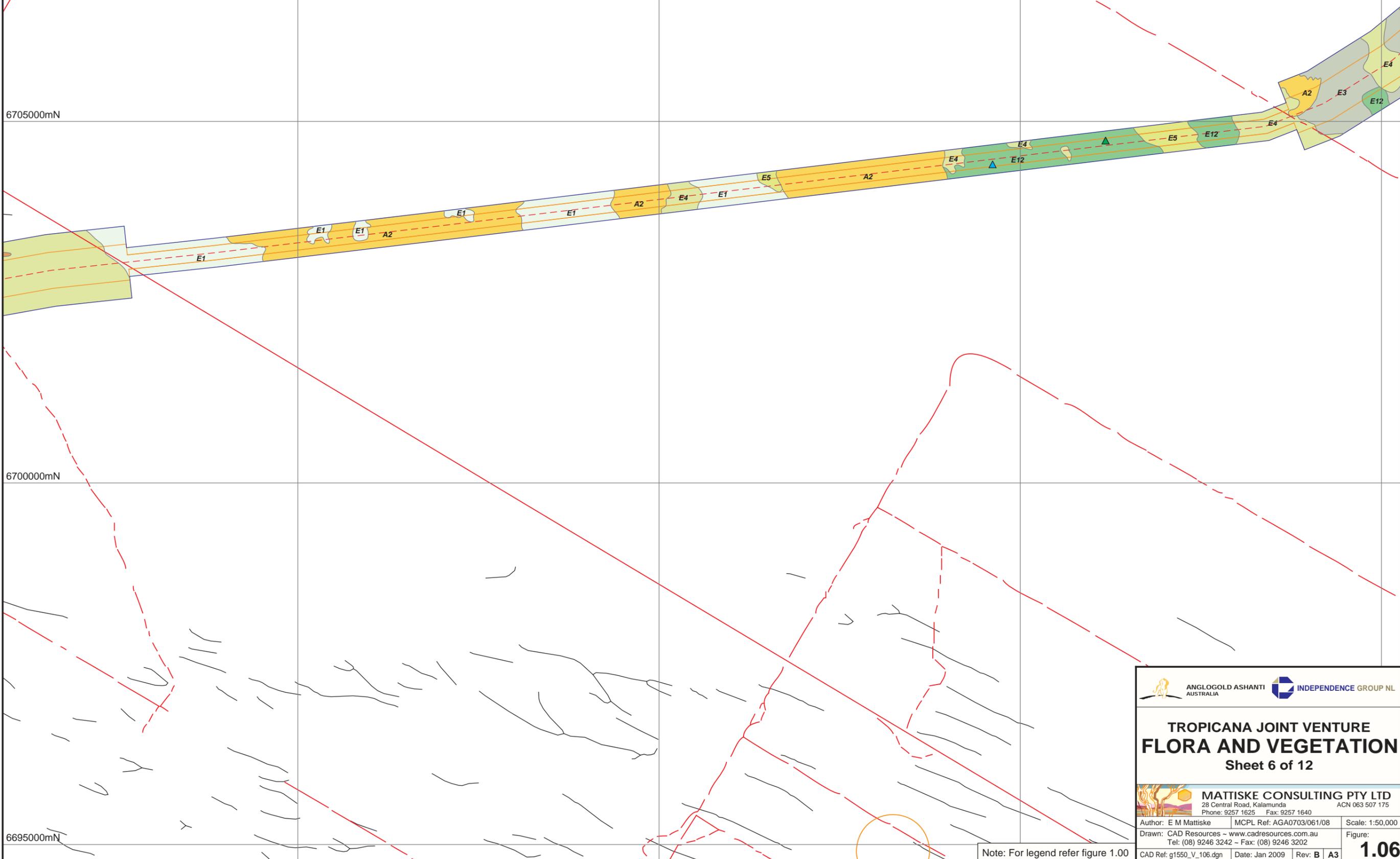
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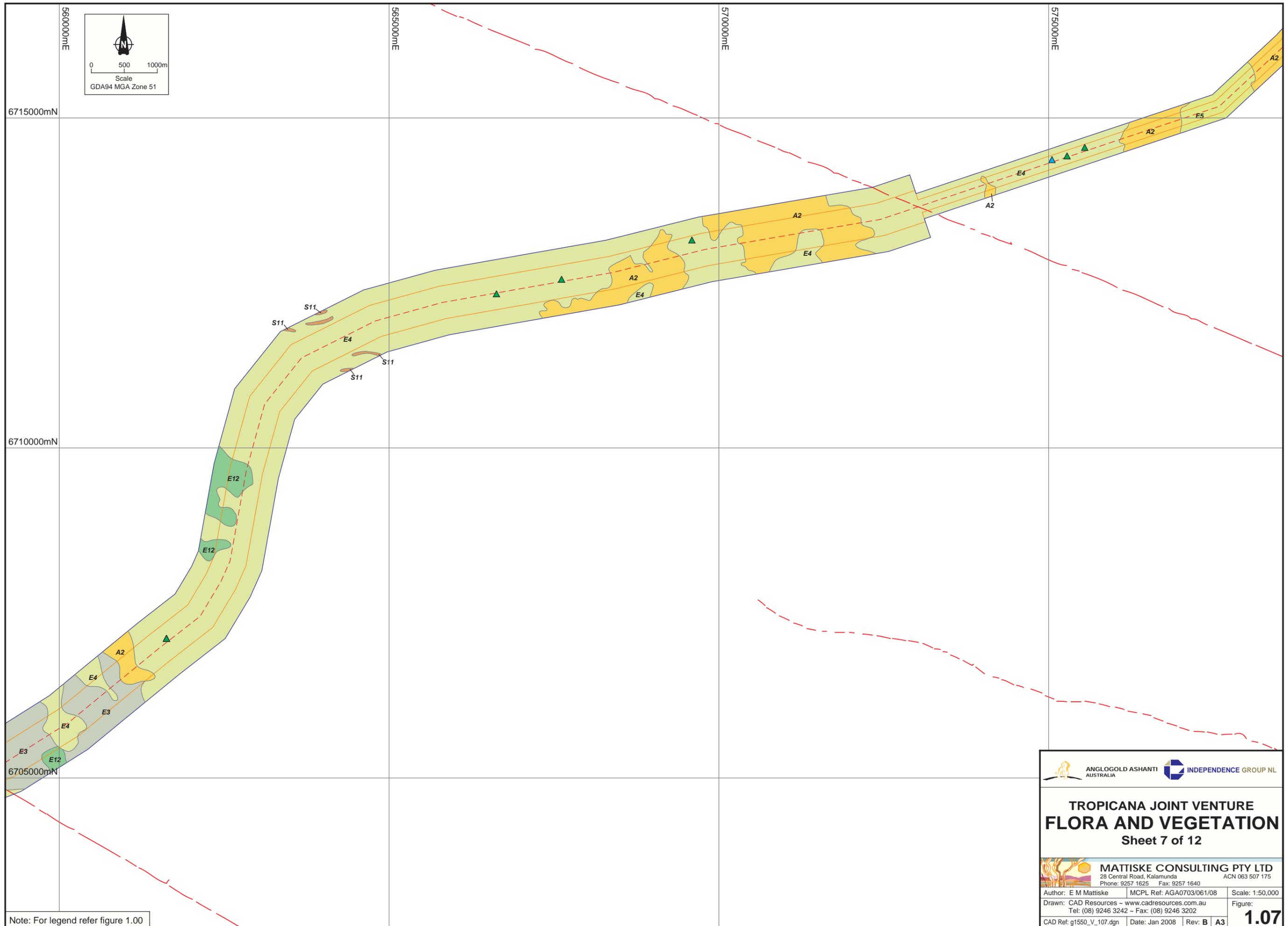
TROPICANA JOINT VENTURE FLORA AND VEGETATION Sheet 6 of 12

MATTISKE CONSULTING PTY LTD
28 Central Road, Kalamunda ACN 063 507 175
Phone: 9257 1625 Fax: 9257 1640

Author: E M Mattiske MCPL Ref: AGA0703/061/08 Scale: 1:50,000
Drawn: CAD Resources - www.cadresources.com.au Figure:
Tel: (08) 9246 3242 - Fax: (08) 9246 3202

CAD Ref: g1550_V_106.dgn Date: Jan 2009 Rev: B | A3 **1.06**

Note: For legend refer figure 1.00



Note: For legend refer figure 1.00

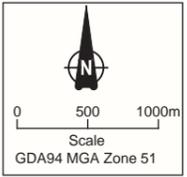
 ANGLOGOLD ASHANTI AUSTRALIA		 INDEPENDENCE GROUP NL	
TROPICANA JOINT VENTURE FLORA AND VEGETATION Sheet 7 of 12			
 MATTISKE CONSULTING PTY LTD 28 Central Road, Kalamunda ACN 063 507 175 Phone: 9257 1625 Fax: 9257 1640			
Author: E M Mattiske	MCPL Ref: AGA0703/061/08	Scale: 1:50,000	
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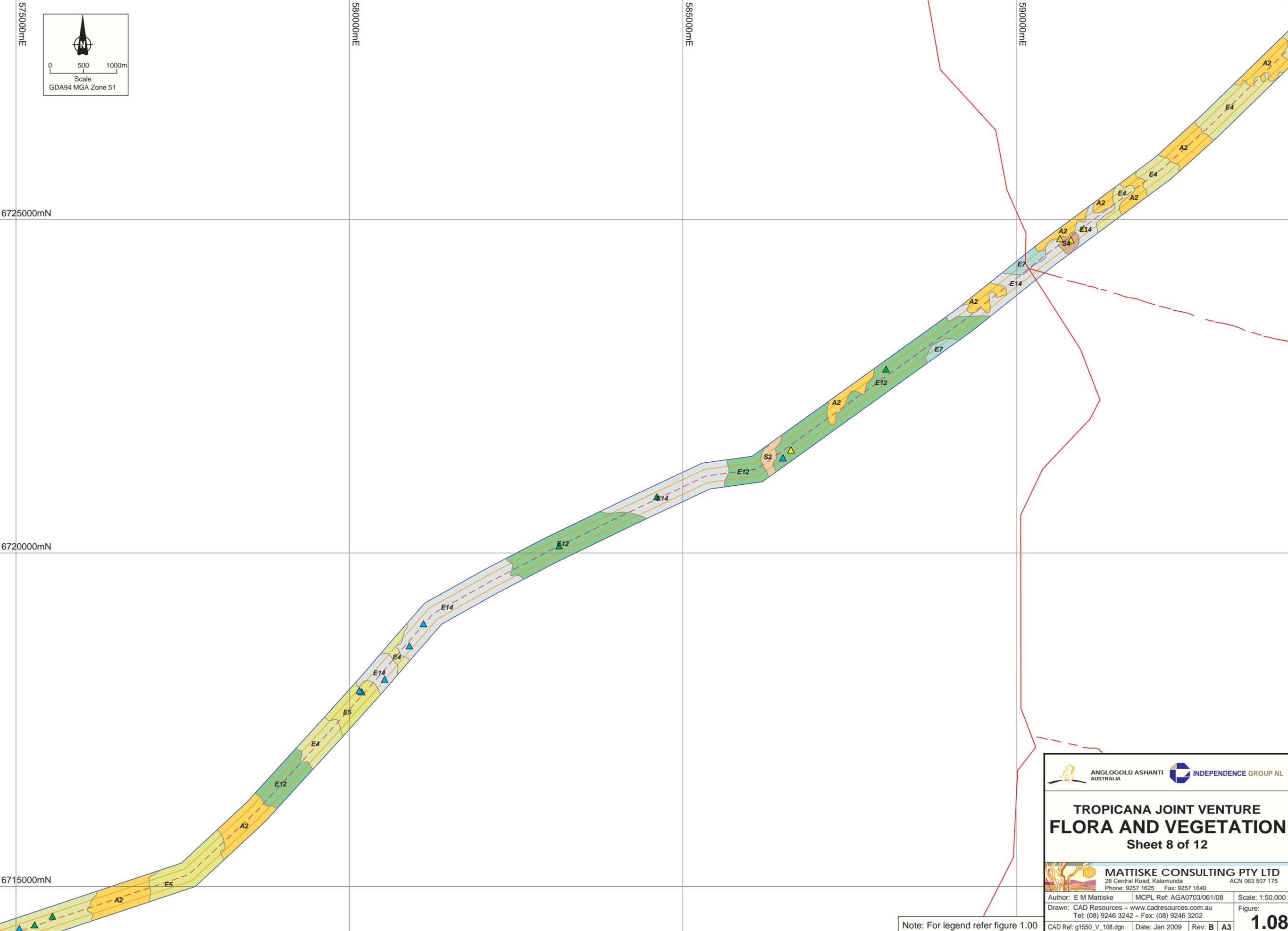
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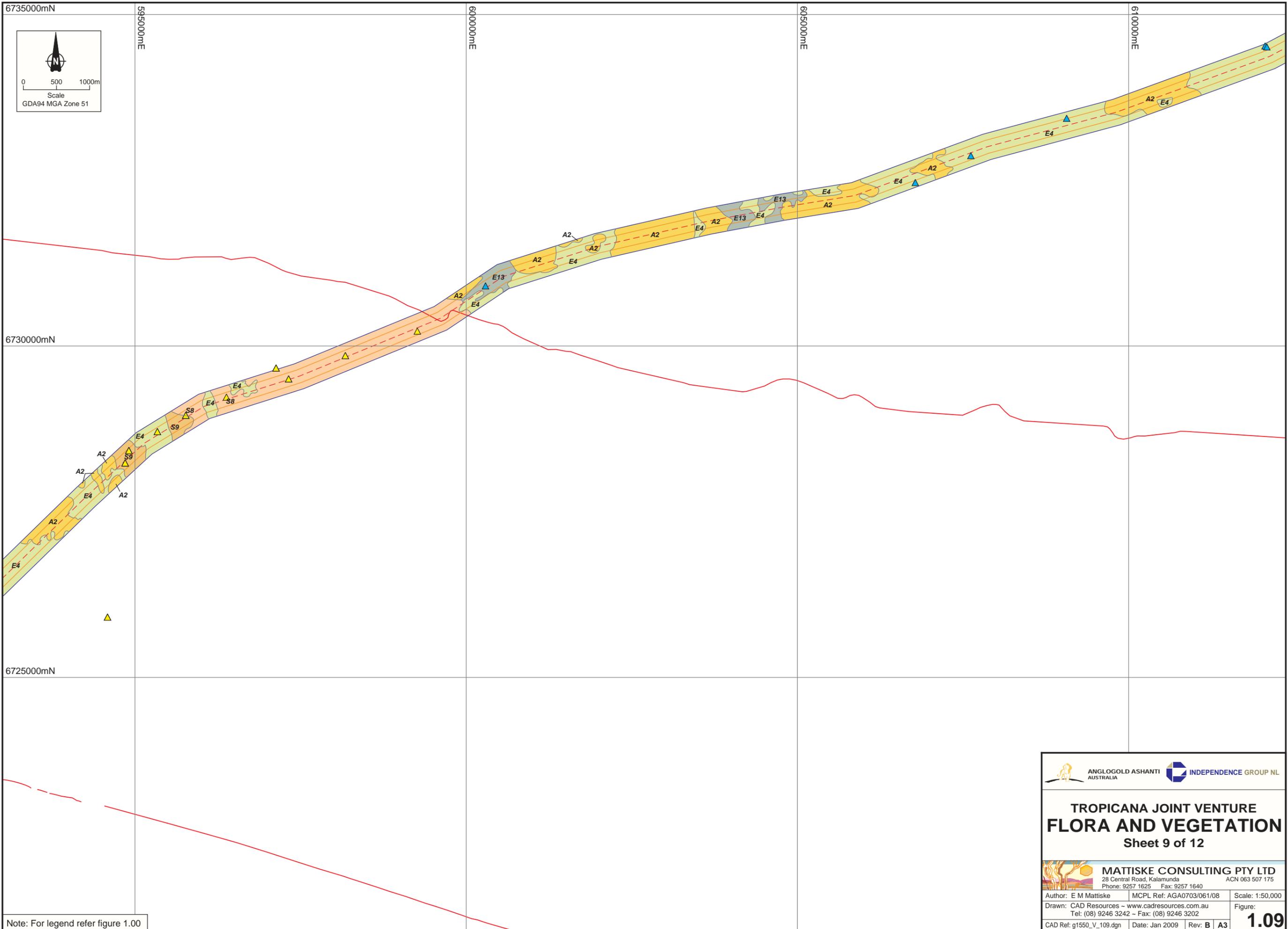


**TROPICANA JOINT VENTURE
FLORA AND VEGETATION**
Sheet 8 of 12

MATTISKE CONSULTING PTY LTD
28 Central Road, Kalamunda ACN 063 507 175
Phone: 9257 1625 Fax: 9257 1640

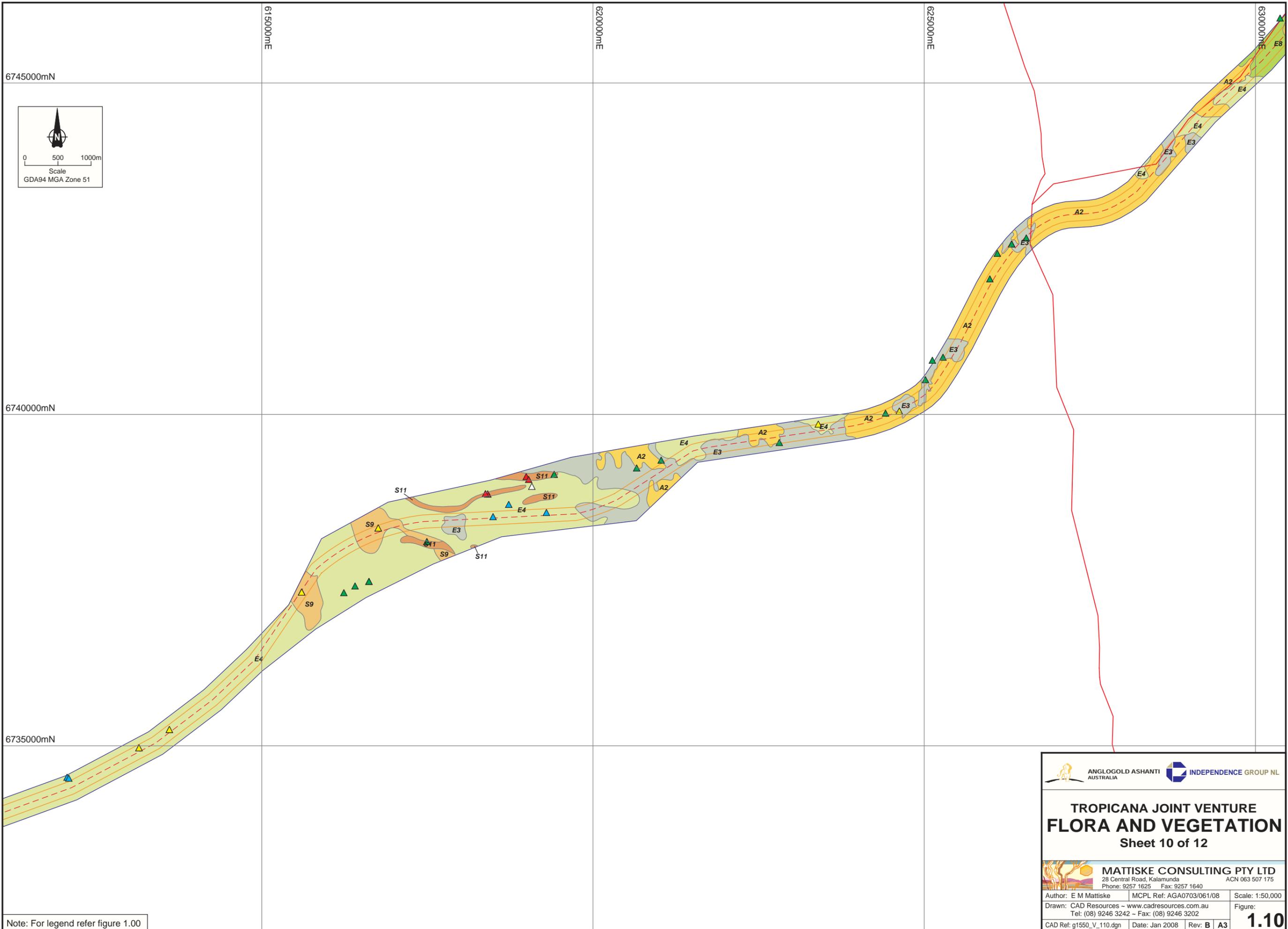
Author: E M Mattiske	MCPL Ref: AGA0703/061/08	Scale: 1:50,000
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Note: For legend refer figure 1.00



