

Level 1Vegetation and Flora Survey of Proposed Disturbance Areas at the
Davyhurst Mine Site, Service Corridor and Battery Borefield

Eastern Goldfields Pty Ltd



Surveyed June 11th to 15th 2016

Surveyed by Jennifer Borger

Botanical Consultant

29 Andrew Street, Kalamunda WA 6076

M: 0427998403

E: jjborger1@westnet.com.au

Acknowledgements: Staff of the WA Herbarium (DPaW) – Michael Hislop, Rob Davis and Dr Andrew Brown – for assistance with identifications.

Contents

	Page
1. Background	4
2. Climate	5
3. Vegetation and landform	5
3.1 Threatened and Priority Flora	9
3.2 Threatened and priority ecological communities	9
4. Methodology	11
5. Results	11
5.1 Davyhurst TSF, Mill and Camp areas	12
5.2 Pipeline/ power line/ bore field	19
5.2.1 Battery Borefield	20
5.2.2 Service corridor from Camp to Battery Borefield	27
6. Conclusions	33
7. References	35

Appendices

Appendix 1A: Tenements – Davyhurst	37
Appendix 1B: Tenements – Bore line and Battery Bore Field	37
Appendix 2: Species list for Davyhurst Mill, TSF and camp area	38
Appendix 3: Species list for the service corridor and Battery Borefield	40
Appendix 4: Conservation code descriptions	43
Appendix 5: Conservation code descriptions	44
Appendix 6: Hydrology – Davyhurst area	45
Appendix 7: Davyhurst mine extended area hydrology	46
Appendix 8A: GPS location data for Sandalwood (<i>Santalum spicatum</i>) – Davyhurst	46
Appendix 8B: GPS location data for Sandalwood (<i>Santalum spicatum</i>) – Service corridor and Battery Borefield	48
Appendix 9: Mapped locations of Sandalwood	51

Tables

Table 1: Pre-European vegetation	8
Table 2: Conservation significant flora	10
Table 3: Vegetation communities in the bore field area	20
Table 4: Vegetation types in the service corridor area	28

Figures

Figure 1: Average monthly rainfall	5
Figure 2: Pre European Vegetation	6
Figure 3: Land system mapping (DAFWA)	7
Figure 4: Vegetation types within the Davyhurst TSF survey area	13

Figure 5: (Left) Vegetation type 1: drainage line – <i>Eucalyptus salubris</i> , <i>E. griffithsii</i> woodland;	14
(Right) Vegetation type 2: Plain - <i>Eucalyptus griffithsii</i> , <i>E. oleosa</i> open mallee woodland	
Figure 6: Vegetation Type 2 <i>Eucalyptus griffithsii</i> , <i>E. oleosa</i> open mallee woodland	14
Figure 7: Vegetation type 3 – <i>Eucalyptus salubris</i> woodland	15
Figure 8: Vegetation type 4 – <i>Eucalyptus salubris</i> woodland over <i>Acacia tetragonophylla</i> ,	16
<i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Scaevola spinescens</i> , <i>Acacia burkittii</i> open shrubland	
Figure 9: Vegetation type 5 (left); Vegetation type 6 (right)	16
Figure 10: Vegetation type 7 (L: fire regrowth – shrubland; R: <i>Acacia mulganeura</i> at the	17
edges; unburnt)	
Figure 11: Vegetation type 8, looking towards vegetation type 2.	17
Figure 12: Vegetation type 9 – <i>Eucalyptus salmonophloia</i> , <i>E. clelandii</i> , <i>E. lesouefii</i> , <i>E. salubris</i>	18
isolated trees to open woodland	
Figure 13: Battery Borefield vegetation communities	20
Figure 14: <i>Eucalyptus salmonophloia</i> woodland over <i>Callistemon phoeniceus</i> shrubland	21
Figure 15: Chenopod shrubland in valleys.	22
Figure 16: (left) <i>Bursaria occidentalis</i> dominant regrowth near Bore BA15; (right) <i>Eucalyptus</i>	23
<i>horistes</i> (EH) woodland adjacent to the service corridor	
Figure 17: <i>Eucalyptus sheathiana</i> low mallee woodland in the area of proposed bore	24
SKWB20P	
Figure 18: <i>Eucalyptus salmonophloia</i> woodland	25
Figure 19: (L) <i>Eucalyptus salmonophloia</i> woodland on plains – Chenopod shrubs were	26
dominant in the disturbance area; (R) disturbed area at the north end of the Battery	
Borefield	
Figure 20: Vegetation types in the western section of the service corridor, with Davyhurst	27
sites on the left.	
Figure 21: Vegetation types in the eastern section of the service corridor, with the Battery	27
Borefield on the right	
Figure 22: Vegetation association 7	30
Figure 23: <i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i> , <i>Acacia fuscanaura</i> low mallee woodland	31
(left); <i>Eucalyptus lucasii</i> , <i>E. griffithsii</i> , <i>Callitris columellaris</i> , and <i>Allocasuarina acutivalvis</i>	
open woodland (right)	
Figure 24: <i>Eucalyptus leptopoda</i> low open mallee woodland	32
Figure 25: <i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i> , <i>E. oleosa</i> low mallee woodland	33

1. Background

Eastern Goldfields Ltd (EGS) proposes to recommission the Davyhurst mining operation, located within the Shire of Menzies, adjacent to the Davyhurst – Ora Banda Road 130 kilometres north west of Kalgoorlie within the Eastern Murchison IBRA sub-region (Interim biogeographic regionalisation for Australia). Mining commenced in the Davyhurst area in 1898 following the discovery of gold in 1897, and continued until 2005. Monarch Gold Mining Company Ltd acquired the mine in 2006 from which it was acquired by EGS. The proposal is located near the Davyhurst town common on unallocated crown land within the boundary of ex-Credo Station, a former pastoral lease purchased by the Government in 2007 as it is a representative conservation area and includes two reserves – Clear and Muddy Lakes Nature Reserve and Rowles Lagoon Conservation Park.

The works to be conducted include the recommissioning of the Davyhurst site which requires the immediate establishment of a new bulk fuel facility, power station, core yard and potentially in the future a second tailings storage facility (TSF) cell covering forty hectares. The site is serviced by a pipeline and power line from the Battery Borefield area located on Mt Burgess Station, and to reduce any potential fire hazard, there may be a requirement to obtain an approval to clear a fire break around the 35 km service corridor.

The area has historic and current disturbances through mining and pastoral activities as well as sandalwood collecting. A waste dump and pit are located just to the north of the plant. The service corridor was constructed for earlier mining activities. The powerline is currently active; however the pipeline is not currently being used, but will be required for the new operations. The vegetation within the corridor and around bores to be used will be surveyed to determine potential impacts from the maintenance activities.

The tenements included for the surveys are (Appendix 1):

- Davyhurst (TSF expansion; camp;): M30/108, M30/255, M30/73, M30/5, M30/42
- Pipeline/ power line/ bore field: L30/35, L29/38, L29/34, L24/170, L24/101, L24/174, M30/108, M30/255

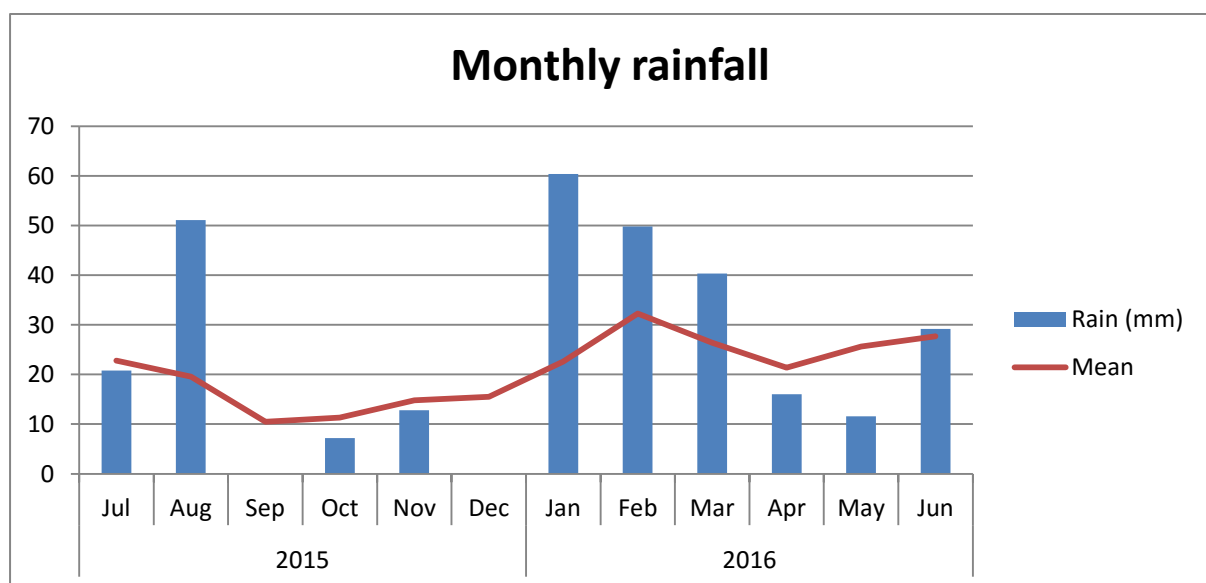
A Level 1 flora and vegetation survey was conducted in accordance with the EPA Guidance Statement No. 51 “Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia” (EPA 2004) and includes desktop research followed by on-ground surveys of the sites. The report presents results of the desktop and vegetation surveys and includes:

- Identification of vascular plants from the three survey areas
- Results of DPaW database searches for species of conservation significance
- Maps of vegetation communities/ associations
- A review of the significance of the plant communities at a regional level
- Vegetation condition, impacts and threats

2. Climate

The Davyhurst area experiences an arid climate with average annual rainfall recorded at Menzies at 254 mm. Mean monthly averages are shown with the 12 month records prior to the survey in Figure 1. Rainfall can be unreliable and extensive dry periods of around 4 – 6 months can be expected. The data shows that rainfall in the six months prior to survey has mostly been above average, and significant falls were recorded prior to commencing the survey, as well as during the survey. Summers are generally hot and dry with maximum temperature averaging around 34 – 35°C (December to February), and winters are mild with cool nights, with average maximum temperature in June and July around 17°C.

Figure 1: Average monthly rainfall (Menzies BOM 12052) with monthly records for 12 months prior to the survey



3. Vegetation and landform

The sites are located within the Murchison IBRA bioregion and within the Eastern Murchison (MUR1) IBRA sub-region. MUR1 comprises the northern parts of the Yilgarn Craton and is characterized by extensive areas of elevated red desert sandplains with internal drainage, salt lake systems and broad plains of red-brown soils and breakaways. Minor areas of granite/ gneiss/ greenstone rock outcrop in the survey area. Vegetation is dominated by mulga (*Acacia aneura* complex) woodlands and is often rich in ephemerals, hummock grasslands (*Triodia* spp.), saltbush shrublands and Halosarcia (*Tecticornia*) shrublands. The survey area is close to the boundary of the Coolgardie bioregion which includes the mulga/ spinifex complexes as well as Eucalypt woodlands.

Pre-European mapping undertaken by Beard (1990) included the Davyhurst area in the northern part of the Coolgardie Botanical District characterized by dry eucalypt woodlands bordering the Austin Botanical District supporting mulga communities. Pre-European mapping for the area is presented in Figure 2. Davyhurst is mapped as Associations 468 - medium woodland; salmon gum and goldfields blackbutt, 538 and 1413, the latter two being shrublands; *Acacia brachystachya* scrub; and shrublands; *Acacia*, *Casuarina* and *Melaleuca* thicket respectively.

