Biota Environmental Sciences

Vegetation and Flora Survey of the Proposed FMG Stage A Rail Corridor

Fortescue Metals Group (FMG)

Baseline Botanical Survey

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1.1 Project Background and Scope

Fortescue Metals Group Limited (FMG) proposes to construct a port facility at Port Hedland and a connecting railway to the location of proposed Mindy Mindy iron ore mining operation, some 345 km to the south-southeast. The majority of the proposed railway will run parallel and in close proximity to the existing BHP Billiton Newman to Port Hedland Railway and the proposed Hope Downs rail corridor.

The proposal to construct the new port and railway was referred to the Environmental Protection Authority (EPA), which determined that it would be assessed at the level of Public Environmental Review (PER). This document is intended as a supporting technical appendix to the PER for the project, providing a more detailed account of the scope, methods and findings of the flora and vegetation assessment completed for the project. The scope of this document reflects the terrestrial components of the Stage A PER. That is, it addresses the proposed FMG north-south rail corridor and port site, but not the Mindy Mindy mine area (which will be covered in a future report).

1.2 Methodology

1.2.1 Approach

In order to determine the overall value of the vegetation and flora of the study area, data was collected during a field survey to assess two different botanical attributes:

- The vegetation types occurring within the rail corridor were described and mapped during a vegetation survey. The mapping indicated the distribution and relative abundance of each vegetation unit, which helped to define units of particular conservation value; and

- The overall flora occurring in the study area was determined through a flora survey that focussed on sampling of quadrats. This survey provided a measure of the overall floristic richness of the area, and identified the individual species present. It also identified species of particular conservation significance.

The data collected during the field survey were then compared with other data from the region. The most recent and directly relevant studies are the systematic biological surveys of the proposed Hope Downs port facility and rail corridor between Port Hedland and Weeli Wolli Creek (Halpern Glick Maunsell (HGM) 2000a, Biota and Trudgen 2002, Biota 2004a, Biota 2004b), as these project areas are in close proximity to the proposed FMG port and rail corridor. In some areas the rail corridors overlap and the data arising from these earlier surveys is of direct relevance to the current assessment. These data have therefore been used as the principal references both for local context and to provide for the assessment of impacts in areas where the project footprints overlap.

1.2.2 Survey Methods

A systematic flora and vegetation survey was completed of the proposed rail corridor. The approach and methodology adopted was consistent with the guidance provided in EPA Guidance Statement No. 51: Terrestrial flora and vegetation surveys for Environmental Impact Assessment in Western Australia (EPA 2003).

The terrestrial flora survey was done approximately 6 weeks after sustained and heavy rainfall in the area in February and was extremely favourable for the collection of ephemeral

flora and flowering grasses. The vegetation was described at 97 quadrats, with the flora at each of these quadrats recorded in detail. The following parameters were recorded for each quadrat:

1. **Location**
   MGA coordinates recorded in WGS84 datum (within 1m of GDA94) using a hand-held Global Positioning System (GPS), to an accuracy usually within 5 m; readings usually taken for three or four corners, occasionally for only two corners.
2. **Vegetation Description**
   Broad description based on the height and estimated cover of dominant species after Aplin's (1979) modification of the vegetation classification system of Specht (1970).
3. **Habitat**
   Description of landform and habitat.
4. **Soil**
   Broad description of soil type and surface mantle (with confirmation samples collected).
5. **Disturbance Details**
   Evidence of grazing, mining exploration activities, weed invasion, frequent fires etc. Note that fire effects were only considered as a negative impact if they appeared to be caused by repeated burning (such as that done for pastoral purposes).
6. **Percentage Foliar Cover**
   Estimated visually for each species. Estimates were made to the nearest percent where possible, or a range (eg. 5-10%) was used. '+' was used where only occasional individuals were present, with a cover of less than 1%.

Colour photographs of the vegetation at most sites were taken using a digital camera. Additional foot traverses were completed to assess areas that were inaccessible by vehicle. In addition to detailed flora sites, opportunistic flora collections were made on these traverses to supplement the list of species recorded from the flora survey sites. Particular attention was paid to searching habitats and vegetation types likely to support flora species with sporadic distributions (eg. creeklines, gorges, calcretes, and Mulga vegetation).

Vegetation descriptions were based on the height and estimated cover of dominant species in sampling quadrats using Aplin's (1979) modification of the vegetation classification of Specht (1970). Additional foot traverses were completed to ground-truth the boundaries of vegetation types. Vegetation descriptions were then grouped to arrive at vegetation units, defined on the basis of a shared suite of perennial species with a similar range of cover values. These were then grouped into similar landform/habitat types.

The coding system used for the vegetation types was consistent with previous studies along the adjacent Hope Downs rail corridor, to facilitate comparisons between the current proposal and previous survey work in the area. Aerial imagery was marked up with vegetation type boundaries with the aid of aerial photography at a scale of 1:10,000. Some of the vegetation units were either too small to show at the scale of mapping, or too variable to map individually based on the level of investigation that was possible during the field survey. These latter units were mapped as mosaics.

1.3 Vegetation

One hundred and twenty-two (122) terrestrial vegetation types were defined for the proposed rail corridor, representing a wide range of structural and floristic variants. These mainly comprised:

- hummock grasslands of *Triodia* species with a variable shrub overstorey on plains, hillslopes and crests (dominating the majority of the project area);
- tall shrublands of *Acacia* species, usually with an overstorey of *Corymbia*, in creeklines;

- open forests or woodlands of Cadjeput *Melaleuca argentea*, River red gum *Eucalyptus camaldulensis* and/or Coolibah *E. victrix* over tall shrublands of *Acacia* or *Melaleuca* spp. on river banks and beds;
- Mulga *Acacia aneura* woodlands and tall shrublands over spinifex or various grasses on the plains of the Fortescue Valley; and
- variable vegetation on cracking clays of the Fortescue Valley (ranging from tussock grasslands to high open shrublands of Snakewood *Acacia xiphophylla*).

The vegetation types of high conservation significance within the FMG rail corridor include those previously identified by Biota and Trudgen (2002), as well as some newly described types. The vegetation types considered to be of the highest conservation significance within the rail corridor comprise:

- **Abydos Plain**

Ar3-Ar7	Granite, quartz and dolerite outcrop vegetation types
Ah5a	*Acacia inaequilatera* scattered tall shrubs over *Triodia* aff. *lanigera* (dwarf form) mid-dense hummock grassland
Apt1 and Apt2	Hummock grassland dominated by *Triodia secunda*
Apt5 and Apt8	Hummock grassland dominated by *Triodia angusta*
Ac21	*Acacia ampliceps* open scrub over *Triodia secunda* hummock grassland in creekline
Ac30	*Corymbia hamersleyana, C. candida* low open woodland over *Acacia colei, A. tumida* scattered tall shrubs over *Triodia epactia* hummock grassland and very open herbland in soak

- **Chichester Range**

Cx4	*Astrebla pectinata, Aristida latifolia* tussock grassland on cracking clays
Cx5	*Acacia xiphophylla* open to closed scrub over *Rhagodia eremaea* open shrubland on cracking clays
Ch9 and Ch10	*Corymbia deserticola* scattered low trees over *Acacia aneura* shrubland over *Triodia lanigera* closed hummock grassland on stony hills
Cp1	*Acacia inaequilatera* scattered tall shrubs over *Triodia schinzii* mid-dense hummock grassland on sandplains
Cc3	*Acacia synchronicia, A. farnesiana* open shrubland over *Eriachne benthamii, Chrysopogon fallax* closed tussock grassland in creeklines
Cc17	*Acacia synchronicia, A. farnesiana* open shrubland over *Eriachne benthamii, Chrysopogon fallax* closed tussock grassland in creeklines

- **Fortescue Valley**

Fx1- Fx9	Vegetation of clayey plains of the Fortescue Marsh and surrounding valley
Fa1-Fa7, Fa9, Fh1	Mulga dominated vegetation types associated with clayey plains and isolated hills of the Fortescue Valley
Fc2	*Eucalyptus victrix* scattered low trees over *Acacia stenophylla* open scrub over *Triodia longiceps* mid-dense hummock grassland and/or mixed tussock grassland in creekline

- **Hamersley Range**

Hd1	*Acacia dictyophleba* scattered tall shrubs over *Crotalaria cunninghamii, Trichodesma zeylanicum* var. *grandiflorum* open shrubland on sand dunes
Hp4	*Acacia aneura* groved low open forest over *Eremophila forrestii* subsp. *forrestii* scattered low shrubs over *Triodia pungens* scattered hummock grasses and *Aristida contorta, Enneapogon polyphyllus* open annual grassland

1.4 Terrestrial Flora

A total of 762 taxa of terrestrial vascular flora from 218 genera belonging to 69 families has been recorded from the proposed FMG rail corridor. Eleven of these species are introduced flora. In addition, five mangrove species from four families have been recorded. By comparison, 760 taxa of vascular flora from 233 genera and 70 families were recorded from the initial survey of the Hope Downs rail corridor between Port Hedland and Weeli Wolli Creek, which was of a similar length and, being adjacent to the FMG corridor, covered a similar range of habitats (see Biota and Trudgen 2002).

The large number of vascular flora recorded reflects a number of factors:

- the long, linear nature of the project area, meaning that it intersected a wide variety of habitats and therefore vegetation types;
- the relatively large number of intensively sampled quadrats;
- the timing of the field surveys following substantial summer rainfall in the region, such that many ephemeral species were available for recording; approximately 50% of the species recorded were annual or weakly perennial flora; and
- the richness of the flora of the Fortescue Botanical District.

The families with the greatest number of native flora taxa within the proposed FMG rail corridor were those that are predominant in the vegetation of the eastern Pilbara. The best represented families were the Poaceae (grasses; 121 taxa), Papilionaceae (peas; 76 taxa), Malvaceae (*Hibiscus* etc; 65 taxa) and Mimosaceae (wattles; 63 taxa). The best represented genera were *Acacia* (61 taxa), *Sida* (29 taxa), *Tephrosia* (21 taxa), and *Cassia* and *Ptilotus* (19 taxa each). In contrast, 22 families and 111 genera recorded within the FMG rail corridor were represented by only one taxon.

Flora of conservation significance occurring along the rail corridor include:

- three Priority 1 species (*Eremophila spongiocarpa, Goodenia omearana, Josephinia* ?sp. Marandoo (ME Trudgen 1554);
- seven Priority 2 species (*Euphorbia clementii, Gonocarpus ephemerus, Indigofera ixocarpa* ms., *Ischaemum albovillosum, Olearia fluvialis, Paspalidium retiglume Stylidium weeliwolli*);
- ten Priority 3 species (*Abutilon trudgenii* ms., *Bulbostylis burbidgeae, Eriachne tenuiculmis, Goodenia nuda, Gymnanthera cunninghamii, Hibiscus brachysiphonius, Phyllanthus aridus, Polymeria* sp. Hamersley (ME Trudgen 11353), *Sida* sp. Wittenoom (WR Barker 1962), *Themeda* sp. Hamersley Station (ME Trudgen 11,431));
- one Priority 4 species (*Goodenia stellata*); and
- several other poorly known or collected species.

1.5 Mangroves

Seven species of mangroves are known to occur in coastal environments in the Pilbara region (Semeniuk et al. 1978; Kenneally 1982), and six of these are documented as occurring in Port Hedland Harbour (Paling et al. 2003). The species recorded from the vicinity of the proposed FMG port facilities were:

- *Avicennia marina* White (or Grey) Mangrove;
- *Ceriops tagal* Yellow-leaved Spurred Mangrove;
- *Rhizophora stylosa* Stilt-rooted Mangrove;
- *Aegialitis annulata* Club Mangrove; and
- *Aegiceras corniculatum* Horned Mangrove.

The only other species known for the area, *Bruguiera exaristata* Rib-fruited Orange Mangrove, occurs only as scattered individuals, largely in the eastern portion of the harbour (Paling et al. 2003).

1.6 Potential Impacts

Given the similarities between the proposed FMG rail corridor and the previously surveyed Hope Downs rail corridor, the impacts associated with the current proposal are essentially the same in nature as those presented by the earlier proposal (Biota and Trudgen 2002, Hope Downs Management Services 2002). Note that FMG has stated that only one more railway would ultimately be constructed along this corridor. This report therefore only considers the impacts of the construction and operation of the proposed FMG railway adjacent to the existing BHP Billiton line and not the cumulative impact of these two lines

in addition to the proposed Hope Downs railway (Hope Downs Management Services 2002).

1.6.1 Impacts on Terrestrial Flora and Vegetation

Impact mechanisms that may affect terrestrial flora and vegetation during the construction and operation of the proposed railway include:

· Vegetation Clearing

Clearing of vegetation will be required along the proposed railway, and for establishment of infrastructure such as borrow pits, laydown areas, water bores, dams and access tracks. The construction of the railway will result in the clearing of approximately 1,845 ha of vegetation, affecting most vegetation types along the corridor. Additional impacts on vegetation may result from other project-related activities including off-road driving and fire (see below). Spinifex (*Triodia* spp.) is particularly susceptible to physical damage from vehicle movements and may take extended periods to recover.

· Introduction and/or Spread of Weeds

Eleven introduced flora species were recorded from the rail corridor, at least one of which is a significant environmental weed (Buffel grass **Cenchrus ciliaris*). Earthworks, disturbance to vegetation, vehicle movement and other factors have the potential to introduce additional weeds to the area and to spread existing populations of introduced flora along the length of the rail corridor.

· Disturbance of Surface Hydrology

The proposed rail corridor crosses several large river systems and numerous minor tributaries and floodplains. Disturbance to surface drainage flow has the potential to negatively impact downstream vegetation. Large areas of Mulga are also present towards the southern end of the corridor (south of the Chichester Range, particularly in association with the Fortescue River basin). These are reliant on surface sheet flow, and interruption to such flow has the potential to cause substantial degradation and mulga mortality by either restriction of water input downstream of the rail or ponding upstream.

· Fire

The frequency of fires in the vicinity of the proposed rail corridor is already likely to be higher than in the surrounding region due to the increased fire frequency resulting from track-grinding maintenance on the existing BHP Billiton rail line. The increase in similar activities associated in the area associated with the FMG during rail construction also has the potential to contribute to more frequent fires in the locality.

The level of impact on vegetation associated with this potential increase in fire frequency is dependent on the structure of the affected vegetation. The hummock grassland vegetation types that dominate the northern half of the rail corridor are typically very flammable, but are also adapted to fire and recover relatively quickly. Increased frequency of fires can, however, lead to changes in floristic composition and a prevalence of early seral stages of the vegetation (the climax vegetation is prevented from developing; Biota and Trudgen 2002). Mulga communities may killed by hot fires; the Mulga woodlands and tall shrublands along the southern section of the rail corridor would be particularly susceptible to damage from fires, particularly if there was also strong grazing pressure or other stress presented by modification to the existing hydrological regime.

Dust generation and increased erosion also have the potential to impact flora and vegetation, but these may be more minor tier impacts compared to the principal issues listed above.

1.6.2 Impacts on Mangroves

Impact mechanisms that may affect mangroves during the construction and operation of the proposed port include:

· Clearing of Mangals during Construction

The proposed development would result in the clearing of approximately 22.0 ha of mangroves (approximately 2% of the total mangal habitat within Port Hedland Harbour; Paling et al. 2003), in addition to a further 87 ha of open mudflat with scattered samphires and occasional low *Avicennia marina* (the more open form of association 4B of Paling et al. 2003). The total clearing would amount to approximately 10% of the harbour's current mangrove assemblage cover; a similar impact to that presented by the proposed Hope Downs port site (Hope Downs Management Services 2002). Most of this clearing (80%), however, impacts on a very low mangrove cover unit at the top end of the tidal range.

Clearing loss of mangal is the principal impact likely to affect existing mangrove communities in the project area. Other potential impact mechanisms include:

- dust deposition;
- effluent discharge and changes in surface hydrology; and
- alteration to groundwater regimes.

With the design and management measures to be implemented for this port development (Section 1.7.2), these latter potential impacts are not anticipated to result in any major changes in mangrove representation within Port Hedland harbour.

1.7 Management

1.7.1 Management of Impacts on Terrestrial Flora and Vegetation

A variety of management measures exist to address the potential impacts presented by the proposed railway. These should be implemented as part of the design, construction and operation of the proposed railway to reduce the potential impacts to terrestrial vegetation and flora. Recommended management measures for the proposal include:

1) The design of the rail alignment should be refined, taking into account the locations of significant vegetation types and populations of Priority flora (Sections 6.0 and 7.0), with the objective of avoiding these through final design.

2) The drainage design for the railway should take into account local hydrological patterns that may have ecological significance. This includes adequate provision for drainage line habitats to ensure that back-water or flow restriction does not occur. In most areas this would probably be met by mirroring the drainage design of the existing BHPBIO railway (when adjacent), and following best practice drainage design in other areas.

3) The rail alignment and drainage design must ensure that interruption to existing sheet flow is kept to a minimum. This is required to ensure that sensitive vegetation both upstream and downstream (primarily mulga) is not adversely affected. This will be a consideration south of the Chichester Range, particularly where the rail passes through mulga vegetation in the Fortescue basin. This aspect of the drainage design will need to be finalised to the satisfaction of the DCLM regional office and we recommend close liaison with them. It is noted that design of the rail entry to Mindy Mindy has already been modified as a result of initial discussions to minimise the potential for disruption to sheet flow in this area.

4) Vegetation clearing should be kept to the minimum necessary for safe construction and operation of the railway, particularly in areas adjacent to vegetation of higher conservation significance. Clearing limits should be marked on all design drawings and pegged in the field prior to any clearing works commencing. This would then constitute a hold-point for the site supervisor to review and provide written approval prior to clearing works commencing;

5) Off-road driving should be strictly prohibited, with all staff to be informed of this (and significant environmental issues generally) as part of an on-site induction programme;

6) Weed control measures should be developed and implemented to ensure that exotic flora species identified from the rail corridor are not spread as part of the construction of the railway. This may include targeted control of more aggressive weed species where these are intersected by the final rail alignment. A Weed Hygiene and Management Plan should be prepared in consultation with DCLM prior to construction commencing.

7) Fire management should be addressed as part of the Environmental Management Plans (EMPs) prepared for construction, operation and maintenance of the railway. A key objective of these management measures should be to reduce the risk of unplanned fires and provide contingency measures to minimise any impacts in the event that a fire is started. This could include measures to address normal construction activities including the use of heavy plant and equipment in dry vegetated areas, welding, grinding and other activities with the potential to start fires. Management of track maintenance and the fire risk associated with track-grinding activities would be an important consideration. Spark shields should be specified for all rail maintenance contracts, with fire tender vehicles equipped with fire fighting equipment to follow the track grinder in order to address any spot fires started.

8) A Topsoil Management and Rehabilitation Plan should be prepared for all non-permanent cleared areas, in liaison with DCLM, DOE and DOIR, prior to the commencement of construction activities. This plan should include use of provenance collected native seed, characterisation and management of topsoil, and the respreading of cleared vegetative material. Recovery monitoring should also be carried out, with any rehabilitation failure subject to additional treatment to a suitable standard.

9) Standard dust suppression measures should be implemented across the project area during construction to minimise effects on surrounding vegetation.

10) The location of borrow pits and other materials sourcing sites were not known in detail at the time of preparing this report. Given that all biological surveys are based on representative sampling only, there will always be areas within the corridor that have not been adequately ground-truthed. It is therefore possible that borrow pits may ultimately be located in areas that have not been specifically surveyed. Once pit locations are identified, the location of these sites should be subject to targeted surveys for any threatened flora species or vegetation types of conservation significance prior to clearing commencing. The location of materials sourcing sites may then need to be revised as appropriate based on the findings of this work in liaison with the DCLM regional office.

11) Off-sets should be considered in consultation with the DCLM regional office. These could include contribution of funds to relevant taxonomic research (eg. research into *Acacia "aneura"* in the Pilbara, or some of the other poorly known taxa such as the Malvaceae and Tiliaceae).

1.7.2 Management of Impacts on Mangroves

Potential impacts on mangrove communities in the proposed port area have largely been addressed via design modifications and improvement in an interactive process as the feasibility study has progressed.

This has resulted in the following aspects being incorporated into project development to ameliorate or eliminate impacts on mangrove systems:

1) Situation and alignment of the stockpile area such that as much of the footprint as possible occupies supratidal land;

2) All structures that cross tidal channels will be designed in accordance with the outcomes of the modelling work completed for the project to ensure hydrodynamic

exchange such that tidal flushing of upstream mangrove systems is not inhibited (particularly in the mangrove habitats of South-west Creek within the rail loop);

3) Modification of the dredge spoil storage bund walls to minimise direct impacts on mangroves. Initial concept designs were square in nature but these have now been customised to follow the boundary of the mangrove zone to reduce clearing requirements.

4) Detailed design of the port and stockpile infrastructure will aim to minimise impacts on mangrove areas wherever possible. All final design drawings will show clearing limits and these will be pegged in the field prior to clearing commencing.

5) Detailed design of the facility will include best practice management of all surface drainages including run-off from stockpile facilities and surface stabilisation of the dredge spoil bund walls (FMG 2004).

6) Best practice dust-suppression technology will be installed on stockpile facilities and associated areas to ensure that dust deposition on mangroves is minimised (FMG 2004).

2.0 Introduction

2.1 Purpose of this Report

2.1.1 Background to the Project and Location of the Study Area

Fortescue Metals Group Limited (FMG) proposes to construct a port facility at Port Hedland and a connecting railway to the location of proposed Mindy Mindy iron ore mining operation, some 345 km to the south-southeast (Figure 2.1). The majority of the proposed railway will run parallel and in close proximity to the existing BHP Billiton Newman to Port Hedland Railway and the proposed Hope Downs rail corridor (Figure 2.1). The most southerly extent of the railway is approximately 100 km northwest of the Newman town site (Figure 2.1).

2.1.2 Role of this Document

The proposal to construct the new port and railway was referred to the Environmental Protection Authority (EPA), which determined that it would be assessed at the level of Public Environmental Review (PER).

This document is intended as a supporting technical appendix to the PER for the project, providing a more detailed account of the scope, methods and findings of the terrestrial flora and vegetation assessment completed for the project. The scope of this document reflects the terrestrial components of the Stage A PER; ie. it addresses the proposed FMG north-south rail corridor, but not the Mindy Mindy mine area (which will be covered in a future report).

2.2 Previous Biological Surveys in the Region

The most recent and directly relevant studies are the systematic biological surveys of the proposed Hope Downs port facility and rail corridor between Port Hedland and Weeli Wolli Creek, as these project areas are in close proximity to the proposed FMG port and rail corridor. In some areas the rail corridors overlap and the data arising from these earlier surveys is of direct relevance to the current assessment. These data have therefore been used as the principal references both for local context and to provide for the assessment of impacts in areas where the project footprints overlap.

