SPRING SURVEY

PINJIN INFRASTRUCTURE CORRIDOR & OPPORTUNISTIC THREATENED FLORA COLLECTIONS

L31/56, L31/57, L39/185

TROPICANA GOLD PROJECT

OPERATIONAL AREA – PINJIN STATION

Prepared for:

Tropicana Joint Venture

Prepared by:

Mattiske Consulting Pty Ltd

January 2010

ANGLOGOLD ASHANTI AUSTRALIA

INDEPENDENCE GROUP NL

MATTISKE CONSULTING PTY LTD

TABLE OF CONTENTS

TABLES

FIGURES

1. SUMMARY

Mattiske Consulting Pty Ltd was commissioned by AngloGold Ashanti Australia on behalf of the Tropicana Joint Venture to conduct a spring survey of the Pinjin Infrastructure Corridor, from the Tropicana Gold Project to Pinjin Station plus conduct opportunistic collections of Threatened Flora species observed outside the survey area. The 2009 spring survey supplements three surveys of the corridor completed 2007 – 2008.

Flora

A total of 53 families, 150 genera, 318 species and 325 taxa have been recorded within the proposed corridor 2007 – 2009. Species representation was greatest among the Myrtaceae (38 taxa), Chenopodiaceae (29 taxa), Mimosaceae (24 taxa), Asteraceae (23 taxa), Goodeniaceae (20 taxa) and Myoporaceae (18 taxa) families.

This compares to the 44 families, 122 genera, 260 species and 267 taxa recorded within the proposed corridor between 2007 – 2008.

Twenty-six of the 325 recorded taxa are considered annual or biennial species. Of these 26 species, 18 were recorded for the first time during the spring survey.

Two species of Priority Flora were recorded for the first time during the 2009 spring survey. Additional records of one species of Declared Rare Flora and 11 species of Priority Flora were recorded during the spring survey. To date, one species of Declared Rare Flora and 15 species of Priority Flora have been recorded within the proposed corridor:

- *Conospermum toddii* (R),
- *Dampiera eriantha* (P1),
- *Baeckea* sp. Great Victoria Desert (A.S. Weston 14813) (P2),
- *Dicrastylis nicholasii* (P2),
- *Grevillea secunda* (P2),
- *Malleostemon* sp. Officer Basin (D. Pearson 350) (P2),
- *Olearia arida* (P2),
- *Dicrastylis cundeeleensis* (P3),
- *Eucalyptus pimpiniana* (P3),
- *Microcorys macredieana* (P3),
- *Micromyrtus serrulata* (P3),
- *Micromyrtus stenocalyx* (P3),
- *Thryptomene eremaea* (P2),
- *Comesperma viscidulum* (P4),
- *Daviesia purpurascens* (P4), and
- *Lepidobolus deserti* (P4).

New records of the potentially new *Hibbertia* species were also recorded. *Physopsis chrysotricha* (P2) was also recorded opportunistically, outside of the proposed corridor.

Sixteen taxa recorded from 2007 – 2009 surveys have not previously been recorded as occurring in this region. Nine species exhibiting range extensions were recorded during the 2009 spring survey.

Two introduced (weed) species, **Salvia verbenaca* and **Cucumis myriocarpus* have been recorded within the proposed corridor 2007 – 2009, both within the Pinjin Pastoral Station. Neither of these weeds are defined as Declared Weeds pursuant to Section 37 of the *Agriculture and Related Resources Act, 1976* (WA).

2. INTRODUCTION

The Tropicana Joint Venture (TJV) commissioned Mattiske Consulting to conduct a spring survey of the Pinjin Infrastructure Corridor alignment (L31/56, L31/57 and L39/185). The TJV is an agreement between AngloGold Ashanti Australia LTD (70%) and the Independence Group (30%). AngloGold Ashanti Australia Ltd is the manager of the Tropicana Joint Venture and is acting as agent severally for each of the Joint Venturers in their respective percentage interests from time to time. The obligations and liabilities of the Joint Venturers are several only, in accordance with their respective percentage interests.

2.1 Location

The Pinjin Infrastructure Corridor traverses approximately 220kms, and is located from the south of the operational area of the Tropicana Gold Project, 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 2). A 16 km bypass road, to the south of the operational area, was also surveyed.

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).

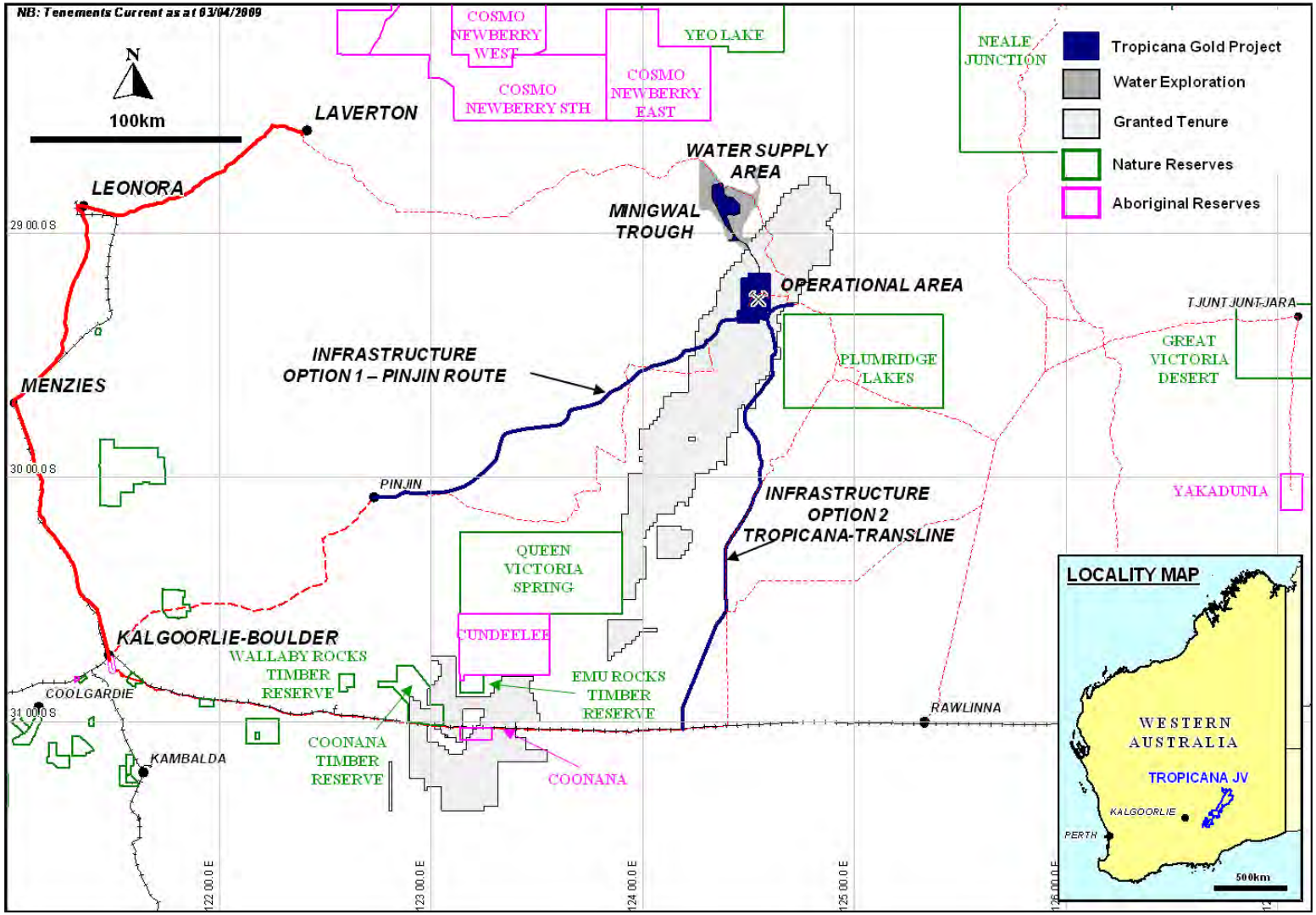


Figure 2: Layout of Tropicana Gold Project key infrastructure

Mattiske Consulting (2009) have previously mapped the following vegetation communities within the survey area:

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 (e_{22}Li.xSi.xZr.t_8Hi)

E2 – Low Woodland of *Eucalyptus gracilis* over mixed shrubs. This community occurs on red-orange sandy loams on minor drainage lines (e_{e1}Li.Xsi.)

E3 – Low Woodland of *Eucalyptus trivalva* and *Eucalyptus concinna* over mixed shrubs over *Triodia* spp. This community occurs on red sandy loam on flats ($e_{22}e_{40}$Li.xSi.t_xHi).

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 ($e_{19}pe_x$Mr.xSi.t_xHi)

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 (e_{40}Li.xSi.t_xHi)

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 (e_{10}Li.xSi.t_8Hi).

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 ($e_{34}c_2$Lr.xSi.kCr)

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 ($e_{22}a_1$Lr.xSi.t_xHi)

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 ($e_{40}e_x$Lr.$a_x\varepsilon_x$Si.t_8Hi)

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 ($e_{e3}e_{e4}$pLr.xSi)

E11 – Low Open Woodland of *Eucalyptus gongylocarpa* with *Callitris preissii* over *Bertya dimerostigma*, *Dicrastylis cundeeleensis* (P3), *Lomandra leucocephala*, *Dodonaea viscosa* subsp. *angustissima* and mixed low shrubs. This community occurs on orange sand dunes (e_{19}pLr.xSi.xZr)

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 ($e_{e5}e_{22}e_{e6}$ex.xSi.t_xHi)

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 ($e_{e7}e_{e2}e_{20}$p.xSi.t_{13}Hi)

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(e_{e8}p.xSi.t_xHi)

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 ($e_{20}e_x$Sr.xSi.t_7Hi)

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 (c_2Lr.xSi.xZr)

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 (c_2a_1Lr.xSi.kCr.xZr).

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 (c_2a_1Lr.xSi.xZr)

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 (a_1Li.xSr.xZr)

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 (a_1Li.xSr.xZr)

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 (a_1Lr.a_xSi.xZr)

A4 – Low Open Woodland to Tall Open Shrubland of *Acacia aneura* var. *aneura* over *Maireana sedifolia* with *Ptilotus obovatus* and *Enneapogon caerulescens*. This community occurs on orange-red sandy loams on flats (a_1Lr.k_2Cr.xZr).

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 (a_1e_{e2}Si.xSi.t_xHi)

Shrubland

S1 – Tall Open Scrub of *Callistemon phoeniceus*. This community occurs on pink-brown clay adjacent to a seasonally wet area (xSi)

S2 – Tall Shrubland of *Allocasuarina acutivalvis* subsp. *acutivalvis* with *Callitris preissii* over low mixed shrubs with emergent *Eucalyptus* spp (e_xLr.c_4p.xSi)

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 (c_2Lr.a_xSi)

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 (m_xSi.xSi)

S5 – Open Shrubland of *Grevillea juncifolia*, *Cryptandra distigma*, *Acacia desertorum* var. *desertorum* and mixed low shrubs over *Triodia desertorum*, *Lepidobolus deserti* (P4) and *Chrysitrix distigmatosa* with occasional emergent *Eucalyptus gongylocarpa*. This community occurs on yellow to yellow-orange sand on slopes (e_{19}Lr.xSi.t_7Hi)

S6 – Open Mixed Shrubland with occasional emergent *Acacia* spp. This community occurs on orange sandy loams with granite outcropping (a_xSr.xSi)

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 (k_xxCi)

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 ($e_{20}e_x$Lr.xSi.xZr)

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 (e_xLr.xSi.xZr)

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 (xSi.k_xCi)

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 (e_xLr.xSi.xZr.t_xHi)

Grassland

G1 – Open Grassland of *Eragrostis eriopoda*, *Aristida contorta* and *Enneapogon caerulescens* 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 (a_1Sr.xSi.xGi)

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 (k_xCi.xZr)

CH2 – Low Chenopod Shrubland of *Tecticornia* spp. with *Frankenia setosa*, *Hemichroa diandra*, *Lawrencia squamata* and *Eragrostis pergracilis*. This community occurs on orange sandy clays in low lying saline flow areas (k_xCi.xZr.xGi)

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).

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). Tables 1 – 3 illustrate the data for the three nearest active Bureau of Meteorology weather stations to the proposed corridor, located at Kalgoorlie–Boulder Airport, Laverton and Balgair.

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

Table 3: Mean Climatic Data for Balgair (BOM, 2009)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Maximum Temperature (°C)	32.9	31.9	29.2	26.1	22.4	19.1	18.6	20.6	24.2	26.9	29.2	30.9	26
Mean Min Temperature (°C)	16.3	16.6	14.7	11.9	9	6.2	5.1	5.9	8.1	10.5	12.8	14.7	11
Mean Rainfall (mm)	20.2	27.3	29.9	21.4	21.7	25.3	17.8	18.7	16.1	15.7	23.9	34.9	271.9

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 (2009a).

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 2009a). 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 2009c) 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 2009d). Appendix A3 presents a summary of the definitions of Threatened Ecological Communities as extracted from the Department of Environment and Conservation (2009d). 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 2009b).

Possible Threatened Ecological Communities can be listed as Priority Ecological Communities (PEC's) by the Department of Environment and Conservation (2009e). 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 (2009b). Appendix A4 presents a summary of the definitions of Priority Ecological Communities as extracted from the Department of Environment and Conservation (2009d).

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 objective of the flora survey was to collect and identify taxa, particularly annual taxa not previously recorded within the proposed corridor.

4. METHODS

4.1 Survey Timing

The spring survey was undertaken by one Botanist from Mattiske Consulting Pty Ltd and one Environmental Officer from AngloGold Ashanti Australia between 2nd – 5th October 2009.

The spring survey supplements three surveys of the proposed corridor undertaken by four Botanists from Mattiske Consulting Pty Ltd during three trips, 2007 - 2008.

4.2 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 was conducted by driving the entire length of the proposed corridor and targeting annual and biennial species. Each of the 37 vegetation communities predefined in Mattiske Consulting (2009) were sampled multiple times. All flora species were recorded 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 (2009a).

4.3 Survey Constraints

It is recommended that flora and vegetation surveys are conducted after significant rainfall events in the Eremaean Province (EPA, 2004). The three nearest weather stations to the proposed corridor are Kalgoorlie-Boulder, Laverton and Balgair. For the four months preceding the survey (June – September). Kalgoorlie-Boulder received 3.2mm above average rainfall (Figure 3). For the four months preceding the survey, Laverton received 9.6mm below average rainfall (Figure 4). For the four months preceding the survey, Balgair received 39.8mm above average rainfall (Figure 5). It is likely that the survey corridor received adequate rainfall to capture seasonal growth.

