

Appendix C-3

Flora survey of Lethbridge haul road

MATILDA MINERALS PTY LTD

TIWI ISLANDS PROJECT —LETHBRIDGE PROSPECT

**SURVEY OF HABITATS & WEEDS
for
LETHBRIDGE HAUL ROAD**



FIELD REPORT

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Prepared for

URS

by

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MATILDA MINERALS – TIWI ISLANDS PROJECT

LETHBRIDGE HAUL ROAD

FIELD REPORT - SUMMARY

The Existing Environment

- The 66 kilometer Lethbridge haul road mainly traverses a single upland vegetation type—Eucalypt forest and woodland (dominant species *Eucalyptus miniata*, *Eucalyptus tetradonta* and *Corymbia nesophila*)
- The overall floristic composition is relatively uniform along the majority of the proposed haul road alignment
- At the time of the survey, little groundcover vegetation was present due to the effects of seasonal aridity and fire
- Two pockets of mixed species shrubland, which support a diverse assemblage of forbs, are located adjacent to the road alignment

Plant Species and Vegetation Communities of Conservation Significance

- The Tiwi islands are known for their high floristic diversity which includes an exceptional number of recognised rare and threatened species
- During this survey, only *Cycas armstrongii*, listed as Vulnerable (under NT Legislation—*Territory Parks and Wildlife Conservation Act, 2000*) was recorded in habitats traversed by the proposed Lethbridge haul road.
- *Cycas armstrongii*, which is locally common along the haul road, is a Northern Territory endemic with a reasonably small range, that is threatened by fire and land clearing and poorly represented in conservation reserves
- A permit from NT Parks and Wildlife (Contact: David Liddle, DIPE) is required prior to clearing of *Cycas armstrongii*.
- The number of cycads likely to be affected by clearing for road construction (approximately 50-100 plants) is relatively minor in the context of their population in the local region where they are relatively abundant
- The proposed Lethbridge haul road does not traverse any habitats of potential conservation significance (eg. Vine- forest or wetlands) and where possible it should remain within well drained upland areas

Potential Environmental Impacts

- Clearing and loss of habitat is anticipated to be the major impact on vegetation from construction of the 4 to 6m wide haul road
- Impacts on native vegetation from construction and operation of the Lethbridge haul road are anticipated to be relatively localised in extent
- Due to the timing of the field survey (late dry season) and recent fires, a full floristic survey was not possible. However, potential impacts on any plant species of conservation significance are unlikely

- Given the absence of plant communities of restricted distribution or vegetation types known to contain a high proportion of rare species, the presence of rare plants along the haul road corridor is unlikely
- To confirm the absence of any annual species of conservation significance a follow up survey of the proposed haul road corridor is suggested, this should be scheduled for the late wet season
- The proposed haul road alignment is currently weed-free but local disturbance associated with road construction greatly increases the potential for weed invasion
- Weed introductions are most likely to occur by the spread of seed due to increased vehicular traffic from areas such as Pickertaramoor and settlement areas with dense weed infestations.
- No Gamba Grass (*Andropogon gayanus*) or Mission Grass (*Pennisetum polystachion*) were observed and preventing the introduction and spread of these serious environmental weeds should be given high priority

Recommended Mitigation Measures

- The introduction of weeds can be avoided by the requirement that all vehicles and plant to be used in construction should be subject to washdown and inspection prior to moving on to the construction site.
- A weed monitoring program should be implemented for the duration of the project, and weed control measures be implemented rapidly in the event of an outbreak.
- Regular weed surveys of this road and the Andranangoo Haul road should be conducted to prevent introductions, which is more cost-effective than weed control.
- The exclusion of exotic species is important for biodiversity conservation and the importance of weed control measures in the construction of these roads is stressed.
- Any variations to the road alignment currently proposed should avoid wetland or poorly drained areas. The potential for environmental impacts on flora is greatly reduced by confining construction to within upland Eucalyptus-dominated habitats.

MATILDA MINERALS – TIWI ISLANDS PROJECT LETHBRIDGE HAUL ROAD

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MATILDA MINERALS – TIWI ISLANDS PROJECT LETHBRIDGE HAUL ROAD

1. INTRODUCTION

Matilda Minerals Pty Ltd is investigating the feasibility of extracting zircon and rutile from sand plains occurring on the northern coastline of Melville Island. As part of this process, an Environmental Impact Statement is being prepared. This survey was commissioned to provide environmental information on the proposed 66 km haul road alignment leading to the Lethbridge Bay prospect. The specific aims of the survey were to:-

- Describe and map the habitats (vegetation communities) traversed by the haul road
- To assess the potential for the proposed haul road alignment to impact on plant species or vegetation communities of conservation significance
- To document the distribution and density of weed species that occur within the proposed haul road alignment

2. METHODOLOGY

Fieldwork was conducted from 4th to 7th October 2005. During the survey the road was traversed three times from the junction of Andranangoo Haul Road and Lethbridge Haul Road, to the Lethbridge Bay prospect site. A total of 20 survey sites were established in 2 main vegetation communities to examine community floristics. A weed survey was conducted by detailed searches at each of the selected sites on foot and by noting the presence of weeds within 1 km intervals along the entire length of proposed haul road.

Habitat types within the road corridor were mapped at 1: 50,000 scale using existing topographic maps as a baseline. At each survey site the GPS coordinate location was recorded in WGS84 datum. Site photographs were taken within each vegetation community.