The following botanical studies are thus the major comparative references used in this document:

- Seasonal survey of the proposed Hope Downs rail corridor between Port Hedland and Weeli Wolli Creek (Biota and Trudgen 2002);
- Survey of a proposed addition to the Hope Downs rail corridor through the Chichester Range (Biota 2004a);
- Survey of a proposed extension to the Hope Downs rail corridor through the Hamersley Range (Biota 2004b); and
- Survey of the original Hope Downs rail corridor between the minesite and the BHP rail line (Halpern Glick Maunsell (HGM) 2000a).

This work comprised detailed seasonal sampling of flora, vegetation and mangrove communities. The baseline flora survey compiled a dataset of 286 quadrats (Biota and Trudgen 2002). Additional work was subsequently completed in areas where the Hope Downs rail corridor was realigned in the Chichester Range (Biota 2004a) and parallel to Weeli Wolli Creek (Biota 2004b). These studies added a further 51 flora quadrats. This recent work thus provided systematic contextual sampling along the same general corridor as the FMG proposal, amounting to 337 flora quadrats.

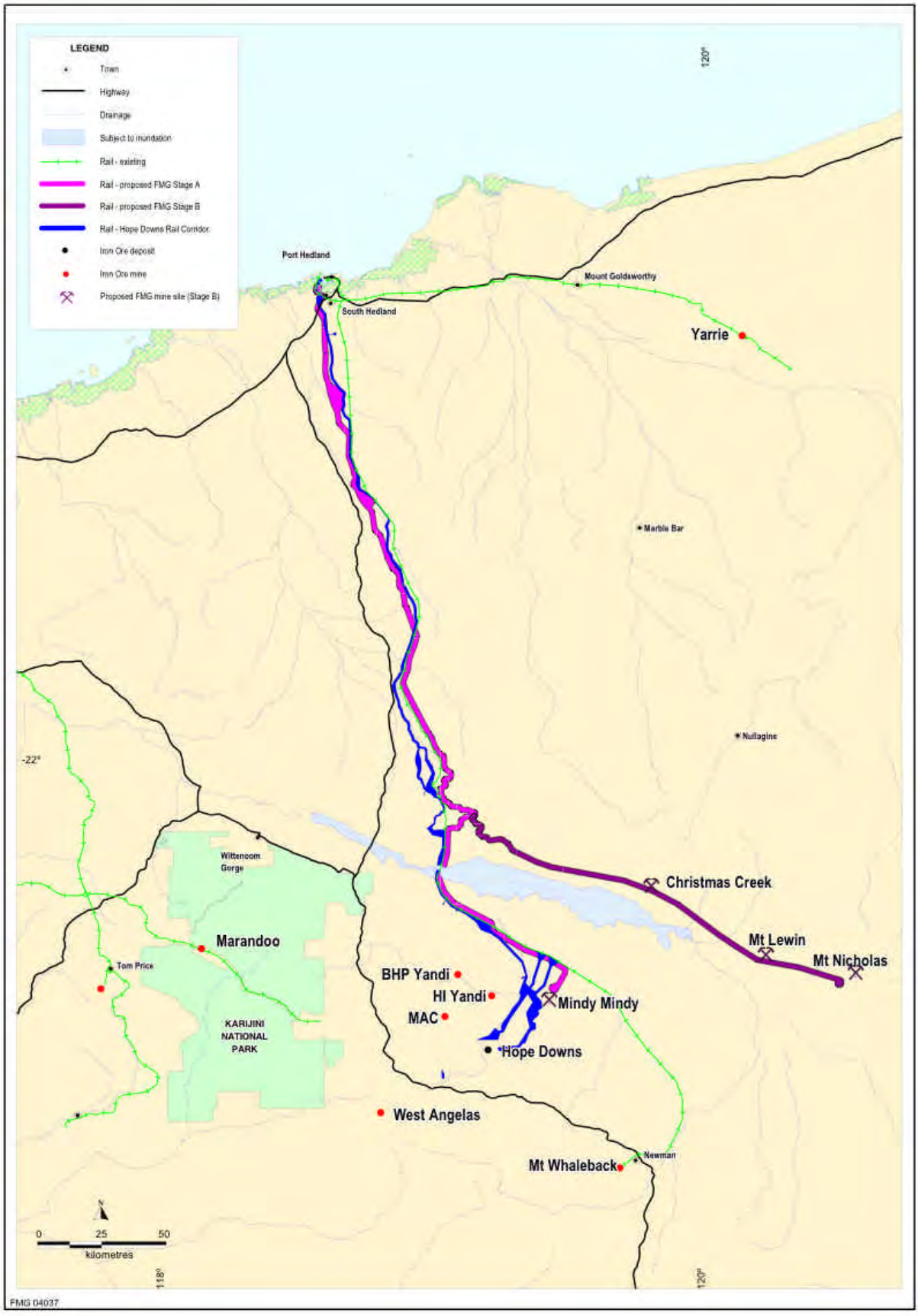

Figure 2.1: Locality map of the FMG Stage A port facility and rail corridor between Port Hedland and Mindy Mindy.

2.3 Geological and Physiographic Context of the Study Area

2.3.1 Geology

The study area crosses a large variety of geological types. On the Geological Survey of Western Australia 1:500,000 scale map sheets (Thorne and Trendall 2001), these are (from Port Hedland southwards):

- Qm (clay, mud, silt and sand on tidal areas and coastal dunes);
- Qa (alluvium - unconsolidated silt, sand and gravel) in major river channels, eg. the Turner, Yule and Fortescue Rivers;
- Qx (undivided Quaternary deposits) fringing major river systems, mainly on the northern Abydos Plain but also occurring broadly in the Fortescue Valley;
- Agp, Agf and Agt (granitoid rocks of various ages) on the central and southern Abydos Plain;
- AFt and AFtc (Tumbiana basalts), AFmk and AFm (Maddina basalts), AFjo and AFj (Jeerinah basalts) occurring broadly over the Chichester Range;
- AHm (metamorphosed chert, banded iron formation, mudstone and siltstone of the Marra Mamba Formation) along the southern edge of the Chichester Range;
- Czx (undivided Cainozoic deposits, of partly consolidated colluvium and alluvium, and silcrete and laterite) in the central Fortescue Valley area and on the colluvial fans the Hamersley Range;
- PHb (Boolgeeda Iron Formation) and PHj (Weeli Wolli Formation) on the Hamersley Range.

2.3.2 Soils

The dominant soil types in the region comprise:

- Duplex soils on the granite plains; and
- Uniform and skeletal soils on the stony hills.

Subordinate soil types comprise:

- Creek alluvia in the numerous drainage lines dissecting the area; and
- Localised areas of gilgai cracking clays associated with the basalts of the Chichester Range.

2.3.3 Major Physiographic Units

Beard (1975) identified four major physiographic units within the section of the Fortescue District encompassing the study area:

1 Abydos Plain - extending from Cape Preston east to Pardoo Creek, and south to the Chichester Range; including alluvial plains, low stony hills and granite outcrops; comprising largely granitic soils, with alluvial sands on the coastal portion;

2 Chichester Plateau - a plateau of mainly basalts, with included siltstone, mudstone, shale, dolomite and jaspilite; forming a watershed between numerous rivers flowing north through the Abydos Plain to the coast, and the Fortescue drainage on the southern side of the range;

3 Fortescue Valley - occupying a trough between the Chichester and Hamersley Plateaux; the eastern portion drains into the Fortescue Marshes, while the western portion drains through a valley through the Chichester Plateau; and

4 Hamersley Plateau - rounded hills and ranges, mainly of jaspilite and dolomite with some shale, siltstone and volcanics.

2.3.4 Rangelands (Land Systems)

Rangelands (Land System) mapping covering the project area has been prepared to a draft stage by Agriculture Western Australia (Agwest 2002). The proposed rail corridor traverses the following Rangeland units (ordered from northernmost occurrence):

1	Littoral	Bare coastal mudflats with mangroves on seaward fringes, samphire flats, sandy islands, coastal dunes and beaches; occurred along the coast in the northern section of the project area;
2	Uaroo	Broad sandy plains supporting shrubby hard and soft spinifex grasslands; occurred broadly on the northern Abydos Plain from approximately 10 km north of Chinnamon Creek, except for a ~15 km section surrounding the East Turner River;
3	Talga	Hills and ridges of greenstone and chert and stony plains supporting hard and soft spinifex grasslands; limited distribution in the survey area; ~5 km north of the East Turner River, south of the East Turner River crossing, and south of the Turner River crossing;
4	Macroy	Stony plains and occasional tor fields based on granite supporting hard and soft spinifex grasslands; occurred broadly over the southern Abydos Plain in a more or less continuous swathe to ~10 km north of the Yandee airstrip, and from the Turner River crossing to ~5 km north of Chinnamon Creek, with a few small patches further to the north;
5	Mallina	Sandy-surfaced alluvial plains supporting soft spinifex (and occasionally hard spinifex) grasslands; occurred in a broad swathe around the East Turner River;
6	River	Active flood plains and major rivers supporting grassy eucalypt woodlands, tussock grasslands and soft spinifex grasslands; occurred throughout the survey area, including the East Turner River, Chinnamon Creek, Turner River, Yule River and Weeli Wolli Creek;
7	Robe	Low limonite mesas and buttes supporting soft spinifex (and occasionally hard spinifex) grasslands; limited distribution in the survey area, in the vicinity of the East Turner River;
8	Boolaloo	Granite hills, domes and tor fields and restricted sandy plains supporting soft spinifex grasslands; limited distribution in the survey area, occurring between ~5-10 km north of Chinnamon Creek;
9	Oakover	Breakaways and stony plains on calcrete with shrubby hard spinifex grasslands; one small patch south of Chinnamon Creek;
10	Granitic	Rugged granitic hills supporting shrubby hard and soft spinifex grasslands; several swathes in the Chichester Range / southern Abydos Plain area, from south of Coonarrie Creek to south of Redmont Camp;
11	McKay	Hills, ridges, plateaux remnants and breakaways of metasedimentary and sedimentary rocks supporting hard spinifex grasslands; broad swathes bordering the cracking clays near the BHP quarry (the Wona LS);
12	Rocklea	Basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex (and occasionally soft spinifex) grasslands; a single stretch in the northern Chichester Range;
13	Wona	Basalt upland gilgai plains supporting tussock grasslands and minor hard spinifex grasslands; restricted to the central Chichester Range, in a single swathe near the BHP rail quarry;

14	Capricorn	Hills and ridges of sandstone and dolomite supporting shrubby hard and soft spinifex grasslands; limited occurrence in central Chichester Range area;
15	Newman	Rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands; occurred broadly over the southern Chichester Range and dominates the hills of the Hamersley Range;
16	Jamindie	Stony hardpan plains and rises supporting groved mulga shrublands, occasionally with spinifex understorey; occurred in broad patches over the plains of the Fortescue Valley;
17	Christmas	Stony alluvial plains supporting snakewood and mulga shrublands with sparse tussock grasses; restricted to the broad plain in the Fortescue Valley immediately south of the Chichester Range;
18	Adrian	Stony plains and low silcrete hills supporting hard spinifex grasslands; limited distribution in the survey area, occurring on low stony hills in the Fortescue Valley;
19	Marsh	Lake beds and floodplains subject to regular inundation, with samphire shrublands, mixed halophytic shrublands and saltwater couch grasslands; occurring broadly over the seasonally inundated Fortescue Marsh system;
20	Coolibah	Flood plains with weakly gilgaied clay soils supporting coolibah woodlands with tussock grass understorey; restricted to the drainage area within the Fortescue Valley, representing the westernmost extent of the Fortescue Marsh system;
21	Calcrete	Low calcrete platforms and plains with shrubby hard spinifex grasslands; narrow calcareous plains fringing the southern side of the Marsh LS;
22	Cowra	Plains supporting snakewood and mulga shrublands with some halophytic undershrubs; limited distribution within the survey area, occurring on the clayey plains fringing the Calcrete LS;
23	Boolgeeda	Stony lower slopes and plains found below hill systems supporting hard and soft spinifex grasslands and mulga shrublands; occurred broadly over the plains fringing the hills of the Hamersley Range;
24	Divide	Sandplains and occasional dunes supporting shrubby hard spinifex grasslands; extremely limited representation in the southern portion of the survey area;
25	Fortescue	Alluvial plains with patchy grassy woodlands and shrublands; single swathe in the eastern portion of the rail corridor, north of the Munjina Road crossing of the BHP rail;
26	Fan	Washplains and gilgai plains with groved mulga shrublands and tussock grasslands; broad swathe surrounding the Urandy LS; and
27	Urandy	Alluvial plains and drainage lines supporting soft spinifex grasslands; narrow channels draining out of Weeli Wolli Creek towards the Fortescue Marsh system.

2.4 Biological Context of the Study Area

2.4.1 Pilbara IBRA Bioregion

The Interim Biogeographic Regionalisation for Australia (IBRA) recognises 85 bioregions (Environment Australia 2000). The Pilbara Bioregion has four main components, based on the physiographic work of Beard (see Section 2.3.3): the Hamersley and Chichester Ranges, Fortescue Plains and Roebourne Plains subregions. All four components are traversed by the proposed development.

With increasing survey work in the Pilbara, it is becoming apparent that this region is one of the centers of biodiversity in the State. This appears to be related to the diversity of geological, altitudinal and climatic elements in the region, as well as a function of its location. The eastern portion of the Pilbara in particular is located in a transitional zone between the floras of the Eyrean (central desert) and southern Torresian (tropical) bioclimatic regions, and contains elements of both floras (see for example van Leeuwen and Bromilow (2002) for a detailed discussion of the significance of the Hamersley Range). In recognition of this high species diversity and the high levels of endemism in the region, the Pilbara has recently been nominated as one of 15 national biodiversity "hotspots" by the Minister for the Environment and Heritage (go to www.deh.gov.au/minister/env/2003/mr03oct03.html).

The Pilbara Bioregion is listed as a high priority for funding for land purchase under the National Reserves System Co-operative Program due to the limited representation of the area in conservation reserves. Portions of various pastoral leases in the region have been nominated for exclusion for public purposes in 2015, when the leases come up for renewal. Many of the submissions are from the Department of Conservation and Land Management, with the intention of adding these areas to the existing conservation estate in order to provide a comprehensive, adequate and representative reserve system.

Of relevance to the proposed FMG rail development are:

- the proposed exclusion of some 46,660 ha from Mulga Downs Station between the Great Northern Highway and existing BHP rail line; and
- the proposed exclusion of some 135,537 ha from Marillana Station, mainly north of the Munjina – Roy Hill Road.

The clear intent of these proposed exclusions is to form a management area to protect the highly significant Fortescue Marsh, which is listed as a nationally important wetland (Environment Australia 2001). A wetland may be considered nationally important if it meets at least one of the following criteria:

1. It is a good example of a wetland type occurring within a biogeographic region in Australia;
2. It is a wetland which plays an important ecological or hydrological role in the natural functioning of a major wetland system/complex;
3. It is a wetland which is important as the habitat for animal taxa at a vulnerable stage in their life cycles, or provides a refuge when adverse conditions such as drought prevail;
4. The wetland supports 1% or more of the national populations of any native plant or animal taxa;
5. The wetland supports native plant or animal taxa or communities which are considered endangered or vulnerable at the national level; or
6. The wetland is of outstanding historical or cultural significance (Environment Australia 2001).

Under this classification, the Fortescue Marsh is listed as meeting criteria 1, 2, 3 and 6 (notably the same criteria by which the more widely recognised Millstream is listed).

2.4.2 Beard's Vegetation Mapping

Beard (1975) mapped the vegetation of the Pilbara at a scale of 1:1,000,000. The study area lies entirely within the Fortescue Botanical District of the Eremaean Botanical Province as defined by Beard. The vegetation of this province is typically open, and frequently dominated by spinifex, wattles and occasional Eucalypts.

The study area includes portions of 11 of Beard's mapping units. From north to south, these are1:

- Mangals on the coast at Port Hedland;
- Tidal mudflats at Port Hedland;
- *Acacia stellaticeps* dwarf shrubs over *Triodia epactia*2 hummock grassland, mainly near the coast;
- Kanji *Acacia inaequilatera* shrubs over *Triodia epactia* hummock grassland on the broad granite plain south to the Chichester Range;
- Coolibah *Eucalyptus victrix* and River Red Gum *E. camaldulensis* var. *obtusa* woodland in the major drainage systems such as the Yule and Turner Rivers;
- *Acacia inaequilatera* shrubs over mixed *Triodia epactia* and *Triodia wiseana* hummock grassland on the Chichester Range;
- Patches of short grassland on the cracking clays of the Chichester Range;
- Snappy Gum *Eucalyptus leucophloia* scattered trees over *Triodia wiseana* hummock grassland, with Mulga *Acacia aneura*3 low woodland in valleys, on the southern side of the Chichester Range;
- Mulga groves on the plain surrounding the Fortescue Marsh and near Weeli Wolli Creek;
- Succulent steppe dominated by various halophytes within the Fortescue Marsh; and
- Twin-leaf Mallee *Eucalyptus gamophylla* scattered mallees over *Triodia basedowii* hummock grassland on the low footslopes of the Hamersley Range.

2.4.3 Other Botanical Studies

A survey of the Abydos-Woodstock Reserve in the late 80s is the only published vegetation survey relating to the area (Tinley 1991). This report described a variety of vegetation types from the reserve.

The dominant vegetation of the granite plains included:

- *Acacia inaequilatera* shrublands over *Triodia epactia* hummock grasslands on the dominant duplex red earths;
- *Acacia orthocarpa* shrublands on leached, slightly acid, shallow stony red earths on granite;
- *Triodia lanigera* hummock grasslands in seasonally waterlogged areas;
- *Triodia brizoides* treeless hummock grasslands on stony ferricrete soils; and
- *Corymbia hamersleyana* over *Triodia wiseana* hummock grasslands on stony calcrete soils (Tinley 1991).

Vegetation of lower lying areas and creeks included:

- River gums *Eucalyptus camaldulensis* var. *obtusa* and Cadjeputs *Melaleuca argentea* in major creeks;
- Wattle *Acacia* scrub over grasses on floodplain alluvia;
- Hummock grasslands of various spinifex species on the mosaic soils of low lying and saline flats - *Triodia wiseana* (deep loamy gradational, alkaline, non-sodic to

1 Note that species names have been updated as necessary to reflect changes in nomenclature.
2 Note that '*Triodia epactia*' is a species complex rather than a single taxon.
3 Note that '*Acacia aneura*' is also a species complex.

calcareous soils), *T. epactia, T. longiceps* (strongly alkaline or calcareous soils), *T. secunda* (calcareous sodic clays); and

- *Melaleuca* scrub thicket on deep, alkaline, duplex calcareous clays over calcrete (Tinley 1991).

As mentioned previously, the Department of Agriculture (Agwest 2002) has carried out a broad scale survey of parts of the Pilbara. This will result in brief descriptions of the vegetation of the Rangelands, however these are not yet available. The Department of Conservation and Land Management (DCLM) has also sampled cracking clays of the Chichester Plateau and in the Fortescue Valley, however this data is not yet readily available. DCLM has also sampled the flora of numerous hilltops in the Hamersley Range (van Leeuwen and Bromilow 2002).

3.0 Vegetation and Flora Survey Methodology

3.1 Approach to the Survey

In order to determine the overall value of the vegetation and flora of the study area, data collected during the field survey was used to assess two different botanical attributes:

- The vegetation types occurring within the rail corridor were described and mapped during a vegetation survey. The mapping indicated the distribution and relative abundance of each vegetation unit, which helped to define units of particular conservation value; and

- The overall flora occurring in the study area was determined through a flora survey that focussed on sampling of quadrats. This survey provided a measure of the overall floristic richness of the area, and identified the individual species present. It also identified species of particular conservation significance.

A PATN analysis was also planned to investigate relationships between the intensively sampled quadrats on the basis of floristic composition and abundance, however this could not be completed in the timeframe of the study. The analysis would have used a combined dataset of data from the FMG corridor and other survey areas in the region, particularly the nearby Hope Downs rail corridor, and would have indicated quadrats that were similar floristically. This information would have been used to refine the vegetation units identified from the vegetation survey, and would have assisted in the definition of uncommon vegetation types.

3.2 Survey Timing

The terrestrial flora survey comprised a single visit to the study area by four botanists in March / April 2004:

- Michi Maier (Biota) and Brian Morgan (private consultant) surveyed the northern section of the rail corridor down to the Turner River between 17th and 21st March; and

- Michi Maier, Brian Morgan, Kelli McCreery (Biota) and Raimond Orifici (Biota) surveyed the rail corridor south of the Turner River between 22nd March and 6th April.

The mangrove survey was completed by Garth Humphreys (Biota) and Dr Eric Paling (Murdoch University) between 5th and 7th May 2004.

The terrestrial flora survey was done approximately 6 weeks after sustained and heavy rainfall in the area in February (see Figure 3.1), and was extremely favourable for the collection of ephemeral flora and flowering grasses. Additional rail fell on the southern portion of the corridor during the latter part of the trip, arising out of Tropical Cyclone Faye.

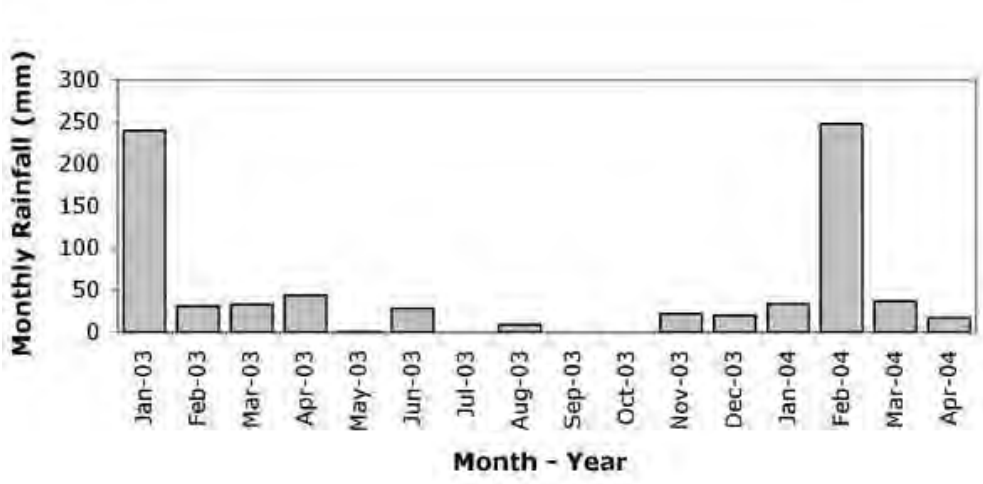

Figure 3.1: Monthly rainfall for Newman from January 2003 to April 2004 (data supplied by Bureau of Meteorology).

