




VENDOR COVER SHEET

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OCTOBER 2015



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**IRON BRIDGE AND FORTESCUE METALS GROUP
NORTH STAR SLURRY AND INFRASTRUCTURE CORRIDORS
CONSERVATION SIGNIFICANT FLORA AND VEGETATION
ASSESSMENT**

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ACRONYMS

BOM	Bureau of Meteorology
DEC	Department of Environment and Conservation
DPAW	Department of Parks and Wildlife
EPA	Environmental Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ESCAVI	Executive Steering Committee for Australian Vegetation Information
FMGIB	FMG Iron Bridge
GDE	Groundwater Dependent Ecosystem
IBO	IB Operations Pty Ltd (IBO)
IUCN	International Union for Conservation of Nature
NVIS	National Vegetation Information System
PEC	Priority Ecological Communities
TECs	Threatened Ecological Communities
TPRF	Threatened and Priority Flora Report Forms
WC Act	<i>Wildlife Conservation Act 1950</i>

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EXECUTIVE SUMMARY

IB Operations Pty Ltd is developing the North Star Hematite Project (the Project), on behalf of the joint venture partners FMG Iron Bridge (Aust) Pty Ltd (FMGIB) and Formosa Steel IB Pty Ltd. The Project is located approximately 110 km south of Port Hedland in the Pilbara region of Western Australia. FMGIB is the proponent under the North Star Magnetite Project Ministerial Statement 993 (MS 993). Under the conditions of MS 993, FMGIB was required to develop a Conservation Significant Flora and Vegetation Survey Plan - Linear Infrastructure and Borefield Alignment prior to undertaking any ground disturbing activities for construction of the linear infrastructure and the borefield. This report constitutes the survey component of the condition to undertake a survey of all Project infrastructure corridors for conservation significant flora and vegetation, including the:

- Slurry Corridor Development Envelope (104 km); and
- Infrastructure Development Envelope (40 km).

The primary purpose of this assessment is to identify and accurately record the location of any conservation significant flora species and/or vegetation communities, in particular, any Threatened flora, Priority 1 listed flora, and Threatened Ecological Communities (TECs) occurring within the Slurry and Infrastructure Corridor Development Envelopes.

FLORA

No EPBC Act listed or WC Act listed Threatened Flora taxa were recorded at the study area.

Twelve Priority Flora taxa and one potentially new or novel taxon were recorded and are listed below.

- Priority 1: *Abutilon* sp. Pritzelianum (S. van Leeuwen 5095), *Heliotropium muticum*, *Rothia indica* subsp. *australis*;
- Priority 2: *Euphorbia clementii*;
- Priority 3: *Eragrostis crateriformis*, *Gomphrena leptophylla*, *Gymnanthera cunninghamii*, *Nicotiana umbratica*, *Phyllanthus hebecarpus*;
- Priority 4: *Bulbostylis burbridgeae*, *Goodenia nuda*, *Ptilotus mollis*; and
- Potentially novel: *Tephrosia rosea* var. Unknown

In addition to the taxa listed above, the Priority 1 taxon; *Pityrodia* sp. Marble Bar (G. Woodman & D. Coultas GWDC Opp 4) was recorded opportunistically two kilometres north of the infrastructure study area.

One Declared Weed; **Calotropis procera* was recorded at the study area. An additional ten environmental weeds were also recorded: **Aerva javanica*, **Cenchrus ciliaris*, **Cenchrus setiger*, **Chloris virgata*, **Citrullus lanatus*, **Echinochloa colona*, **Macroptilium atropurpureum*, **Malvastrum americanum*, **Sonchus oleraceus* and **Stylosanthes hamata*.

Vegetation

No EPBC Act or State listed TECs, PECs or vegetation units that correspond with these communities were recorded from the study areas.

Additional significant vegetation units recorded within the study area include three that correspond with GDE communities which are associated with the main river and creek beds that intersect the study area. These include:

- GDE1: +/-*Eucalyptus camaldulensis* isolated low trees to sparse low woodland, over *Melaleuca argentea* open low woodland (+/- *Melaleuca glomerata*), over sparse **Cenchrus ciliaris* tussock grassland and *Triodia epactia* hummock grassland;

- GDE2: *Eucalyptus camaldulensis* and *Eucalyptus victrix* low woodland, over *Acacia trachycarpa* and *Melaleuca glomerata* tall open shrubland, over **Cenchrus ciliaris* open tussock grassland and *Triodia epactia* open hummock grassland; and
- GDE3: *Melaleuca argentea* open low woodland, over *Acacia trachycarpa* open tall shrubland, over *Triodia epactia* hummock grassland.

1 INTRODUCTION

1.1 PROJECT OVERVIEW

IB Operations Pty Ltd is developing the North Star Hematite Project (the Project), on behalf of the joint venture partners FMG Iron Bridge (Aust) Pty Ltd (FMGIB) and Formosa Steel IB Pty Ltd. The Project is located approximately 110 km south of Port Hedland in the Pilbara region of Western Australia.

FMGIB is the proponent under the North Star Magnetite Project Ministerial Statement 993 (MS 993). Under the conditions of MS 993, FMGIB was requirement to develop a Conservation Significant Flora and Vegetation Survey Plan: Linear Infrastructure and Borefield Alignment prior to undertaking any ground disturbing activities for construction.

FMGIB plan to develop two corridor development envelopes (the study areas), which include:

- A slurry corridor that runs the length of the Fortescue rail line from Port Hedland, approximately 100 km south towards the North Star Project. It is mostly 200 m in width, increasing up to 500 m in some sections; and
- A 40 km long infrastructure corridor running from Great Northern Highway, east to the North Star Project and is approximately 1 km in width.

The study areas are mapped on Figure 1.1.

The primary purpose of this assessment is to identify and accurately identify the locations of any conservation significant flora species and/or vegetation communities, in particular, any Threatened, Priority 1 listed flora, and Threatened Ecological Communities (TECs) occurring within the study areas.

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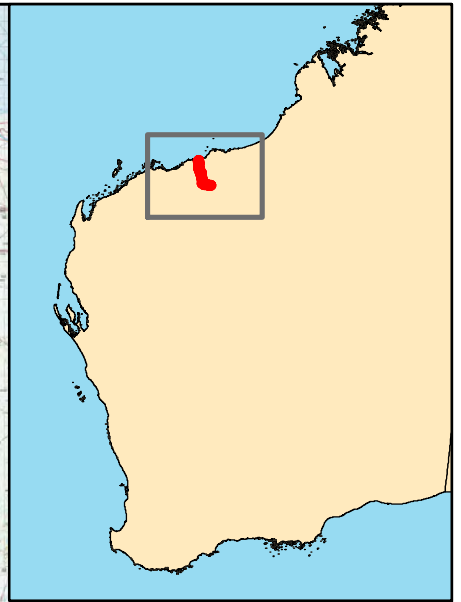
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Port Hedland





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Legend

-  Fortescue Rail
-  Infrastructure Corridor
-  Slurry Corridor
-  Additional areas



0 10 20
 Kilometres
Absolute Scale - 1:600,000

The study area

Figure: 1.1
Project: 1643

Drawn: MH
Date: 22/06/2015

Coordinate System
 Name: GDA 1994 MGA Zone 50
 Projection: Transverse Mercator
 Datum: GDA 1994

1.3 CONSERVATION SIGNIFICANT FAUNA, FLORA AND VEGETATION DESCRIPTIONS

1.3.1 Significant Flora

Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth of Australia)

At a Commonwealth level, Threatened Flora are protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), which lists species that are considered Critically Endangered, Endangered, Vulnerable, Conservation Dependant, Extinct, or Extinct in the Wild (see Appendix A for more detail).

Wildlife Conservation Act 1950 (Western Australia)

At State level, Threatened Flora are protected under the *Wildlife Conservation Act 1950* (WC Act). These are taxa which have been adequately searched for and are deemed to be either rare, in danger of extinction, or otherwise in need of special protection in the wild, and are gazetted as Threatened (Declared Rare) Flora. Threatened Flora are further categorised by the Department of Parks and Wildlife (DPaW) according to their level of threat using the International Union for Conservation of Nature (IUCN) red list criteria (IUCN 2001):

- Critically Endangered: considered to be facing an extremely high risk of extinction in the wild;
- Endangered: considered to be facing a very high risk of extinction in the wild; and
- Vulnerable: considered to be facing a high risk of extinction in the wild.

These taxa are legally protected and their removal or impact to their surroundings cannot be conducted without Ministerial approval, obtained specifically on each occasion for each population (refer to Appendix A for conservation category definitions).

Priority Flora

DPaW maintains a list of Priority Flora, which are considered poorly known, uncommon or under threat but for which there is insufficient justification to be listed as Threatened, based on known distribution and population sizes. A Priority Flora taxon is assigned to one of five priority categories (Appendix A).

Other Significant Flora

In addition, flora species can have ecological significance without being listed as a Threatened or Priority Flora species. In Guidance Statement 51 (Environmental Protection Authority (EPA) 2004) the following characteristics are listed as reasons for flora to be considered of significance:

Having a keystone role in a particular habitat for threatened species, or supporting large populations representing a significant proportion of the local regional population of a species;

- Being of relic status;
- Possessing anomalous features that indicate a potential new discovery;
- Being a range extension (> 100 km) or at the extremes of the distribution range of a species, or an isolated outlier;
- Being a restricted subspecies, variety or naturally occurring hybrid;
- Being locally endemic or of restricted distribution; or
- Being poorly reserved.

1.3.2 Significant Vegetation

Nationally Listed Threatened Ecological Communities

Ecological communities are naturally occurring biological assemblages associated with a particular type of habitat (Department of Environment and Conservation (DEC) 2010). At a national level, flora

and TECs are protected under the Commonwealth EPBC Act. An ecological community may be categorised into one of three sub-categories:

- Critically Endangered: if it is facing an extremely high risk of extinction in the wild in the immediate future;
- Endangered: if it is not critically endangered and is facing a very high risk of extinction in the wild in the near future; and
- Vulnerable: if it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium-term future.

State Listed TECs

DPaW also maintains a list of state listed TECs which are further categorised into three subcategories, much like those of the EPBC Act. Within the Western Australian classification, an ecological community will be listed as Vulnerable "when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium to long-term future".

A search of the DPaW state listed TEC database for the study area was conducted using a 40 km buffer.

State Listed PECs

DPaW maintains a list of Priority Ecological Communities (PEC). PECs include potential TECs that do not meet survey criteria, or that are not adequately defined.

Other Significant Vegetation

In addition, vegetation communities can have ecological significance without being listed as a TEC or PEC. In Guidance Statement 51 (EPA 2004) the following characteristics are listed as reasons for vegetation to be considered of significance:

- Scarcity;
- Unusual species;
- Novel combination of species;
- Role as a refuge;
- Role as a key habitat for threatened species or large populations representing a significant proportion of the local to regional total population of a species;
- Being representative of the range of the unit (particular a good local and/or regional example unit in 'prime' habitat, at the extremes of range, recently discovered range extension or isolated outliers of the main range; and
- Restricted distribution.

Groundwater Dependent Ecosystems

Groundwater Dependent Ecosystems (GDEs) are characterised by the presence of species that have been found to rely on groundwater for water intake, and are known as phreatophytic species. In the Pilbara this includes *Eucalyptus camaldulensis* and *Melaleuca argentea*.

1.4 DESKTOP ASSESSMENT

Prior to the field survey a *North Star Significant Flora and Vegetation Survey Plan (NS-PL-EN-005)* (Fortescue 2014) for Linear Infrastructure and Borefield Alignment was prepared and approved by the EPA on advice from the Department of Parks and Wildlife (DPaW). A desktop assessment was conducted as part of this survey plan which is summarised below.

1.4.1 Significant Flora

For the slurry corridor, no Threatened flora taxa were identified and the following Priority 1 taxa were identified as having high or moderate potential to occur at the study area:

High:

- *Abutilon* sp. Pritzelianum (S. van Leeuwen 5095);
- *Heliotropium muticum*; and
- *Tephrosia rosea* var. Port Hedland (A.S. George 1114).

Moderate:

- *Pityrodia* sp. Marble Bar (G. Woodman & D. Coultas GWDC Opp 4); and
- *Rothia indica* subsp. *australis*

Additionally, the following Priority taxa were identified in the searches with the potential to occur at the study area based on proximity (within 40 km):

- Priority 1: *Acacia leeuweniana*, *Fimbristylis* sp. Shay Gap (K.R. Newbey 10293);
- Priority 2: *Euphorbia clementii*, *Gomphrena pusilla*, *Stylidium weeliwollii*;
- Priority 3: *Acacia glaucocaesia*; *Acacia levata*; *Eragrostis crateriformis*; *Gomphrena leptophylla*; *Gymnanthera cunninghamii*; *Nicotiana umbratica*; *Phyllanthus hebecarpus*; *Polymeria distigma*; *Pterocaulon intermedium*; *Terminalia supranitifolia*;
- Priority 4: *Bulbostylis burbidgeae*, *Goodenia nuda*, *Ptilotus mollis*; and
- Other (Range Extension): *Eriachne melicacea*.