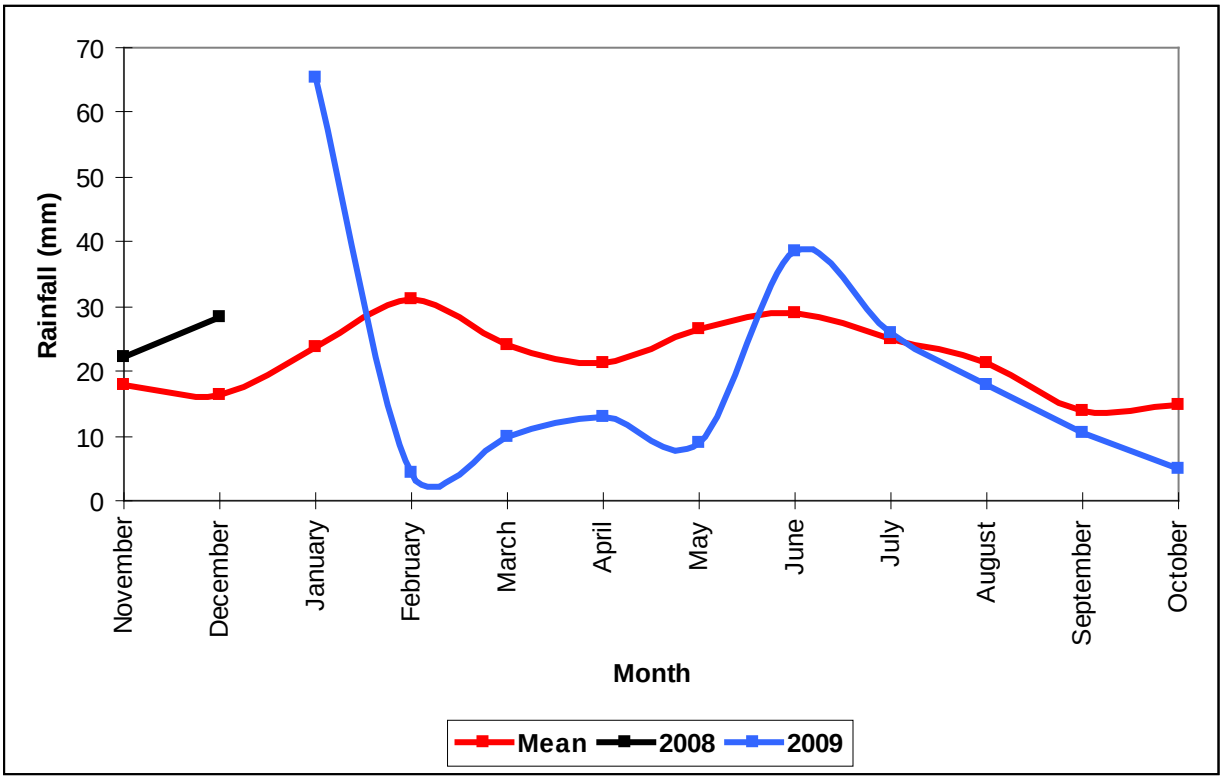


Figure 3: **Rainfall comparison of long term mean and past 12 months, Kalgoorlie-Boulder (BOM 2009)**

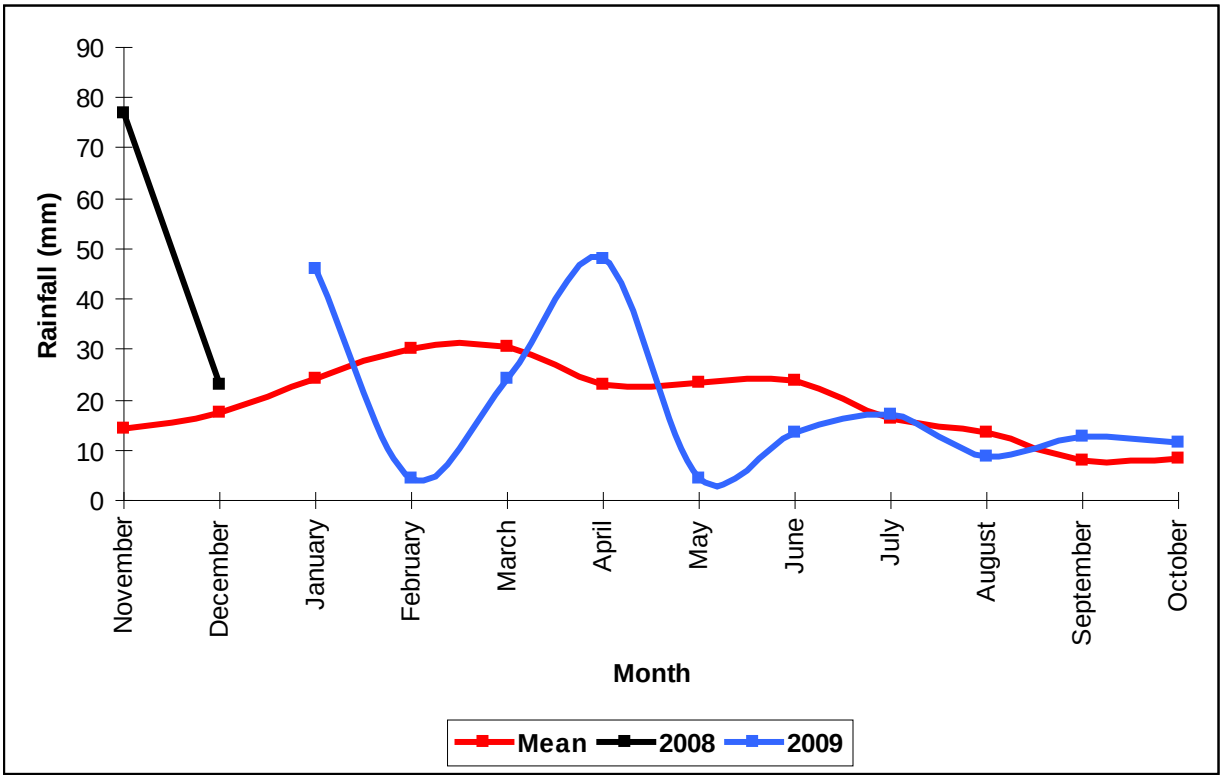


Figure 4: **Rainfall comparison of long term mean and past 12 months, Laverton (BOM 2009)**

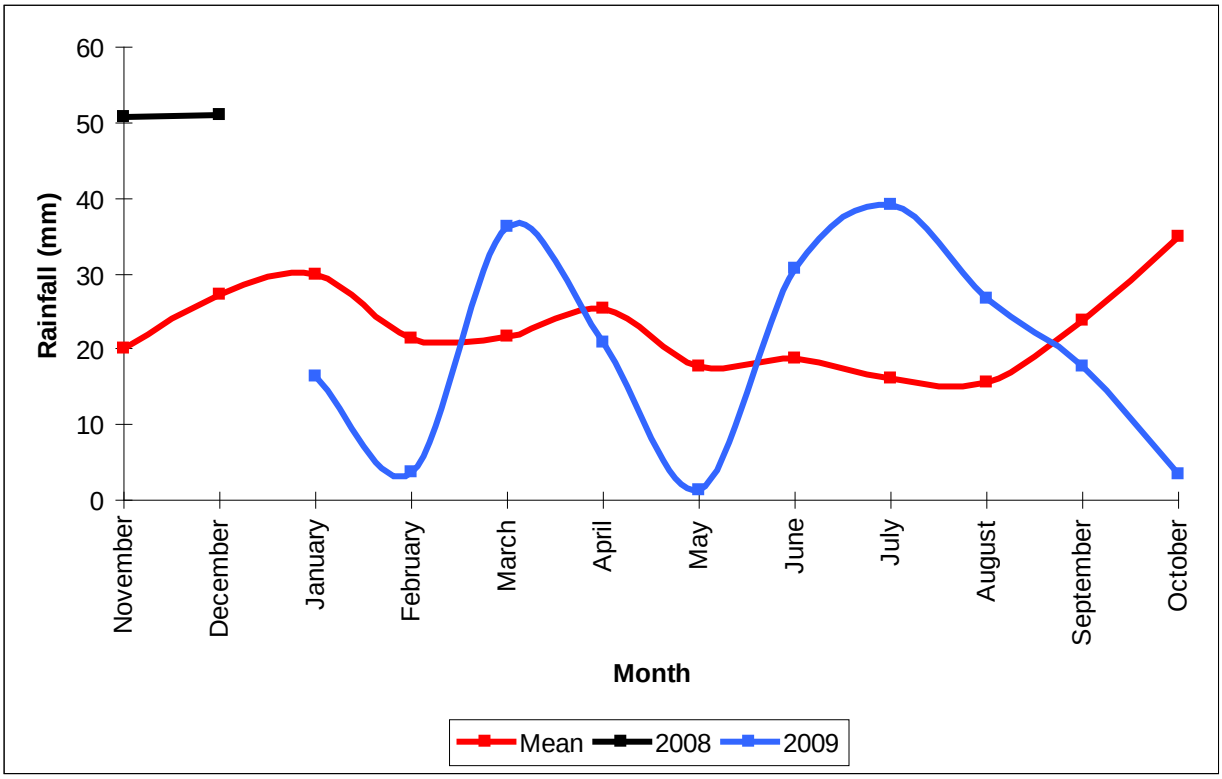


Figure 5: Rainfall comparison of long term mean and past 12 months, Balgair (BOM 2009)

5. RESULTS

A total of 53 families, 150 genera, 318 species and 325 taxa have been recorded within the proposed corridor 2007 – 2009 (Appendix B). Species representation was greatest among the Myrtaceae (38 taxa), Chenopodiaceae (29 taxa), Mimosaceae (24 taxa), Asteraceae (23 taxa), Goodeniaceae (20 taxa) and Myoporaceae (18 taxa) families.

This compares to the 44 families, 122 genera, 260 species and 267 taxa recorded within the proposed corridor between 2007 and 2008.

5.1 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 (2009a, 2009b) 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 2009a).

***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, 2009a). It has been recorded as occurring on yellow sand dunes. The Western Australian State Herbarium has 43 records in its collections.

This species was observed on yellow sand dunes from six sites (Table 4) from the following locations.

Table 4: GPS locations of *Conospermum toddii* (R), 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	618113		26-50
2007 - 2008	539288		12-15
2007 - 2008	618992		50-100 plants
2007 - 2008	619029		1 plant
2007 - 2008	618409		10-25 plants
2007 - 2008	618376		To 618302mE, 6738766mN, 100-150 plants

5.2 Priority Flora

Fifteen Priority Flora species as defined by the Department of Environment and Conservation (2009a, 2009b) were recorded during the 2007 – 2009 surveys. Two Priority Flora species not recorded from the 2007 – 2008 surveys were recorded from the 2009 survey.

***Dampiera eriantha* K.Krause GOODENIACEAE (Priority 1)**
This species has been described as an erect perennial herb to 60cm tall (DEC, 2009a). It has been recorded as occurring on yellow sand dunes. The Western Australian State Herbarium has nine records in its collections.

This species was observed on yellow sand dunes from the following locations (Table 5).

Table 5: GPS locations of *Dampiera eriantha* (P1), 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	618113		11-25
2009	619113		26-50

***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, 2009a). 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 13 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 6).

Table 6: GPS locations of *Baeckea* sp. Great Victoria Desert (A.S. Weston 14813) (P2), 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	598726		51-100
2009	599110		11-25
2009	615854		101-200
2007-2008	596381		
2007-2008	598176		
2007-2008	635634		3 plants within 20m
2007-2008	623401		10-20 plants within 15m
2007-2008	616758		4-10 plants within 20m
2007-2008	615602		25-50 plants within 20m
2007-2008	613605		25-50 plants within 20m
2007-2008	613146		25-50 plants within 20m
2007-2008	624624		1 plant within 20m
2007-2008	530174		
2007-2008	530697		
2007-2008	531530		
2007-2008	590820		
2007-2008	591015		
2007-2008	594908		
2007-2008	595339		

***Dicrastylis nicholasii* F.Muell. LAMIACEAE (Priority 2)**
This species has been described as an erect, woolly shrub to 60cm tall (DEC, 2009a). It has been recorded as occurring on red sandy loam. The Western Australian State Herbarium has 16 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 7).

Table 7: GPS locations of *Dicrastylis nicholasii* (P2), 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	590792		11-25
2009	630788		11-25
2009	649826		11-25
2009	650598		11-25
2007-2008	650514		25-50 plants within 20m
2007-2008	647628		
2007-2008	644543		
2007-2008	638466		
2007-2008	590654		1 plant. Seasonally wet area.

***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, 2009a). It has been recorded as occurring on yellow or red sands on sand dunes and sandplains. The Western Australian State Herbarium has 21 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 8).

Table 8: GPS locations of *Grevillea secunda* (P2), 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	598726		11-25
2009	599110		26-50
2007-2008	597130		
2007-2008	594852		5-10 plants within 20m
2007-2008	594908		5-10 plants within 20m
2007-2008	597320		5-10 plants within 20m
2007-2008	598176		5-10 plants within 20m
2007-2008	599263		2-5 plants within 20m
2007-2008	533165		
2007-2008	594586		
2007-2008	595767		

***Malleostemon* sp. Officer Basin (D. Pearson 350) MYRTACEAE (Priority 2)**
This species is a shrub to 150cm that produces white flowers in December (DEC, 2009a). It has been recorded as occurring on yellow sand on dunes. . The Western Australian State Herbarium has 10 records in its collections.

This species was observed on yellow sand dunes from the following locations (Table 9):

Table 9: GPS locations of *Malleostemon* sp. Officer Basin (D. Pearson 350) (P2), 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	618113		6-10

***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, 2009a). It has been recorded as occurring on red or yellow sands on undulating low rises. The Western Australian State Herbarium has 15 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 10).

Table 10: GPS locations of *Olearia arida* (P2), 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	611334		11-25
2007-2008	586622		
2007-2008	645180		4-10 plants within 20m
2007-2008	642112		1 plant within 20m
2007-2008	613605		6 plants within 20m
2007-2008	613146		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, 2009a). 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 11).

Table 11: GPS locations of *Thryptomene eremaea* (P2), 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2007-2008	496648		20-40 plants within 30m
2007-2008	496647		40-60 plants within 30m
2007-2008	501955		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, 2009a). It has been recorded as occurring on yellow, red or reddish yellow sand on sandplains. The Western Australian State Herbarium has 14 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 12).

Table 12: GPS locations of *Dicrastylis cundeeleensis* (P3), 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	502573		500+
2009	505566		51-100
2009	515138		500+
2009	526440		500+
2009	527872		500+
2009	538984		101-200
2009	642067		26-50
2007-2008	644543		2-4 plants within 20m
2007-2008	642112		25-50 plants within 20m
2007-2008	631105		25 plant (very stressed)
2007-2008	630372		50-100 plants within 20m. Near side of track.
2007-2008	626541		40-60 plants within 20m. Also ~10 dead plants
2007-2008	626104		10-25 plants with 15m
2007-2008	625019		2 plants
2007-2008	616758		2 - 4alive plants, 10 dead plants
2007-2008	616239		2-4 plants
2007-2008	615602		2 plants, recently dead.
2007-2008	630635		15-25 plants within 10m
2007-2008	630372		50-100 plants
2007-2008	626320		25-50 plants within 15m
2007-2008	625991		200+ plants within 50m of

Table 12: GPS locations of *Dicrastylis cundeeleensis* (P3), 2007 – 2009 (Continued)

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2007-2008	625284		~15 plants within 10m
2007-2008	625123		6-15 plants within 15m
2007-2008	624624		10-25 plants all very stressed
2007-2008	624416		75-125 plants
2007-2008	622813		5-10 plants
2007-2008	621029		10-25 plants within 10m
2007-2008	620659		10-25 plants within 10m
2007-2008	616408		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, 2009a). It has been recorded as occurring on red sand on sand dunes and plains. The Western Australian State Herbarium has 21 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 13).

Table 13: GPS locations of *Eucalyptus pimpiniana* (P3), 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2007-2008	514320		~20 plants within 30m
2007-2008	514931		5 plants
2007-2008	569591		200+ in unburnt 300x300m area
2007-2008	586622		~50 plants
2007-2008	514731		10-20 plants adjacent to track
2007-2008	514901		
2007-2008	515477		
2007-2008	523970		
2007-2008	523976		~20 plants in burnt area
2007-2008	575547		20-40 plants
2007-2008	583146		>100 plants extending ~200m south east
2007-2008	584610		~ 50 plants
2007-2008	588048		20-30 plants
2007-2008	566628		10-20 plants, burnt
2007-2008	567615		30-50 plants
2007-2008	575279		~ 35 plants
2007-2008	514927		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, 2009a). It has been recorded as occurring on yellow sand on dunes and sandplains. The Western Australian State Herbarium has 31 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 14).