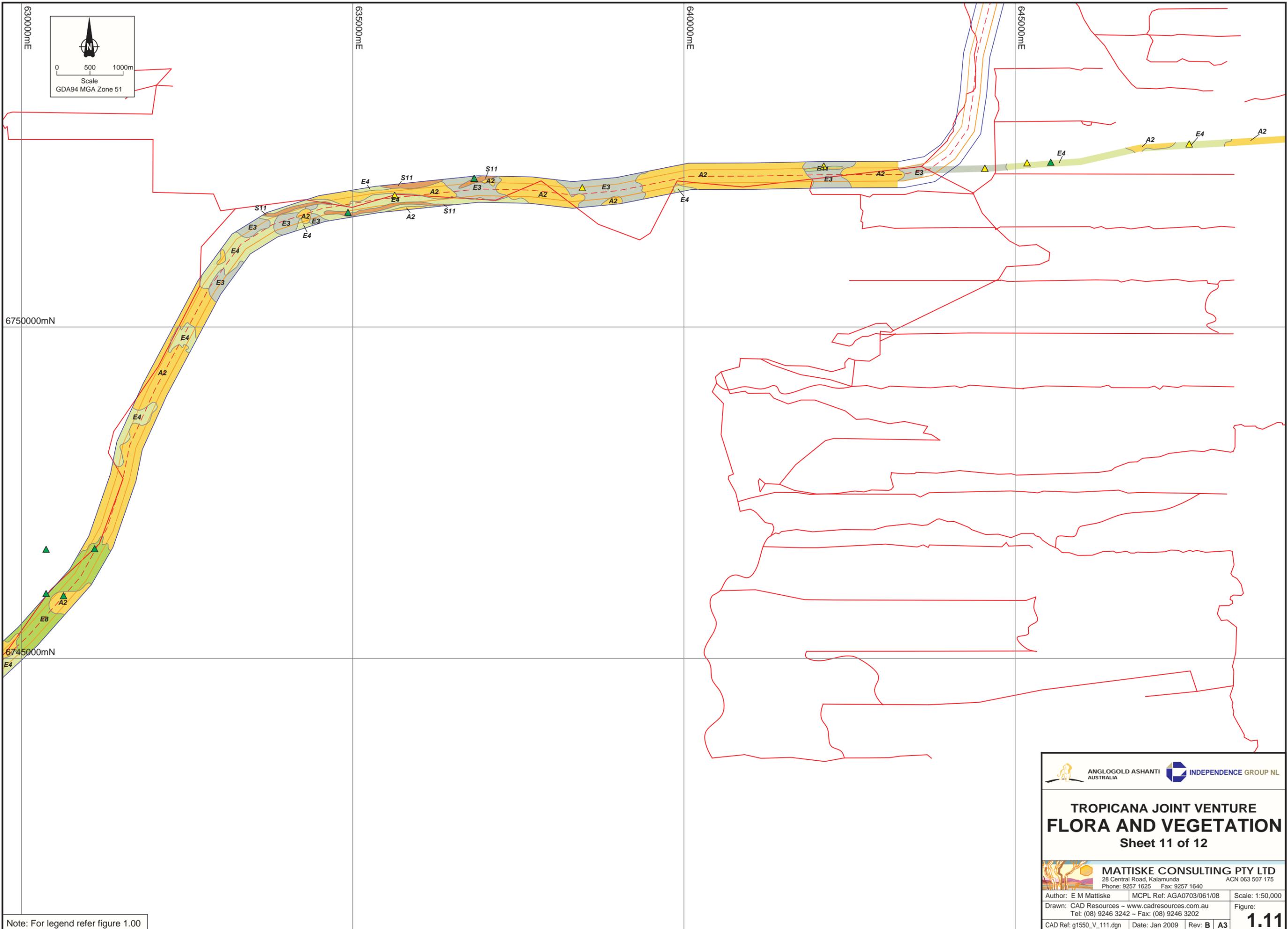
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 ANGLOGOLD ASHANTI AUSTRALIA		 INDEPENDENCE GROUP NL	
TROPICANA JOINT VENTURE FLORA AND VEGETATION Sheet 9 of 12			
 MATTISKE CONSULTING PTY LTD 28 Central Road, Kalamunda ACN 063 507 175 Phone: 9257 1625 Fax: 9257 1640			
Author: E M Mattiske	MCPL Ref: AGA0703/061/08	Scale: 1:50,000	
Drawn: CAD Resources - www.cadresources.com.au	Tel: (08) 9246 3242 - Fax: (08) 9246 3202	Figure: 1.09	
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Note: For legend refer figure 1.00

 ANGLOGOLD ASHANTI AUSTRALIA		 INDEPENDENCE GROUP NL	
TROPICANA JOINT VENTURE FLORA AND VEGETATION Sheet 10 of 12			
 MATTISKE CONSULTING PTY LTD 28 Central Road, Kalamunda ACN 063 507 175 Phone: 9257 1625 Fax: 9257 1640			
Author: E M Mattiske	MCPL Ref: AGA0703/061/08	Scale: 1:50,000	
Drawn: CAD Resources - www.cadresources.com.au Tel: (08) 9246 3242 - Fax: (08) 9246 3202		Figure:	
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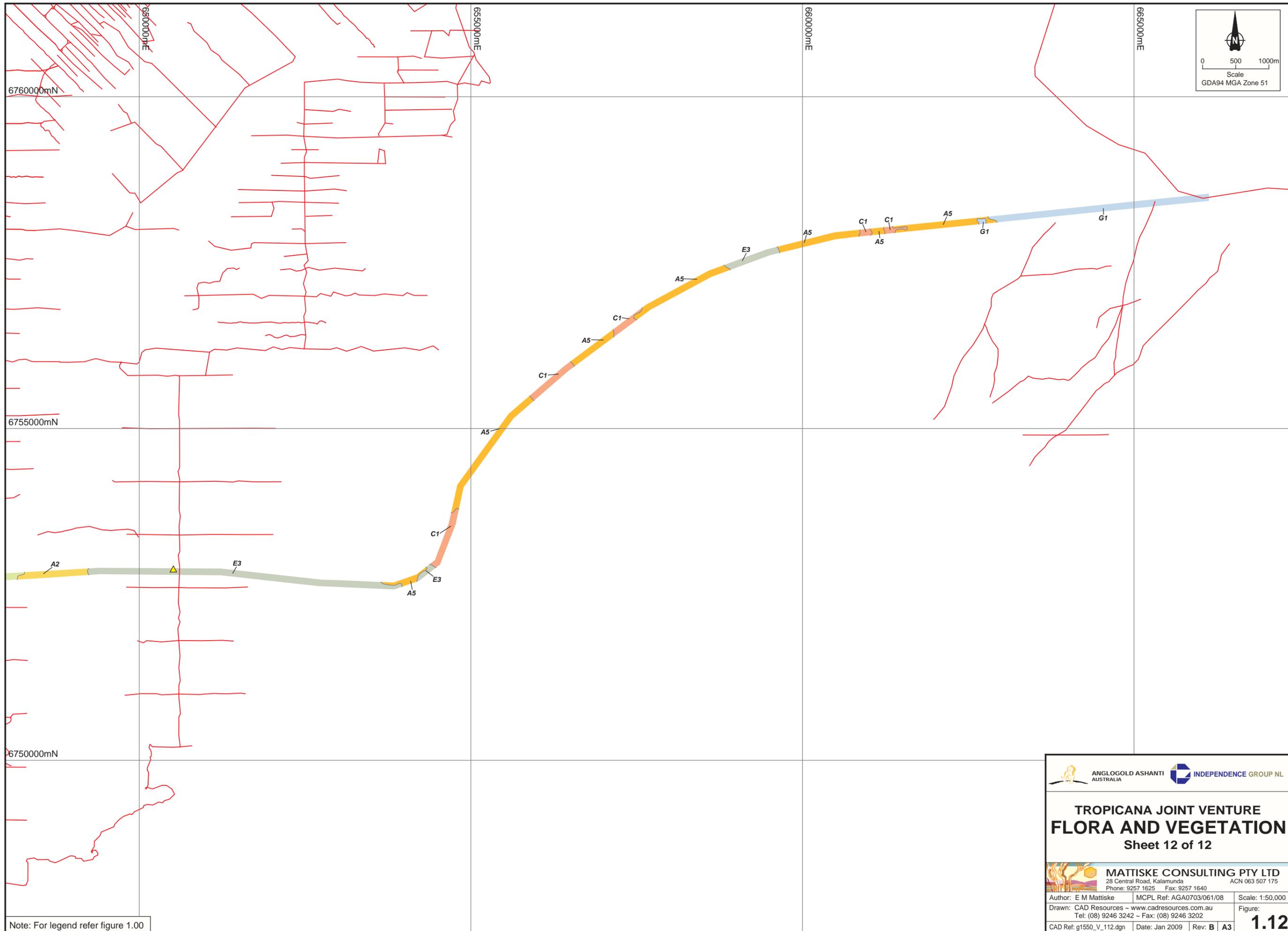


**TROPICANA JOINT VENTURE
FLORA AND VEGETATION
Sheet 11 of 12**

MATTISKE CONSULTING PTY LTD
28 Central Road, Kalamunda ACN 063 507 175
Phone: 9257 1625 Fax: 9257 1640

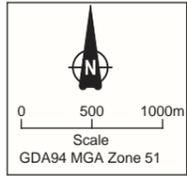
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CAD Ref: g1550_V_111.dgn	Date: Jan 2009	Rev: B A3

Note: For legend refer figure 1.00



Note: For legend refer figure 1.00

 ANGLOGOLD ASHANTI AUSTRALIA		 INDEPENDENCE GROUP NL	
TROPICANA JOINT VENTURE FLORA AND VEGETATION Sheet 12 of 12			
 MATTISKE CONSULTING PTY LTD 28 Central Road, Kalamunda ACN 063 507 175 Phone: 9257 1625 Fax: 9257 1640			
Author: E M Mattiske	MCPL Ref: AGA0703/061/08	Scale: 1:50,000	
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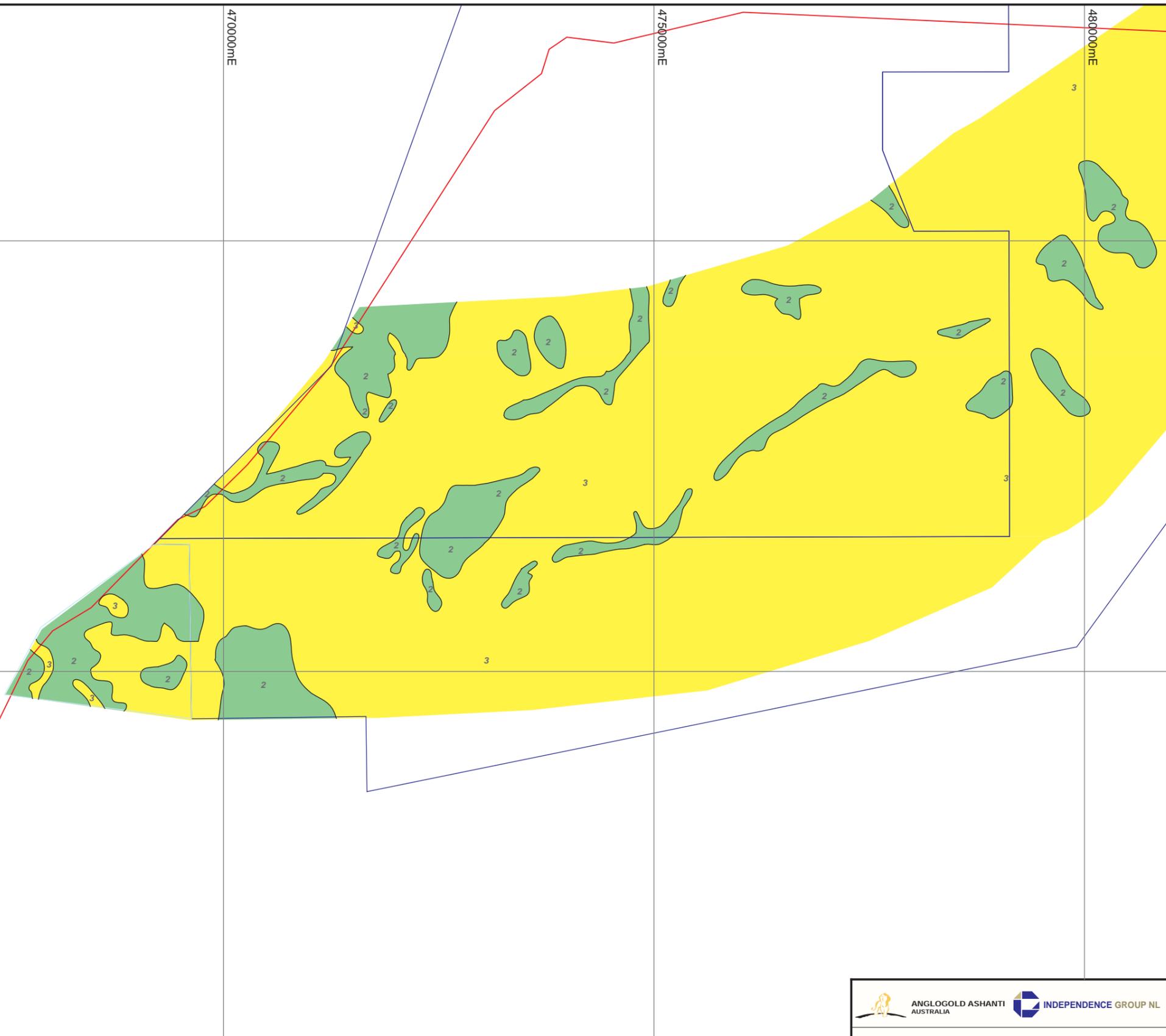
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Note: For legend refer figure 1.00

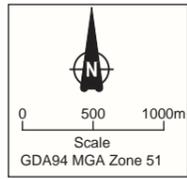
TROPICANA JOINT VENTURE VEGETATION CONDITION Sheet 1 of 12			
MATTISKE CONSULTING PTY LTD 28 Central Road, Kalamunda ACN 063 507 175 Phone: 9257 1625 Fax: 9257 1640			
Author: E M Mattiske	MCPL Ref: AGA0703/061/08	Scale: 1:50,000	
Drawn: CAD Resources - www.cadresources.com.au Tel: (08) 9246 3242 - Fax: (08) 9246 3202			Figure:
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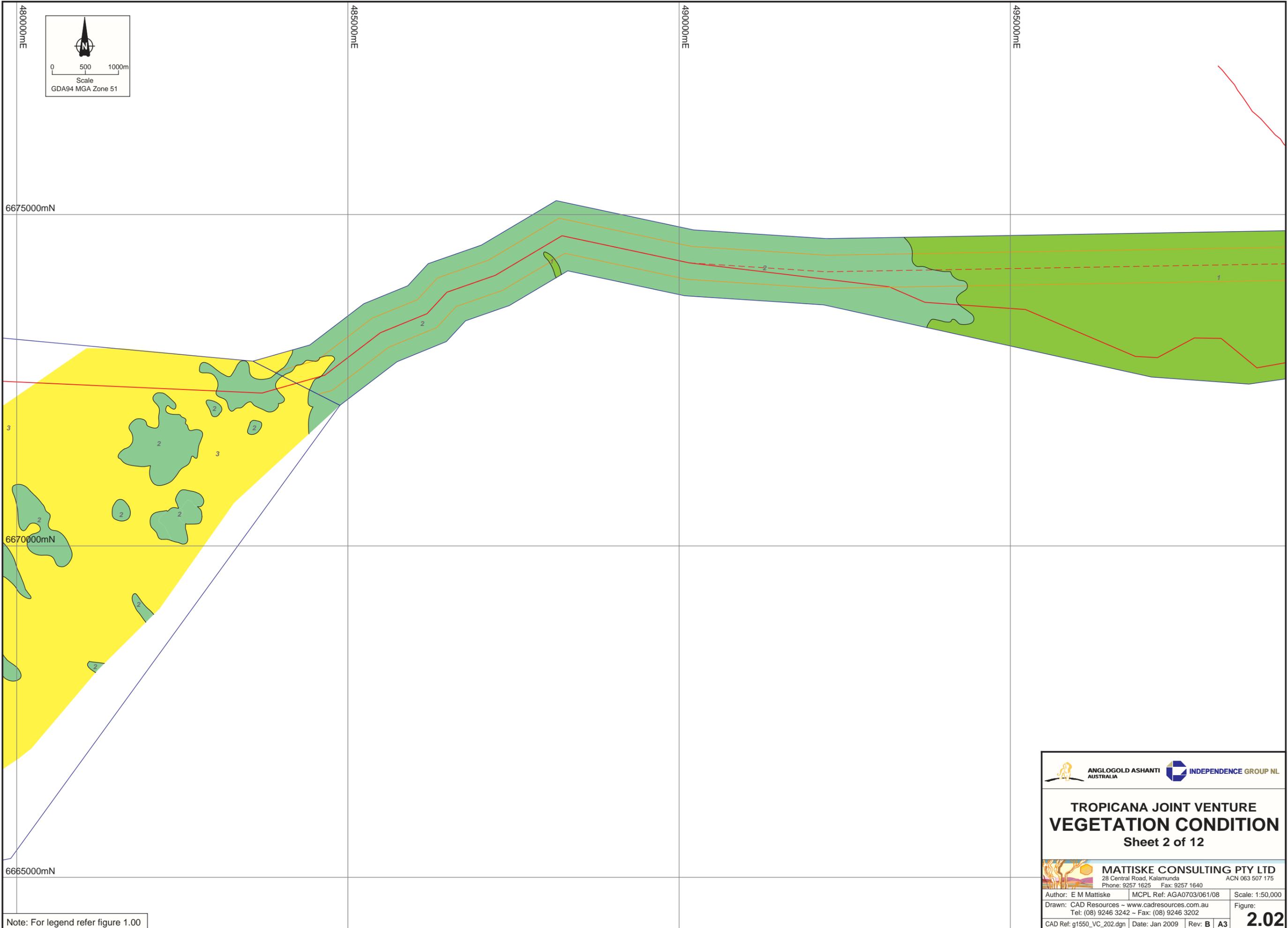


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Note: For legend refer figure 1.00



 ANGLOGOLD ASHANTI AUSTRALIA		 INDEPENDENCE GROUP NL	
TROPICANA JOINT VENTURE VEGETATION CONDITION Sheet 2 of 12			
 MATTISKE CONSULTING PTY LTD 28 Central Road, Kalamunda ACN 063 507 175 Phone: 9257 1625 Fax: 9257 1640			
Author: E M Matiske	MCPL Ref: AGA0703/061/08	Scale: 1:50,000	
Drawn: CAD Resources - www.cadresources.com.au		Figure:	
Tel: (08) 9246 3242 - Fax: (08) 9246 3202		2.02	
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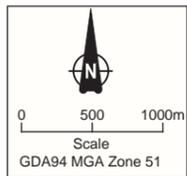
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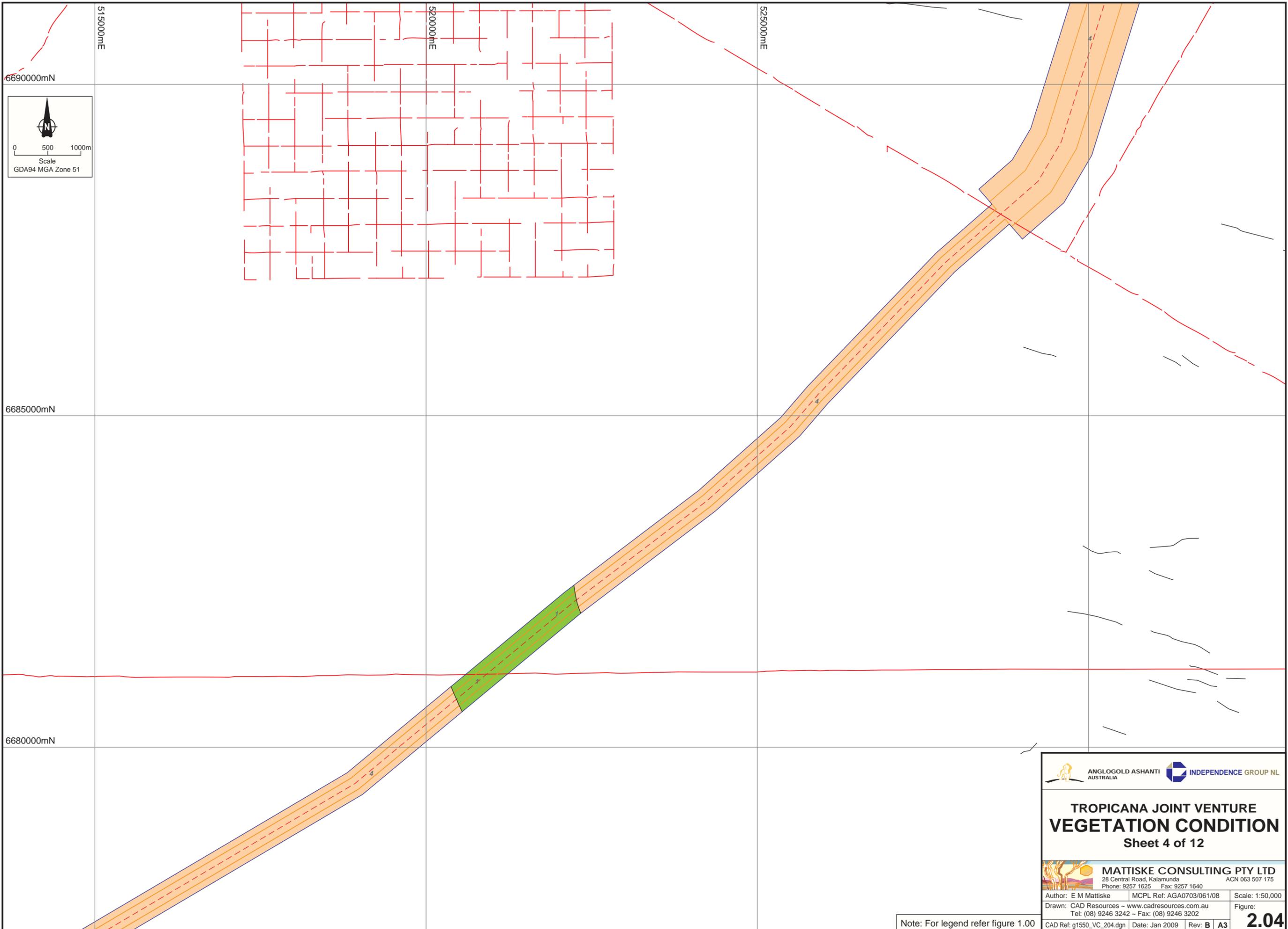


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Note: For legend refer figure 1.00

 ANGLOGOLD ASHANTI AUSTRALIA		 INDEPENDENCE GROUP NL	
TROPICANA JOINT VENTURE VEGETATION CONDITION Sheet 3 of 12			
 MATTISKE CONSULTING PTY LTD 28 Central Road, Kalamunda ACN 063 507 175 Phone: 9257 1625 Fax: 9257 1640			
Author: E M Mattiske	MCPL Ref: AGA0703/061/08	Scale: 1:50,000	
Drawn: CAD Resources - www.cadresources.com.au		Figure:	
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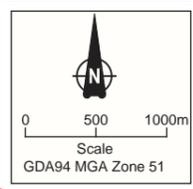
**TROPICANA JOINT VENTURE
VEGETATION CONDITION**
Sheet 4 of 12