3.3 Terrestrial Vegetation Survey Methodology

3.3.1 General

The terrestrial vegetation and flora surveys were carried out together. While they are presented as separate surveys in this report, the data collection for the two surveys is interwoven. The vegetation was described at 97 quadrats, with the flora at each of these quadrats recorded in detail (see Section 3.4). The flora records provided the names for use in the vegetation descriptions, and contributed to the flora species lists and frequency of occurrence data. Several parameters relating to the individual quadrats were used to assist in both the description of vegetation types and the determination of flora distribution (particularly in terms of defining associated habitats).

3.3.2 Vegetation Description and Mapping

There is currently no agreed framework for vegetation description in the Pilbara. In the current study, terrestrial vegetation descriptions were based on the height and estimated cover of dominant species using Muir's (1977) classification, modified after Aplin's (1979) modification of the vegetation classification of Specht (1970) to include a hummock grassland category (see Appendix 3). Descriptions were made at each of the 97 quadrats (see Section 3.4.2), and at over 30 relevés (unbounded flora survey sites). Additional foot traverses were done to ground-truth the boundaries of vegetation types and to allow assessment of areas that were inaccessible by vehicle.

The vegetation descriptions were then grouped to arrive at vegetation units that were defined on the basis of a shared suite of perennial species with a similar range of cover values. These have been listed under the main phytogeographic region in which they were found to occur, and further grouped into similar landform/habitat types. Alternative approaches could utilise another framework, such as Rangelands (Land System) mapping or geology, however such information was not available in an appropriate form for incorporation in this study.

An arbitrary coding system was used for the vegetation types based on that used for a previous major study in the region (the Hope Downs rail corridor between Port Hedland and Weeli Wolli Creek; Biota and Trudgen 2002). This system incorporated:

- the initial letter of the phytogeographic unit: Abydos Plain (A); Chichester Range (C); Fortescue Valley (F); Hamersley Range (H);

- a lower case letter designating the habitat / vegetation type: mudflats (s); stony plains, hills and ridges (h); creeks and floodplains (c); plains (p) (divided into those dominated by spinifex (pt) or shrubs (ps) for the Abydos plain); rockpiles (r); Mulga-dominated vegetation (a); cracking clays (x); sand dunes (d); and
- a number to further separate vegetation types within each habitat.

To collect spatial information, 1:10,000 scale topographic maps were marked up with vegetation type boundaries by reference to aerial photography (rectified and geo-referenced 1:10,000 scale colour photography). Several of the vegetation units were either too small to represent at the scale of mapping, or too variable to map individually based on the level of investigation which was possible during the field survey. These latter units were mapped as mosaics. These vegetation boundaries were then scanned and imported into ArcView 3.2a for digitising, polygonising and attributing. Other point source datasets, such as site locations, weed locations and priority flora locations were also entered as spatial data sets in ArcView. These datasets, in conjunction with data used in other public environmental assessments (primarily Hope Downs Management Services 2002), were used in the production of the maps contained in this report.

3.4 Terrestrial Flora Survey Methodology

3.4.1 Location of the Quadrats

The locations of the 97 detailed flora recording quadrats were chosen to represent the range of terrestrial vegetation types occurring within the survey area, particularly types that had not previously been sampled within the nearby Hope Downs rail corridor.

Where possible, quadrats were located near the centerline of the proposed rail corridor.

3.4.2 Field Sampling Method

Quadrats were typically 50 m x 50 m, as this size gives a good sample of flora presence in the Pilbara. It also gives a good indication of the shrub and grass layer vegetation structure for most vegetation types in the Pilbara that occur in 'uniform' habitats (eg. plains and hillslopes, where vegetation stands are typically greater than this quadrat size). Quadrat shape and/or size were adjusted as necessary to fit smaller or oddly shaped habitats (eg. flowlines, rocky outcrops).

Each quadrat was permanently marked using a steel fence dropper at one corner of the quadrat (usually the northwest corner). Quadrats were uniquely numbered in a series from FMG10 to FMG108; this series excluded five site numbers that were not used (FMG11, FMG62, FMG86, FMG87 and FMG106), and included three site numbers that were duplicates and were distinguished by adding ‘F’ (ie. FMG20 / FMG20F, FMG25 / FMG25F, and FMG26 / FMG26F).

The following parameters were recorded for each quadrat:

1. Location — AMG coordinates recorded in WGS84 datum (~equivalent to GDA94) using a hand-held Global Positioning System (GPS), to an accuracy usually within 5 m; readings usually taken for all four corners of the quadrat;
2. Vegetation Description — Broad description based on the height and estimated cover of dominant species after Muir (1977), modified according to Aplin's (1979) modification of the vegetation classification system of Specht (1970) (see Appendix 3);
3. Habitat — Description of landform and habitat;

4.	Soil	Broad description of soil type and stony surface mantle;
5.	Disturbance Details	Evidence of grazing, mining exploration activities, weed invasion, frequent fires etc. Note that fire effects were only considered as a negative impact if they were caused by repeated burning (such as that done for pastoral purposes). Fire is a natural and frequent process in the Pilbara to which the vegetation has adapted, and to class areas as being in poor condition simply because they have been recently burnt is misleading; and
6.	Percentage Foliar Cover	Cover was estimated visually for each species. Estimates were made to the nearest percent where possible, or a range (eg. 5-10%) was used. '+' was used where only occasional individuals were present, with a cover of less than 1%.

Colour photographs of the vegetation at each site were taken using a digital camera.

Additional foot traverses were done to allow assessment of areas that were inaccessible by vehicle. Opportunistic flora collections were made on these traverses to supplement the list of species recorded from the flora survey sites. Particular attention was paid to searching habitats likely to support flora species with sporadic distributions (eg. creeklines, rockpiles and cracking clay areas).

3.4.3 Flora Identification and Data Entry

Common species that were well known to the survey botanists were identified in the field. Voucher specimens of all other species were collected and assigned a unique number to facilitate tracking of data. These were pressed in the field, and dried in a drying oven.

These vouchers were then identified by keying out, reference to appropriate publications, use of reference collections and comparison to the collections held at the Western Australian Herbarium. Most specimens were identified by Michi Maier and Kelli McCreery, with assistance from Malcolm Trudgen. Some specimens of difficult taxa were identified by relevant specialists (see Section 11.0). Specimens will be lodged with the Western Australian Herbarium and Karratha Regional Herbarium for all taxa for which suitable material is available.

Nomenclature was checked against the current listing of scientific names recognised by the Western Australian Herbarium and updated as necessary. The only outdated nomenclature retained was that relating to *Cassia*. This genus is currently recognised as *Senna* (see Randell 1989), however the older *Cassia* classification (Symon 1966) was perceived to be a more realistic level of separation of the taxa (eg. with taxa such as *'glutinosa'* and *'pruinosa'* recognised at specific rather than subspecific level). A more detailed discussion is contained in Trudgen and Casson (1998), while a comparison of the nomenclature under the two classifications is presented in Appendix 4.

All raw site data was entered into an Access database, with species names entered following identification of the specimens.

Seventy-one (71) quadrats within the Hope Downs rail corridor (Biota and Trudgen 2002) are also located within the FMG rail corridor: H008, H009, H010, H011, H012, H013, H014, H015, H016, H018, H019, H020, H021, H029, H030, H039, H041, H042, H054, H055, H056, H057, H058, H067, H068, H069, H070, H071, H072, H073, H074, H075, H076, H087, H088, H093, H099, H102, H103, H104, H105, H140, H143, H144, H145, H146, H147, H148, H149, H150, H151, H152, H154, H156, H163, H165, H178, H180, H234, H237, H238, H239, H245, H248, H249, H250, H257, H260, H281, H282 and H287.

Species from these 71 quadrats have been included in the species list in Appendix 4. The total number of quadrats sampled in the FMG corridor is thus 168.

3.4.4 Declared Rare and Priority Flora Database Searches

A search of the DCLM and Western Australian Herbarium databases was done for Declared Rare Flora (DRF) and Priority Flora recorded within the area bounded by:

- NW: 118° E, 20° S;
- NE: 121° E, 20° S;
- SE: 121° 30' E, 23° S; and
- SW: 118° 30' E, 23° S.

These locations were overlain on the study area in ArcView to indicate populations in the vicinity of the rail corridor.

3.5 Mangrove Survey Methodology

A site-specific field survey was conducted in April 2004 to ground-truth mangrove assemblages identified from colour aerial photography, and review key impact areas in the field. Field work on mangrove communities was completed by Garth Humphreys (Biota Environmental Sciences) and Dr. Eric Paling (Murdoch University).

The mangrove associations in the vicinity of the proposed stockpile, ore handling and port area were mapped from the aerial photography, largely by a process of updating and re-ground-truthing historical mapping of the entire harbour area completed in 1993 (Paling et al. 2003). Data were collected on mangrove species representation, mangal associations, heights and other relevant information, and related directly to aerial photography.

A Differential Global Positioning System (DGPS) was also used to spatially map the upper limit of the mangrove zone. This margin represents the limit of mangrove salinity tolerance under normal conditions and is therefore the most sensitive to any reduction in tidal flushing. Elevation data were collected (200 waypoints) for integration into the hydrodynamic modelling completed for the project.

Mangrove assemblage categories were described, consistent with those of Paling et al. (2003) to allow for local context assessments. The distribution of these units was mapped by manual overlay onto rectified aerial photography, followed by digitising and capture into ArcView 3.2a GIS. The GIS was then used for further analysis, including intersection with the estimated works area for the proposed stockpile and port facilities.

3.6 Limitations of the Survey

Due to time limitations, sampling was targeted at the centerline of the proposed rail alignment (as indicated by FMG at the time of survey), with additional unusual vegetation types beyond this area being sampled wherever possible.

Some areas could not be accessed; some of the tracks and creek crossings that had been useable during the Hope Downs studies were no longer viable due to the recent floods, and some areas lacked existing vehicle tracks. Vehicle access was attempted to some of these areas, and other sections were traversed on foot where time allowed, however some sections were not visited (ie. the easternmost section of the Chichester deviation).

Some sections of the rail corridor were modified subsequent to the field survey, mainly in the area of the White Hills Estate, East Turner River, Turner River and near the southern rail loop. These areas were not specifically sampled in the field, but were mapped on the basis of interpretation of aerial photography and existing vegetation mapping.

As only a portion of the entire area of the rail corridor was sampled, not all of the variation in vegetation would have been identified. In addition, the digital aerial photographs supplied for the field survey were of poor quality and of limited use for vegetation mapping. High quality film photography became available during the mapping process following the field survey for the portion of the rail corridor between Port Hedland and the deviation through the Chichester Range, but was not provided for the Fortescue Valley and Hamersley Range sections of the rail corridor.

Fungi and nonvascular flora (eg. algae, mosses and liverworts) were not specifically sampled.

Although the field work was done at an appropriate time for detecting most ephemeral flora, some species (eg. annual daisies that would germinate mostly after late winter rains) would not have been present or identifiable at the time of survey.

As the survey sites were only sampled once, additional species would be recorded if the sites were revisited. The species lists should therefore be taken as indicative rather than exhaustive.

Although a floristic analysis of the quadrat data is planned, this could not be completed in the time frame of this study.

4.0 Terrestrial Vegetation

4.1 Vegetation Types

A total of 122 terrestrial vegetation types was defined for the FMG rail corridor, comprising a wide range of structural and floristic variants. These included hummock grasslands of *Triodia* species with a variable shrub overstorey on plains, hillslopes and crests, dominating the majority of the project area; tall shrublands of *Acacia* species, usually with an overstorey of *Corymbia*, in creeklines; open forests or woodlands of Cadjeput *Melaleuca argentea*, River red gum *Eucalyptus camaldulensis* and/or Coolibah *E. victrix* over tall shrublands of *Acacia* or *Melaleuca* spp. on river banks and beds; Mulga *Acacia aneura* woodlands and tall shrublands over spinifex or various grasses on the plains of the Fortescue Valley; and variable vegetation on cracking clays of the Fortescue Valley (ranging from tussock grasslands to high open shrublands of Snakewood *Acacia xiphophylla*).

A description of each terrestrial vegetation type is given below, grouped under the region of the Fortescue District and the habitat type in which they were mainly found to occur. Sites assessed within the FMG rail corridor during both the current study and Biota and Trudgen (2002) are listed below each vegetation type. Cleared or heavily disturbed areas (eg. South Hedland townsite, quarry areas etc) were not specifically surveyed but have been indicated on the mapping as 'Dist' (Disturbed). Mangals are described separately in Section 8.0.

Maps of the distribution of the vegetation types are presented in Appendix 1, together with the mapping of the nearby Hope Downs rail corridor for context, and plates of representative types. Mangals are mapped broadly on the 'terrestrial' vegetation mapping as unit Am, and mapped individually in more detail on a specific mangrove map (see Figure 9.1). Appendix 2 contains a summary table of the areal extent of each vegetation type. The raw data from the individual detailed flora survey sites is contained in Appendix 3.

Note that an asterisk (*) preceding a scientific name denotes that the species is introduced (not native). Note also that *Cassia* has been retained in preference to *Senna* in this document (see Section 3.4.3).

4.2 Abydos Plain

4.2.1 Vegetation of Littoral Areas

As ***Halosarcia* spp., *Frankenia ambita* scattered low shrubs to low open shrubland**
Coastal mudflats and tidal creeks penetrating into the Abydos Plain near Port Hedland had occasional low shrubs to low open shrublands (usually less than 50 cm tall) dominated by largely succulent and/or salt-tolerant species. These included various *Halosarcia* species, mainly *H. halocnemoides* (subsp. *tenuis* and a newly identified subspecies) and *H. indica* (var. *leiostachya* and *julacea*), *Frankenia ambita*, and lesser amounts of *Eragrostis falcata*, *Hemichroa diandra*, *Muellerolimon salicorniaceum*, *Neobassia astrocarpa*, *Sporobolus virginicus* and *Trianthema turgidifolia*. Only occasional tall shrubs (mainly *Acacia ampliceps* and seedlings of the mangrove *Avicennia marina*) were noted. No sites from the current study; sites H150, H151 of Biota and Trudgen (2002).

4.2.2 Vegetation of Sandy Areas

4.2.2.1 Hummock grasslands of *Triodia* ('spinifex') species

Apt1 ***Triodia epactia, T. secunda* mid-dense hummock grassland**
This vegetation occurred on low sandy islands within the coastal mudflats and on sodic soils in low-lying, seasonally inundated areas within the Abydos Plain. It was characterised by

mid-dense hummock grasslands of Soft spinifex *Triodia epactia* and Leaping spinifex *T. secunda*. Few other species were recorded (eg. *Bulbostylis barbata, Eriachne* sp. Port Hedland, *Fimbristylis dichotoma, Pluchea tetranthera, Sporobolus australasicus*). Sites FMG34, FMG108; also sites H074, H149, H154 of Biota and Trudgen (2002).

Apt2 *Triodia secunda* mid-dense hummock grassland
Virtual monocultures of *Triodia secunda* occurred on areas of calcareous sodic clays throughout the Abydos Plain. Only occasional other species were recorded, such as *Sporobolus actinocladus* and *Trianthema cussackiana*. Site FMG26F and part site FMG77.

Apt3 *Triodia epactia* hummock grassland to mid-dense hummock grassland
Occasional areas had *Triodia epactia* hummock grasslands with only very scattered shrubs, typically of *Pluchea tetranthera*. Other associated species: *Bulbostylis barbata, Eragrostis cumingii, Eriachne aristidea, Fimbristylis dichotoma, Goodenia lamprosperma*. Sites FMG32, FMG39.

Apt4 *Triodia longiceps, T. epactia* mid-dense hummock grassland
This vegetation occurred on calcareous alkaline soils of the northern portion of the Abydos Plain, on orange-brown coarse sands with algal crusts on the surface. It had a moderately dense hummock grassland of *Triodia longiceps*, with variable amounts of *T. epactia*. Other associated species: *Acacia inaequilatera, A. stellaticeps, Bulbostylis barbata, Mollugo molluginis, Polycarpaea corymbosa, Sporobolus australasicus*. Site FMG35.

Apt5 *Triodia angusta* mid-dense hummock grassland
Moderately dense hummock grasslands of *Triodia angusta*[4], with only scattered other species, were recorded from the central portion of the Abydos Plain. Other associated species: *Cassytha filiformis, Sporobolus australasicus*. No sites from this study; site H099 of Biota and Trudgen (2002).

4.2.2.2 Scattered shrubs over *Triodia* hummock grasslands

Apt6 *Acacia stellaticeps, Pluchea ferdinandi-muelleri* low open shrubland over *Triodia lanigera* mid-dense hummock grassland
Some areas of sandy plain (eg. bordering the East Turner River) had a mid-dense hummock grassland of *Triodia lanigera*, with only occasional shrubs, typically of *Acacia stellaticeps* and *Pluchea ferdinandi-muelleri*. Other associated species: *Aristida holathera* var. *holathera, Bulbostylis barbata, Eriachne obtusa*. Sites FMG83, FMG99.

Apt7 *Acacia* spp., *Pluchea ferdinandi-muelleri* scattered shrubs over *Triodia longiceps* mid-dense hummock grassland
Areas of calcareous and strongly alkaline soils on the southern Abydos Plain were dominated by relatively dense hummock grasslands of *Triodia longiceps* with only scattered shrubs such as *Acacia bivenosa, A. victoriae* and *Pluchea ferdinandi-muelleri*. Other associated species: *Phyllanthus maderaspatensis, Pluchea tetranthera, Pterocaulon serrulatum, Salsola tragus, Trianthema triquetra, Triodia secunda*. Site FMG81 and part site FMG77.

Apt8 *Acacia stellaticeps, Pluchea ferdinandi-muelleri* low open shrubland over *Triodia angusta, T. lanigera* mid-dense hummock grassland
This vegetation was recorded from a floodplain adjacent to a minor creekline in the southern Abydos Plain area. It had scattered low shrubs of *Acacia stellaticeps* and *Pluchea ferdinandi-muelleri* over a moderately dense hummock grassland of a mixture of *Triodia angusta* and *T. lanigera*. There was also a very open annual grassland dominated by *Schizachyrium fragile* and *Eriachne* sp. Port Hedland. Other associated species: *Aristida holathera* var. *holathera, Cyperus blakeanus, Eriachne obtusa, Fimbristylis dichotoma, Pterocaulon serrulatum, Stemodia grossa*. No sites in this study.

Apt9 *Acacia stellaticeps* scattered shrubs to low shrubland over *Triodia epactia, T. schinzii* dense hummock grassland
The northern section of the Abydos Plain near Port Hedland had a variably dense cover of *Acacia stellaticeps* over a dense to mid-dense hummock grassland of a mixture of *Triodia epactia* and *T. schinzii*. Other associated species: *Aristida holathera* var. *holathera, Bonamia linearis, Cajanus marmoratus, Chrysopogon fallax, Cleome uncifera, Corchorus*

4 Note that '*Triodia angusta*' is a species complex rather than a single taxon.

incanus, Digitaria brownii, Eragrostis eriopoda, Eriachne obtusa, Hibiscus leptocladus, Hybanthus aurantiacus, Mollugo molluginis, Pluchea tetranthera, Polymeria ambigua, Schizachyrium fragile. No sites from this study; sites H105, H140, H148, H156 of Biota and Trudgen (2002).

Apt10 *Acacia stellaticeps* scattered shrubs to low shrubland over *Triodia epactia* dense hummock grassland

On the Abydos Plain further to the south, the vegetation was structurally similar to Apt9 however *Triodia schinzii* was no longer a dominant component of the hummock grassland. Other associated species: *Aristida holathera* var. *holathera, Cassia notabilis, Chrysopogon fallax, Corchorus incanus, Desmodium filiforme, Eriachne aristidea, Eucalyptus victrix, Goodenia lamprosperma, Pluchea tetranthera, Sida cardiophylla* and *Zornia muelleriana* subsp. *congesta*. Site FMG104; also sites H103, H147 of Biota and Trudgen (2002).

The following vegetation types Apt11, Apt12 and Apt13 are closely related.

Apt11 *Acacia* spp. scattered tall shrubs over *A. stellaticeps* low open shrubland over *Triodia lanigera* hummock grassland

This broadly defined vegetation type of the Abydos Plain includes a number of floristic variations that do not have distinct signatures on aerial photography. It had occasional tall shrubs of a mixture of *Acacia* species, mainly *A. inaequilatera, A. colei, A. tumida, A. ancistrocarpa* and *A. coriacea* subsp. *coriacea*, over a low open shrubland to low shrubland of *A. stellaticeps*, often with *Indigofera monophylla* (small calyx form). The hummock grassland was dominated by *Triodia lanigera*, occasionally with some *T. epactia*. Other associated species: *Aristida holathera* var. *holathera, Bonamia linearis, B. rosea, Cassia notabilis, Eragrostis eriopoda, Eriachne obtusa, Goodenia microptera, Hibiscus leptocladus, Isotropis atropurpurea, Mollugo molluginis, Paraneurachne muelleri*. No sites in this study; sites H075, H260 of Biota and Trudgen (2002).

Apt12 *Acacia inaequilatera* scattered tall shrubs over *Triodia lanigera* mid-dense hummock grassland

This vegetation was recorded from the southern portion of the Abydos Plain, and was similar to Apt11 but lacked the *Acacia stellaticeps* low shrub component. It had occasional tall shrubs of *Acacia inaequilatera*, usually with *A. ancistrocarpa* or *A. bivenosa*, over a moderately dense hummock grassland of *Triodia lanigera*. There was typically a low open shrubland to scattered low shrub layer of species such as *Corchorus parviflorus, Indigofera monophylla* (small calyx form) and *Isotropis atropurpurea*. Other associated species: *Aristida contorta, A. holathera* var. *holathera, Bonamia rosea, Eragrostis eriopoda, Goodenia microptera, Mollugo molluginis, Tephrosia* sp. Bungaroo Creek. Sites FMG73, FMG75, FMG95, FMG100; also site H239 of Biota and Trudgen (2002).

Apt13 *Acacia ancistrocarpa* open shrubland to open heath over *Triodia lanigera* hummock grassland

This vegetation occurred broadly on the northern Abydos Plain, from approximately the old Yandee airstrip northwards, and was again similar to Apt11. It had a usually open shrubland, sometimes to an open scrub, of *Acacia ancistrocarpa* over a hummock grassland dominated by *Triodia lanigera*. Other associated species: *Acacia bivenosa, A. inaequilatera, A. stellaticeps, Aristida holathera* var. *holathera, Bonamia linearis, B. rosea, Cassia notabilis, Cleome uncifera, Goodenia microptera, Grevillea wickhamii* subsp. *aprica, Indigofera monophylla* (small calyx form), *Mollugo molluginis, Tephrosia* sp. Bungaroo Creek. Sites FMG27, FMG37, FMG105 and releve FMGMA; also sites H093, H144, H178, H238 of Biota and Trudgen (2002).