Table 14: GPS locations of *Microcorys macredieana* (P3), 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	532263		26-50
2009	535046		11-25
2009	598726		6-10
2009	599110		11-25
2009	615854		11-25
2009	619113		6-10
2007-2008	532266		
2007-2008	634901		
2007-2008	636834		4-10 plants within 20m
2007-2008	634929		10-25 plants within 20m
2007-2008	619414		25-40 plants within 20m
2007-2008	618412		2-5 plants within 20m
2007-2008	616618		1 plant
2007-2008	615602		20-30 plants within 20m
2007-2008	645538		~40 plants within 15m
2007-2008	617492		25-50 plants within 20m

***Micromyrtus serrulata* J.W.Green MYRTACEAE (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, 2009a). 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 15).

Table 15: GPS locations of *Micromyrtus serrulata* (P3), 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	497547		11-25
2007-2008	497385		
2007-2008	496648		1 plant
2007-2008	497416		~ 40 plants within 30m
2007-2008	497068		60 - 80 plants, slightly stressed, within 30m
2007-2008	497164		60 - 80 plants within 30m
2007-2008	497254		60 - 80 plants (most < 40cm) within 20m
2007-2008	497300		50 plants within 15m
2007-2008	497294		30 plants, edge of population

***Micromyrtus stenocalyx* (F.Muell.) J.W.Green MYRTACEAE (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, 2009a). It has been recorded as occurring on yellow or rarely red soils on sand dunes and undulating sandplains. The Western Australian State Herbarium has 25 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 16).

Table 16: GPS locations of *Micromyrtus stenocalyx* (P3), 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	532263		101-200
2009	599110		6-10
2007-2008	539288		
2007-2008	597130		
2007-2008	530174		20-50 plants within 30m
2007-2008	531530		
2007-2008	532266		5-10 plants within 20m
2007-2008	634901		5-10 plants within 20m
2007-2008	594852		20-50 plants within 30m
2007-2008	595339		5-10 plants within 20m
2007-2008	561625		
2007-2008	636834		10-25 plants within 20m
2007-2008	533165		
2007-2008	595767		
2007-2008	556181		~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, 2009a). It has been recorded as occurring on red or yellow sands on sands dunes and undulating sandplains. The Western Australian State Herbarium has 11 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 17).

Table 17: GPS locations of *Comesperma viscidulum* (P4), 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	604721		1 plant
2007-2008	594852		~15 plants within 20m
2007-2008	580184		2 plants within 20m
2007-2008	586502		
2007-2008	607619		1 plant within 20m
2007-2008	594586		
2007-2008	556181		~ 3 plants within 20m
2007-2008	581111		
2007-2008	580529		1 plant within 20m
2007-2008	580184		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, 2009a). It has been recorded as occurring on sandy or loamy soils over laterite on flats and ridges. The Western Australian State Herbarium has 59 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 18).

Table 18: GPS locations of *Daviesia purpurascens* (P4), 2007 – 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	586640		6-10
2009	619917		6-10
2009	630788		6-10
2007-2008	554617		
2007-2008	561625		
2007-2008	575050		
2007-2008	580150		
2007-2008	586502		
2007-2008	586622		
2007-2008	618491		5-10 plants within 20m
2007-2008	616618		1 plant
2007-2008	615602		4 plants
2007-2008	612060		15-25 plants within 20m
2007-2008	609065		6 –10 plants
2007-2008	606780		1 plant
2007-2008	626320		3 plants within 10m
2007-2008	619297		~10 plants within 30m
2007-2008	618728		10-15 plants within 20m
2007-2008	612087		4-10 plants within 15m
2007-2008	600292		1 plant
2007-2008	594908		5-10 plants within 20m.
2007-2008	507845		
2007-2008	504917		

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

This species is a rhizomatous, caespitose perennial, herb (sedge-like), 15-45cm tall (DEC, 2009a). It has been recorded as occurring on yellow or orange sand on sand dunes. 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, lower slope, mid slope and upper slope topographies as well as dunes from the following locations (Table 19).

Table 19: GPS locations of *Lepidobolus deserti* (P4), 2007 – 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	528748		101-200
2009	532263		201-500
2009	538984		101-200
2009	598726		201-500
2009	599110		201-500
2009	618113		101-200
2009	619113		101-200
2009	635894		11-25
2007-2008	636834		10-25 plants within 20m
2007-2008	634929		25-50 plants within 20m
2007-2008	619414		>200 plants within 20m
2007-2008	618412		>200 plants within 20m
2007-2008	539288		

Table 19: GPS locations of *Lepidobolus deserti* (P4), 2007 – 2009 (Continued)

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2007-2008	597130		
2007-2008	529211		
2007-2008	532107		50-100 plants within 20m
2007-2008	531530		50-100 plants within 20m
2007-2008	532266		50-100 plants within 20m
2007-2008	634901		
2007-2008	594852		
2007-2008	594908		50-100 plants within 20m
2007-2008	597320		
2007-2008	504885		
2007-2008	528520		
2007-2008	528814		50-100 plants within 20m
2007-2008	529601		
2007-2008	561625		50-100 plants within 20m
2007-2008	580900		
2007-2008	528663		
2007-2008	533165		
2007-2008	594586		
2007-2008	595767		
2007-2008	617492		

One potentially undescribed species of *Hibbertia* was recorded during the survey. This species was recorded from large yellow-orange sand dunes (Table 20).

Table 20: GPS locations of potentially new *Hibbertia* species, 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	618113		11-25
2009	619113		11-25
2007-2008	619076		10 – 25

5.3 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, 2009a). This collection represents an approximate 150km range extension to the north east.

This species was recorded from orange sandy loam on flats (Table 21).

Table 21: GPS locations of *Acacia xerophila* var. *brevior*, 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2007-2008	513380		1 plant

***Centipeda* ?*pleiocephala* N.G.Walsh ASTERACEAE**
This species is an erect annual, herb that has scattered Western Australian Herbarium records from the Gascoyne and Great Victoria Desert regions of the Eremaean Botanical Province (DEC, 2009a). This collection represents an approximate 200km range extension to the south east.

This species was recorded from a seasonally wet area (Table 22).

Table 22: GPS locations of *Centipeda* ?*pleiocephala*, 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	470462		51-100

***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, 2009a). This collection represents an approximate 200km range extension to the south west.

This species was recorded from yellow-orange sand dunes (Table 23).

Table 23: GPS locations of *Dampiera ramosa*, 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	538984		6-10
2007-2008	618412		

***Eucalyptus* ?*lucasii* 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, 2009a). This collection represents an approximate 100km range extension to the south.

This species was recorded from red sandy loams on flats (Table 24).

Table 24: GPS locations of *Eucalyptus* ?*lucasii*, 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2007-2008	655028		
2007-2008	658611		
2007-2008	662002		

?*Jacksonia nematoclada* 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, 2009a). This collection represents an approximate 200km range extension to the south.

This species was recorded from orange sandy loam on flats affected by fire approximately two years ago (Table 25).

Table 25: GPS locations of ?*Jacksonia nematoclada*, 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2007-2008	580900		

***Kennedia prorepens* (F.Muell.) F.Muell. PAPILIONACEAE**
This species is a prostrate or ascending shrub that has scattered Western Australian Herbarium records from most regions within the Eremaean Botanical Province (DEC, 2009a). This collection represents an approximate 200km range extension to the east.

This species was recorded from a orange sandy loam flat, affected by fire approximately two years ago (Table 26).

Table 26: GPS locations of *Kennedia prorepens*, 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	502573		51-100

***Lawrencia* ?*diffusa* (Benth.) Melville MALVACEAE**
This species is a diminutive, prostrate perennial, herb or shrub that has scattered Western Australian Herbarium records from the South West (particularly from the mallee region) and Eremaean Botanical Provinces (DEC, 2009a). This collection represents an approximate 300km range extension to the east.

This species was recorded from orange-red sandy clay with nearby massive granite outcropping (Table 27).

Table 27: GPS locations of *Lawrencia* ?*diffusa*, 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	496788		6-10

***Persicaria prostrata* (R.Br.) Sojak**
This species is a prostrate perennial, herb that has many Western Australian Herbarium records from the South West Botanical Province and few from the Coolgardie region of the Eremaean Botanical Province (DEC, 2009a). This collection represents an approximate 150km range extension to the east.

This species was recorded from a seasonally wet area (Table 28).

Table 28: GPS locations of *Persicaria prostrata*, 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	470462		500+

***Polygonum plebeium* R.Br. POLYGONACEAE**
This species is a prostrate, wiry annual, herb that has scattered Western Australian Herbarium records from the Coolgardie, Murchison and Mallee regions of the South West and Eremaean Botanical Provinces (DEC, 2009a). This collection represents an approximate 200km range extension to the east.

This species was recorded from a seasonally wet area (Table 29):

Table 29: GPS locations of *Polygonum plebeium*, 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	470462		11-25

***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, 2009a). This collection represents an approximate 100km range extension to the north west.

This species was recorded from orange sandy loams on flats (Table 30).

Table 30: GPS locations of *Rhagodia spinescens*, 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2007-2008	484683		
2007-2008	490242		
2007-2008	661390		
2007-2008	662429		
2007-2008	663230		

***Rulingia loxophylla* F.Muell. STERCULIACEAE**
This species is a spreading or semi-prostrate shrub that has scattered Western Australian Herbarium records from most regions across the Eremaean Botanical Province as well as one record from the Dampierland region within the Northern Botanical Province (DEC, 2009a). This collection represents an approximate 150km range extension to the south east.

This species was recorded from yellow-orange sandy loam on an undulating plain, affected by fire approximately 2-4 years ago (Table 31).

Table 31: GPS locations of *Rulingia loxophylla*, 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	528748		11-25

***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, 2009a). This collection represents an approximate 100km range extension to the north west.

This species was recorded from red and red-orange sandy loams on flats (Table 32):

Table 32: GPS locations of *Solanum ellipticum*, 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2007-2008	472464		
2007-2008	477716		
2007-2008	656685		
2007-2008	660502		
2007-2008	661390		
2007-2008	662002		
2007-2008	663230		
2007-2008	664478		
2007-2008	664983		
2007-2008	665902		

***Swainsona colutoides* F.Muell. PAPILIONACEAE**
This species is an erect annual or herb that has scattered Western Australian Herbarium records from the Coolgardie and Murchison regions of the Eremaean Botanical Province and Avon Wheatbelt and Mallee regions of the South West Botanical Province (DEC, 2009a). This collection represents an approximate 100km range extension to the east.

This species was recorded from red-orange sandy loam flat, affected by fire approximately 2-4 years ago (Table 33).

Table 33: GPS locations of *Swainsona colutoides*, 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	525178		1 plant

***Swainsona tenuis* E.Pritz.**
This species is a prostrate perennial herb that has scattered Western Australian Herbarium records across the Eremaean Botanical Province, predominantly the Murchison, Great Victoria Desert and Central Ranges (DEC, 2009a). This collection represents an approximate 150km range extension to the south.

This species was recorded from orange-red sandy clay with nearby massive granite outcropping (Table 34).

Table 34: GPS locations of *Swainsona tenuis*, 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	496788		11-25

***Templetonia aculeata* (F.Muell.) Benth.**
This species is an erect, open many-stemmed shrub that has many Western Australian Herbarium from the South West Botanical Province, mainly the Avon Wheatbelt and Mallee Regions and few records from the Coolgardie, Murchison and Great Victoria Desert regions of the Eremaean Botanical Province. This collection represents an approximate 100km infill to the east.

This species was recorded from yellow and yellow –orange sand and sandy loam from dunes and undulating plains (Table 35).

Table 35: GPS locations of *Templetonia aculeata*, 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	598726		6-10
2009	615854		6-10
2009	616603		6-10
2007-2008	504885		6-10

***Thyridolepis xerophila* (Domin) S.T.Blake**
This species is an erect, tufted perennial (woolly at the base), grass-like or herb that has few Western Australian Herbarium from the Gascoyne, Gibson Desert and Great Victoria Desert regions of the Eremaean Botanical Province. This collection represents an approximate 300km range extension to the south.

This species was recorded from orange sandy loam from flat topographies (Table 36).

Table 36: GPS locations of *Thyridolepis xerophila*, 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	497547		6-10

5.4 Introduced Flora

Two introduced (weed) species, **Salvia verbenaca* and **Cucumis myriocarpus* were recorded within the proposed corridor. **Salvia verbenaca* was recorded from five locations (Table 37), and **Cucumis myriocarpus* from one location (Table 38), all within the Pinjin Pastoral Station.

Table 37: GPS locations of **Salvia verbenaca*, 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2007-2008	472012		100 + plants
2007-2008	472389		50-100 plants
2007-2008	475895		50-100 plants
2007-2008	477716		50-100 plants
2007-2008	484683		50-100 plants

Table 38: GPS locations of **Cucumis myriocarpus*, 2007 - 2009

Survey Year	Easting (MGA 94, 51J)	Northing (MGA 94, 51J)	Comments
2009	470462		11-25

None of these weeds are defined as Declared Weeds pursuant to Section 37 of the *Agriculture and Related Resources Act, 1976* (WA).

5.5 Seasonal Flora

Twenty-six of the 325 recorded taxa are considered annual or biennial species (Appendix B). Of these 26 species, 18 were recorded for the first time in October 2009.

5.6 Opportunistic records of Priority Flora located outside of Pinjin Infrastructure Corridor

Nine Priority Flora species were recorded opportunistically outside of the Pinjin Infrastructure Corridor in October 2009 (Table 39):

Table 39: Opportunistic records of Priority Flora located outside of Pinjin Infrastructure Corridor

Species	Easting	Northing	Population Numbers
	MGA 94 – ZONE 51J		
Baeckea sp. Great Victoria Desert (A.S. Weston 14813) (P2)	646738 648614 656229 656029 649490		6-10 2-5 6-10 2-5 26-50
Dicrastylis nicholasii (P2)	667944 650600 649975 531794		26-50 26-50 51-100 500+
Olearia arida (P2)	655782 601691		51-100 11-25
Physopsis chrysotricha (P2)	650196 664350		11-25 11-25
Dicrastylis cundeeleensis (P3)	649490 650196 665939 665751 667723 667944 668455 532993 528050 526024 526590 522823 515160 515010 513334 513025 506825 502210		200-500 11-25 101-200 51-100 201-500 500+ 201-500 500+ 500+ 101-200 500+ 51-100 500+ 500+ 101-200 101-200 101-200 500+
Eucalyptus pimpiniana (P3)	513334		26-50
Microcorys macredieana (P3)	647806 646738 647272 648614 531751		51-100 11-25 50-100 26-50 26-50
Micromyrtus stenocalyx (P3)	531751		26-50
Lepidobolus deserti (P4)	646738		11-25

6. DISCUSSION

6.1 Rare and Priority Flora

Two species of Priority Flora were recorded for the first time within or adjacent to the proposed corridor during the spring survey. Additional records of one species of Declared Rare Flora and 11 species of Priority Flora were recorded during the spring survey. To date, one species of Declared Rare Flora and 15 species of Priority Flora have been recorded within the proposed corridor:

- *Conospermum toddii* (R),
- *Dampiera eriantha* (P1),
- *Baeckea* sp. Great Victoria Desert (A.S. Weston 14813) (P2),
- *Dicrastylis nicholasii* (P2),
- *Grevillea secunda* (P2),
- *Malleostemon* sp. Officer Basin (D. Pearson 350) (P2),
- *Olearia arida* (P2),
- *Dicrastylis cundeeleensis* (P3),
- *Eucalyptus pimpiniana* (P3),
- *Microcorys macredieana* (P3),
- *Micromyrtus serrulata* (P3),
- *Micromyrtus stenocalyx* (P3),
- *Thryptomene eremaea* (P2),
- *Comesperma viscidulum* (P4),
- *Daviesia purpurascens* (P4), and
- *Lepidobolus deserti* (P4).