MATTISKE CONSULTING PTY LTD
28 Central Road, Kalamunda ACN 063 507 175
Phone: 9257 1625 Fax: 9257 1640

Author: E M Mattiske	MCPL Ref: AGA0703/061/08	Scale: 1:50,000
Drawn: CAD Resources - www.cadresources.com.au	Tel: (08) 9246 3242 - Fax: (08) 9246 3202	Figure:
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Note: For legend refer figure 1.00

2.04



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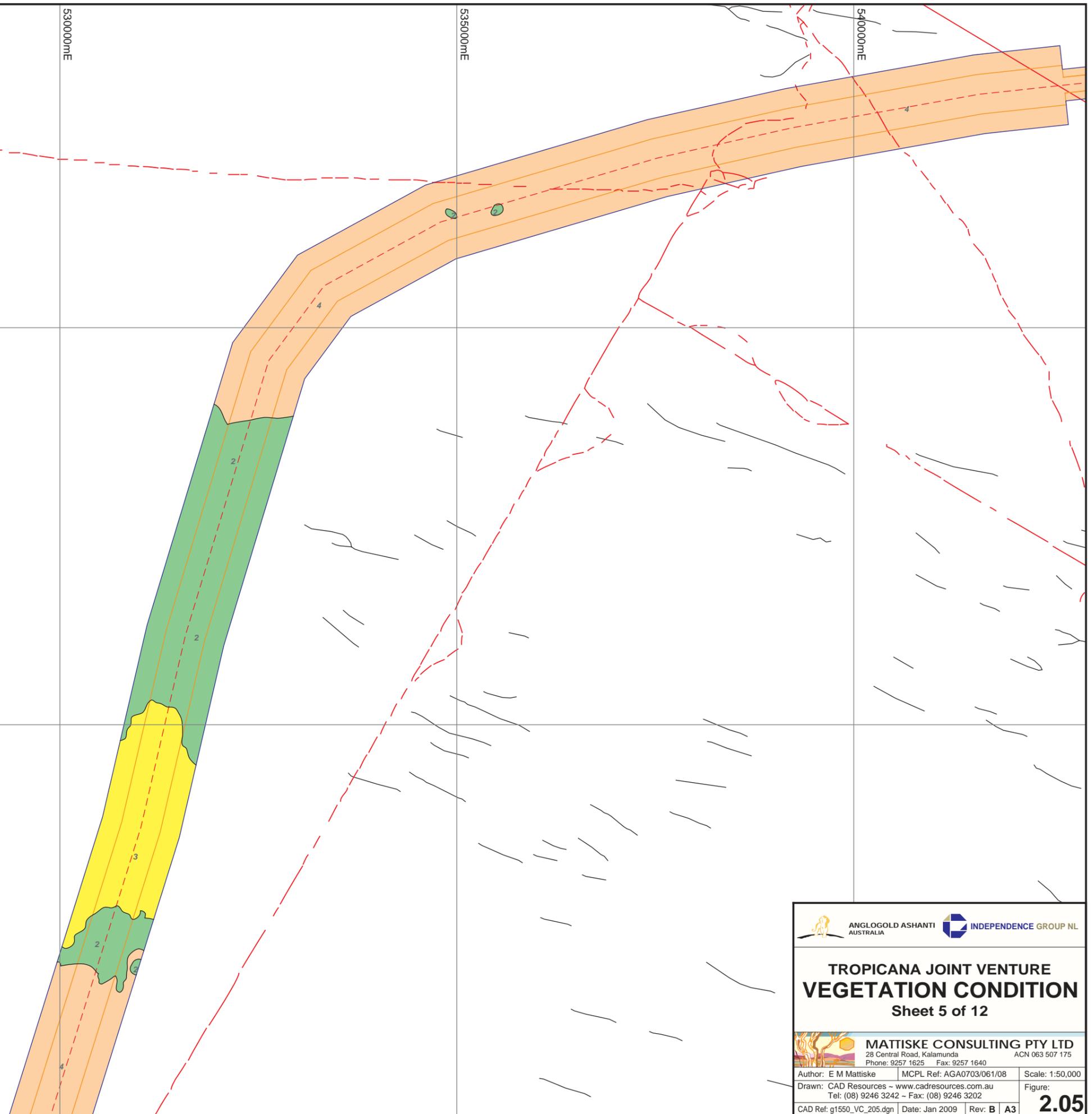
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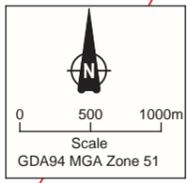
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Note: For legend refer figure 1.00

TROPICANA JOINT VENTURE VEGETATION CONDITION		
Sheet 5 of 12		
MATTISKE CONSULTING PTY LTD 28 Central Road, Kalamunda ACN 063 507 175 Phone: 9257 1625 Fax: 9257 1640		
Author: E M Matiske	MCP Ref: AGA0703/061/08	Scale: 1:50,000
Drawn: CAD Resources - www.cadresources.com.au	Tel: (08) 9246 3242 - Fax: (08) 9246 3202	Figure:
CAD Ref: g1550_VC_205.dgn	Date: Jan 2009	Rev: B A3
		2.05



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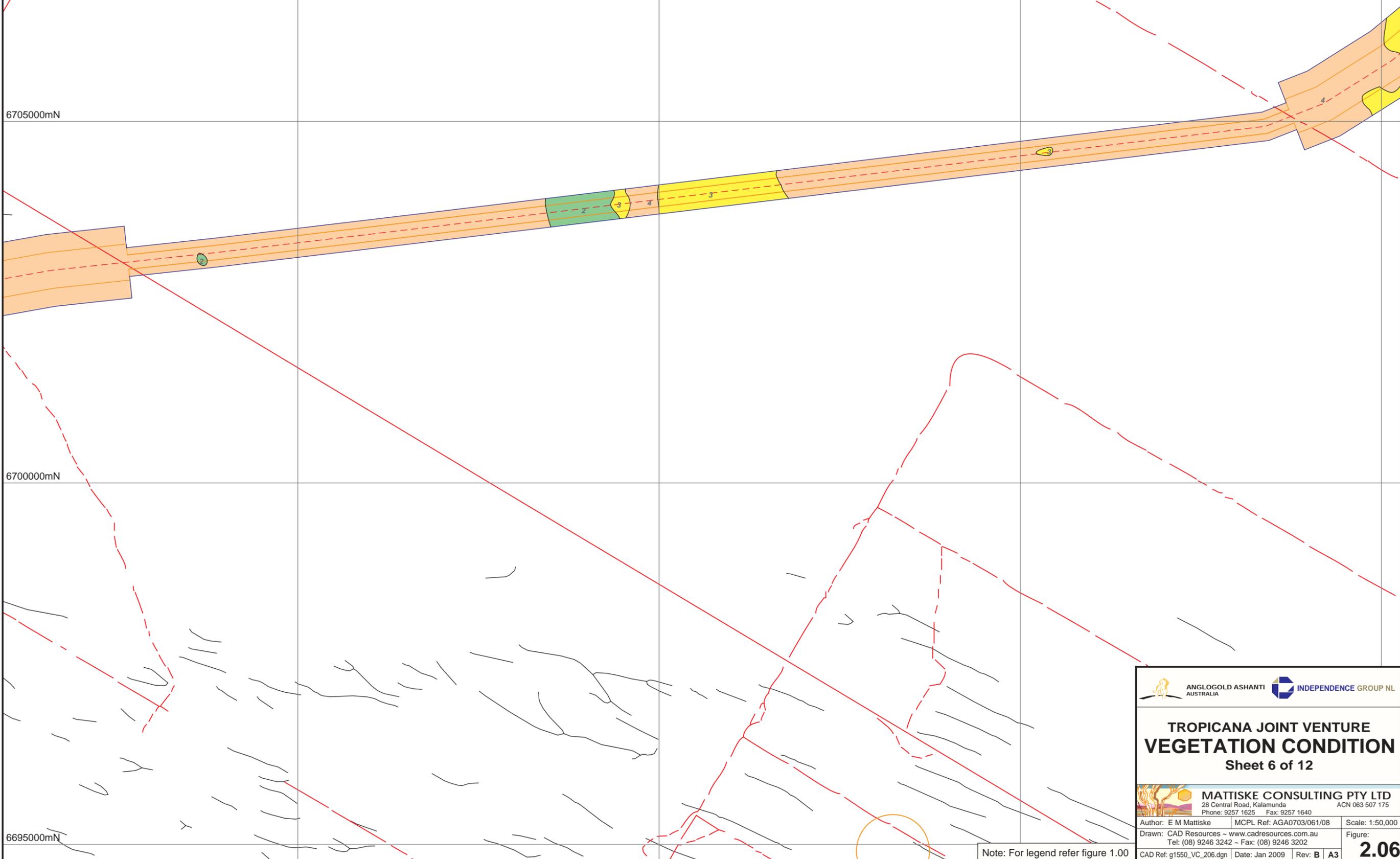
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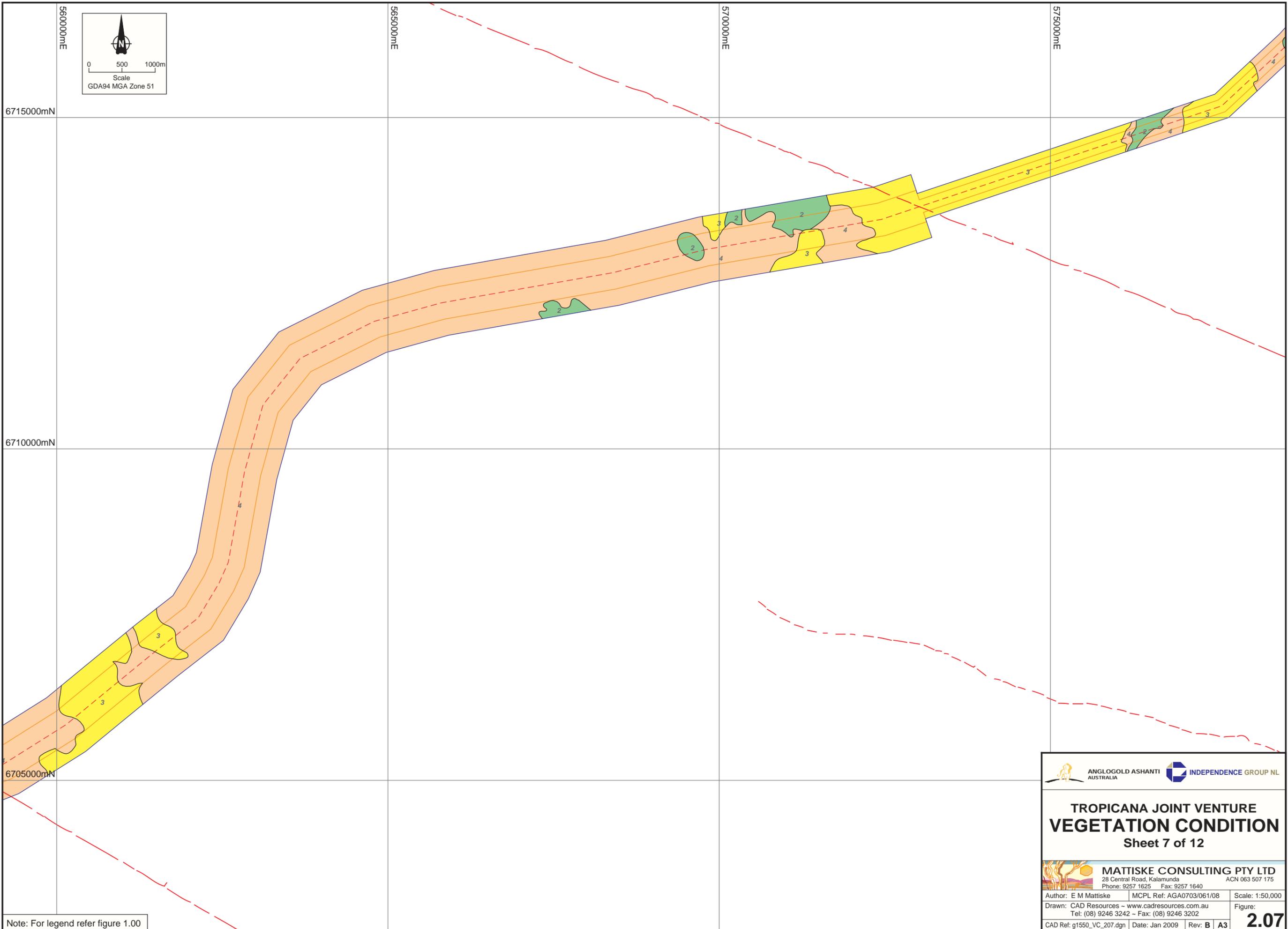
TROPICANA JOINT VENTURE VEGETATION CONDITION Sheet 6 of 12

MATTISKE CONSULTING PTY LTD
28 Central Road, Kalamunda ACN 063 507 175
Phone: 9257 1625 Fax: 9257 1640

Author: E M Mattiske MCPL Ref: AGA0703/061/08 Scale: 1:50,000
Drawn: CAD Resources - www.cadresources.com.au Figure:
Tel: (08) 9246 3242 - Fax: (08) 9246 3202

CAD Ref: g1550_VC_206.dgn Date: Jan 2009 Rev: B | A3 **2.06**

Note: For legend refer figure 1.00



Note: For legend refer figure 1.00

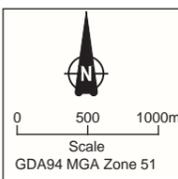
 ANGLOGOLD ASHANTI AUSTRALIA		 INDEPENDENCE GROUP NL	
TROPICANA JOINT VENTURE VEGETATION CONDITION Sheet 7 of 12			
 MATTISSE CONSULTING PTY LTD 28 Central Road, Kalamunda ACN 063 507 175 Phone: 9257 1625 Fax: 9257 1640			
Author: E M Matisse	MCPL Ref: AGA0703/061/08	Scale: 1:50,000	
Drawn: CAD Resources - www.cadresources.com.au		Figure:	
Tel: (08) 9246 3242 - Fax: (08) 9246 3202		2.07	
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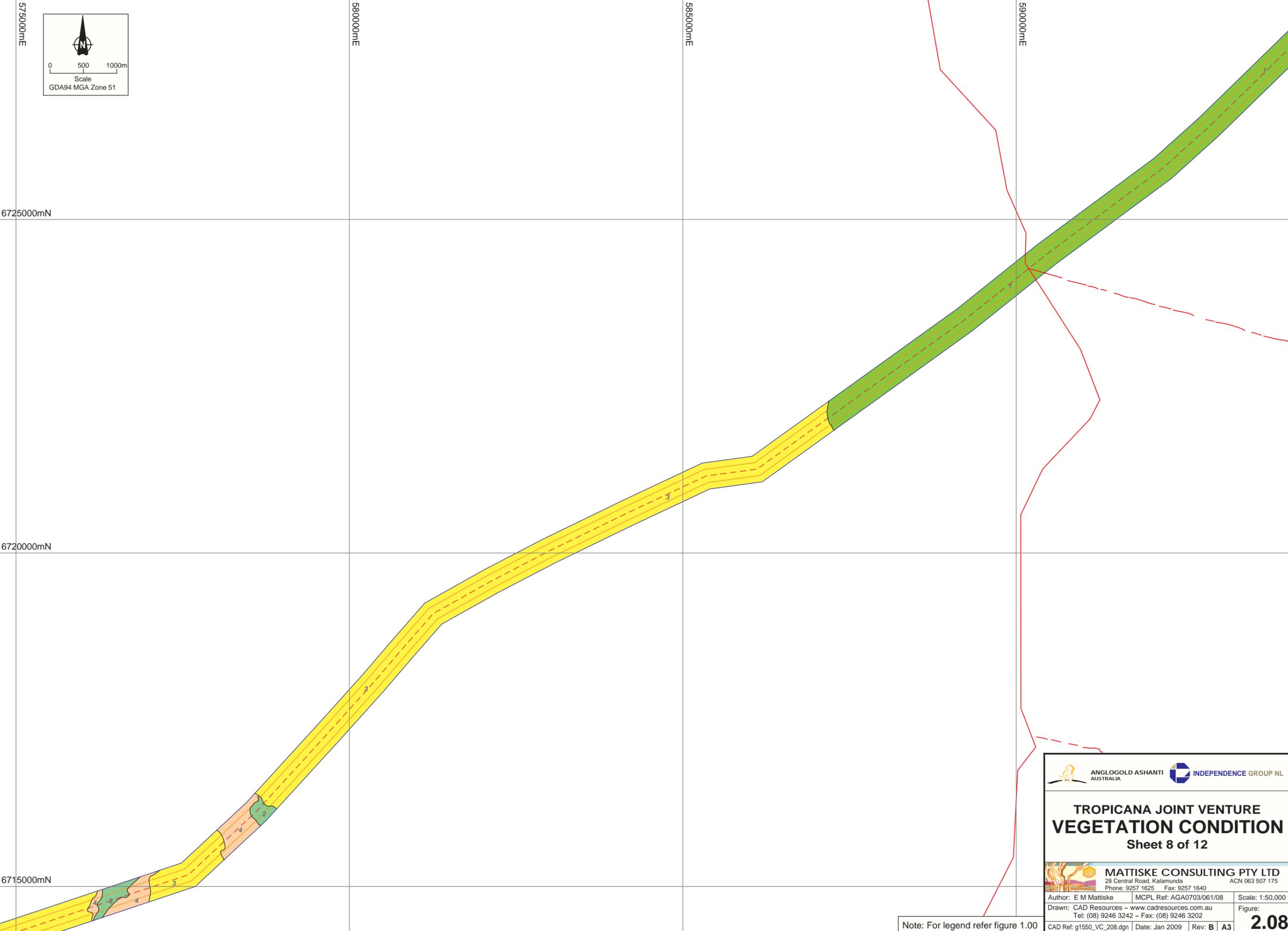
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6720000mN

6715000mN



**TROPICANA JOINT VENTURE
VEGETATION CONDITION**
Sheet 8 of 12

MATTISKE CONSULTING PTY LTD
28 Central Road, Kalamunda ACN 063 507 175
Phone: 9257 1625 Fax: 9257 1640

Author: E M Mattiske	MCPL Ref: AGA0703/061/08	Scale: 1:50,000
Drawn: CAD Resources - www.cadresources.com.au	Tel: (08) 9246 3242 - Fax: (08) 9246 3202	Figure: 2.08
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Note: For legend refer figure 1.00

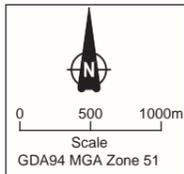
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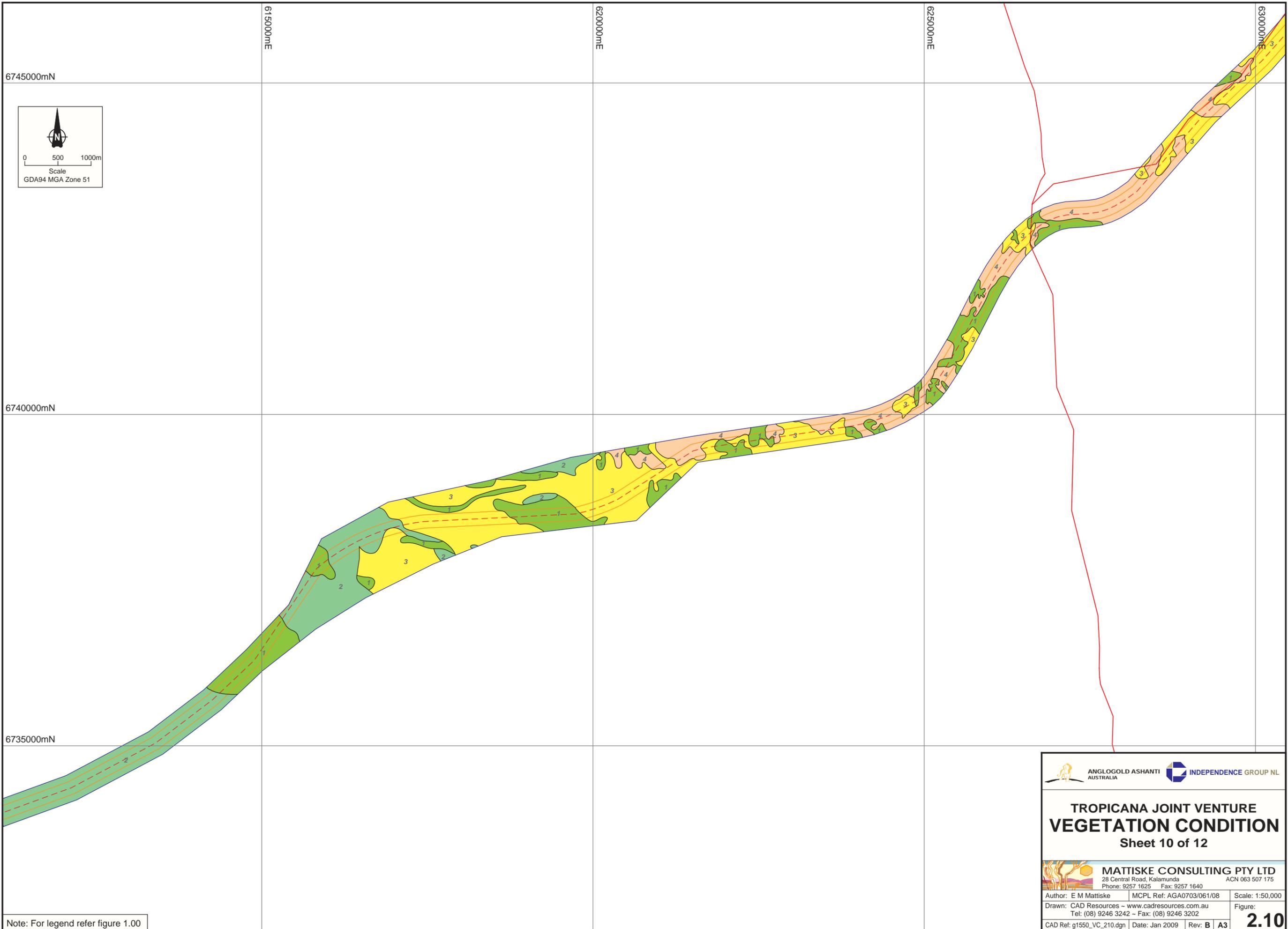