For the infrastructure corridor, no Threatened flora taxa were identified and the following Priority 1 taxa were identified as having high potential to occur at the study area:

High:

- *Abutilon* sp. Pritzelianum (S. van Leeuwen 5095);
- *Heliotropium muticum*; and
- *Pityrodia* sp. Marble Bar (G. Woodman & D. Coultas GWDC Opp 4).

Additionally, the following Priority taxa were identified in the searches with the potential to occur at the study area based on proximity (within 40 km):

- Priority 1: *Acacia leeuweniana*;
- Priority 2: *Euphorbia clementii*;
- Priority 3: *Acacia glaucocaesia*; *Acacia levata*; *Eragrostis crateriformis*; *Gomphrena leptophylla*; *Gymnanthera cunninghamii*; *Heliotropium murinum*, *Nicotiana umbratica*; *Phyllanthus hebecarpus*; *Terminalia supranitifolia*;
- Priority 4: *Bulbostylis burbidgeae*, *Goodenia nuda*, *Ptilotus mollis*; and
- Other (Range Extension): *Eriachne melicacea*.

1.4.2 Significant Vegetation

No EPBC Act listed TECs occur in the Pilbara. One State listed TEC; '*Themeda* grassland on cracking clay' occurs in the Pilbara, but was not recorded within 40 km of the study areas. Thirty PECs are known from the Pilbara. Results of this database search were not included in the *North Star Significant Flora and Vegetation Survey Plan*. However these PECs are not known from the study area and are unlikely to occur.

2 METHODOLOGY

2.1 SURVEY TIMING

The field survey was conducted by two experienced botanists over 12 days from the 30 June to 11 July 2015 with an additional area surveyed on the 26 August 2015. A survey effort equivalent to 22 person days was expended (excluding travel).

2.1.1 Rainfall Prior to the Field Survey

For the northern area of the slurry corridor, data from Port Hedland Airport (Site No. 4032), is used to indicate conditions for the survey and is shown in Figure 2.1 (Bureau of Meteorology (BOM) 2015). Rainfall recorded in the three months prior to the survey (148.6 mm from April to June 2015) was 74.7 mm more than the long-term average of 73.9 mm (1942-2015) for the same period.

For the southern areas of the slurry and the infrastructure corridor, data from Indee Station (Site No. 4016), approximately 50 km south of Port Hedland, is used to indicate conditions for the survey and is shown in Figure 2.2 (BoM 2015). Rainfall recorded in the two months prior to the survey (225.3 mm from April to May, June not available, 2015) was 177.1 mm more than the long-term average of 48.2 mm (1909-2015) for the same period.

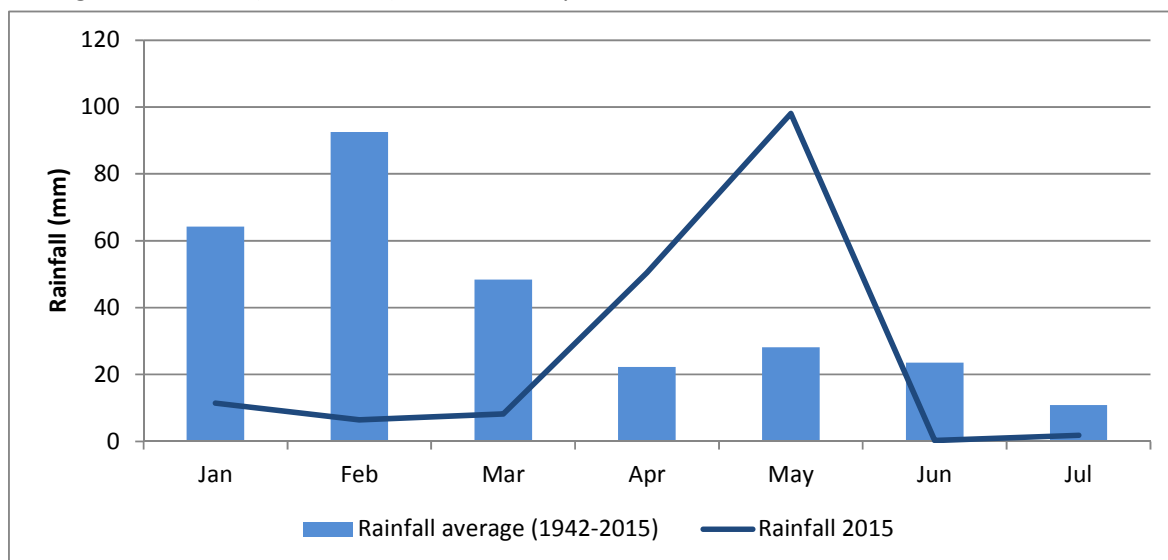


Figure 2.1 – Rainfall data at Port Hedland

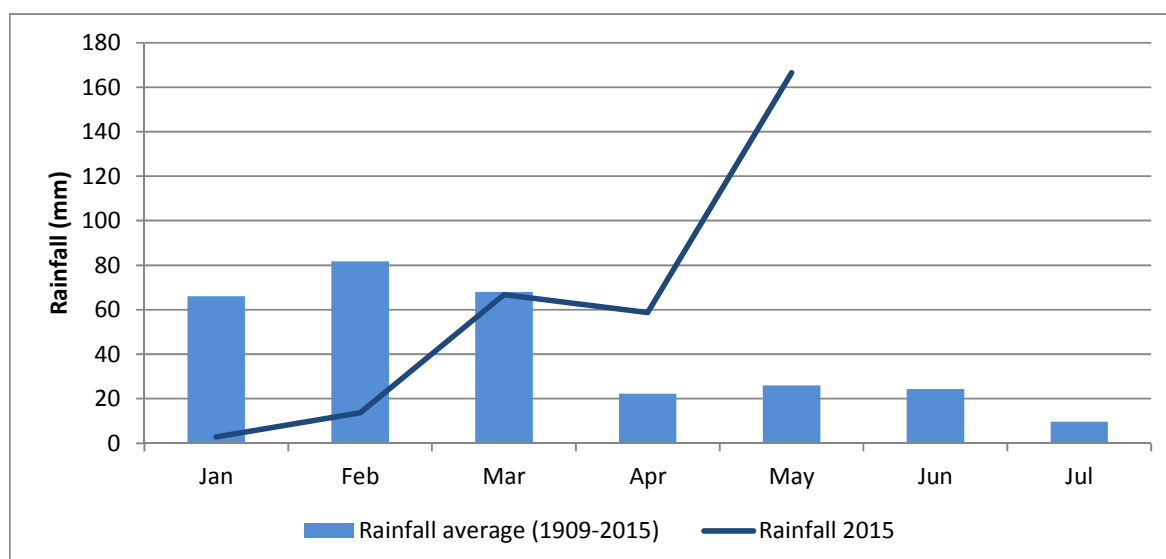


Figure 2.2 – Rainfall data at Indee Station

2.2 SURVEY METHODOLOGY

Based on the *North Star Significant Flora and Vegetation Survey Plan (NS-PL-EN-005)* (Fortescue 2014), the 104 km Slurry Corridor Development Envelope was divided into 72 km of high priority for survey, 32 km of moderate priority and there are no low priority areas. The 40 km Infrastructure Corridor Development Envelope was divided into 28 km of high priority, 10 km of moderate priority and 2 km of low priority areas for survey.

2.2.1 Transects

A higher sampling intensity occurred in the high priority areas. For the most part, the *North Star Significant Flora and Vegetation Survey Plan* accurately identified high priority areas, however where field observations did not support these results, transects were traversed in areas where Priority Flora taxa were opportunistically recorded. Transects walked are shown on Figure 3.2 to Figure 3.9. Approximately 390 km of transects were walked at the study area (provided as shapefiles in Appendix C). In addition, where tracks were driven through or next to the study areas, larger significant flora taxa were opportunistically recorded.

2.2.2 Flora of Conservation Significance

Where significant flora was encountered, sufficient information for the completion of DPaW Threatened and Priority Flora Report Forms (TPRF) was recorded, including:

- Date of record;
- Recorder;
- Location (recorded by hand-held GPS) (GDA94);
- Abundance (count of individuals);
- Vegetation and landform details;
- Associated species;
- Photographs; and
- Collection of a voucher specimen.

Significant flora was also recorded when opportunistically encountered in the wider regional area.

2.2.3 Introduced Flora

Where introduced flora taxa are encountered, the following parameters was recorded:

- Date of record;
- Recorder;
- Location (recorded by hand-held GPS); and
- Abundance (count of individuals).

2.2.4 Conservation Significant Vegetation

There are no TECs or PECs known or considered likely to occur along the infrastructure corridors, however, if encountered sufficient data will be recorded to allow the accurate delineation and confirmation of status of vegetation units considered to be TECs, and their condition consistent with Trudgen (1991) condition scale.

2.2.5 GDEs

Prior to the survey, aerial imagery will be examined and all areas of potential GDEs were mapped. GDEs are characterised by the presence of species that have been found to rely on groundwater for water intake, and are known as phreatophytic species. In the Pilbara this includes *Eucalyptus camaldulensis* and *Melaleuca argentea*. Sourcing fruits of *Eucalyptus camaldulensis* (a phreatophytic

species) and *E. victrix* (a vadophyte) to accurately distinguish between the species will be a key objective throughout the survey to allow accurate mapping of GDE's within the study area. The boundaries of areas that were considered to be a GDE's based on aerial photography were identified for ground-truthing during the field survey and relevés surveys conducted in order to describe the vegetation community.

Relevés are unbounded sampling points, and eight were conducted at the study area (Figure 3.13 and Figure 3.14). The following parameters were recorded at each releve:

- Dominant flora species;
- Vegetation structure (National Vegetation Information System (NVIS) Level V (Executive Steering Committee for Australian Vegetation Information (ESCAVI) 2003);
- Vegetation condition scale (Trudgen 1991), which is based on the criteria in Table 2.1.
- Estimated time since fire;
- GPS co-ordinate;
- Digital image of the vegetation;
- The landform element (morphological type, position and element type);
- The presence of rock outcrops (type and abundance);
- Soil type (colour, profile, field texture and surface type); and
- Slope and aspect.

Site information for each releve is presented in Appendix B.

Table 2.1 – Vegetation condition assessment (Trudgen 1991)

Vegetation Condition	Criteria
Pristine	Pristine or nearly so, no obvious sign of disturbance.
Excellent	Vegetation structure intact; disturbance affecting individual species; weeds are non-aggressive species.
Very good	Vegetation structure altered; obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires; the presence of some more aggressive weeds; dieback; logging and grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires; the presence of some very aggressive weeds at high density; partial clearing; dieback and grazing.
Degraded or Poor	Very few values remaining.
Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as “parkland cleared” with the flora comprising weed or crop species with isolated native trees or shrubs.

2.2.6 Data

All field data will be provided electronically in Appendix C.

2.3 STUDY TEAM AND LICENCES

The targeted flora and vegetation assessment described in this document was planned, coordinated and executed by those summarised and under the following licences listed in Table 2.2.

Table 2.2 – Study team and licences

Project Staff			
Name	Qualification	Role	Project role
Shaun Grein	B. App. Sc; Dip. Nat Res.	Director	Project management, quality
Melissa Hay	Bsc. (Hons)	Senior Botanist	Project management, field survey and reporting
Alison Saligari	Bsc.	Botanist	Field survey
Palitha Jayasekera	PhD	Taxonomist	Flora identifications
Licences			
The flora, fauna and vegetation assessment described in this report was conducted under the authorisation of the following licences issued by DPaW:			
Name	Licence Number	Licence	
Melissa Hay	SL011068	Licence to take flora for scientific purposes	
Alison Saligari	SL011380	Licence to take flora for scientific purposes	

3 RESULTS

3.1 SIGNIFICANT FLORA

No EPBC Act 1999 or WC Act 1950 listed Threatened Flora taxa were recorded at the study area. Twelve Priority Flora taxa and one potentially new or novel taxon were recorded and are listed below.

Priority 1:

- *Abutilon* sp. Pritzelianum (S. van Leeuwen 5095);
- *Heliotropium muticum*; and
- *Rothia indica* subsp. *australis*.

Priority 2:

- *Euphorbia clementii*.

Priority 3:

- *Eragrostis crateriformis*;
- *Gomphrena leptophylla*;
- *Gymnanthera cunninghamii*;
- *Nicotiana umbratica*; and
- *Phyllanthus hebecarpus*

Priority 4:

- *Bulbostylis burbridgeae*;
- *Goodenia nuda*; and
- *Ptilotus mollis*.

Potential novel:

- *Tephrosia rosea* var. Unknown

In addition to the taxa listed above, the Priority 1 taxon; *Pityrodia* sp. Marble Bar (G. Woodman & D. Coultas GWDC Opp 4) was opportunistically recorded from an area approximately two kilometres north of the infrastructure study area.





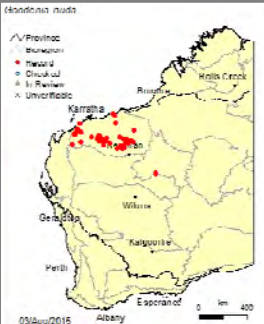

Each population were described, and their numbers and associated habitats from the study area are provided in Table 3.1. They are mapped on Figure 3.1 to Figure 3.9 and their locations are provided in Appendix D. TPRF forms for submission to the Western Australian Herbarium for each species are also provided electronically in Appendix C.