New records of the potentially new *Hibbertia* species were also recorded. *Physopsis chrysotricha* (P2) was also recorded opportunistically, outside of the proposed corridor.

6.2 Seasonal Flora

Eighteen new annual or biennial species were recorded for the first time in October 2009. This increases the count of annual or biennial species to 26 species.

6.3 Taxonomic Changes and Limitations

Beyeria brevifolia var. *robustior* was previously identified within the proposed corridor and identified as a range extension (Mattiske, 2009). This species has undergone taxonomic revision and is now recognised as *Beyeria sulcata* var. *sulcata*.

Styphelia sp. was previously recorded as *Styphelia intertexta*. *Styphelia intertexta* has undergone a review, and its range reduced. The specimen collected by Mattiske Consulting matches the specimens labelled *Styphelia* sp. (Sheet Numbers 02999048 and 03326934) from the Western Australian Herbarium collected near Queen Victoria Springs.

The sterile specimen identified as *Cassinia arctuata* from 2007 has been re-identified as *Olearia subspicata*. Both species when sterile are very similar and described as having narrow-linear leaves with revolute margins and branches covered with white tomentose hair.

Austrostipa sp., *Eragrostis* sp., ?*Phebalium* sp., *Podolepis* sp. *Acacia* sp. and *Allocasuarina* sp. are sterile or burnt specimens and not able to be identified to species.

Hibbertia sp. (?nov.) is the same as Western Australian Herbarium collections labeled *Hibbertia* aff. *inclusa* (Sheet Numbers 2578751, 4542681 and 4509013) previously collected from the Officer Basin area.

7. ACKNOWLEDGEMENTS

The authors would like to thank staff from AngloGold Ashanti Australia, in particular Ana Storey who assisted with the spring survey, and plant taxonomists from the Western Australian State Herbarium who assisted with plant identifications.

8. LIST OF PERSONNEL

The following personnel of Mattiske Consulting Pty Ltd were involved in the spring survey:

Principle Ecologist	Dr E.M. Mattiske
Senior Botanist	B. Koch
Botanists	S. Reiffer K. Tippur

9. REFERENCES

Agriculture and Related Resources Act 1976 (WA)

Beard, J.S. (1974)
Vegetation *Survey of Western Australia, Great Victorian Desert. 1:1000000 Vegetation Series. Map Sheet 3 and Explanatory Notes: The Vegetation of the great Victorian Desert Area.* University of Western Australia Press. Nedlands, Western Australia.

Beard, J.S. (1990)
Plant Life of Western Australia. Kangaroo Press, Kenthurst NSW.

Bureau of Meteorology (2009)
Climate Statistics for Australian Locations. Publicly available data prepared by the Bureau of Meteorology, Commonwealth of Australia.
http://www.bom.gov.au/climate/averages/

Curry, P.J., Payne, A.L., Leighton, K.A., Hennig, P., Blood, D.A. (1994)
Technical Bulletin - An Inventory and Condition Survey of the Murchison River Catchment and Surrounds, Western Australia No. 84, Department of Agriculture Western Australia.

Department of Agriculture and Food (2009*)*
Declared Plants List.
http://agspsrv34.agric.wa.gov.au/programs/app/dec_pl/declaredplants.htm

Department of Environment and Conservation (2009a)
Florabase. Department of Environment and Conservation (http://www.dec.wa.gov.au)

Department of Environment and Conservation (2009b)
Max. Department of Environment and Conservation, Perth.

Department of Environment and Conservation (2009c)
Threatened Ecological Communities Database. Department of Environment and Conservation http://www.naturebase.net/content/view/849/1210/

Department of Environment and Conservation (2009d)
List of Threatened Ecological Communities on the Department of Conservation and Land Management's Threatened Ecological Community (TEC) Database endorsed by the Minister for the Environment. Department of Environment and Conservation http://www.naturebase.net/content/view/849/1210/

Department of Environment and Conservation (2009e)
Priority Ecological Communities for Western Australia. Department of Environment and Conservation

Department of the Environment, Water, Heritage and the Arts (2009a)
EPBC Act list of Threatened Flora.
http://www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl?wanted=flora

Department of the Environment, Water, Heritage and the Arts (2009b)
Environment Protection and Biodiversity Conservation Act 1999 List of Threatened Ecological Communities.
http://www.environment.gov.au/cgi-bin/sprat/public/publiclookupcommunities.pl

Environmental Protection Act 1986

Environmental Protection Authority (2004)
Guidance for the Assessment of Environmental Factors: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia. No 51.
www.epa.wa.gov.au/docs/1839_GS51.pdf

Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

Environmental Protection (Clearing of Native Vegetation) Regulations 2004 [WA]

Keighery, B.J. (1994)
Bushland Plant Survey. A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc.), Western Australia.

Mattiske Consulting Pty Ltd (2009).
Flora and Vegetation Survey – Pinjin Infrastructure Corridor L31/56, L31/57, L39/185 Tropicana Gold Project. Technical report prepared for AngloGold Ashanti Australia Limited.

Pringle, H.J.R. (1994)
Vegetation, in: Pringle, H.J.R., van Vreeswyk, A.M.E. & Gilligan S.A. (eds) *An inventory and condition survey of rangelands in the north-eastern Goldfields, Western Australia*, Western Australia Department of Agriculture Technical Bulletin no. 87, Perth

van Vreeswyk; A.M.E. (1994)
Soils, in: Pringle, H.J.R., van Vreeswyk, A.M.E. & Gilligan S.A. (eds) *An inventory and condition survey of rangelands in the north-eastern Goldfields, Western Australia*, Western Australia Department of Agriculture Technical Bulletin no. 87, Perth

Wildlife Conservation Act 1950 (WA)

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

Conservation Code	Category
R	**Declared Rare Flora – Extant Taxa** "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."
P1	**Priority One – Poorly Known Taxa** "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."
P2	**Priority Two – Poorly Known Taxa** "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."
P3	**Priority Three – Poorly Known Taxa** "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."
P4	**Priority Four – Rare Taxa** "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."

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

Conservation Code	Category
Ex	**Extinct** Taxa which at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
ExW	**Extinct in the Wild** 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.
CE	**Critically Endangered** 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.
E	**Endangered** 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.
V	**Vulnerable** 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.
CD	**Conservation Dependent** 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.

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

Conservation Code	Category
PTD	**Presumed Totally Destroyed** 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: (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	**Critically Endangered** 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: (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	**Endangered** 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: (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	**Vulnerable** 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: (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	**Poorly-known ecological communities** 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.
P2	**Poorly-known ecological communities** 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.
P3	**Poorly known ecological communities** (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: (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; (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.
P4	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.
P5	**Conservation Dependent ecological communities** 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.

APPENDIX B: SUMMARY OF VASCULAR PLANT SPECIES RECORDED WITHIN PROPOSED PINJIN ACCESS ROAD AND INFRASTRUCTURE CORRIDOR, 2007-2009

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

Family	Species	MCPL 2007 - 2008	MCPL 2009	Annual / Biennial
ADIANTACEAE	*Cheilanthes sieberi* subsp. *sieberi*	X	X	
CUPRESSACEAE	*Callitris preissii*	X	X	
POACEAE	*Amphipogon caricinus*		X	
	Aristida contorta	X		X
	Austrostipa nitida	X		
	Austrostipa ?plumigera		X	
	Austrostipa sp.	X		
	Enneapogon caerulescens	X	X	
	Enteropogon ramosus	X		
	Eragrostis eriopoda	X	X	
	Eragrostis falcata	X	X	
	Eragrostis pergracilis	X		X
	Eragrostis sp.	X		
	Paspalidium basicladum	X		X
	Thyridolepis xerophila		X	
	Triodia basedowii	X	X	
	Triodia desertorum	X	X	
	Triodia rigidissima	X	X	
	Triodia scariosa	X	X	
CYPERACEAE	*Caustis dioica*	X	X	
	Chrysitrix distigmatosa	X	X	
	Lepidosperma sp. A2 Inland Flat (G.J. Keighery 7000)	X		
	Schoenus subaphyllus	X	X	
RESTIONACEAE	*Lepidobolus deserti* (P4)	X	X	
ASPARAGACEAE	?*Chamaexeros fimbriata*	X		
	Laxmannia arida		X	
	Lomandra leucocephala	X	X	
XANTHORRHOEACEAE	*Xanthorrhoea thorntonii*	X	X	
HEMEROCALLIDACEAE	*Dianella revoluta* var. *divaricata*	X	X	
	Tricoryne sp. Mullewa (G.J. Keighery 12080)	X		
CASUARINACEAE	*Allocasuarina acutivalvis subsp. acutivalvis*	X	X	
	Allocasuarina helmsii	X	X	
	Allocasuarina spinosissima	X	X	
	Allocasuarina sp.	X		
	Casuarina pauper	X	X	
PROTEACEAE	*Banksia elderiana*	X	X	
	Conospermum toddii (R)	X	X	
	Grevillea acacioides	X		
	Grevillea acuaria	X	X	
	Grevillea didymobotrya subsp. *didymobotrya*	X	X	
	Grevillea juncifolia	X	X	
	Grevillea juncifolia subsp. *temulenta*	X		
	Grevillea nematophylla subsp. *planicosta*	X		
	Grevillea sarissa	X		
	Grevillea secunda (P2)	X	X	
	Hakea francisiana	X	X	
	Hakea preissii	X		
	Hakea recurva	X		
	Persoonia coriacea	X	X	
	Persoonia pertinax	X	X	

APPENDIX B: SUMMARY OF VASCULAR PLANT SPECIES RECORDED WITHIN PROPOSED PINJIN ACCESS ROAD AND INFRASTRUCTURE CORRIDOR, 2007-2009

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

Family	Species	MCPL 2007 - 2008	MCPL 2009	Annual / Biennial
SANTALACEAE	*Exocarpos aphyllus*	X		
	Santalum acuminatum	X		
	Santalum spicatum	X	X	
LORANTHACEAE	*Amyema fitzgeraldii*	X		
	Amyema gibberula var. ?*gibberula*	X		
	Lysiana casuarinae	X		
POLYGONACEAE	*Persicaria prostrata*		X	
	Polygonum plebeium		X	
CHENOPODIACEAE	*Atriplex nummularia*	X		
	Atriplex stipitata	X		
	Atriplex vesicaria	X		
	Dysphania kalpari		X	
	Enchylaena tomentosa	X		
	Maireana appressa	X		
	Maireana atkinsiana	X		
	Maireana eriosphaera		X	
	Maireana integra		X	
	Maireana ?*planifolia*		X	
	Maireana pyramidata	X		
	Maireana sedifolia	X	X	
	Maireana suaedifolia	X		
	Maireana tomentosa	X		
	Maireana trichoptera	X		
	Maireana triptera	X		
	Rhagodia drummondii	X	X	
	Rhagodia eremaea	X		
	Rhagodia preissii	X		
	Rhagodia spinescens	X		
	Salsola tragus	X		
	Sclerolaena cuneata	X		
	Sclerolaena ?*deserticola*	X		
	Sclerolaena diacantha	X	X	
	Tecticornia halocnemoides	X		
	Tecticornia indica subsp. *bidens*	X		
	Tecticornia pergranulata	X		
	Tecticornia ?*pruinosa*	X		
	Tecticornia undulata	X		
AMARANTHACEAE	*Hemichroa diandra*	X		
	Ptilotus drummondii	X		
	Ptilotus exaltatus		X	X
	Ptilotus gaudichaudii var. *gaudichaudii*		X	X
	Ptilotus obovatus	X	X	
	Ptilotus polystachyus	X	X	X
GYROSTEMONACEAE	*Codonocarpus cotinifolius*	X	X	
	?*Gyrostemon racemiger*	X		
	Gyrostemon ramulosus		X	
AIZOACEAE	*Disphyma crassifolium*	X	X	
PORTULACACEAE	*Calandrinia polyandra*		X	
LAURACEAE	*Cassytha melantha*		X	
PITTOSPORACEAE	*Bursaria occidentalis*	X		
	Marianthus bicolor	X	X	
	Pittosporum angustifolium	X		

APPENDIX B: SUMMARY OF VASCULAR PLANT SPECIES RECORDED WITHIN PROPOSED PINJIN ACCESS ROAD AND INFRASTRUCTURE CORRIDOR, 2007-2009

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

Family	Species	MCPL 2007 - 2008	MCPL 2009	Annual / Biennial
MIMOSACEAE	*Acacia acanthoclada* subsp. *acanthoclada*	X		
	Acacia aneura var. *aneura*	X	X	
	Acacia aneura var. *argentea*	X		
	Acacia aneura var. *conifera*	X		
	Acacia ayersiana	X	X	
	Acacia burkittii	X		
	Acacia calcarata	X		
	Acacia colletioides	X	X	
	Acacia desertorum var. *desertorum*	X	X	
	Acacia fragilis	X	X	
	Acacia helmsiana	X	X	
	Acacia hemiteles	X	X	
	Acacia heteroneura var. *jutsonii*	X		
	Acacia inaequiloba		X	
	Acacia kempeana	X		
	Acacia ligulata	X	X	
	Acacia murrayana	X	X	
	Acacia oswaldii	X		
	Acacia prainii	X	X	
	Acacia ramulosa var. *ramulosa*	X		
	Acacia rigens		X	
	Acacia sibina	X	X	
	Acacia tetragonophylla	X		
	Acacia xerophila var. *brevior*	X		
	Acacia sp.	X		
CAESALPINIACEAE	*Senna artemisioides* subsp. *filifolia*	X	X	
	Senna artemisioides subsp. *helmsii*	X		
	Senna artemisioides subsp. *petiolaris*	X	X	
	Senna artemisioides subsp. x *artemisioides*	X	X	
	Senna pleurocarpa var. *pleurocarpa*	X	X	
PAPILIONACEAE	*Daviesia benthamii* subsp. *acanthoclona*	X		
	Daviesia grahamii	X		
	Daviesia purpurascens (P4)	X	X	
	Daviesia ?*purpurascens* (P4)	X		
	Daviesia ulicifolia subsp. *aridicola*		X	
	Gompholobium gompholobioides	X	X	
	?*Indigofera georgei*	X		
	?*Jacksonia nematoclada*	X		
	Kennedia prorepens		X	
	Leptosema chambersii	X	X	
	Leptosema daviesioides	X		
	Mirbelia depressa	X		
	Mirbelia seorsifolia	X	X	
	Otion simplicifolium	X		
	Otion tortile (ms)	X		
	Swainsona colutoides		X	
	Swainsona tenuis		X	
	Templetonia aculeata	X	X	
	Templetonia egena	X		
ZYGOPHYLLACEAE	*Zygophyllum iodocarpum*		X	X
RUTACEAE	*Phebalium brevifolium*	X		
	Phebalium canaliculatum	X		
	Phebalium laevigatum	X		
	?*Phebalium* sp.	X		
	Philotheca tomentella	X		

APPENDIX B: SUMMARY OF VASCULAR PLANT SPECIES RECORDED WITHIN PROPOSED PINJIN ACCESS ROAD AND INFRASTRUCTURE CORRIDOR, 2007-2009