3. THE EXISTING ENVIRONMENT - HABITATS

3.1. VEGETATION COMMUNITIES TRAVERSED BY THE HAUL ROAD

A total of 57 plant species have been recorded during the field survey of the Lethbridge Haul Road. A species list is included in Table 1-1, Appendix 1. More detailed lists were also compiled for species recorded at each of the 20 study sites (Table 1-2, Appendix 1).

The 66 km haul road alignment traverses an upland area at a vertical range of 90 -116m above sea level in an east north east direction from the junction of Andranangoo Haul Road for approximately 18 km. At this point the haul road heads north, where the elevation gradually declines to 39 m above sea level over the next 47 km prior to reaching the Lethbridge Bay prospect area, located on the coast. The quite uniform topography encourages relatively similar habitat for the vegetation along the full length of the road corridor.

The vegetation communities traversed by the Lethbridge Haul Road are broadly grouped as upland communities, characterised by well-drained terrestrial areas typically with Eucalyptus species dominant in the upper stratum. Vegetation varies subtly in structure from dense open forests and mid-dense woodland to more sparse open woodland. Dominance also varies between several eucalypt species, changing with variations in topography, soils and drainage. Two vegetation

communities were identified along the proposed 66 km haul road (Table 1). The majority of the road will traverse Eucalypt dominated forests but minor mixed species shrubland is also encountered. These pockets of mixed species shrubland were located in small depressions or associated with minor drainage ways adjacent to the proposed road corridor. Photos of the major vegetation communities are presented in Appendix 3.

Table 1: Summary table of the major vegetation types traversed by the Lethbridge Haul Road

MAP UNIT	VEGETATION COMMUNITY and STRUCTURE	KEY FEATURES
UPLAND COMMUNITIES		
1	Eucalypt –dominated forest Open forest, woodland and open woodland	Typical of savanna woodland across the Top End with <i>Eucalyptus miniata</i> / <i>E. tetradonta</i> and <i>Corymbia nesophila</i> as dominant tree species. The NT endemic palm, <i>Livistonia humilis</i> and <i>Cycas armstrongii</i> are dispersed within the forest, sometimes in dense patches. This habitat is subject to regular, often annual, fires.
2	Mixed species shrubland Shrubs and low trees amongst grassland.	Relatively small areas of treeless habitat indicating changes in soil and drainage—typically seasonal waterlogging. Variable species composition but typically including <i>Grevillea pteridifolia</i> , <i>Acacia</i> spp., <i>Persoonia falcata</i> , <i>Planchonia careya</i> and <i>Melaleuca viridiflora</i>

The overall appearance and floristic composition is relatively uniform along the majority of the road corridor. The two vegetation communities located along the proposed haul road are described as follows:

UPLAND COMMUNITIES

Upland vegetation communities, classified according to canopy density include open forest, woodland and open forest vegetation and are typically dominated by *Eucalypts* (and *Corymbia*) species. Typical of large areas across the Top End, these communities are common and have a widespread distribution.

3.1.1. Eucalypt-dominated communities

This community covers approximately 75% of the Tiwi Islands area (Woinarski *et al.*, 2003a) and the majority of vegetation traversed by the Lethbridge road is largely *Eucalyptus* –dominated woodland.

Much of this vegetation had been burnt prior to the survey, hence many locations did not have ground layer vegetation aside from regeneration of the primary tree species. Nevertheless, upper stratum vegetation was readily identifiable and dominance varied with slight variations in topography, soils and drainage. Indeed, tree height and canopy cover, and the floristics and density of the understory can vary substantially depending upon on fire history, soil depth and texture (Woinarski *et al* 2003a). Thus three vegetation formations were identified along the Lethbridge haul road —open forest, woodlands and open woodland—based on variation in canopy cover. Species dominance also varies according to local variations in topography



Figure 1: Regeneration of dominant tree species *Corymbia nesophila* following recent fire in woodland habitat, Lethbridge haul road

Open Forest:

This community mainly comprises tall (canopy height 10-30m) relatively dense (canopy cover 70-30%) trees dominated by *Eucalyptus miniata* (Darwin Woollybutt) and *Corymbia nesophila* (Melville Island Bloodwood). The co- dominant upper stratum tree species is *Eucalyptus tetradonta* (Darwin Stringybark). The mid stratum of the open forests habitats typically comprised *Acacia lamprocarpa*, *Erythrophleum chlorostachys*, *Persoonia falcata* and the palm, *Livistonia humilis*. The mid- stratum is sparse at most sites and reflects the occurrence of regular fire.



Figure 2: Eucalypt-dominated open forest community typical of vegetation fringing the proposed Lethbridge haul road

Woodland

The woodland community is also mostly dominated by the *Eucalypts*, (*E. miniata*, *E. tetradonta*) and *Corymbia bleeseri*, ranging in height between 10-30 metres. Canopy cover is less dense (30-10%) than open forest habitats, therefore has a higher proportion of mid stratum species. . Species that form a mid stratum in the woodland community include *Persoonia falcata*, *Planchonia careya*, *Buchanania obovata*, *Acacia difficilis* and *Acacia lamprocarpa*. *Livistonia humilis* and *Pandanus spiralis* were locally common to dominant mid-stratum species in woodland, particularly along drainage lines and in water shed areas



Figure 3: Woodland community with *Eucalyptus* species dominant in the upper stratum and *Livistonia* palms and *Acacias* common mid-stratum species

Open Woodland

Open woodland occurs at the northern end of the haul road immediately before the Lethbridge Bay prospect area. Open woodland typically has a low canopy density ranging between 1-10%. Tree species *Brachychiton diversifolius* and *Corymbia bleeseri* and abundant shrubs including *Boronia lanceolata* and *Mallotus nesophilus* were recorded in open woodland community next to the proposed Lethbridge mining camp.