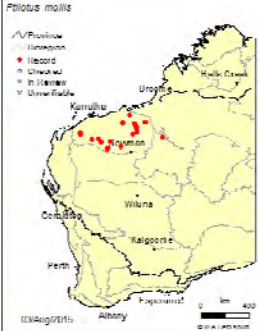


Table 3.1 – Significant flora recorded at the study area

Taxa (status)	Number & description of habitat at the study area	Description, known habitat and distribution	Known distribution	Photograph
<p><i>Abutilon</i> sp. <i>Pritzelianum</i> (S. van Leeuwen 5095)</p> <p>(Priority 1)</p>	<p>At the study area <i>A. Pritzelianum</i> was recorded mostly on sandy plains and sometimes on disturbed areas. It was recorded from Port Hedland, up to ca. 50 km south in the slurry corridor. One large population was recorded between chainage 22 and 31. Here a recent fire resulted in a large post fire re-growth population and most of the plants were seedlings.</p> <p>No. in slurry corridor: 5,899 No. infrastructure corridor: 0 No. opportunist in the region: 321</p>	<p><i>A. Pritzelianum</i> is a tall spindly shrub with yellow/orange flowers growing to 2 m in height.</p> <p>It has been recorded on sand plains, creek beds and roadsides and is known from the Carnarvon, Murchison and Pilbara IBRA regions.</p>	<p><i>Abutilon</i> sp. <i>Pritzelianum</i> (S. van Leeuwen 5095)</p>	
<p><i>Heliotropium muticum</i></p> <p>(Priority 1)</p>	<p><i>H. muticum</i> was recorded on a variety of habitats including areas recently burnt, sand plains and stony plains at the study area. It was recorded from ca. chainage 14 within the slurry corridor, south to the infrastructure corridor. The main population was recorded where the two corridors intersected in an area that was recently burnt. Many of these individuals were in late senescence and unlikely to be there in future years.</p> <p>No. in slurry corridor: 93 No. infrastructure corridor: 406 No. opportunist in the region: 0</p>	<p><i>H. muticum</i> is an ascending to spreading perennial herb growing to 0.3 m.</p> <p>It has been recorded on sand plains, floodplains and rocky plains and is known from the Pilbara IBRA region.</p>	<p><i>Heliotropium muticum</i></p>	
<p><i>Pityrodia</i> sp. Marble Bar (G. Woodman & D. Coultas GWDC Opp 4)</p> <p>(Priority 1)</p>	<p><i>P. Marble Bar</i> was recorded in a minor drainage gully, on an ironstone hilltop high in the landscape to the north of the study area.</p> <p>No. in slurry corridor: 0 No. infrastructure corridor: 0 No. opportunist in the region: 12</p>	<p><i>P. sp. Marble Bar</i> is greyish erect shrub to 1 m.</p> <p>It has been recorded on steep ironstone slopes and is known from five locations comprising 36 discrete populations in the Pilbara IBRA region.</p>	<p><i>Pityrodia</i> sp. Marble Bar (G. Woodman & D. Coultas GWDC Opp 4)</p>	

Taxa (status)	Number & description of habitat at the study area	Description, known habitat and distribution	Known distribution	Photograph
<p><i>Rothia indica</i> subsp. <i>australis</i></p> <p>(Priority 1)</p>	<p><i>R. indica</i> subsp. <i>australis</i> was located on a depression area on a flat clay plain at approximately chainage 6 in the slurry corridor.</p> <p>No. in slurry corridor: 7 No. infrastructure corridor: 0 No. opportunist in the region: 0</p>	<p><i>R. indica</i> subsp. <i>australis</i> is a prostrate annual, herb, to 0.3 m high, densely covered in spreading hairs.</p> <p>It has been recorded on sandy soils and sand flats and is known from the Dampierland, Great Sandy Desert and Pilbara IBRA regions.</p>	<p><i>Rothia indica</i> subsp. <i>australis</i></p>	
<p><i>Euphorbia clementii</i></p> <p>(Priority 2)</p>	<p><i>E. clementii</i> was recorded on low rolling ironstone hills, commonly in the drainage lines in the infrastructure corridor. One large population was recorded within 1.5 km in an area that had been recently burnt.</p> <p>No. in slurry corridor: 0 No. infrastructure corridor: 1,187 No. opportunist in the region: 0</p>	<p><i>E. clementii</i> is a yellowish erect herb, growing to 0.6 m high.</p> <p>It has been recorded on gravelly hillsides and stony grounds and is known from the Pilbara IBRA region.</p>	<p><i>Euphorbia clementii</i></p>	
<p><i>Eragrostis crateriformis</i></p> <p>(Priority 3)</p>	<p><i>E. crateriformis</i> was recorded on a depression area on a flat clay plain at two main locations within the slurry corridor; one at chainage 4 and one at chainage 32.</p> <p>No. in slurry corridor: 290 No. infrastructure corridor: 0 No. opportunist in the region: 0</p>	<p><i>E. crateriformis</i> is an annual, grass, growing to 0.4 m high. Flowers occur from January to May or July.</p> <p>It has been recorded on clay loams, creek banks and depressions and is known from the Carnarvon, Pilbara and Tanami IBRA regions.</p>	<p><i>Eragrostis crateriformis</i></p>	

Taxa (status)	Number & description of habitat at the study area	Description, known habitat and distribution	Known distribution	Photograph
<p><i>Gomphrena leptophylla</i></p> <p>(Priority 3)</p>	<p><i>G. leptophylla</i> was recorded on a depression area on a flat clay plain and along a granitic drainage line. It was recorded in both the slurry and infrastructure corridors, at two main locations where they intersect.</p> <p>No. in slurry corridor: 28 No. infrastructure corridor: 7 No. in the additional survey areas: 30 No. opportunist in the region: 0</p>	<p><i>G. leptophylla</i> is a prostrate or erect to spreading annual, herb, growing to 0.15 m high. Flowers are white, and occur from March to September.</p> <p>It has been recorded on sand, loam, open flats, sandy creek beds and hillsides and is known from the Dampierland, Ord Victoria Plain and Pilbara IBRA regions.</p>		
<p><i>Gymnanthera cunninghamii</i></p> <p>(Priority 3)</p>	<p><i>G. cunninghamii</i> was recorded as scattered individuals along the sandy beds of minor and major creek and rivers from chainage 66 at the slurry corridor, into the infrastructure corridor where they intersect.</p> <p>No. in slurry corridor: 28 No. infrastructure corridor: 7 No. opportunist in the region: 0</p>	<p><i>G. cunninghamii</i> is an erect shrub to 2 m high. Flowers are cream to yellow.</p> <p>It has been recorded on sandy soils and drainage lines and is known from the Carnarvon, Great Sandy Desert and Pilbara IBRA regions.</p>		
<p><i>Nicotiana umbratica</i></p> <p>(Priority 3)</p>	<p><i>N. imbricata</i> was recorded as scattered individuals in sheltered areas of large granite boulders in both the slurry and infrastructure corridors where they intersect.</p> <p>No. in slurry corridor: 32 No. infrastructure corridor: 42 No. opportunist in the region: 0</p>	<p><i>N. umbratica</i> is an erect, short-lived annual or perennial, herb, growing to 0.7 m high. Flowers are white, occurring from April to June.</p> <p>It has been recorded on shallow soils and rocky outcrops and is known from the Pilbara IBRA region.</p>		

Taxa (status)	Number & description of habitat at the study area	Description, known habitat and distribution	Known distribution	Photograph
<p><i>Phyllanthus hebecarpus</i></p> <p>(Priority 3)</p>	<p><i>P. hebecarpus</i> was recorded in one location within the infrastructure corridor in an area with granite boulders and slabs were outcropping.</p> <p>No. in slurry corridor: 0 No. infrastructure corridor: 25 No. opportunist in the region: 0</p>	<p><i>P. hebecarpus</i> is an erect, yellowish spindly shrub growing to 1 m in height.</p> <p>It has been recorded on granite outcrops and boulders and is known from the Pilbara IBRA region.</p>		
<p><i>Bulbostylis burbridgeae</i></p> <p>(Priority 4)</p>	<p><i>B. burbridgeae</i> was recorded as large groups in sheltered areas of large granite boulders in both the slurry and infrastructure corridors where they intersect.</p> <p>No. in slurry corridor: 1,684 No. infrastructure corridor: 790 No. in the additional survey areas: 500 No. opportunist in the region: 1</p>	<p><i>B. burbridgeae</i> is a tufted, erect to spreading annual sedge growing to 0.2 m high. Flowers are brown and occur from March or June to August.</p> <p>It has been recorded on granitic soils, granite outcrops and cliff bases and is known from the Pilbara IBRA region.</p>		
<p><i>Goodenia nuda</i></p> <p>(Priority 4)</p>	<p><i>Herb <0.5 m. G. nuda</i> was recorded on a sandy plain that had been recently burnt. It was recorded at ca. chainage 7 within the slurry corridor.</p> <p>No. in slurry corridor: 2,132 No. infrastructure corridor: 0 No. opportunist in the region: 101</p>	<p><i>Herb <0.5 m. G. nuda</i> is an erect to ascending herb, growing to 0.5 m high. Flowers are yellow, occurring from April to August.</p> <p>It has been recorded on red sand plains, clay pans and alluvial plains and is known from the Gascoyne and Pilbara IBRA regions.</p>		

Taxa (status)	Number & description of habitat at the study area	Description, known habitat and distribution	Known distribution	Photograph
<p><i>Ptilotus mollis</i></p> <p>(Priority 4)</p>	<p><i>P. mollis</i> was recorded along a steep ironstone ridge top in one main population within the infrastructure corridor.</p> <p>No. in slurry corridor: 0 No. infrastructure corridor: 537 No. opportunist in the region: 0</p>	<p><i>P. mollis</i> is a compact, perennial shrub, with soft grey foliage growing to 0.5 m high. Flowers are white/pink, occurring from May or September.</p> <p>It has been recorded on stony hills and screes and is known from the Little Sandy Desert and Pilbara IBRA regions.</p>		
<p><i>Tephrosia rosea</i> var. Unknown</p> <p>(Potentially novel)</p>	<p><i>T. rosea</i> var. Unknown was recorded on sandy plains at ca. chainage 6 within the slurry corridor.</p> <p>No. in slurry corridor: 0 No. infrastructure corridor: 11 No. opportunist in the region: 0</p>	<p><i>T. rosea</i> var. Unknown is an erect spreading shrub to 1 m.</p>	<p>n/a</p>	

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Port Hedland

Map 1

Map 2

Map 3

Map 4

Map 5

Map 6

Map 7

Map 8

Legend

- Fortescue Rail
- Infrastructure Corridor
- Slurry Corridor
- Additional areas

Significant flora

Priority 1

- *Abutilon* sp. Pritzelianum (S. van Leeuwen 5095)
- *Heliotropium muticum*
- *Pityrodia* sp. Marble Bar (G. Woodman and D. Coultas GWDC Opp 4)
- *Rothia indica* subsp. australis

Priority 2

- *Euphorbia clementii*

Priority 3

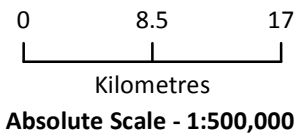
- ▲ *Eragrostis crateriformis*
- ▲ *Gomphrena leptophylla*
- ▲ *Gymnanthera cunninghamii*
- ▲ *Nicotiana umbratica*
- ▲ *Phyllanthus hebecarpus*