Figure 2: Pre European Vegetation

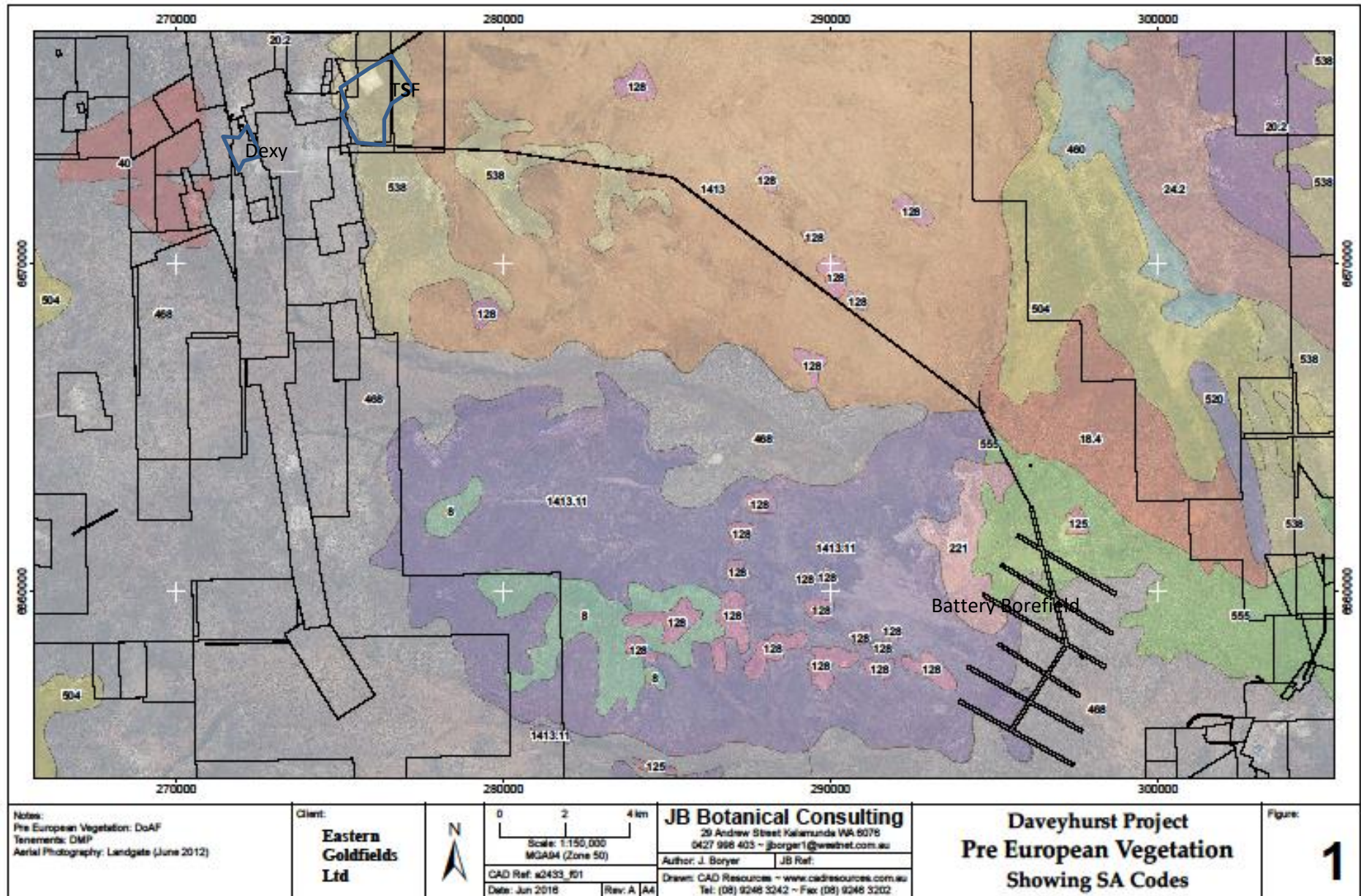
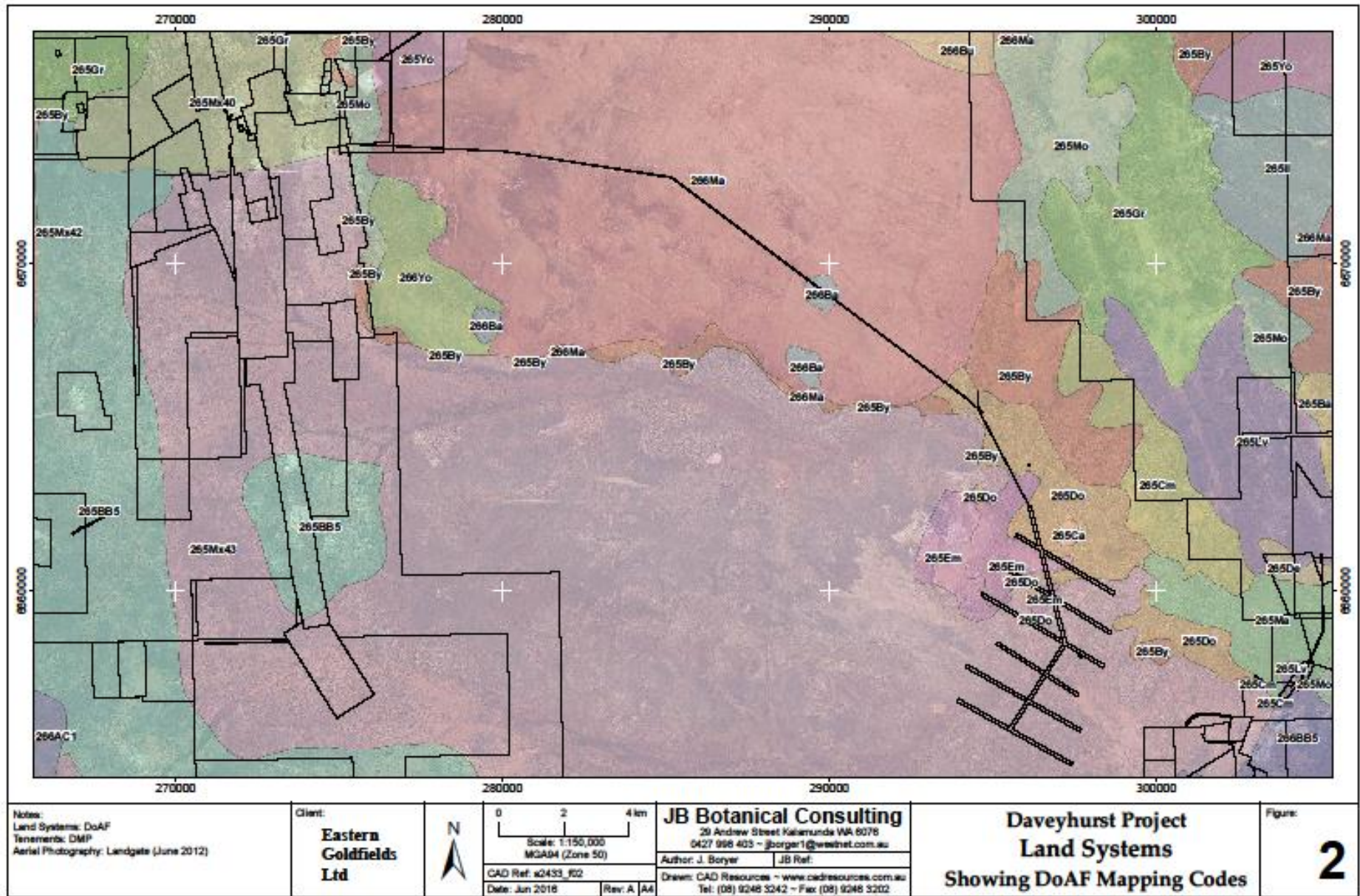


Figure 3: Land system mapping (DAFWA)



The service corridor and bore field are located to the south east of Davyhurst, with the corridor traversing approximately 35 km. Pre-European vegetation mapping for the site includes 1413 (dominant), 538, 468 (as described above) and 555 – hummock grasslands, mallee steppe; red mallee over spinifex, *Triodia scariosa*; 221 – succulent steppe, salt bush; and 18.4 – low woodland; mulga (*Acacia aneura*). All vegetation associations are in the Barlee system.

Table 1: Pre-European vegetation

Code	Location	Area (ha)	Description
18.4	SC ¹	3,198,859	Low woodland; mulga (<i>Acacia aneura</i> complex)
221	SC	3,575	succulent steppe, salt bush
468	Tailings	8,632	Medium woodland; salmon gum (<i>Eucalyptus salmonophloia</i>) and goldfields blackbutt (<i>E. lesouefii</i>)
538	Tailings, SC	19,227	<i>Acacia brachystachya</i> * (Turpentine mulga)scrub; and shrublands; (may refer to other mulga alliances such as <i>A. fuscaneura</i> or <i>A. caesaneura</i>)
555	SC	22,475	Hummock grasslands, mallee steppe; red mallee over spinifex, (<i>Triodia scariosa</i>)
1413	Tailings, SC	29,688	<i>Acacia</i> , <i>Casuarina</i> (<i>Allocasuarina</i>) and <i>Melaleuca</i> thicket

1 – Service corridor

**Acacia brachystachya* is not recorded from the survey area, with records in Western Australia placing it mostly further north except one record east of Kalgoorlie, close to the South Australian border.

Recorded pre-European extent is presented in Table 1. These are mostly listed as being 100% uncleared but doesn't take into account minor areas for mining and passive clearing through grazing (pastoral activities). The region has been stocked since the early 20th century.

Land system (LS) mapping was undertaken by the Department of Agriculture Western Australia – Figure 3 (Pringle et al 1994). The sites are mapped predominantly as 266Ma (Marmion LS; gently undulating sandplains with mixed tall shrubland and hummock grasslands – SC and Davyhurst), 265Yo (Yowie LS; sandy plains supporting tall shrubland of mulga and bowgada (*Acacia ramulosa*) with patchy wanderrie grasses – Davyhurst); 265By (Bunyip LS; gilgaied drainage tract, draining greenstone hills supporting mixed halophytic shrublands occasionally with a black oak overstorey – Davyhurst); 265Mo (Moriarty LS; low greenstone rises and stony plains supporting chenopod shrublands with patchy eucalypt overstorey – Davyhurst); 266Ba (Bandy LS; gritty surfaced plains and low outcrops of granite with scattered *Acacia* shrublands – SC); 265Do (Doney LS; Calcareous alluvial plains with eucalypt woodlands adjacent to salt lake systems – Bore field); 265Em (Emu LS; fresh or brackish ephemeral lakes and swamps with cane grass, lignum (*Duma florulenta* – formerly *Muehlenbeckia florulenta*) and paperbark shrublands – Bore field). The region is located on mostly undulating plains with low rocky outcrops, with paleodrainage present as sometimes poorly defined drainage lines which terminate at saline lakes or at the edges of sandplain (Pringle et al). Flow in these systems is intermittent depending on rainfall. In times of high rainfall surface waters flow into Lake Goongarrie, draining east into Ponton Creek, which flows into the Nullarbor Plain.

3.1 Threatened and Priority Flora

A search of databases (NatureMap, FloraBase DPaW 2016) resulted in 28 threatened and priority taxa, of which two were incorrect records – *Eucalyptus crucis* subsp. *crucis* (T) and *Pterostylis elegantissima* (P1), neither of which occur in the area. The *Pterostylis* specimen was checked by Dr Andrew Brown (DPaW) and found to be *P. sp. dainty brown*, which is listed as not threatened. The list of taxa is presented in Table 2, with likelihood of occurring within the survey area listed based on recorded habitat. Specimens of the priority taxa were studied at the WA Herbarium (DPaW) prior to travelling to site. Eleven of the taxa are either herbs or opportunistic species which depend on rainfall, with six recorded from clay pans. A small area of clay pan was present in the bore field area; however this was heavily disturbed through pastoral activities as well as construction of access tracks along the pipeline and power line. The grass – *Austrostipa blackii* – may occur in the area, but is hard to identify unless it is flowering. Current and historic pastoral impacts from stock grazing have resulted in very low levels of ground cover (mostly < 1%) in much of the area, with many of the grasses grazed almost to ground level. Conservation code descriptions are presented in Appendix 5.

Ptilotus procumbens has been recorded from Credo Station in *Acacia burkittii* shrubland on red cracking clay in a broad flat plain (Gibson & Langley 2012). It is superficially similar to *Ptilotus aervoides* when not in flower, but the leaf shape can be used to tell them apart. Possible habitat was searched for this species, but these areas were mostly lacking in ground cover. *Newcastelia insignis* is a disturbance species recorded from red and yellow sands mostly from areas burnt or disturbed, being common in one area three years following fire. Large sections of the service corridor are located on yellow-red sandplain which has been burnt, with regrowth to about 1 metre. These sections were checked quite closely, but no plants were found. A related species, *Physopsis viscida*, was common in disturbance areas along the corridor. *Homalocalyx grandiflorus* is recorded within fifteen km of the TSF and corridor areas in habitat most likely to occur in the north east area of the TSF survey area. No plants which could be *H. grandiflorus* were recorded in this area.

A Bush Blitz vegetation survey (Gibson & Langley 2012) was undertaken within Credo Reserve (ex-pastoral lease), within the boundary of which the mining tenements are located, in 2011 from which six priority taxa were recorded – *Atriplex lindleyi* subsp. *conduplicata*, *Gnephosis intonsa*, *Goodenia berringbinensis*, *Grevillea georgeana*, *Lepidium fasciculatum* and *Wurmbea murchisoniana*. Credo Reserve covers an area of approximately 90 km x 25 km and includes the Clear and Muddy Lakes Nature Reserve (R7634) and Rowles Lagoon Conservation Park (R4274). *Grevillea georgeana* is located within twenty km of Davyhurst and recorded from a flat plain with red sandy soil in *Eucalyptus ?oleosa* open woodland over *Acacia* shrubland and *Triodia scariosa* open hummock grassland. Most other records of this species are from banded ironstone formations. Similar habitat to the Credo collection does occur within the Davyhurst TSF and SC areas. *Santalum spicatum*, a registered species, was recorded in several areas, mostly along drainage lines, or associated with rock outcrops.

3.2 Threatened and priority ecological communities

No threatened or priority ecological communities (TEC, PEC) are recorded near the survey area, although the survey sites do occur within the Great Western Woodlands, the largest area of temperate woodlands in the world.

Table 2: Conservation significant flora recorded within 40 km of the survey area (NatureMap 18/5/16); likelihood of occurrence in proposed disturbance areas

Code	Scientific Name	Described Habitat	Possibility of occurrence
P1	<i>Calandrinia</i> sp. Goongarrie	Depression on flats adjacent to lake margins	L
P1	<i>Hysterobaeckea ochropetala</i>	Sandy plain in <i>Acacia effusifolia</i> and <i>Melaleuca hamata</i> shrubland	N – L
P1	<i>Persoonia leucopogon</i>	Yellow sand or sandy clay	L – M
P1	<i>Ptilotus procumbens</i>	Gravelly plain; broad flats; Red clay/ gravelly sandy loam; flowers Sept – Nov	M
P1	<i>Ptilotus rigidus</i>	Ironstone or quartz outcrop near or in lakes	N
P1	<i>Rhagodia</i> sp. Yeelirrie Station	Floodway; red cracking clay over calcrete	N
P2	<i>Malleostemon</i> sp. Adelong	Red sands; interdunal	L
P2	<i>Newcastelia insignis</i>	Lamiaceae; red or yellow sandy soils; fire or mechanical disturbance species	L – M
P2	<i>Rumex crystallinus</i>	Rowles lagoon: moist soil near lagoon	L
P2	<i>Thysanotus brachyantherus</i>	Clay over limestone, loam	N
P2	<i>Thryptomene eremaea</i>	Red or yellow sand; sandplains	M
P3	<i>Acacia eremophila</i> var. <i>variabilis</i>	Sandy or sandy loam soils Widespread	
P3	<i>Alyxia tetanifolia</i>	sandy clay, loam, concretionary gravel; drainage lines; near lakes	L
P3	<i>Austrostipa blackii</i>	Grass; wide distribution; flowers Sep – Nov	L – M
P3	<i>Elatine macrocalyx</i>	Prostrate glabrous mat-forming annual herb; margins of playa lakes and clay pans	N – L
P3	<i>Eleocharis papillosa</i>	Cyperaceae; wide distribution; poorly collected; claypans	N – L
P3	<i>Eutaxia nanophylla</i>	Variety of habitats; flowers Oct – Nov. Foliage quite distinctive; wide distribution	L – M
P3	<i>Eutaxia rubricarina</i>	Variety of habitats, more commonly on flats, alley floors; flowers August to October	L – M
P3	<i>Gnephosis intonsa</i>	Herb; variety of habitats; quite a few collections south of GEH. Flowers Sep – Oct	L – M
P3	<i>Grevillea georgeana</i>	Flowering recorded Jan, Mar, Sept – Nov; ironstone hilltops and slopes	N
P3	<i>Homalocalyx grandiflorus</i>	Yellow & red sand; sandplains; flowers Oct – Dec	L – M
P3	<i>Menkea draboides</i>	Prostrate spreading herb; wide distribution; flowers Aug – Sept; variety of habitats	L - M
P3	<i>Philotheca coateana</i>	Red sand; flowers Aug – Sep	L – M
P4	<i>Eucalyptus jutsonii</i> subsp. <i>jutsonii</i>	Red to pale orange deep sands	L – M
P4	<i>Goodenia berringbinensis</i>	Herb; south end of wide distribution; along watercourses, clay pans	L
P4	<i>Grevillea secunda</i>	Red or yellow sand; sandplains, sand dunes	L – M
P4	<i>Sowerbaea multicaulis</i>	Yellow brown sand; mostly south of area	L
P4	<i>Wurmbea murchisoniana</i>	Cormous perennial herb; flowers Jul – Sep; rock pools; seasonally inundated clay hollows	L

4. Methodology

A desktop survey of the proposal areas was undertaken prior to field survey, from which threatened and priority taxa likely to occur in the area (NatureMap, FloraBase (DPaW 2016), Gibson & Langley (2012); G & G environmental 2007; J & J Tucker Environmental Solutions (2007); Outback Ecology (2003 & 2007)), as well as prior vegetation mapping (Beard 1990) and land system mapping (Pringle et al 1994). The field survey was undertaken from the 11th to 15th June 2016. The TSF area at Davyhurst was surveyed by vegetation association areas based on aerial photograph interpretation, and previous mapping. The areas were surveyed in transects, with vegetation changes recorded by GPS. Species of interest, such as sandalwood or weeds, were recorded. A description of the condition (Keighery 1994) and current and potential threats were also recorded. The identity of taxa was confirmed using photographic imagery and/ or specimens against verified specimens or plant keys/ published descriptions.