Figure 4: Open woodland on sandy coastal soils provide suitable habitat for *Boronia lanceolata*

3.1.2. Mixed species shrubland

Two areas of mixed species shrubland, typical of seasonally wet areas, were traversed by or located close to the proposed haul road alignment. This community differed from the eucalypt dominated communities in both species composition and structure and supports vegetation typical of areas with poor drainage.

An almost mono-specific stand of *Melaleuca viridiflora* is located approx 8 Kilometres from the Andranangoo and Lethbridge Haul Road intersection. Surrounding this swampy area is a transition zone comprising *Leucopogon acuminatus* growing in association with *Calytrix exstipulata*. Another mixed species shrubland within the survey area was much more diverse floristically. *Melaleuca nervosa* and *Corymbia ptychocarpa* were the dominant tree species in this area. The perennial fern *Platyzoma microphyllum* and other forb species (*Goodenia* sp., *Trachynema* sp.) formed a distinctive community not found elsewhere in the survey area. This community was located approx 300m from the haul road and thus will be unaffected by the construction of the road. The GPS location and plant species recorded are listed in Appendix 2 (Table 2-1.)



Figure 5: Seasonally wet mixed species shrubland - habitat for *Melaleuca nervosa* and a diverse range of forbs

4. PLANT SPECIES AND VEGETATION COMMUNITIES OF CONSERVATION SIGNIFICANCE

The Tiwi Islands are known for their high floristic diversity which includes an exceptional number of recognised rare and threatened species (Woinarski et al., 2003a). Twenty plant taxa are listed as Endangered or Vulnerable under NT legislation while a further 44 are listed as Data Deficient; a category generally synonymous with rarity. Furthermore a high proportion of the rare and threatened species are also endemic to the Tiwi Islands in the NT. Overall, the most significant habitat for rare and endangered species on the Tiwi Islands is rainforest but rare and threatened plants have been recorded from most other habitat types.

The main plant communities to be affected by construction of the Lethbridge haul road will be the upland Eucalpyt-dominated woodlands and open forests. There are 25 rare and endangered plant species listed under NT legislation that are known from these environments on the Tiwi Islands.

Only one of these species, *Cycas armstrongii* was recorded during this survey of the haul road. *Cycas armstrongii*, which is locally common along the haul road, is a Northern Territory endemic with a reasonably small range that is threatened by fire and land clearing and poorly represented in conservation reserves (Holmes, 2005). This species was observed to be relatively common in open forest and woodland formations throughout the landscape. They are relatively abundant, particularly along an approximately 25- 30 km section of the haul road corridor. All cycads in the Northern Territory are protected under section 43(2) of the *Territory Parks and Wildlife Act* 2002. The legislation does not preclude development in areas where Cycads occur but requires that Cycad plants must not be 'taken or interfered with' without a permit from PWCNT. Construction of the Haul road will result in the clearing of approximately 50 to 100 *Cycas armstrongii* plants. However, in the context of local area where it is relatively common and its abundance in the region, the number of plants affected is quite low.

This survey was conducted in the late dry season. The habitats were very dry and mostly fire affected and it was not possible to determine whether herbaceous species had already completed their life cycle or were absent from the site. These extreme conditions are unsatisfactory for surveys of the majority of the threatened species known from the area many of which are annuals and/or flower and fruit during the wet season. Thus a post-wet season follow-up survey is suggested to support the current findings and confirm the absence of threatened taxa. Ideally, this survey could be done in tandem with other environmental studies to be conducted for Matilda Minerals at that time.

5. POTENTIAL ENVIRONMENTAL IMPACTS

The new road alignment will be cleared from the Lethbridge Bay mining prospect before joining an existing track which then joins with the Andranangoo Haul Road (0717425E , 8705025 N). The new alignment will cover a total distance of approx 66 km and clearing for the road will be approximately 4 to 6 m in width. Based in the topography, and the findings of this survey, it is anticipated that any impacts on flora arising from the road construction will be relatively localised in extent. The main environmental issues associated with the haul road include:

- Clearing and loss of habitat—anticipated to be the major impact on vegetation
- Localised clearing and changes in drainage
- Disturbance associated with road construction greatly increases the potential for weed invasion
- Weed introductions are most likely to occur by the spread of seed by increased vehicular traffic from other areas of the island with dense weed infestations.

- No Gamba Grass (*Andropogon gayanus*) or Mission Grass (*Pennisetum polystachion*) were observed and preventing their introduction and spread should be given high priority

The alignment of the proposed Lethbridge Haul Road passes mainly through Eucalyptus - dominated woodland habitat and does not traverse any habitats of potential conservation significance (eg vine-forest or wetlands). This will reduce the possibility of significant impacts on vegetation particularly if the proposed corridor remains within well-drained upland areas.

Recommended mitigation measures include:

- The requirement that all vehicles and plant to be used in construction should be subject to washdown and inspection prior to moving on to the construction site.
- A weed monitoring program should be implemented for the duration of the project, and weed control measures be implemented rapidly in the event of an outbreak.
- Regular weed surveys of this road and the Andranangoo Haul road should be conducted to prevent introductions, which is more cost-effective than weed control.
- Any variations to the road alignment currently proposed should avoid wetland or poorly drained areas.