Priority 4

- ◆ *Bulbostylis burbridgeae*
- ◆ *Goodenia nuda*
- ◆ *Ptilotus mollis*

Novel taxa

- *Tephrosia rosea* var. Unknown

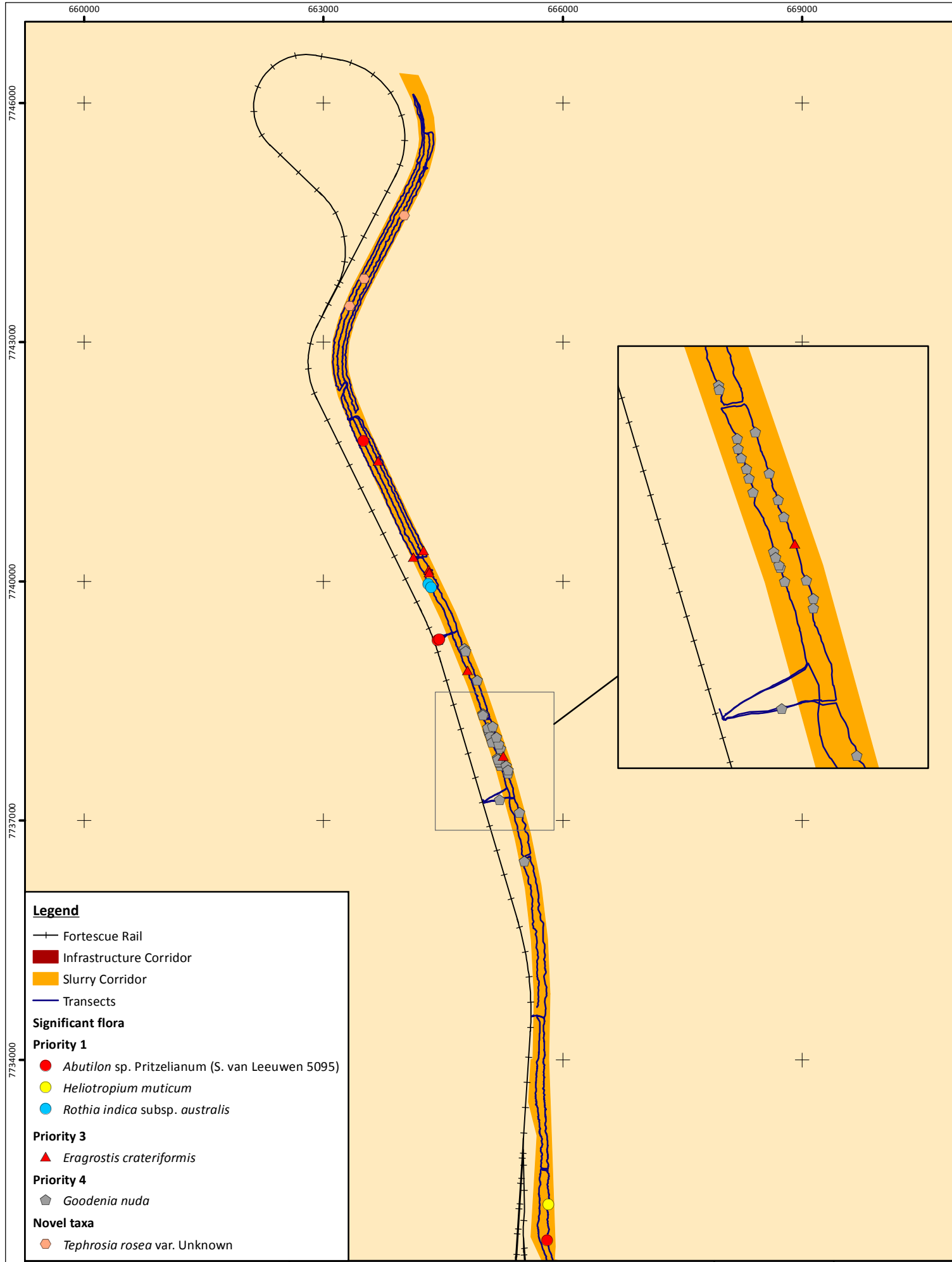


Significant flora locations at the study area - overview

Figure: 3.1
Project: 1643

Drawn: MH
Date: 06/08/2015

Coordinate System
Name: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994



Legend

- +— Fortescue Rail
- Infrastructure Corridor
- Slurry Corridor
- Transects

Significant flora

Priority 1

- *Abutilon* sp. Pritzelianum (S. van Leeuwen 5095)
- *Heliotropium muticum*
- *Rothia indica* subsp. *australis*

Priority 3

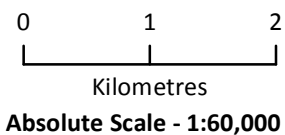
- ▲ *Eragrostis crateriformis*

Priority 4

- ⬠ *Goodenia nuda*

Novel taxa

- ⬠ *Tephrosia rosea* var. Unknown

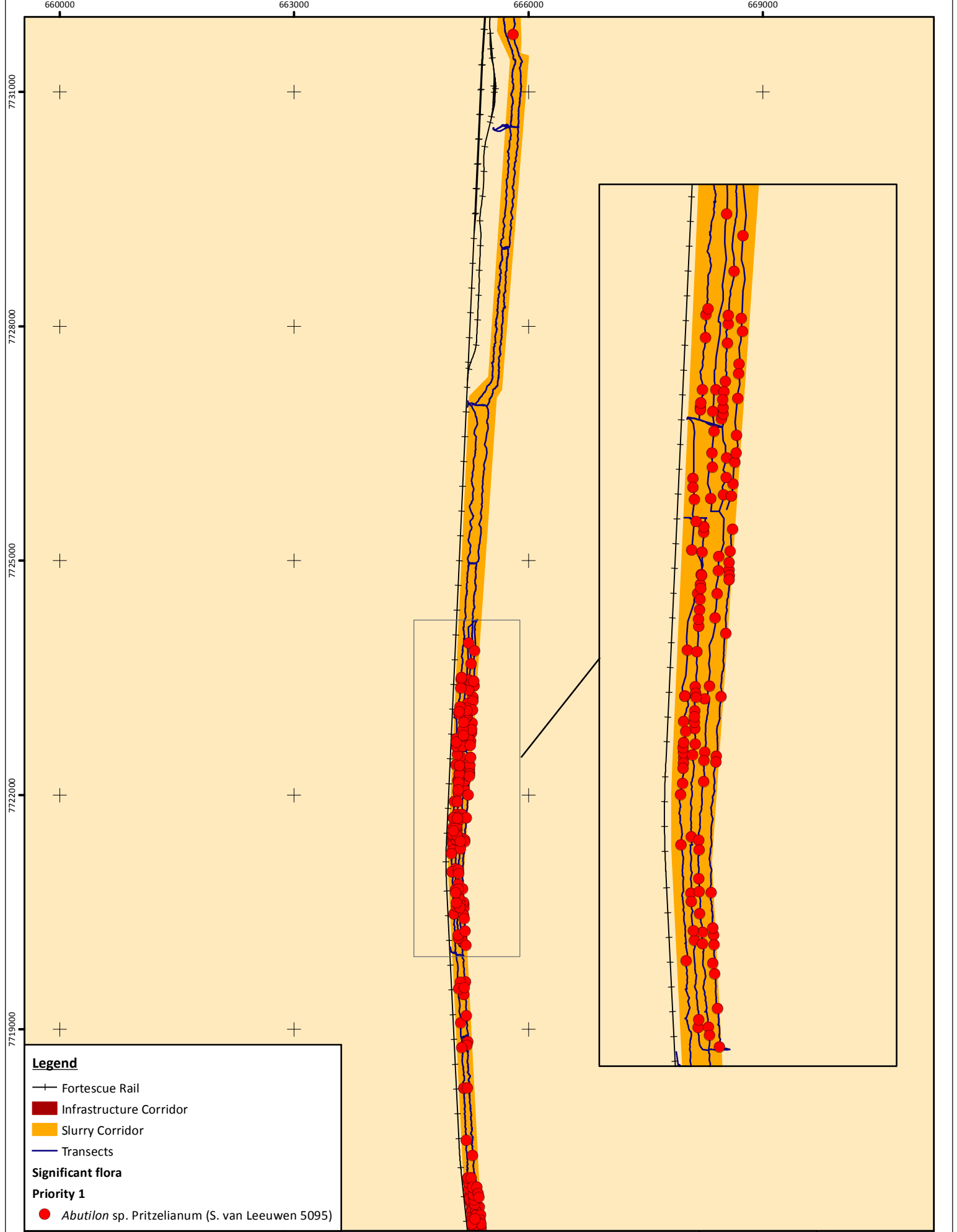


**Significant flora locations and transects
at the study area - map 1**

Figure: 3.2
Project: 1643

Drawn: MH
Date: 06/08/2015

Coordinate System
Name: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994



Legend

- + Fortescue Rail
- Infrastructure Corridor
- Slurry Corridor
- Transects

Significant flora

Priority 1

- *Abutilon* sp. Pritzelianum (S. van Leeuwen 5095)



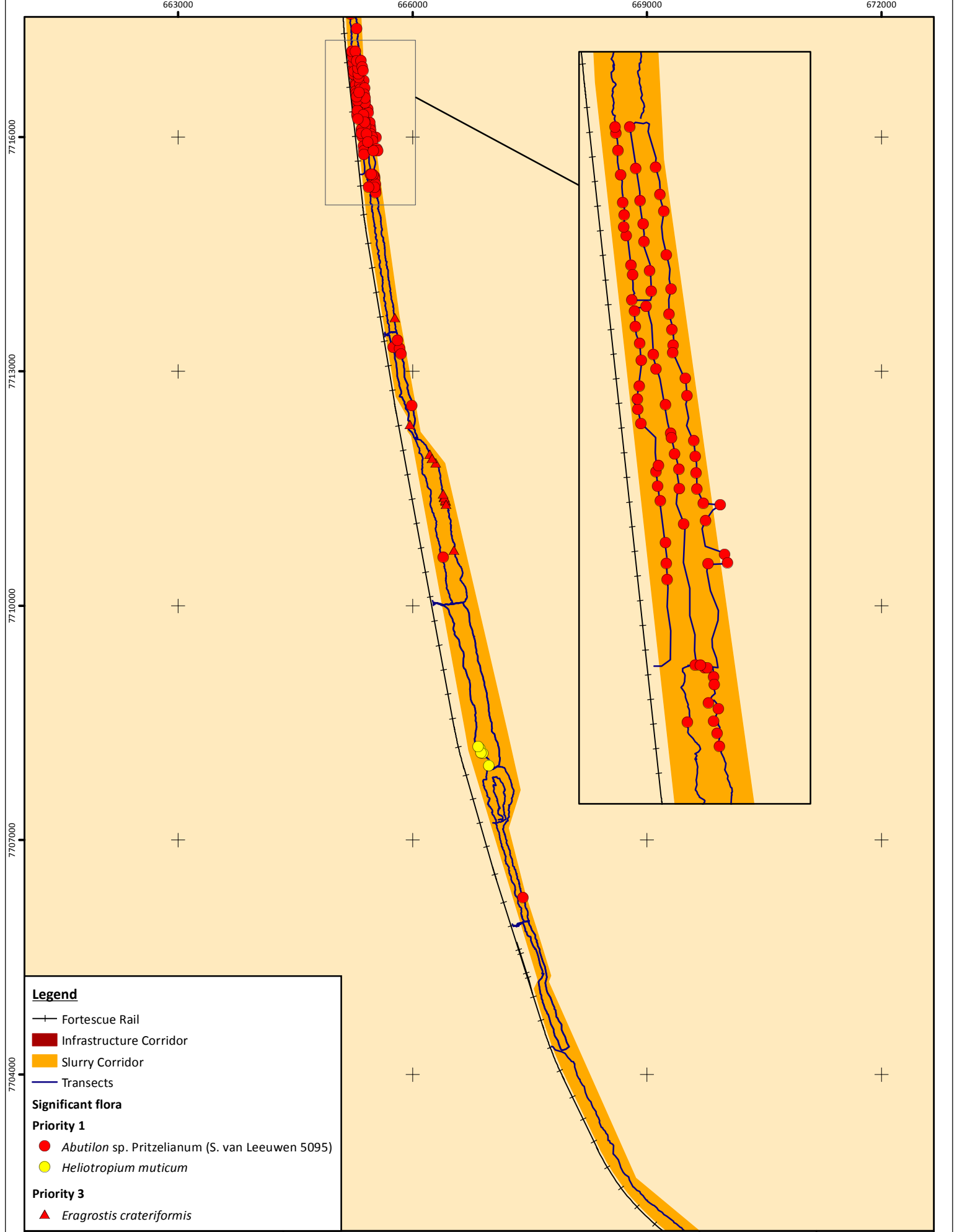
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Kilometres
Absolute Scale - 1:60,000

**Significant flora locations and transects
at the study area - map 2**

Figure: 3.3
Project: 1643

Drawn: MH
Date: 06/08/2015

Coordinate System
Name: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994



Legend

- +— Fortescue Rail
- Infrastructure Corridor
- Slurry Corridor
- Transects

Significant flora

Priority 1

- *Abutilon* sp. Pritzelianum (S. van Leeuwen 5095)
- *Heliotropium muticum*

Priority 3

- ▲ *Eragrostis crateriformis*



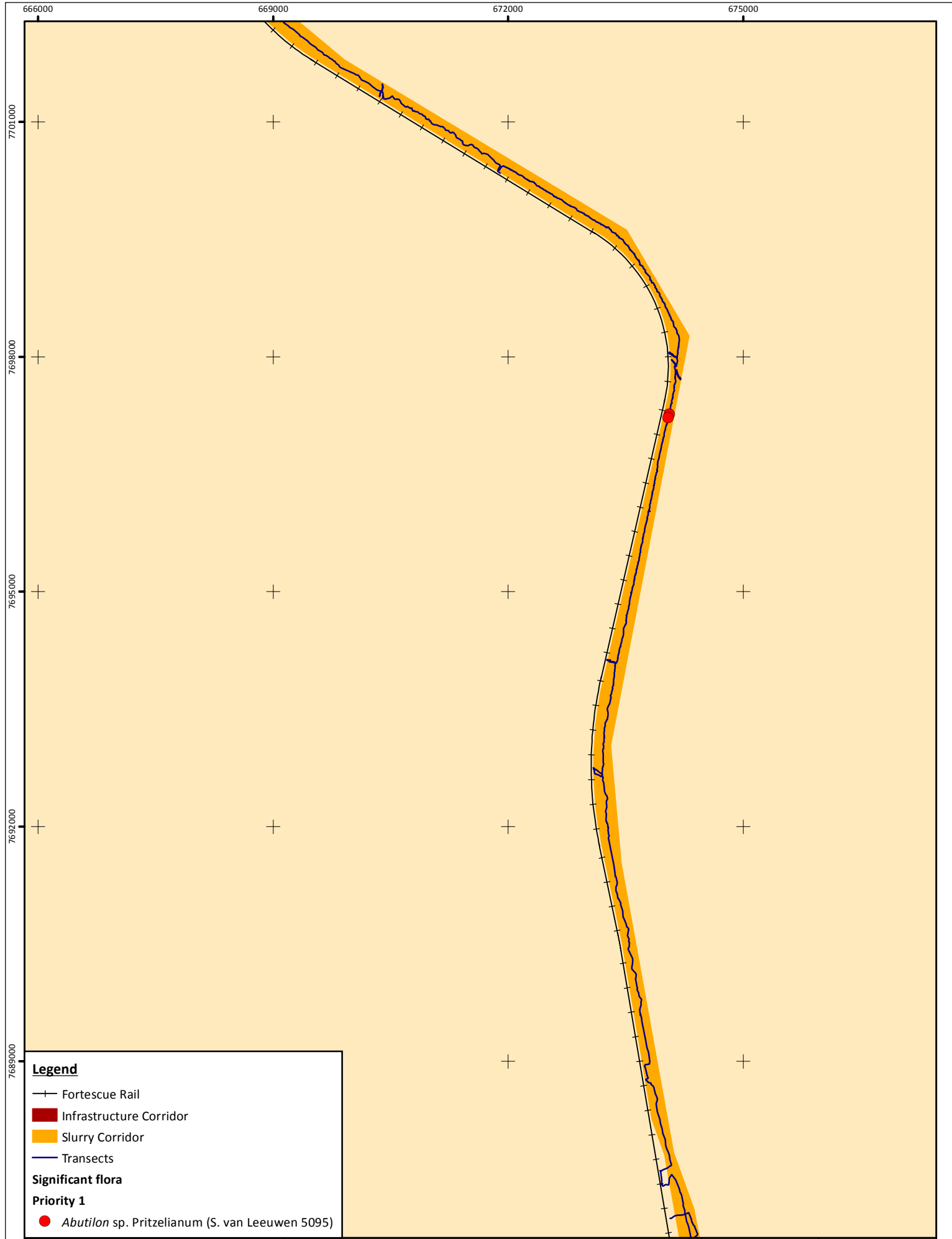
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Kilometres
Absolute Scale - 1:60,000