The service corridor was surveyed between the pipeline and powerline as well as 10 metres on the outer edges. Species of interest and vegetation changes were recorded by GPS. Sites within the bore field were surveyed along existing access tracks, with larger areas (20 – 30 metres) surveyed around bores where disturbance areas are likely to be broader. All bores except the proposed bore No. SKWB20, (east of the current bore field, but located adjacent to an existing track) already exist.

Mapping/ aerial imagery of the sites was provided by EGS.

5. Results

The sites were surveyed from 11th to 15th June 2016. The area had received significant rainfall prior to the survey period, with further falls recorded during the period. The sites were generally quite damp, and vegetation was healthy, showing no signs of drought stress. Approximately half the species were in bud or flowering. Buds and fruit were present on at least some individuals within the *Eucalyptus* species, assisting with identification. One species was just coming into flower – *Eucalyptus sheathiana*.

Weeds were most common near the bores in the bore field at the south end of the pipeline – power line corridor, with *Citrullus lanatus* * (pie melon) and *Cucumis myriocarpus** (prickly paddy melon) being the most common. A few weeds were present in the Tailings/ camp and Deyx areas, with the most notable being *Nicotiana glauca* (Tobacco tree) which was present on the edges of the dam next to the present TSF.

Ground cover was generally very sparse, with < 1% cover recorded in most areas. This is likely a result of historic and current pastoral grazing impacts with many fresh signs (cattle) present in the Davyhurst mine tailings areas, as well as timing, with an increase in forbs and grasses expected in late winter and spring as a result of recent rains. Very few dicot seedlings were present, although they were more common in piles of rabbit faecal pellets. Other disturbances to the vegetation included timber removal (used for mining), sandalwood harvesting, clearing (mining/ exploration; pastoral; access tracks) which have resulted in erosion (sheet and gully) and deposition which have also impacted on the vegetation.

Sandalwood locations are presented in Appendix 8.

5.1 Davyhurst TSF, Mill and Camp areas

Tenement numbers: M 30/108, M 30/255, M 30/73, M 30/5, M 30/42

Location: Located on either side of the Davyhurst – Ora Banda Road at the site of the original mining operation.

Pre-European vegetation: 538 - *Acacia brachystachya** (Turpentine mulga) scrub; and shrublands; (may refer to other mulga alliances such as *A. fuscaneura* or *A. caesaneura*); 1413 - *Acacia*, *Casuarina (Allocasuarina)* and *Melaleuca* thicket

Land system: 266Ma (Marmion LS; gently undulating sandplains with mixed tall shrubland and hummock grasslands), 265Yo (Yowie LS; sandy plains supporting tall shrubland of mulga and bowgada (*Acacia ramulosa*) with patchy wanderrie grasses); 265By (Bunyip LS; gilgaied drainage tract, draining greenstone hills supporting mixed halophytic shrublands occasionally with a black oak overstorey); 265Mo (Moriarty LS; low greenstone rises and stony plains supporting chenopod shrublands with patchy eucalypt overstorey)

Condition (Keighery 1994): Degraded (few areas west of the office and mill) to excellent, with most areas placed within the “very good” category.

Disturbances: Historic and current mining activities – access tracks, drill lines, clearing; timber cutting & sandalwood harvesting; rabbits, cattle, weeds; these have led to removal of vegetation, particularly the ground covers and litter. There are several areas, adjacent to the mill, which have active erosion.

Conservation significant species: No threatened or priority taxa were recorded. *Santalum spicatum* was present mostly on low granitic rises and within the drainage lines. *Spartothamnella canescens* (formerly *S. sp. Helena & Aurora Range*) was recorded south of the camp. It is no longer a priority taxon.

Vegetation

Eighty seven taxa (one unknown – dicotyledon seedling) were recorded from twenty two families and forty three genera, with the best represented families being Fabaceae with fifteen species from three genera (*Acacia* the most records); Chenopodiaceae with nine species from four genera; Myrtaceae with eight species from two genera (*Eucalyptus* the most records) and Scrophulariaceae with seven species from one genera (*Eremophila*). Asteraceae was poorly represented due to timing of the survey as well as high levels of impact to the ground stratum.

There are eight vegetation types, some of which have been described separately due to likely disturbances impacting on the vegetation present. The mapped vegetation association (VA) boundaries are presented in Figure 4. VA3 is dominated by *Eucalyptus salubris* and has very sparse understorey and appears to be semi mature dense regrowth. VA4 also has *Eucalyptus salubris* in the upper stratum occurring with *E. griffithsii*, and has a defined mid stratum higher levels of litter and fallen timber (and less erosion/ scalding), and higher species diversity. Signs of impact in VA3 include access tracks and drill locations; earthworks/ surface mechanical disturbances and likely clearing. Due to the age of the trees appearing very close, it is also possibly regrowth following fire.

Homalocalyx grandiflorus (P3) was recorded approximately 5 km east of the TSF in similar habitat to VA8.

Figure 4: Vegetation types within the Davyhurst TSF survey area



Code	Description
1	<p>Drainage line</p> <p>1. (Near entrance) <i>Acacia fuscanera</i>, <i>Eucalyptus salubris</i> and <i>E. griffithsii</i> woodland over <i>Acacia burkittii</i> and <i>Santalum spicatum</i> tall shrubland over <i>Eremophila eriocalyx</i>, <i>Senna artemisioides</i> subsp. <i>filifolia</i>, <i>Scaevola spinescens</i>, <i>Pimelea microcephala</i> and <i>Marsdenia australis</i> (vines) open shrubland</p> <p>2. (South of TSF) <i>Eucalyptus salubris</i>, <i>E. oleosa</i> mallee woodland over <i>Acacia ramulosa</i>, <i>A. caesaneura</i>, <i>A. tetragonophylla</i>, <i>A. burkittii</i>, <i>A. colletioides</i>, <i>Santalum spicatum</i> and <i>Eremophila decipiens</i> tall shrubland over <i>Solanum nummularium</i> and <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> low sparse shrubs and ferns.</p> <p>Reddish brown fine sandy clay loam to clay loam; gently sloping, almost level, with drainage to the north; condition mostly very good to excellent; some disturbances – clearing, regrowth; cattle grazing; sheet erosion and sedimentation</p>

Figure 5: (Left) Vegetation type 1: drainage line – *Eucalyptus salubris*, *E. griffithsii* woodland; (Right) Vegetation type 2: Plain - *Eucalyptus griffithsii*, *E. oleosa* open mallee woodland



2	<p><i>Eucalyptus griffithsii</i>, <i>E. oleosa</i> open mallee woodland to mallee woodland over <i>Acacia fuscanera</i>, <i>A. aptaneura</i>, <i>Grevillea juncifolia</i>, <i>Eremophila decipiens</i> subsp. <i>decipiens</i> tall open shrubland over <i>Acacia tetragonophylla</i>, <i>A. ramulosa</i> var. <i>ramulosa</i>, <i>A. burkittii</i>, <i>Eremophila interstans</i>, <i>E. ericalyx</i>, <i>Dodonaea lobulata</i> open shrubland over <i>Prostanthera althoferi</i> subsp. <i>althoferi</i>, <i>Dodonaea lobulata</i>, <i>Senna artemisioides</i> subsp. <i>filifolia</i> low sparse shrubland</p> <p>Plain; reddish yellow sandy clay loam to clay loam; cryptogam cover 30 – 50 %; condition good to excellent; various disturbances – drill lines and capped drill holes; cattle; several old access tracks; timber removal; recent echidna activity; some active erosion</p>
---	--

Figure 6: Vegetation Type 2 *Eucalyptus griffithsii*, *E. oleosa* open mallee woodland



3	<p><i>Eucalyptus salubris</i> subsp. <i>salubris</i> low woodland over <i>Senna artemisioides</i> subsp. <i>filifolia</i>, <i>Scaevola spinescens</i>, <i>Exocarpos aphyllus</i>, <i>Atriplex nummularia</i> subsp. <i>spathulata</i>, <i>A. semibaccata</i> sparse shrubland over <i>Ptilotus obovatus</i>, <i>Sclerolaena</i> sp. low isolated shrubs and forbs</p> <p>Brown clay loam; gentle sloping plain; condition – mostly good to very good; high levels of disturbance in some areas; semi mature regrowth; sparse understorey</p>
---	--

Figure 7: Vegetation type 3 – *Eucalyptus salubris* woodland



4	<p><i>Eucalyptus salubris</i> and <i>E. griffithsii</i> woodland over <i>Acacia tetragonophylla</i>, <i>Senna artemisioides</i> subsp. <i>filifolia</i>, <i>Scaevola spinescens</i>, <i>Acacia burkittii</i>, <i>A. prainii</i>, and <i>Marsdenia australis</i> (vines) open shrubland to shrubland over <i>Ptilotus obovatus</i> and <i>Maireana triptera</i> low sparse shrubland</p> <p>Reddish brown clay loam; gently sloping plain; condition mostly very good to excellent</p>
---	---

5	<p><i>Eucalyptus griffithsii</i>, <i>E. clelandii</i>, <i>Casuarina pauper</i> low mallee woodland over <i>Acacia burkittii</i>, <i>A. tetragonophylla</i>, <i>Senna artemisioides</i> subsp. <i>filifolia</i>, <i>Santalum spicatum</i> open shrubland over <i>Dodonaea lobulata</i>, <i>D. viscosa</i> subsp. <i>angustissima</i>, <i>Acacia tetragonophylla</i>, <i>A. burkittii</i> shrubland over <i>Scaevola spinescens</i>, <i>Olearia muelleri</i>, <i>Ptilotus obovatus</i>, <i>Enchylaena tomentosa</i>, <i>Maireana trichoptera</i> low open shrubland over <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> isolated ferns to sparse fernland</p>
---	---

Figure 8: Vegetation type 4 – *Eucalyptus salubris* woodland over *Acacia tetragonophylla*, *Senna artemisioides* subsp. *filifolia*, *Scaevola spinescens*, *Acacia burkittii* open shrubland



Figure 9: Vegetation type 5 (left); Vegetation type 6 (right)



6	<p><i>Casuarina pauper</i> woodland to open forest with pockets of <i>Acacia ramulosa</i> var. <i>ramulosa</i>, <i>Dodonaea viscosa</i> subsp. <i>angustissima</i> and <i>Acacia caesaneura</i> tall shrubland over <i>Senna artemisioides</i> subsp. <i>filifolia</i>, <i>Olearia muelleri</i> and <i>Scaevola spinescens</i> open shrubland</p> <p>Plain; yellowish red sandy clay loam with ironstone washed gravel on the surface; condition excellent; minor areas of erosion and surface wash; drainage to the north east</p>
---	---

7	<p><i>Acacia mulganeura</i>, <i>A. fuscaneura</i>, <i>A. ramulosa</i>, <i>Hakea preissii</i>, <i>Allocasuarina eriochlamys</i> subsp. <i>eriochlamys</i> shrubland over isolated <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> ferns</p> <p>Low granite rise; fire scar – immature regrowth to about 1m height; some erosion; pale brown sandy loam with surface rock 30 – 40 % (weathered granite/gneiss) (Image from service corridor)</p>
---	---

Figure 10: Vegetation type 7 (L: fire regrowth – shrubland; R: *Acacia mulganeura* at the edges; unburnt)



8	<p>Isolated emergent pockets of <i>Eucalyptus oleosa</i> mallee over <i>Acacia ramulosa</i> var. <i>ramulosa</i>, <i>Phebalium canaliculatum</i>, <i>Prostanthera grylloana</i>, <i>Eremophila eriocalyx</i>, <i>Acacia prainii</i> over <i>Triodia</i> sp. low open hummock grassland</p> <p>Plain: red sand to sandy loam; flat; surface rock < 5 %; litter < 10 %; species poor area which may support a good diversity of annuals in late winter to spring, although there appears to be some grazing impact; condition – very good to excellent</p>
---	--

Figure 11: Vegetation type 8, looking towards vegetation type 2.



9	<p>1. <i>Eucalyptus salmonophloia</i>, <i>E. clelandii</i>, <i>E. lesouefii</i>, <i>E. salubris</i> isolated trees to open woodland over <i>Eremophila decipiens</i>, <i>Santalum spicatum</i>, <i>Acacia tetragonophylla</i>, <i>Dodonaea lobulata</i> tall open shrubland to isolated tall shrubs over <i>Atriplex nummularia</i> subsp. <i>spathulata</i>, <i>A. bunburyana</i>, <i>Scaevola spinescens</i>, <i>Senna artemisioides</i> subsp. <i>filifolia</i>, <i>Eremophila scoparia</i>, <i>E. ionantha</i>, <i>Senna artemisioides</i> subsp. x <i>artemisioides</i> low open shrubland over <i>Keraudrenia integrifolia</i>, <i>Solanum lasiophyllum</i> isolated low shrubs over <i>Eriachne pulchella</i> isolated grass tussocks; low rise: Mid to upper slope with granite/ gneiss outcropping; gentle slope; condition degraded some areas to good and very good areas; active gully and sheet erosion; rabbits, historic clearing; old tracks, rubbish; poor recruitment most areas</p> <p>2. <i>Eucalyptus lesouefii</i> woodland over <i>Acacia tetragonophylla</i>, <i>Acacia erinacea</i>, <i>Scaevola spinescens</i> open shrubland; western slope; moderate gradient; exposed granite/ gneiss; ground cover and understorey mostly cleared; historic mining; shafts & spoil dumps</p>
---	--

Figure 12: Vegetation type 9 – *Eucalyptus salmonophloia*, *E. clelandii*, *E. lesouefii*, *E. salubris* isolated trees to open woodland – much of the area had high levels of disturbance



5.2 Pipeline/ power line/ bore field

Tenements: L 30/35, L 29/38, L29/34, L 24/170, L24/101, M 30/108, M 30/255

Location: The power line and pipeline are located within a long narrow corridor starting from the Davyhurst mill site, then south east past the camp area, then broadly parallel with the Davyhurst – Ora Banda Road south east for 35 km to the bore field.