6. WEEDS

The entire proposed road corridor was surveyed for weeds, the survey commencing at the junction of Andranangoo and Lethbridge haul roads. The road corridor was surveyed by noting the presence of weeds within each 1 km interval from the starting point to the Lethbridge Bay Mining camp. At selected sites along the corridor, detailed searches for weeds were also made on foot to record the presence and abundance of any weed species present (Appendix 2. Table 2-1)

No weeds were recorded during this survey. The absence of weeds reflects the undisturbed, natural state of the vegetation. Very similar results were found during survey of the Andranangoo haul road conducted in May 2005. It is difficult to ascertain that the survey area is indeed totally weed free due to the extensive recent fires and the desiccated state of the vegetation (late dry season). Surveys after rain may reveal the presence of some weeds. This is unlikely however, given the pristine nature of the landscape and the lack of any previous anthropogenic development in the area.

This report does not include information regarding the road from Pickertaramoor to the junction of the two haul roads as this area was included in a weed survey conducted in May 2005 (see Andranangoo haul road report). The findings and recommendations arising from that survey have addressed weed management issues related to the southern section of the road.

REFERENCES

- Brock. John 1993, Top End Native Plants Reed, Chatswood N.S.W
- Holmes, J, Bisa, D, Hill, A and Crase, B (2005) A guide to Threatened, Near Threatened and Data Deficient Plants in the Litchfield Shire of the Northern Territory. WWF- Australia.
- Metcalf, K (unpublished report). Flora Survey, Lethbridge and Andranangoo Prospects, Tiwi Islands Project, Matilda Minerals Pty. Ltd. Prepared for URS, January 2005. 31pp
- Wilson B.A., Brocklehurst P.S., Clark M.J. Dickinson K.J.M 1990. Vegetation of the Northern Territory, Australia, Conservation Commission of the Northern Territory Australia. NT Government Printing Office
- Woinarski, J., Brennan, K., Cowie, I.D., Kerrigan, R. and Hempel, C., 2003a. Biodiversity Conservation on the Tiwi Islands, Northern Territory, Department of Infrastructure, Planning and Environment, Northern Territory Government, Darwin, NT.
- Woinarski, J.C.Z. et al., 2003b. Biodiversity conservation on the Tiwi Islands, Northern Territory: Part 2. Fauna, Department of Infrastructure Planning and Environment, Darwin, Northern Territory.

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APPENDICES

APPENDIX 1: PLANT SPECIES LISTS

TABLE 1.1

**Plant species recorded during field surveys of the proposed Lethbridge Haul Road ,
Melville Island, 4th-7th October 2005.**

Family	Genus Species	Life form	Conservation value
ACANTHACEAE	Brunoniella linearifolia	fo r	lc
ANACARDIACEAE	Buchanania obovata	tr f	lc
APIACEAE	Trachymene sp	fo a	lc
ARACACEAE	Hydiastele ramsayi	pm p	lc
ARACACEAE	Livistonia humulis	pm p	lc
ASTERACEAE	Minuria macrorhiza	fo r	lc
BURSERACEAE	Canarium australianum	tr f	lc
CAESALPINIACEAE	Erythrophleum chlorostachys	tr sh f	lc
CELASTRACEAE	Denhamia obscura	tr p	lc
COMBRETACEAE	Terminalia ferdinandiana	tr o	lc
CYCADACEAE	Cycas armstrongii	pm o	V
DILLENIACEAE	Hibbertia cistifolia	sh fo p	lc
DILLENIACEAE	Pachynema complanatum	sh fo p	lc
DROSERACEAE	Drosera sp	fo r	
DROSERACEAE	Drosera dilatatopetiolaris	fo r	ne
EPACRIDACEAE	Leucopogon acuminatus	tr sh p	LC
EUPHORBIACEAE	Mallotus nesophilus	tr sh p	lc
EUPHORBIACEAE	Petalostigma pubescens	tr f	lc
EUPHORBIACEAE	Sauropus ditassoides	fo r	lc
FABACEAE	Jacksonia dilatata	sh p	lc
GOODENIACEAE	Goodenia sp.	fo a	
HAEMODORACEAE	Haemodorum sp.	fo r	V
HEMIONITIDACEAE	Platzoma microphyllum	fn p	lc
LAURACEAE	Cryptocarya cunninghamii	tr p	lc
LECYTHIDACEAE	Planchonia careya	tr sh p	lc
MIMOSACEAE	Acacia difficilis	tr sh p	lc
MIMOSACEAE	Acacia lamprocarpa	tr.sh.p	lc
MIMOSACEAE	Acacia latescens	tr sh p	lc
MIMOSACEAE	Acacia leptocarpa	tr	lc
MIMOSACEAE	Acacia oncinocarpa	tr sh p	lc
MIMOSACEAE	Acacia praelongata	tr p	LC
MIMOSACEAE	Acacia sp.	tr sh p	lc
MYRTACEAE	Corymbia polysciada	tr p	lc
MYRTACEAE	Eucalyptus tetrodonta	tr p	lc
MYRTACEAE	Calytrix exstipulata	sh p	lc
MYRTACEAE	Corymbia bleeseri	tr p	lc
MYRTACEAE	Corymbia nesophila	tr p	lc
MYRTACEAE	Corymbia ptychocarpa	tr p	lc
MYRTACEAE	Eucalyptus miniata	tr p	lc
MYRTACEAE	Lophostemon lactifluus	tr f	LC
MYRTACEAE	Melaleuca leucadendra	tr p	lc
MYRTACEAE	Melaleuca viridiflora	tr p	lc
MYRTACEAE	Meleuca nervosa	tr p	lc
PANDANACEAE	Pandanus spiralis	pm p	lc
PROTEACEAE	Banksia dentata	tr p	lc
PROTEACEAE	Grevillea decurrens	tr sh p	lc
PROTEACEAE	Grevillea dryandri	sh p	
PROTEACEAE	Grevillea heliosperma	tr p	lc
PROTEACEAE	Grevillea pleuricaulis	sh p	lc
PROTEACEAE	Persoonia falcata	tr sh p	lc
PROTEACEAE	Stenocarpus acacioides	tr p	lc
RHAMNACEAE	Alphatonia excelsa	tr p	lc
RUBIACEAE	Kailarsenia suffruticosa	sh fo r	lc
RUTACEAE	Boronia lanceolata	sh p	lc
SAPOTACEAE	Pouteria sericea	tr p	lc
STERCULIACEAE	Brachychiton megaphyllus	tr sh o	lc
STERCULIACEAE	Helecteres sp	fo r	lc