**Significant flora locations and transects
at the study area - map 3**

Figure: 3.4
Project: 1643

Drawn: MH
Date: 06/08/2015

Coordinate System
Name: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994



Legend

- + Fortescue Rail
- Infrastructure Corridor
- Slurry Corridor
- Transects

Significant flora

Priority 1

- *Abutilon sp. Pritzelianum* (S. van Leeuwen 5095)



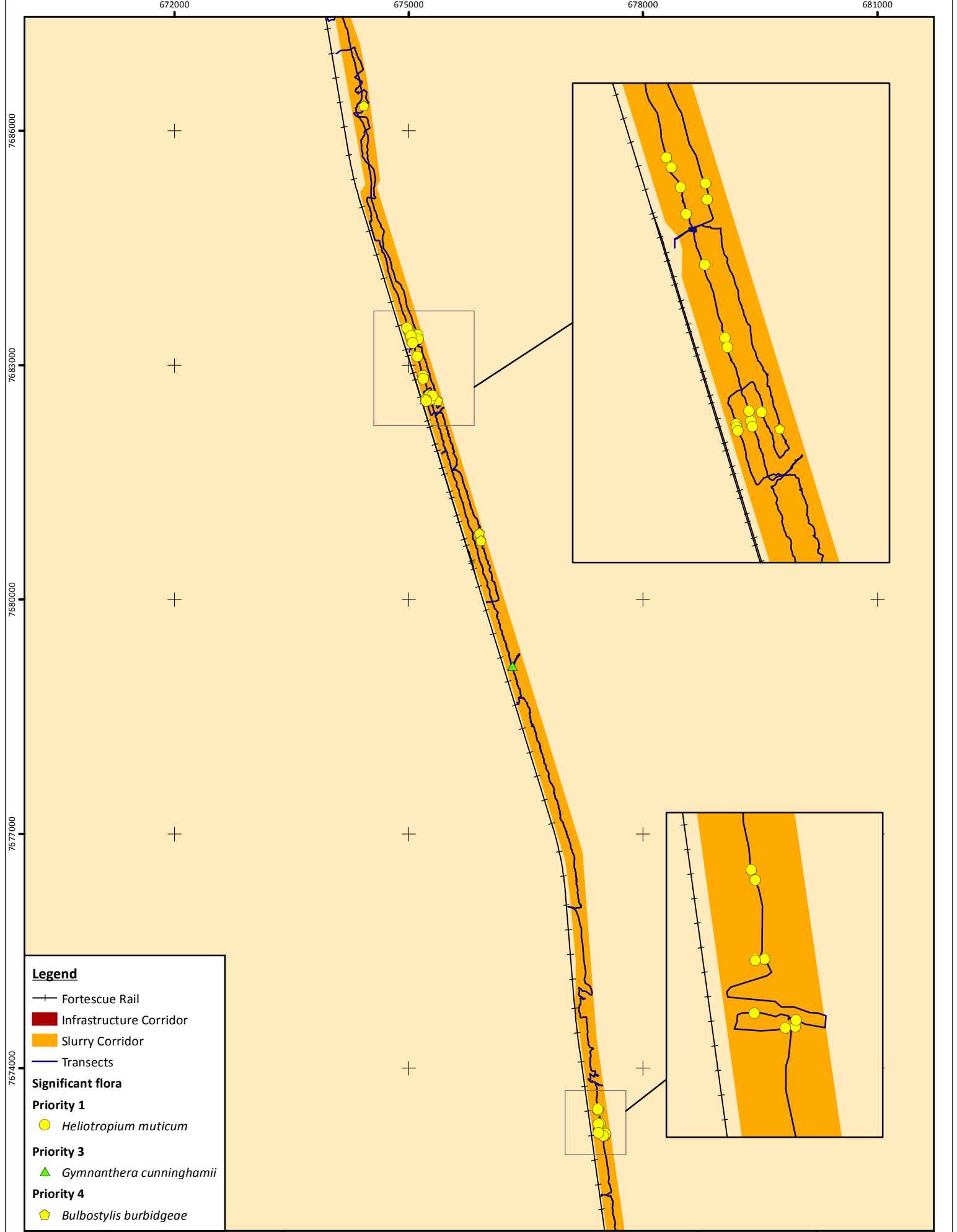
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Kilometres
Absolute Scale - 1:60,000

**Significant flora locations and transects
at the study area - map 4**

Figure: 3.5
Project: 1643

Drawn: MH
Date: 06/08/2015

Coordinate System
Name: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994



Legend

- + Fortescue Rail
- Infrastructure Corridor
- Slurry Corridor
- Transects

Significant flora

Priority 1

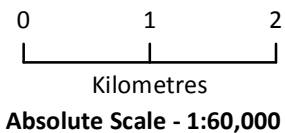
- *Heliotropium muticum*

Priority 3

- ▲ *Gymnanthera cunninghamii*

Priority 4

- ◆ *Bulbostylis burbidgeae*



**Significant flora locations and transects
at the study area - map 5**

Figure: 3.6
Project: 1643

Drawn: MH
Date: 06/08/2015

Coordinate System
Name: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994

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678000

681000

684000

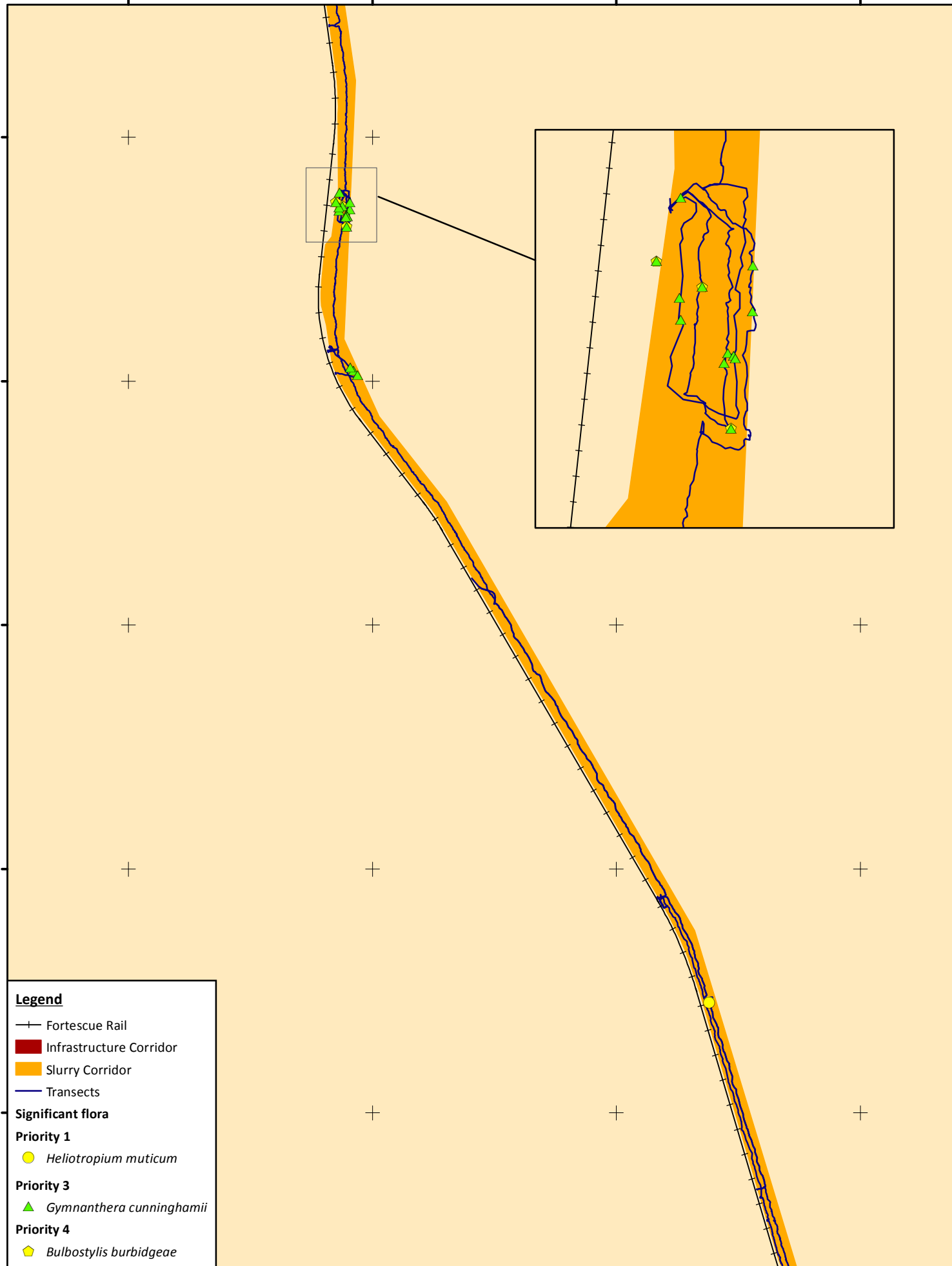
7671000

7668000

7665000

7662000

7659000



Legend

- +— Fortescue Rail
- Infrastructure Corridor
- Slurry Corridor
- Transects

Significant flora

- Priority 1**
- *Heliotropium muticum*
- Priority 3**
- ▲ *Gymnanthera cunninghamii*
- Priority 4**
- ◆ *Bulbostylis burbidgeae*



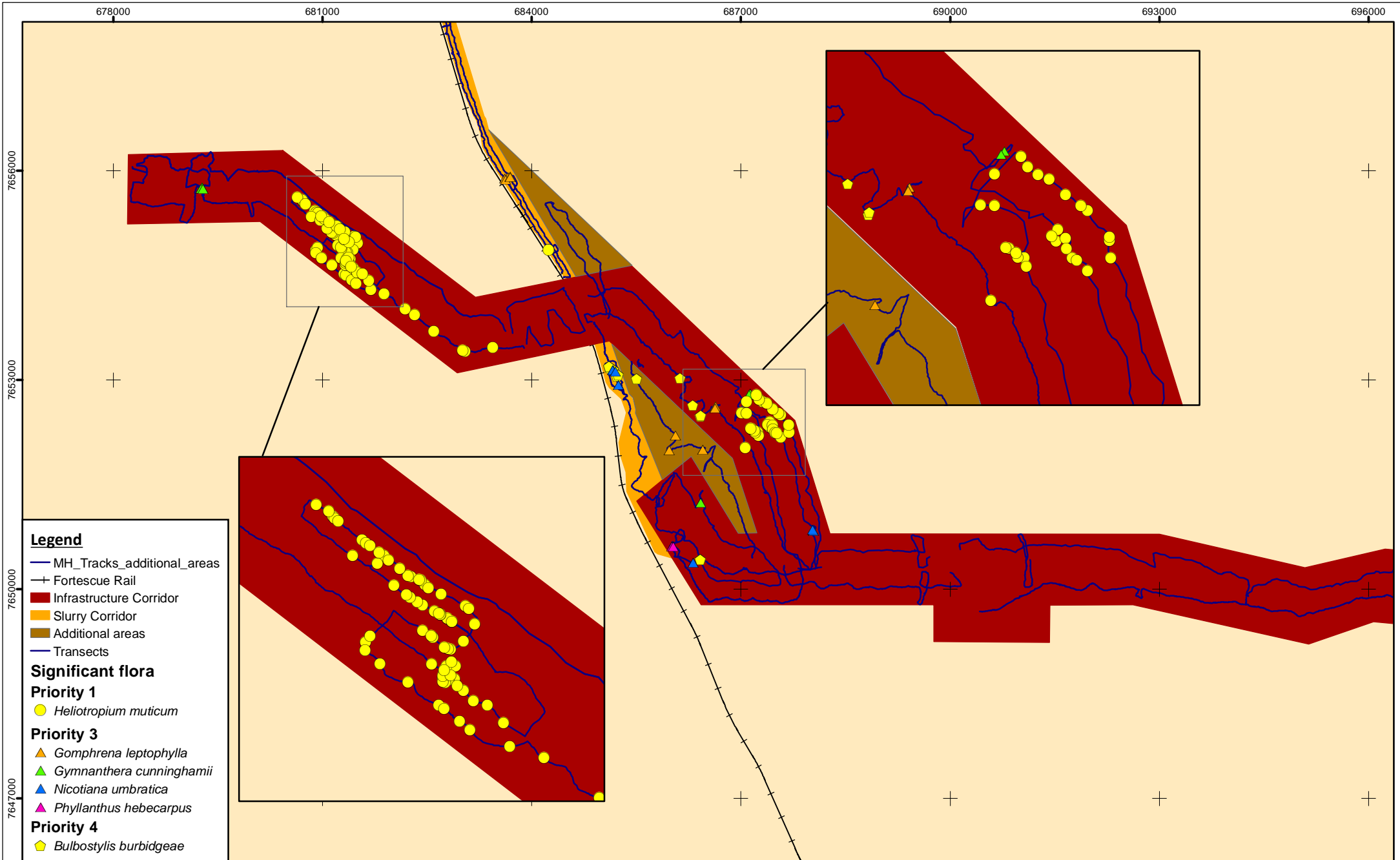
0 1 2
 ───────────
 Kilometres
Absolute Scale - 1:60,000