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

Family	Species	MCPL 2007 - 2008	MCPL 2009	Annual / Biennial
POLYGALACEAE	*Comesperma viscidulum* (P4)	X	X	
EUPHORBIACEAE	*Bertya dimerostigma*	X	X	
	Beyeria sulcata var. *sulcata*	X	X	
	Euphorbia drummondii	X		X
	Euphorbia tannensis	X	X	X
	Monotaxis luteiflora	X	X	
CELASTRACEAE	*Stackhousia megaloptera*		X	
SAPINDACEAE	*Alectryon oleifolius* subsp. *canescens*	X		
	Dodonaea amblyophylla	X		
	Dodonaea lobulata	X	X	
	Dodonaea microzyga var. *acrolobata*	X	X	
	Dodonaea rigida	X		
	Dodonaea stenozyga	X		
	Dodonaea viscosa subsp. *angustissima*	X		
	Dodonaea viscosa subsp. *spatulata*	X		
RHAMNACEAE	*Cryptandra aridicola*	X		
	Cryptandra distigma	X	X	
MALVACEAE	*Abutilon cryptopetalum*	X		
	Abutilon otocarpum	X		
	Alyogyne pinoniana var. *leptochlamys* (ms)	X		
	Hibiscus sturtii var. *truncatus*	X		
	Lawrencia ?*diffusa*		X	
	Lawrencia squamata	X		
	Sida calyxhymenia	X		
	Sida spodochroma	X		
STERCULIACEAE	*Brachychiton gregorii*	X		
	Commersonia melanopetala	X	X	
	Hannafordia bissillii subsp. *bissillii*	X	X	
	Keraudrenia velutina	X	X	
	Keraudrenia velutina subsp. *velutina*	X		
	Rulingia loxophylla		X	
DILLENEACEAE	*Hibbertia exasperata*		X	
	Hibbertia sp. (?nov)	X	X	
FRANKENIACEAE	*Frankenia* ?*cinerea*	X		
	Frankenia fecunda	X		
	Frankenia pauciflora	X		
	Frankenia setosa	X		
VIOLACEAE	*Hybanthus floribundus* subsp. *floribundus*	X	X	
THYMELAEACEAE	*Pimelea angustifolia*		X	
MYRTACEAE	*Aluta maisonneuvei subsp. auriculata*	X	X	
	Baeckea sp. Great Victoria Desert (P2) (AS Western 14813)		X	
	Callistemon phoeniceus	X	X	
	Calothamnus gilesii	X	X	
	Enekbatus eremaeus	X	X	
	Eucalyptus ceratocorys	X	X	
	Eucalyptus concinna	X	X	
	Eucalyptus ebbanoensis subsp. *ebbanoensis*	X		
	Eucalyptus effusa	X		
	Eucalyptus ewartiana	X		

APPENDIX B: SUMMARY OF VASCULAR PLANT SPECIES RECORDED WITHIN PROPOSED PINJIN ACCESS ROAD AND INFRASTRUCTURE CORRIDOR, 2007-2009

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

Family	Species	MCPL 2007 - 2008	MCPL 2009	Annual / Biennial
MYRTACEAE (Continued)	*Eucalyptus gongylocarpa*	X	X	
	Eucalyptus gracilis	X		
	Eucalyptus horistes	X	X	
	Eucalyptus hypolaena	X	X	
	Eucalyptus leptophylla	X	X	
	Eucalyptus ?*lucasii*	X		
	Eucalyptus mannensis subsp. mannensis	X	X	
	Eucalyptus oleosa	X	X	
	Eucalyptus pimpiniana (P3)	X		
	Eucalyptus platycorys	X	X	
	Eucalyptus rosacea	X		
	Eucalyptus salicola	X		
	Eucalyptus salubris	X	X	
	Eucalyptus transcontinentalis	X		
	Eucalyptus trivalva	X	X	
	Eucalyptus youngiana	X	X	
	Homalocalyx thryptomenoides	X	X	
	Leptospermum fastigiatum	X	X	
	Malleostemon sp. Officer Basin (D. Pearson 350) (P2)		X	
	Melaleuca eleuterostachya	X	X	
	Melaleuca halmaturorum	X		
	Melaleuca hamata	X	X	
	Micromyrtus hymenonema	X		
	Micromyrtus serrulata (P3)	X	X	
	Micromyrtus stenocalyx (P3)	X	X	
	Thryptomene biseriata	X	X	
	Thryptomene eremaea (P2)	X	X	
	Verticordia helmsii	X	X	
HALORAGACEAE	*Glischrocaryon aureum*	X	X	
	Gonocarpus confertifolius		X	X
	Haloragis odontocarpa		X	X
APIACEAE	*Platysace trachymenioides*		X	
EPACRIDACEAE	*Leucopogon cuneifolius*	X		
	Styphelia sp.	X		
LOGANIACEAE	*Logania nuda*	X	X	
APOCYNACEAE	*Alyxia buxifolia*	X		
ASCLEPIADACEAE	*Marsdenia australis*	X	X	
	Rhyncharrhena linearis	X		
BORAGINACEAE	*Halgania cyanea* var. Allambi Stn	X		
	Halgania integerrima	X		
LAMIACEAE	*Dicrastylis brunnea*	X	X	
	Dicrastylis cundeeleensis (P3)	X	X	
	Dicrastylis nicholasii (P2)	X	X	
	Microcorys macredieana (P3)	X	X	
	Pityrodia lepidota	X	X	
	Pityrodia loricata	X		
	Prostanthera althoferi subsp. *althoferi*	X		
	Prostanthera laricoides	X		
	* *Salvia verbenaca*	X		
	Spartothamnella teucriiflora	X		
	Westringia cephalantha	X	X	
	Westringia rigida	X	X	

APPENDIX B: SUMMARY OF VASCULAR PLANT SPECIES RECORDED WITHIN PROPOSED PINJIN ACCESS ROAD AND INFRASTRUCTURE CORRIDOR, 2007-2009

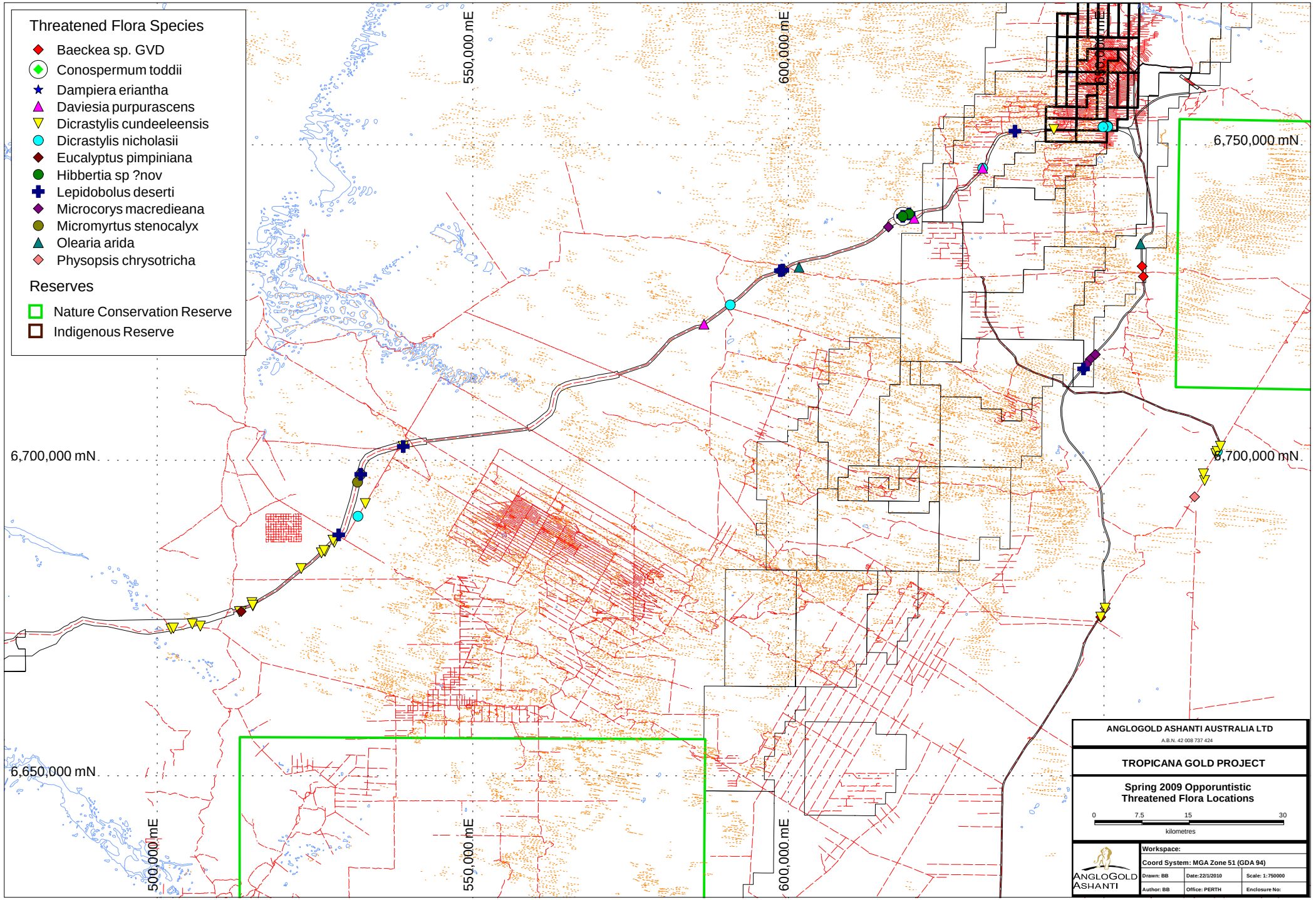
Note: P1, P2, P3 and P4 denote - Priority Flora Species (DEC, 2008a)
(R) denotes Rare Flora (DEC, 2008a)

Family		Species	MCPL 2007 - 2008	MCPL 2009	Annual / Biennial
SOLANACEAE		*Anthotroche pannosa*	X	X	
		Duboisia hopwoodii	X	X	
		Solanum ellipticum	X		
		Solanum ?ferocissimum	X		
		Solanum lasiophyllum	X	X	
		Solanum nummularium	X	X	
		Solanum orbiculatum	X	X	
		Solanum plicatile	X	X	
MYOPORACEAE		*Eremophila alternifolia*	X		
		Eremophila caperata	X	X	
		Eremophila decipiens subsp. *decipiens*	X		
		Eremophila dempsteri	X		
		Eremophila forrestii	X	X	
		Eremophila glabra subsp. *glabra*	X	X	
		Eremophila granitica	X		
		Eremophila latrobei subsp. *?glabra*	X		
		Eremophila latrobei subsp. *latrobei*	X		
		Eremophila longifolia	X		
		Eremophila maculata subsp. *brevifolia*	X		
		Eremophila miniata	X		
		Eremophila oldfieldii subsp. *angustifolia*	X		
		Eremophila oppositifolia subsp. *angustifolia*	X		
		Eremophila platythamnos subsp. *platythamnos*	X	X	
		Eremophila pustulata	X		
		Eremophila scoparia	X		
		Eremophila serrulata	X		
RUBIACEAE		*Opercularia spermacocea*		X	
		Pomax sp. Desert (A.S. George 11968)		X	
		Psydrax suaveolens	X		
CUCURBITACEAE	*	*Cucumis myriocarpus*		X	X
GOODENIACEAE		*Brunonia australis*		X	
		Coopernookia strophiolata		X	
		Dampiera eriantha (P1)		X	
		Dampiera lavandulacea		X	
		Dampiera ramosa	X	X	
		Dampiera tomentosa		X	
		Goodenia elderi	X	X	
		Goodenia glandulosa		X	
		Goodenia pinnatifida		X	
		Goodenia quasilibera	X	X	
		Goodenia ramelii		X	
		Goodenia triodiophila		X	
		Goodenia xanthosperma	X	X	
		Lechenaultia striata		X	
		Scaevola basedowii	X	X	
		Scaevola ?parvifolia	X		
		Scaevola spinescens	X	X	
		Velleia connata		X	X
		Velleia glabrata		X	X
		Velleia rosea		X	X
STYLIDIACEAE		*Stylidium induratum*		X	
		Stylidium limbatum		X	

APPENDIX B: SUMMARY OF VASCULAR PLANT SPECIES RECORDED WITHIN PROPOSED PINJIN ACCESS ROAD AND INFRASTRUCTURE CORRIDOR, 2007-2009

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

Family	Species	MCPL 2007 - 2008	MCPL 2009	Annual / Biennial
ASTERACEAE	*Brachyscome ciliaris*	X	X	X
	Calotis sp. Carnarvon Range (D.J. Edinger & K.F. Kenneally D 2708 K 12243)		X	
	Centipeda ?*pleiocephala*		X	X
	Centipeda crateriformis subsp. ?*crateriformis*		X	X
	Chrysocephalum apiculatum		X	
	Chrysocephalum puteale	X	X	
	Cratystylis subspinescens	X	X	
	Gnephosis angianthoides		X	X
	Gnephosis ?*tenuissima*		X	X
	Helipterum craspedioides		X	X
	?*Leiocarpa semicalva*	X		
	Olearia arida (P2)	X	X	
	Olearia exiguifolia	X	X	
	Olearia incana	X		
	Olearia lanuginosa	X		
	Olearia muelleri	X	X	
	Olearia subspicata	X	X	
	Podolepis capillaris	X	X	X
	Rhodanthe maryonii		X	X
	Senecio lacustrinus		X	X
	Senecio ?*pinnatifolius*	X		
	Vittadinia sulcata	X		X
	Waitzia acuminata var. *acuminata*		X	X


Threatened Flora Species
Baeckea sp. GVD
Conospermum toddii
Dampiera eriantha
Daviesia purpurascens
Dicrastylis cundeeleensis
Dicrastylis nicholasii
Eucalyptus pimpiniana
Hibbertia sp ?nov
Lepidobolus deserti
Microcorys macredieana
Micromyrtus stenocalyx
Olearia arida
Physopsis chrysotricha
Reserves
Nature Conservation Reserve
Indigenous Reserve
550,000 mE
600,000 mE
650,000 mE
6,750,000 mN
6,700,000 mN
6,650,000 mN
500,000 mE
550,000 mE
600,000 mE
ANGLOGOLD ASHANTI AUSTRALIA LTD
A.B.N. 42 008 737 424
TROPICANA GOLD PROJECT
Spring 2009 Opporuntistic
Threatened Flora Locations
0 7.5 15 30
kilometres
ANGLOGOLD ASHANTI
Workspace:
Coord System: MGA Zone 51 (GDA 94)
Drawn: BB
Date: 22/1/2010
Scale: 1:750000
Author: BB
Office: PERTH
Enclosure No:

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 ?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*, *Dicrastylis 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 caerulescens*. 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 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 distigmatosa* 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

G1 Open Grassland of *Eragrostis eriopoda*, *Aristida contorta* and *Enneapogon caerulescens* 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.

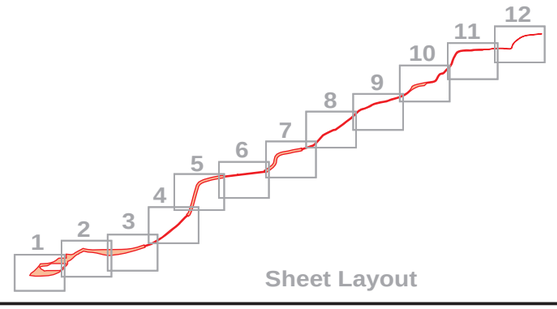
CH1 Low Open Chenopod Shrubland of *Atriplex ?vesicaria* with *Frankenia setosa* and *Frankenia ?cinerea* with low mixed shrubs and Chenopods. This community occurs on orange sands on flats, adjacent to weathered calcrete outcropping.