TABLE 1.2

Plant species recorded at 20 study sites surveyed along Lethbridge Haul Road, Melville Island, 4th-7th October 2005.

Site No.	Eastings	Northings	Site descript	Family	Genus species	Life form	C value
1	717425	8705025	Open forest	ANACARDIACEAE	Buchanania obovata	tr f	lc
				CAESALPINIACEAE	Erythrophleum chlorostachys	tr sh f	lc
				CYCADACEAE	Cycas armstrongii	pm o	V
				LECYNTHIDACEAE	Planchonia careya	tr sh p	lc
				MIMOSACEAE	Acacia lamprocarpa	tr.sh.p	lc
				MYRTACEAE	Eucalptus tetradonta	tr p	lc
				MYRTACEAE	Eucalyptus miniata	tr p	lc
				MYRTACEAE	Corymbia nesophila	tr p	lc
				PANDANACEAE	Pandanus spiralis	pm p	lc
				PROTEACEAE	Grevellia heliosperma	tr p	lc
				PROTEACEAE	Grevellia decurrens	tr sh p	lc
2	0717709	8705688	Open forest	PROTEACEAE	Persoonia falcata	tr sh p	lc
				ARACACEAE	Livistonia humulis	pm p	LC
				CAESALPINIACEAE	Erythrophleum chlorostachys	tr sh f	lc
				CYCADACEAE	Cycas armstrongii	pm o	V
				EUPHORBIACEAE	Petalostigma pubescans	tr f	lc
				HAEMODORACEAE	Haemodorum sp.	fo r	lc
				LECYNTHIDACEAE	Planchonia careya	tr sh p	lc
				MIMOSACEAE	Acacia difficilis	tr sh p	lc
				MIMOSACEAE	Acacia latescens	tr sh p	lc
				MIMOSACEAE	Acacia leptocarpa	tr	lc
				MIMOSACEAE	Acacia lamprocarpa	tr.sh.p	lc
				MYRTACEAE	Eucalptus tetradonta	tr p	lc
				MYRTACEAE	Eucalyptus miniata	tr p	lc
				MYRTACEAE	Corymbia nesophila	tr p	lc
				PROTEACEAE	Grevellia heliosperma	tr p	lc
3	0718237	8706502	Woodland	PROTEACEAE	Grevellia decurrens	tr sh p	lc
				PROTEACEAE	Persoonia falcata	tr sh p	lc
				ARACACEAE	Livistonia humulis	pm p	LC
				EUPHORBIACEAE	Petalostigma pubescans	tr f	lc
				FABACEAE	Jacksonia dilatata	sh p	lc
				MIMOSACEAE	Acacia oncinocarpa	tr sh p	lc
				MIMOSACEAE	Acacia leptocarpa	tr	lc
				MIMOSACEAE	Acacia latescens	tr sh p	lc
				MYRTACEAE	Eucalptus tetradonta	tr p	lc
				MYRTACEAE	Eucalyptus miniata	tr p	lc
4	0719095	8707428	Woodland	MYRTACEAE	Corymbia nesophila	tr p	lc
				PROTEACEAE	Grevillea pteridifolia	tr p	lc
				PROTEACEAE	Persoonia falcata	tr sh p	lc
				ARACACEAE	Livistonia humulis	pm p	LC
				EUPHORBIACEAE	Petalostigma pubescans	tr f	lc
				MIMOSACEAE	Acacia difficilis	tr sh p	lc
				MIMOSACEAE	Acacia latescens	tr sh p	lc
				MYRTACEAE	Calytrix exstipulata	sh p	lc
				MYRTACEAE	Eucalptus tetradonta	tr p	lc
5	0720183	8707448	Open forest	MYRTACEAE	Eucalyptus miniata	tr p	lc
				MYRTACEAE	Corymbia nesophila	tr p	lc
				PROTEACEAE	Grevillea pteridifolia	tr p	lc
				PROTEACEAE	Persoonia falcata	tr sh p	lc
				ARACACEAE	Livistonia humulis	pm p	LC
				EUPHORBIACEAE	Petalostigma pubescans	tr f	lc
				LECYNTHIDACEAE	Planchonia careya	tr sh p	lc
				MIMOSACEAE	Acacia leptocarpa	tr	lc
				MIMOSACEAE	Acacia lamprocarpa	tr.sh.p	lc
				MYRTACEAE	Corymbia polysiada	tr p	lc
				MYRTACEAE	Calytrix exstipulata	sh p	lc
				MYRTACEAE	Eucalptus tetradonta	tr p	lc
				MYRTACEAE	Eucalyptus miniata	tr p	lc
				MYRTACEAE	Corymbia nesophila	tr p	lc
				PANDANACEAE	Pandanus spiralis	pm p	lc
				PROTEACEAE	Grevillea pteridifolia	tr p	lc
				PROTEACEAE	Grevillea decurrens	tr sh p	lc