**Significant flora locations and transects
 at the study area - map 6**

Figure: 3.7
Project: 1643

Drawn: MH
Date: 06/08/2015

Coordinate System
 Name: GDA 1994 MGA Zone 50
 Projection: Transverse Mercator
 Datum: GDA 1994



Legend

- MH_Tracks_additional_areas
- + Fortescue Rail
- Infrastructure Corridor
- Slurry Corridor
- Additional areas
- Transects

Significant flora

Priority 1

- *Heliotropium muticum*

Priority 3

- ▲ *Gomphrena leptophylla*
- ▲ *Gymnanthera cunninghamii*
- ▲ *Nicotiana umbratica*
- ▲ *Phyllanthus hebecarpus*

Priority 4

- ◆ *Bulbostylis burbidgeae*

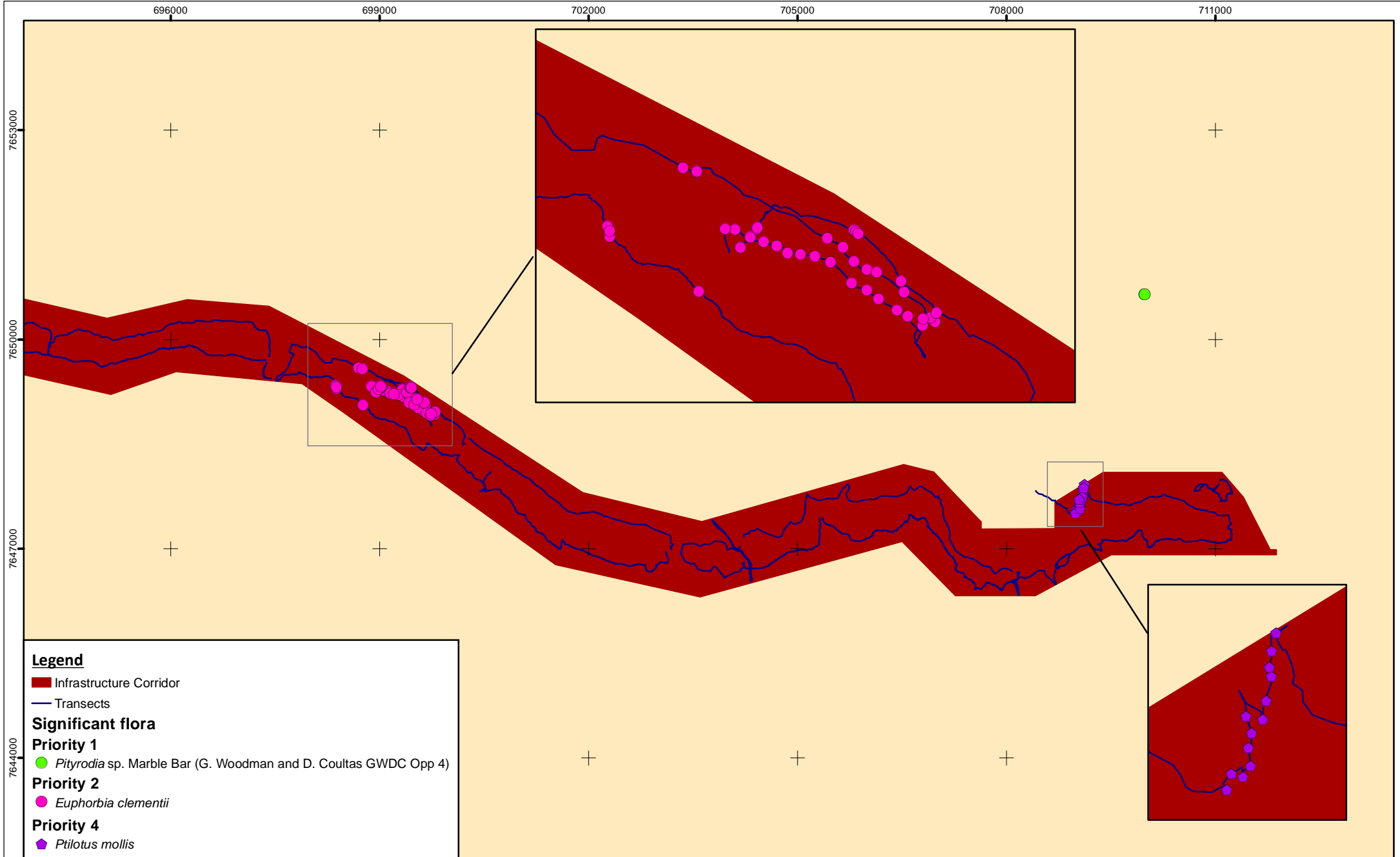


0 1.5 3
 Kilometres
Absolute Scale - 1:70,000

**Significant flora locations and transects
 at the study area - map 7**

Figure: 3.8
Project ID: 1643
 Coordinate System
 Name: GDA 1994 MGA Zone 50
 Projection: Transverse Mercator
 Datum: GDA 1994

Drawn: MH
Date: 17/07/2015



Legend

- Infrastructure Corridor
- Transects

Significant flora

Priority 1

- *Pityrodia* sp. Marble Bar (G. Woodman and D. Coultas GWDC Opp 4)

Priority 2

- *Euphorbia clementii*

Priority 4

- ◆ *Ptilotus mollis*



0 1.5 3
Kilometres
Absolute Scale - 1:70,000

**Significant flora locations and transects
at the study area - map 8**

Figure: 3.9
Project ID: 1643

Drawn: MH
Date: 17/07/2015







Coordinate System
Name: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994






3.2 INTRODUCED FLORA

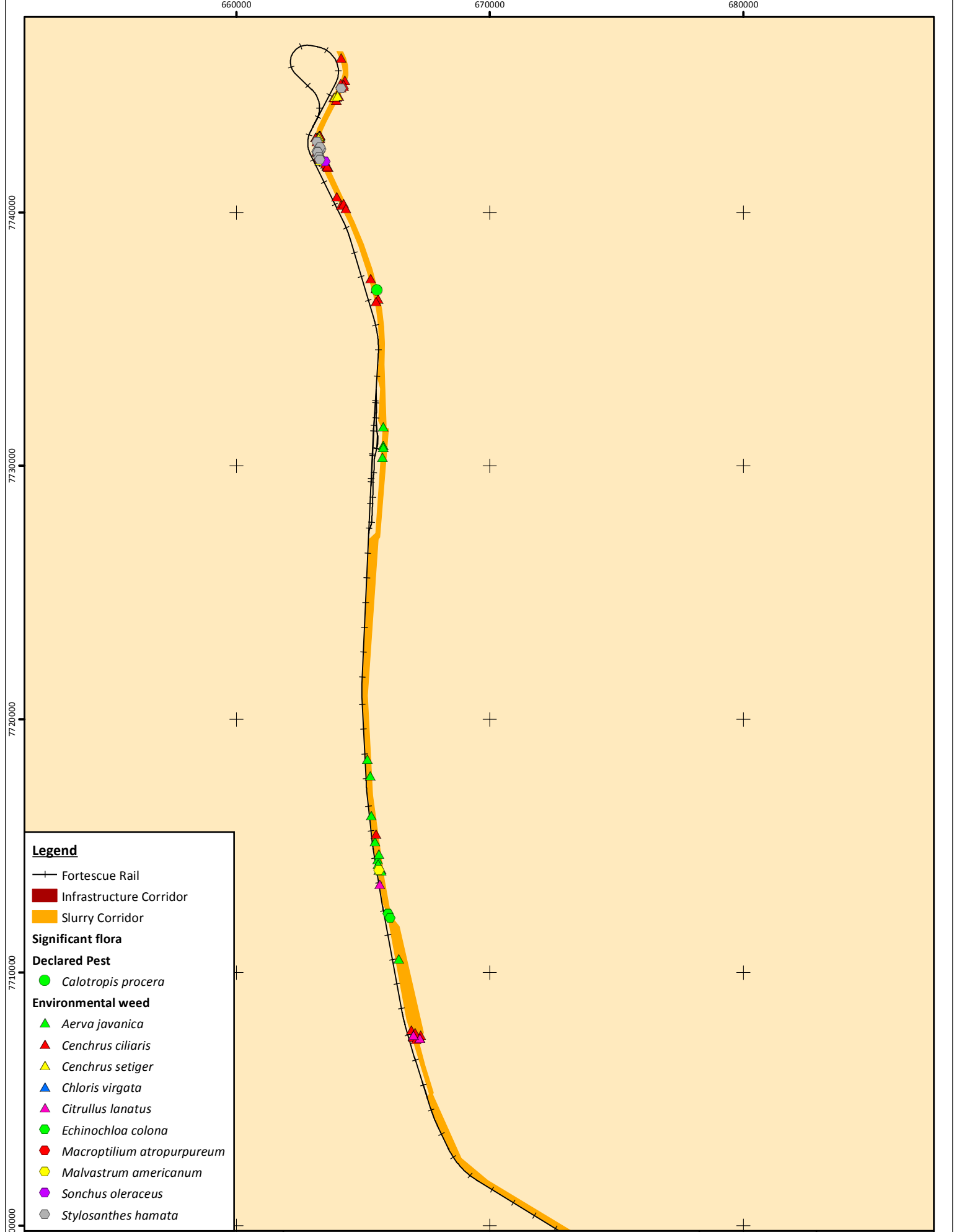
Eleven introduced flora taxa were recorded at the study area, including one Declared Weed; *Calotropis procera*.

They are described, and their numbers and habitats detailed at the study area are provided in Table 3.1. They are mapped at the slurry corridor in Figure 3.10 and Figure 3.11, the infrastructure corridor in Figure 3.12 and their locations are provided in Appendix E.

Table 3.2 – Introduced Flora recorded at the study area

Species	Description at the study area	Photograph
Declared		
<i>*Calotropis procera</i>	Two locations (2 plants) were recorded at the study area. One was ca. 10 km of Port Hedland in the slurry corridor on a sandy floodplain and one where the two corridors intersect in the infrastructure corridor also, on a floodplain. <i>*C. procera</i> is a declared pest requiring C3 management in the East Pilbara (See Appendix A).	
Environmental		
<i>*Aerva javanica</i>	<i>*A. javanica</i> was recorded as scattered individuals or small groups across the entire study area. 736 plants were recorded mostly on creeklines, floodplains and disturbed areas.	
<i>*Cenchrus ciliaris</i>	<i>*C. ciliaris</i> was the most widespread weed, with 767,650 individuals recorded across the entire study area. It was mainly associated with the main river and creeks, but also recorded on the minor drainage lines and disturbed areas and often recorded as the dominant species in the grass stratum.	
<i>*Cenchrus setiger</i>	<i>*C. setiger</i> was also a widespread weed, with 5,356 individuals recorded across the entire study area. It was mainly recorded on the main river and creeks and often in association with <i>*C. ciliaris</i> .	
<i>*Chloris virgata</i>	Two locations of <i>C. virgata</i> were recorded (1,140 individuals) at the northern end of the slurry corridor and ca 60 km south. Both were on disturbed creeklines.	
<i>*Citrullus lanatus</i>	<i>*C. lanatus</i> was recorded as scattered plants (3 individuals) at ca chainage 32 km south of Port Hedland on the Slurry corridor.	