Pre-European vegetation: 538, 1413, 555 (hummock grasslands, mallee steppe; red mallee over spinifex, (*Triodia scariosa*)), 221 (succulent steppe, salt bush), 18.4 (low woodland; mulga); 128 – bare areas – rocky outcrop

Land systems: 266Ma (Marmion LS; gently undulating sandplains with mixed tall shrubland and hummock grasslands); 266Ba (Bandy LS; gritty surfaced plains and low outcrops of granite with scattered *Acacia* shrublands); 265Do (Doney LS; Calcareous alluvial plains with eucalypt woodlands adjacent to salt lake systems – Bore field); 265Em (Emu LS; fresh or brackish ephemeral lakes and swamps with cane grass, lignum (*Duma florulenta*) and paperbark shrublands – Bore field)

Condition of vegetation within the corridor (Keighery 1994): mostly very good with minor areas degraded to good; condition adjacent to the corridor – mostly very good to excellent, with minor areas degraded.

Disturbances: clearing – access track establishment and maintenance; fire; small dams; bores; weeds; cattle – particularly within the bore field area

Conservation significant species: No threatened or priority taxa were recorded. *Santalum spicatum* (sandalwood) were present along the service corridor (Appendices 9, 10 main report) mostly within areas with rock close to the surface. No sandalwood were present in the bore field area. There were no signs of mallee fowl activity.

Vegetation

One hundred and seven taxa from twenty nine families and fifty eight genera were recorded in this survey area, which included five weed species from two families – Asteraceae and Cucurbitaceae. The families with the most taxa were Fabaceae with 21 species from six genera, with 16 species of *Acacia* recorded. A sterile pea – *Swainsona ?formosa* (Sturt Desert Pea) was present in the bore field area on disturbed ground. Myrtaceae was represented by 16 taxa, with twelve *Eucalyptus* species recorded. Of interest were isolated occurrences of *Verticordia helmsii* and *Baeckea* sp. Comet Vale in unburnt patches within the sandplain areas. Chenopodiaceae (11 species) and Scrophulariaceae (*Eremophila* – ten species) were also well represented. A list of all taxa from the survey area is presented in [Appendix 4 in the](#) main report.

5.2.1 Battery Borefield

Figure 13: Battery Borefield vegetation communities (green markers). Bore identification numbers have white markers.

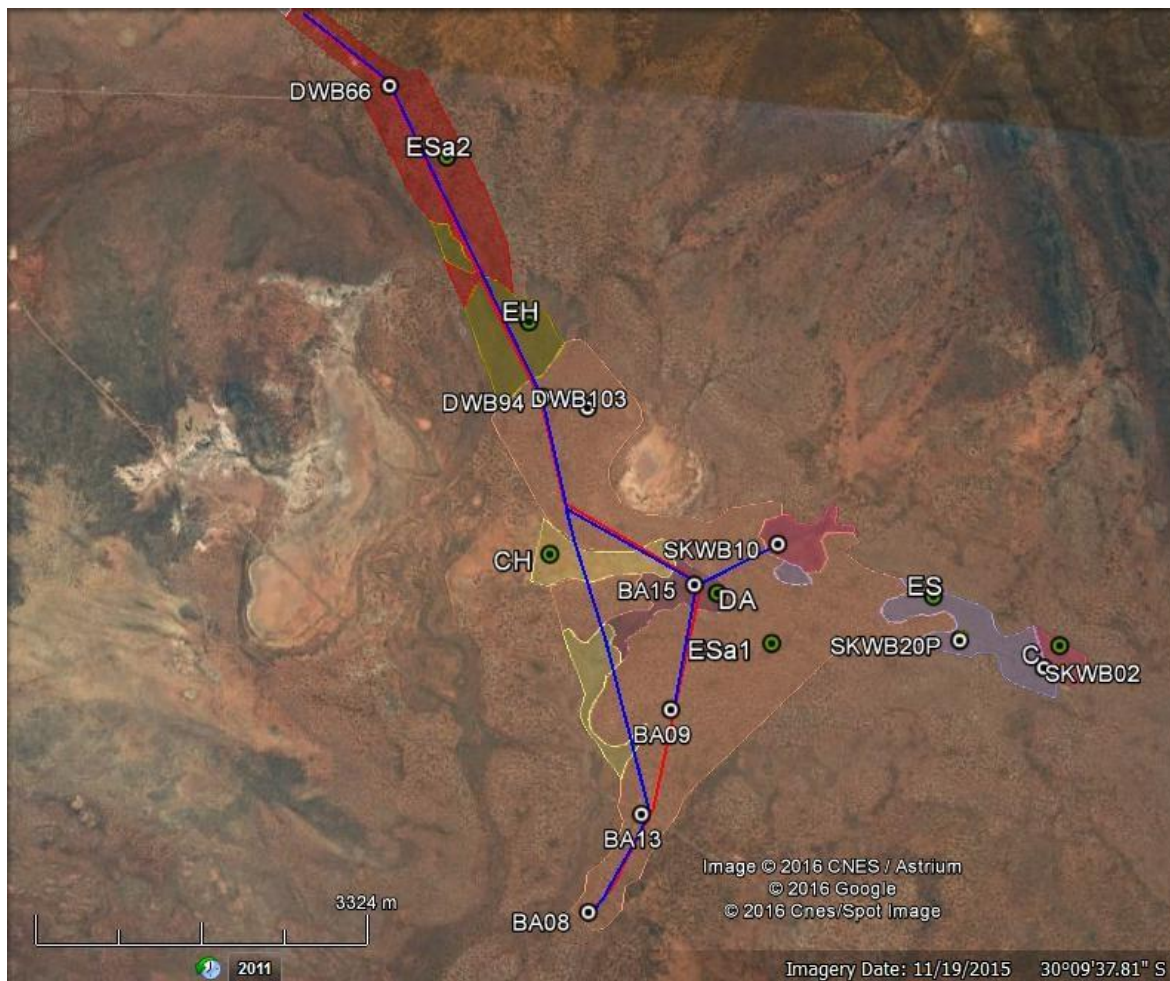


Table 3: Vegetation communities in the bore field area

Code	Vegetation description
C	<i>Eucalyptus salmonophloia</i> woodland over <i>Callistemon phoeniceus</i> ; lower slopes and drainage lines in sandplain
CH	Chenopod shrubland; drainage lines and valleys
DA	<i>Dodonaea viscosa</i> and <i>Acacia</i> shrubland
EH	<i>Eucalyptus horistes</i> low woodland; floodplain
ES	<i>Eucalyptus sheathiana</i> open mallee woodland; sandplain
ESa1	<i>Eucalyptus salmonophloia</i> & <i>E. griffithsii</i> woodland on red sandy loam on low rises
ESa2	<i>Eucalyptus salmonophloia</i> on clay loam; broad drainage line

Vegetation community C

Eucalyptus salmonophloia woodland over *Callistemon phoeniceus*; lower slopes and drainage lines in sandplain

Vegetation description: *Eucalyptus salmonophloia* woodland over *Callistemon phoeniceus*, *Acacia ligulata*, *Dodonaea viscosa* subsp. *angustissima*, *Senna artemisioides* subsp. *filifolia* and *Grevillea acuarria* shrubland to tall shrubland over *Grevillea acuarria*, *Callistemon phoeniceus* low sparse shrubland with isolated *Austrostipa elegantissima* grass tussocks



Other species: *Casuarina pauper*

Landform & surface: valleys and lower slopes; red sandy loam to sandy clay loam

Condition: very good to excellent in area around Bore SKWB10; degraded to very good adjacent to Bore SKWB02 (high levels of disturbance from cattle and erosion)

Figure 14: *Eucalyptus salmonophloia* woodland over *Callistemon phoeniceus* shrubland

Vegetation community CH
Chenopod shrubland; drainage lines and valleys

Vegetation description: *Acacia murrayana*, *Atriplex bunburyana*, *A. nummularia*, *Dodonaea viscosa* subsp. *angustissima*, *Rhagodia preissii* subsp. *preissii*, *Acacia eremophila* subsp. *eremophila*, *Bossiaea walkeri* open shrubland to isolated shrubs over *Senecio pinnatifolius*, *Sonchus oleraceus**, *Vittadinia cervicalis* var. *circularis*, *Taraxacum khatoonae**, *Sclerolaena cuneata*, *Acacia murrayana* and *Grevillea acuaria* open forbland with isolated shrubs

Other species: *Eucalyptus ?oleosa*, *Frankenia setosa*, *Eremophila scoparia*, *E. interstans* subsp. *virgata*, *Zygophyllum tetrapterum*

Landform & land surface: valleys/ drainage lines; reddish brown sandy clay loam

Condition: degraded to good; to very good; heavily disturbed in some areas – clearing, cattle, isolated weeds, dam, tracks; water logging and salinity; several historic deaths of trees in drainage line area, most likely a result of waterlogging and secondary salinity

Figure 15: Chenopod shrubland in valleys.



Vegetation community DA
Dodonaea viscosa and *Acacia* shrubland

Vegetation description: *Dodonaea viscosa* subsp. *angustissima*, *Acacia murrayana*, *A. ligulata*, *Bursaria occidentalis*, *Atriplex bunburyana* and *Rhagodia preissii* subsp. *preissii* shrubland to open shrubland over *Senna artemisioides* subsp. *filifolia*, *Sclerolaena cuneata*, *Acacia ligulata*, *Atriplex bunburyana* low open shrubland/forbland

Bursaria occidentalis was dominant in parts of the area (image).

Other species (including less disturbed areas outside the proposed impact areas): *Acacia fuscaneura*, *Eucalyptus salmonophloia*, *Alectryon oleifolius*, *Allocasuarina acutivalvis* subsp. *acutivalvis*, *Casuarina pauper*, *Scaevola spinescens*, *Triodia scariosa*, *Westringia rigida*

Landform: Mid slope; gentle gradient; yellowish red sand to sandy loam

Condition: Good to very good; old clearing/ regrowth; access tracks; cattle grazing and ground disturbance; powerline and pipe line & bore; erosion gullies and sheet wash

Figure 16: (left) *Bursaria occidentalis* dominant regrowth near Bore BA15; (right) *Eucalyptus horistes* (EH) woodland adjacent to the service corridor



Vegetation community EH
Eucalyptus horistes low woodland; floodplain

Vegetation description – *Eucalyptus horistes* woodland

Eucalyptus horistes woodland over *Sclerolaena cuneata* isolated forbs

Other species: *Eucalyptus oleosa*, *Acacia ligulata*, *A. murrayana*, *Duma florulenta* (formerly *Muehlenbeckia florulenta*), *Atriplex nummularia*, *Vittadinia cervicalis* var. *cervicalis*, *Ptilotus obovatus*, *Eremophila interstans* subsp. *virgata*

Landform: Broad flat valley, floodplain; reddish brown clay loam

Condition: Very good – appears to have impact to lower strata – very sparse ground cover and isolated mid-shrubs; cattle grazing; some lower and mid shrubs present along access track for powerline and pipeline.

Vegetation community ES
Eucalyptus sheathiana open mallee woodland; sandplain

Vegetation description

Eucalyptus sheathiana low mallee woodland to low open mallee woodland over *Eremophila scoparia*, *Grevillea acuaria*, *Santalum acuminatum*, *Exocarpos aphyllus* open shrubland over *Triodia scariosa*, *Olearia muelleri*, *Westringia rigida*, *Grevillea huegelii* and *Scaevola spinescens* open tussock grassland with sparse low shrubs

Other species: *Eucalyptus griffithsii*, *Acacia merrallii*, *Callistemon phoeniceus* (lower slopes), *Senna artemisioides* subsp. *filifolia*, *Acacia ligulata*, *A. murrayana*, *A. tetragonophylla*, *Solanum lasiophyllum*

Small areas of this vegetation type also occurred within vegetation type ESa1.

Landform: plain; red sandy loam; gently sloping

Condition: mostly very good to excellent; some degraded to good areas around Bore SKWB02; disturbances – access tracks; cattle – grazing, land surface disturbance; erosion

Figure 17: *Eucalyptus sheathiana* low mallee woodland in the area of proposed bore SKWB20P



Vegetation ESa1

Eucalyptus salmonophloia & *E. griffithsii* woodland on red sandy loam on low rises

Near SKWB10: Vegetation description: *Eucalyptus salmonophloia*, *E. griffithsii*, woodland over *Acacia ligulata*, *Dodonaea viscosa* subsp. *angustissima*, *Acacia ramulosa* var. *ramulosa*, *Grevillea acuaria*, *Senna artemisioides* subsp. *filifolia* and *Acacia colletioides* shrubland to tall shrubland over *Grevillea acuaria*, *Austrostipa elegantissima*, *Enchylaena tomentosa* low sparse shrubland

Other species: *E. sheathiana*, *Eremophila decipiens* subsp. *decipiens*, *Alectryon oleifolius*, *Bursaria occidentalis*, *Callistemon phoeniceus*, *Casuarina pauper*, *Eremophila scoparia*

DWB94/ DWB103: *Eucalyptus salmonophloia*, *E. griffithsii*, *Casuarina pauper* open forest over *Eremophila scoparia*, *Exocarpos aphyllus*, *Bossiaea walkeri*, *Alectryon oleifolius* open shrubland over *Grevillea acuaria*, *Scaevola spinescens* low open shrubland

Other species: *Acacia ligulata*, *Acacia colletioides*, *Swainsona ?formosa*, *Vittadinia cervicalis* var. *circularis*, *Citrullus lanatus* *, *Eremophila interstans* subsp. *virgata*, *Enchylaena tomentosa*

Landform: Low hills/ sand dunes; red sandy loam

Condition: generally very good to excellent away from the service corridor; disturbances – clearing (timber cutting, access tracks); ?fire; erosion – sheet and gully erosion mostly near the tracks

Figure 18: *Eucalyptus salmonophloia* woodland (L) from lower slope looking uphill. *Callistemon* was more common on the lower slopes; (R) Upper slopes with *Acacia ligulata*, *Dodonaea viscosa* and *Grevillea acuaria* dominant in the understorey



Vegetation community ESa2
Eucalyptus salmonophloia on clay loam; broad drainage line

Vegetation description: *Eucalyptus salmonophloia* open forest over *Eremophila scoparia*, *E. interstans* subsp. *virgata*, *Atriplex nummularia*, *Acacia ligulata*, *Senna artemisioides* subsp. *filifolia*, *Alectryon oleifolius* open shrubland over *Ptilotus obovatus* isolated low shrubs

Other species (mostly at edges and in disturbance sites): *Maireana brevifolia*, *Rhagodia preissii* subsp. *preissii*, *Dodonaea viscosa* subsp. *angustissima*, *Acacia burkittii*, *Taraxacum khatoonae**, *Ptilotus obovatus*, young *E. salmonophloia* trees

Landform: Broad gently sloping valley; red brown clay loam

Condition: Woodland areas in very good to excellent condition; some impact from cattle; area along the service corridor degraded to good with multiple disturbances – mostly mechanical clearing for tracks and infrastructure; few weeds; cattle grazing and surface disturbance

Figure 19: (L) *Eucalyptus salmonophloia* woodland on plains – Chenopod shrubs were dominant in the disturbance area; (R) disturbed area at the north end of the Battery Borefield



5.2.2 Service corridor from Camp to Battery Borefield

Figure 20: Vegetation types in the western section of the service corridor, with Davyhurst sites on the left.