Site No.	Eastings	Northings	Site descrip	Family	Genus species	Life form	C value
6	0722124	8706991	Woodland	ANACARDIACEAE	Buchanania obvata	tr f	
				DILLENIACEAE	Pachynema complanatum	sh fo p	lc
				MIMOSACEAE	Acacia lamprocarpa	tr.sh.p	lc
				MYRTACEAE	Corymbia bleeseri	tr p	lc
				MYRTACEAE	Calytrix exstipulata	sh p	lc
				MYRTACEAE	Eucalptus tetradonta	tr p	lc
				MYRTACEAE	Eucalyptus miniata	tr p	lc
				PROTEACEAE	Grevillea dryandri	sh p	lc
				STERCULIACEAE	Brachychiton megaphyllus	tr sh o	lc
7	722558	8706511	Miix shrubland	ARACACEAE	Hydriastele ramsayi	pm p	lc
				EPACRIDACEAE	Leucopogan acuminatus	tr sh p	lc
				MYRTACEAE	Melaleuca viridiflora	tr p	lc
				MYRTACEAE	Calytrix exstipulata	sh p	lc
				ANACARDIACEAE	Buchanania obvata	tr f	lc
8	0725742	8705513	Open Forest	ARACACEAE	Livistonia humulis	pm p	LC
				CYCADACEAE	Cycas armstrongii	pm o	V
				MIMOSACEAE	Acacia difficilis	tr sh p	lc
				MIMOSACEAE	Acacia lamprocarpa	tr.sh.p	lc
				MYRTACEAE	Eucalptus tetradonta	tr p	lc
				MYRTACEAE	Eucalyptus miniata	tr p	lc
				MYRTACEAE	Corymbia ptychocarpa	tr p	lc
				MYRTACEAE	Corymbia nesophila	tr p	lc
				PROTEACEAE	Grevillea pteridifolia	tr p	lc
				STERCULIACEAE	Helecteres sp	fo r	lc
9	0726562	8706024	Mix shrubland	STERCULIACEAE	Brachychiton diversifolius	tr o	lc
				APIACEAE	Trachymene sp		
				DROSERACEAE	Drosera sp	fo r	
				DROSERACEAE	Drosera dilatatopetolaris	fo r	ne
				GOODENIACEAE	Goodenia sp.		
				HEMIONITIDACEAE	Platyzoma microphyllum	fn p	lc
				LECYTHIDACEAE	Planchonia careya	tr sh p	lc
				MYRTACEAE	Corymbia ptychocarpa	tr p	lc
				MYRTACEAE	Meleuca nervosa	tr p	lc
				PANDANACEAE	Pandanus spiralis	pm p	lc
				PROTEACEAE	Banksia dentata	tr p	lc
				PROTEACEAE	Persoonia falcata	tr sh p	lc
10	0729938	8708260	Woodland	ANACARDIACEAE	Buchanania obvata	tr f	lc
				ARACACEAE	Livistonia humulis	pm p	LC
				MIMOSACEAE	Acacia oncinocarpa	tr sh p	lc
				MYRTACEAE	Calytrix exstipulata	sh p	lc
				MYRTACEAE	Eucalptus tetradonta	tr p	lc
				MYRTACEAE	Eucalyptus miniata	tr p	lc
				PROTEACEAE	Grevillea pteridifolia	tr p	lc
				PROTEACEAE	Persoonia falcata	tr sh p	lc
				STERCULIACEAE	Helecteres sp	fo r	lc
11	0730021	8708841	Open forest	STERCULIACEAE	Brachychiton megaphyllus	tr sh o	lc
				ARACACEAE	Livistonia humulis	pm p	LC
				CAESALPINIACEAE	Erythrophleum chlorostachys	tr sh f	lc
				CYCADACEAE	Cycas armstrongii	pm o	V
				MIMOSACEAE	Acacia lamprocarpa	tr.sh.p	lc
				MYRTACEAE	Corymbia nesophila	tr p	lc
				MYRTACEAE	Eucalyptus miniata	tr p	lc
				MYRTACEAE	Corymbia bleeseri	tr p	lc
				MYRTACEAE	Corymbia ptychocarpa	tr p	lc
12	0725923	8713639	Woodland	ASTERACEAE	Minuria macrorhiza	fo r	lc
				CYCADACEAE	Cycas armstrongii	pm o	V
				EUPHORBIACEAE	Sauropus ditassoides	fo r	lc
				LECYTHIDACEAE	Planchonia careya	tr sh p	lc
				MYRTACEAE	Corymbia nesophila	tr p	lc
				MYRTACEAE	Eucalyptus miniata	tr p	lc
				MYRTACEAE	Corymbia bleeseri	tr p	lc
				MYRTACEAE	Corymbia ptychocarpa	tr p	lc
				PANDANACEAE	Pandanus spiralis	pm p	lc