Species	Description at the study area	Photograph
<i>*Echinochloa colona</i>	One location (70 individuals) of <i>*E. colona</i> was recorded approximately 30 km south of Port Hedland on a floodplain.	
<i>*Macroptilium atropurpureum</i>	One individual was recorded on a disturbed roadside near Port Hedland in the slurry corridor.	
<i>*Malvastrum americanum</i>	Two locations (120 individuals) ca 30 to 50 km south of Port Hedland were recorded in the slurry corridor. One was on a floodplain and one along a minor creekline.	
<i>*Sonchus oleraceus</i>	One location (1 individual) was recorded along a roadside at the most northern end of the slurry corridor.	
<i>*Stylosanthes hamata</i>	<i>*S. hamata</i> was recorded in one main location (458 individuals), at the most northern end of the slurry corridor in disturbed areas and roadsides.	



Legend

- + Fortescue Rail
- Infrastructure Corridor
- Slurry Corridor
- Significant flora**
- Declared Pest**
- *Calotropis procera*
- Environmental weed**
- ▲ *Aerva javanica*
- ▲ *Cenchrus ciliaris*
- ▲ *Cenchrus setiger*
- ▲ *Chloris virgata*
- ▲ *Citrullus lanatus*
- *Echinochloa colona*
- *Macroptilium atropurpureum*
- *Malvastrum americanum*
- *Sonchus oleraceus*
- *Stylosanthes hamata*



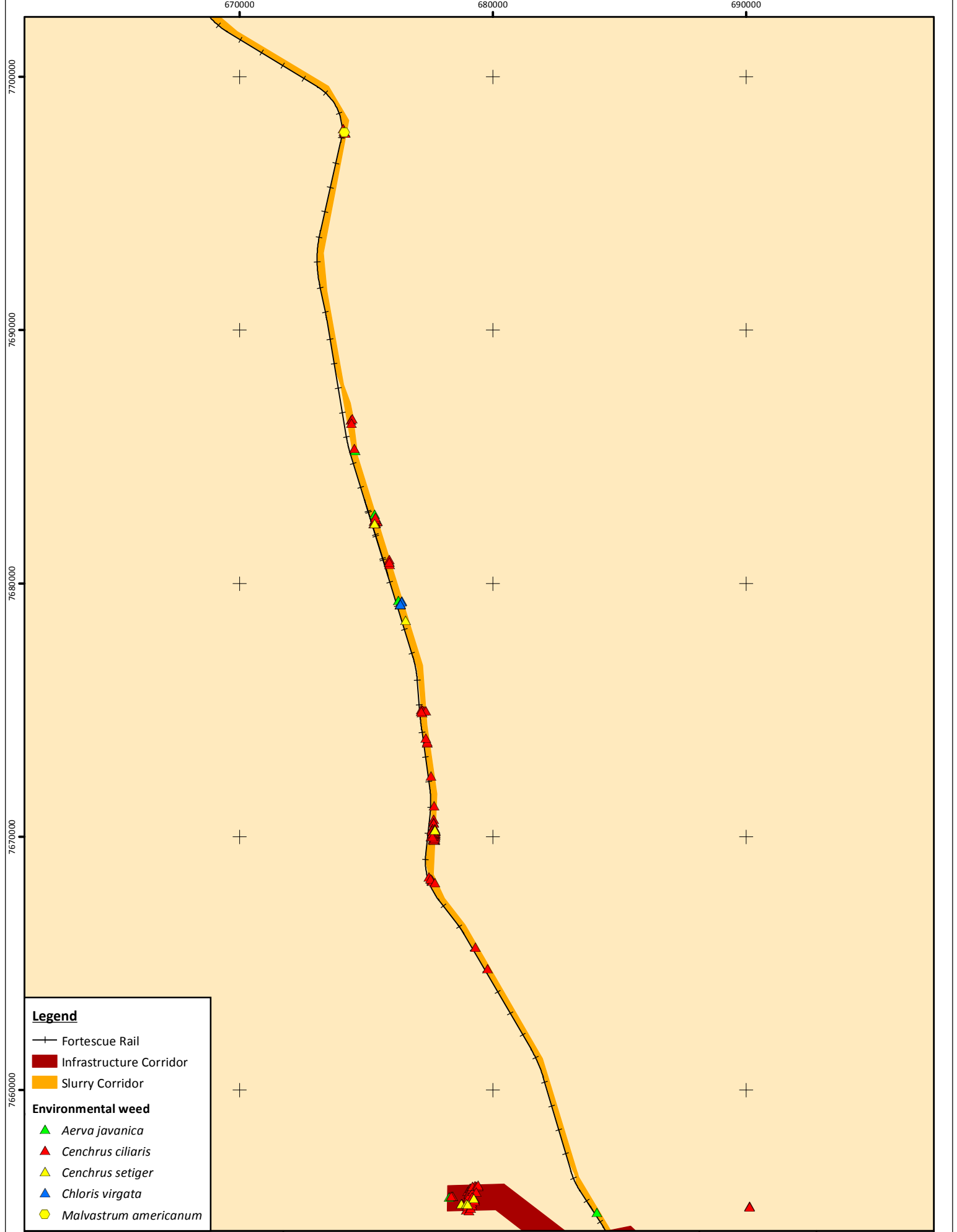
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 Kilometres
Absolute Scale - 1:185,000

**Introduced flora recorded within the
 slurry corridor - north**

Figure: 3.10
Project: 1643

Drawn: MH
Date: 06/08/2015

Coordinate System
 Name: GDA 1994 MGA Zone 50
 Projection: Transverse Mercator
 Datum: GDA 1994



Legend

- +— Fortescue Rail
- Infrastructure Corridor
- Slurry Corridor
- Environmental weed**
- ▲ *Aerva javanica*
- ▲ *Cenchrus ciliaris*
- ▲ *Cenchrus setiger*
- ▲ *Chloris virgata*
- *Malvastrum americanum*



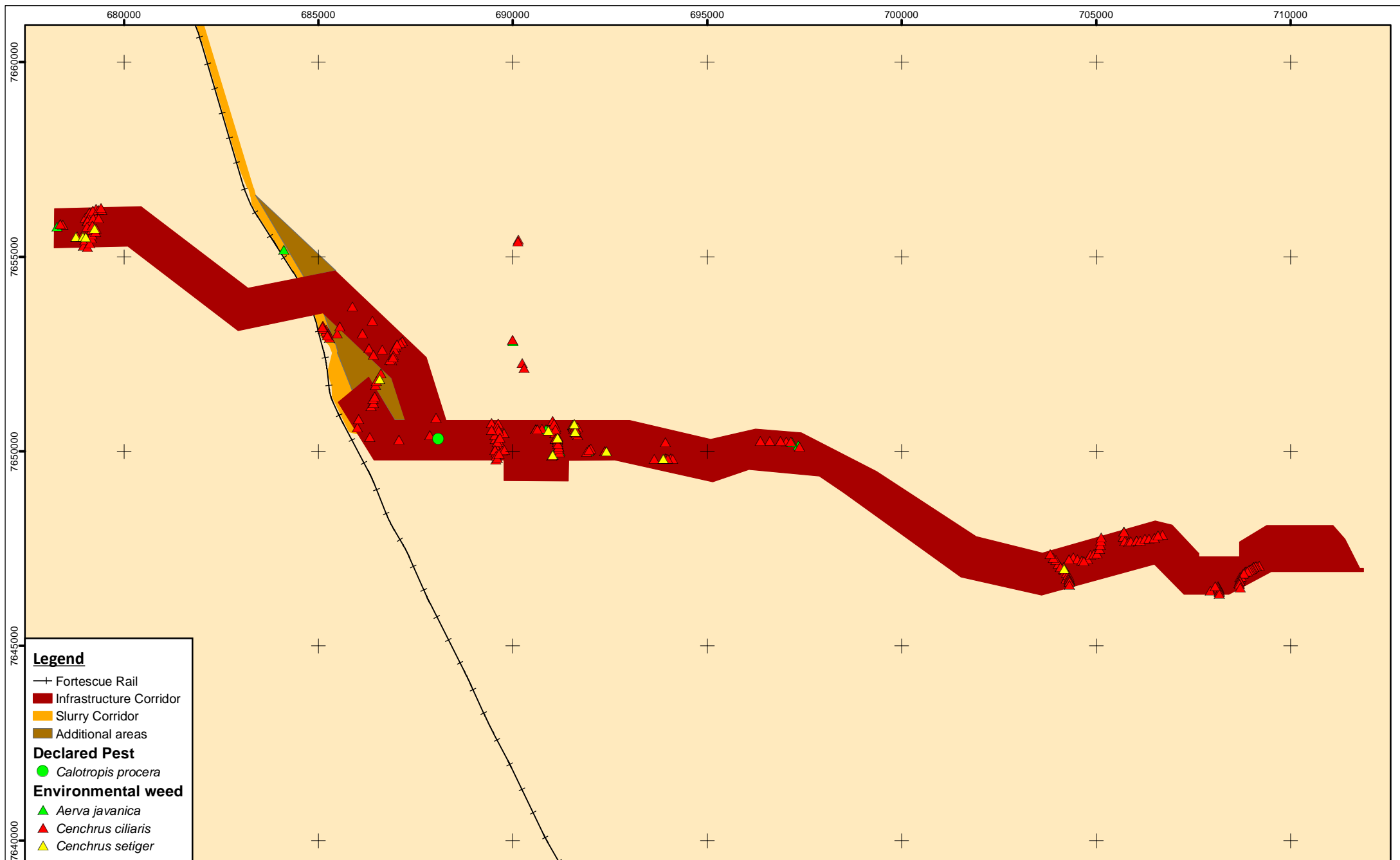
0 3 6
 Kilometres
Absolute Scale - 1:185,000

**Introduced flora recorded within the
 slurry corridor - south**

Figure: 3.11
Project: 1643


Drawn: MH
Date: 06/08/2015

Coordinate System
 Name: GDA 1994 MGA Zone 50
 Projection: Transverse Mercator
 Datum: GDA 1994



Legend

- + Fortescue Rail
- Infrastructure Corridor
- Slurry Corridor
- Additional areas
- Declared Pest**
- *Calotropis procera*
- Environmental weed**
- ▲ *Aerva javanica*
- ▲ *Cenchrus ciliaris*
- ▲ *Cenchrus setiger*



 0 2.5 5

 Kilometres

Absolute Scale - 1:125,000

Introduced flora recorded within the infrastructure corridor

Figure: 3.12 Project ID: 1643	Drawn: MH Date: 17/07/2015
<small>Coordinate System Name: GDA 1994 MGA Zone 50 Projection: Transverse Mercator Datum: GDA 1994</small>	
A4	




3.3 VEGETATION

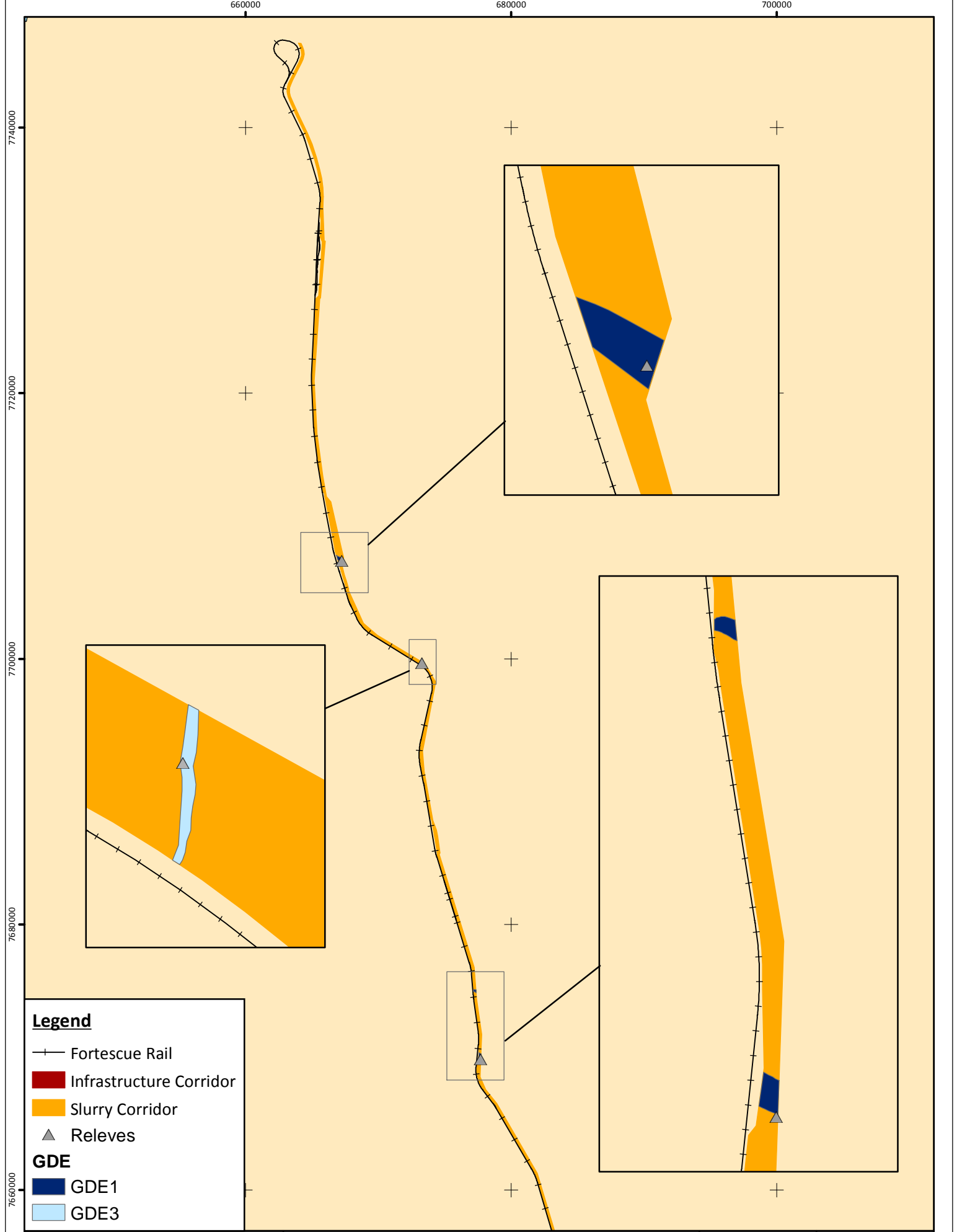
No nationally or state listed TECs or vegetation units resembling TECs were recorded at study area. No PECs or vegetation units resembling PECs were recorded at the study area.