Figure 21: Vegetation types in the eastern section of the service corridor, with the Battery Borefield on the right (bottom)

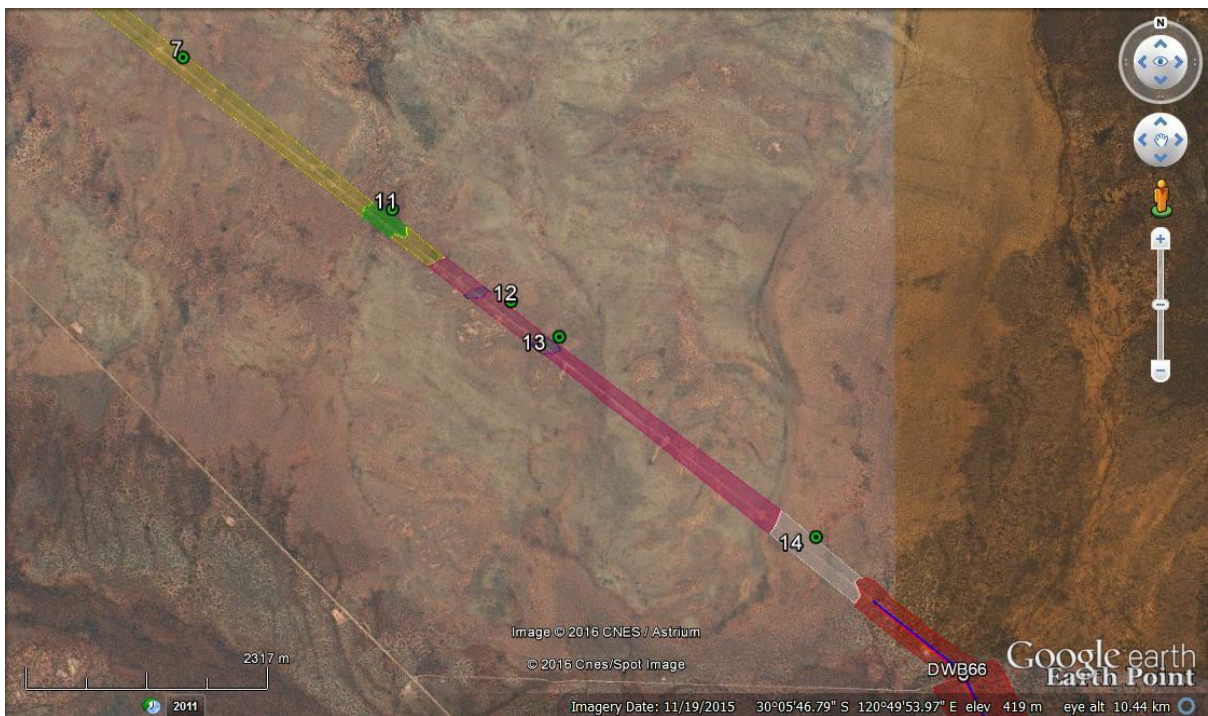


Table 4: Vegetation types in the service corridor area

Code	Brief Description
1	<i>Acacia fuscaneura</i> , <i>Eucalyptus salubris</i> and <i>E. griffithsii</i> woodland over <i>Acacia burkittii</i> and <i>Santalum spicatum</i> tall shrubland
2	<i>Eucalyptus griffithsii</i> , <i>E. oleosa</i> open mallee woodland to mallee woodland
7	<i>Allocasuarina eriochlamys</i> subsp. <i>eriochlamys</i> , <i>A. acutivalvis</i> subsp. <i>acutivalvis</i> , <i>Phebalium canaliculatum</i> , <i>Melaleuca hamata</i> , <i>Aluta aspera</i> subsp. <i>aspera</i> , <i>Acacia burkittii</i> shrubland
10	<i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i> , <i>Acacia fuscaneura</i> low mallee woodland over <i>A. ramulosa</i> var. <i>ramulosa</i> , <i>A. fuscaneura</i> tall open shrubland
11	<i>Eucalyptus lucasii</i> , <i>E. griffithsii</i> , <i>Callitris columellaris</i> , <i>Allocasuarina acutivalvis</i> open woodland
12	<i>Eucalyptus leptopoda</i> low open mallee woodland
13	<i>Casuarina pauper</i> woodland with isolated <i>Eucalyptus clelandii</i> trees
14	<i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i> , <i>E. oleosa</i> low mallee woodland

Vegetation types 7, and 10 – 14 are representative of the vegetation associations on the broad sandplain area mapped as pre-European 1413 - *Acacia*, *Casuarina* (*Allocasuarina*) and *Melaleuca* thicket and 538 – *Acacia brachystachya** (Turpentine mulga) scrub; and shrublands; (may refer to other mulga alliances such as *A. fuscaneura* or *A. caesaneura*). Another VA was also mapped - 128 – which are bare areas – rocky outcrop. None of these areas occurred along the service corridor between the camp and the Battery Borefield.

Most of the areas of 538 mapping aligns with shallower soils with some rocky outcrop – although these were mostly minor areas, which did support *Acacia fuscaneura*, *A. caesaneura* or *A. mulganeura*, usually in association with mallee species.

Vegetation type 14 occurs at the edge of the broad floodplains which then grades into *Eucalyptus salmonophloia* woodland within the borefield section.

1. *Acacia fuscaneura*, *Eucalyptus salubris* and *E. griffithsii* woodland over *Acacia burkittii* and *Santalum spicatum* tall shrubland

Code	Description
1	Drainage line; reddish brown fine sandy clay loam to clay loam; gently sloping, almost level, with drainage to the north; condition mostly very good to excellent; some disturbances – clearing, regrowth; cattle grazing; sheet erosion and sedimentation (Davyhurst camp area) <i>Acacia fuscaneura</i> , <i>Eucalyptus salubris</i> and <i>E. griffithsii</i> woodland over <i>Acacia burkittii</i> and <i>Santalum spicatum</i> tall shrubland over <i>Eremophila eriocalyx</i> , <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Scaevola spinescens</i> , <i>Pimelea microcephala</i> and <i>Marsdenia australis</i> (vines) open shrubland

2. *Eucalyptus griffithsii*, *E. oleosa* open mallee woodland to mallee woodland

2	<p>Plain; reddish yellow sandy clay loam to clay loam; cryptogam cover 30 – 50 %; condition good to excellent; various disturbances – drill lines and capped drill holes; cattle; several old access tracks; timber removal; recent echidna activity; some active erosion</p> <p>(Davyhurst camp area) <i>Eucalyptus griffithsii</i>, <i>E. oleosa</i> open mallee woodland to mallee woodland over <i>Acacia fuscaneura</i>, <i>A. aptaneura</i>, <i>Grevillea juncifolia</i>, <i>Eremophila decipiens</i> subsp. <i>decipiens</i> tall open shrubland over <i>Acacia tetragonophylla</i>, <i>A. ramulosa</i> var. <i>ramulosa</i>, <i>A. burkittii</i>, <i>Eremophila interstans</i>, <i>E. eriocalyx</i>, <i>Dodonaea lobulata</i> open shrubland over <i>Prostanthera althoferi</i> subsp. <i>althoferi</i>, <i>Dodonaea lobulata</i>, <i>Senna artemisioides</i> subsp. <i>filifolia</i> low sparse shrubland</p>
---	--

7. *Acacia*, *Allocasuarina*, *Melaleuca* on sandplain

Most of this vegetation type was located within lands which had been burnt and supported semi mature regrowth. It ties in with pre- European vegetation mapping unit 1413 - *Acacia*, *Casuarina* (*Allocasuarina*) and *Melaleuca* thicket, and land system 266 Ma - Marmion LS; gently undulating sandplains with mixed tall shrubland and hummock grasslands. *Allocasuarina eriochlamys* subsp. *eriochlamys* was dominant in some areas, with *Acacia burkittii*, *A. resinimarginea* and *Melaleuca hamata*. Isolated pockets of mature vegetation was present within the shrubland (unburnt).

Vegetation descriptions – burnt areas

1. *Allocasuarina eriochlamys* subsp. *eriochlamys*, *A. acutivalvis* subsp. *acutivalvis*, *Phebalium canaliculatum*, *Aluta aspera* subsp. *aspera*, *Acacia burkittii*, *Hakea minyma*, *Philothea brucei*, *Prostanthera grylloana*, *Eucalyptus leptopoda*, *Physopsis viscida* and *Santalum spicatum* shrubland to closed shrubland

2. *Acacia burkittii*, *A. prainii*, *Dodonaea lobulata*, *Phebalium canaliculatum* over *Prostanthera grylloana* sparse low shrubland with isolated mallee (*E. ?oleosa* – young, sterile)

3. *Acacia burkittii*, *Melaleuca hamata*, *Acacia prainii*, *Alyxia buxifolia*, *Acacia colletioides*, *Phebalium canaliculatum*, *Eucalyptus leptopoda*, *Scaevola spinescens* shrubland over *Triodia ?scariosa*, *Grevillea acuaria*, *Leptosema daviesioides*, *Dianella revoluta* low open shrubland

4. *Acacia ramulosa*, *A. prainii*, *Scaevola spinescens*, *Santalum spicatum* and *Physopsis viscida* shrubland

Unburnt areas – generally small pockets at the edges of the track/ corridor

5. *Eucalyptus lucasii* low mallee woodland over *Callitris columellaris*, *Hakea minyma* tall open shrubland over *Bursaria occidentalis*, *Phebalium canaliculatum* and *Philothea brucei* low open shrubland over *Triodia scariosa* low open hummock grassland.

6. *Acacia burkittii*, *A. resinimarginea*, *Callitris columellaris* tall shrubs over *Eremophila subfloccosa* subsp. *lanata* and *Platysace trachymenioides*, *Olearia* sp. *Eremicola*, *Hakea minyma* and *Eucalyptus lucasii* shrubland - depression in sandplain – very disturbed

Figure 22: Vegetation association 7 (See also Figure 11)



10. Eucalyptus loxophleba subsp. lissophloia, Acacia fuscaneura low mallee woodland

Vegetation description: *Acacia fuscaneura*, *A. ramulosa* var. *ramulosa* tall open shrubland over *Scaevola spinescens*, *Eremophila eriocalyx*, *E. granitica*, *Prostanthera grylloana*, *Philotheca brucei* subsp. *brucei* shrubland over *Triodia scariosa* open hummock grassland

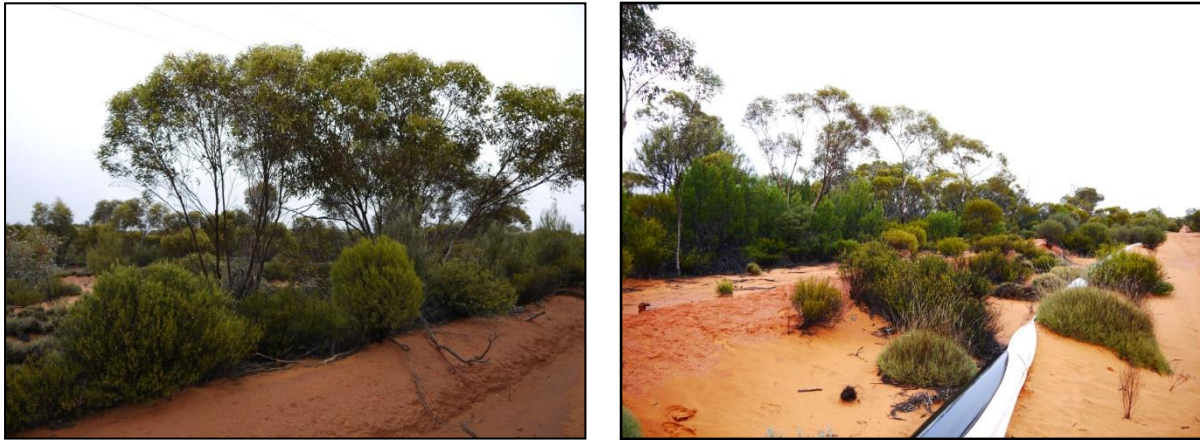
Eucalyptus loxophleba subsp. *lissophloia* mallee woodland over *Eremophila longifolia*, *Sandalwood*, *Acacia burkittii*, *A. fuscaneura*, *A. caesaneura* tall open shrubland over *Philotheca brucei*, *Scaevola spinescens*, *Atriplex semibaccata*, *Acacia burkittii*, *Dodonaea microzyga*, *Alyxia buxifolia* open shrubland over *Triodia scariosa* low open hummock grassland

Other species: *Eucalyptus lucasii*, *E. salubris*, *E. clelandii*, *Maireana georgei*, *Eremophila gibbosa*, *E. scoparia*, *Olearia muelleri*, *Senna artemisioides* subsp. *filifolia*, *Ptilotus obovatus*, *Brachychiton gregorii*, *Mirbelia microphylla*, *Cheilanthes sieberi* subsp. *sieberi*

Landform: Low rises with granitoid rock close to or at the surface with sand to sandy loam soil, sometimes with lateritic gravel

Condition: Good to very good within the service corridor, and very good to excellent in adjacent areas; some impact from fire – young mallees in shrub layer

Figure 23: *Eucalyptus loxophleba* subsp. *lissophloia*, *Acacia fuscaneura* low mallee woodland (left); *Eucalyptus lucasii*, *E. griffithsii*, *Callitris columellaris*, and *Allocasuarina acutivalvis* open woodland (right)



11. *Eucalyptus lucasii*, *E. griffithsii*, *Callitris columellaris*, *Allocasuarina acutivalvis* open woodland

Vegetation description: *Eucalyptus lucasii*, *E. griffithsii*, *Callitris columellaris*, *Allocasuarina acutivalvis* open woodland over *Eremophila decipiens*, *Exocarpos aphyllus*, *Alyxia buxifolia* tall open shrubland over *Dodonaea lobulata*, *Ptilotus obovatus*, *Acacia colletioides*, *Bursaria occidentalis* over *Triodia scariosa*, *Physopsis viscida*, *Westringia rigida* low open hummock grassland

Landform: Plain; red sand with gravel

Condition: Good to very good within the service corridor; very good to excellent in adjacent areas; disturbances – mechanical clearing for construction and maintenance within the corridor; rabbits, fire at edges; wind erosion/ deposition along tracks

12. *Eucalyptus leptopoda* low mallee woodland

Vegetation description: *Eucalyptus leptopoda*, *Codonocarpus cotinifolius* isolated tall mallee, low trees over *Eremophila gibbosa*, *Acacia ramulosa*, *Grevillea acuaria*, *Bursaria occidentalis*, *Platysace trachymenioides*, *Olearia* sp. *Eremicola*, *Hakea minyma*, *Eucalyptus ?oleosa* (sterile, young plants) over *Triodia ?scariosa* low open hummock grassland

Eucalyptus leptopoda low open mallee woodland over *Acacia burkittii*, *Dodonaea viscosa* subsp. *angustissima*, *Acacia tetragonophylla*, *Exocarpos aphyllus*, *Santalum spicatum* open shrubland over *Westringia cephalantha*, *Scaevola spinescens*, *Physopsis viscida* low shrubland over *Triodia ?scariosa* low open hummock grassland

Eucalyptus leptopoda, *Eremophila decipiens*, *Santalum spicatum*, *Verticordia ?helmsii*, *Baeckea* sp. Comet Vale low mallee and shrubs in burnt area – *Melaleuca hamata*, *Dodonaea lobulata*, *Callitris columellaris*, *Acacia burkittii*, *Grevillea acuaria*, *Triodia scariosa*, *Phebalium canaliculatum* and *Persoonia ?coriacea* mixed shrubland

Other species: *Xanthorrhoea thorntonii*, *Casuarina pauper*, *Acacia leptopetala*, *Eremophila longifolia*. The grass trees were not present within the disturbance area. A few old plants were located at the edge of the burnt area.