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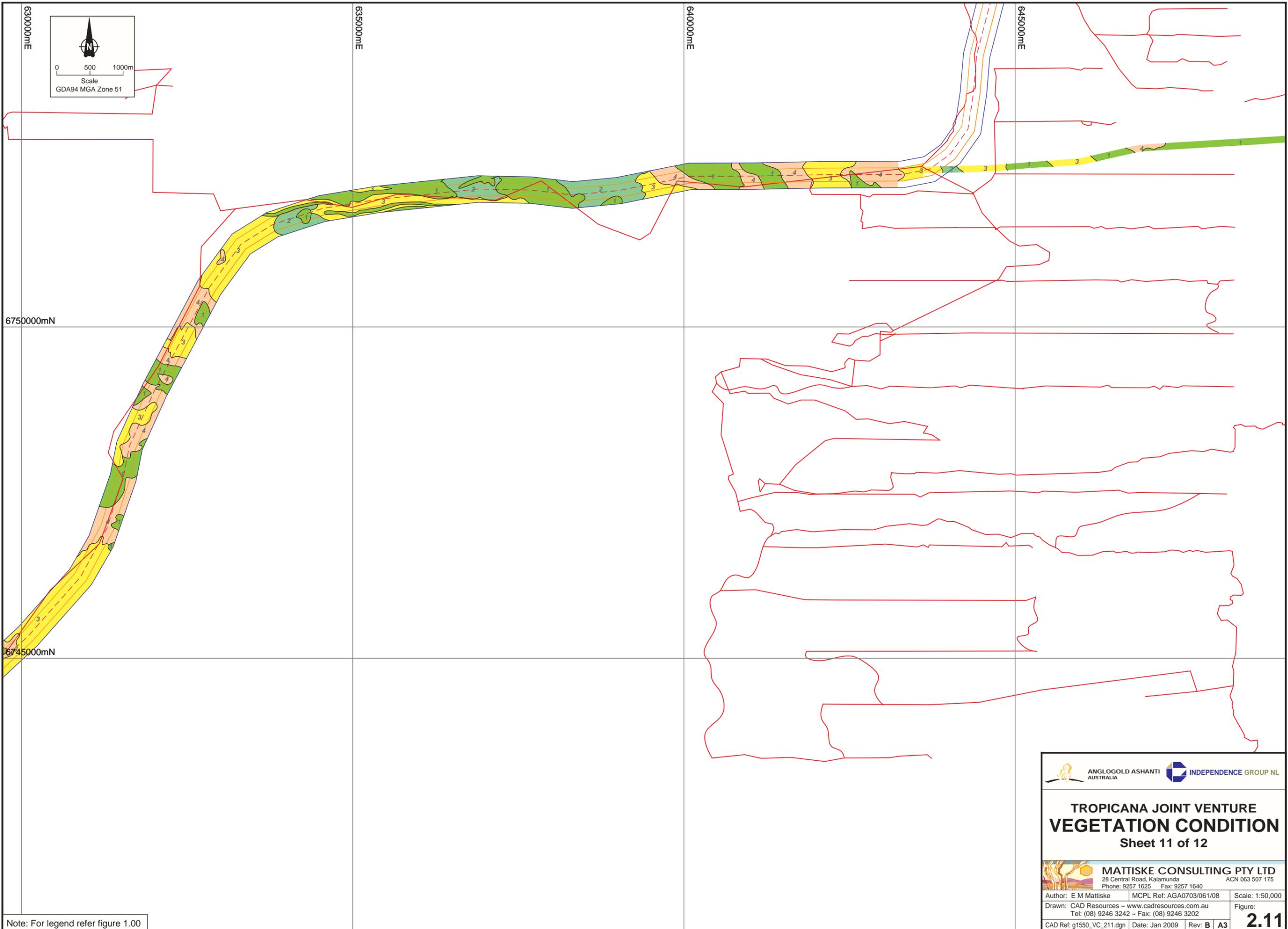
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TROPICANA JOINT VENTURE VEGETATION CONDITION Sheet 9 of 12			
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Author: E M Mattiske	MCPL Ref: AGA0703/061/08	Scale: 1:50,000	
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Tel: (08) 9246 3242 - Fax: (08) 9246 3202		2.09	
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Note: For legend refer figure 1.00

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TROPICANA JOINT VENTURE VEGETATION CONDITION Sheet 10 of 12			
 MATTISKE CONSULTING PTY LTD 28 Central Road, Kalamunda ACN 063 507 175 Phone: 9257 1625 Fax: 9257 1640			
Author: E M Mattiske	MCPL Ref: AGA0703/061/08	Scale: 1:50,000	
Drawn: CAD Resources - www.cadresources.com.au Tel: (08) 9246 3242 - Fax: (08) 9246 3202		Figure:	
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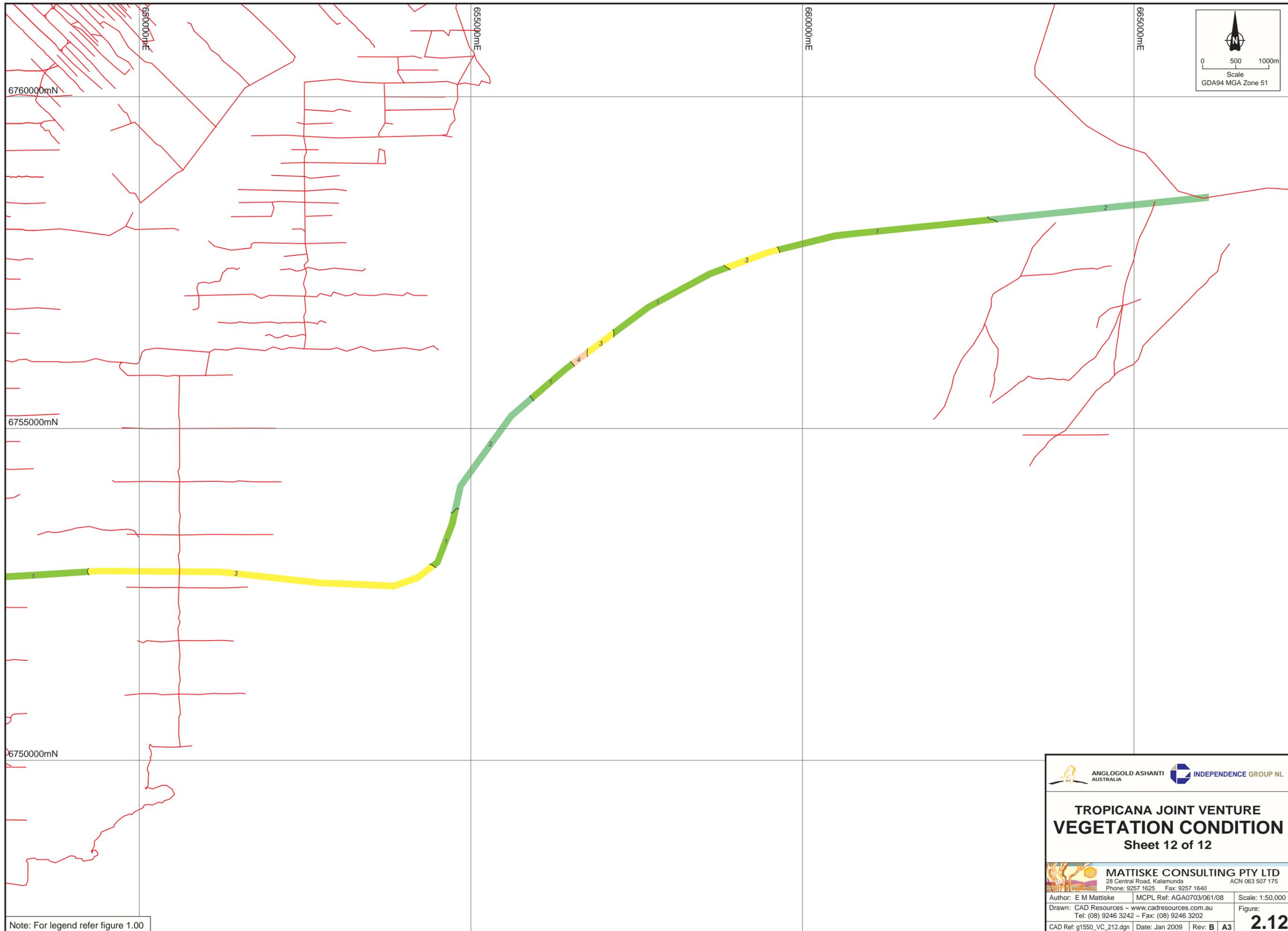
**TROPICANA JOINT VENTURE
VEGETATION CONDITION**
Sheet 11 of 12

MATTISKE CONSULTING PTY LTD
28 Central Road, Kalamunda ACN 063 507 175
Phone: 9257 1625 Fax: 9257 1640

Author: E M Mattiske	MCPL Ref: AGA0703/061/08	Scale: 1:50,000
Drawn: CAD Resources - www.cadresources.com.au	Tel: (08) 9246 3242 - Fax: (08) 9246 3202	Figure:
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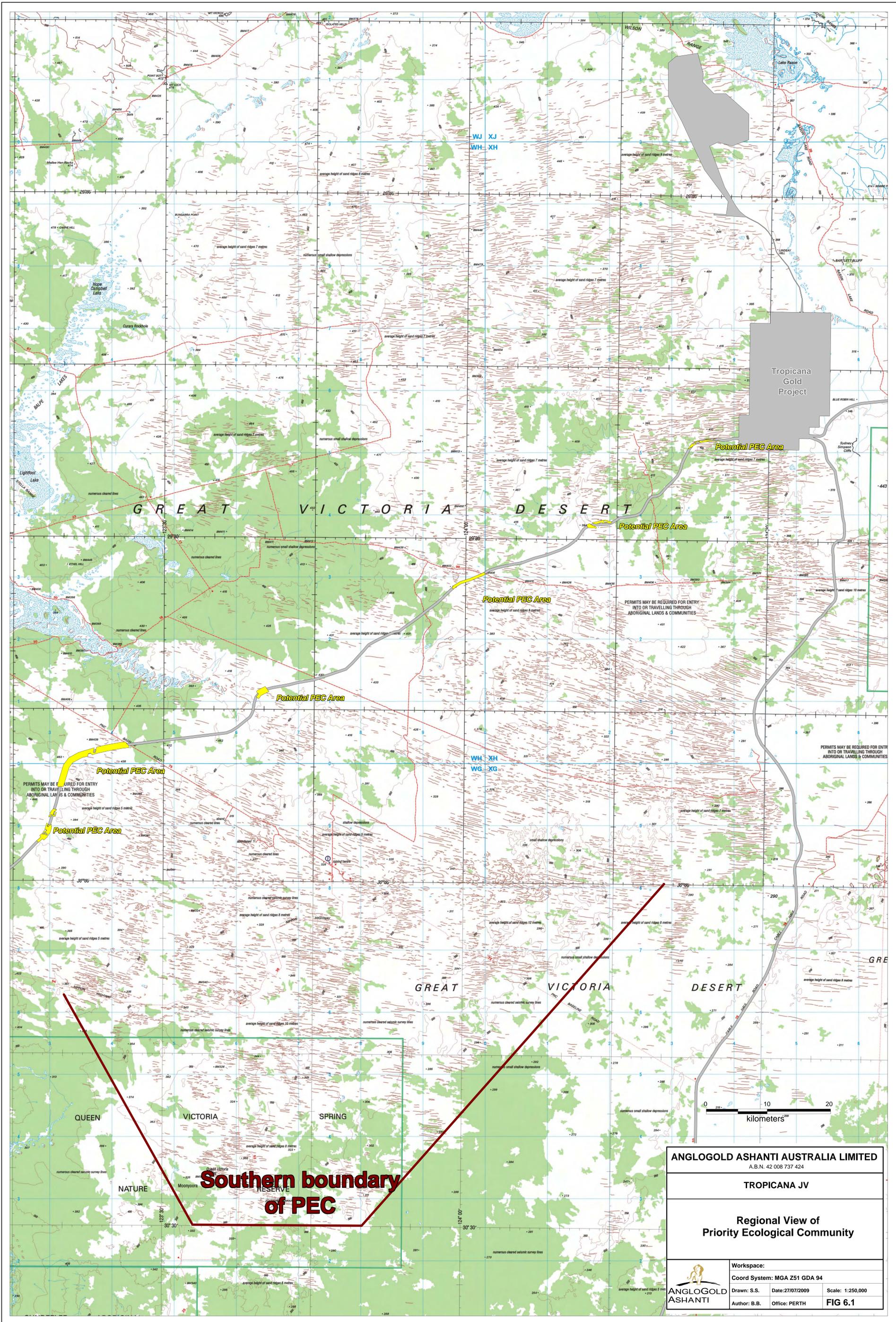
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Note: For legend refer figure 1.00



Note: For legend refer figure 1.00

 ANGLOGOLD ASHANTI AUSTRALIA		 INDEPENDENCE GROUP NL	
TROPICANA JOINT VENTURE VEGETATION CONDITION Sheet 12 of 12			
 MATTISKE CONSULTING PTY LTD 28 Central Road, Kalamunda ACN 063 507 175 Phone: 9257 1625 Fax: 9257 1640			
Author: E M Mattiske	MCPL Ref: AGA0703/061/08	Scale: 1:50,000	
Drawn: CAD Resources - www.cadresources.com.au Tel: (08) 9246 3242 - Fax: (08) 9246 3202			Figure:
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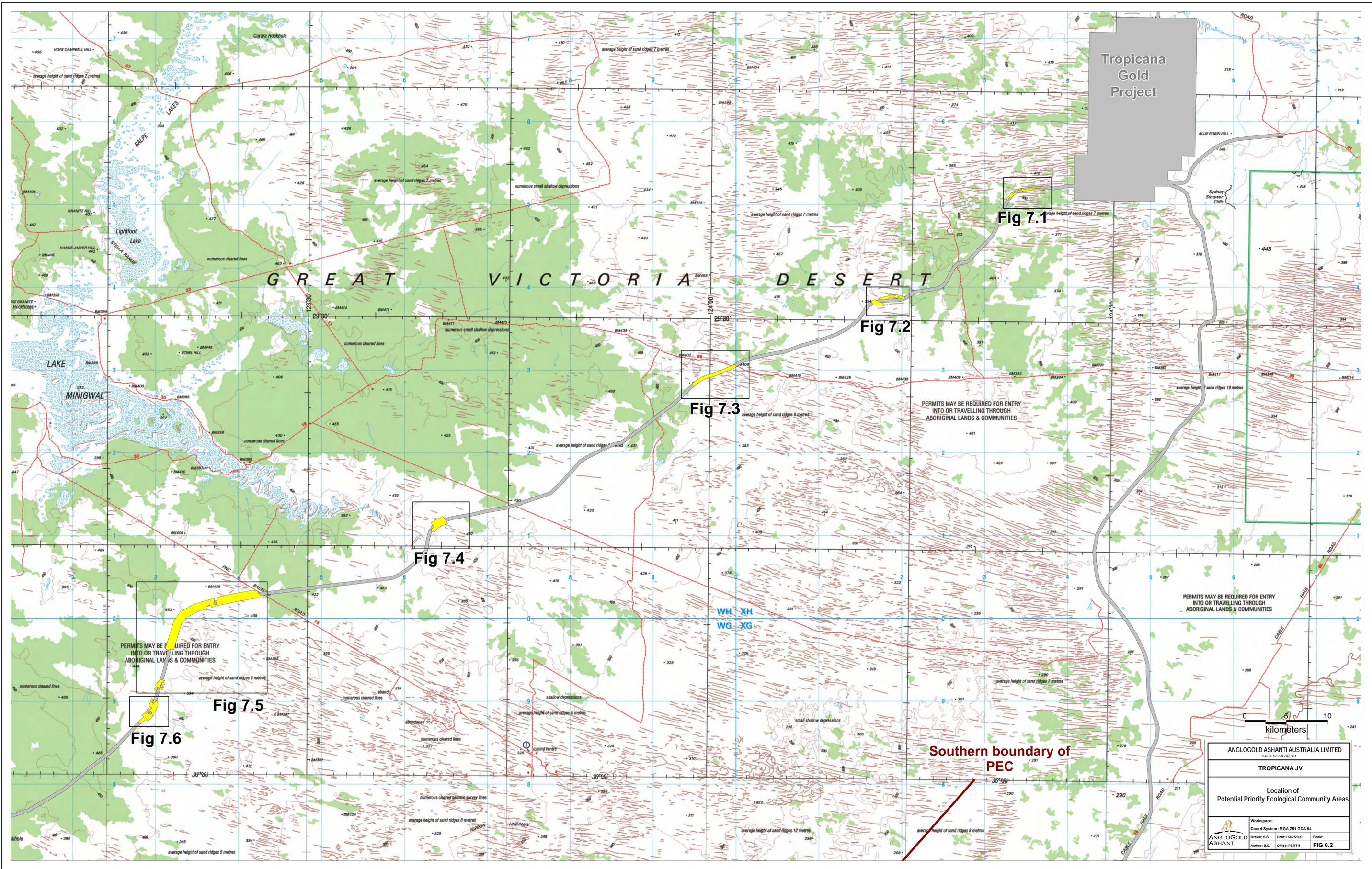
ANGLOGOLD ASHANTI AUSTRALIA LIMITED
A.B.N. 42 008 737 424

TROPICANA JV

Regional View of
Priority Ecological Community



Workspace:
Coord System: MGA Z51 GDA 94
Drawn: S.S. Date: 27/07/2009 Scale: 1:250,000
Author: B.B. Office: PERTH FIG 6.1



Tropicana Gold Project

Fig 7.1

Fig 7.2

Fig 7.3

Fig 7.4

Fig 7.5

Fig 7.6

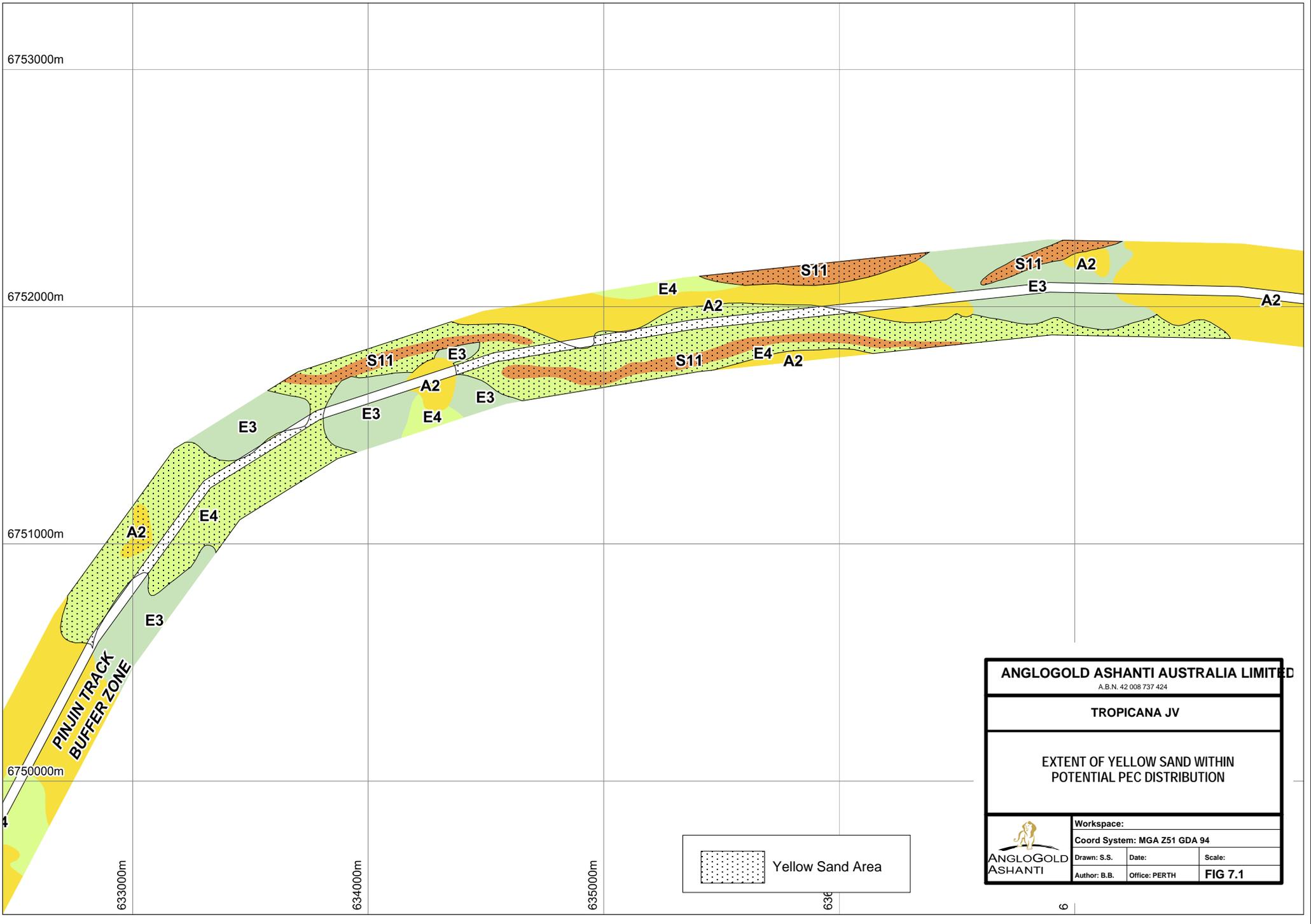
Southern boundary of PEC

PERMITS MAY BE REQUIRED FOR ENTRY INTO OR TRAVELLING THROUGH ABORIGINAL LANDS & COMMUNITIES

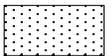
PERMITS MAY BE REQUIRED FOR ENTRY INTO OR TRAVELLING THROUGH ABORIGINAL LANDS & COMMUNITIES