CH2 Low Chenopod Shrubland of *Tecticornia* spp. with *Frankenia setosa*, *Hemichroa diandra*, *Lawrencia squamata* and *Eragrostis pergracilis*. This community occurs on orange sandy clays in low lying saline flow areas.

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)



Priority Species

Ct	Conospermum toddii
De	Dampiera eriantha
Bg	Baeckea sp. Great Victoria Desert (A.S. Weston 14813)
Dn	Dicrastylis nicholasii
Gs	Grevillea secunda
Mo	Malleostemon sp. Officer Basin (D. Pearson 350)
Oa	Olearia arida
Te	Thryptomene eremaea
Dc	Dicrastylis cundeeleensis
Ep	Eucalyptus pimpiniana
Mm	Microcorys macredieana
Mse	Micromyrtus serrulata
Mst	Micromyrtus stenocalyx
Cv	Comesperma viscidulum
Dp	Daviesia purpurascens
Ld	Lepidobolus deserti
Hs	Hibbertia sp ?nov
Jn	?Jacksonia nematoclada
Ax	Acacia xerophila var. brevior
Cp	Centipeda ?pleiocephala
Dr	Dampiera ramosa
El	Eucalyptus ?lucasii
Kp	Kennedia prorepens
La	Lawrencia ?diffusa
Pe	Persicaria prostrata
Pp	Polygonum plebeium
Rs	Rhagodia spinescens
Rl	Rulingia loxophylla
Se	Solanum ellipticum
Sc	Swainsona colutoides
St	Swainsona tenuis
Ta	Templetonia aculeata
Tx	Thyridolepis xerophila
*Sv	*Salvia verbenaca

RARE AND PRIORITY SPECIES

Priority	DEC	Herbarium	MCPL 2009	MCPL 2007-2008	TEC
Rare	●	■	▲	▼	★
1	●	■	▲	▼	
2	●	■	▲	▼	
3	●	■	▲	▼	
4	●	■	▲	▼	
Other	●	■	△	▽	

ANGLOGOLD ASHANTI AUSTRALIA

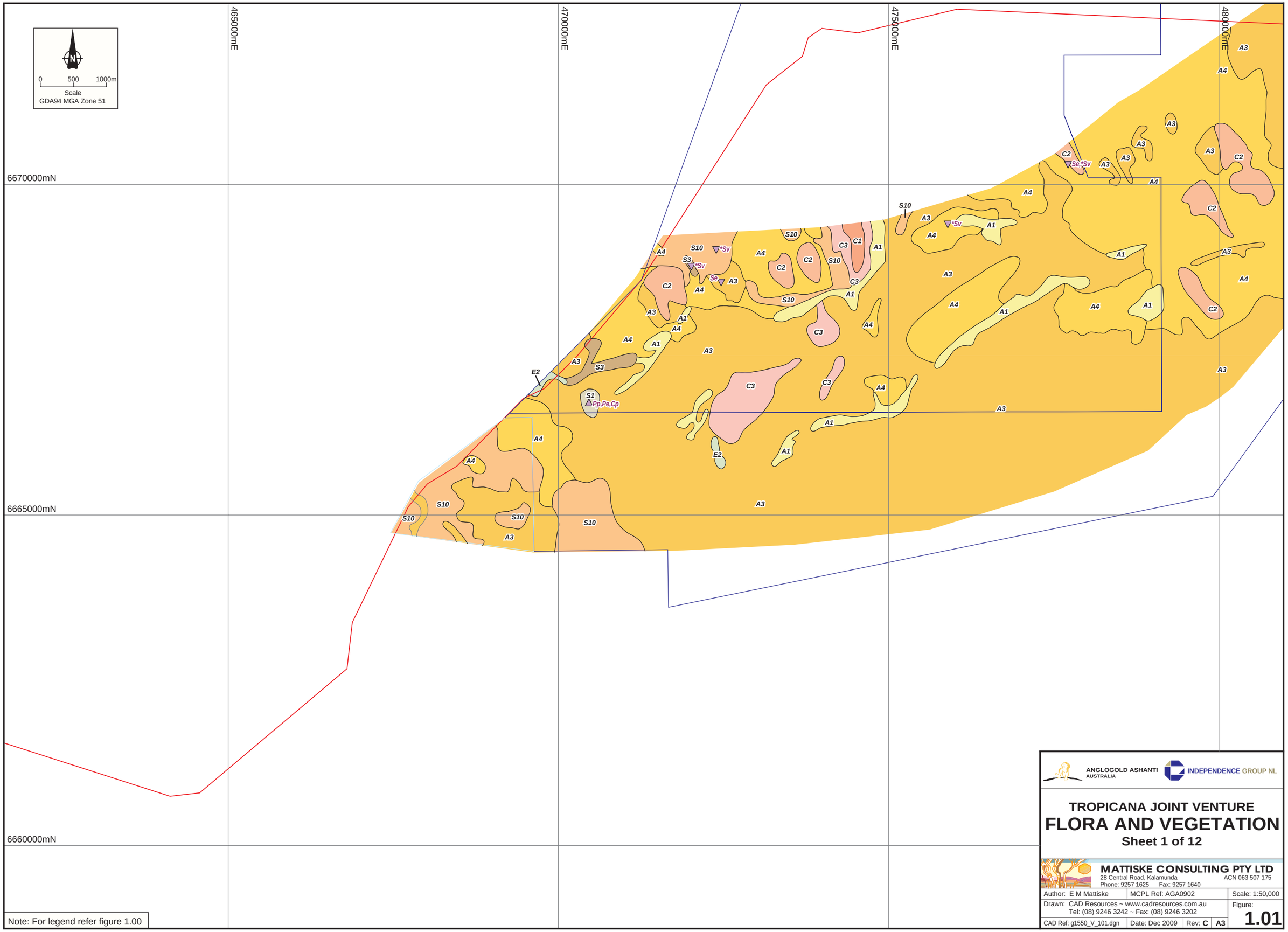
INDEPENDENCE GROUP NL

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: AGA0902	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: Dec 2009	Rev: C A3



Note: For legend refer figure 1.00

ANGLOGOLD ASHANTI AUSTRALIA

INDEPENDENCE GROUP NL

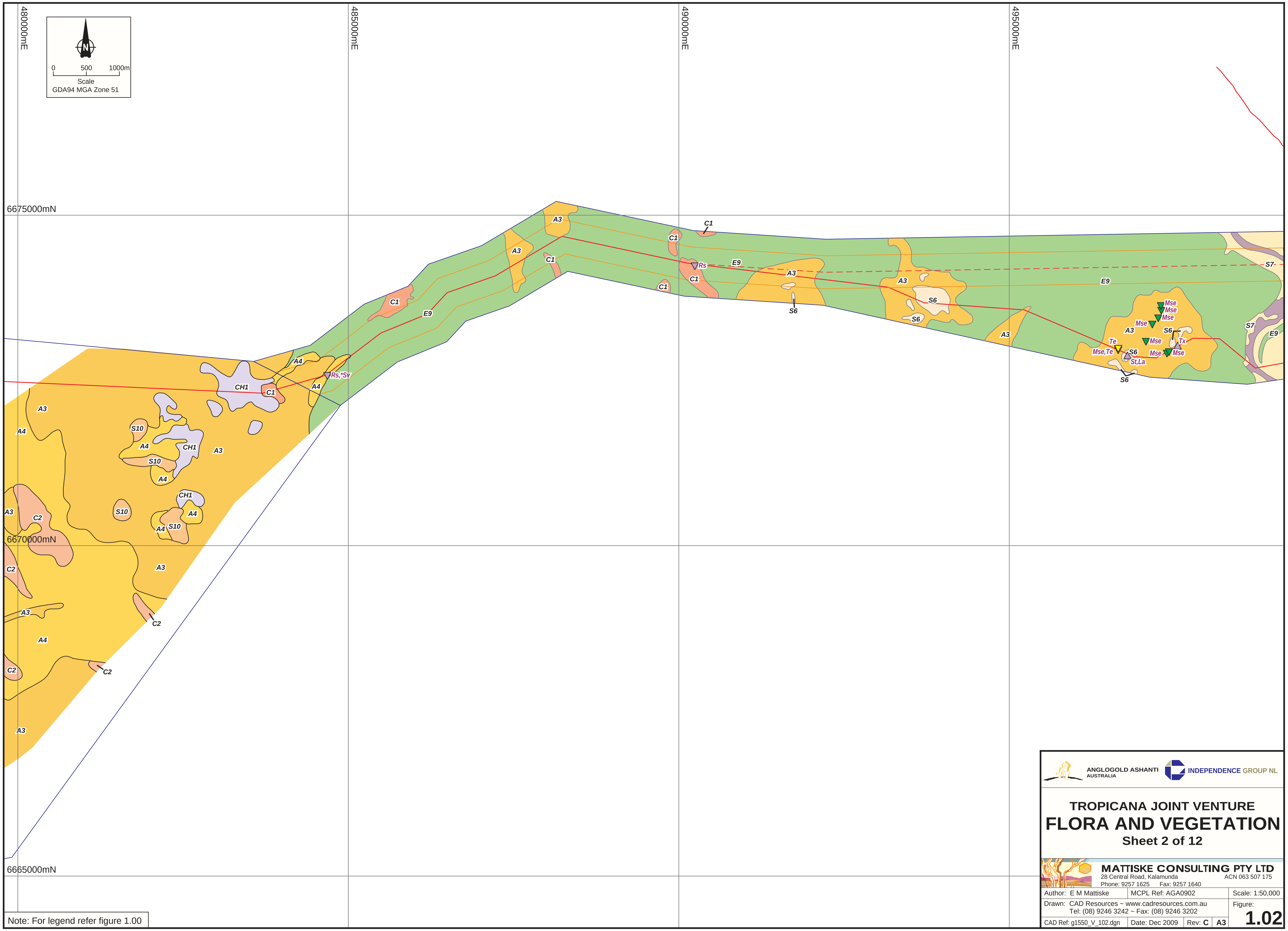
TROPICANA JOINT VENTURE

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: AGA0902	Scale: 1:50,000
Drawn: CAD Resources ~ www.cadresources.com.au Tel: (08) 9246 3242 ~ Fax: (08) 9246 3202		Figure: 1.01
CAD Ref: g1550_V_101.dgn	Date: Dec 2009	Rev: C A3



ANGLOGOLD ASHANTI AUSTRALIA

INDEPENDENCE GROUP NL

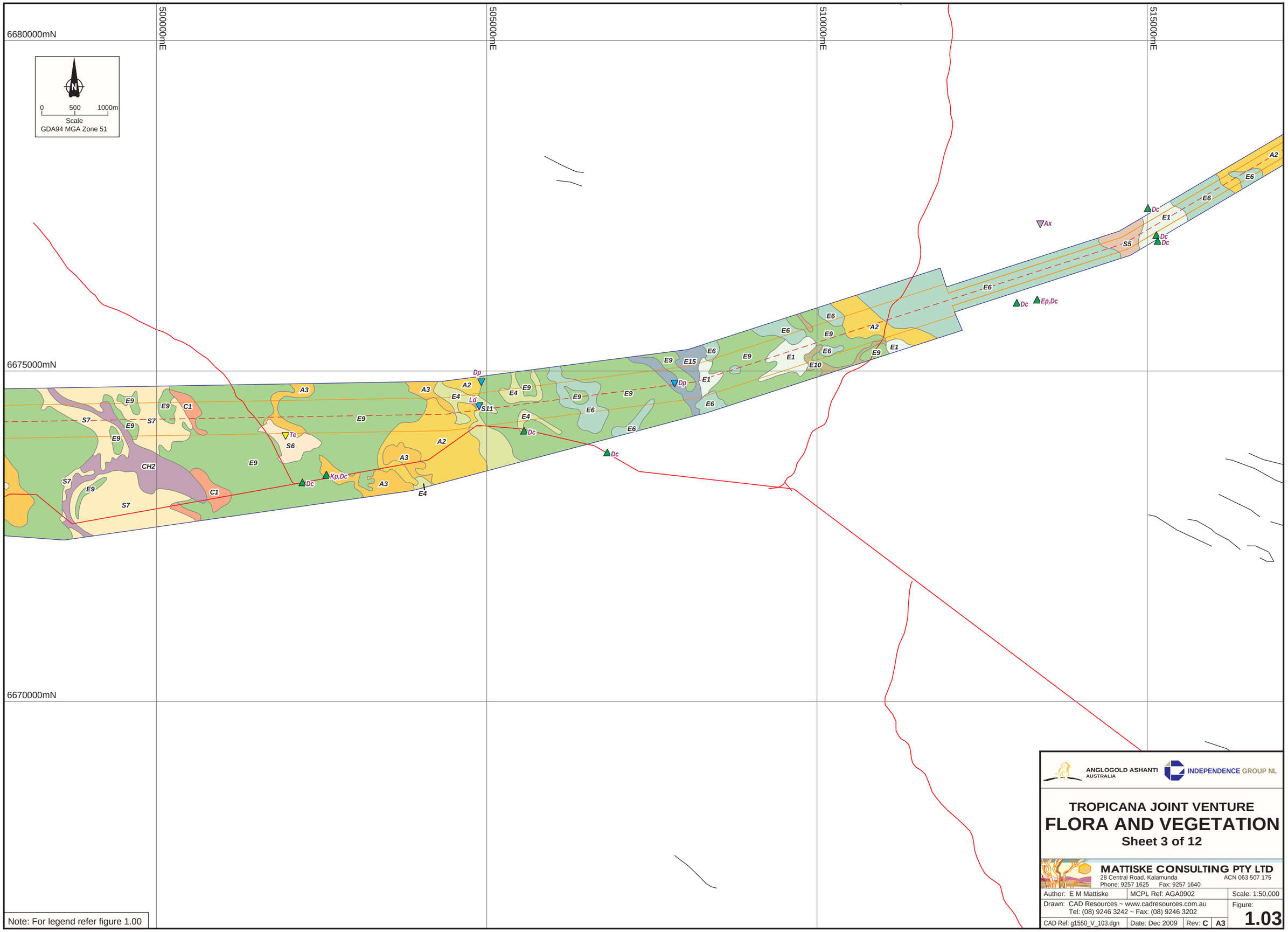
TROPICANA JOINT VENTURE

FLORA AND VEGETATION

Sheet 2 of 12

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

Author: E M Mattiske	MCPL Ref: AGA0902	Scale: 1:50,000
Drawn: CAD Resources ~ www.cadresources.com.au Tel: (08) 9246 3242 ~ Fax: (08) 9246 3202		Figure: 1.02
CAD Ref: g1550_V_102.dgn	Date: Dec 2009 Rev: C A3	