Apt14 *Acacia inaequilatera* scattered tall shrubs to high open shrubland over *Triodia epactia* hummock grassland to mid-dense hummock grassland

This vegetation was described by Tinley (1991) as occurring broadly on the dominant duplex red earths of the granite plains. It had a scattered to 10% cover of *Acacia inaequilatera* tall shrubs over a hummock grassland of *Triodia epactia*. Other associated species: *Acacia ancistrocarpa, A. colei, Aristida holathera* var. *holathera, Bulbostylis barbata, Cassia notabilis*. No sites from this study.

Apt15 *Acacia inaequilatera, A. ancistrocarpa* scattered tall shrubs over *Triodia epactia, T. lanigera* hummock grassland

This vegetation occurred on sandy granite-derived soils of the northern Abydos Plain. It had scattered tall shrubs of *Acacia inaequilatera* and *A. ancistrocarpa* over a hummock

grassland of a mixture of *Triodia epactia* and *T. lanigera*. Other associated species: *Acacia ancistrocarpa, A. colei, Aristida contorta, A. holathera* var. *holathera, Bonamia linearis, Bulbostylis barbata, Cassia notabilis, Eriachne pulchella* subsp. *dominii, Indigofera monophylla* (small calyx form), *Mollugo molluginis, Pluchea tetranthera*. No sites from this study; sites H067, H071, H087 of Biota and Trudgen (2002).

Apt16 *Acacia colei, A. tumida* high open shrubland over *Triodia epactia* hummock grassland

This vegetation type occurred mainly on the northern Abydos Plain. It had a high open shrubland to scattered tall shrubs dominated by *Acacia colei* and *A. tumida* over a *Triodia epactia* hummock grassland. There was typically also a very open tussock grassland dominated by species such as *Aristida holathera* var. *holathera, Eragrostis eriopoda* and *Paraneurachne muelleri*. Other associated species: *Acacia ancistrocarpa, A. coriacea* subsp. *coriacea, A. inaequilatera, A. stellaticeps, Bonamia linearis, Bulbostylis barbata, Cassia notabilis, Hakea lorea* subsp. *lorea, Indigofera monophylla* (small calyx form), *Mollugo molluginis, Sida cardiophylla*. No sites from this study.

Apt18 *Acacia inaequilatera, A. ancistrocarpa* scattered tall shrubs over *Triodia basedowii* closed hummock grassland

This vegetation was recorded from the central Abydos Plain area. It had occasional tall shrubs to a high open shrubland of *Acacia inaequilatera* and *A. ancistrocarpa* over a closed hummock grassland of *Triodia basedowii*. It is possible that the spinifex at this site was actually the more common *T. lanigera*, however in the absence of additional data this species' identification has been retained. Other associated species: *Bonamia rosea, Cajanus cinereus, Cassia glutinosa, C. notabilis, Isotropis atropurpurea, Pluchea tetranthera*. No sites from this study; site H073 of Biota and Trudgen (2002).

4.2.2.3 Shrublands over *Triodia* hummock grasslands

Aps1 *Acacia orthocarpa* high open shrubland to open scrub over *Triodia epactia* mid-dense hummock grassland

Acacia orthocarpa shrublands were described by Tinley (1991) as occurring broadly over the leached, slightly acid, shallow stony red earths on granite in the Abydos-Woodstock area. Three main types were identified within the FMG rail corridor (Aps1, Aps2 and Aps3). Aps1 was a high shrubland, occasionally to open scrub, of *Acacia orthocarpa* over a hummock grassland of *Triodia epactia*. Other associated species: *Acacia ancistrocarpa, A. bivenosa, Aristida contorta, Bonamia rosea, Bulbostylis barbata, Cassia glutinosa, Fimbristylis dichotoma, Mollugo molluginis, Tephrosia* sp. Bungaroo Creek. Sites FMG91, FMG103 and part site FMG79,.

Aps2 *Acacia orthocarpa* high shrubland to open scrub over *Triodia lanigera* mid-dense hummock grassland

This vegetation was similar to Aps1 in structure, however it tended to occur on more elevated areas and the hummock grassland was dominated by *Triodia lanigera*. Other associated species: *Acacia ancistrocarpa, A. inaequilatera, Aristida contorta, A. holathera* var. *holathera, Bonamia rosea, Fimbristylis dichotoma, Goodenia microptera, G. stobbsiana, Indigofera monophylla* (small calyx form), *Mollugo molluginis, Triodia epactia*. Sites FMF57, FMG92, FMG93, FMG94; also site H069 of Biota and Trudgen (2002).

Aps3 *Acacia orthocarpa* high open shrubland to high shrubland over *Triodia wiseana* mid-dense hummock grassland

This vegetation was again similar in structure to Aps1, but occurred on more calcareous soils, indicated by the dominance of *Triodia wiseana*. Other associated species: *Bonamia rosea, Cassia glutinosa, Eriachne pulchella* subsp. *dominii, Fimbristylis dichotoma, Goodenia stobbsiana, Polycarpaea holtzei, Scaevola browniana*. Part site FMG79.

Aps6 *Acacia tumida* open shrubland to shrubland over *Triodia schinzii* hummock grassland

This vegetation occurred on the northern Abydos Plain. It had an open shrubland to shrubland dominated by *Acacia tumida*, usually with scattered *Acacia inaequilatera* and *A. colei*. The hummock grassland of *Triodia schinzii* was usually interspersed with tussock grasses of species such as *Aristida holathera* var. *holathera, Chrysopogon fallax, Eragrostis eriopoda, Eriachne obtusa* and *Paraneurachne muelleri*. Other associated species: *Acacia ancistrocarpa, A. stellaticeps, Bonamia rosea, Carissa spinarum, Cassia notabilis, Cleome uncifera, Corchorus incanus, Evolvulus alsinoides* var. *villosicalyx, Goodenia microptera,*

Hakea lorea subsp. *lorea, Hibiscus leptocladus, Hybanthus aurantiacus, Indigofera monophylla* (small calyx form), *Mollugo molluginis, Ptilotus astrolasius, Sida cardiophylla.* No sites from this study; sites H163, H165 of Biota and Trudgen (2002).

Aps7 *Acacia colei* high shrubland over *Triodia epactia, T. lanigera* mid-dense hummock grassland

This vegetation type was recorded from a single area on the northern Abydos Plain. It had a high shrubland of *Acacia colei* over a low shrubland dominated by *A. stellaticeps*. The mid-dense hummock grassland was dominated by *Triodia epactia*, with some *T. lanigera*. Other associated species: *Acacia ancistrocarpa, A. inaequilatera, Aristida holathera* var. *holathera, Carissa spinarum, Pimelea ammocharis, Pluchea tetranthera, Sida rohlenae* subsp. *rohlenae, Solanum lasiophyllum*. Sites FMG28, FMG29.

Aps8 *Acacia maitlandii* open scrub over *Triodia lanigera* mid-dense hummock grassland

This vegetation tended to occur on elevated areas on plains or on upper slopes of low hills, from approximately the Yule River north to the old Yandee airstrip. It had occasional tall shrubs of *Acacia inaequilatera* over an open scrub of *Acacia maitlandii*, sometimes with significant amounts of *A. ancistrocarpa*. The moderately dense hummock grassland was dominated by *Triodia lanigera*. Other associated species: *Aristida contorta, A. holathera* var. *holathera, Bonamia rosea, Eriachne aristidea, Goodenia microptera, Indigofera monophylla* (small calyx form), *Scaevola browniana, Sida cardiophylla, Tephrosia* sp. Bungaroo Creek. No sites from this study; sites H249, H250 of Biota and Trudgen (2002)

4.2.3 Vegetation of Stony Plains and Hills

4.2.3.1 Scattered shrubs to shrublands over *Triodia* hummock grasslands

Ah1 *Acacia inaequilatera* scattered tall shrubs over *Triodia wiseana* hummock grassland to mid-dense hummock grassland

This vegetation type was recorded mainly from the section of the Abydos Plain between the East Turner River and Chinnamon Creek, occurring on stony plains and low ridges probably overlying calcareous soils. It had scattered tall shrubs of *Acacia inaequilatera* over a hummock grassland to mid-dense hummock grassland dominated by *Triodia wiseana*, frequently with scattered *T. epactia*. Other associated species: *Bonamia* sp. (HD94-6), *Cassia notabilis, Corymbia hamersleyana, Eriachne pulchella* subsp. *dominii, Indigofera monophylla* (small calyx form), *Mollugo molluginis, Ptilotus astrolasius*. Site FMG25F and FMG-MD; also sites H088, H145 of Biota and Trudgen (2002).

Ah2 *Acacia bivenosa, A. ancistrocarpa* open shrubland over *Triodia wiseana, T. lanigera* mid-dense hummock grassland

This vegetation was recorded from calcareous stony plains near the old Yandee airstrip. It had scattered tall shrubs of *Acacia inaequilatera* over an open shrubland dominated by *A. bivenosa* and also including *A. ancistrocarpa*. The moderately dense hummock grassland was dominated by *Triodia wiseana*, with small amounts of *T. lanigera*. Other associated species: *Goodenia microptera, Hakea lorea* subsp. *lorea, Ptilotus astrolasius, P. calostachyus* var. *calostachyus*. No sites from this study.

Ah4 *Acacia ancistrocarpa, A. inaequilatera* scattered tall shrubs over *Triodia brizoides* mid-dense hummock grassland

This vegetation was recorded from a small number of low stony rises and stony ridges south of Coonarrie Creek (Appendix 1, map sheet 7). It had scattered tall shrubs to a high open shrubland of *Acacia ancistrocarpa* and *A. inaequilatera* over a moderately dense hummock grassland of *Triodia brizoides*, with small amounts of other spinifex (mainly *T. lanigera* and *T.* aff. *basedowii*). Other associated species: *Goodenia stobbsiana, Hakea lorea* subsp. *lorea, Mollugo molluginis, Ptilotus astrolasius*. No sites from this study.

Ah5 *Corymbia hamersleyana* scattered low trees over *Triodia* aff. *basedowii* mid-dense to closed hummock grassland

This vegetation occurred on low calcrete rises throughout the project area, on orange-brown loams with calcareous nodules. It had very scattered low trees of *Corymbia hamersleyana* over scattered tall shrubs, mainly *Acacia inaequilatera, Grevillea wickhamii* subsp. *aprica* and *Hakea lorea* subsp. *lorea*. The relatively dense hummock grassland was dominated by *Triodia* aff. *basedowii*. A low open shrubland of *Acacia stellaticeps* and *A. bivenosa* was sometimes present. Other associated species: *Aristida holathera* var.

holathera, Bonamia sp. (HD94-6), *Indigofera monophylla* (small calyx form), *Ptilotus astrolasius*. No sites from this study; sites H146, H180 of Biota and Trudgen (2002).

Ah5a ***Acacia inaequilatera* scattered tall shrubs over *Triodia* aff. *lanigera* mid-dense hummock grassland**
This vegetation was recorded from low stony rises and baseslopes in the northern portion of the Abydos Plain (Appendix 1, map sheet 2). It was similar to Ah5, and the dominant spinifex was also a dwarf-form species with bluish foliage, however the floret characters appear more similar to *Triodia lanigera* than *T. basedowii*. It may be the same as the Ah5 vegetation unit identified during the Hope Downs survey, however the spinifex specimens from these sites have yet to be redetermined. Other associated species: *Acacia ancistrocarpa, Aristida holathera* var. *holathera, Paraneurachne muelleri, Ptilotus incanus*. Site FMG33.

Ah6 ***Acacia ancistrocarpa* scattered shrubs over *Acacia stellaticeps* scattered low shrubs over *Triodia epactia, T. schinzii* mid-dense hummock grassland**
This vegetation was recorded from a hill crest and stony ridge south of the East Turner River (Appendix 1, map sheet 3). It had occasional shrubs of *Acacia ancistrocarpa* and *A. inaequilatera* over scattered low shrubs of *Acacia stellaticeps* and *Ptilotus calostachyus* var. *calostachyus*. The ground cover was a moderately dense hummock grassland of *Triodia epactia* and *T. schinzii*. No sites from this study.

4.2.4 Vegetation of Major Creeklines

Ac1 ***Eucalyptus victrix, Melaleuca argentea* low woodland to low open woodland**
This vegetation type occurred in the broad sandy beds of major rivers, including the East Turner River and Chinnamon Creek. It had scattered trees to a woodland of Coolibah *Eucalyptus victrix* over occasional lower trees to a low woodland of Cadjeput *Melaleuca argentea*. Understorey species were usually scattered, and included *Acacia ampliceps, A. tumida, Cassia notabilis, *Cenchrus ciliaris, Chrysopogon fallax, Cleome viscosa, Crotalaria cunninghamii, Euphorbia coghlanii, Ipomoea muelleri, Melaleuca glomerata, M. linophylla, Mukia maderaspatana, Pluchea rubelliflora*. Sites FMG25, FMG82 and part site FMG78; also site H143 of Biota and Trudgen (2002).

Ac2 ***Eucalyptus camaldulensis* scattered low trees over *Melaleuca argentea* low open forest over *Melaleuca linophylla, Acacia ampliceps* high shrubland**
This vegetation was recorded from the Turner River. It had occasional low trees of River red gum *Eucalyptus camaldulensis* var. *obtusa* over a low open forest of *Melaleuca argentea*. Below this there was a high shrubland dominated by *Melaleuca linophylla* and *Acacia ampliceps*, and also including *A. coriacea*. The ground cover had patches of sedges, mainly *Cyperus vaginatus*, and scattered grasses such as *Diplachne fusca, Eulalia aurea*. Other associated species: *Eragrostis cumingii, Goodenia lamprosperma, Pluchea rubelliflora*. No sites from this study.

Ac3 ***Eucalyptus camaldulensis* woodland over *Melaleuca* spp. high shrubland to open scrub over *Triodia epactia*, tussock grasses and patches of sedges**
This vegetation occurred on the banks of larger rivers and creeks through the study area. It had a woodland of *Eucalyptus camaldulensis* var. *obtusa* over patches of high shrubland to open scrub dominated by *Melaleuca glomerata* and/or *M. linophylla*. Other shrub species recorded included *Acacia coriacea* subsp. *pendens, Atalaya hemiglauca* and *Sesbania cannabina*. The ground cover was a mixture of *Triodia epactia*, a variety of tussock grasses such as *Cymbopogon ambiguus* and *Cenchrus ciliaris*, and patches of sedges such as *Cyperus vaginatus*. Other associated species: *Eragrostis tenellula, Pluchea rubelliflora, *Setaria verticillata, Stemodia grossa, Tinospora smilacina*. No sites from this study.

Ac4 ***Eucalyptus victrix* scattered low trees to low open woodland over *Melaleuca glomerata* high shrubland to open scrub over *Triodia epactia*, tussock grasses and patches of sedges**
This vegetation was very similar to Ac3, differing mainly in the dominance of *E. victrix* in the overstorey. Other associated species: *Acacia pyrifolia, Atalaya hemiglauca, Cleome viscosa, Cymbopogon ambiguus, Cyperus vaginatus, Eragrostis tenellula, Eriachne tenuiculmis* (Priority 3), *Euphorbia coghlanii, Phyllanthus maderaspatensis, Stemodia grossa*. Sites FMG23, FMG74.

Ac5 ***Eucalyptus camaldulensis* low open woodland over *Acacia trachycarpa* high shrubland over *Triodia epactia* mid-dense hummock grassland and **Cenchrus ciliaris* very open tussock grassland**

This vegetation was similar to Ac8, but with an overstorey low open woodland of *E. camaldulensis* var. *obtusa*. This occurred above a high shrubland of *Acacia trachycarpa*, and over a moderately dense hummock grassland dominated by *Triodia epactia* and a very open tussock grassland of **Cenchrus ciliaris*. Other associated species: *Acacia ampliceps, A. coriacea* subsp. *pendens, Chrysopogon fallax, Crotalaria cunninghamii, Cyperus vaginatus, Diplachne fusca, Goodenia lamprosperma, Hakea lorea, Sesbania cannabina, Stemodia grossa*. Part site FMG78 and releve FMGME.

Ac6 ***Eucalyptus victrix* scattered trees over *Acacia coriacea* subsp. *pendens, Atalaya hemiglauca, Hakea lorea* subsp. *lorea* high open shrubland over **Cenchrus ciliaris* tussock grassland**

This vegetation occurred on floodplains and islands associated with major creeklines throughout the project area. It had scattered trees of *Eucalyptus victrix* over a high open shrubland of species such as *Acacia coriacea* subsp. *pendens, Atalaya hemiglauca* and *Hakea lorea* subsp. *lorea*. The ground cover would probably originally have been a *Triodia epactia* hummock grassland, but has been heavily invaded by Buffel grass **Cenchrus ciliaris*. Other associated species: *Cassia notabilis, Cleome viscosa, Hybanthus aurantiacus, Mukia maderaspatana, Petalostylis labicheoides*. No sites in this study.

Ac7 **Scoured creek bed**

Scoured creek channel areas occur in most major drainage systems within the project area. These typically had only scattered shrubs and herbs of species present in the surrounding riparian vegetation types. Only large areas have been separately mapped. No sites from this study.

4.2.5 Vegetation of Minor Creeklines and Floodplains

Ac8 ***Eucalyptus victrix* scattered low trees over *Acacia trachycarpa* open scrub over *Triodia epactia* mid-dense hummock grassland or **Cenchrus ciliaris* open to closed tussock grassland**

This vegetation type occurred in numerous minor creeklines throughout the project area. It had scattered low trees of *Eucalyptus victrix* over an open scrub of *Acacia trachycarpa*. The ground cover in undisturbed areas was a moderately dense hummock grassland of *Triodia epactia*, however heavily grazed areas were invaded by Buffel grass **Cenchrus ciliaris*. Other associated species: *Acacia coriacea* subsp. *pendens, A. pyrifolia, Amaranthus pallidiflorus, Cleome viscosa, Crotalaria cunninghamii, Euphorbia coghlanii, Euphorbia* sp. (site 1089), *Hybanthus aurantiacus, Phyllanthus maderaspatensis, Pluchea rubelliflora, Pterocaulon ?sphaeranthoides* x *sphacelatum, Ptilotus obovatus*. Sites FMG24, FMG25, FMG26; also site H257 of Biota and Trudgen (2002).

Ac9 ***Corymbia* spp. scattered low trees over *Acacia trachycarpa* open scrub over *Triodia lanigera* mid-dense hummock grassland and **Cenchrus ciliaris* tussock grassland**

This vegetation was recorded from narrow floodplains and minor creeklines in the southern section of the Abydos Plain, and was similar to Ac8. It had occasional low trees of *Corymbia aspera* and *C. hamersleyana* over an open scrub of *Acacia trachycarpa*. The smallest flowlines lacked the Eucalypt overstorey entirely. At ground level there was a mid-dense hummock grassland of *Triodia lanigera*, which was invaded by **Cenchrus ciliaris*. Other associated species: *Acacia tumida, Atalaya hemiglauca, Cassia notabilis, Cleome viscosa, Cullen lachnostachys, Eriachne obtusa, Euphorbia* sp. (site 1089), *Hakea lorea, Hibiscus panduriformis, Isotropis atropurpurea, Pluchea ferdinandi-muelleri, P. rubelliflora, Triumfetta chaetocarpa, Wahlenbergia tumidifructa*. Site FMG96 and releve FMGBG; also site H248 of Biota and Trudgen (2002).

Ac11 ***Corymbia* spp. scattered low trees over *Acacia tumida, A. colei* open scrub over *Triodia epactia* hummock grassland**

This vegetation type occurred in smaller flowlines in the northern Abydos Plain. The open scrub was dominated by *Acacia tumida* and *A. colei*, and occurred over a ground cover of *Triodia epactia*, sometimes with scattered grasses such as *Aristida holathera* var. *holathera, Chrysopogon fallax* and *Eragrostis cumingii*. Other associated species: *Acacia ancistrocarpa, Bonamia linearis, Bulbostylis barbata, Cajanus cinereus, Cassia notabilis,*

Corchorus incanus, Mukia maderaspatana, Pluchea tetranthera, Sida rohlenae subsp. *rohlenae*. Site FMG94; also site H068 of Biota and Trudgen (2002).

Ac12 *Corymbia hamersleyana* scattered low trees over *Acacia tumida* high shrubland over *Triodia lanigera, T. epactia* mid-dense hummock grassland

This vegetation type occurred in minor creeklines between the East Turner River and Chinnamon Creek. It had scattered low trees of *Corymbia hamersleyana* over a high shrubland of *Acacia tumida*, with occasional *Acacia colei, Cajanus cinereus* and *Crotalaria cunninghamii*. The mid-dense hummock grassland was dominated by *Triodia lanigera*, with small amounts of *T. epactia*. Other associated species: *Acacia bivenosa, Aristida holathera* var. *holathera, Chrysopogon fallax, Eriachne aristidea, Hybanthus aurantiacus, Isotropis atropurpurea*. Site FMG88; also site H070 of Biota and Trudgen (2002).

Ac13 *Corymbia hamersleyana* scattered low trees over *Acacia tumida* closed scrub over *Triodia lanigera* mid-dense hummock grassland

This vegetation occurred in minor flowlines through the low hills and stony plains south of Chinnamon Creek. It had a closed scrub dominated by *Acacia tumida*, with occasional *A. ancistrocarpa, A. acradenia* and *Petalostylis labicheoides*, over a moderately dense hummock grassland of *Triodia lanigera* with occasional *T. epactia*. There was also a low open shrubland dominated by *Bonamia rosea*. Other associated species: *Aristida holathera* var. *holathera, Chrysopogon fallax, Hibiscus leptocladus, Isotropis atropurpurea, Paraneurachne muelleri, Ptilotus astrolasius*. No sites from this study; site H066 of Biota and Trudgen (2002).

Ac14 *Eucalyptus victrix, Corymbia* spp. scattered trees to low open woodland over *Acacia colei* open scrub over *Triodia epactia* dense hummock grassland

This vegetation type occurred on a broad drainage plain centered to the north of the White Hills Estate (Appendix 1, map sheet 1). It had scattered trees to a low open woodland dominated by *Eucalyptus victrix* with a variety of *Corymbia* species, over an open scrub of *Acacia colei*. At ground level there was a dense hummock grassland of *Triodia epactia*. Other associated species: *Acacia stellaticeps, A. tumida, Achyranthes aspera, Alternanthera nana, Bulbostylis barbata, Carissa spinarum, Chrysopogon fallax, Cleome viscosa, Corchorus incanus, Eragrostis cumingii, Euphorbia coghlanii, Goodenia lamprosperma, Indigofera monophylla* (small calyx form), *Mukia maderaspatana, Pluchea tetranthera, Stemodia lathraia, Tinospora smilacina*. No sites from this study; sites H104, H152 of Biota and Trudgen (2002).