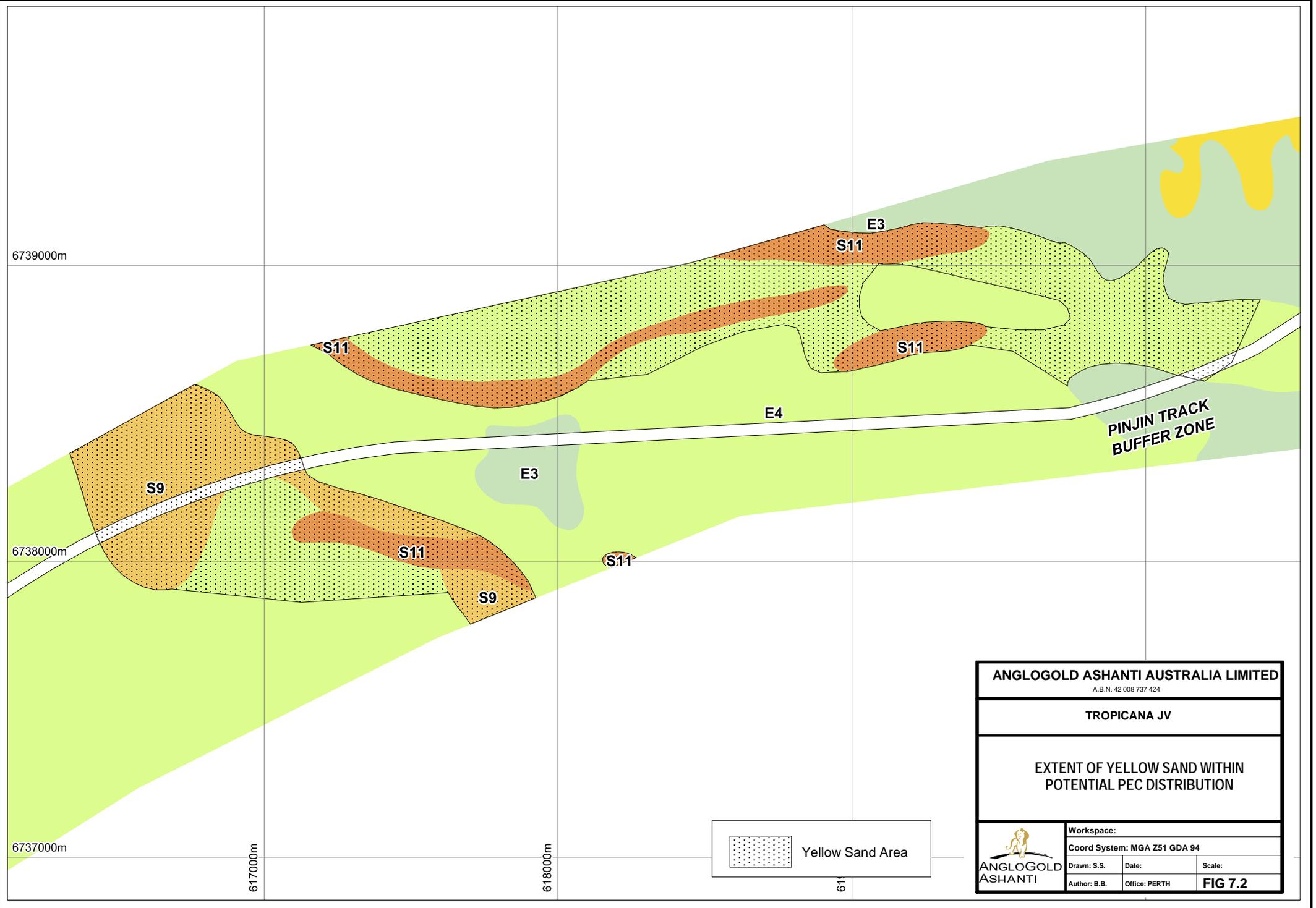
PERMITS MAY BE REQUIRED FOR ENTRY INTO OR TRAVELLING THROUGH ABORIGINAL LANDS & COMMUNITIES

ANGLGOLD ASHANTI AUSTRALIA LIMITED A.B.N. 42 008 737 424	
TROPICANA JV	
Location of Potential Priority Ecological Community Areas	
Workspace: Coord System: MGA Z51 GDA 94	Scale: 1:50,000
Drawn: S.S. Date: 27/07/2009	Author: B.B. Office: PERTH
FIG 6.2	



ANGLOGOLD ASHANTI AUSTRALIA LIMITED <small>A.B.N. 42 008 737 424</small>		
TROPICANA JV		
EXTENT OF YELLOW SAND WITHIN POTENTIAL PEC DISTRIBUTION		
		
Workspace:		
Coord System: MGA Z51 GDA 94		
Drawn: S.S.	Date:	Scale:
Author: B.B.	Office: PERTH	FIG 7.1


 Yellow Sand Area



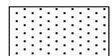
ANGLOGOLD ASHANTI AUSTRALIA LIMITED
 A.B.N. 42 008 737 424

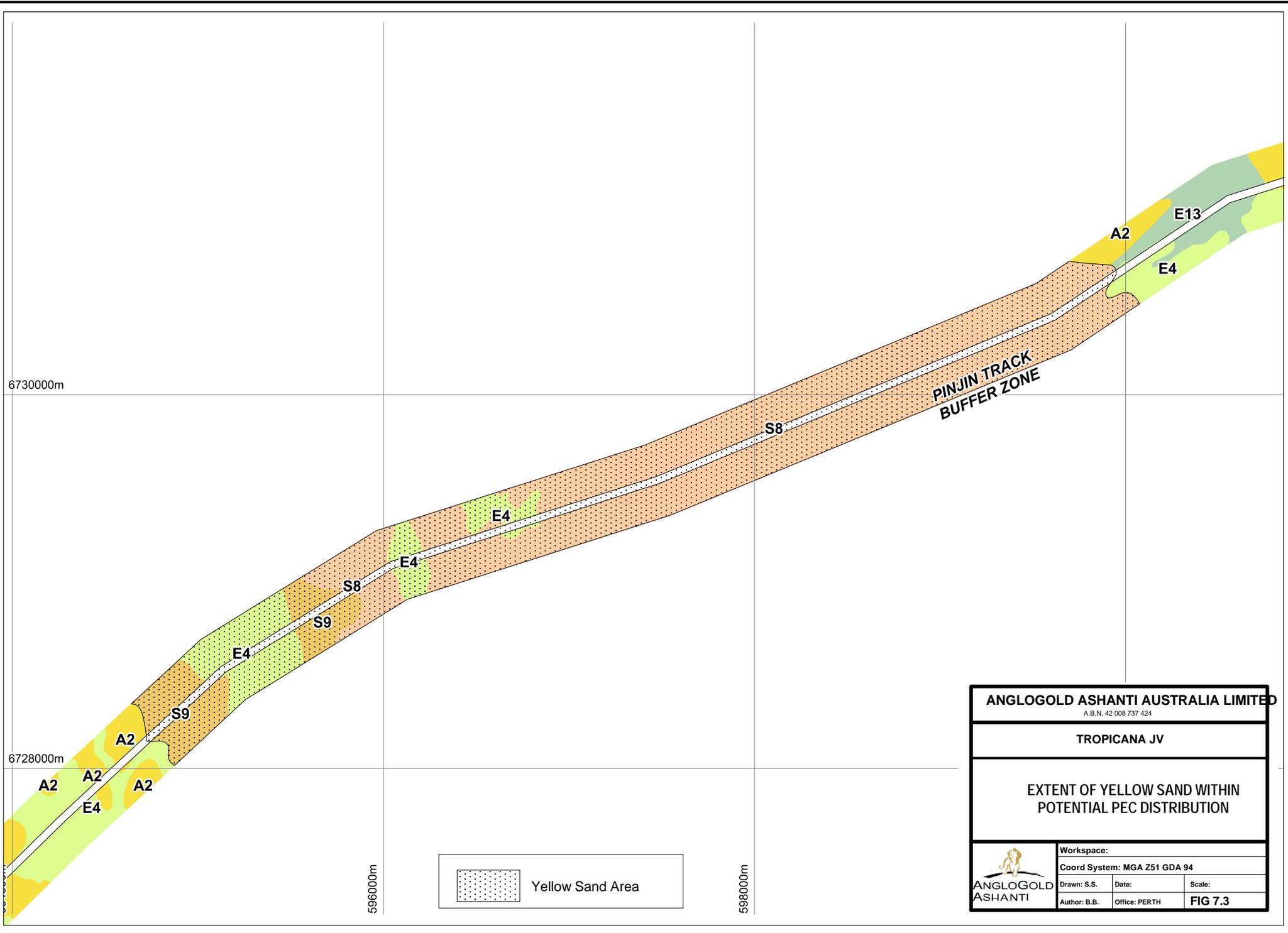
TROPICANA JV

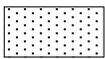
**EXTENT OF YELLOW SAND WITHIN
 POTENTIAL PEC DISTRIBUTION**



Workspace:		
Coord System: MGA Z51 GDA 94		
Drawn: S.S.	Date:	Scale:
Author: B.B.	Office: PERTH	FIG 7.2

 Yellow Sand Area



 Yellow Sand Area

ANGLOGOLD ASHANTI AUSTRALIA LIMITED <small>A.B.N. 42 008 737 424</small>			
TROPICANA JV			
EXTENT OF YELLOW SAND WITHIN POTENTIAL PEC DISTRIBUTION			
 ANGLOGOLD ASHANTI	Workspace:		
	Coord System: MGA Z51 GDA 94		
	Drawn: S.S.	Date:	Scale:
	Author: B.B.	Office: PERTH	FIG 7.3

6713000m

6712000m

6711000m

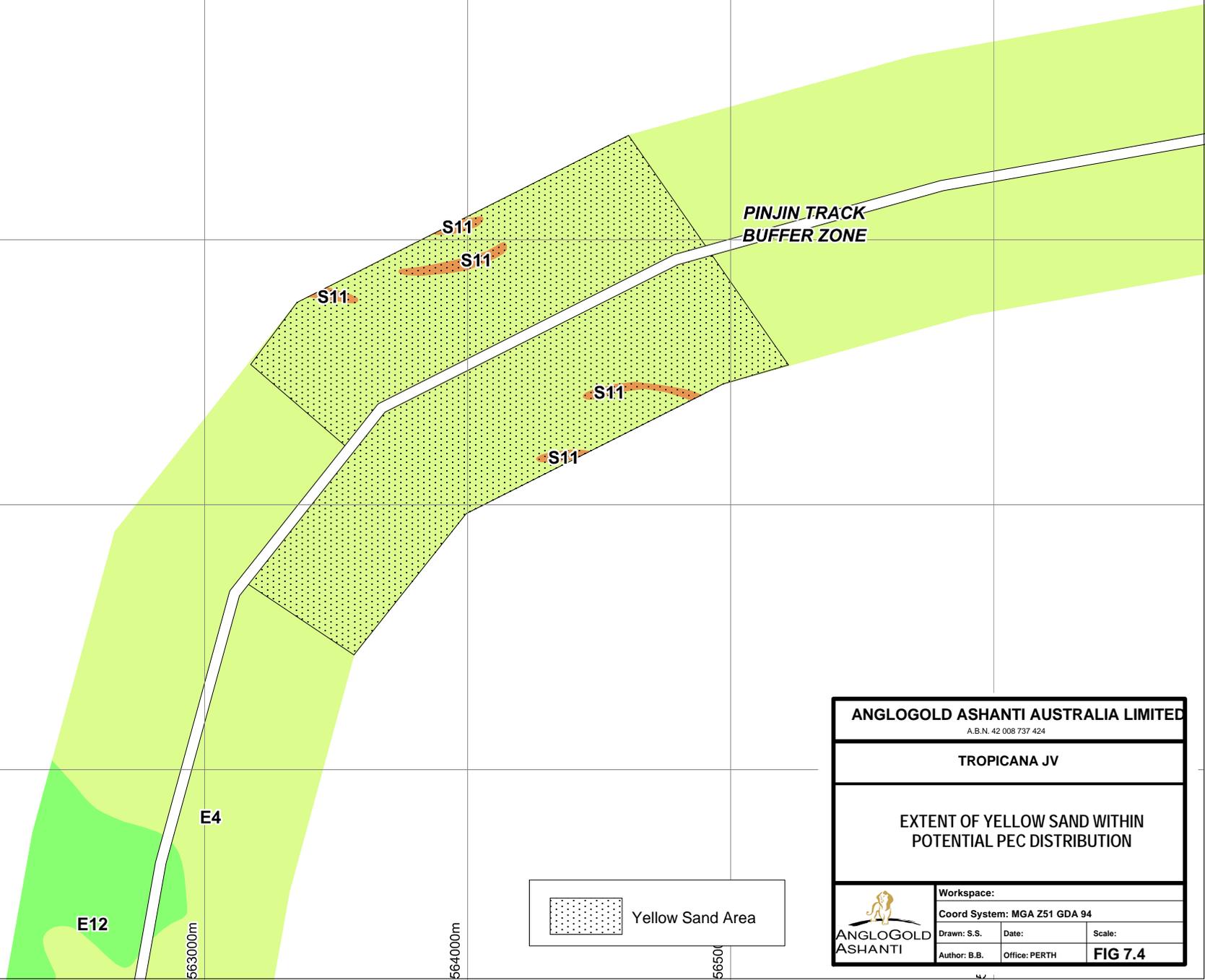
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563000m

564000m

565000m

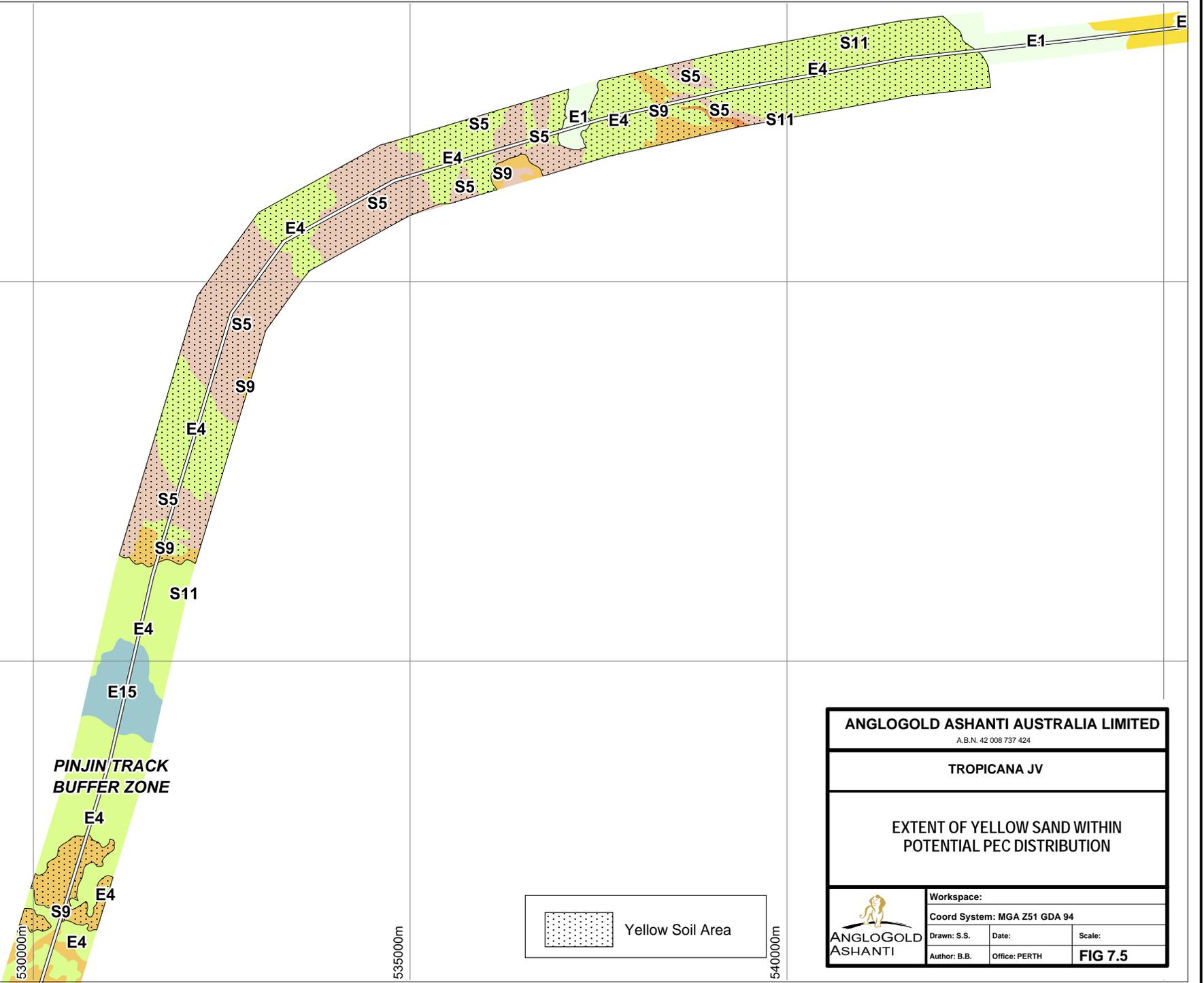


 Yellow Sand Area

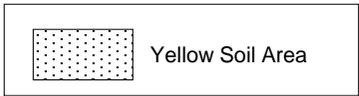
ANGLOGOLD ASHANTI AUSTRALIA LIMITED		
A.B.N. 42 008 737 424		
TROPICANA JV		
EXTENT OF YELLOW SAND WITHIN POTENTIAL PEC DISTRIBUTION		
		
Workspace:		
Coord System: MGA Z51 GDA 94		
Drawn: S.S.	Date:	Scale:
Author: B.B.	Office: PERTH	FIG 7.4

6700000m

6695000m



**PINJIN TRACK
BUFFER ZONE**



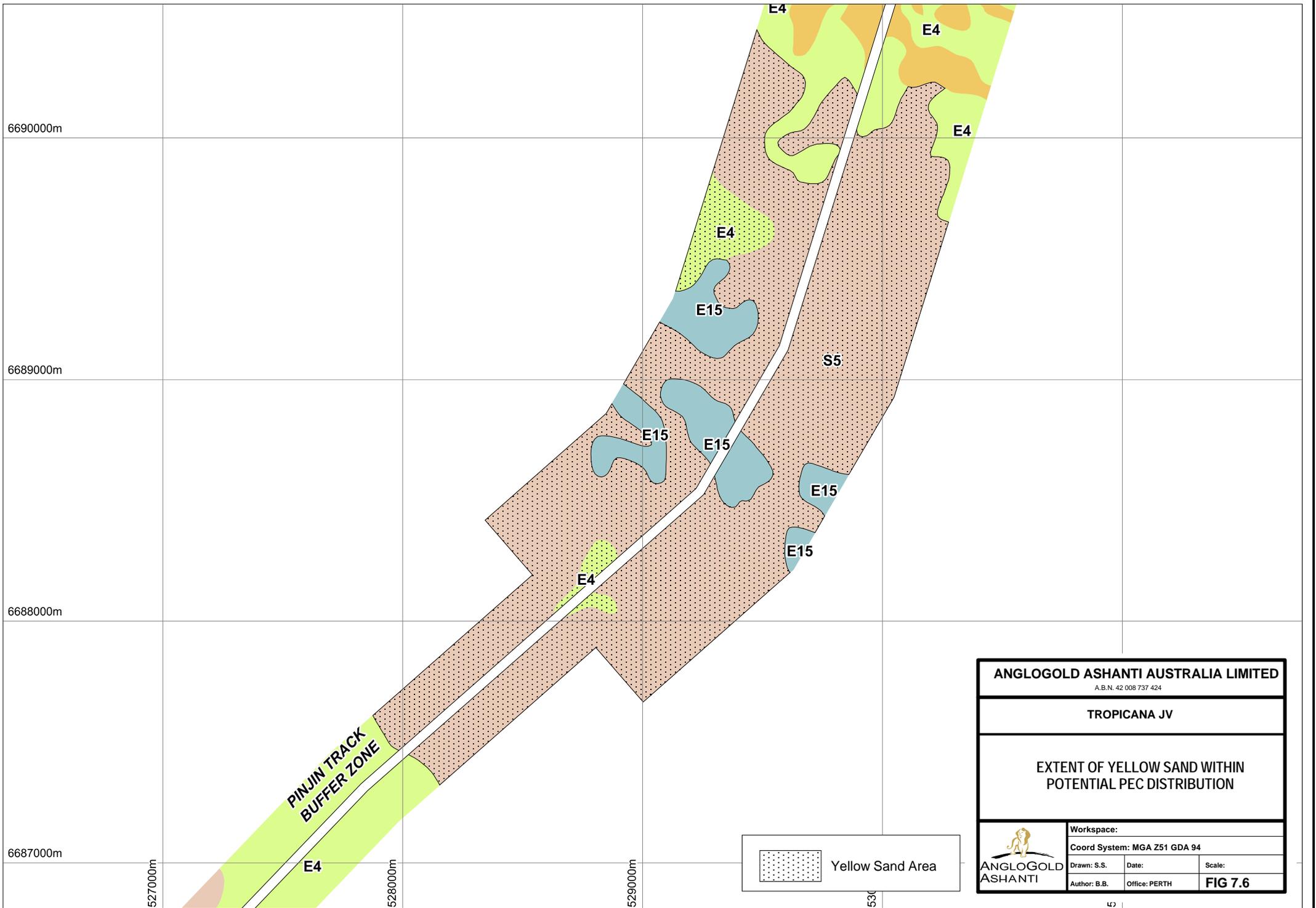
ANGLOGOLD ASHANTI AUSTRALIA LIMITED			
A.B.N. 42 008 737 424			
TROPICANA JV			
EXTENT OF YELLOW SAND WITHIN POTENTIAL PEC DISTRIBUTION			
Workspace:			
Coord System: MGA Z51 GDA 94			
Drawn: S.S.	Date:	Scale:	
Author: B.B.	Office: PERTH	FIG 7.5	



5300000m

5350000m

5400000m



ANGLOGOLD ASHANTI AUSTRALIA LIMITED

A.B.N. 42 008 737 424

TROPICANA JV

**EXTENT OF YELLOW SAND WITHIN
POTENTIAL PEC DISTRIBUTION**



Workspace:

Coord System: MGA Z51 GDA 94

Drawn: S.S.