Landform: Sandplain, broad valley; reddish yellow sand to sandy loam; gently sloping; fire regrowth

Condition: Good to very good within the service corridor; very good to excellent in adjacent areas.

Disturbances – mechanical clearing within corridor; fire; rabbits

Figure 24: *Eucalyptus leptopoda* low open mallee woodland



13. *Casuarina pauper* woodland

Vegetation description: *Casuarina pauper* woodland with isolated *Eucalyptus clelandii* trees over *Santalum spicatum*, *Acacia burkittii*, *Dodonaea lobulata*, *Acacia yorkrakinensis* subsp. *acrita* tall shrubland over *Dodonaea lobulata*, *Grevillea acuaria*, *Scaevola spinescens*, *Casuarina pauper*, *Westringia cephalantha*, *W. rigida*, *Senna artemisioides* subsp. *filifolia* low open shrubland

Landform: Depression/ drainage line; similar to VA 6 in the TSF area

Condition: good to very good within service corridor; restricted distribution in survey area – small area not burnt

14. *Eucalyptus loxophleba* subsp. *lissophloia*, *E. oleosa* low mallee woodland

Vegetation description: *Eucalyptus loxophleba* subsp. *lissophloia*, *E. oleosa* low mallee woodland over *Acacia ligulata*, ?*Duma florulenta*, *Bursaria occidentalis*, *Callitris columellaris*, *Grevillea acuaria* open shrubland

Other species: *Bossiaea walkeri*, *Eremophila pantonii*, *Exocarpos aphyllus* and *Olearia muelleri*

Landform: Plain, lower slopes adjacent to floodplain; red sandy loam

Condition: Good to very good within service corridor; very good to excellent in adjacent areas. Some evidence of cattle in area – tracks, cow pats.

Figure 25: *Eucalyptus loxophleba* subsp. *lissophloia*, *E. oleosa* low mallee woodland



6. Conclusions

The sites have been impacted through historical and current pastoral activities as well as mining activities, which has resulted in much of the vegetation being in good to very good condition, with some degraded areas. No threatened or priority taxa or ecological communities were present. Diversity was low in some areas, with substantial impacts to the lower shrub and ground strata. Removal of these strata has led to active surface erosion, reducing the likelihood of future recruitment. Cattle were still present within the area, and there are plans to remove them eventually, which will improve future prospects of regeneration in areas which will not be impacted through the proposed works.

Weeds were generally isolated. The *Nicotiana glauca** plants around the dam adjacent to the TSF are restricted to that area, and control would be possible.

The proposed firebreak around the Davyhurst camp may cause some erosion; however the site is mostly flat, and could be constructed to minimize this threat through having a rough surface – for example using rip lines on the contour, with strategically placed spreader banks, particularly north-west of the village which has active gully erosion.

Santalum spicatum (Sandalwood) was recorded at numerous locations within the proposals. Some plants near the entry to the office and camp area at Davyhurst appeared to have been planted due to regular spacing.

The results from these surveys will be used to address the 10 clearing principles which are presented in a supporting document.

7. References

- Beard, J.S. (1990) Plant Life of Western Australia. Kangaroo Press, Kenthurst, NSW
- Brooker M I H and Kleinig D A (1990): Field Guide to Eucalypts – South-western and Southern Australia. Inkata Press Pty Ltd Melbourne and Sydney
- Brown A and Buirchell B (2011) A Field Guide to the Eremophilas of Western Australia. Published by Simon Nevill Publications, snpub@bigpond.net.au
- Bureau of Meteorology (BoM), 2016, Climate Averages for Menzies, viewed June 2016, www.bom.gov.au
- Centre for Plant Biodiversity Research (2006) Euclid – Eucalypts of Australia 3rd Edition. Interactive CD. CSIRO Publishing
- Department of Environment and Conservation (2009) Car Reserve Analysis, Geographic Information Systems Section; Kensington WA
- Department of Parks and Wildlife (2016) NatureMap, accessed June 2016 naturemap.dpaw.wa.gov.au
- EPA (2004) Guidance for the Assessment of Environmental Factors (in accordance with the Environmental Protection Act 1986), Terrestrial flora and vegetation surveys for Environmental Impact Assessment in Western Australia, Environmental Protection Authority
- Flora of Australia* Volume 3, Hamamelidales to Casuarinales, Australian Government Publishing Service, Canberra (1989) Wilson K L and Johnson L A S, *Flora of Australia* 3: 100 – 175 (1989)
- Flora of Australia* Volume 4, Phytolaccaceae to Chenopodiaceae, Australian Government Publishing Service (1984) Wilson P, *Flora of Australia* 4:81 – 330 (1984)
- Flora of Australia* Volume 26, Meliaceae, Rutaceae, Zygophyllaceae. Melbourne: ABRS/ CSIRO Australia (2013) – Zygophyllaceae R M Barker, *Flora of Australia* 26: 511 – 579 (2013)
- G & G Environmental Pty Ltd (2007) Flora and vegetation survey of proposed mining areas and a tailings storage facility at the Monarch Gold Mining Company Ltd Davyhurst operation. Greenmount Western Australia
- Gibson N and Langley M A (2012) Vascular flora of Credo Station and adjacent reserves. A report to the Bush Blitz Program, Australian Biological Resources Study. Department of Environment and Conservation, Perth WA
- Grieve B J (1998) How to know Western Australian wildflowers: a key to the flora of the extratropical regions of Western Australia. Part II. University of Western Australia Press, Nedlands WA 6907
- Hussey B M J, Keighery G J, Dodd J, Lloyd S G and Cousens R D (2007) Western Weeds – A guide to the weeds of Western Australia. Published by The Weeds Society of Western Australia
- Keighery, B. (1994). Bushland Plant Survey – A guide to Plant Community Survey for the Community, Wildflower Society of WA (Inc.)

Maslin, B R (Coordinator) (2001): Wattle: Acacias of Australia; Published by Australian Biological Resources Study, Canberra & Department of Conservation and Land Management, Perth. (Interactive CD)

Maslin B R and Reid J E (2012) A taxonomic revision of Mulga (*Acacia aneura* and its close relatives: Fabaceae) in Western Australia. *Nuytsia* 22 (4): 129 – 267, the Journal of the Western Australian Herbarium; published online September 2012. Department of Environment and Conservation

Moore P (2005) A Guide to Plants of Inland Australia. Published by Reed New Holland, Sydney

Munsell Color Company (1992) Soil Color Charts. Macbeth Division of Kollmorgen Instruments Group, New York USA

Olde P and Marriott N (1995) The Grevillea Book (volumes 2 & 3). Kangaroo Press Ltd, Kenthurst NSW

Outback Ecology (2007) Flora survey of Salmon Gums, Two Gums, Federal Flag, Walhalla, Golden Eagle, Makai, Sand King, Missouri and Lady Bountiful sites for Monarch Gold Mining Company Ltd: Davyhurst Gold Mine

Outback Ecology (2003) Baseline survey of the flora and fauna of the Siberia Mining Leases, Ora Banda, Western Australia for the Siberia Mining Company Ltd

Pringle H J R, Van Vreeswyk A M E and Gilligan S A (1994) An inventory and condition survey of the north-eastern Goldfield, Western Australia. Department of Agriculture, Western Australia Technical Bulletin No. 87

Simon B K & Alfonso Y (2011) AusGrass2, <http://ausgrass2.myspecies.info/> accessed on 20 June 2016

Thackway R and Cresswell I D (1995), An Interim Biogeographic Regionalisation for Australia: a framework for establishing the national system of reserves, Version 4.0 Canberra: Australia Nature Conservation Agency

Thiele K R and Shepherd K A (2014) *Spartothamnella canescens* (Lamiaceae: Chloantheae), a new species from Western Australia and Central Australia, with notes on the status of *S. sp. Helena* & *Aurora Range*. *Nuytsia* 24:177 – 185. Department of Parks and Wildlife, WA

Tucker J (J & J Tucker Environmental Solutions Pty Ltd) (2007) Flora and fauna survey of portions of M24/39 and M 24/290 for the Halcyon Group Ltd

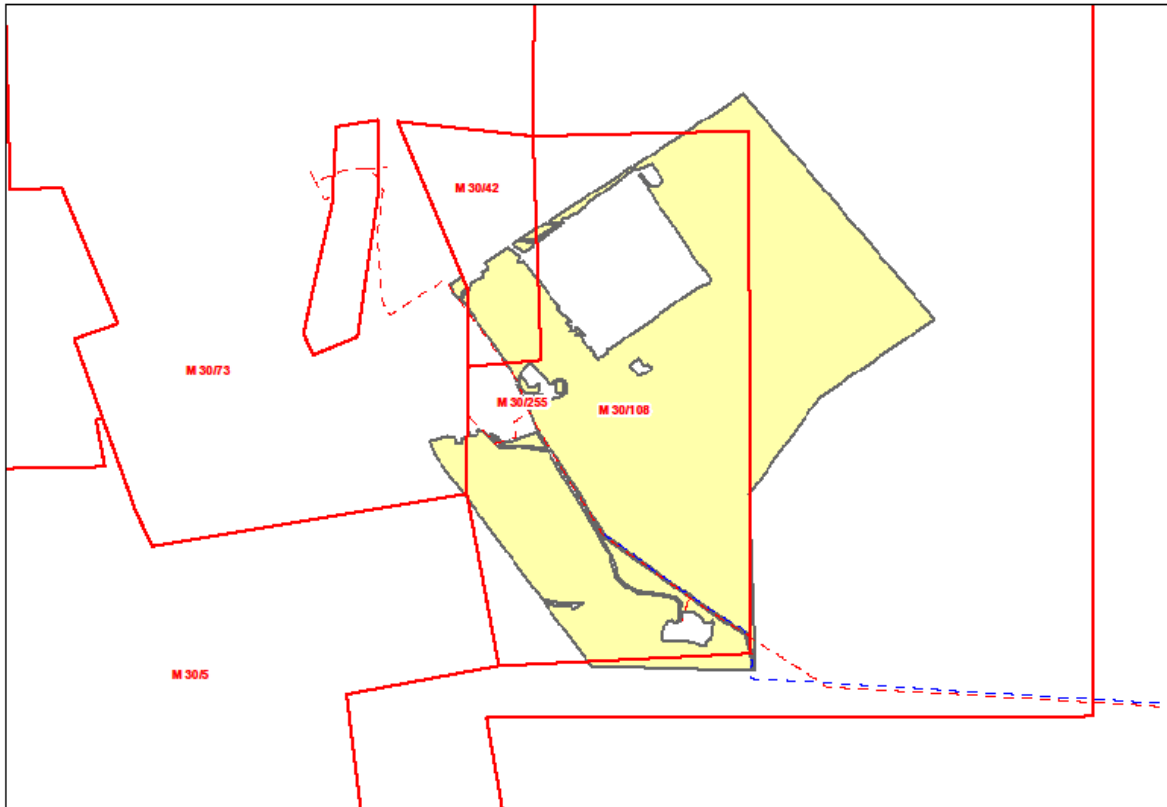
US Department of State Geographer – Google Earth – accessed June – July 2016

Western Australian Herbarium (2016) FloraBase – the Western Australian Flora, viewed May & June 2016, <http://florabase.dpaw.wa.gov.au>

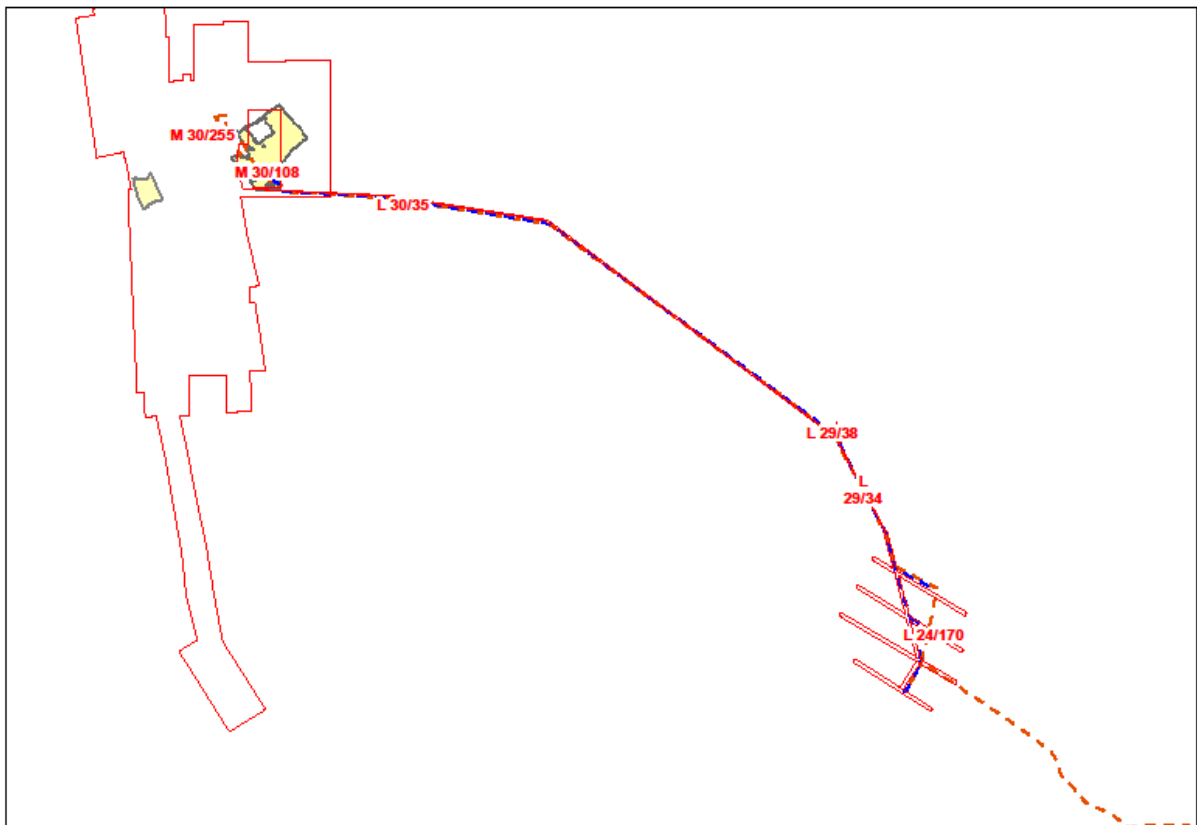
Weston P H (1995) Proteaceae: Subfam. 1. Persoonioideae in Flora of Australia Volume 16, Elaeaganaceae, Proteaceae 1. Melbourne CSIRO