Ac15 *Eucalyptus victrix* low open woodland to woodland over *Acacia colei* scattered tall shrubs to high open shrubland over *Triodia epactia* scattered hummock grasses and *Eriachne* spp. tussock grasses

This vegetation occurred in small creeklines in the northern Abydos Plain. The overstorey was a low open woodland to woodland of *Eucalyptus victrix* over occasional tall shrubs to a high open shrubland of *Acacia colei*. The ground cover was usually scattered hummocks of *Triodia epactia* with scattered grasses to a tussock grassland of *Eriachne* species, mainly *E. benthamii*. Other associated species: *Ammannia baccifera, Cassia notabilis, Centipeda minima, Chrysopogon fallax, Cyperus squarrosus, Eragrostis cumingii, E. tenellula, Fimbristylis microcarya, Goodenia lamprosperma, Pluchea tetranthera, Rotala diandra*. No sites from this study.

Ac16 *Corymbia hamersleyana* scattered low trees over *Acacia colei* open scrub over *A. stellaticeps* low open shrubland over *Triodia lanigera* hummock grassland and *Chrysopogon fallax, Eriachne obtusa* open tussock grassland

This vegetation was recorded from a flowline in the central portion of the Abydos Plain (Appendix 1, map sheet 6). It had occasional low trees of *Corymbia hamersleyana* over an open scrub of *Acacia colei*, with scattered *A. tumida, A. bivenosa, A. pyrifolia* and *Grevillea wickhamii* subsp. *aprica*. There was also a low open shrubland of *Acacia stellaticeps*. The ground cover was a hummock grassland of *Triodia lanigera* and an open tussock grassland of *Chrysopogon fallax* and *Eriachne obtusa*. Other associated species: *Aristida holathera* var. *holathera, Cymbopogon obtectus, Cyperus blakeanus, Goodenia lamprosperma, Isotropis atropurpurea, Triumfetta chaetocarpa*. No sites from this study; site H282 of Biota and Trudgen (2002).

Ac17 *Acacia tumida, A. colei* open scrub over mixed tussock grassland

This vegetation was recorded from drainage areas north of the Yule River. It had occasional tall shrubs of *Acacia inaequilatera* over an open scrub dominated by *A. tumida,*

usually with small amounts of *A. colei*. At ground level there was a grassland dominated by species such as *Eriachne obtusa* and *Eragrostis ?elongata*, and also including *Aristida holathera* var. *holathera*, *Chrysopogon fallax* and *Eriachne aristidea*. Other associated species: *Alternanthera nana*, *Cassia notabilis*, **Cenchrus ciliaris*, *Cleome viscosa*, *Cymbopogon ambiguus*, *Eriachne aristidea*, *Euphorbia coghlanii*, *Euphorbia* sp. (site 1089), *Goodenia lamprosperma*, *Indigofera monophylla* (small calyx form), *Mukia maderaspatana*, *Pluchea dentex*, *P. ferdinandi-muelleri*, *P. rubelliflora*, *P. tetranthera*, *Sporobolus australasicus*, *Stemodia grossa*, *Triodia lanigera*. No sites from this study; sites H237 of Biota and Trudgen (2002).

Ac19 ***Corymbia hamersleyana* scattered low trees over *Acacia ampliceps, A. tumida* high shrubland over *Triodia lanigera, T. epactia* mid-dense hummock grassland**
The banks of this minor creek had occasional low trees of *Corymbia hamersleyana* over a high shrubland of *Acacia ampliceps* and *A. tumida*, over a spinifex ground cover of a mixture of *Triodia lanigera* and *T. epactia*. Relatively short, scattered individuals of *Melaleuca argentea* occurred in the creek bed. Other associated species: *Acacia colei*, *A. pyrifolia* (slender, white form), *Cajanus cinereus*, *Cassytha filiformis*, *Chrysopogon fallax*, *Tinospora smilacina*. No sites from this study.

Ac20 ***Acacia ampliceps* open scrub over *A. trachycarpa* shrubland over **Cenchrus ciliaris, Diplachne fusca* closed tussock grassland**
This vegetation was recorded from a creekline north of the Yule River. It had an open scrub of *Acacia ampliceps* over a shrubland of *A. trachycarpa*, with occasional *Cajanus cinereus* and *Crotalaria cunninghamii*. The ground cover was a closed tussock grassland dominated by **Cenchrus ciliaris* and *Diplachne fusca*, with small amounts of *Eriachne festucacea* and *Chloris pumilio*. Patches of sedgeland were dominated by *Cyperus vaginatus*. Other associated species: *Chrysopogon fallax*, *Eragrostis cumingii*, *Pluchea rubelliflora*, *Stemodia grossa*, *Triodia epactia*. No sites from this study.

Ac21 ***Acacia ampliceps* open scrub over *Triodia secunda* hummock grassland**
Some small flowlines south of Chinnamon Creek (Appendix 1, map sheet 4) had an open scrub of *Acacia ampliceps* over patches of *Triodia secunda* hummock grassland. Only a few other species were noted, including *Trianthema pilosa*. No sites from this study.

Ac22 ***Corymbia* spp. low open woodland over *Acacia acradenia, A. ancistrocarpa* open scrub over *Triodia epactia* open hummock grassland and *Chrysopogon fallax, Themeda triandra* tussock grassland**
This vegetation was recorded from minor creeklines south of Chinnamon Creek on the Abydos Plain. It had a low open woodland of the bloodwoods *Corymbia semiclara* or *C. hamersleyana* over an open scrub dominated by *Acacia acradenia*, sometimes with significant amounts of *A. ancistrocarpa*. The usually open spinifex cover was typically dominated by *Triodia epactia*, although other species such as *T. lanigera* and *T. schinzii* sometimes contributed a significant cover. This occurred with a tussock grassland of species such as *Chrysopogon fallax* and *Themeda triandra*. Other associated species: *Aristida holathera* var. *holathera*, *Bonamia rosea*, *Cassytha capillaris*, *Corchorus parviflorus*, *Dampiera candicans*, *Goodenia microptera*, *Grevillea wickhamii*, *Hybanthus aurantiacus*, *Indigofera monophylla* (small calyx form), *Paraneurachne muelleri*. Site FMG107.

Ac24 ***Acacia acradenia, A. colei* open scrub to high shrubland over *Triodia lanigera* mid-dense hummock grassland**
This vegetation was found in minor flowlines in the East Turner River area. It had an open scrub to high shrubland dominated by *Acacia acradenia* and *A. colei*, with lesser amounts of *A. ancistrocarpa* and *A. inaequilatera*. The moderately dense hummock grassland was dominated by *Triodia lanigera*. Other associated species: *Acacia bivenosa*, *A. stellaticeps*, *Aristida holathera* var. *holathera*, *Mollugo molluginis*. No sites from this study.

Ac27 ***Acacia ancistrocarpa* open scrub over *Triodia epactia* mid-dense hummock grassland**
This vegetation was recorded from drainage areas through the southern Abydos Plain (Appendix 1, map sheet 7). It had an open scrub of *Acacia ancistrocarpa*, with scattered tall shrubs of *A. inaequilatera* and *A. bivenosa*, over a moderately dense hummock grassland of *Triodia epactia*. There was also a low shrub layer dominated by *Indigofera monophylla* (small calyx form). Other associated species: *Aristida holathera* var. *holathera*, *Bonamia rosea*, *Chrysopogon fallax*, *Isotropis atropurpurea*, *Pluchea rubelliflora*, *P. tetranthera*, *Trichodesma zeylanicum* var. *zeylanicum*. No sites from this study.

Ac28 ***Acacia bivenosa* open heath over *Triodia lanigera* hummock grassland**
This vegetation was recorded from broad flow areas in the vicinity of the Yule River. It had scattered low trees of *Corymbia hamersleyana* over an open heath of *Acacia bivenosa*, with occasional *A. maitlandii*, over a low open shrubland of *Indigofera monophylla* (small calyx form) with *Corchorus* sp. (HD200). The hummock grassland was dominated by *Triodia lanigera*. Other associated species: *Acacia colei, A. inaequilatera, Aristida holathera* var. *holathera, Eriachne aristidea, Isotropis atropurpurea, Paraneurachne muelleri, Stemodia grossa*. Site FMG89; also site H281 of Biota and Trudgen (2002).

Ac29 ***Acacia farnesiana, A. sclerosperma* scattered tall shrubs over **Cenchrus ciliaris, *Chrysopogon fallax* closed tussock grassland**
This vegetation was recorded from a floodplain adjacent to a creek south of the Yule River (Appendix 1, map sheet 7). It had scattered tall shrubs of *Acacia farnesiana* and *A. sclerosperma* over a closed tussock grassland of *Chrysopogon fallax*, heavily invaded by **Cenchrus ciliaris*. A small amount of *Triodia longiceps* was also present. Other associated species: *Acacia synchronicia, Eriachne benthamii, Eragrostis setifolia, Neptunia dimorphantha*. Site FMG80.

Ac30 ***Corymbia hamersleyana, C. candida* low open woodland over *Acacia colei, A. tumida* scattered tall shrubs over *Triodia epactia* hummock grassland and very open herbland**
This vegetation was recorded only from a small soak in the northern section of the corridor (see Appendix 1, map sheet 2). The overstorey was a low open woodland of *Corymbia hamersleyana* with lesser amounts of *C. candida* over scattered tall shrubs of *Acacia colei* and *A. tumida*. At ground level there was a hummock grassland of *Triodia epactia* interspersed with herbs associated with wet conditions, particularly *Goodenia lamprosperma* and *Marsilea hirsuta*. Other associated species: *Eriachne benthamii, Peplidium muelleri, Pluchea tetranthera, Schoenoplectus laevis*. Sites FMG30, FMG31.

Ac31 ***Acacia bivenosa* shrubland to open heath over *Triodia longiceps* mid-dense hummock grassland**
This vegetation was recorded from a drainage area through a calcareous plain in the southern Abydos Plain area (Appendix 1, map sheet 8). It had a shrubland to open heath of *Acacia bivenosa* over a mid-dense hummock grassland of *Triodia longiceps* interspersed with tussock grasses, mainly of *Chrysopogon fallax*. Occasional low trees of *Eucalyptus victrix* and tall shrubs of *Acacia trachycarpa* were also present. Other associated species: *Acacia pyrifolia, Corymbia hamersleyana, Eragrostis cumingii, Eremophila longifolia, Hakea lorea* subsp. *lorea*. Site FMG76.

4.2.6 Vegetation of Rocky Outcrops

4.2.6.1 Granite outcrop vegetation

Numerous granite outcrops (both sheet outcrops and boulder rockpiles) were recorded from the central portion of the rail corridor. Although this habitat supported a number of distinct vegetation types, these were typically not differentiated on the mapping due to their small areal extent, and the time which would be required to accurately groundtruth their distribution. Typical rock-inhabiting species recorded from most outcrops included *Ficus brachypoda, Flueggea virosa* subsp. *melanthesoides, Nicotiana benthamiana, Terminalia canescens* and *Tinospora smilacina* (the latter also recorded frequently from drainage lines).

Ar1 ***Ficus brachypoda, Flueggea virosa* subsp. *melanthesoides, Terminalia canescens, Clerodendrum* spp. scattered shrubs over *Triodia epactia* hummock grassland and **Cenchrus ciliaris* tussock grassland**
Most of the boulder-form rockpiles had scattered shrubs of a similar range of species adapted to such habitats, for example *Clerodendrum floribundum* var. *angustifolium, C. tomentosum* var. *lanceolatum, Ficus brachypoda, Flueggea virosa* subsp. *melanthesoides, Mallotus nesophilus* and *Terminalia canescens*. The understorey was typically dominated by *Triodia epactia*, which was frequently invaded by Buffel grass **Cenchrus ciliaris*. Numerous herbs, sedges and native grasses were still recorded (eg. *Boerhavia coccinea, Bulbostylis burbidgeae* (Priority 3), *Cleome viscosa, Cymbopogon ambiguus, Cyperus cunninghamii* subsp. *cunninghamii, Evolvulus alsinoides* var. *villosicalyx, Paspalidium tabulatum* (Whim Creek form)). Other associated species: *Abutilon* aff. *dioicum* (H72-14),

Cajanus cinereus, Cassia venusta, Cullen stipulaceum, Hibiscus goldsworthii, Solanum horridum, Tinospora smilacina, Triumfetta maconochieana. Site FMG90 and releves FMG-BA, FMG-MT, FMG-MU, FMG-RE, FMG-RF; also site H072 of Biota and Trudgen (2002).

Ar2 *Acacia tumida* high shrubland to open scrub over *Triodia epactia* hummock grassland

This vegetation type usually occurred on top of sheet outcrops and also in flow areas amongst boulder piles. It was similar to Ac11, but typically had some rock-inhabiting species (eg. *Ficus brachypoda* and *Terminalia canescens*). This vegetation was a tall shrubland dominated by *Acacia tumida* over a relatively open cover of *Triodia epactia*, usually with some invasion by **Cenchrus ciliaris*. Other associated species: *Amaranthus pallidiflorus, Cajanus cinereus, Cymbopogon ambiguus, Eragrostis cumingii, Indigofera colutea, Tinospora smilacina.* Site FMG36 and releve FMG-BC; site H102 of Biota and Trudgen (2002).

Ar3 *Tripogon loliiformis* dwarf open grassland

This vegetation type occurred in small soil pockets forming in depressions in granite sheet outcrops, and on the narrow fringing strip immediately surrounding the outcrops. It was characterised by a short (typically 10-20 cm high), open to sometimes closed grassland of *Tripogon loliiformis*. A variety of other herbs (eg. *Cleome viscosa, Indigofera colutea, Polycarpaea corymbosa* var. *corymbosa*), sedges (eg. *Cyperus squarrosus, Fimbristylis dichotoma*) and grasses (eg. *Perotis rara, Schizachyrium fragile, Yakirra australiensis* var. *australiensis*) was scattered throughout. Releve FMG-BB.

Ar4 *Bulbostylis burbidgeae* sedgeland

Small patches of this Priority 3 sedge were noted on soil pockets under overhangs within granite boulder rockpiles. This vegetation was mentioned specifically in Tinley (1991) as occurring in the Abydos-Woodstock area, and appears to be relatively widespread although restricted to this specific microhabitat. Given the Priority status of *B. burbidgeae*, this vegetation has high conservation significance. Recorded from numerous rockpiles in this study; also from site H102 of Biota and Trudgen (2002).

4.2.6.2 Granite ridge vegetation

Ar5 *Acacia inaequilatera* scattered tall shrubs over *Gossypium australe* (Whim Creek form) open shrubland over *Triodia epactia* hummock grassland

This vegetation was only recorded from a number of rocky granite ridges north of the Marble Bar Road (Appendix 1, map sheet 6). It had occasional tall shrubs of *Acacia inaequilatera* over an open shrubland of *Gossypium australe* (Whim Creek form) with scattered *Tribulus platypterus*. There was a hummock grassland of *Triodia epactia* at ground level. Other associated species: *Aristida contorta, A. holathera* var. *holathera, Cassia venusta, Cleome viscosa, Cymbopogon ambiguus, Eriachne aristidea, Grevillea wickhamii, Ptilotus auriculifolius, P. incanus, Solanum phlomoides.* No sites from this study.

4.2.6.3 Quartz ridge vegetation

Ar6 *Acacia tumida, Grevillea wickhamii* scattered shrubs to open shrubland over *Triodia epactia* open hummock grassland to hummock grassland

A small number of quartz outcrops and ridges occurred to the south of Port Hedland near the White Hills Estate (Appendix 1, map sheet 1). These had scattered shrubs of *Acacia tumida* and *Grevillea wickhamii,* often over a low open shrubland dominated by *Dampiera candicans*. The relatively open hummock grassland was dominated by *Triodia epactia.* Other associated species: *Abutilon lepidum, Acacia inaequilatera, Boerhavia coccinea, Bulbostylis barbata, Cassia notabilis, Cleome viscosa, Corchorus elachocarpus, Eriachne aristidea, E. mucronata* (typical form), *Euphorbia* sp. (site 1089), *Fimbristylis dichotoma, Gomphrena cunninghamii, Goodenia microptera, G. stobbsiana, Hakea lorea* subsp. *lorea, Hibiscus leptocladus, Hybanthus aurantiacus, Mollugo molluginis, Mukia maderaspatana, Paspalidium clementii, Perotis rara, Portulaca pilosa, Ptilotus calostachyus* var. *calostachyus, Schizachyrium fragile, Sida* aff. *cardiophylla* (M79-27), *Sida rohlenae* subsp. *rohlenae, Solanum phlomoides, Waltheria indica.* The quartz ridges had an extremely limited distribution in the rail corridor, and the vegetation was in relatively good condition, with little or no invasion by Buffel grass. This vegetation is thus considered to have high conservation significance. No sites from this study.

4.2.6.4 Dolerite dyke vegetation

Ar7 ***Cajanus cinereus* shrubland over *Triodia epactia* hummock grassland**
This vegetation was only recorded from a dolerite dyke south of the East Turner River (Appendix 1, map sheet 3). Other associated species: *Acacia ancistrocarpa, A. inaequilatera, Paraneurachne muelleri, Solanum phlomoides, Triumfetta maconochieana.* No sites from this study; site H076 of Biota and Trudgen (2002).

4.3 Chichester Range

4.3.1 Vegetation of Stony Plains and Hills

4.3.1.1 Scattered shrubs over *Triodia* hummock grasslands

Ch1 ***Acacia inaequilatera, Cassia* spp. scattered tall shrubs over *Triodia epactia* mid-dense hummock grassland**
This vegetation was recorded from the northern section of the Chichester Range (Appendix 1, map sheets 8 and 9). It had scattered tall shrubs of *Acacia inaequilatera* and a variety of *Cassia* species, mainly *C. glutinosa, C. luerssenii* and *C. pruinosa,* over a moderately dense hummock grassland of *Triodia epactia,* with some *Triodia brizoides* on very rocky areas. Other associated species: *Cleome viscosa, Goodenia stobbsiana, Hakea lorea, Indigofera monophylla* (small calyx form), *Solanum gabrielae, S. lasiophyllum, S. phlomoides, Tribulus suberosus.* Sites FMG22, FMG56, FMG102.

Ch2 ***Acacia inaequilatera, Cassia* spp. scattered tall shrubs over *Triodia wiseana* mid-dense hummock grassland**
This vegetation occurred on low hills in the northern section of the Chichester Range, on calcareous soils and dolomite substrates. It had scattered tall shrubs of *Acacia inaequilatera* with occasional *Cassia* shrubs, mainly *C. glutinosa, C. oligophylla* and *C. pruinosa,* over a moderately dense hummock grassland of *Triodia wiseana.* Other associated species: *Corchorus lasiocarpus* subsp. *lasiocarpus* ms., *Mollugo molluginis, Ptilotus calostachyus* var. *calostachyus.* Releves FMG-BF, FMG-RD.

Ch4 ***Cassia glutinosa* scattered shrubs over *Triodia brizoides, T. epactia* mid-dense hummock grassland**
Steep hillslopes on the northern side of the Chichester Range tended to have mid-dense hummock grasslands of *Triodia brizoides*, with *T. epactia* occurring on lower slopes and in gullies. Only occasional shrubs were recorded, typically of scattered *Cassia glutinosa* over a low open shrubland of *Tephrosia* aff. *rosea* (HD292-37). Other associated species: *Acacia pyrifolia* (slender, white form), *Cassia oligophylla, C. pruinosa, Cymbopogon ambiguus, Gossypium australe* (Whim Creek form), *Hakea lorea* subsp. *lorea, Solanum phlomoides.* No sites from this study; site H287 of Biota and Trudgen (2002).

Ch12 ***Eucalyptus leucophloia* scattered low trees over *Acacia hilliana* scattered low shrubs over *Triodia lanigera* mid-dense hummock grassland**
This vegetation occurred on broad low hills in the Chichesters (Appendix 1, map sheet 9). It had scattered low trees of *Eucalyptus leucophloia* over scattered low shrubs to an open low shrub layer dominated by *Acacia hilliana* over a moderately dense hummock grassland of *Triodia lanigera.* Other associated species: *Acacia adoxa* var. *adoxa, Bonamia media* var. *villosa, B. rosea, Goodenia stobbsiana, Hakea chordophylla, H. lorea, Mollugo molluginis, Solanum lasiophyllum, S. phlomoides.* Sites FMG69, FMG84.

Ch13 ***Triodia brizoides, T. longiceps* mid-dense hummock grassland**
This vegetation was recorded from stony plains along the eastern deviation through the Chichester Range (see Appendix 1, map sheet 9). It had a moderately dense hummock grassland of *Triodia brizoides,* with patches of *T. longiceps,* with scattered shrubs of species including *Acacia synchronicia, Cassia pruinosa, Ptilotus schwartzii* var. *schwartzii, Solanum horridum* and *S. lasiophyllum.* Other associated species: *Eucalyptus leucophloia, Polygala* aff. *isingii, Portulaca oleracea.* Site FMG97.

4.3.1.2 Shrublands over *Triodia* hummock grasslands

Ch7 *Acacia inaequilatera* scattered tall shrubs over *Indigofera rugosa* low open heath over *Triodia epactia* closed hummock grassland

This vegetation occurred on steep dolerite slopes in the Chichester area (Appendix 1, map sheets 8 and 9). It had scattered tall shrubs of *Acacia inaequilatera*, often with occasional *Cassia* spp., over a low open heath of *Indigofera rugosa* and a closed hummock grassland dominated by *Triodia epactia*. Other associated species: *Acacia acradenia, Boerhavia gardneri, Goodenia stobbsiana, Mollugo molluginis, Solanum phlomoides*. No sites from this study.

Ch8 *Corymbia hamersleyana* scattered low trees over *Acacia arida, A. ptychophylla* low open heath over *Triodia lanigera* closed hummock grassland

This vegetation occurred on low spurs of the southern Chichester Range (Appendix 1, map sheet 9). It had occasional low trees of *Corymbia hamersleyana* over a low open heath dominated by either *Acacia arida* or *A. ptychophylla*. The relatively dense hummock grassland was dominated by *Triodia lanigera*. Other associated species: *Acacia bivenosa, A. tetragonophylla, Corchorus lasiocarpus* subsp. *lasiocarpus* ms., *Sida cardiophylla, Solanum lasiophyllum, S. phlomoides*. Site FMG67.

Ch9 *Corymbia deserticola* scattered low trees over *Acacia aneura* high open shrubland over *Triodia lanigera* closed hummock grassland

This vegetation occurred on the upper slopes and crests of the relatively low rolling hills in the southern Chichester Range. It had scattered low trees of *Corymbia deserticola* over a high shrubland dominated by *Acacia aneura*, and also including scattered *A. orthocarpa* and *A. marramamba*. The relatively dense hummock grassland was dominated by *Triodia lanigera*. Other associated species: *Acacia adoxa* var. *adoxa, Cassia glutinosa, C. luerssenii, Eriachne mucronata, Goodenia stobbsiana, Solanum phlomoides*. No sites from this study.