Groundwater Dependent Ecosystems

Three vegetation communities considered to be GDEs were recorded within the study area. These were associated with the major tributaries that intersect the corridors and are described in Table 3.3 and mapped at the slurry corridor in Figure 3.13 and the infrastructure corridor in Figure 3.14.

Table 3.3 – GDEs occurring at the study area

Unit	Description and distribution
GDE1	Vegetation: +/- <i>Eucalyptus camaldulensis</i> isolated low trees to sparse low woodland, over <i>Melaleuca argentea</i> open low woodland (+/- <i>Melaleuca glomerata</i>), over sparse * <i>Cenchrus ciliaris</i> tussock grassland and <i>Triodia epactia</i> hummock grassland
	Associated species: <i>Eriachne benthamii</i> , <i>Jasminum diddum</i> subsp. <i>linearis</i> , <i>Acacia ampliceps</i> , <i>Grevillea wickhamii</i> , <i>Gossypium robinsonii</i> , <i>Crotalaria cunninghamii</i> , <i>Chrysopogon fallax</i> , <i>Eulalia aurea</i>
	Relevés: R001, R002, R005
	
GDE2	Vegetation: <i>Eucalyptus camaldulensis</i> and <i>Eucalyptus victrix</i> low woodland, over <i>Acacia trachycarpa</i> and <i>Melaleuca glomerata</i> tall open shrubland, over * <i>Cenchrus ciliaris</i> open tussock grassland and <i>Triodia epactia</i> open hummock grassland
	Associated species: <i>Melaleuca argentea</i> , <i>Cyperus vaginatus</i> , <i>Atalaya hemiglaucua</i> , <i>Acacia pruinocarpa</i> , <i>Acacia tumida</i> subsp. <i>pilbarensis</i> , <i>Chrysopogon fallax</i>
	Relevés: R004, R006, R007, R008
	
GDE3	Vegetation: <i>Melaleuca argentea</i> open low woodland, over <i>Acacia trachycarpa</i> open tall shrubland, over <i>Triodia epactia</i> hummock grassland.
	Associated species: <i>Acacia tumida</i> subsp. <i>pilbarensis</i> , <i>Acacia acradenia</i> , <i>Triodia longiceps</i>
	Relevés: R003
	



Legend

- +— Fortescue Rail
 - Infrastructure Corridor
 - Slurry Corridor
 - ▲ Relevés
- GDE**
- GDE1
 - GDE3



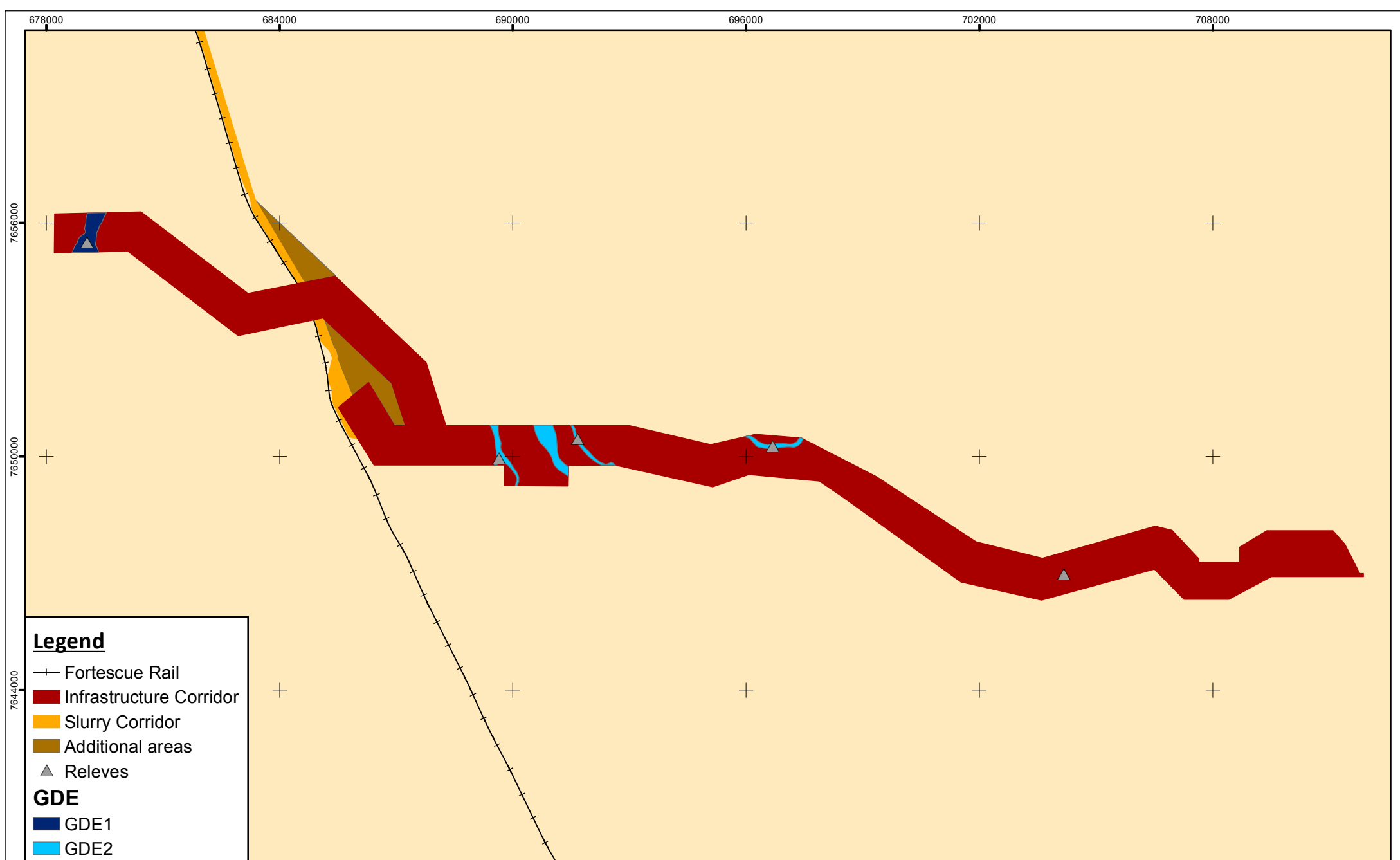
0 6 12
 Kilometres
 Absolute Scale - 1:353,000

GDEs recorded and relevés surveyed within the slurry corridor

Figure: 3.13
Project: 1643

Drawn: MH
Date: 06/08/2015

Coordinate System
 Name: GDA 1994 MGA Zone 50
 Projection: Transverse Mercator
 Datum: GDA 1994



Legend

- + Fortescue Rail
- Infrastructure Corridor
- Slurry Corridor
- Additional areas
- ▲ Releves
- GDE**
- GDE1
- GDE2



0 2.5 5
 Kilometres
Absolute Scale - 1:125,000

GDEs recorded and releves surveyed within the infrastructure corridor

Figure: 3.14
Project ID: 1643

Drawn: MH
Date: 17/07/2015

Coordinate System
 Name: GDA 1994 MGA Zone 50
 Projection: Transverse Mercator
 Datum: GDA 1994

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4 CONCLUSIONS

No EPBC Act or WC Act listed Threatened Flora taxa were recorded at the study area. Twelve Priority Flora and one potential novel taxa were recorded at the study area as listed below:

- Priority 1: *Abutilon* sp. Pritzelianum (S. van Leeuwen 5095), *Heliotropium muticum*, *Rothia indica* subsp. *australis*;
- Priority 2: *Euphorbia clementii*;
- Priority 3: *Eragrostis crateriformis*, *Gomphrena leptophylla*, *Gymnanthera cunninghamii*, *Nicotiana umbratica*, *Phyllanthus hebecarpus*;
- Priority 4: *Bulbostylis burbridgeae*, *Goodenia nuda*, *Ptilotus mollis*; and
- Potentially novel: *Tephrosia rosea* var. Unknown

Populations of the Priority 1 taxa recorded at the study area are described below:

Abutilon sp. Pritzelianum (S. van Leeuwen 5095) was recorded mostly as scattered individuals or in small groups on sandy plains up to approximately 50 km south of Port Hedland. One large population of 5,903 individuals comprising predominantly of seedlings, (representing 95% of the total recorded) indicating a post fire re-growth population was recorded. Many of these plants are not expected to survive to maturity and are not likely to be present in the future. Impacts on the species would therefore be much less.

Heliotropium muticum was recorded mostly as clumps, though occasionally as scattered individuals in areas that had recently been burnt from Chainage 14 along the slurry corridor to the intersection of the infrastructure corridor. As *H. muticum* is a weakly perennial species, populations will develop and subsequently die off and consequently these large populations may not be present in future years reducing impacts in these areas.

Rothia indica subsp. *australis* was recorded from one location on a flat clay depression area at approximately Chainage 6 of the slurry corridor. A thorough search for the taxon was undertaken in and around the location and was not found. Therefore it is considered that *Rothia indica* subsp. *australis* is unlikely to occur elsewhere in the study area.

One Declared Weed, **Calotropis procera*, was recorded from the study area requiring C3 management (see Appendix A) of any disturbance within the study area. An additional ten environmental weeds were also recorded: **Aerva javanica*, **Cenchrus ciliaris*, **Cenchrus setiger*, **Chloris virgata*, **Citrullus lanatus*, **Echinochloa colona*, **Macroptilium atropurpureum*, **Malvastrum americanum*, **Sonchus oleraceus* and **Stylosanthes hamata*.

No EPBC Act or State listed TECs, PECs or vegetation units that correspond with these TEC or PEC communities were recorded from the study area. Additional significant vegetation units recorded within the study area include three GDE communities which are associated with the main river and creek beds that intersect the study area.

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5 REFERENCES

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APPENDIX A CONSERVATION CODES

Definition of codes for Threatened and Priority Flora (DPaW)	
Code	Definition
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 <i>Wildlife Conservation Act 1950</i>).
X	Presumed Extinct Flora (Declared Rare Flora - Extinct) Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such Schedule 2 under the <i>Wildlife Conservation Act 1950</i> .
Priority 1	Priority One – Poorly Known Species Species 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. Species 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.
Priority 2	Priority Two – Poorly Known Species Species 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. Species 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.
Priority 3	Priority Three – Poorly Known Species Species 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. Species 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.
Priority 4	Priority Four – Rare, Near Threatened and other species in need of monitoring (a) Rare. Species 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 species are usually represented on conservation lands. (b) Near Threatened. Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.
Priority 5	Priority Five - Conservation Dependent species Species that are not threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

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

Definition of codes for Threatened Ecological Communities	
Code	Definition
PD: Presumed Totally Destroyed	An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future. An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant.
CR: Critically Endangered	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated. An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future.
EN: Endangered	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future. An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future.
VU: Vulnerable	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range. An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium to long-term future.

Definition of codes for Priority Ecological Communities	
Code	Definition
P1: Priority 1	Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or Pastoral lands, urban areas, active mineral leases) and for which current threats exist. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.
P2: Priority 2	Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, unallocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.
P3: Priority 3	(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or; (ii) Communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or; (iii) Communities made up of large, and/or widespread occurrences that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes. Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.
P4: Priority 4	Ecological communities that are adequately known, Rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring. (a) Rare. Ecological communities known from few occurrences 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 communities are usually represented on conservation lands. (b) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. (c) Ecological communities that have been removed from the list of threatened communities during the past five years.
P5: Priority 5	Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Control categories for Declared Pests	
Category	Description
C1 - Exclusion	Pests assigned to this category are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State
C2 - Eradication	Pests assigned to this category are present in WA in low enough numbers or in sufficiently limited areas that their eradication is still a possibility
C3 - Management	Pests assigned to this category are established in WA but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest

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APPENDIX B RELEVE DESCRIPTIONS

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APPENDIX C ELECTRONIC DATA

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Provided electronically:

C.1: TPRF Forms

C.2: Significant and introduced flora locations, GDE & releve information (Fortescue compliant)

C.3: Photographs

C.4: Shapefiles: GDEs, transects, significant flora and weeds

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APPENDIX D SIGNIFICANT FLORA LOCATIONS

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APPENDIX E INTRODUCED FLORA LOCATIONS

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