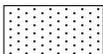
Date:

Scale:

Author: B.B.

Office: PERTH

FIG 7.6

 Yellow Sand Area

APPENDIX A Rare Flora Definitions and Categories

- A1: Definition of Rare and Priority Flora Species
- A2: Categories of Threatened Flora Species
- A3: Definition of Threatened Ecological Communities
- A4: Definition of Priority Ecological Communities

APPENDIX A1: DEFINITION OF RARE AND PRIORITY FLORA SPECIES (Department of Environment and Conservation 2008a)

Conservation Code	Category
R	<p>Declared Rare Flora – Extant Taxa</p> <p>“Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection and have been gazetted as such.”</p>
P1	<p>Priority One – Poorly Known Taxa</p> <p>“Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat. Such taxa are under consideration for declaration as ‘rare flora’, but are in urgent need of further survey.”</p>
P2	<p>Priority Two – Poorly Known Taxa</p> <p>“Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as ‘rare flora’, but urgently need further survey.”</p>
P3	<p>Priority Three – Poorly Known Taxa</p> <p>“Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as ‘rare flora’ but need further survey.”</p>
P4	<p>Priority Four – Rare Taxa</p> <p>“Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years.”</p>

APPENDIX A2: DEFINITION OF THREATENED FLORA SPECIES (Environment Protection and Biodiversity Conservation Act 1999 [Commonwealth])

Conservation Code	Category
Ex	<p>Extinct</p> <p>Taxa which at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.</p>
ExW	<p>Extinct in the Wild</p> <p>Taxa which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.</p>
CE	<p>Critically Endangered</p> <p>Taxa which at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.</p>
E	<p>Endangered</p> <p>Taxa which is not critically endangered and it is facing a very high risk of extinction in the wild in the immediate or near future, as determined in accordance with the prescribed criteria.</p>
V	<p>Vulnerable</p> <p>Taxa which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.</p>
CD	<p>Conservation Dependent</p> <p>Taxa which at a particular time if, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.</p>

APPENDIX A3 : DEFINITION OF THREATENED ECOLOGICAL COMMUNITIES (Department of Environment and Conservation 2008c)

Conservation Code	Category
PTD	<p>Presumed Totally Destroyed</p> <p>An ecological community will be listed as Presumed Totally Destroyed if there are no recent records of the community being extant and either of the following applies:</p> <ul style="list-style-type: none"> (i) records within the last 50 years have not been confirmed despite thorough searches or known likely habitats or; (ii) all occurrences recorded within the last 50 years have since been destroyed.
CE	<p>Critically Endangered</p> <p>An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future, meeting any one of the following criteria:</p> <ul style="list-style-type: none"> (i) The estimated geographic range and distribution has been reduced by at least 90% and is either continuing to decline with total destruction imminent, or is unlikely to be substantially rehabilitated in the immediate future due to modification; (ii) The current distribution is limited ie. highly restricted, having very few small or isolated occurrences, or covering a small area; (iii) The ecological community is highly modified with potential of being rehabilitated in the immediate future.
E	<p>Endangered</p> <p>An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. The ecological community must meet any one of the following criteria:</p> <ul style="list-style-type: none"> (i) The estimated geographic range and distribution has been reduced by at least 70% and is either continuing to decline with total destruction imminent in the short term future, or is unlikely to be substantially rehabilitated in the short term future due to modification; (ii) The current distribution is limited ie. highly restricted, having very few small or isolated occurrences, or covering a small area; (iii) The ecological community is highly modified with potential of being rehabilitated in the short term future.
V	<p>Vulnerable</p> <p>An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing high risk of total destruction in the medium to long term future. The ecological community must meet any one of the following criteria:</p> <ul style="list-style-type: none"> (i) The ecological community exists largely as modified occurrences that are likely to be able to be substantially restored or rehabilitated; (ii) The ecological community may already be modified and would be vulnerable to threatening process, and restricted in range or distribution; (iii) The ecological community may be widespread but has potential to move to a higher threat category due to existing or impending threatening processes.

APPENDIX A4: DEFINITION OF PRIORITY ECOLOGICAL COMMUNITIES (Department of Environment and Conservation 2008e)

Conservation Code	Category
P1	<p>Poorly-known ecological communities</p> <p>Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) and for which current threats exist.</p>
P2	<p>Poorly-known ecological communities</p> <p>Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, un-allocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation.</p>
P3	<p>Poorly known ecological communities</p> <p>(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:</p> <p>(ii) Communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or;</p> <p>(iii) Communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing and inappropriate fire regimes.</p>
P4	<p>Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.</p>
P5	<p>Conservation Dependent ecological communities</p> <p>Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.</p>

APPENDIX B

Summary of Vascular Plant Species recorded within Proposed Pinjin Access Road and Infrastructure Corridor, 2007-2008

**APPENDIX B: SUMMARY OF VASCULAR PLANT SPECIES RECORDED WITHIN PROPOSED
PINJIN ACCESS ROAD AND INFRASTRUCTURE CORRIDOR 2007-2008**

Note: P1, P2, P3 and P4 denote - Priority Flora Species (DEC, 2008a)
(R) denotes Rare Flora (DEC, 2008a)

Family	Species
ADIANTACEAE	<i>Cheilanthes sieberi</i>
CUPRESSACEAE	<i>Callitris preissii</i> <i>Callitris</i> sp.
POACEAE	<i>Aristida contorta</i> <i>Austrostipa nitida</i> <i>Austrostipa</i> sp. <i>Enneapogon caerulescens</i> <i>Enteropogon ramosus</i> <i>Eragrostis eriopoda</i> <i>Eragrostis falcata</i> <i>Eragrostis pergracilis</i> <i>Eragrostis</i> sp. <i>Paspalidium basicladum</i> <i>Triodia basedowii</i> <i>Triodia desertorum</i> <i>Triodia rigidissima</i> <i>Triodia scariosa</i>
CYPERACEAE	<i>Caustis dioica</i> <i>Chrysitrix distigmatosa</i> <i>Lepidosperma</i> sp. A2 Island Flat <i>Schoenus subaphyllus</i>
RESTIONACEAE	<i>Lepidobolus deserti</i> (P4)
DASYPOGONACEAE	? <i>Chamaexeros fimbriata</i> <i>Lomandra leucocephala</i>
XANTHORRHOACEAE	<i>Xanthorrhoea thorntonii</i>
PHORMIACEAE	<i>Dianella revoluta</i> var. <i>divaricata</i>
ANTHERICACEAE	<i>Tricoryne</i> sp. Mullewa (G.J. Keighery 12080)
CASUARINACEAE	<i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i> <i>Allocasuarina helmsii</i> <i>Allocasuarina spinosissima</i> <i>Allocasuarina</i> sp. <i>Casuarina pauper</i>
PROTEACEAE	<i>Banksia elderiana</i> <i>Conospermum toddii</i> (R) <i>Grevillea acacioides</i> <i>Grevillea acuaria</i> <i>Grevillea didymobotrya</i> subsp. <i>didymobotrya</i> <i>Grevillea juncifolia</i> <i>Grevillea juncifolia</i> subsp. <i>temulenta</i>

**APPENDIX B: SUMMARY OF VASCULAR PLANT SPECIES RECORDED WITHIN PROPOSED
PINJIN ACCESS ROAD AND INFRASTRUCTURE CORRIDOR 2007-2008**

Note: P1, P2, P3 and P4 denote - Priority Flora Species (DEC, 2008a)
(R) denotes Rare Flora (DEC, 2008a)

Family	Species
PROTEACEAE (continued)	<i>Grevillea nematophylla</i> subsp. <i>planicosta</i> <i>Grevillea sarissa</i> <i>Grevillea secunda</i> (P2) <i>Hakea francisiana</i> <i>Hakea preissii</i> <i>Hakea recurva</i> <i>Persoonia coriacea</i> <i>Persoonia pertinax</i>
SANTALACEAE	<i>Exocarpos aphyllus</i> <i>Santalum acuminatum</i> <i>Santalum spicatum</i>
LORANTHACEAE	<i>Amyema fitzgeraldii</i> <i>Amyema gibberula</i> var. ? <i>gibberula</i> <i>Lysiana casuarinae</i>
CHENOPODIACEAE	<i>Atriplex nummularia</i> <i>Atriplex stipitata</i> <i>Atriplex vesicaria</i> <i>Enchylaena tomentosa</i> <i>Maireana appressa</i> <i>Maireana atkinsiana</i> <i>Maireana pyramidata</i> <i>Maireana sedifolia</i> <i>Maireana suaedifolia</i> <i>Maireana tomentosa</i> <i>Maireana trichoptera</i> <i>Maireana triptera</i> <i>Rhagodia drummondii</i> <i>Rhagodia eremaea</i> <i>Rhagodia preissii</i> <i>Rhagodia spinescens</i> <i>Salsola tragus</i> <i>Sclerolaena cuneata</i> <i>Sclerolaena ?deserticola</i> <i>Sclerolaena diacantha</i> <i>Tecticornia halocnemoides</i> <i>Tecticornia indica</i> subsp. <i>bidens</i> <i>Tecticornia pergranulata</i> <i>Tecticornia ?pruinosa</i> <i>Tecticornia undulata</i>
AMARANTHACEAE	<i>Hemichroa diandra</i> <i>Ptilotus ?drummondii</i> <i>Ptilotus obovatus</i> <i>Ptilotus ?polystachyus</i>

**APPENDIX B: SUMMARY OF VASCULAR PLANT SPECIES RECORDED WITHIN PROPOSED
PINJIN ACCESS ROAD AND INFRASTRUCTURE CORRIDOR 2007-2008**

Note: P1, P2, P3 and P4 denote - Priority Flora Species (DEC, 2008a)
(R) denotes Rare Flora (DEC, 2008a)

Family	Species
GYROSTEMONACEAE	? <i>Codonocarpus cotinifolius</i> ? <i>Gyrostemon racemiger</i>
AIZOACEAE	<i>Disphyma crassifolium</i>
PITTOSPORACEAE	<i>Bursaria occidentalis</i> <i>Marianthus bicolor</i> <i>Pittosporum angustifolium</i>
MIMOSACEAE	<i>Acacia acanthoclada</i> subsp. <i>acanthoclada</i> <i>Acacia aneura</i> var. <i>aneura</i> <i>Acacia aneura</i> var. <i>argentea</i> <i>Acacia aneura</i> var. <i>conifera</i> <i>Acacia ayersiana</i> <i>Acacia burkittii</i> <i>Acacia calcarata</i> <i>Acacia colletioides</i> <i>Acacia desertorum</i> var. <i>desertorum</i> <i>Acacia fragilis</i> <i>Acacia helmsiana</i> <i>Acacia hemiteles</i> <i>Acacia heteroneura</i> var. <i>jutsonii</i> <i>Acacia kempeana</i> <i>Acacia ligulata</i> <i>Acacia murrayana</i> <i>Acacia oswaldii</i> <i>Acacia prainii</i> <i>Acacia ramulosa</i> var. <i>ramulosa</i> <i>Acacia sibina</i> <i>Acacia tetragonophylla</i> <i>Acacia xerophila</i> var. <i>brevior</i> <i>Acacia</i> sp.
CAESALPINIACEAE	<i>Senna artemisioides</i> subsp. <i>x artemisioides</i> <i>Senna artemisioides</i> subsp. <i>filifolia</i> <i>Senna artemisioides</i> subsp. <i>helmsii</i> <i>Senna artemisioides</i> subsp. <i>petiolaris</i> <i>Senna pleurocarpa</i> var. <i>pleurocarpa</i>
PAPILIONACEAE	<i>Daviesia benthamii</i> subsp. <i>acanthoclona</i> <i>Daviesia grahamii</i> <i>Daviesia purpureascens</i> (P4) <i>Daviesia</i> ? <i>purpureascens</i> (P4) <i>Gompholobium gompholobioides</i> ? <i>Indigofera georgei</i> ? <i>Jacksonia nematochlada</i> <i>Leptosema chambersii</i> <i>Leptosema daviesioides</i>

**APPENDIX B: SUMMARY OF VASCULAR PLANT SPECIES RECORDED WITHIN PROPOSED
PINJIN ACCESS ROAD AND INFRASTRUCTURE CORRIDOR 2007-2008**

Note: P1, P2, P3 and P4 denote - Priority Flora Species (DEC, 2008a)
(R) denotes Rare Flora (DEC, 2008a)

Family	Species
PAPILIONACEAE (Continued)	<i>Mirbelia depressa</i> <i>Mirbelia seorsifolia</i> <i>Otion simplicifolium</i> <i>Otion tortile</i> (ms) <i>Templetonia aculeata</i> <i>Templetonia egena</i>
RUTACEAE	<i>Phebalium brevifolium</i> <i>Phebalium canaliculatum</i> <i>Phebalium laevigatum</i> ? <i>Phebalium</i> sp. <i>Philotheca tomentella</i>
POLYGALACEAE	<i>Comesperma viscidulum</i> (P4)
EUPHORBIACEAE	<i>Bertya dimerostigma</i> <i>Beyeria brevifolia</i> var. <i>robustior</i> <i>Euphorbia drummondii</i> <i>Euphorbia tannensis</i> <i>Monotaxis luteiflora</i>
SAPINDACEAE	<i>Alectryon oleifolius</i> subsp. <i>canescens</i> <i>Dodonaea amblyophylla</i> <i>Dodonaea lobulata</i> <i>Dodonaea microzyga</i> var. <i>acrolobata</i> <i>Dodonaea rigida</i> <i>Dodonaea stenozyga</i> <i>Dodonaea viscosa</i> subsp. <i>angustissima</i> <i>Dodonaea viscosa</i> subsp. <i>spatulata</i>
RHAMNACEAE	<i>Cryptandra aridicola</i> <i>Cryptandra distigma</i> ? <i>Cryptandra</i> sp.
MALVACEAE	<i>Abutilon cryptopetalum</i> <i>Abutilon otocarpum</i> <i>Alyogyne pinoniana</i> var. <i>leptochlamys</i> (ms) <i>Hibiscus sturtii</i> var. <i>truncatus</i> <i>Lawrencia squamata</i> <i>Sida calyxhymenia</i> <i>Sida spodochroma</i>
STERCULIACEAE	<i>Brachychiton gregorii</i> <i>Commersonia melanopetala</i> <i>Hannafordia bissillii</i> subsp. <i>bissillii</i> <i>Keraudrenia velutina</i> <i>Keraudrenia velutina</i> subsp. <i>velutina</i>
DILLENIACEAE	<i>Hibbertia</i> sp. (nov.)

**APPENDIX B: SUMMARY OF VASCULAR PLANT SPECIES RECORDED WITHIN PROPOSED
PINJIN ACCESS ROAD AND INFRASTRUCTURE CORRIDOR 2007-2008**

Note: P1, P2, P3 and P4 denote - Priority Flora Species (DEC, 2008a)
(R) denotes Rare Flora (DEC, 2008a)

Family	Species
FRANKENIACEAE	<i>Frankenia ?cinerea</i> <i>Frankenia fecunda</i> <i>Frankenia pauciflora</i> <i>Frankenia setosa</i>
VILOACEAE	<i>Hybanthus floribundus</i>
MYRTACEAE	<i>Aluta maisonneuvei</i> subsp. <i>auriculata</i> <i>Baeckea</i> sp. Great Victoria Desert (P2) <i>Callistemon phoeniceus</i> <i>Calothamnus gilesii</i> <i>Enekbatus eremaeus</i> <i>Eucalyptus ceratocorys</i> <i>Eucalyptus concinna</i> <i>Eucalyptus ebbanoensis</i> subsp. <i>ebbanoensis</i> <i>Eucalyptus effusa</i> <i>Eucalyptus ewartiana</i> <i>Eucalyptus gongylocarpa</i> <i>Eucalyptus gracilis</i> <i>Eucalyptus horistes</i> <i>Eucalyptus hypolaena</i> <i>Eucalyptus leptophylla</i> <i>Eucalyptus ?lucasii</i> <i>Eucalyptus mannensis</i> subsp. <i>mannensis</i> <i>Eucalyptus oleosa</i> <i>Eucalyptus pimpiniana</i> (P3) <i>Eucalyptus platycorys</i> <i>Eucalyptus rosacea</i> <i>Eucalyptus salicola</i> <i>Eucalyptus salubris</i> <i>Eucalyptus transcontinentalis</i> <i>Eucalyptus trivalva</i> <i>Eucalyptus youngiana</i> <i>Homalocalyx thryptomenoides</i> <i>Leptospermum fastigiatum</i> <i>Melaleuca eleuterostachya</i> <i>Melaleuca halmaturorum</i> <i>Melaleuca hamata</i> <i>Micromyrtus hymenonema</i> <i>Micromyrtus serrulata</i> (P3) <i>Micromyrtus stenocalyx</i> (P3) <i>Thryptomene biseriata</i> <i>Thryptomene eremaea</i> (P2) <i>Verticordia helmsii</i>
HALORAGACEAE	<i>Glischrocaryon aureum</i>
EPACRIDACEAE	<i>Leucopogon cuneifolius</i> <i>Styphelia intertexta</i>
LOGANIACEAE	<i>Logania nuda</i>

**APPENDIX B: SUMMARY OF VASCULAR PLANT SPECIES RECORDED WITHIN PROPOSED
PINJIN ACCESS ROAD AND INFRASTRUCTURE CORRIDOR 2007-2008**

Note: P1, P2, P3 and P4 denote - Priority Flora Species (DEC, 2008a)
(R) denotes Rare Flora (DEC, 2008a)

Family	Species
APOCYNACEAE	<i>Alyxia buxifolia</i>
ASCLEPIADACEAE	<i>Marsdenia australis</i> <i>Rhyncharrhena linearis</i>
BORAGINACEAE	<i>Halgania cyanea</i> var. Allambi Stn <i>Halgania integerrima</i>
LAMIACEAE	<i>Dicrastylis brunnea</i> <i>Dicrastylis cundeeleensis</i> (P3) <i>Dicrastylis nicholasii</i> (P2) <i>Microcorys macredieana</i> (P3) <i>Pityrodia lepidota</i> <i>Pityrodia loricata</i> <i>Prostanthera althoferi</i> subsp. <i>althoferi</i> <i>Prostanthera laricoides</i> * <i>Salvia verbenaca</i> <i>Spartothamnella teucriflora</i> <i>Westringia cephalantha</i> <i>Westringia rigida</i>
SOLANACEAE	<i>Anthotroche pannosa</i> <i>Duboisia hopwoodii</i> <i>Solanum ellipticum</i> <i>Solanum ?ferocissimum</i> <i>Solanum lasiophyllum</i> <i>Solanum nummularium</i> <i>Solanum orbiculatum</i> <i>Solanum plicatile</i>
MYOPORACEAE	<i>Eremophila alternifolia</i> <i>Eremophila caperata</i> <i>Eremophila decipiens</i> subsp. <i>decipiens</i> <i>Eremophila dempsteri</i> <i>Eremophila forrestii</i> <i>Eremophila glabra</i> subsp. <i>glabra</i> <i>Eremophila granitica</i> <i>Eremophila latrobei</i> subsp. <i>?glabra</i> <i>Eremophila latrobei</i> subsp. <i>latrobei</i> <i>Eremophila longifolia</i> <i>Eremophila maculata</i> subsp. <i>brevifolia</i> <i>Eremophila miniata</i> <i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i> <i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i> <i>Eremophila platythamnus</i> subsp. <i>platythamnus</i> <i>Eremophila pustulata</i> <i>Eremophila scoparia</i> <i>Eremophila serrulata</i>
RUBIACEAE	<i>Psydrax suaveolens</i>

**APPENDIX B: SUMMARY OF VASCULAR PLANT SPECIES RECORDED WITHIN PROPOSED
PINJIN ACCESS ROAD AND INFRASTRUCTURE CORRIDOR 2007-2008**

Note: P1, P2, P3 and P4 denote - Priority Flora Species (DEC, 2008a)
(R) denotes Rare Flora (DEC, 2008a)

Family	Species
GOODENIACEAE	<i>Dampiera ramosa</i> <i>Goodenia elderi</i> <i>Goodenia quasilibera</i> <i>Goodenia xanthosperma</i>
GOODENIACEAE (Continued)	<i>Scaevola basedowii</i> <i>Scaevola ?parvifolia</i> <i>Scaevola spinescens</i>
ASTERACEAE	<i>Brachyscome ciliaris</i> <i>Cassinia arcuata</i> <i>Chrysocephalum puteale</i> <i>Cratystylis subspinescens</i> <i>?Leiocarpa semicalva</i> <i>Olearia arida</i> (P2) <i>Olearia exiguifolia</i> <i>Olearia incana</i> (ms) <i>Olearia lanuginosa</i> <i>Olearia muelleri</i> <i>Podolepis capillaris</i> <i>Senecio ?pinnatifolius</i> <i>Vittadinia sulcata</i>

APPENDIX C

Vascular Plant Species recorded in Plant Communities in the Pinjin Access Road and Infrastructure Corridor, 2007-2008

APPENDIX D

Summary of Site Recording Locations 2005 - 2008

APPENDIX D: SUMMARY OF SITE RECORDING LOCATIONS, 2005-2008

GDA94 Easting mE	GDA94 Northing mN
467773	6665053
468596	6665807
468720	6665251
469264	6666498
469963	6667101
470248	6667084
470476	6666753
471609	6668514
472012	6668775
472331	6665850
472389	6669028
472464	6668536
472814	6666412
473078	6665583
473340	6668697
473463	6665709
474223	6668836
474315	6669164
474521	6669000
474833	6666869
474891	6669066
475125	6669200
475815	6666274
475895	6669415
475910	6665855
476341	6665586
476519	6669384
476760	6666462
477716	6670320
478339	6666176
478397	6670764
479092	6666369
479506	6670710
479873	6667162
480110	6670600
480538	6667835
480777	6667596
481142	6670455
481161	6668595
481205	6668184
481438	6668952
481586	6670537
481602	6670286
481791	6669203
482066	6669268
482235	6670800
482417	6671677
482417	6672385
482458	6671789
482667	6670890
483180	6672364
483887	6672299