Wilkins C F and Chappill (2007) Five new species of *Eutaxia* (Leguminosae: Mirbelieae) from south-western Australia. *Nuytsia* 17: 469 – 482. Department of Environment and Conservation Western Australia

Appendix 1A: Tenements – Davyhurst



Appendix 1B: Tenements – Bore line and Battery Bore Field



Appendix 2: Species list for Davyhurst Mill, TSF and camp area

Family	Scientific Name
Amaranthaceae	<i>Ptilotus aervoides</i> <i>Ptilotus obovatus</i>
Apocynaceae	<i>Alyxia buxifolia</i> <i>Marsdenia australis</i>
Asteraceae	<i>Centaurea melitensis</i> * <i>Dittrichia graveolens</i> * <i>Olearia muelleri</i> <i>Olearia pimeleoides</i> <i>Taraxacum khatoonae</i> *
Casuarinaceae	<i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i> <i>Allocasuarina eriochlamys</i> subsp. <i>eriochlamys</i> <i>Casuarina pauper</i>
Chenopodiaceae	<i>Atriplex bunburyana</i> <i>Atriplex nummularia</i> subsp. <i>spathulata</i> <i>Atriplex semibaccata</i> <i>Enchylaena tomentosa</i> <i>Maireana georgei</i> <i>Maireana sedifolia</i> <i>Maireana trichoptera</i> <i>Maireana triptera</i> <i>Sclerolaena fusiformis</i>
Fabaceae	<i>Acacia aptaneura</i> <i>Acacia burkittii</i> <i>Acacia caesaneura</i> <i>Acacia colletioides</i> <i>Acacia coolgardiensis</i> <i>Acacia erinacea</i> <i>Acacia fuscaneura</i> <i>Acacia mulganeura</i> <i>Acacia murrayana</i> <i>Acacia ramulosa</i> var. <i>ramulosa</i> <i>Acacia tetragonophylla</i> <i>Bossiaea walkeri</i> <i>Senna artemisioides</i> subsp. <i>filifolia</i> <i>Senna artemisioides</i> subsp. <i>x artemisioides</i> <i>Senna cardiosperma</i>
Goodeniaceae	<i>Scaevola spinescens</i>
Haloragaceae	<i>Haloragis gossei</i>
Lamiaceae	<i>Prostanthera althoferi</i> subsp. <i>althoferi</i> <i>Prostanthera grylloana</i> <i>Spartothamnella canescens</i> <i>Westringia rigida</i>

Family	Scientific Name
Loranthaceae	<i>Amyema gibberula</i> var. <i>tatei</i>
Malvaceae	<i>Brachychiton gregorii</i> <i>Keraudrenia integrifolia</i> <i>Sida calyxhymenia</i>
Myrtaceae	<i>Eucalyptus clelandii</i> <i>Eucalyptus griffithsii</i> <i>Eucalyptus lesouefii</i> <i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i> <i>Eucalyptus oleosa</i> <i>Eucalyptus salmonophloia</i> <i>Eucalyptus salubris</i> subsp. <i>salubris</i> <i>Melaleuca hamata</i>
Poaceae	<i>Eriachne pulchella</i> <i>Eriachne</i> sp. <i>Monachather paradoxus</i> <i>Triodia scariosa</i>
Proteaceae	<i>Grevillea juncifolia</i> <i>Grevillea obliquistigma</i> <i>Grevillea oligomera</i> <i>Hakea minyma</i> <i>Hakea preissii</i>
Pteridaceae	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>
Rutaceae	<i>Phebalium canaliculatum</i> <i>Philotheca deserti</i> subsp. <i>deserti</i> <i>Philotheca brucei</i> subsp. <i>brucei</i>
Santalaceae	<i>Exocarpos aphyllus</i> <i>Santalum acuminatum</i> <i>Santalum spicatum</i>
Sapindaceae	<i>Dodonaea lobulata</i> <i>Dodonaea microzyga</i> var. <i>acrolobata</i> <i>Dodonaea viscosa</i> subsp. <i>angustissima</i>
Scrophulariaceae	<i>Eremophila decipiens</i> subsp. <i>decipiens</i> <i>Eremophila eriocalyx</i> <i>Eremophila interstans</i> subsp. <i>virgata</i> <i>Eremophila ionantha</i> <i>Eremophila longifolia</i> <i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i> <i>Eremophila scoparia</i>
Solanaceae	<i>Nicotiana glauca</i> * <i>Solanum hoplopetalum</i> <i>Solanum lasiopetalum</i> <i>Solanum nummularium</i>
Thymelaeaceae	<i>Pimelea microcephala</i> subsp. <i>microcephala</i>
Zygophyllaceae	<i>Zygophyllum eremaum</i>
Unknown dicot seedling	

Appendix 3: Species list for the service corridor and Battery Borefield

(Includes minor areas in the camp area – Appendix 2)

Family	Scientific Name
Amaranthaceae	<i>Ptilotus obovatus</i>
Apiaceae	<i>Platysace trachymenioides</i>
Apocynaceae	<i>Alyxia buxifolia</i>
	<i>Marsdenia australis</i>
Asteraceae	<i>Centaurea melitensis</i> *
	<i>Olearia muelleri</i>
	<i>Olearia sp. Eremicola</i>
	<i>Senecio pinnatifolius</i>
	<i>Sonchus oleraceus</i> *
	<i>Taraxacum khatoonae</i> *
	<i>Vittadinia cervicalis var. cervicalis</i>
Casuarinaceae	<i>Allocasuarina acutivalvis</i> subsp. <i>acutivalvis</i>
	<i>Allocasuarina eriochlamys</i> subsp. <i>eriochlamys</i>
	<i>Casuarina pauper</i>
Celastraceae	<i>Psammomoya choretroides</i>
Chenopodiaceae	<i>Atriplex nummularia</i>
	<i>Atriplex semibaccata</i>
	<i>Enchylaena tomentosa</i>
	<i>Maireana brevifolia</i>
	<i>Maireana carnosa</i>
	<i>Maireana georgei</i>
	<i>Maireana sedifolia</i>
	<i>Maireana trichoptera</i>
	<i>Rhagodia preissii</i> subsp. <i>preissii</i>
	<i>Sclerolaena cuneata</i>
	<i>Sclerolaena fusiformis</i>
Cucurbitaceae	<i>Citrullus lanatus</i> *
	<i>Cucumis myriocarpus</i> *
Cupressaceae	<i>Callitris columellaris</i>
Euphorbiaceae	<i>Beyeria ?sulcata</i> var. <i>sulcata</i>
Fabaceae	<i>Acacia burkittii</i>
	<i>Acacia caesaneura</i>
	<i>Acacia colletioides</i>
	<i>Acacia coolgardiensis</i>
	<i>Acacia eremophila</i> subsp. <i>eremophila</i>
	<i>Acacia fusaneura</i>
	<i>Acacia leptopetala</i>
	<i>Acacia ligulata</i>
	<i>Acacia merrallii</i>
	<i>Acacia mulganeura</i>
	<i>Acacia murrayana</i>
	<i>Acacia prainii</i>

Appendix 3 cont.

Family	Scientific Name
Fabaceae	<i>Acacia ramulosa</i> var. <i>ramulosa</i> <i>Acacia resinimarginea</i> <i>Acacia tetragonophylla</i> <i>Acacia yorkrakinensis</i> subsp. <i>acrita</i> <i>Bossiaea walkeri</i> <i>Leptosema daviesioides</i> <i>Mirbelia microphylla</i> <i>Senna artemisioides</i> subsp. <i>filifolia</i> <i>Swainsona ?formosa</i>
Frankeniaceae	<i>Frankenia setosa</i>
Goodeniaceae	<i>Scaevola spinescens</i>
Gyrostemonaceae	<i>Codonocarpus cotinifolius</i>
Hemerocallidaceae	<i>Dianella revoluta</i> var. <i>divaricata</i>
Lamiaceae	<i>Physopsis viscida</i> <i>Prostanthera grylloana</i> <i>Westringia cephalantha</i> <i>Westringia rigida</i>
Malvaceae	<i>Brachychiton gregorii</i>
Myrtaceae	<i>Aluta aspera</i> subsp. <i>aspera</i> <i>Baeckea</i> sp. Comet Vale (tentative) <i>Eucalyptus clelandii</i> <i>Eucalyptus griffithsii</i> <i>Eucalyptus horistes</i> <i>Eucalyptus leptopoda</i> subsp. <i>subluta</i> <i>Eucalyptus lesouefii</i> <i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i> <i>Eucalyptus lucasii</i> <i>Eucalyptus oleosa</i> <i>Eucalyptus salmonophloia</i> <i>Eucalyptus salubris</i> subsp. <i>salubris</i> <i>Eucalyptus sheathiana</i> <i>Eucalyptus yilgarnensis</i> <i>Melaleuca hamata</i> <i>Verticordia helmsii</i>
Pittosporaceae	<i>Bursaria occidentalis</i> <i>Pittosporum angustifolium</i>
Poaceae	<i>Triodia ?scariosa</i>
Polygonaceae	<i>Duma florulenta</i>
Proteaceae	<i>Grevillea acuaria</i> <i>Grevillea haplantha</i> subsp. <i>haplantha</i> <i>Grevillea huegelii</i> <i>Hakea minyma</i> <i>Persoonia ?coriacea</i>

Appendix 3 cont.

Family	Scientific Name
Pteridaceae	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>
Rutaceae	<i>Phebalium canaliculatum</i> <i>Philotheca brucei</i> subsp. <i>brucei</i>
Santalaceae	<i>Exocarpos aphyllus</i> <i>Santalum acuminatum</i> <i>Santalum spicatum</i>
Sapindaceae	<i>Alectryon oleifolius</i> subsp. <i>canescens</i> <i>Dodonaea lobulata</i> <i>Dodonaea microzyga</i> var. <i>acrolobata</i> <i>Dodonaea viscosa</i> subsp. <i>angustissima</i>
Scrophulariaceae	<i>Eremophila decipiens</i> subsp. <i>decipiens</i> <i>Eremophila eriocalyx</i> <i>Eremophila gibbosa</i> <i>Eremophila granitica</i> <i>Eremophila interstans</i> subsp. <i>virgata</i> <i>Eremophila ionantha</i> <i>Eremophila longifolia</i> <i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i> <i>Eremophila scoparia</i> <i>Eremophila subfloccosa</i> subsp. <i>lanata</i>
Xanthorrhoeaceae	<i>Xanthorrhoea thorntonii</i>
Zygophyllaceae	<i>Zygophyllum tetrapterum</i>

Appendix 4: Conservation code descriptions (DPaW 2016)

T: Threatened Flora (Declared Rare Flora — Extant)

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 (Schedule 1 under the Wildlife Conservation Act 1950).

1: Priority One: Poorly-known taxa

Taxa that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.

2: Priority Two: Poorly-known taxa

Taxa that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.

3: Priority Three: Poorly-known taxa

Taxa that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.

4: Priority Four: Rare, Near Threatened and other taxa in need of monitoring

1. **Rare.** Taxa that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands.
2. **Near Threatened.** Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.
3. Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

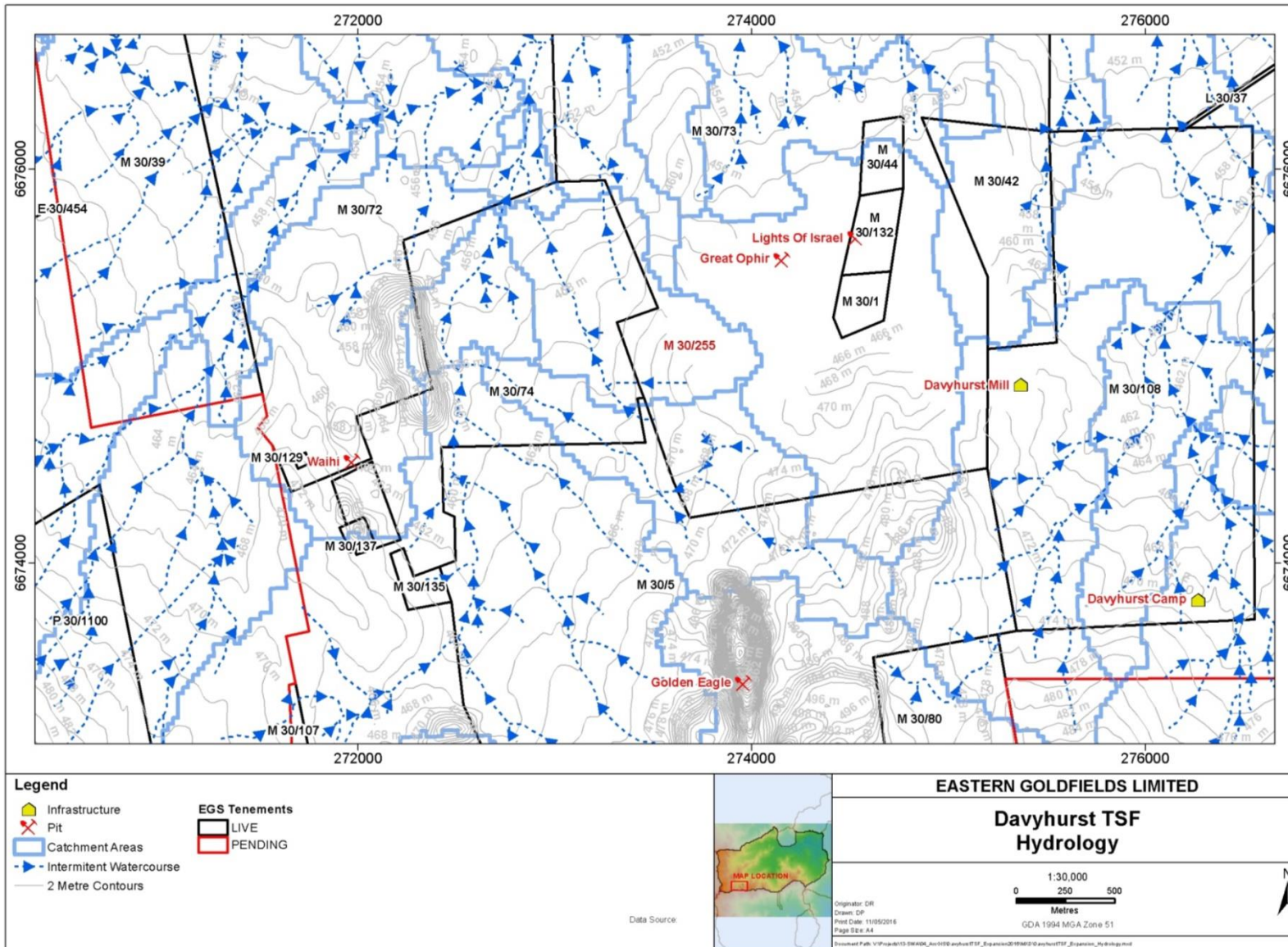
5: Priority Five: Conservation Dependent taxa

Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxon becoming threatened within five years

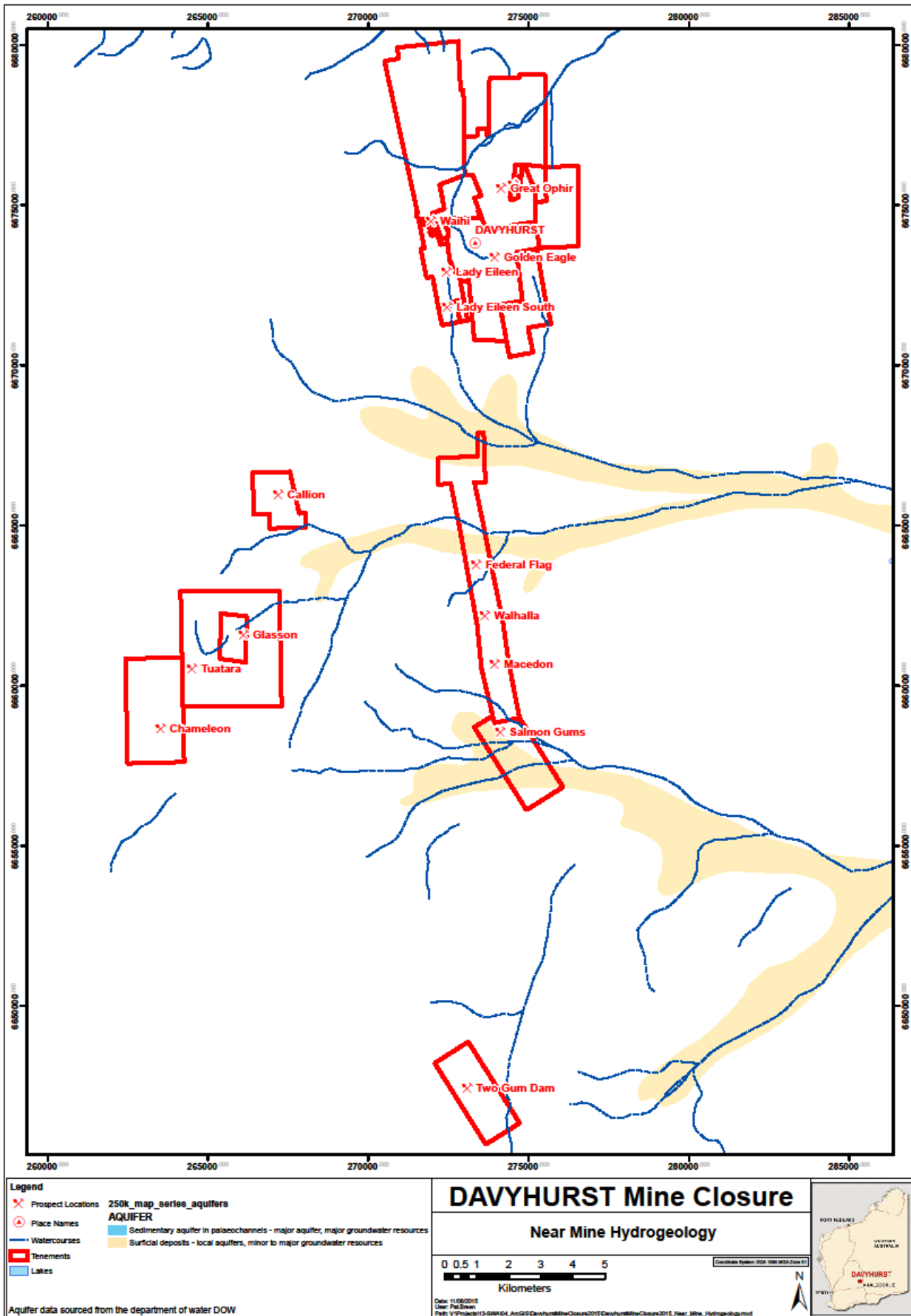
Appendix 5: Vegetation condition descriptions (Keighery 1994)

Condition	Description
Pristine	Pristine or nearly so, no obvious signs of disturbance
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species
Very good	Vegetation structure altered, obvious signs of disturbance
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management.
Completely degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species

Appendix 6: Hydrology – Davyhurst area (Figure supplied by EGS)



Appendix 7: Davyhurst mine extended area hydrology. Drainage from the Davyhurst sites is to the north. (Figure supplied by EGS)



Appendix 8A: GPS location data for Sandalwood (*Santalum spicatum*) – Davyhurst

Davyhurst	Site	Date	Zone	Easting	Northing	No.
Santalum spicatum	Camp	11/6/2016	51J	276165	6673981	1
Santalum spicatum	Camp	11/6/2016	51J	276135	6673981	1
Santalum spicatum	Camp	11/6/2016	51J	276075	6673816	2
Santalum spicatum	Camp	11/6/2016	51J	276044	6673726	1
Santalum spicatum	Camp	11/6/2016	51J	276063	6673719	2
Santalum spicatum	Camp	11/6/2016	51J	276081	6673713	1
Santalum spicatum	Camp	11/6/2016	51J	276291	6673762	1
Santalum spicatum	Camp	11/6/2016	51J	276302	6673769	1
Santalum spicatum	Camp	11/6/2016	51J	276519	6674027	1
Santalum spicatum	Camp	11/6/2016	51J	276236	6673939	1
Santalum spicatum	Camp	11/6/2016	51J	276242	6673952	1
Santalum spicatum	Camp	11/6/2016	51J	276313	6674288	1
Santalum spicatum	Entry	11/6/2016	51J	276102	6674190	3
Santalum spicatum	Entry	11/6/2016	51J	276120	6674207	1
Santalum spicatum	Entry	11/6/2016	51J	276114	6674211	1
Santalum spicatum	Entry	11/6/2016	51J	276130	6674221	1
Santalum spicatum	Entry	11/6/2016	51J	276142	6674228	1
Santalum spicatum	Entry	11/6/2016	51J	276151	6674235	1
Santalum spicatum	Entry	11/6/2016	51J	276274	6674355	1
Santalum spicatum	Entry	11/6/2016	51J	276374	6674399	1
Santalum spicatum	Office	11/6/2016	51J	275672	6673978	1
Santalum spicatum	Office	11/6/2016	51J	275686	6673980	1
Santalum spicatum	Office	11/6/2016	51J	275694	6673994	1
Santalum spicatum	Office	11/6/2016	51J	275799	6674044	1
Santalum spicatum	Office	11/6/2016	51J	275571	6674376	1
Santalum spicatum	Office	11/6/2016	51J	275430	6674377	8
Santalum spicatum	Office	11/6/2016	51J	275400	6674361	7
Santalum spicatum	Office	11/6/2016	51J	275238	6674412	1
Santalum spicatum	Office	11/6/2016	51J	275216	6674426	1
Santalum spicatum	Tailings	11/6/2016	51J	276586	6675926	2
Santalum spicatum	Tailings	11/6/2016	51J	276621	6675908	2
Santalum spicatum	Tailings	11/6/2016	51J	276617	6675894	1
Santalum spicatum	Tailings	11/6/2016	51J	276848	6675239	1
Santalum spicatum	Tailings	11/6/2016	51J	276867	6675235	1
Santalum spicatum	Tailings	11/6/2016	51J	276870	6675222	1
Santalum spicatum	Tailings	11/6/2016	51J	276897	6675231	1
Santalum spicatum	Tailings	11/6/2016	51J	276772	6675085	4
Santalum spicatum	Tailings	11/6/2016	51J	276741	6675097	1
Santalum spicatum	Tailings	12/6/2016	51J	276264	6675358	1
Santalum spicatum	Tailings	12/6/2016	51J	276289	6675349	1
Santalum spicatum	Tailings	12/6/2016	51J	276036	6675167	1

Santalum spicatum	Tailings	12/6/2016	51J	275970	6675168	1
Santalum spicatum	Tailings	12/6/2016	51J	275904	6675177	1
Santalum spicatum	Camp	15/6/2016	51J	276354	6673912	1
Santalum spicatum	Camp	15/6/2016	51J	276328	6673898	1
Santalum spicatum	Camp	15/6/2016	51J	276322	6673912	2
Santalum spicatum	Camp	15/6/2016	51J	276132	6673984	1
Santalum spicatum	Camp	15/6/2016	51J	275755	6673923	1
Santalum spicatum	Camp	15/6/2016	51J	275740	6673918	1
Santalum spicatum	Camp	15/6/2016	51J	275577	6673945	1

Appendix 8B: GPS location data for Sandalwood (*Santalum spicatum*) – Service corridor and Battery Borefield

West of Ora Banda Road	Date	Zone	Easting	Northing	total No.
Santalum spicatum	12/6/2016	51J	280996	6673236	1
Santalum spicatum	12/6/2016	51J	281025	6673231	4
Santalum spicatum	12/6/2016	51J	280815	6673250	3
Santalum spicatum	12/6/2016	51J	280830	6673245	4
Santalum spicatum	12/6/2016	51J	280839	6673244	1
Santalum spicatum	12/6/2016	51J	280787	6673252	2
Santalum spicatum	12/6/2016	51J	280779	6673266	1
Santalum spicatum	12/6/2016	51J	280783	6673282	1
Santalum spicatum	12/6/2016	51J	280613	6673283	4
Santalum spicatum	12/6/2016	51J	280604	6673284	1
Santalum spicatum	12/6/2016	51J	277763	6673504	1
Santalum spicatum	12/6/2016	51J	277760	6673515	2
Santalum spicatum	14/6/2016	51J	276873	6673571	1
Santalum spicatum	14/6/2016	51J	276808	6673573	1
Santalum spicatum	14/6/2016	51J	277555	6673514	1
Santalum spicatum	14/6/2016	51J	277585	6673536	1
Santalum spicatum	14/6/2016	51J	277537	6673535	3
Santalum spicatum	14/6/2016	51J	277524	6673518	4
Santalum spicatum	14/6/2016	51J	277512	6673518	1
Santalum spicatum	14/6/2016	51J	277207	6673588	1
Santalum spicatum	14/6/2016	51J	277151	6673550	1
Santalum spicatum	14/6/2016	51J	276730	6673601	1
Santalum spicatum	14/6/2016	51J	278010	6673499	5
Santalum spicatum	14/6/2016	51J	278010	6673486	1
Santalum spicatum	14/6/2016	51J	278029	6673504	1
Santalum spicatum	14/6/2016	51J	279276	6673428	1
Santalum spicatum	14/6/2016	51J	279303	6673422	1
Santalum spicatum	14/6/2016	51J	279829	6673402	1
Santalum spicatum	14/6/2016	51J	279985	6673394	1

Santalum spicatum	14/6/2016	51J	280644	6673300	1
Santalum spicatum	15/6/2016	51J	276353	6673908	1
Santalum spicatum	15/6/2016	51J	276464	6673850	1
Santalum spicatum	15/6/2016	51J	276454	6673851	1
Santalum spicatum	15/6/2016	51J	276739	6673687	1
Santalum spicatum	15/6/2016	51J	276778	6673645	1
Santalum spicatum	15/6/2016	51J	276841	6673619	1
Santalum spicatum	15/6/2016	51J	276451	6673857	1

East of Ora Banda Road					
	Date	Zone	Easting	Northing	No.
Santalum spicatum	13/6/16	51J	281390	6673146	2
Santalum spicatum	13/6/16	51J	281395	6673140	2
Santalum spicatum	13/6/16	51J	281521	6673119	1
Santalum spicatum	13/6/16	51J	281947	6673075	1
Santalum spicatum	13/6/16	51J	281940	6673085	1
Santalum spicatum	13/6/16	51J	282499	6672988	2
Santalum spicatum	13/6/16	51J	282540	6672979	1
Santalum spicatum	13/6/16	51J	283591	6672808	1
Santalum spicatum	13/6/16	51J	283586	6672817	1
Santalum spicatum	13/6/16	51J	283770	6672771	1
Santalum spicatum	13/6/16	51J	283787	6672776	1
Santalum spicatum	13/6/16	51J	283774	6672766	1
Santalum spicatum	13/6/16	51J	283865	6672764	2
Santalum spicatum	13/6/16	51J	283855	6672753	1
Santalum spicatum	13/6/16	51J	283864	6672753	2
Santalum spicatum	13/6/16	51J	283844	6672747	2
Santalum spicatum	13/6/16	51J	283836	6672744	1
Santalum spicatum	13/6/16	51J	283834	6672753	2
Santalum spicatum	13/6/16	51J	283827	6672757	1
Santalum spicatum	13/6/16	51J	283802	6672753	1
Santalum spicatum	13/6/16	51J	283979	6672744	1
Santalum spicatum	13/6/16	51J	283973	6672751	1
Santalum spicatum	13/6/16	51J	284052	6672711	1
Santalum spicatum	13/6/16	51J	286173	6671852	2
Santalum spicatum	13/6/16	51J	286170	6671841	1
Santalum spicatum	13/6/16	51J	288530	6670123	1
Santalum spicatum	13/6/16	51J	288528	6670119	1
Santalum spicatum	13/6/16	51J	288522	6670124	1
Santalum spicatum	13/6/16	51J	288521	6670128	1
Santalum spicatum	13/6/16	51J	288747	6669938	1
Santalum spicatum	13/6/16	51J	288786	6669933	1
Santalum spicatum	13/6/16	51J	288800	6669936	1
Santalum spicatum	13/6/16	51J	288793	6669943	1

Santalum spicatum	13/6/16	51J	288839	6669874	2
Santalum spicatum	13/6/16	51J	288845	6669869	3
Santalum spicatum	13/6/16	51J	288856	6669851	1
Santalum spicatum	13/6/16	51J	288863	6669866	1
Santalum spicatum	13/6/16	51J	288906	6669842	2
Santalum spicatum	13/6/16	51J	288939	6669832	2
Santalum spicatum	13/6/16	51J	289247	6669584	4
Santalum spicatum	13/6/16	51J	289241	6669607	1
Santalum spicatum	13/6/16	51J	289200	6669603	1
Santalum spicatum	13/6/16	51J	289302	6669524	1
Santalum spicatum	13/6/16	51J	289339	6669519	1
Santalum spicatum	13/6/16	51J	289345	6669531	1
Santalum spicatum	13/6/16	51J	289356	6669528	1
Santalum spicatum	13/6/16	51J	289362	6669501	1
Santalum spicatum	13/6/16	51J	290012	6669025	1
Santalum spicatum	13/6/16	51J	290030	6669004	2

Appendix 9: Mapped locations of Sandalwood (none were recorded within the Borefield area)