Site No.	Easting s	Northing s	Site descrip	Family	Genus species	Life form	C value
13	0725126	8715445	Open forest	CAESALPINIACEAE	Erythrophleum chlorostachys	tr sh f	lc
				DILLENIACEAE	Pachynema complantum	sh fo p	lc
				EUPHORBIACEAE	Petalostigma pubescans	tr f	lc
				MIMOSACEAE	Acacia latescens	tr sh p	lc
				MYRTACEAE	Eucalyptus tetradonta	tr p	lc
				MYRTACEAE	Eucalyptus miniata	tr p	lc
				MYRTACEAE	Corymbia nesophila	tr p	lc
14	0721695	8718266	Open forest	MYRTACEAE	Corymbia bleeseri	tr p	lc
				ARACACEAE	Livistonia humulis	pm p	LC
				CAESALPINIACEAE	Erythrophleum chlorostachys	tr sh f	lc
				DILLENIACEAE	Hibbertia cistifolia	sh fo p	lc
				MIMOSACEAE	Acacia latescens	tr sh p	lc
				MYRTACEAE	Eucalyptus tetradonta	tr p	lc
				MYRTACEAE	Eucalyptus miniata	tr p	lc
				MYRTACEAE	Corymbia nesophila	tr p	lc
				PROTEACEAE	Grevellia heliosperma	tr p	lc
15	0717746	8722839	Woodland	PROTEACEAE	Grevellia decurrens	tr sh p	lc
				PROTEACEAE	Persoonia falcata	tr sh p	lc
				ARACACEAE	Livistonia humulis	pm p	LC
				DILLENIACEAE	Pachynema complantum	sh fo p	lc
				EUPHORBIACEAE	Sauropus ditassoides	fo r	lc
				LECYNTHIDACEAE	Planchonia careya	tr sh p	lc
				MIMOSACEAE	Acacia sp.	tr sh p	lc
				MYRTACEAE	Corymbia bleeseri	tr p	lc
				PROTEACEAE	Grevellia heliosperma	tr p	lc
16	0715699	8733086	Open forest	PROTEACEAE	Grevellia decurrens	tr sh p	lc
				PROTEACEAE	Persoonia falcata	tr sh p	lc
				ARACACEAE	Livistonia humulis	pm p	LC
				DILLENIACEAE	Pachynema complantum	sh fo p	lc
				MIMOSACEAE	Acacia sp.	tr sh p	lc
				MIMOSACEAE	Acacia latescens	tr sh p	lc
				MYRTACEAE	Melaleuca leucadendra	tr p	lc
				MYRTACEAE	Eucalyptus miniata	tr p	lc
				MYRTACEAE	Corymbia nesophila	tr p	lc
17	0715073	8734855	Woodland	MYRTACEAE	Corymbia ptychocarpa	tr p	lc
				PROTEACEAE	Grevillea pleuricaulis	sh p	V
				ARACACEAE	Livistonia humulis	pm p	LC
				LECYNTHIDACEAE	Planchonia careya	tr sh p	lc
				MIMOSACEAE	Acacia difficilis	tr sh p	lc
				MYRTACEAE	Lophostemon lactifluus	tr f	lc
				MYRTACEAE	Melaleuca leucadendra	tr p	lc
18	0713690	8738693	Woodland	PROTEACEAE	Grevillea pteridifolia	tr p	lc
				PROTEACEAE	Grevillea pleuricaulis	sh p	V
				ARACACEAE	Livistonia humulis	pm p	LC
				COMBRETACEAE	Terminalia ferdinandiana	tr o	lc
				DILLENIACEAE	Hibbertia cistifolia	sh fo p	lc
				MIMOSACEAE	Acacia difficilis	tr sh p	lc
				MIMOSACEAE	Acacia leptocarpa	tr	lc
				MYRTACEAE	Corymbia bleeseri	tr p	lc
				MYRTACEAE	Corymbia polycarpa	tr p	lc
				MYRTACEAE	Eucalyptus tetradonta	tr p	lc
19	0713509	8739631	Open forest	MYRTACEAE	Eucalyptus miniata	tr p	lc
				PROTEACEAE	Grevillea decurrens	tr sh p	lc
				PROTEACEAE	Persoonia falcata	tr sh p	lc
				ANACARDIACEAE	Buchanania obvata	tr f	lc
				COMBRETACEAE	Terminalia ferdinandiana	tr o	lc
				MIMOSACEAE	Acacia praelongata	tr p	LC

				MIMOSACEAE	Acacia difficilis	tr sh p	lc
				MIMOSACEAE	Acacia latescens	tr sh p	lc
				MIMOSACEAE	Acacia leptocarpa	tr	lc
				MIMOSACEAE	Acacia lamprocarpa	tr.sh.p	lc
				MIMOSACEAE	Acacia oncinocarpa	tr sh p	lc
				MYRTACEAE	Eucalyptus miniata	tr p	lc
				MYRTACEAE	Corymbia nesophila	tr p	lc
				MYRTACEAE	Corymbia bleeseri	tr p	lc
				RHAMNACEAE	Alphatonia excelsa	tr p	lc