APPENDIX D: SUMMARY OF SITE RECORDING LOCATIONS, 2005-2008

GDA94 Easting mE	GDA94 Northing mN
484683	6672584
485130	6672923
486941	6673965
487555	6674301
487851	6674458
488392	6674638
488579	6674534
488927	6674400
490242	6674244
491217	6674085
493562	6673957
494941	6674077
495079	6673552
496648	6672974
497385	6672922
498689	6672677
499480	6672864
500956	6675007
501433	6674371
504885	6674486
506102	6674349
507717	6674852
507845	6674827
508415	6674922
509847	6675227
510544	6675623
510544	6675623
511890	6678105
512611	6681100
513319	6681144
513380	6677237
514320	6681128
514743	6677047
514931	6681075
515104	6677198
515873	6681052
517861	6681076
520973	6681107
525526	6685190
528520	6687111
528814	6688262
529211	6687473
529601	6689336
530174	6692025
530697	6692026
530951	6693554
531300	6694990
531530	6696528
532107	6695909
532266	6697939
535506	6701511
543657	6703072

APPENDIX D: SUMMARY OF SITE RECORDING LOCATIONS, 2005-2008

GDA94 Easting mE	GDA94 Northing mN
544540	6704780
548500	6703800
549522	6703837
550032	6703933
551090	6704068
554617	6704391
560370	6706060
561625	6707100
569591	6713135
570897	6713450
572593	6713619
573652	6713898
574183	6714023
575050	6714353
576245	6714572
580150	6717920
580900	6718591
582652	6719866
586331	6721515
586502	6721411
586622	6721528
587355	6722050
588694	6723260
589437	6723750
590062	6724273
590438	6724355
590820	6724678
591015	6724849
592094	6725711
592970	6726464
594852	6728220
594908	6728407
595339	6728693
596381	6729213
597320	6729488
598176	6729840
599263	6730209
600544	6730971
604206	6732002
605720	6732180
606780	6732450
607619	6732855
609172	6733347
610141	6733600
610790	6733811
612060	6734510
613146	6734955
613605	6735231
615309	6736470
615602	6737304
616239	6737295
616618	6737465

APPENDIX D: SUMMARY OF SITE RECORDING LOCATIONS, 2005-2008

GDA94 Easting mE	GDA94 Northing mN
616758	6738271
617070	6737890
618412	6738783
618491	6738442
619394	6738530
619414	6739080
622220	6739457
623401	6739838
625019	6740508
625552	6741046
626104	6742414
626541	6742647
626884	6742913
630372	6746631
631105	6746639
631549	6747842
631832	6748662
634901	6701409
634929	6751712
635634	6751973
636834	6752228
636873	6752050
637509	6752048
638466	6752087
641302	6752273
642112	6752412
644543	6752378
645180	6752461
645851	6752494
646898	6752676
647628	6752746
649000	6752824
650514	6752869
652914	6752696
653903	6752689
654624	6753311
655028	6754418
656685	6756210
657342	6756499
658611	6757323
659336	6757579
660502	6757876
661390	6757972
662002	6757798
662429	6758088
663230	6758185
664478	6758302
664983	6758324
665902	6758449

APPENDIX E

***Eucalyptus articulata* Search**

APPENDIX E: *Eucalyptus articulata* Search

A targeted search was undertaken for AngloGold Ashanti by botanists from Mattiske Consulting during March and May 2008 for *Eucalyptus articulata*, a declared rare mallee known to occur in the vicinity of Ponton Creek, east of Kalgoorlie.

Known locations of *Eucalyptus articulata* were inspected, to increase knowledge of soils, topography and vegetation where this species is found.

Eucalyptus articulata was observed growing on dull orange-brown or deep red-orange sandy loams with arkose rock cover and occasional weathered granite outcropping on upper or mid slopes. *Eucalyptus articulata* was recorded from the following vegetation:

- Low Open Woodland of *Eucalyptus concinna* with *Acacia ayersiana* and *Acacia aneura* over *Acacia burkittii*, *Eremophila oldfieldii* and *Scaevola spinescens* and other mixed shrubs over *Triodia* spp;
- Low Open Woodland of *Eucalyptus articulata* and mixed *Eucalyptus* spp. over *Triodia* spp. with mixed low shrubs.

A map provided by AngloGold Ashanti was used to extrapolate potential locations of *Eucalyptus articulata* that may occur between the known locations and the proposed infrastructure corridor.

Findings

The following locations were inspected for *Eucalyptus articulata*:

Easting (MGA94)	Northing (MGA94)	Comments
527290	6666407	No <i>Eucalyptus articulata</i> . Eucalypts over <i>Chrysitrix</i> on yellow sand. Wrong soil, geography, vegetation
527858	6666440	No <i>Eucalyptus articulata</i> . Mulga shrubland. No arkose cover.
532409	6669353	No <i>Eucalyptus articulata</i> . <i>Eucalyptus concinna</i> woodland over mixed shrubs on red orange sandy loam. No arkose cover.
529760	6670152	No <i>Eucalyptus articulata</i> . <i>Casuarina</i> woodland moving into Mulga on red orange sandy loam with some rock cover.
529201	6670457	No <i>Eucalyptus articulata</i> . Mulga shrubland with some Eucalypts on red orange sandy loam. No arkose cover
529091	6670849	No <i>Eucalyptus articulata</i> . Mixed Woodland of <i>Acacia</i> , Eucalypts with some <i>Casuarina</i> on red sandy loam with some quartz rock cover.
530192	6673046	No <i>Eucalyptus articulata</i> . <i>Eucalyptus concinna</i> mallees on orange red sandy loam on mid slope with some rubble cover.
525500	6677500	No <i>Eucalyptus articulata</i> . Wrong vegetation.
526500	6676300	No <i>Eucalyptus articulata</i> . Totally burnt out by recent fire. Orange red sandy loam. Appears wrong vegetation with no arkose cover and is flat topography.
527000	6673500	No <i>Eucalyptus articulata</i> . Low Open Woodland of <i>Eucalyptus</i> spp. over <i>Senna</i> , <i>Olearia</i> , <i>Exocarpos</i> on red orange sandy loam. Wrong vegetation, no arkose, not a slope.
528088	6670880	No <i>Eucalyptus articulata</i> . Low Open Woodland of <i>Eucalyptus concinna</i> over mixed shrubs on red orange sandy loam with some arkose cover.
529750	6669860	No <i>Eucalyptus articulata</i> . Wrong vegetation.
510500	6674100	No <i>Eucalyptus articulata</i> . Mixed shrubland Of <i>Acacia</i> , <i>Dodonea</i> , <i>Eucalyptus</i> and <i>Eremophila</i> on orange red sandy loam with some quartz rock cover. Wrong vegetation. No arkose cover.

Overall, *Eucalyptus articulata* was not recorded outside of its known distribution.

APPENDIX E: *Eucalyptus articulata* Search

The most likely location was 530192E, 6673046N, which contained similar soil, topography and arkose rock cover to the known populations of *Eucalyptus articulata*, however weathered granite outcropping was not observed.

It is possible to confuse *Eucalyptus articulata* with *Eucalyptus concinna*, especially if *Eucalyptus concinna* is in a low mallee form, which may occur if an area has been affected by fire in the last ten years. It is possible to distinguish these two species apart in the field by leaf venation and operculum shape.



Photo 1: Habit of *Eucalyptus articulata*

APPENDIX E: *Eucalyptus articulata* Search



Photo 2: Operculum of *Eucalyptus articulata*



Photo 3: Operculum of *Eucalyptus concinna*.

APPENDIX F Threatened Species Survey

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Threatened Species Assessment of Areas Adjacent to TGP

A targeted search for threatened species was undertaken for AngloGold Ashanti Australia by one botanist from Mattiske Consulting and two Environmental Officers from AngloGold Ashanti Australia between 5th – 8th May 2009 and 16th – 20th June 2009. The aim of the search was to locate additional populations of:

- *Grevillea secunda* (P2);
- *Acacia eremophila* var. *variabilis* (P3);
- *Acacia eremophila* numerous-nerved variant (P3);
- *Dicrastylis cundeeleensis* (P3);
- *Eucalyptus pimpiniana* (P3);
- *Comesperma viscidulum* (P4); and
- *Daviesia purpurascens* (P4)

outside of the Tropicana Gold Project operational area.

Upon finding a new population of the targeted species, the following parameters were noted:

- GPS location;
- Population size;
- Soil type and colour;
- Topography; and
- Equivalent Vegetation Mapping Code from Flora and Vegetation Survey – Pinjin Infrastructure Corridor L31/57, L39/185, Tropicana Gold Project (Mattiske Consulting, 2009).

Findings

Targeted Species were recorded from the following locations (Table 1):

The following additional Rare and Priority Species were recorded during the search from the following locations (Table 2):

- *Conospermum toddii* (R)
- *Baekkea* sp. Great Victoria Desert (A.S. Weston 14813) (P2)
- *Dicrastylis nicholasii* (P2)
- *Malleostemon* sp. Officer Basin (D. Pearson 350) (P2)
- *Olearia arida* (P2)
- *Microcorys macredieana* (P3)
- *Micromyrtus stenocalyx* (P3)
- *Lepidobolus deserti* (P4)

Table 1: Targeted Threatened Species located outside of the Tropicana Gold Project Operational Areas, May & June 2009

No	Species	Eastings	Northings	Size of Population	Equivalent Vegetation Community	Soil Type	Topography
		(MGA94 51J)					
1	<i>Grevillea secunda</i>	585	672	6-10	E12	Orange Sandy Loam	Flat
2	<i>Grevillea secunda</i>	586	672	10-25	S8	Orange Yellow	Mid Slope
3	<i>Grevillea secunda</i>	586	672	6-10	S8	Orange Yellow	Mid Slope
4	<i>Grevillea secunda</i>	587	672	6-10	E12	Light orange	Mid Slope
5	<i>Grevillea secunda</i>	589	673	6-10	S9	Orange Yellow Sandy Loam	Mid Slope
6	<i>Grevillea secunda</i>	590	673	2-5	E4	Orange Yellow	Flat
7	<i>Grevillea secunda</i>	591	673	100-200	S8	Orange Yellow Sandy Loam	Flat
8	<i>Grevillea secunda</i>	591	673	11-25	S9	Orange Yellow Sandy Loam	Flat
9	<i>Grevillea secunda</i>	598	673	50-100	S8	Orange Yellow Sandy Loam	Flat
10	<i>Grevillea secunda</i>	629	672	11-25	S9	Orange yellow	Undulating
11	<i>Grevillea secunda</i>	629	672	6-10	S8	Yellow orange	Undulating
12	<i>Grevillea secunda</i>	629	672	11-25	S8	Orange yellow Sandy Loam	Undulating
13	<i>Grevillea secunda</i>	629	672	11-25	S8	Orange yellow sand	Undulating
14	<i>Grevillea secunda</i>	629	672	6-10	S8	Orange yellow Sandy Loam	Undulating
15	<i>Grevillea secunda</i>	629	672	11-25	S8	Orange yellow Sandy Loam	Undulating
16	<i>Grevillea secunda</i>	630	672	25-50	S8	Orange yellow Sand	Undulating
17	<i>Grevillea secunda</i>	630	672	2-5	S8	Yellow sand	Undulating
18	<i>Grevillea secunda</i>	630	672	2-5	S8	orange yellow Sandy Loam	Undulating
19	<i>Grevillea secunda</i>	630	672	25-50	S8	Orange yellow Sandy Loam	Undulating
20	<i>Grevillea secunda</i>	630	672	11-25	S8	Orange yellow Sandy Loam	Undulating
21	<i>Grevillea secunda</i>	630	672	25-50	S9	Yellow Sand	Undulating
22	<i>Grevillea secunda</i>	631	674	6-10	S9	Red orange	Mid slope
23	<i>Grevillea secunda</i>	631	672	6-10	S9	Orange Yellow Sand	Flat
24	<i>Grevillea secunda</i>	640	673	11-25	S8	Orange Sandy Loam	Flat
25	<i>Grevillea secunda</i>	647	673	25-50	S8	Orange yellow Sand	Undulating
26	<i>Grevillea secunda</i>	647	673	11-25	S8	Yellow Orange Sand	Undulating
27	<i>Grevillea secunda</i>	647	673	2-5	S8	Yellow Orange Sand	Undulating
28	<i>Grevillea secunda</i>	647	673	11-25	S8	Yellow Orange Sand	Undulating

Table 1: Targeted Threatened Species located outside of the Tropicana Gold Project Operational Areas, May & June 2009 (Continued)

No	Species	Eastings	Northings	Size of Population	Equivalent Vegetation Community	Soil Type	Topography
		(MGA94 51J)					
1	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	500	6588	50-100	N/A	Red Sandy Loam	Flat
2	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	501	6588	25-50	N/A	Red Sandy Loam	Flat
3	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	502	6588	10-25	N/A	Red Sandy Loam	Flat
4	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	502	6588	25-50	N/A	Red Sandy Loam	Flat
5	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	502	6589	10-25	N/A	Red Sandy Loam	Flat
6	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	502	6588	10-25	N/A	Red Sandy Loam	Flat
7	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	502	6590	25-50	N/A	Red Sandy Loam	Flat
8	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	503	6590	25-50	N/A	Red Sandy Loam	Flat
9	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	503	6590	10-25	N/A	Red Sandy Loam	Flat
10	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	503	6590	25-50	N/A	Red Sandy Loam	Flat
11	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	503	6589	25-50	N/A	Red Sandy Loam	Flat
12	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	503	6589	6-10	N/A	Red Sandy Loam	Flat
13	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	503	6589	10-25	N/A	Red Sandy Loam	Flat
14	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	503	6590	10-25	N/A	Red Sandy Loam	Flat
15	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	504	6590	10-25	N/A	Red Sandy Loam	Flat
16	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	504	6590	10-25	N/A	Red Sandy Loam	Flat
17	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	506	6590	6-10	N/A	Red Sandy Loam	Flat
18	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	506	6590	6-10	N/A	Red Sandy Loam	Flat
19	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	506	6590	6-10	N/A	Red Sandy Loam	Flat
20	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	507	6590	6-10	N/A	Red Sandy Loam	Flat
21	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	507	6590	10-25	N/A	Red Sandy Loam	Flat
22	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	507	6590	10-25	N/A	Red Sandy Loam	Flat
23	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	507	6590	10-25	N/A	Red Sandy Loam	Flat
24	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	507	6590	25-50	N/A	Red Sandy Loam	Flat
25	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	507	6590	25-50	N/A	Red Sandy Loam	Flat
26	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	692	6722	50-100	N/A	Red Sandy Loam	Flat
27	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	692	6722	50-100	N/A	Red Sandy Loam	Flat
28	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	692	6722	11-25	N/A	Red Sandy Loam	Flat

Table 1: Targeted Threatened Species located outside of the Tropicana Gold Project Operational Areas, May & June 2009 (Continued)

No	Species	Eastings	Northings	Size of Population	Equivalent Vegetation Community	Soil Type	Topography
		(MGA94 51J)					
29	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	694	6722	6-10	N/A	Red Sandy Loam	Flat
30	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	694	6722	25-50	N/A	Red Sandy Loam	Flat
31	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	694	6722	25-50	N/A	Red Sandy Loam	Flat
32	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	695	6722	11-25	N/A	Red Sandy Loam	Flat
33	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	695	6722	2-5	N/A	Red Sandy Loam	Flat
34	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	695	6722	50-100	N/A	Red Sandy Loam	Flat
35	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	695	6722	6-10	N/A	Red Sandy Loam	Flat
36	<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	695	6723	11-25	N/A	Red Sandy Loam	Flat
1	<i>Acacia eremophila</i> var. <i>variabilis</i>	503	6590	25-50	N/A	Red Sandy Loam	Flat
2	<i>Acacia eremophila</i> var. <i>variabilis</i>	503	6588	5-10	N/A	Red Sandy Loam	Flat
3	<i>Acacia eremophila</i> var. <i>variabilis</i>	503	6589	25-50	N/A	Red Sandy Loam	Flat
4	<i>Acacia eremophila</i> var. <i>variabilis</i>	506	6590	10-25	N/A	Red Sandy Loam	Flat
5	<i>Acacia eremophila</i> var. <i>variabilis</i>	508	6593	10-25	N/A	Red Sandy Loam	Flat
6	<i>Acacia eremophila</i> var. <i>variabilis</i>	509	6593	5-10	N/A	Red Sandy Loam	Flat
7	<i>Acacia eremophila</i> var. <i>variabilis</i>	509	6593	10-25	N/A	Red Sandy Loam	Flat
1	<i>Dicrasyllis cundeeleensis</i>	502	6673	200-500	N/A	Red orange Sandy Loam	Flat
2	<i>Dicrasyllis cundeeleensis</i>	631	6744	25-50	A2	Red orange Sandy Loam	Flat
3	<i>Dicrasyllis cundeeleensis</i>	635	6744	11-25	A2	Red orange Sandy Loam	Flat
4	<i>Dicrasyllis cundeeleensis</i>	636	6744	11-25	E3	Red orange Sandy Loam	Flat
5	<i>Dicrasyllis cundeeleensis</i>	647	6787	500+	N/A	Orange Sandy Loam	Low Dune
6	<i>Dicrasyllis cundeeleensis</i>	664	6729	100-200	E4	Orange yellow Sandy Loam	Swale
7	<i>Dicrasyllis cundeeleensis</i>	666	6729	100-200	N/A	Orange red Sandy Loam	Swale
8	<i>Dicrasyllis cundeeleensis</i>	699	6742	50-100	N/A	Orange Sandy Loam	Flat
1	<i>Eucalyptus pimpiniana</i>	585	6721	11-25	E12	Orange Sandy Loam	Flat
2	<i>Eucalyptus pimpiniana</i>	585	6720	25-50	E12	Orange Sandy Loam	Flat

Table 1: Targeted Threatened Species located outside of the Tropicana Gold Project Operational Areas, May & June 2009 (Continued)

No	Species	Eastings	Northings	Size of Population	Equivalent Vegetation Community	Soil Type	Topography
		(MGA94 51J)					
3	<i>Eucalyptus pampiniana</i>	586	672	6-10	E12	Light orange Sandy Loam	Flat
4	<i>Eucalyptus pampiniana</i>	586	672	25-50	E12	Light orange Sandy Loam	Lower Slope
1	<i>Comesperma viscidulum</i>	583	6719	1 plant	E12	Orange Sandy Loam	Flat
2	<i>Comesperma viscidulum</i>	583	6720	1 plant	E14	Orange Yellow Sand	Flat
3	<i>Comesperma viscidulum</i>	583	6721	11-25	E12	Orange Sandy Loam	Mid Slope
4	<i>Comesperma viscidulum</i>	583	6720	2-5	E12	Orange Sandy Loam	Flat
5	<i>Comesperma viscidulum</i>	586	6721	2-5	E12	Orange Sandy Loam	Mid Slope
6	<i>Comesperma viscidulum</i>	586	6722	2-5	E12	Orange Sandy Loam	Mid Slope
7	<i>Comesperma viscidulum</i>	586	6722	2-5	E12	Orange Sandy Loam	Mid Slope
8	<i>Comesperma viscidulum</i>	586	6721	1 plant	E12	Orange Yellow Sandy Loam	Mid Slope
9	<i>Comesperma viscidulum</i>	586	6722	6-10	E12	Orange Sandy Loam	Mid Slope
10	<i>Comesperma viscidulum</i>	601	6729	1 plant	E4	Orange Yellow Sandy Loam	Flat
11	<i>Comesperma viscidulum</i>	607	6728	6-10	E4	Yellow orange Sandy Loam	Flat
12	<i>Comesperma viscidulum</i>	607	6729	11-25	E4	Yellow orange Sand	Undulating
13	<i>Comesperma viscidulum</i>	608	6729	6-10	E4	Orange yellow Sandy Loam	Flat
14	<i>Comesperma viscidulum</i>	609	6728	50-100	E4	Yellow orange Sandy Loam	Undulating
15	<i>Comesperma viscidulum</i>	611	6728	25-50	E4	Orange yellow Sandy Loam	Flat
16	<i>Comesperma viscidulum</i>	616	6728	1 plant	E4	Orange yellow Sandy Loam	Mid Slope
17	<i>Comesperma viscidulum</i>	616	6727	1 plant	E4	Orange Sandy Loam	Mid Slope
18	<i>Comesperma viscidulum</i>	618	6727	2-5	E4	Orange Yellow Sand	Undulating
19	<i>Comesperma viscidulum</i>	619	6728	2-5	E4	Orange Yellow Sand	Flat
20	<i>Comesperma viscidulum</i>	619	6729	2-5	E4	Orange Yellow Sand	Flat
1	<i>Daviesia purpurascens</i>	583	6721	6-10	E12	Orange Sandy Loam	Mid Slope
2	<i>Daviesia purpurascens</i>	583	6720	2-5	E14	Orange Yellow Sand	Flat
3	<i>Daviesia purpurascens</i>	583	6720	2-5	E12	Orange Sandy Loam	Flat
4	<i>Daviesia purpurascens</i>	586	6721	10-25	E12	Orange Sandy Loam	Mid Slope

Table 1: Targeted Threatened Species located outside of the Tropicana Gold Project Operational Areas, May & June 2009 (Continued)

No	Species	Eastings	Northings	Size of Population	Equivalent Vegetation Community	Soil Type	Topography
		(MGA94 51J)					
5	<i>Daviesia purpurascens</i>	586	6722	6-10	E12	Orange Sandy Loam	Mid Slope
6	<i>Daviesia purpurascens</i>	586	6721	2-5	E12	Orange yellow Sandy Loam	Mid Slope
7	<i>Daviesia purpurascens</i>	586	6722	6-10	E12	Orange Sandy Loam	Mid Slope
8	<i>Daviesia purpurascens</i>	587	6723	2-5	E12	Orange Sandy Loam	Flat
9	<i>Daviesia purpurascens</i>	591	6732	2-5	S9	Orange Yellow Sandy Loam	Flat
10	<i>Daviesia purpurascens</i>	598	6730	2-5	S8	Orange Yellow Sandy Loam	Flat
11	<i>Daviesia purpurascens</i>	601	6729	2-5	E4	Orange Yellow Sandy Loam	Flat
12	<i>Daviesia purpurascens</i>	607	6728	11-25	E4	Yellow orange Sandy Loam	Flat
13	<i>Daviesia purpurascens</i>	607	6729	1 plant	E4	Yellow orange Sand	Und
14	<i>Daviesia purpurascens</i>	608	6728	2-5	E4	Orange yellow Sandy Loam	Flat
15	<i>Daviesia purpurascens</i>	608	6728	6-10	E4	Orange yellow Sandy Loam	Flat
16	<i>Daviesia purpurascens</i>	609	6728	6-10	E4	Yellow orange Sandy Loam	Undulating
17	<i>Daviesia purpurascens</i>	610	6728	11-25	E4	Orange yellow Sandy Loam	Mid Slope
18	<i>Daviesia purpurascens</i>	611	6728	2-5	E4	Orange Sandy Loam	Flat
19	<i>Daviesia purpurascens</i>	613	6728	2-5	E4	Orange Sandy Loam	Flat
20	<i>Daviesia purpurascens</i>	630	6745	11-25	E3	Red Sandy Loam	Flat

Table 2: Additional Rare and Priority Species Located Outside of the Tropicana Gold Project Operational Areas, May & June 2009.