ANGLOGOLD ASHANTI AUSTRALIA

INDEPENDENCE GROUP NL

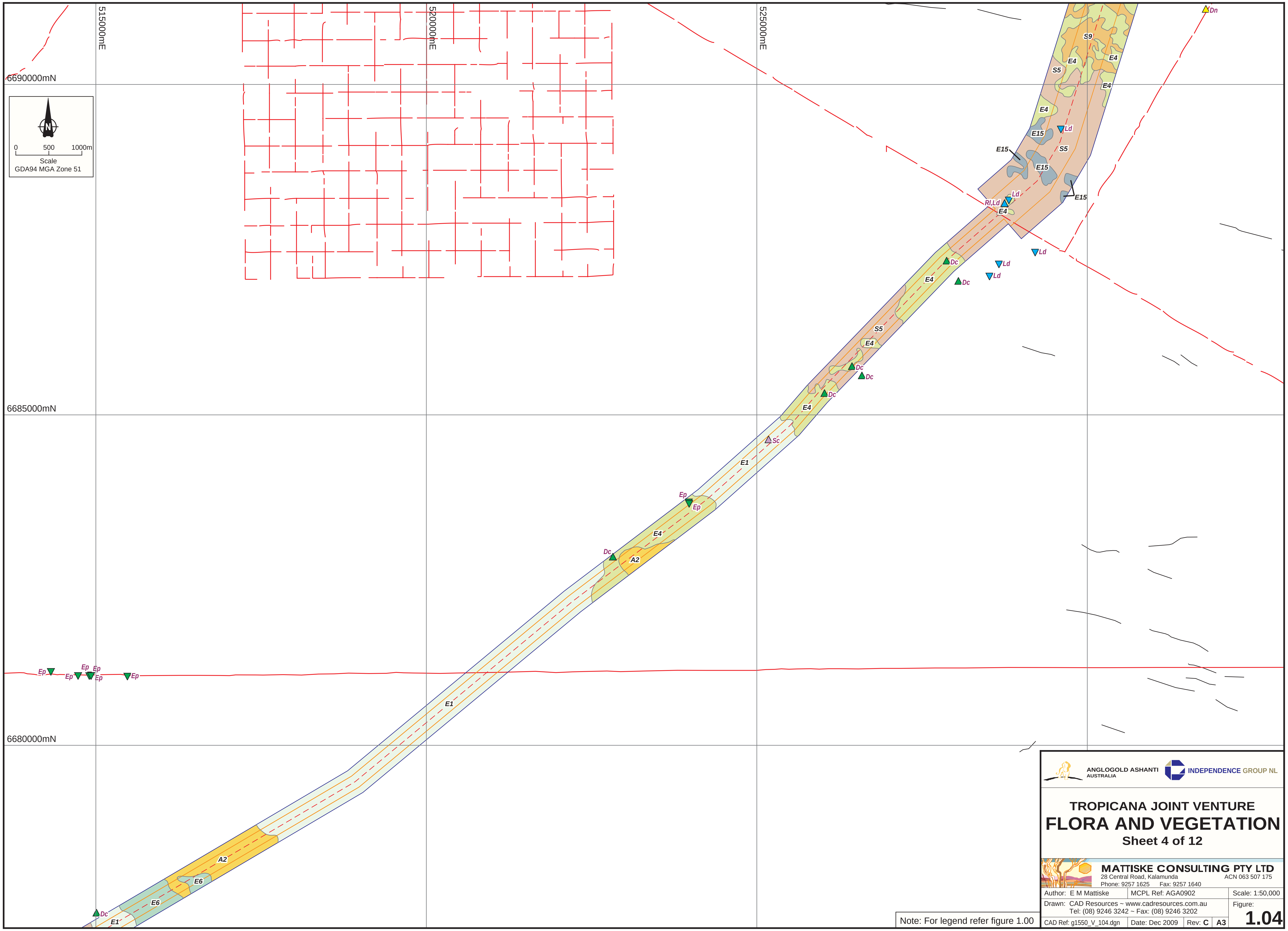
TROPICANA JOINT VENTURE

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: AGA0902	Scale: 1:50,000
Drawn: CAD Resources ~ www.cadresources.com.au Tel: (08) 9246 3242 ~ Fax: (08) 9246 3202		Figure: 1.03
CAD Ref: g1550_V_103.dgn	Date: Dec 2009	Rev: C A3



ANGLOGOLD ASHANTI AUSTRALIA

INDEPENDENCE GROUP NL

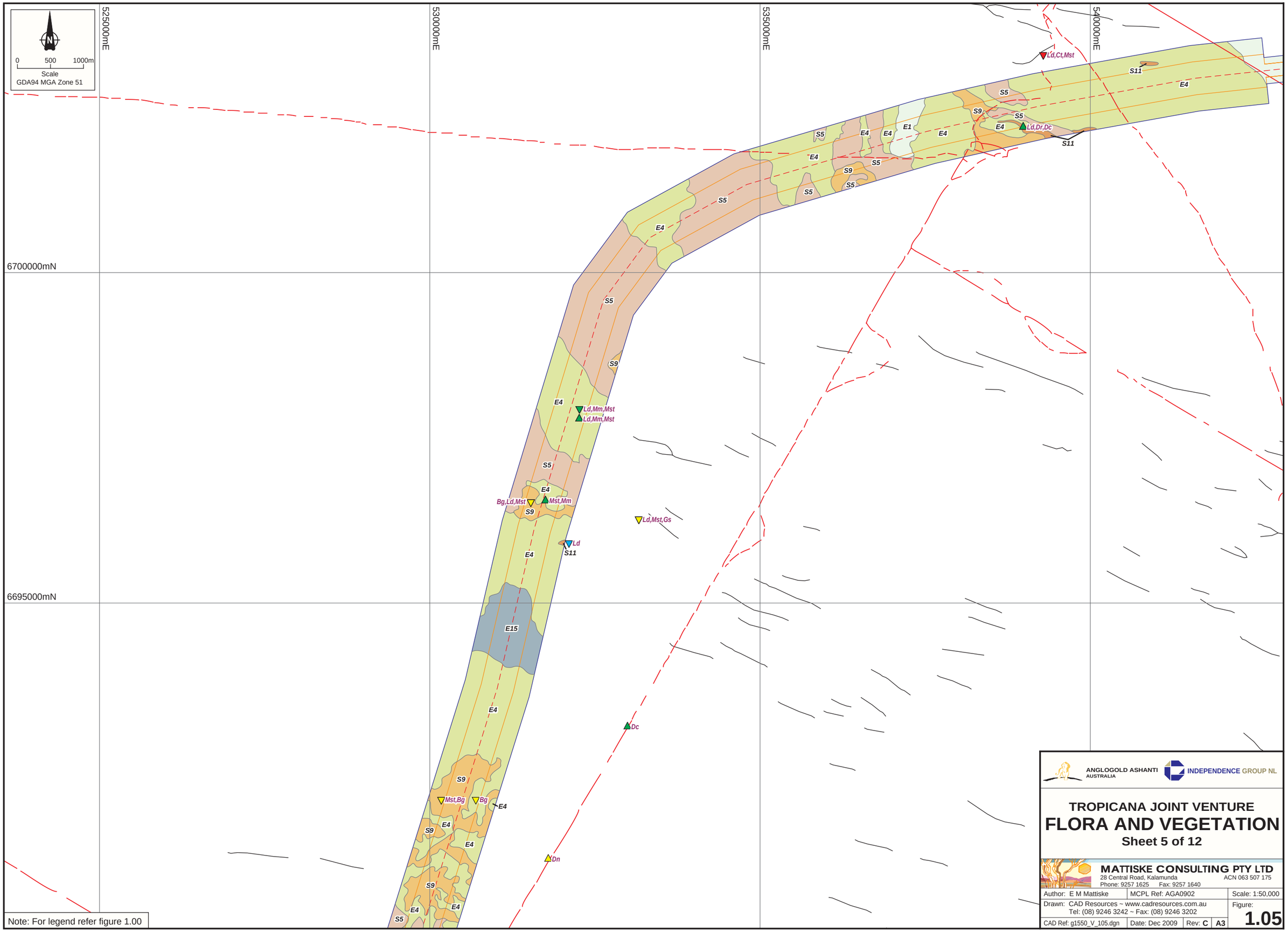
TROPICANA JOINT VENTURE

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: AGA0902	Scale: 1:50,000
Drawn: CAD Resources ~ www.cadresources.com.au Tel: (08) 9246 3242 ~ Fax: (08) 9246 3202		Figure: 1.04
CAD Ref: g1550_V_104.dgn	Date: Dec 2009 Rev: C A3	



ANGLOGOLD ASHANTI AUSTRALIA

INDEPENDENCE GROUP NL

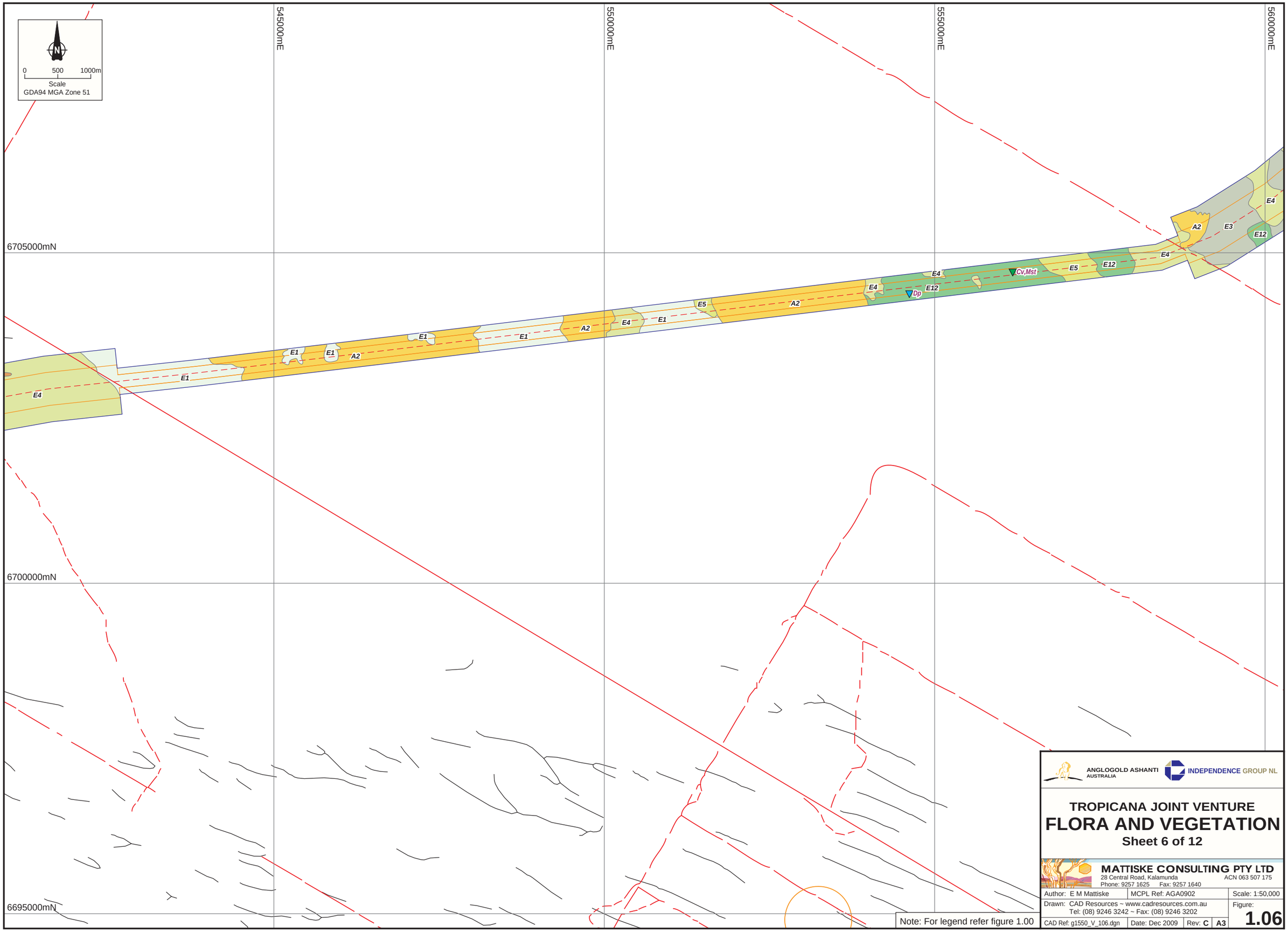
TROPICANA JOINT VENTURE

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 Mattiske	MCPL Ref: AGA0902	Scale: 1:50,000
Drawn: CAD Resources ~ www.cadresources.com.au Tel: (08) 9246 3242 ~ Fax: (08) 9246 3202		Figure: **1.05**
CAD Ref: g1550_V_105.dgn	Date: Dec 2009	Rev: **C** **A3**



Note: For legend refer figure 1.00

ANGLOGOLD ASHANTI AUSTRALIA

INDEPENDENCE GROUP NL

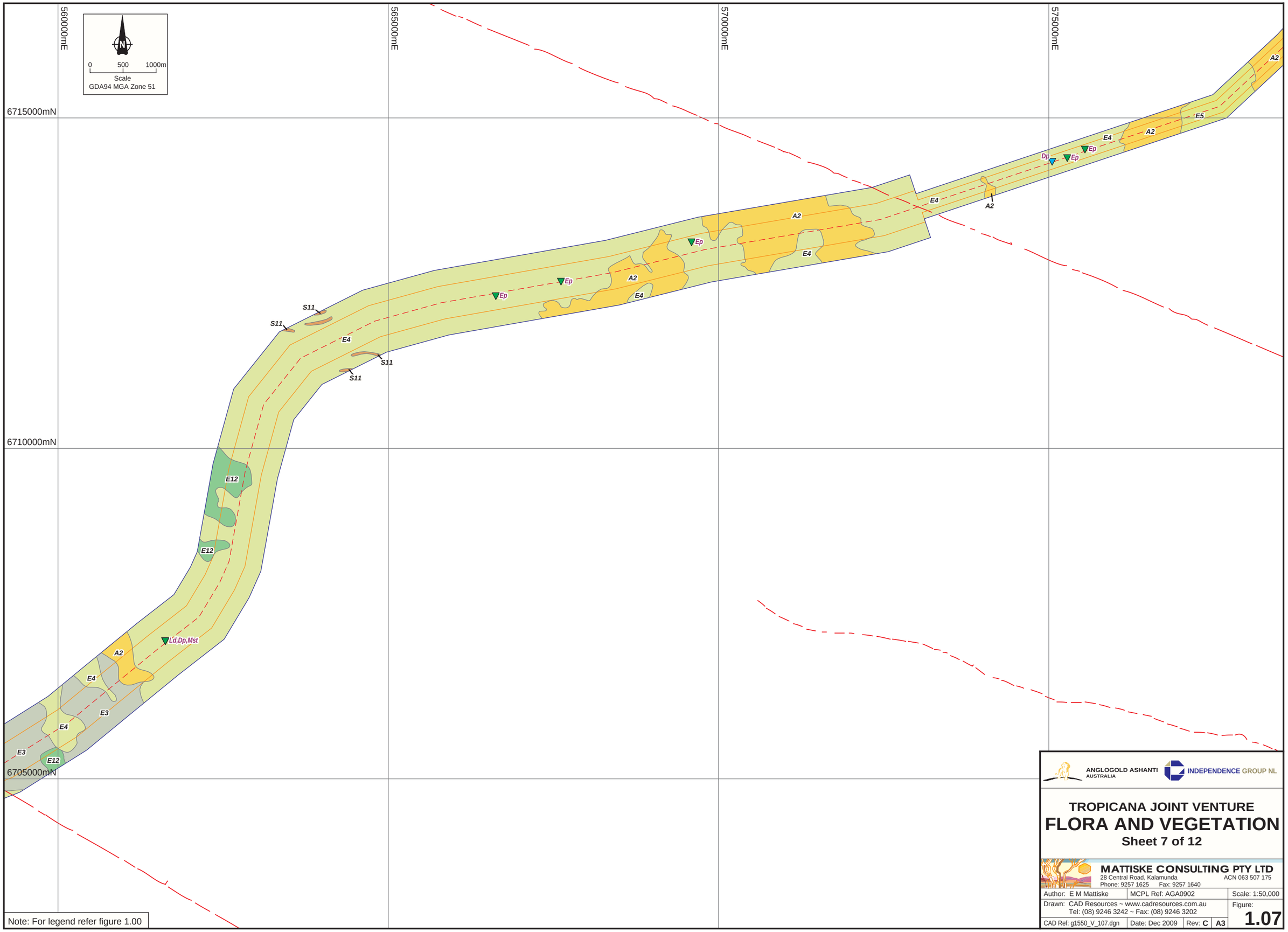
TROPICANA JOINT VENTURE

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: AGA0902	Scale: 1:50,000
Drawn: CAD Resources ~ www.cadresources.com.au Tel: (08) 9246 3242 ~ Fax: (08) 9246 3202		Figure: **1.06**
CAD Ref: g1550_V_106.dgn	Date: Dec 2009	Rev: **C** **A3**