Ch10 *Corymbia deserticola* scattered low trees over *Acacia aneura* high shrubland to low woodland over *Triodia lanigera* closed hummock grassland

This vegetation was similar to Ch9, but occurred on the lower slopes of the same hills and had a taller, more dense overstorey. The high shrubland to low woodland was dominated by *Acacia aneura* var. *?aneura/intermedia* with scattered *A. atkinsiana* and *A. marramamba*, and occurred over scattered tall shrubs of *Acacia ancistrocarpa, Cassia glutinosa, Psydrax latifolia* and *P. suaveolens*. The closed hummock grassland was dominated by *Triodia lanigera*. Other associated species: *Corchorus lasiocarpus* subsp. *lasiocarpus* ms., *Cymbopogon ambiguus, Dodonaea petiolaris, Enneapogon polyphyllus, Eremophila forrestii* subsp. *forrestii, E. latrobei* subsp. *filiformis, Indigofera monophylla* (small leaflet form), *Ptilotus calostachyus* var. *calostachyus, Solanum lasiophyllum*. No sites from this study.

Ch11 *Eucalyptus leucophloia* scattered low trees over *Triodia* aff. *basedowii* hummock grassland

This vegetation dominated the crests of mesas in the northern Chichester area. It had scattered low trees of *Eucalyptus leucophloia* over a hummock grassland, probably of *Triodia* aff. *basedowii*. A low open shrubland of *Acacia hilliana* was also frequently present. Other associated species: *Cassia pruinosa, Dampiera candicans, Eriachne lanata, Goodenia stobbsiana*. No sites from this study.

4.3.2 Vegetation of Sandy Plain Areas of the Chichester Range

Cp1 *Acacia inaequilatera* scattered tall shrubs over *Triodia schinzii* mid-dense hummock grassland

This vegetation was recorded from some small areas of sandy plain in the central section of the Chichester Range (Appendix 1, map sheet 8). It had scattered tall shrubs of *Acacia inaequilatera* and *Gossypium australe* over a moderately dense hummock grassland of *Triodia schinzii* with small amounts of *T. epactia*. Other associated species: *Acacia acradenia, Eragrostis eriopoda, Eriachne aristidea, Hakea lorea, Indigofera colutea, I. rugosa, Mollugo molluginis, Solanum phlomoides*. Site FMG101.

4.3.3 Vegetation of Minor Creeklines and Floodplains

Cc1 ***Acacia coriacea* open woodland over *Petalostylis labicheoides, Acacia acradenia, A. bivenosa* high open shrubland over *Themeda triandra* open tussock grassland**

This vegetation was recorded from a flowline north of the Chichester Range. It had an open woodland of *Acacia coriacea* over a high open shrubland of *Petalostylis labicheoides, Acacia acradenia* and *A. bivenosa*. The ground cover was an open tussock grassland of *Themeda triandra*. Other associated species: *Cassia glutinosa, Hakea lorea* subsp. *lorea, Hybanthus aurantiacus, Santalum lanceolatum, Trichodesma zeylanicum* var. *zeylanicum, Triodia longiceps*. No sites from this study; site H197 of Biota and Trudgen (2002).

Cc2 ***Eucalyptus victrix, Corymbia hamersleyana* scattered low trees over *Acacia tumida, Petalostylis labicheoides* open scrub over *Triodia epactia* mid-dense hummock grassland**

This vegetation was recorded from some small flowlines within the Chichester Range (Appendix 1, map sheet 9). It had scattered trees of *Eucalyptus victrix* and *Corymbia hamersleyana* over an open scrub dominated by *Acacia tumida* and *Petalostylis labicheoides*, with scattered *Atalaya hemiglauca*. There was an open shrubland of *Tephrosia rosea* var. *glabrior* ms. with occasional *Rulingia kempeana* over a mid-dense hummock grassland of *Triodia epactia*. Other associated species: *Alternanthera nana, Chrysopogon fallax, Cymbopogon ambiguus, Cyperus vaginatus, Digitaria brownii, Eriachne mucronata, Jasminum didymum* subsp. *lineare*. No sites from this study.

Cc3 ***Eucalyptus victrix* low woodland over *Melaleuca linophylla* open shrubland over *Sorghum plumosum* open tussock grassland and *Triodia longiceps* very open hummock grassland**

This vegetation was recorded from a creekline in the Chichester Range, extending marginally into the FMG rail corridor (Appendix 1, map sheet 9). The overstorey was a low woodland of *Eucalyptus victrix* over an open shrubland dominated by *Melaleuca linophylla*, with scattered *Acacia coriacea* subsp. *pendens, A. pyrifolia, A. trachycarpa, Atalaya hemiglauca, Eremophila longifolia* and *Flueggea virosa* subsp. *melanthesoides*. The ground cover was an open tussock grassland of *Sorghum plumosum* with a very open hummock grassland of *Triodia longiceps*. Other associated species: *Sesbania cannabina, Stemodia grossa, Tephrosia rosea* var. *glabrior* ms., *Themeda triandra*. No sites from this study; site H225 of Biota and Trudgen (2002).

Cc8 ***Eucalyptus victrix* scattered low trees over *Acacia bivenosa* open heath over *Triodia epactia* mid-dense hummock grassland and patches of *Themeda triandra* tussock grassland**

This vegetation occurred on colluvial plains associated with creeklines. It had scattered low trees of *Eucalyptus victrix* over an open heath dominated by *Acacia bivenosa*, and also including *Grevillea wickhamii* subsp. *aprica* and *Petalostylis labicheoides*. The moderately dense hummock grassland was dominated by *Triodia epactia*, and interspersed with patches of grasses, mainly *Themeda triandra* with some *Panicum decompositum*. No sites from this study.

Cc16 ***Corymbia hamersleyana* scattered low trees over *Acacia tumida, Grevillea wickhamii, Petalostylis labicheoides* open scrub to tall shrubland over *Triodia epactia* open hummock grassland**

This vegetation was similar to Cc2 but occurred in smaller flowlines through the stony hills of the southern Chichester Range and hence lacked the *Eucalyptus victrix* overstorey. Only larger occurrences have been mapped. It had scattered low trees to a low open woodland of *Corymbia hamersleyana* above an open scrub to tall shrubland dominated by *Acacia tumida*, with lesser amounts of *Grevillea wickhamii* and *Petalostylis labicheoides*. The open hummock grassland was dominated by *Triodia epactia*, interspersed with tussock grasses of *Themeda triandra*. Other associated species: *Acacia maitlandii, A. monticola, A. pyrifolia, Gossypium robinsonii, Santalum lanceolatum*. No sites from this study; site FMG72 of Biota and Trudgen (2002).

Cc17 ***Acacia synchronicia, A. farnesiana* open shrubland over *Eriachne benthamii, Chrysopogon fallax* closed tussock grassland**

This vegetation was recorded from a flowline through the broad area of cracking clay near the BHP rail quarry (Appendix 1, map sheet 9). It had an open shrubland to tall open shrubland of *Acacia synchronicia* and *A. farnesiana* over a closed tussock grassland dominated by *Eriachne benthamii*, with some *Chrysopogon fallax*. Other associated

species: *Eremophila longifolia, Ptilotus gomphrenoides, Santalum lanceolatum*. Releves FMG-KG, FMG-KH.

4.3.4 Vegetation of Cracking Clays of the Chichester Range

The patches of cracking clays, mainly associated with the Chichester Range and Fortescue Valley, had mosaics of numerous different vegetation types. These are defined separately wherever sufficient information is available from sites or field descriptions, however it should be noted that additional vegetation types are likely to occur. Only some of the vegetation types have been individually discriminated on the mapping due to the extreme fine-scale variation in vegetation and the degree of ground-truthing that would be required to accurately define boundaries between individual units.

Within the FMG rail corridor, the Cx vegetation units occurred on the Wona Land System (Agwest 2002).

Cx4 ***Astrebla pectinata, Aristida latifolia* tussock grassland**
This vegetation type was recorded from the broad swathe of cracking clay interspersed with basalt rocks near the BHP rail quarry (Appendix 1, map sheet 9). It was a grassland of varying proportions of *Astrebla pectinata* and *Aristida latifolia* over a variable cover of the daisy *Streptoglossa bubakii*. Only occasional tall shrubs of *Acacia victoriae* and *A. tetragonophylla* were recorded. Other associated species: *Boerhavia paludosa, Brachyachne convergens, Corchorus tridens, Flaveria* sp. Tom Price (ME Trudgen 11,246), *Goodenia muelleriana, Kennedia* sp. Barowana Hill, *Oldenlandia* sp. 'gilgai', *Phyllanthus maderaspatensis, Ptilotus gomphrenoides* var. *gomphrenoides, Rhynchosia minima* var. *australis, Vigna lanceolata* var. *lanceolata*. Sites FMG20, FMG20F, FMG58, FMG59, FMG71.

Cx5 ***Acacia xiphophylla* open to closed scrub over *Rhagodia eremaea* open shrubland**
This vegetation occurred in patches on the broad swathe of cracking clay interspersed with basalt rocks near the BHP rail quarry. It had an open to closed scrub dominated by Snakewood *Acacia xiphophylla* over an open shrubland of *Rhagodia eremaea*, with occasional *Cassia helmsii, C. luerssenii* and *C. oligophylla*. The ground cover was typically a very open hummock grassland of *Triodia epactia* with scattered other grasses including *Aristida latifolia, Brachyachne convergens* and *Eriachne mucronata* (typical form). Other associated species: *Enchylaena tomentosa, Ptilotus obovatus, Solanum lasiophyllum, Streptoglossa bubakii*. Site FMG85 and releve FMG-KF.

4.4 Fortescue Valley

4.4.1 Vegetation of Stony Plains and Hills

Fh1 ***Acacia aneura* high open shrubland to high shrubland over *Triodia brizoides* mid-dense hummock grassland**
There were only a small number of low hills within the Fortescue Valley, which may be southern extensions of the Chichester Range (Appendix 1, map sheet 10). These were mapped mainly as the Adrian Land System (Agwest 2002). These had a relatively open cover of tall shrubs dominated by *Acacia aneura* var. aff. *longicarpa* (MET 16,050) over a moderately dense hummock grassland of *Triodia brizoides*. Scattered shrubs of *Eremophila forrestii* subsp. *forrestii, E. longifolia* and *Cassia luerssenii* were also typically present. Other associated species: *Acacia acradenia, A. arrecta, A. rhodophloia, Aristida contorta, Enneapogon polyphyllus, Eucalyptus gamophylla, Maireana triptera, M. villosa, Rhagodia eremaea, Sclerolaena cornishiana, Sida* aff. *fibulifera* (HD12-39), *Solanum horridum*. Site FMG70 and releves FMG-KD, FMG-MJ.

Fh2 ***Acacia synchronicia* scattered tall shrubs over *Triodia longiceps* mid-dense hummock grassland**
This vegetation occurred on calcareous plains with a continuous surface mantle of pebbles (Appendix 1, map sheet 10), corresponding to the Calcrete Land System (Agwest 2002). It had occasional tall shrubs of *Acacia synchronicia* over a relatively dense hummock grassland of *Triodia longiceps*. Other associated species: *Acacia sclerosperma, Eragrostis*

falcata, Pluchea tetranthera, Rhynchosia minima var. *australis, Stemodia grossa.* Sites FMG14, FMG38, FMG41, FMG60, FMG61 and releve FMG-MI.

Fh3 ***Acacia aneura* scattered low trees over *Acacia synchronicia* tall shrubland to scattered tall shrubs over **Cenchrus ciliaris* tussock grassland**
This vegetation occurred on broad plains north of the Munjina Road crossing of the BHP rail (Appendix 1, map sheet 11), and corresponds with the Fortescue Land System (Agwest 2002). It had scattered low trees of Mulga, particularly *Acacia aneura* (flat curved; MET 15 548), over a tall shrubland of *Acacia synchronicia*. The grassy ground cover was dominated by **Cenchrus ciliaris* and also included *Aristida holathera* var. *holathera*. Other associated species: *Cullen leucanthum, Dactyloctenium radulans, Enneapogon polyphyllus, Rhagodia eremaea.* ' Scalds' within the general shrubland vegetation were dominated by herbs such as *Boerhavia coccinea, Portulaca oleracea, Euphorbia* spp., *Sclerolaena cornishiana.* Site FMG51.

Fh4 ***Eucalyptus gamophylla* low open woodland over *Acacia sclerosperma* high open shrubland over *Triodia basedowii* mid-dense hummock grassland**
This vegetation occurred on stony plains north of the Munjina Road crossing of the BHP rail (Appendix 1, map sheet 12). It had a low open woodland of mallee *Eucalyptus gamophylla* over an open tall shrubland of *Acacia sclerosperma* and scattered low shrubs including *Hibiscus brachychlaenus, Ptilotus astrolasius* var. *astrolasius* and *Sida echinocarpa.* The hummock grassland was dominated by *Triodia basedowii*. Other associated species: *Aristida inaequiglumis, Dicrastylis georgei, Eriachne aristidea, Goodenia stobbsiana, Petalostylis cassioides, Stylobasium spathulatum.* Site FMG47.

4.4.2 Vegetation of Clayey / Sandy Plains

A variety of vegetation types dominated by Mulga *Acacia aneura* was recorded from the Fortescue Valley area, south of the Chichester Range. Units Fa1 to Fa3 broadly correspond with the Christmas Land System, while Fa4 to Fa9 occurred mainly on the Jamindie Land System (Agwest 2002).

Fa1 ***Acacia aneura* open scrub to low open forest over *Dodonaea petiolaris, Eremophila forrestii* subsp. *forrestii, Cassia helmsii, Sida calyxhymenia* open heath with *Enneapogon polyphyllus* annual very open grassland**
This vegetation occurred in groves on the low stony plain immediately south of the Chichester Range (Appendix 1, map sheets 9 and 10). It had an open scrub to low open forest of *Acacia aneura* var. *?aneura/intermedia*, with scattered *A. ayersiana, A. pruinocarpa* and *Psydrax latifolia*, over an open heath dominated by *Dodonaea petiolaris* with small amounts of *Eremophila forrestii* subsp. *forrestii, Cassia helmsii, C. luerssenii* and *Sida calyxhymenia.* At ground level there was a very open grassland of species such as *Enneapogon polyphyllus* and *Aristida obscura.* Other associated species were *Acacia tetragonophylla, Aristida contorta, Digitaria brownii, Eremophila latrobei* subsp. *filiformis, E. longifolia* and *Hibiscus burtonii.* The intergroves were largely devoid of vegetation, with scattered individuals of largely annual herbs and grasses including *Cleome viscosa, Enneapogon polyphyllus, Pterocaulon sphacelatum, Ptilotus helipteroides* var. *helipteroides, Salsola tragus* and *Sclerolaena cornishiana.* Sites FMG19, FMG54, FMG55.

Fa2 ***Acacia aneura* low woodland over *A. aneura, A. atkinsiana* high open shrubland over *Eremophila forrestii* subsp. *forrestii* open shrubland over *Triodia epactia* mid-dense hummock grassland**
This vegetation occurred in drainage areas within the plain immediately south of the Chichester Range. The overstorey was a low woodland of a variety of forms of *Acacia aneura* over a high open shrubland of *A. aneura* and *A. atkinsiana.* The open shrubland below this was dominated by *Eremophila forrestii* subsp. *forrestii* and also included *E. latrobei* subsp. *filiformis* and *Maireana planifolia.* The mid-dense hummock grassland was dominated by *Triodia epactia.* Other associated species: *Aristida contorta, Cassia glutinosa, C. luerssenii, Enneapogon polyphyllus, Eremophila longifolia, Porana commixta, Psydrax suaveolens, Rhagodia eremaea, Salsola tragus.* Site FMG98.

Fa3 ***Acacia xiphophylla, A. aneura*** **high open shrubland to low woodland over** ***Acacia victoriae, Eremophila forrestii*** **subsp.** ***forrestii, Cassia*** **spp. open shrubland to open heath over** ***Aristida latifolia*** **grassland with** ***Enneapogon polyphyllus, Aristida contorta*** **annual grassland**

This vegetation occurred on the broad plain associated with the Fortescue Valley. The variable substrate included sandy to clayey patches, which had a mixed high shrubland to low open woodland dominated by *Acacia xiphophylla* and *A. aneura* var. *?aneura / intermedia*, over an open shrubland to open heath of *Acacia victoriae, Eremophila forrestii* subsp. *forrestii* and a variety of *Cassia* species (particularly *C. oligophylla* and *C. sturtii*). At ground level there was typically a grassland of *Enneapogon polyphyllus, Aristida contorta* and *A. latifolia*. Intergrove areas usually had a grassland of *Aristida contorta* with small amounts of *Enneapogon polyphyllus*, along with an open herbland of *Pterocaulon sphacelatum* and *Sclerolaena cornishiana*. Other associated species: *Abutilon otocarpum, Cleome viscosa, Dodonaea petiolaris, Enneapogon caerulescens* var. *caerulescens, Evolvulus alsinoides* var. *villosicalyx, Goodenia muelleriana*, varieties of *Hibiscus sturtii, Mukia maderaspatana, Ptilotus aervoides, P. exaltatus, P. gomphrenoides, Salsola tragus, Solanum horridum, S. lasiophyllum*. Sites FMG17, FMG18 and releve FMG-KE; also sites H234, H245 of Biota and Trudgen (2002).

Fa4 ***Acacia aneura, A. pruinocarpa*** **closed scrub over** ***Dodonaea petiolaris*** **open shrubland over** ***Aristida inaequiglumis*** **open grassland**

This vegetation occurred in groves on the broad sandy plain at the junction of the Fortescue Valley and Hamersley Range areas (Appendix 1, map sheets 10 and 11). It had a closed scrub of *Acacia aneura* (a variety of forms including var. *?aneura/intermedia*, var. aff. *longicarpa* (MET 16,050), and grey bushy form; MET 15,732), with small amounts of *A. pruinocarpa* and *Psydrax latifolia*, over an open shrubland dominated by *Dodonaea petiolaris* and also including *Cassia helmsii* and *Eremophila forrestii* subsp. *forrestii*. At ground level there was typically an open grassland of *Aristida inaequiglumis*, sometimes with occasional hummocks of *Triodia basedowii*. Other associated species: *Corymbia deserticola, Digitaria brownii, Enneapogon polyphyllus, Hibiscus burtonii, H. sturtii* var. aff. *platychlamys, Maireana planifolia, Porana commixta, Ptilotus obovatus, Sida* aff. *fibulifera* (HD12-39), *Solanum lasiophyllum, Rhyncharrhena linearis*. Sites FMG44, FMG45; also sites H010, H020, H055 of Biota and Trudgen (2002).

Fa5 ***Acacia pruinocarpa, A. aneura*** **high open shrubland over** ***Dodonaea petiolaris, Cassia luerssenii*** **open shrubland over** ***Triodia epactia*** **hummock grassland with** ***Aristida inaequiglumis*** **grassland**

This vegetation occurred on a clayey plain in the southern portion of the Fortescue Valley (Appendix 1, map sheet 10), and would probably once have been groved Mulga, since degraded by repeated fires. It had a high open shrubland of *Acacia pruinocarpa* and *A. aneura* var. aff. *longicarpa* (MET 16,050) over an open shrubland of *Dodonaea petiolaris* and *Cassia luerssenii*. The hummock grassland was dominated by *Triodia epactia* and occurred with a grassland of *Aristida inaequiglumis*. Other associated species: *Acacia wanyu, Aristida contorta, Cassia helmsii, Eremophila forrestii* subsp. *forrestii, Hakea lorea* subsp. *lorea, Solanum lasiophyllum*. Site FMG42; also site H056 of Biota and Trudgen (2002).

Fa6 ***Acacia aneura, A. citrinoviridis*** **open scrub over** ***Eremophila lanceolata*** **low open shrubland to low shrubland**

This vegetation occurred on the clayey plain on the southern edge of the Fortescue Valley (Appendix 1, map sheet 10). It had groves of *Acacia aneura* (var. *?aneura/intermedia* and var. *conifera*), sometimes with *A. citrinoviridis* as a dominant, over a relatively open cover of low shrubs, usually *Eremophila lanceolata* ms., *Maireana triptera* and *Ptilotus obovatus*. Scattered shrubs to an open shrubland of *Rhagodia eremaea* were also typically present, with occasional *Cassia helmsii, Eremophila forrestii* subsp. *forrestii, E. latrobei* subsp. *filiformis* and *Psydrax latifolia*. The ground cover was typically a very open cover of grasses, dominated by *Enneapogon polyphyllus* and also including *Aristida contorta, Chrysopogon fallax* and *Perotis rara*. Other associated species: *Abutilon* aff. *lepidum* (1) (MET 15,352), *A. otocarpum, Amaranthus mitchellii, Cleome viscosa, Corchorus sidoides, Enchylaena tomentosa, Euphorbia biconvexa, Evolvulus alsinoides* var. *villosicalyx, Glycine canescens, Maireana planifolia, M. pyramidata, *Malvastrum americanum, Mukia maderaspatana, Portulaca oleracea, Ptilotus gomphrenoides* var. *gomphrenoides, Sclerolaena cuneata, Sida* aff. *fibulifera* (HD12-39), *S. platycalyx, Solanum lasiophyllum*. No sites from this study; site H058 of Biota and Trudgen (2002).

Fa7 ***Corymbia deserticola* scattered low trees over *Acacia aneura, A. pruinocarpa* high open shrubland to low open woodland over *Triodia basedowii* hummock grassland and *Digitaria brownii* open tussock grassland**

This vegetation was recorded from the sandy plain on the southern edge of the Fortescue Valley (Appendix 1, map sheet 11). It had occasional low trees of *Corymbia deserticola* over a high open shrubland to low open woodland of *Acacia aneura* (a variety of forms including aff. *aneura* (scythe-shaped; MET 15,743), var. *?aneura/intermedia* and var. aff. *longicarpa* (MET 16,050)), with small amounts of *A. pruinocarpa*. Scattered tall shrubs of *Psydrax latifolia* were typically present over an open shrubland of *Dodonaea petiolaris*. The ground cover was a hummock grassland of *Triodia basedowii* with an open tussock grassland of *Digitaria brownii*, usually with an annual grassland of *Aristida* species (*A. contorta, A. holathera* var. *holathera* and *A. inaequiglumis*). Other associated species: *Abutilon lepidum, Anthobolus leptomerioides, Cassia luerssenii, Cleome viscosa, Enneapogon polyphyllus, Eriachne aristidea, E. pulchella* subsp. *dominii, Grevillea wickhamii* subsp. *aprica, Hibiscus sturtii* var. *platychlamys, Indigofera monophylla* (brown calyx form), *Maireana planifolia, M. triptera, Mukia maderaspatana, Porana commixta, Pterocaulon ?sphaeranthoides* x *sphacelatum, Ptilotus exaltatus* var. *exaltatus, P. polystachyus* var. *polystachyus, Sclerolaena cornishiana, Tribulus astrocarpus*. No sites from this study; sites H012, H021 of Biota and Trudgen (2002).