20	0717382	8743109	Open woodland	BURSERACEAE	Canarium australianum	tr f	lc
				EUPHORBIACEAE	Mallotus nesophilus	tr sh p	lc
				MYRTACEAE	Corymbia bleeseri	tr p	lc
				PROTEACEAE	Stenocarpus acacioides	tr p	lc
				RUTACEAE	Boronia lanceolata	sh p	lc
				SAPOTACEAE	Pouteria sericea	tr p	lc
				STERCULIACEAE	Brachychiton diversifolius	tr o	lc
Other				ACANTHACEAE	Brunoniella linearifolia	fo r	lc
				LAURACEAE	Cryptocarya cunninghamii	tr p	lc
				RUBIACEAE	Kailarsenia suffruticosa	sh fo r	LC

KEY TO ABBREVIATIONS IN PLANT SPECIES LIST

LIFEFORMS	
lifeform	explanation
fn	Fern
fo	Forb (herbaceous, not a grass or sedge)
gr	Grass
pm	Palm
se	Sedge
sh	Shrub
sh.fo	Subshrub
sh.vnw	Shrubby vine
tr	Tree
tr.sh	Tree or shrub
vn	Vine
vnh	Herbaceous vine
vnh.pr	Herbaceous vine, root parasite
vnw	Woody vine
LIFE CYCLE	
r	annual aerial parts, root perennial
a	true annual
a.r	'a' or 'r'
p	perennial aerial parts, evergreen
p.r	'p' or 'r'
a.p	'a' or 'p'
o	obligate deciduous
f	facultative deciduous
CONSERVATION STATUS	
lc	least concern
v	vulnerable
ne	not evaluated
upper case = endemic	

**APPENDIX 2: COMMUNITY VEGETATION & WEED SURVEY SITES –
GPS REFERENCE POINTS**

TABLE 2.1

GPS Reference points for weed survey sites along Lethbridge Haul Road 4th – 7th October 2005

Site No	Easting	Northing	Site No	Easting	Northing
1	0717414	8705003	55	0714540	8736334
2	0712808	8705935	56	0714180	8737236
3	0718421	8706683	57	0713848	8738179
4	0719077	8707414	58	0713570	8739073
5	0720031	8707543	59	0713714	8739638
6	0720830	8706980	60	0714708	8739733
7	0721716	8706883	61	0715665	8739887
8	0722578	8706753	62	0716533	8740378
9	0722436	8705845	63	0717382	8740832
10	0723235	8705548	64	0718180	87412497
11	0724214	8705459	65	0718284	8742280
12	07251191	8705374	66	0718550	8743223
13	0726138	8705671			
14	0726923	8706199			
15	0727849	8706436			
16	0728645	8706565			
17	0729322	8707248			
18	0729840	8708088			
19	0730049	8709014			
20	0729563	8709761			
21	0728759	8710302			
22	0728473	8710912			
23	0727990	8711769			
24	0727299	8712440			
25	0726478	8702726			
26	0725952	8713526			
27	0726026	8714414			
28	0725706	8715182			
29	0724817	8715604			
30	0724502	8716212			
31	0723740	8716649			
32	0722844	8717058			
33	0722186	8717754			
34	0721485	8718477			
35	0720750	8719044			
36	0719862	8719527			
37	0719115	8720075			
38	0718652	8720991			
39	0718231	8721851			
40	0717811	8722717			
41	0717340	8723592			
42	0716869	8724462			
43	0716809	8725403			
44	0716217	8726029			
45	0716152	8726996			
46	0716166	8727966			
47	0716158	8728952			
48	0715797	8729698			
49	0715805	8730705			
50	0715828	8731700			
51	0715829	8732645			
52	0715209	8734507			
53	0715209	8734507			
54	0714882	8735419			

TABLE 2.2
GPS Reference points for community vegetation sites along Lethbridge Haul Road 4th – 7th October 2005

Site No	Easting	Northing
1	0717425	8705025
2	0717709	8705688
3	0718237	8706502
4	0719095	8707428
5	0720183	8707448
6	0722124	8706991
7	0722558	8706511
8	0725742	8705513
9	0726562	8706024
10	0729938	8708260
11	0730021	8708841
12	725923	8703639
13	0725126	8715445
14	0721695	8718266
15	0717746	8722839
16	0715699	8733086
17	0715073	8734855
18	0713690	8738693
19	0713509	8739631
20	0718382	8743109

**APPENDIX 3: SITE PHOTOS OF VEGETATION COMMUNITIES FOR EACH KEY
SECTION OF THE LETHBRIDGE HAUL ROAD SURVEYED 4TH -7TH OCTOBER 2005**



173 Site 1



182 Site 2



183 Site 2 R



198 Site 3 L



199 Site 3 R



200 Site 4 L



201 Site 4 R



209 Site 5 L



210 Site 5 R



221 Site 6 L



222 Site 6 R



240 Site 7 Mel depression



247 Site 8 L



248 Site 8 R



281 Site 9 Mel swamp off road



282 Site 10 L



283 Site 10 R



286 Site 11 L



287 Site 11 R



288 Site 12 L



289 Site 12 R



301 Site 13 L



302 Site 13 R



307 Site 14 L



308 Site 14 R



309 Site 15 L



310 Site 15 R



311 Site 16 L



312 Site 16 R



325 Site 17 L



326 Site 17 R



350 Site 18 L



351 Site 18 R



353 Site 19 L



354 Site 19 R



363 Site 20 L



364 Site 20 R