Note: For legend refer figure 1.00

ANGLOGOLD ASHANTI AUSTRALIA

INDEPENDENCE GROUP NL

TROPICANA JOINT VENTURE

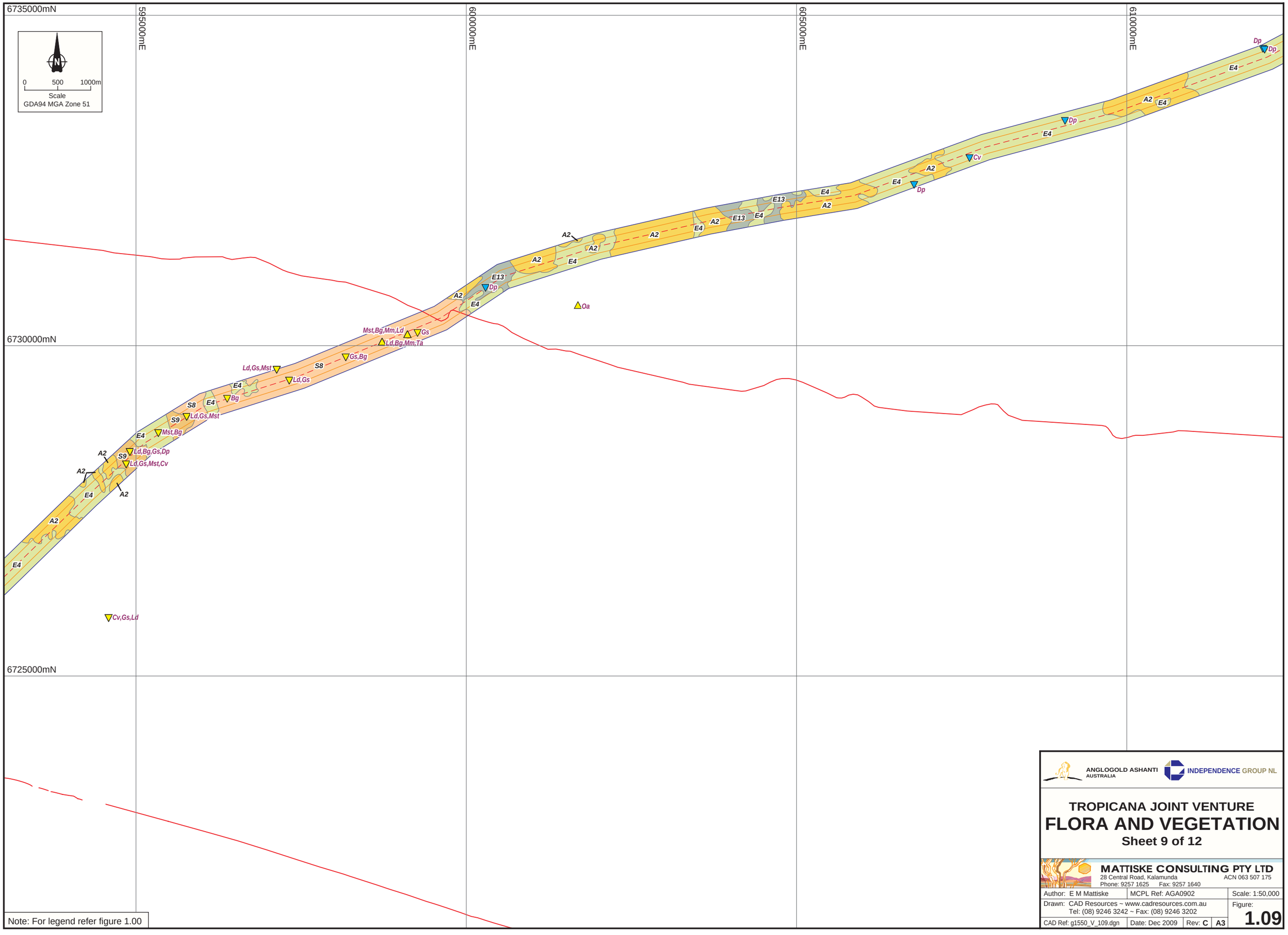
FLORA AND VEGETATION

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: AGA0902	Scale: 1:50,000
Drawn: CAD Resources ~ www.cadresources.com.au Tel: (08) 9246 3242 ~ Fax: (08) 9246 3202		Figure: 1.07
CAD Ref: g1550_V_107.dgn	Date: Dec 2009	Rev: C A3

575000mE
580000mE
585000mE
590000mE
6725000mN
6720000mN
6715000mN
0 500 1000m
Scale
GDA94 MGA Zone 51
A2
E4
E14
Bg
Dn
S4
E7
E12
Ep
Dp
Dp,Ep,Oa
Dp,Cv
S2
Cv
Jn,Ld
E5
Note: For legend refer figure 1.00
ANGLOGOLD ASHANTI AUSTRALIA
INDEPENDENCE GROUP NL
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: AGA0902
Scale: 1:50,000
Drawn: CAD Resources ~ www.cadresources.com.au
Tel: (08) 9246 3242 ~ Fax: (08) 9246 3202
Figure: 1.08
CAD Ref: g1550_V_108.dgn
Date: Dec 2009
Rev: C
A3



Note: For legend refer figure 1.00

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: AGA0902	Scale: 1:50,000
Drawn: CAD Resources ~ www.cadresources.com.au Tel: (08) 9246 3242 ~ Fax: (08) 9246 3202		Figure: **1.09**
CAD Ref: g1550_V_109.dgn	Date: Dec 2009 | Rev: **C** | **A3**	

615000mE

620000mE

625000mE

630000mE

6745000mN

6740000mN

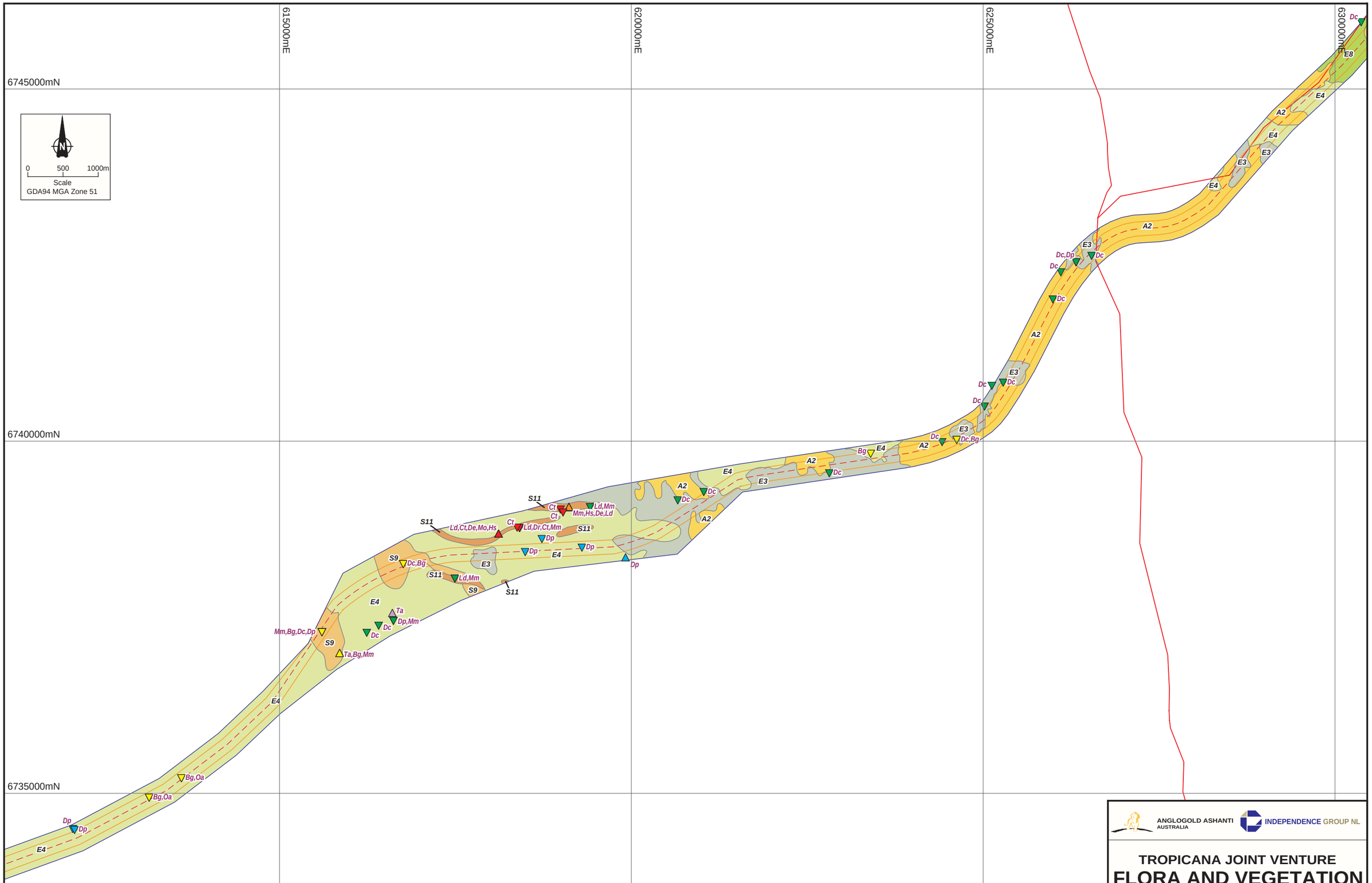
6735000mN

N

0 500 1000m

Scale

GDA94 MGA Zone 51



Note: For legend refer figure 1.00

ANGLOGOLD ASHANTI AUSTRALIA

INDEPENDENCE GROUP NL

TROPICANA JOINT VENTURE

FLORA AND VEGETATION

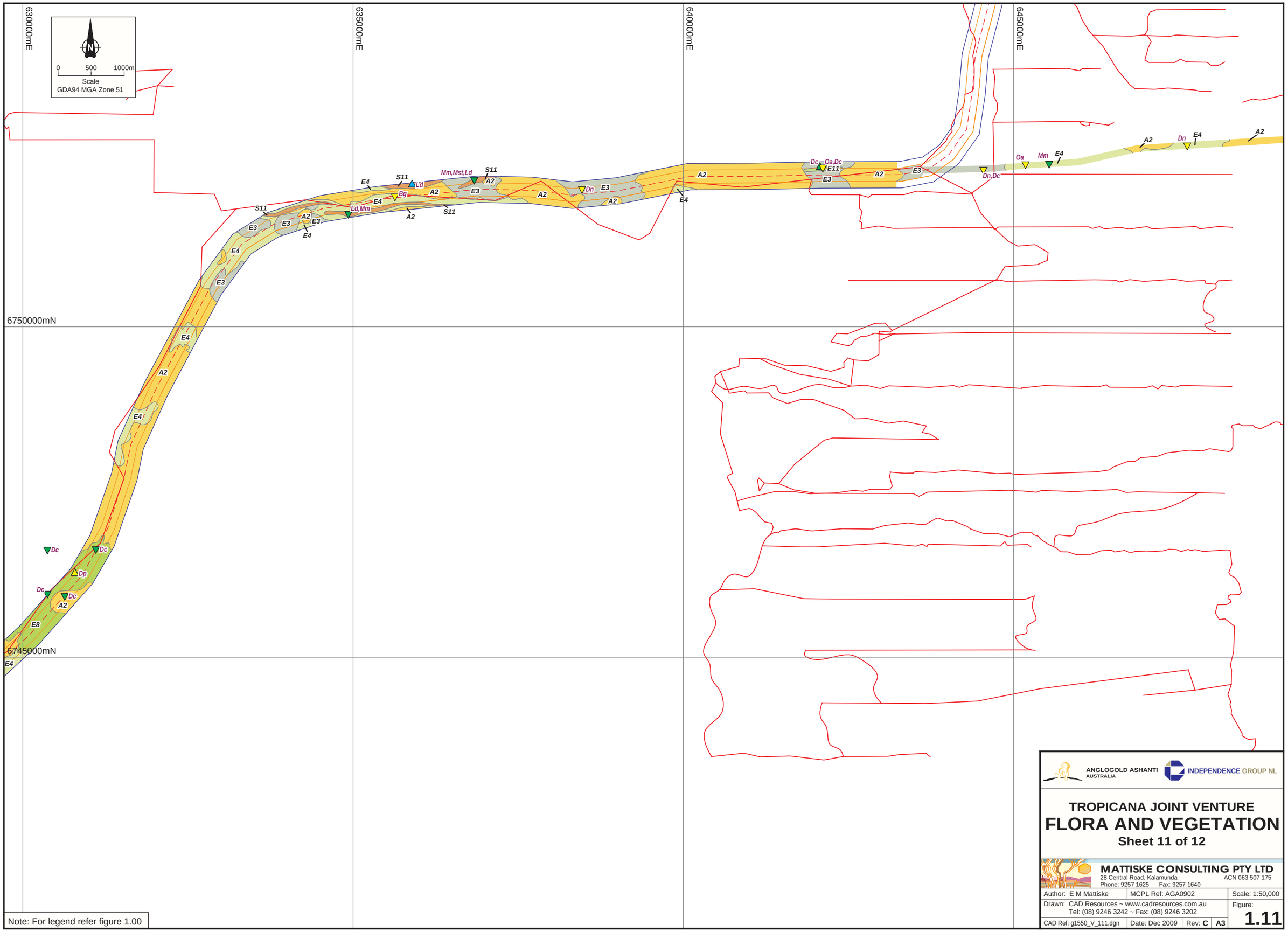
Sheet 10 of 12

MATTISKE CONSULTING PTY LTD

28 Central Road, Kalamunda ACN 063 507 175

Phone: 9257 1625 Fax: 9257 1640

Author: E M Mattiske	MCPL Ref: AGA0902	Scale: 1:50,000
Drawn: CAD Resources ~ www.cadresources.com.au Tel: (08) 9246 3242 ~ Fax: (08) 9246 3202		Figure: 1.10
CAD Ref: g1550_V_110.dgn	Date: Dec 2009	Rev: C A3



Note: For legend refer figure 1.00

ANGLOGOLD ASHANTI AUSTRALIA

INDEPENDENCE GROUP NL

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

Author: E M Mattiske	MCPL Ref: AGA0902	Scale: 1:50,000
Drawn: CAD Resources ~ www.cadresources.com.au Tel: (08) 9246 3242 ~ Fax: (08) 9246 3202		Figure: 1.11
CAD Ref: g1550_V_111.dgn	Date: Dec 2009 Rev: C A3	

650000mE
655000mE
660000mE
665000mE
6760000mN
6755000mN
6750000mN
N
0 500 1000m
Scale
GDA94 MGA Zone 51
A5
Se
C1
A5
Se,Rs
A5
Rs
G1
Se,Rs
Se
G1
Se
Se
A5
C1
E3
A5
El
C1
A5
Se
C1
A5
El
C1
E3
A5
A2
Dn
Dn
Dn
Dn
Dn
E3
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: AGA0902	Scale: 1:50,000
Drawn: CAD Resources ~ www.cadresources.com.au Tel: (08) 9246 3242 ~ Fax: (08) 9246 3202		Figure: 1.12
CAD Ref: g1550_V_112.dgn	Date: Dec 2009	Rev: C A3