Fa8 ***Acacia aneura* low open forest over **Cenchrus ciliaris* closed tussock grassland**

This vegetation occurred on low-lying areas north of the Munjina Road crossing of the BHPB rail (Appendix 1, map sheets 11 and 12). It comprised a low open forest of *Acacia aneura* var. *?aneura/intermedia* over a dense ground cover of **Cenchrus ciliaris*, with less **C. setigerus*. Despite the dense infestation of weeds, numerous native flora species were recorded. Other associated species: *Abutilon fraseri, Acacia citrinoviridis, A. inaequilatera, Amyema fitzgeraldii, Chrysopogon fallax, Cullen leucanthum, Eulalia aurea, Hakea lorea* subsp. *lorea, Porana commixta, Ptilotus obovatus* var. *obovatus, Solanum lasiophyllum*. Site FMG52 and releve FMG-BE.

Fa9 ***Acacia aneura* high open shrubland over *Triodia longiceps* mid-dense hummock grassland**

This vegetation occurred broadly on plains in the same area as vegetation type Fa8. It had a high open shrub cover dominated by *Acacia aneura* over a moderately dense hummock grassland of *Triodia longiceps*. Other associated species: *Sclerolaena cornishiana*. No sites from this study.

4.4.3 Vegetation of Creeklines / Drainage Areas

Fc2 ***Eucalyptus victrix* scattered low trees over *Acacia stenophylla* open scrub over *Triodia longiceps* mid-dense hummock grassland and/or mixed tussock grassland**

This vegetation occurred in the major drainage area through the Fortescue Valley (Appendix 1, map sheet 10), within the Coolibah Land System (Agwest 2002). It had occasional low trees of *Eucalyptus victrix* over an open scrub of *Acacia stenophylla*, with only scattered other shrubs (eg. *Acacia tetragonophylla* and *Eremophila youngii*). The ground cover varied from a closed tussock grassland of *Tripogon loliiformis* and *Eriachne benthamii* in saline and sluggishly drained areas, to a moderately dense hummock grassland of *Triodia longiceps* interspersed with a tussock grassland of *Eulalia aurea*. Other associated species: *Eragrostis falcata, Hakea lorea* subsp. *lorea*. No sites from this study; sites H048, H049 of Biota and Trudgen (2002).

4.4.4 Vegetation of Cracking Clays

Vegetation types Fx1 to Fx6 occurred on the broad clayey plains associated with the drainage through the Fortescue Valley, corresponding to the Coolibah Land System (Agwest 2002). Units Fx7 to Fx9 occurred on the Marsh Land System (Agwest 2002), and comprised the westernmost extent of the Fortescue Marsh.

Fx1 ***Acacia xiphophylla* open scrub over *Cassia sturtii* shrubland to low open heath over *Eragrostis xerophila* open tussock grassland**

This vegetation occurred on areas of clayey plain in the central Fortescue Valley. It had an open scrub of *Acacia xiphophylla* with small amounts of *Rhagodia eremaea* over a variable cover of lower shrubs of *Cassia sturtii*. The dominant ground cover was patches of

Eragrostis xerophila tussock grassland. Other associated species: *Acacia victoriae, Aristida contorta, Cassia helmsii, *Cenchrus ciliaris, Dichanthium sericeum* subsp. *humilius, Enchylaena tomentosa, Enneapogon caerulescens* var. *caerulescens, E. polyphyllus, Eragrostis setifolia, Evolvulus alsinoides* var. *villosicalyx, Hibiscus brachysiphonius* (Priority 3), **Malvastrum americanum, Pterocaulon ?sphaeranthoides* x *sphacelatum, Ptilotus exaltatus* var. *exaltatus, P. gomphrenoides* var. *gomphrenoides, Salsola tragus, Solanum lasiophyllum, Sporobolus australasicus.* No sites in this study; sites H138, H280 of Biota and Trudgen (2002).

Fx3 ***Acacia xiphophylla, A. victoriae* high open shrubland over *Maireana triptera* low shrubland and *Sclerolaena cuneata* open herbland**

This vegetation occurred on areas of clayey plain towards the southern edge of the Fortescue Valley (Appendix 1, map sheet 10). The overstorey was a high open shrubland of *Acacia xiphophylla* and *A. victoriae*, sometimes with *A. aneura*. A low shrubland dominated by *Maireana triptera*, and also including scattered *M. pyramidata* and *Ptilotus obovatus*, occurred over an open herbland dominated by *Sclerolaena cuneata* with occasional *S. costata* and *S. diacantha*. Other associated species: *Abutilon macrum, Aristida contorta, *Cenchrus ciliaris, Cleome viscosa, Dactyloctenium radulans, Enteropogon acicularis, Portulaca oleracea, Pterocaulon ?sphaeranthoides* x *sphacelatum, Ptilotus exaltatus* var. *exaltatus, P. gomphrenoides* var. *gomphrenoides, Salsola tragus, Sida* aff. *fibulifera* (HD12-39), *Trianthema oxycalyptra* var. *oxycalyptra, T. triquetra*. Sites FMG13, FMG40; also site H057 of Biota and Trudgen (2002).

Fx5 ***Frankenia ?setosa* low shrubland**

Low shrublands dominated by *Frankenia ?setosa* with occasional samphires (mainly *Halosarcia indica*) occurred throughout the Fortescue Valley area on small, poorly drained patches of clay. Other associated species: *Atriplex codonocarpa, Eragrostis falcata, Peplidium* sp. E (Flora of Australia). No sites from this study.

Fx6 ***Eragrostis xerophila, Eriachne benthamii* closed tussock grassland**

This vegetation was recorded from low-lying drainage areas within the clayey plain. It had a closed tussock grassland of *Eragrostis xerophila* and *Eriachne benthamii*, with small amounts of *Eragrostis eriopoda*. Only occasional shrubs were noted, such as *Acacia victoriae* and *A. farnesiana*. Other associated species: *Aristida latifolia, Cassia sturtii, Crotalaria dissitiflora* subsp. *benthamiana, Iseilema vaginiflorum, Ptilotus gomphrenoides* var. *gomphrenoides, Stemodia grossa, Streptoglossa bubakii.* No sites from this study; site H279 of Biota and Trudgen (2002).

Fx7 ***Eragrostis falcata* grassland**

Small patches of grassland dominated by *Eragrostis falcata* occurred within the clayey plains of the Fortescue Valley. Other associated species: *Atriplex codonocarpa, Dactyloctenium radulans, Eragrostis cumingii, Ptilotus gomphrenoides* var. *gomphrenoides, Trianthema triquetra*. No sites from this study.

Fx8 **Mixed annual sedgelands**

Patches of annual sedgelands, usually dominated by *Cyperus bulbosus*, occurred within the Fortescue Valley on small, poorly drained patches of clay. Other associated species: *Acacia synchronicia, Triodia longiceps*. No sites in this study.

Fx9 **Samphire low shrubland**

Extensive areas of samphire low shrublands, dominated by species such as *Halosarcia auriculata, H. indica* subsp. *leiostachya, H. halocnemoides* subsp. *tenuis* and *Halosarcia* sp. nov. aff. *pergranulata* occurred in the central portion of the Fortescue Valley, usually interspersed with patches of vegetation types Fx7 and Fx8 (Appendix 1, map sheet 10). Some areas had a shrub overstorey of *Muehlenbeckia florulenta*. Other associated species: *Atriplex semilunaris, Bulbostylis barbata, Cullen cinereum, Cyperus bulbosus, Dysphania plantaginella, Flaveria australasica, Lawrencia densiflora, Maireana* sp. nov. aff. *luehmannii, Ptilotus exaltatus* var. *exaltatus, P. gomphrenoides* var. *gomphrenoides, Swainsona kingii.* Sites FMG15, FMG16 and releves FMG-BD, FMG-ML.

4.5 Hamersley Range

4.5.1 Vegetation of Colluvial Fans

Vegetation types Hh1 to Hh4 were mainly associated with the Boolgeeda Land System, while Hh5 occurred on the Newman Land System (Agwest 2002).

Hh1 ***Corymbia* spp., *Eucalyptus gamophylla* scattered low trees over *Acacia ancistrocarpa* scattered shrubs to open shrubland over *Triodia basedowii* mid-dense hummock grassland**

This vegetation type occurred in the Hamersley Range portion of the project area, dominating the broad sandy plains and colluvial fans (Appendix 1, map sheets 11 - 13). It had occasional low trees of *Corymbia hamersleyana, C. deserticola* and/or *Eucalyptus gamophylla,* over scattered tall shrubs to an open shrubland dominated by *Acacia ancistrocarpa* with occasional *Acacia aneura* var. *?aneura/intermedia, A. inaequilatera, Cullen leucochaites, Hakea chordophylla* and *Hakea lorea* subsp. *lorea*. The mid-dense hummock grassland was dominated by *Triodia basedowii*, while recently burnt areas typically had a grassland of *Aristida inaequiglumis* and/or *A. holathera* var. *holathera*. Other associated species: *Acacia dictyophleba, A. pruinocarpa, A. wanyu, Cassia oligophylla, Cleome viscosa, Corchorus sidoides, C. tectus, Cymbopogon obtectus, Dicrastylis cordifolia, Eragrostis eriopoda, Eriachne aristidea, Euphorbia australis* (mid-green form), *Goodenia microptera, Hibiscus sturtii* var. *platychlamys, Paraneurachne muelleri, Ptilotus obovatus, Sida* aff. *cardiophylla* (site 1215), *Solanum lasiophyllum, Trichodesma zeylanicum* var. *zeylanicum*. Sites FMG12, FMG43; also sites H008, H009, H013, H014, H018, H019 of Biota and Trudgen (2002).

Hh2 ***Corymbia hamersleyana, Eucalyptus gamophylla* scattered low trees over *Acacia inaequilatera, Hakea chordophylla* scattered tall shrubs over *Triodia basedowii* hummock grassland with *Aristida holathera* var. *holathera* annual open grassland**

This vegetation was similar to Hh2 and occurred in similar areas and on similar substrates. It had occasional low trees of *Corymbia hamersleyana* and *Eucalyptus gamophylla* over scattered tall shrubs, typically of *Acacia inaequilatera* and *Hakea chordophylla*, with occasional *Acacia pachyacra*. Scattered lower shrubs typically included *Bonamia rosea, Dicrastylis cordifolia, Indigofera monophylla* (brown calyx form) and *Ptilotus obovatus*. The ground cover was a variably dense hummock grassland of *Triodia basedowii* (depending on the time since the last fire), usually with an open grassland of *Aristida holathera* var. *holathera*. Other associated species: *Acacia ancistrocarpa, Aristida inaequiglumis, Cassia notabilis, C. oligophylla, Corchorus tectus, Cullen leucochaites, Cymbopogon obtectus, Eragrostis eriopoda, Eriachne aristidea, Euphorbia australis* (mid-green form), *Goodenia microptera, Heliotropium chrysocarpum, Paraneurachne muelleri, Pterocaulon ?sphaeranthoides* x *sphacelatum, Scaevola parvifolia* subsp. *pilbarae, Sida arenicola, S.* aff. *cardiophylla* (site 1215), *Tribulus hirsutus, Trichodesma zeylanicum* var. *zeylanicum*. Site FMG50; also sites H011, H015, H042, H054 of Biota and Trudgen (2002).

Hh3 ***Eucalyptus gamophylla* scattered low mallees over *Gossypium australe, Grevillea wickhamii* subsp. *aprica* scattered tall shrubs over *Triodia basedowii* hummock grassland with *Aristida holathera* var. *holathera* annual open grassland**

This vegetation occurred in the southern portion of the Hamersley Range area, again on the sandy plains and colluvial fans (Appendix 1, map sheet 12). It had occasional low mallees of *Eucalyptus gamophylla* over scattered tall shrubs, typically including *Gossypium australe* (Burrup Peninsula form) and *Grevillea wickhamii* subsp. *aprica*, and also *Acacia inaequilatera* and *A. pachyacra*. At ground level there was a hummock grassland of *Triodia basedowii*, with an open grassland of *Aristida holathera* var. *holathera*, usually with scattered **Cenchrus ciliaris*. Other associated species: *Bonamia rosea, Cassia oligophylla, Corchorus tectus, Dicrastylis cordifolia, Eragrostis eriopoda, Eriachne aristidea, Hibiscus leptocladus, H. sturtii* var. *platychlamys, Hybanthus aurantiacus, Indigofera monophylla* (brown calyx form), *Mollugo molluginis, Ptilotus astrolasius, P. obovatus, Sida arenicola, S.* aff. *cardiophylla* (site 1215), *Solanum lasiophyllum, Trichodesma zeylanicum* var. *zeylanicum*. Site FMG63; site H041 of Biota and Trudgen (2002).

Hh4 ***Petalostylis cassioides* high open shrubland over *Triodia basedowii* mid-dense hummock grassland with *Aristida holathera* var. *holathera* annual grassland**

This vegetation occurred on a low swale within the undulating plain in the southern portion of the Hamersley Range area. It had a high open shrubland of *Petalostylis cassi*oides over a mid-dense hummock grassland of *Triodia basedowii* with an annual grassland of *Aristida*

holathera var. *holathera*. Other associated species: *Acacia ancistrocarpa, A. pruinocarpa, Bonamia rosea, Dicrastylis cordifolia, Hybanthus aurantiacus, Ptilotus astrolasius*. No sites from this study; site H039 from Biota and Trudgen (2002).

Hh5 ***Eucalyptus leucophloia* scattered trees to low open woodland over *Acacia hilliana* scattered low shrubs to low open shrubland over *Triodia* aff. *basedowii* moderately dense hummock grassland**
This vegetation occurred over the crests of stony hills in the Hamersley Range, particularly on Banded Iron Formation substrates, extending up into the Chichester Range (previously identified as Ch11). It had scattered trees to a low open woodland of *Eucalyptus leucophloia* over a low open shrubland dominated by *Acacia hilliana* over a moderately dense hummock grassland dominated by *Triodia* aff. *basedowii*, often with small amounts of *T. pungens* or *T. wiseana*. Other associated species: *Acacia arida, A. pruinocarpa, A. spondylophylla, Dodonaea coriacea, Eriachne pulchella* subsp. *dominii, Fimbristylis dichotoma, Gompholobium polyzygum, Goodenia stobbsiana, Grevillea wickhamii, Indigofera monophylla, Paraneurachne muelleri, Ptilotus rotundifolius, Cassia* spp., *Solanum lasiophyllum*. Site FMG64.

4.5.2 Vegetation of Clayey / Sandy Plains of the Hamersley Range

Vegetation types Hp3 and Hp4 occurred on the Fan Land System, Hp5 occurred on the Urandy Land System, and Hp6 occurred mainly on the Divide Land System (Agwest 2002).

Hp3 ***Acacia aneura, A. pruinocarpa* scattered tall shrubs over *Eremophila forrestii* subsp. *forrestii* scattered low shrubs over *Triodia* spp. scattered hummock grasses and *Aristida contorta* open annual grassland**
This open vegetation occurred in areas surrounding Hp4 (Appendix 1, map sheets 12 and 13). The overstorey had scattered tall shrubs of *Acacia aneura* and *A. pruinocarpa* over scattered lower shrubs dominated by *Eremophila forrestii* subsp. *forrestii*. The open understorey had scattered hummock grasses (eg. *Triodia lanigera*) with an open grassland of the annual *Aristida contorta*. Other associated species: *Acacia ayersiana, Aristida holathera* var. *holathera, A. inaequiglumis, Boerhavia coccinea, Cassia* spp., *Enchylaena tomentosa, Enneapogon polyphyllus, Goodenia prostrata, Maireana villosa, Paraneurachne muelleri, Perotis rara, Psydrax latifolia, Ptilotus* spp., *Rhagodia eremaea, Solanum lasiophyllum*. No sites from this study.

Hp4 ***Acacia aneura* groved low open forest over *Eremophila forrestii* subsp. *forrestii* scattered low shrubs over *Triodia pungens* scattered hummock grasses and *Aristida contorta, Enneapogon polyphyllus* open annual grassland**
Mulga woodlands in groved formations occurred on the broad plains near the existing BHP railway (Appendix 1, map sheet 13). These were typically heavily grazed and have also been subject to repeated fires. Other associated species: *Aristida holathera* var. *holathera, Cassia* spp., *Psydrax latifolia, Ptilotus* spp., *Rhagodia eremaea, Solanum lasiophyllum*. No sites from this study.

Hp5 ***Corymbia hamersleyana, Eucalyptus gamophylla* scattered low trees over *Acacia ancistrocarpa, A. dictyophleba, A. pachyacra, Hakea* spp. high open shrubland over *Triodia pungens* hummock grassland**
This vegetation occurred on outwash plains associated with the Weeli Wolli Creek drainage system (Appendix 1, map sheet 13). Other associated species: *Aristida contorta, A. holathera* var. *holathera, Eriachne aristidea, Hakea chordophylla* and *H. lorea*. Site FMG68; also site WW31 of HGM (2000a).

Hp6 ***Eucalyptus gamophylla* scattered low trees over *Triodia basedowii, T. schinzii* hummock grassland**
This vegetation occurred on sandy outwash plains, again associated with the Weeli Wolli Creek drainage system, which are largely mapped as the Divide Land System (Agwest 2002). Scattered shrubs were also recorded, including *Acacia ancistrocarpa, A. bivenosa, A. inaequilatera, A. pachyacra, Hakea lorea* and *Solanum lasiophyllum*. Other associated species: *Aristida holathera* var. *holathera, Eriachne aristidea*. Sites FMG10, FMG65; also site WW05 of HGM (2000a).

4.5.3 Vegetation of Major Creeklines and Floodplains

Hc1 ***Eucalyptus victrix* woodland over *Acacia citrinoviridis* open scrub over *Cenchrus ciliaris open tussock grassland**

This vegetation occurred on the banks of Weeli Wolli Creek (Appendix 1, map sheets 12 and 13). It had an open woodland to woodland of *Eucalyptus victrix* over an open scrub of *Acacia citrinoviridis*, with occasional *Acacia coriacea* subsp. *pendens*. The invasion by **Cenchrus ciliaris* (and to a lesser extent **C. setigerus*) was less pronounced on the more unstable substrates of the immediate creek banks than on the floodplains (Hc2). Other associated species: *Atalaya hemiglauca, Cymbopogon ambiguus, Dicladanthera forrestii, Enneapogon clelandii, Ptilotus obovatus, Rhagodia eremaea, Tephrosia rosea* var. *glabrior* ms. No sites from this study.

Hc2 ***Eucalyptus victrix* scattered low trees over *Acacia citrinoviridis* high open shrubland over *Cenchrus ciliaris closed tussock grassland**

This vegetation occurred on the floodplains surrounding Weeli Wolli Creek. It had occasional low trees of *Eucalyptus victrix* over a high open shrubland of *Acacia citrinoviridis*. While the ground cover would probably once have been a *Triodia pungens* hummock grassland, this area is now heavily invaded by Buffel grass **Cenchrus ciliaris* and Birdwood grass **C. setigerus*. Other associated species: *Atalaya hemiglauca, Dicladanthera forrestii, Porana commixta, Solanum phlomoides, Trichodesma zeylanicum* var. *zeylanicum*. Releves FMG-KC, FMG-RA.

4.5.4 Vegetation of Minor Creeklines and Floodplains

Hc3 ***Corymbia hamersleyana* scattered low trees over *Acacia tumida, Gossypium robinsonii* open scrub over *Cenchrus ciliaris closed tussock grassland**

This vegetation was recorded from a minor flowline in the central portion of the Hamersley Range area. It had scattered low trees of *Corymbia hamersleyana* over an open scrub dominated by *Acacia tumida*, with small amounts of *Gossypium robinsonii* and scattered *Grevillea wickhamii* subsp. *aprica*. At ground level there was a dense infestation of **Cenchrus ciliaris*. Other associated species: *Acacia pyrifolia, Aristida holathera* var. *holathera, Hybanthus aurantiacus, Ptilotus obovatus, Tephrosia rosea* var. *glabrior* ms., *Triodia epactia*. No sites from this study; site H016 of Biota and Trudgen (2002).

Hc4 ***Corymbia hamersleyana* scattered low trees over *Acacia tumida, Gossypium robinsonii* high open shrubland to open scrub over mixed open tussock grassland and *Triodia epactia* open hummock grassland**

This vegetation occurred in flowlines in the central portion of the Hamersley Range area. It had scattered low trees of *Corymbia hamersleyana* and/or *Eucalyptus gamophylla* over a high open shrubland to open scrub dominated by *Acacia tumida* and *Gossypium robinsonii*, usually with lesser amounts of *Grevillea wickhamii* subsp. *aprica* and *Stylobasium spathulatum*. The ground cover was typically an open tussock grassland of **Cenchrus ciliaris* and *Themeda triandra*, with scattered *Triodia epactia* hummocks. Scattered low shrubs included *Bonamia rosea, Corchorus lasiocarpus* subsp. *lasiocarpus* ms., *Solanum phlomoides* and *Tephrosia* aff. *densa* (HD31-4). Other associated species: *Aristida holathera* var. *holathera, A. inaequiglumis, Dicrastylis cordifolia, Eragrostis eriopoda, Indigofera monophylla* (brown calyx form), *Rhynchosia minima* var. *australis, Sida* sp. 'rugose', *Solanum lasiophyllum, Trichodesma zeylanicum* var. *zeylanicum*. Site FMG49; also sites H029, H030 of Biota and Trudgen (2002).

Hc5 ***Acacia tumida, Grevillea wickhamii* high shrubland over *Cenchrus ciliaris very open tussock grassland and *Triodia epactia* open hummock grassland**

This vegetation occurred in minor flowlines dissecting the colluvial spurs in the southern portion of the Hamersley Range area. It had a high shrubland of *Acacia tumida*, with small amounts of *Grevillea wickhamii*, sometimes over an open shrubland of *Petalostylis cassioides*. At ground level there was a very open tussock grassland of **Cenchrus ciliaris* with a variably dense hummock grassland of *Triodia epactia*. Other associated species: *Acacia ancistrocarpa, Aristida holathera* var. *holathera, Eragrostis eriopoda, Hybanthus aurantiacus, Stylobasium spathulatum, Tephrosia* aff. *densa* (HD31-4), *T. rosea* var. *glabrior* ms., *Themeda triandra, Trichodesma zeylanicum* var. *zeylanicum*. No sites from this study.

Hc7 ***Acacia pyrifolia* high open shrubland over *Cenchrus ciliaris open tussock grassland and *Triodia epactia* open hummock grassland**

This vegetation was recorded from a floodplain in the southern Hamersley Range area. It had scattered tall shrubs of *Grevillea wickhamii* and *Gossypium robinsonii* over a high open shrubland of *Acacia pyrifolia* (slender, white form). A low open shrubland of *Indigofera monophylla* occurred over an open tussock grassland of **Cenchrus ciliaris* and an open hummock grassland of *Triodia epactia*. Other associated species: *Acacia pruinocarpa, A. tumida, Atalaya hemiglauca, Eriachne mucronata* (typical form), *Gossypium australe* (Burrup Peninsula form), *Hybanthus aurantiacus, Tephrosia* aff. *densa* (HD31-4). No sites from this study.