No	Species	Eastings	Northings	Size of Population	Equivalent Vegetation Community	Soil Type	Topography
		(MGA94 51J)					
1	<i>Conospermum toddii</i>	648	6736	100-200	S11	Yellow sand	Dune
2	<i>Conospermum toddii</i>	648	6736	100-200	S11	Yellow Orange Sand	Dune
1	<i>Baeckea</i> sp. Great Victoria Desert (A.S. Weston 14813)	587	6723	11-25	E12	Orange Sandy Loam	Flat
2	<i>Baeckea</i> sp. Great Victoria Desert (A.S. Weston 14813)	598	6730	50-100	S8	Orange Yellow Sandy Loam	Flat
3	<i>Baeckea</i> sp. Great Victoria Desert (A.S. Weston 14813)	617	6727	6-10	E4	Orange Sandy Loam	Mid slope
4	<i>Baeckea</i> sp. Great Victoria Desert (A.S. Weston 14813)	629	6727	100-200	S8	Orange yellow Sand	Undulating
5	<i>Baeckea</i> sp. Great Victoria Desert (A.S. Weston 14813)	629	6727	25-50	S8	Yellow orange Sand	Undulating
6	<i>Baeckea</i> sp. Great Victoria Desert (A.S. Weston 14813)	629	6727	25-50	S8	Orange yellow Sandy Loam	Undulating
7	<i>Baeckea</i> sp. Great Victoria Desert (A.S. Weston 14813)	629	6727	25-50	S8	Orange yellow Sandy Loam	Undulating
8	<i>Baeckea</i> sp. Great Victoria Desert (A.S. Weston 14813)	630	6727	11-25	S9	Orange yellow Sandy Loam	Undulating
9	<i>Baeckea</i> sp. Great Victoria Desert (A.S. Weston 14813)	630	6726	11-25	S8	Yellow sand	Undulating
10	<i>Baeckea</i> sp. Great Victoria Desert (A.S. Weston 14813)	630	6727	11-25	S9	Orange yellow Sandy Loam	Undulating
11	<i>Baeckea</i> sp. Great Victoria Desert (A.S. Weston 14813)	630	6727	11-25	S9	Orange yellow Sandy Loam	Undulating
12	<i>Baeckea</i> sp. Great Victoria Desert (A.S. Weston 14813)	642	6739	6-10	A2/E4	Orange Sand	Flat
13	<i>Baeckea</i> sp. Great Victoria Desert (A.S. Weston 14813)	646	6739	6-10	S8	Orange Sandy Loam	Flat
14	<i>Baeckea</i> sp. Great Victoria Desert (A.S. Weston 14813)	646	6739	2-5	S8	Orange Sandy Loam	Flat
15	<i>Baeckea</i> sp. Great Victoria Desert (A.S. Weston 14813)	646	6739	6-10	S8	Orange Sandy Loam	Flat
16	<i>Baeckea</i> sp. Great Victoria Desert (A.S. Weston 14813)	647	6739	11-25	S8	Orange Sandy Loam	Flat
17	<i>Baeckea</i> sp. Great Victoria Desert (A.S. Weston 14813)	648	6739	25-50	E4	Orange Sandy Loam	Mid slope
18	<i>Baeckea</i> sp. Great Victoria Desert (A.S. Weston 14813)	648	6740	11-25	E4	Red orange Sandy Loam	Mid slope
19	<i>Baeckea</i> sp. Great Victoria Desert (A.S. Weston 14813)	648	6736	50-100	A2/E4	Orange Sandy Loam	Flat
20	<i>Baeckea</i> sp. Great Victoria Desert (A.S. Weston 14813)	652	6736	6-10	A5	Red orange Sandy Loam	Flat
21	<i>Baeckea</i> sp. Great Victoria Desert (A.S. Weston 14813)	661	6729	100-200	S8	Yellow orange Sandy Loam	Flat
1	<i>Dicrastylis nicholasii</i>	631	6744	25-50	E3	Red Sandy Loam	Flat
2	<i>Dicrastylis nicholasii</i>	631	6744	100-200	A2	Red orange Sandy Loam	Flat
3	<i>Dicrastylis nicholasii</i>	631	6744	25-50	A5	Red orange Sandy Loam	Flat

Table 2: Additional Rare and Priority Species Located Outside of the Tropicana Gold Project Operational Areas, May & June 2009 (Continued)

No	Species	Eastings	Northings	Size of Population	Equivalent Vegetation Community	Soil Type	Topography
		(MGA94 51J)					
4	<i>Dicrastyliis nicholasii</i>	632	6744	25-50	A2	Red orange Sandy Loam	Flat
5	<i>Dicrastyliis nicholasii</i>	632	6736	100-200	A5	Red Sandy Loam	Flat
6	<i>Dicrastyliis nicholasii</i>	632	6750	50-100	A2	Red Sandy Loam	Flat
7	<i>Dicrastyliis nicholasii</i>	634	6736	6-10	A2	Red Sandy Loam	Flat
8	<i>Dicrastyliis nicholasii</i>	635	6744	25-50	A2	Red Sandy Loam	Flat
9	<i>Dicrastyliis nicholasii</i>	636	6744	25-50	E3	Orange Red Sandy Loam	Flat
10	<i>Dicrastyliis nicholasii</i>	638	6744	11-25	E3	Orange Red Sandy Loam	Flat
11	<i>Dicrastyliis nicholasii</i>	638	6735	6-10	A2	Orange Red Sandy Loam	Flat
12	<i>Dicrastyliis nicholasii</i>	648	6743	25-50	E3	Red Sandy Loam	Flat
13	<i>Dicrastyliis nicholasii</i>	648	6741	2-5	A2	Orange Sandy Loam (laterite)	Flat
14	<i>Dicrastyliis nicholasii</i>	648	6741	11-25	A2	Orange Sandy Loam (laterite)	Flat
15	<i>Dicrastyliis nicholasii</i>	666	6729	25-50	N/A	Orange red Sandy Loam	Swale
16	<i>Dicrastyliis nicholasii</i>	676	6755	100-200	A5	Orange Sandy Loam	Flat
17	<i>Dicrastyliis nicholasii</i>	680	6754	50-100	A5	Orange Sandy Loam	Flat
18	<i>Dicrastyliis nicholasii</i>	682	6752	100-200	E3	Orange red Sandy Loam	Flat
19	<i>Dicrastyliis nicholasii</i>	683	6742	100-200	N/A	Orange red Sandy Loam	Flat
20	<i>Dicrastyliis nicholasii</i>	685	6736	50-100	A5	Orange red Sandy Loam	Flat
21	<i>Dicrastyliis nicholasii</i>	689	6733	200-500	A2	Red orange Sandy Loam	Flat
22	<i>Dicrastyliis nicholasii</i>	692	6722	100-200	N/A	Red Sandy Loam	Flat
23	<i>Dicrastyliis nicholasii</i>	692	6722	50-100	N/A	Red Sandy Loam	Flat
24	<i>Dicrastyliis nicholasii</i>	694	6721	50-100	N/A	Red Sandy Loam	Flat
25	<i>Dicrastyliis nicholasii</i>	694	6722	100-200	N/A	Red Sandy Loam	Flat
26	<i>Dicrastyliis nicholasii</i>	694	6722	11-25	N/A	Red Sandy Loam	Flat
27	<i>Dicrastyliis nicholasii</i>	695	6722	2-5	N/A	Red Sandy Loam	Flat
28	<i>Dicrastyliis nicholasii</i>	695	6723	2-5	N/A	Red Sandy Loam	Flat
29	<i>Dicrastyliis nicholasii</i>	695	6739	100-200	N/A	Orange Sandy Loam	Flat
1	<i>Malleostemon</i> sp. Officer Basin	659	6736	1 plant	S11	Yellow sand	Dune

Table 2: Additional Rare and Priority Species Located Outside of the Tropicana Gold Project Operational Areas, May & June 2009 (Continued)

No	Species	Eastings	Northings	Size of Population	Equivalent Vegetation Community	Soil Type	Topography
		(MGA94 51J)					
2	<i>Malleostemon</i> sp. Officer Basin	659	6736	2-5	S11	Yellow sand	Dune
1	<i>Olearia arida</i>	588	6729	11-25	E4	Orange Yellow Sandy Loam	Flat
2	<i>Olearia arida</i>	600	6730	11-25	E4	Orange Yellow Sandy Loam	Flat between
3	<i>Olearia arida</i>	600	6730	11-25	E4	Orange Yellow Sandy Loam	Flat
4	<i>Olearia arida</i>	600	6730	11-25	E4	Sandy Loam	Flat
5	<i>Olearia arida</i>	601	6729	25-50	E4	Orange Yellow Sandy Loam	Flat between
6	<i>Olearia arida</i>	602	6729	50-100	E4	Orange Sandy Loam	Flat
7	<i>Olearia arida</i>	603	6729	6-10	E4	Orange Sandy Loam	Flat
8	<i>Olearia arida</i>	613	6728	6-10	E4	Orange Sandy Loam	Lower Slope
9	<i>Olearia arida</i>	640	6743	25-50	E4	Red Sandy Loam	Mid Slope
10	<i>Olearia arida</i>	642	6739	2-5	A2 / E4	Orange Sandy Loam	Flat
11	<i>Olearia arida</i>	642	6739	6-10	A2 / E4	Orange Sand	Flat
1	<i>Microcorys macredieana</i>	590	6731	25-50	E4	Orange yellow Sandy Loam	Flat
2	<i>Microcorys macredieana</i>	607	6729	2-5	E4	Yellow orange Sand	Und
3	<i>Microcorys macredieana</i>	608	6729	2-5	E4	Orange yellow Sandy Loam	Flat
4	<i>Microcorys macredieana</i>	608	6728	2-5	E4	Orange yellow Sandy Loam	Flat
5	<i>Microcorys macredieana</i>	609	6728	6-10	E4	Yellow orange Sandy Loam	Undulating
6	<i>Microcorys macredieana</i>	615	6728	2-5	E4	Orange Sandy Loam	Mid Slope
7	<i>Microcorys macredieana</i>	629	6726	2-5	S8	Orange Yellow Sand	Undulating
8	<i>Microcorys macredieana</i>	640	6742	25-50	E15	Yellow orange Sand	Midslope
9	<i>Microcorys macredieana</i>	640	6742	25-50	E15	Yellow orange Sand	Midslope
10	<i>Microcorys macredieana</i>	645	6736	11-25	S11	Yellow sand	Dune
11	<i>Microcorys macredieana</i>	645	6736	50-100	S11	Yellow sand	Dune
12	<i>Microcorys macredieana</i>	647	6736	11-25	S8	Orange yellow Sand	Undulating
13	<i>Microcorys macredieana</i>	647	6736	11-25	S8	Yellow orange Sand	Undulating

Table 2: Additional Rare and Priority Species Located Outside of the Tropicana Gold Project Operational Areas, May & June 2009 (Continued)

No	Species	Eastings	Northings	Size of Population	Equivalent Vegetation Community	Soil Type	Topography
		(MGA94 51J)					
14	<i>Microcorys macredieana</i>	647	6736	6-10	S8	Yellow orange Sand	Undulating
15	<i>Microcorys macredieana</i>	648	6736	25-50	S11	Yellow sand	Dune
16	<i>Microcorys macredieana</i>	648	6736	6-10	S11	Yellow orange Sand	Dune
17	<i>Microcorys macredieana</i>	649	6735	2-5	S11	Yellow sand	Dune
18	<i>Microcorys macredieana</i>	650	6736	6-10	S11	Yellow sand	Dune
19	<i>Microcorys macredieana</i>	664	6729	2-5	E4	Sandy Loam	Swale
1	<i>Micromyrtus stenocalyx</i>	615	6727	50-100	S11	Yellow Orange Sand	Dune
2	<i>Micromyrtus stenocalyx</i>	629	6727	6-10	S8	Yellow Orange Sand	Undulating
3	<i>Micromyrtus stenocalyx</i>	645	6739	6-10	S11	Orange Sandy Loam	Dune
4	<i>Micromyrtus stenocalyx</i>	647	6736	25-50	S8	Yellow Orange Sand	Undulating
5	<i>Micromyrtus stenocalyx</i>	647	6736	25-50	S8	Yellow Orange Sand	Undulating
6	<i>Micromyrtus stenocalyx</i>	648	6736	100-200	S11	Yellow Orange Sand	Dune
7	<i>Micromyrtus stenocalyx</i>	648	6736	6-10	S11	Yellow sand	Dune
8	<i>Micromyrtus stenocalyx</i>	648	6740	25-50	S11	Orange Red Sandy Loam	Dune
9	<i>Micromyrtus stenocalyx</i>	648	6739	11-25	E4	Orange Sandy Loam	Mid Slope
10	<i>Micromyrtus stenocalyx</i>	649	6735	2-5	S11	Yellow sand	Dune
11	<i>Micromyrtus stenocalyx</i>	650	6736	11-25	S11	Yellow sand	Dune
12	<i>Micromyrtus stenocalyx</i>	657	6735	11-25	S11	Yellow sand	Dune
13	<i>Micromyrtus stenocalyx</i>	659	6736	11-25	S11	Yellow sand	Dune
14	<i>Micromyrtus stenocalyx</i>	659	6736	100-200	S11	Yellow sand	Dune
15	<i>Micromyrtus stenocalyx</i>	659	6736	11-25	S11	Yellow sand	Dune
1	<i>Lepidobolus deserti</i>	586	6722	50-100	E12	Orange Sandy Loam	Mid Slope
2	<i>Lepidobolus deserti</i>	586	6722	100-200	E12	Orange Sandy Loam	Mid Slope
3	<i>Lepidobolus deserti</i>	586	6722	11-25	E12	Orange Sandy Loam	Mid Slope
4	<i>Lepidobolus deserti</i>	607	6728	2-5	E4	Yellow orange Sandy Loam	Flat
5	<i>Lepidobolus deserti</i>	607	6729	100-200	E4	Yellow orange Sandy Loam	Undulating

Table 2: Additional Rare and Priority Species Located Outside of the Tropicana Gold Project Operational Areas, May & June 2009 (Continued)

No	Species	Eastings	Northings	Size of Population	Equivalent Vegetation Community	Soil Type	Topography
		(MGA94 51J)					
6	<i>Lepidobolus deserti</i>	608	6729	50-100	E4	Orange yellow Sandy Loam	Flat
7	<i>Lepidobolus deserti</i>	629	6727	25-50	S8	Yellow orange Sandy Loam	Undulating
8	<i>Lepidobolus deserti</i>	629	6726	11-25	S8	Orange yellow Sandy Loam	Undulating
9	<i>Lepidobolus deserti</i>	647	6736	200-500	S8	Yellow Orange Sand	Undulating
10	<i>Lepidobolus deserti</i>	647	6736	100-200	S8	Yellow Orange Sand	Undulating
11	<i>Lepidobolus deserti</i>	648	6736	100-200	S11	Yellow Sand	Dune
12	<i>Lepidobolus deserti</i>	648	6736	25-50	S11	Yellow Orange Sand	Dune
13	<i>Lepidobolus deserti</i>	648	6736	50-100	S11	Yellow Sand	Dune
14	<i>Lepidobolus deserti</i>	648	6740	100-200	S11	Orange Red Sandy Loam	Dune
15	<i>Lepidobolus deserti</i>	648	6736	50-100	A2/E4	Orange Sandy Loam	Flat
16	<i>Lepidobolus deserti</i>	649	6735	2-5	S11	Yellow Sand	Dune

Applicable Vegetation Codes from Mattiske Consulting (2009) include:

- E3** – Low Woodland of *Eucalyptus trivalva* and *Eucalyptus concinna* over mixed shrubs over *Triodia* spp. This community occurs on red sandy loam on flats.
- E4** – Low Woodland to Low Open Woodland of *Eucalyptus gongylocarpa* with *Callitris preissii* and *Eucalyptus* spp. over mixed shrubs over *Triodia* spp. This community occurs on orange, red-orange, yellow-orange and yellow sandy loams on mixed topographies.
- E12** – Open Shrub Mallee to Very Open Shrub Mallee of *Eucalyptus platycorys*, *Eucalyptus oleosa*, *Eucalyptus horistes* and other *Eucalyptus* spp. over *Westringia cephalantha*, *Acacia sibina*, *Acacia hemiteles* over *Triodia* spp. This community occurs on orange sandy loam on flats.
- E14** – Very Open Shrub Mallee of *Eucalyptus rosacea* with *Callitris preissii* over *Acacia sibina*, *Phebalium laevigatum* and low Myrtaceous shrubs over *Triodia* spp. This community occurs on orange sandy loams on flats.
- E15** – Very Open Shrub Mallee of *Eucalyptus youngiana* and mixed *Eucalyptus* spp. over *Acacia desertorum* var. *desertorum*, *Bertya dimerostigma*, *Westringia cephalantha*, *Cryptandra distigma* with mixed shrubs over *Triodia desertorum*. This community occurs on orange sandy loams on lower slopes.
- A2** – Low Woodland to Tall Shrubland of *Acacia ayersiana* and *Acacia aneura* var. *aneura* with *Acacia aneura* var. *argentea* over *Eremophila* spp., *Aluta maisonneuvei* subsp. *auriculata* and *Prostanthera* spp. This community occurs on orange sandy loam with a covering of gravel on lower slopes or flats.
- A5** – Tall Shrubland of *Acacia ayersiana* and *Acacia aneura* var. *aneura* with *Eucalyptus trivalva* over mixed shrubs over *Triodia* spp. with *Eragrostis eriopoda*. This community occurs on red sandy loams on flats.
- S8** – Low Shrubland of *Acacia desertorum* var. *desertorum* with *Grevillea juncifolia*, low Myrtaceous shrubs and mixed low shrubs with occasional emergent *Eucalyptus youngiana* and *Eucalyptus* spp. This community occurs on pale orange sandy loams on flats and lower slopes.
- S9** – Low Shrubland of *Leptosema chambersii*, *Baeckea* sp. Great Victoria Desert, *Homalocalyx thryptomenoides*, *Enekbatus eremaeus*, *Cryptandra distigma* with mixed low shrubs and occasional emergent *Eucalyptus* spp. This community occurs on yellow-orange sandy loams on lower and mid slopes.
- S11** – Low Open Shrubland of *Thryptomene biseriata*, *Lomandra leucocephala*, *Pityrodia lepidota*, *Scaevola basedowii*, *Chrysocephalum puteale* with mixed low shrub over *Triodia* spp. and *Lepidobolus deserti* with occasional emergent *Eucalyptus* spp. This community occurs on yellow or yellow-orange sand dunes

For some records, equivalent vegetation communities were not applicable, as Mattiske (2009) vegetation communities did not match the surrounding vegetation. This was notable for *Acacia eremophila* numerous-nerved variant (A.S. George 11924) and *Acacia eremophila* var. *variabilis*, as all populations were recorded large distances away from the Mattiske (2009) survey area.

Vegetation records for *Acacia eremophila* numerous-nerved variant (A.S. George 11924) include Open Shrub Mallee of *Eucalyptus concinna* over *Triodia basedowii* and low shrubs, Low Open Woodland of *Eucalyptus gongylocarpa* over *Eucalyptus concinna* over *Triodia basedowii* and low shrubs, Low Open Woodland of *Eucalyptus hypolaena* with *Eucalyptus gongylocarpa* over *Eucalyptus concinna* over *Triodia basedowii* and low shrubs.

Vegetation records for *Acacia eremophila* var. *variabilis* include Open Shrub Mallee of *Eucalyptus* spp. over *Triodia* spp. and low shrubs.

The total number of records for each species is presented in Table 3 (below).

Species	Total Records from Survey
<i>Grevillea secunda</i>	627 ± 223
<i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924)	978 ± 347
<i>Acacia eremophila</i> var. <i>variabilis</i>	143 ± 52
<i>Dicrastylis cundeeleensis</i>	1298 ± 302
<i>Eucalyptus pimpiniana</i>	100 ± 35
<i>Comesperma viscidulum</i>	201 ± 100
<i>Daviesia purpurascens</i>	145 ± 55
<i>Conospermum toddii</i>	300 ± 100
<i>Baeckea</i> sp. Great Victoria Desert (A.S. Weston 14813)	765 ± 265
<i>Dicrastylis nicholasii</i>	2263 ± 796
<i>Malleostemon</i> sp. Officer Basin	5 ± 1.5
<i>Olearia arida</i>	247 ± 88
<i>Microcorys macredieana</i>	331 ± 118.5
<i>Micromyrtus stenocalyx</i>	602 ± 208
<i>Lepidobolus deserti</i>	1517 ± 543

Fourteen of the twenty-nine *Dicrastylis nicholasii* records and three of the eight *Dicrastylis cundeeleensis* records were recorded from sites regenerating from past fire.

All Declared Rare Flora forms will be submitted to the Department of Environment and Conservation and plant specimens collected will be lodged with the Western Australian Herbarium.