Hc8 ***Gossypium robinsonii* high open shrubland over *Gossypium australe* open shrubland over *Triodia basedowii* hummock grassland**

This vegetation occurred on a sandy alluvial plain associated with a drainage in the southern portion of the Hamersley Range area. It had a high open shrubland of *Gossypium robinsonii* over an open shrubland of *Gossypium australe* (Burrup Peninsula form). The hummock grassland was dominated by *Triodia basedowii*. Other associated species: *Acacia dictyophleba, A. pachyacra, A. pyrifolia, A. tumida, Aristida holathera* var. *holathera, A. inaequiglumis, Atalaya hemiglauca, Grevillea wickhamii* subsp. *aprica, Hakea lorea* subsp. *lorea, Tephrosia rosea* var. *glabrior* ms. No sites from this study; site H027 of Biota and Trudgen (2002).

Hc17 ***Acacia tumida* var. *pilbarensis* open scrub over *Triodia pungens* hummock grassland**

This vegetation occurred in minor flowlines through stony undulating plains. It had an open scrub dominated by *Acacia tumida* var. *pilbarensis*, sometimes with occasional emergent *Corymbia hamersleyana*, over a hummock grassland of *Triodia pungens* and an open tussock grassland dominated by *Themeda triandra*. Other associated species: *Acacia pyrifolia, Eremophila longifolia, Grevillea wickhamii, Petalostylis labicheoides, Rulingia kempeana, Santalum lanceolatum*. No sites from this study.

Hc21 ***Eucalyptus victrix* scattered low trees over *Eucalyptus xerothermica, Corymbia hamersleyana* low open woodland over *Pluchea ferdinandi-muelleri* low shrubland over *Triodia pungens, T. basedowii* hummock grassland**

This vegetation occurred in a broad drainage area within a loamy plain north of the Munjina road crossing of the BHPB rail (see Appendix 1, map sheet 12). The overstorey comprised scattered trees of *Eucalyptus victrix* over a low open woodland of *Eucalyptus xerothermica* and *Corymbia hamersleyana*. An open shrubland of *Acacia ancistrocarpa* occurred above a low shrubland of *Pluchea ferdinandi-muelleri*. At ground level there was a hummock grassland of mixed *Triodia pungens* and *T. basedowii*, with scattered tussock grasses of *Chrysopogon fallax*. Other associated species: Aris*tida holathera* var. *holathera, A. inaequiglumis, Acacia sclerosperma, A. synchronicia, Ptilotus astrolasius* var. *astrolasius, Sida arenicola*. Site FMG46.

4.5.5 Vegetation of Sand Dunes of the Hamersley Range / Fortescue Valley

Hd1 ***Acacia dictyophleba* scattered tall shrubs over *Crotalaria cunninghamii, Trichodesma zeylanicum* var. *grandiflorum* open shrubland**

This vegetation occurred only on a small number of linear red sand dunes in the southern portion of study area, at the junction of the Hamersley Range and Fortescue Valley (Appendix 1, map sheet 12) in the Divide Land System (Agwest 2002). It had occasional tall shrubs of *Acacia dictyophleba* over an open shrubland dominated by *Crotalaria cunninghamii* and *Trichodesma zeylanicum* var. *grandiflorum*. The open ground cover was typically scattered *Triodia basedowii* hummock grasses and grasses such as *Eragrostis eriopoda* and *Eriachne aristidea*. Other associated species: *Aristida holathera* var. *holathera, Bonamia rosea, Cassia notabilis, *Cenchrus ciliaris, Corchorus tectus, Hakea lorea* subsp. *lorea, Hibiscus brachychlaenus, Paractaenum refractum, Ptilotus latifolius, Sida* aff. *cardiophylla* (site 1215), *Sida* aff. *fibulifera* (HD47). Although portions of the dunes sampled had been recently burnt, much of this vegetation was in very good condition, with only occasional weeds; significant weed infestations were only noted where vehicle tracks crossed the dunes. Two small dunes in similarly good condition were recorded within the Hope Downs rail corridor (Biota and Trudgen 2002), however other dunes in the locality were degraded, mainly through infestation with Buffel grass. The conservation significance of the intact dune vegetation is extremely high, particularly given the small size and fragile nature of the habitat. Sites FMG48, FMG53 and releve FMG-RB.

5.0 Terrestrial Flora

5.1 General

Note that the following discussion is based on the level of specimen identification completed at the time of submission of this document; a small number of taxa require further work, including *Abutilon, Calandrinia, Goodenia, Nicotiana* and *Sida* aff. *fibulifera*. Some additional taxa are likely to be recognised once these identifications are complete.

A total of 762 taxa of terrestrial vascular flora from 218 genera belonging to 69 families has been recorded from the proposed FMG rail corridor (see Appendix 4). Eleven of these species are introduced flora (see Section 5.3). In addition, five mangrove species have been recorded. Nonvascular flora were not specifically sampled but were noted in a variety of habitats; these flora included liverworts on soil crusts, lichens on rocks and soil crusts, and fungi on dead wood and Mulga (*'Acacia aneura'*) trunks.

As a comparison, 760 vascular flora from 233 genera and 70 families were recorded from the initial survey of the Hope Downs rail corridor between Port Hedland and Weeli Wolli Creek, which was of a similar length and, being adjacent to the FMG corridor, covered a similar range of habitats (see Biota and Trudgen 2002). The most noticeable difference in plant groups between the two survey areas is in the lack of water plants from the proposed FMG rail corridor (probably a reflection of recent flood events which had scoured the permanent pools during this survey), and the fewer daisies within the FMG rail corridor (more Asteraceae species would be expected later in the year following winter rainfall).

The large number of vascular flora recorded reflects a number of factors:

- the long, linear nature of the project area, meaning that it intersected a wide variety of habitats (see Section 2.3.4) and therefore vegetation types;
- the relatively large number of intensively sampled quadrats;
- the timing of the field surveys following substantial summer rainfall in the region, such that many ephemeral species were available for recording. Approximately 50% of the species recorded were annual or weakly perennial flora, and many additional species were cryptophytes that would not have been evident in drier months (eg. *Crotalaria dissitiflora* subsp. *benthamiana*); and
- the richness of the flora of the Fortescue Botanical District.

The families and genera with the greatest number of taxa within the proposed FMG rail corridor are shown in Tables 5.1 and 5.2. These families and genera are those that are predominant in the vegetation of the eastern Pilbara, and that usually have most representatives on flora lists from this region, due to their prominence in the Eremaean flora. Some of the families (eg. the Amaranthaceae, Malvaceae and Poaceae) are more species rich in the Northern flora and poorer in the Southern flora, while others (such as the Mimosaceae) are abundant in all three.

In contrast to these families and genera that have many representatives, 22 families and 111 genera recorded during the survey were represented by only one taxon. Such genera included *Byblis* (Byblidaceae), *Corynotheca* (Anthericaceae), *Dolichandrone* (Bignoniaceae), *Ehretia* (Bignoniaceae), *Eriocaulon* (Eriocaulaceae), *Hemichroa* (Amaranthaceae), *Gompholobium* (Papilionaceae), *Gonocarpus* and *Haloragis* (Haloragaceae), *Owenia* (Meliaceae), *Rhodanthe* (Asteraceae) and *Terminalia* (Combretaceae). Some of the genera, such as *Ehretia* and *Dolichandrone*, have northern affinities but have only a few species in the state and only one known in the Pilbara. Others such as *Haloragis, Corynotheca, Gompholobium* and *Gonocarpus* have mostly southern affinities, at least in Australia, and have only a few species in the Eremaean parts of the state.

Table 5.1: Most species rich families within the project area.

Family	No. of Native Taxa (No. of Introduced Taxa)
Poaceae (grass family)	121 (4)
Papilionaceae (pea family)	76 (1)
Malvaceae (Hibiscus family)	65 (1)
Mimosaceae (wattle family)	63 (0)
Chenopodiaceae (saltbush, bluebush family)	37 (0)
Amaranthaceae (mulla-mulla family)	35 (1)
Euphorbiaceae (spurge family)	28 (0)
Cyperaceae (sedge family)	26 (0)
Asteraceae (daisy family)	24 (1)
Convolvulaceae (morning glory family)	24 (0)
Goodeniaceae (fan-flower family)	22 (0)
Caesalpiniaceae (Cassia family)	21 (0)

Table 5.2: Most species rich genera within the project area.

Genus	No. of Native Taxa (No. of Introduced Taxa)
Acacia (wattle family)	61 (0)
Sida (Hibiscus family)	29 (0)
Tephrosia (pea family)	21 (0)
Cassia (Cassia family)	19 (0)
Ptilotus (mulla-mulla family)	19 (0)
Euphorbia (spurge family)	18 (0)
Hibiscus (Hibiscus family)	18 (0)
Corchorus	15 (0)
Eriachne (grass family)	15 (0)
Goodenia (fan-flower family)	15 (0)
Indigofera (pea family)	14 (0)
Eragrostis (grass family)	13 (0)
Abutilon (Hibiscus family)	12 (0)
Cyperus (sedge family)	12 (0)
Heliotropium (borage family)	12 (0)

5.2 Flora of Conservation Significance

5.2.1 Declared Rare and Priority Flora

5.2.1.1 Levels of conservation significance

While all native flora are protected under the *Wildlife Conservation Act 1950-1979*, a number of plant species are assigned an additional level of conservation significance based on the limited number of known populations and the perceived threats to these populations (Table 5.3). Species of the highest conservation significance are designated Declared Rare Flora (DRF), either extant or presumed extinct. Species that appear to be rare or threatened, but for which there is insufficient information to properly evaluate their conservation significance, are assigned to one of four Priority flora categories.

In addition, the presence of some flora species means that it may be necessary to refer proposals to the Federal Minister for the Environment under the *Environment Protection and Biodiversity Conservation Act 1999*. In the Pilbara, only the two Declared Rare Flora species (*Lepidium catapycnon* and *Thryptomene wittweri*) are currently listed under the *EPBC Act 1999*.

Table 5.3: Categories of conservation significance for flora species (Atkins 2003).

Declared Rare Flora - Extant Taxa. Taxa that 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.
Declared Rare Flora - Presumed Extinct. Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently.
Priority 1 - Poorly Known Taxa. Taxa which are known from one or a few (generally <5) populations which are under threat.
Priority 2 - Poorly Known Taxa. Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under threat.
Priority 3 - Poorly Known Taxa. Taxa which are known from several populations, at least some of which are not believed to be under threat.
Priority 4 - Rare Taxa. Taxa which are considered to have been adequately surveyed and which whilst being rare, are not currently threatened by any identifiable factors.

5.2.1.2 DRF and Priority flora previously recorded from the vicinity of the project area

A search of DCLM's Threatened (Declared Rare) and Priority Flora database and the Western Australian Herbarium Specimen database was commissioned for the area bounded by 20°00' - 23°00'S and 118°00' - 121°00'E. This search yielded 275 location records of 68 taxa. The search was of a very large area and only 15 records (of 11 taxa) were actually within 10 km of the proposed rail corridor:

- *Lepidium catapycnon* (DRF) – known from approximately 5 km SE from the southern rail loop and from near Weeli Wolli Creek (8 km from the rail);
- *Eremophila spongiocarpa* ms. (Priority 1) – 100 km N of Marillana Homestead along BHP railway line to Port Hedland (within the FMG rail corridor, near Redmont Camp), ca. 22 km W of Marillana Homestead on S edge of Fortescue Marsh (3 km NE of rail), and 30 km W of Marillana Homestead (within the FMG rail corridor);
- *Eriachne* sp. Hamersley Range hilltops (S. van Leeuwen 4199) (Priority 1) – 40 km ESE of Munjina (Auski) Roadhouse at Koodaiderie (7 km SW of rail);
- *Ptilotus appendiculatus* var. *minor* (Priority 1) – Boodarie (10 km W of the rail corridor near Port Hedland);
- *Gomphrena pusilla* (Priority 2) – near Port Hedland (4 km NE of northern rail loop);
- *Stylidium weeliwolli* (Priority 2) – Head of Weeli Wolli Creek, E of Hamersley Range (~1.5 km south of the rail corridor);
- *Bulbostylis burbidgeae* (Priority 3) – Gallery Hill Tors in Abydos-Woodstock Reserve (2 km W of rail);
- *Cynanchum* sp. Hamersley (M. Trudgen 2302) (Priority 3) – Woodstock Station (7 km E of rail in the Yule River area);
- *Goodenia nuda* (Priority 3) – Weeli Wolli Creek, between Roy Hill and Wittenoom (7 km NE of rail);
- *Gymnanthera cunninghamii* (Priority 3) – 1 km W of Boodarie Landing in the Port Hedland area (3 km W of the rail corridor) and near Woodstock Station (5 km E of rail in the Yule River area); and
- *Triumfetta leptacantha* (Priority 3) – 40 km ESE of Munjina (Auski) Roadhouse at Koodaiderie (7 km SW of rail).

For much of its length, the proposed FMG rail corridor is adjacent to or in close proximity to the previously surveyed Hope Downs rail corridor (HGM 2000a, Biota and Trudgen 2002) and Chichester Range Addition to this corridor (Biota 2004a). The following Priority flora were recorded during these surveys, and some of these populations lie within the FMG rail corridor (see Section 5.2.1.3):

- Priority 1 species: *Eriachne* sp. Hamersley Range hilltops (S. van Leeuwen 4199) (identified as *Eriachne "lanata"* in Biota and Trudgen (2002));
- Priority 2 species: *Euphorbia clementii, Gonocarpus ephemerus, Ischaemum albovillosum, Olearia fluvialis, Indigofera ixocarpa, Stylidium weeliwolli;*
- Priority 3 species: *Abutilon trudgenii* ms., *Bulbostylis burbidgeae, Eriachne tenuiculmis, Goodenia nuda, Gymnanthera cunninghamii, Hibiscus brachysiphonius, Phyllanthus aridus, Sida* sp. Wittenoom (W.R. Barker 1962), *Themeda* sp. Hamersley Station (ME Trudgen 11,431), *Triumfetta leptacantha*; and
- Priority 4 species: *Goodenia stellata.*

It should be noted that all material identified as *Eriachne* sp. Hamersley Range hilltops (S. van Leeuwen 4199) has since been returned to the more common species *E. lanata* (Malcolm Trudgen, ME Trudgen and Associates, pers. comm.; Bryan Simon, Queensland Botanic Gardens, pers. comm.). As "*Eriachne* sp. Hamersley Range hilltops" no longer exists, this taxon would be expected to be removed from the Priority listing at the next revision of the list, and is not considered further in this document.

5.2.1.3 DRF and Priority flora known from the FMG rail corridor

Neither of the Declared Rare Flora species that occur in the Pilbara has been located within the FMG rail corridor, or within the nearby Hope Downs rail corridor (Biota and Trudgen 2002, Biota 2004b). *Lepidium catapycnon* is typically found on stony hillslopes of the Hamersley Range. The only portion of the corridor that contained suitable habitat is a small section near the southern rail loop. *Thryptomene wittweri* is only known from high altitudes in the Hamersley Range and Mt Augustus. There was no suitable habitat for this species within the rail corridor. On the basis of current knowledge, there are therefore no flora of significance under the *EPBC Act 1999* in the survey area.

Sixteen Priority flora were recorded during the survey of the FMG rail corridor, and a further five species have been previously recorded within the area during other surveys. These include the:

- Priority 1 species: *Eremophila spongiocarpa* ms., *Goodenia omearana* ms. and *Josephinia* ?sp. Marandoo (ME Trudgen 1554);
- Priority 2 species: *Euphorbia clementii, Gonocarpus ephemerus, Indigofera ixocarpa, Ischaemum albovillosum, Olearia fluvialis, Paspalidium retiglume* and *Stylidium weeliwolli*;
- Priority 3 species: *Abutilon trudgenii* ms., *Bulbostylis burbidgeae, Eriachne tenuiculmis, Goodenia nuda, Gymnanthera cunninghamii, Hibiscus brachysiphonius, Phyllanthus aridus, Polymeria* sp. Hamersley (M.E. Trudgen 11353), *Sida* sp. Wittenoom (W.R. Barker 1962) and *Themeda* sp. Hamersley Station (M.E. Trudgen 11,431); and
- Priority 4 species: *Goodenia stellata.*

This list of Priority flora includes all but one of the species recorded during work for the Hope Downs project. *Triumfetta leptacantha* (Priority 3) was recorded from gorges during surveys of the section of the Hope Downs rail corridor through the Hamersley Range (HGM 2000a; Biota 2004b). This species is unlikely to occur within the FMG rail corridor as it is restricted to steep gorges and rocky breakaways of the Hamersley Range, and such habitat is absent from the southern portion of the corridor.

Each of the species recorded from the proposed FMG rail corridor is discussed below, while a summary of the distribution of each species is given in Table 5.4 and shown on the maps in Appendix 1.

· ***Eremophila spongiocarpa ms.*** **Priority 1**

This succulent-leaved shrub grows to 1 m high and has white flowers in May/September. Atkins (2003) lists this species as occurring at Mt Marsh, Chichester Range and Marillana Station. According to Florabase there are four voucher specimens of this species, all collected in close proximity, from saline alluvial plains on the margins of the Fortescue Marsh.

During the current survey this species was recorded from five locations in the FMG rail corridor, all within a 5 km stretch of samphire shrubland associated with the westernmost extent of the Fortescue Marsh system (Table 5.4; Appendix 1, map sheet 10). The DCLM database search identified two additional collections within the FMG rail corridor, some distance south and north of the Marsh (map sheets 8 and 11). This species was not recorded during the Hope Downs survey work; the Hope Downs corridor was on the western side of the existing BHP rail line and did not include substantial samphire habitat.

Growth form of *E. spongiocarpa* (medium-sized shrub in foreground).

Flower of *E. spongiocarpa*.

· ***Goodenia omearana* ms.** **Priority 1**

This erect herb with yellow flowers typically grows in clay soil with calcrete on low undulating plains (Florabase). Atkins (2003) lists this species as being known from Weeli Wolli, Nullagine and Mulga Downs in the Pilbara region. According to Florabase, there are three known populations of this species, however it has also been collected from other locations near Newman (M. Maier, pers. obs.) and elsewhere in the Pilbara (E. Thoma, Hamersley Iron, pers. comm.). This species appears to occur mainly on calcrete in the Pilbara region, although there are some records from clays.

During the current survey, *Goodenia omearana* ms. was recorded from three collections on heavy clay in the Fortescue Marsh area (Table 5.4; Appendix 1, map sheet 10). This species has been recorded previously in the locality during the Hamersley Range extension to the Hope Downs rail corridor (Biota 2004b), occurring throughout a large area of calcrete south of Weeli Wolli Creek.

· ***Josephinia* ?sp. Marandoo (ME Trudgen 1554)** **Priority 1**

A single *Josephinia* specimen was collected from a Mulga / Snakewood shrubland on a clayey plain within the FMG rail corridor (Table 5.4; Appendix 1, map sheet 10). This specimen could not be positively identified as the type material is not available for comparison, however it may be the Priority 1 species *Josephinia* sp. Marandoo (ME Trudgen 1554). Atkins (2003) lists this species as being known from Marandoo and West

Angelas in the Pilbara region, and specimens from two further locations are lodged with the WA Herbarium.

· ***Euphorbia clementii*** **Priority 2**

This herb grows to 50cm and occurs on gravelly hillsides and stony ground (Paczkowska and Chapman 2000). Although not recorded during the current survey, *E. clementii* was recorded once during the initial Hope Downs rail survey (Biota and Trudgen 2002), approximately 3 km south of Chinnamon Creek (Table 5.4; Appendix 1, map sheet 4). This species was previously known from Yarrie, near Shay Gap and near Port Hedland (Atkins 2003), and was also recorded twice from a survey south-south-east of Port Hedland (Trudgen et al. 2002).

· ***Gonocarpus ephemerus*** **Priority 2**

This procumbent annual or perennial herb is known from seasonally moist habitats in the Murchison, Gascoyne, Pilbara and Little Sandy Desert. Specimens of Pilbara populations of *G. ephemerus* lodged at the Western Australian Herbarium are from Mt Augustus, Rudall River, Jigalong and near Port Hedland. This species was also recorded three times during the initial survey of the Hope Downs rail corridor (Biota and Trudgen 2002), from a floodplain and two granite outcrops near the Turner River; once from a granite outcrop during the Chichester Additional Corridor survey (Biota 2004a); twice during another survey south-south-east of Port Hedland (Trudgen et al. 2002); and has also been collected near Newman (M. Maier, pers. obs.). *G. ephemerus* appears to be uncommon (or poorly collected) rather than rare.

G. ephemerus was recorded several times from granite outcrops within the proposed FMG rail corridor (Table 5.4), and is likely to occur throughout the northern section of the corridor in appropriate habitat.

· ***Indigofera ixocarpa*** **Priority 2**

Although not recorded during the current survey, this shrubby pea species was recorded from a single site south of Chinnamon Creek during the initial Hope Downs rail survey (Biota and Trudgen 2002), and this site is also within the FMG rail corridor (Table 5.4; Appendix 1, map sheet 4).

· ***Ischaemum albovillosum*** **Priority 2**

This grass species appears restricted to cracking clays. *I. albovillosum* is known from Fortescue, Millstream, Hooley Station and Mulga Downs Station (Atkins 2003), and was also recorded from several sites during the West Angelas surveys (Trudgen and Casson 1998). The latter report described this species as "obviously more common than previous collections would have indicated, but is still uncommon".

During the current survey, this species was recorded only once within the FMG rail corridor, from the area of cracking clay near the BHP rail quarry (Table 5.4; Appendix 1, map sheet 9). It was recorded twice in this area during the survey for the initial Hope Downs rail corridor (Biota and Trudgen 2002), however these locations are outside the proposed FMG rail corridor.

· ***Olearia fluvialis*** **Priority 2**

Although not recorded during the current survey, this perennial, low-shrub form daisy was recorded as scattered individuals from sites in the Turner River and Chinnamon Creek during the survey for the Hope Downs rail corridor (Biota and Trudgen 2002). The Chinnamon Creek population lies within the proposed FMG rail corridor (see Appendix 1, map sheet 4).

O. fluvialis was recorded from three sites during the West Angelas surveys (Trudgen and Casson 1998), and is also known from the Hamersley Range and Karijini National Park

(Atkins 2003), and from Marillana Creek (Weston and Trudgen 1995; K. McCreery and M. Maier, pers. obs.). A collection of *O. fluvialis* was also made from the Shaw River, during another survey south-south-east of Port Hedland (Trudgen et al. 2002). This species appears to be quite uncommon, rather than rare, and is certainly restricted to sporadic populations in riverine habitats.

· ***Paspalidium retiglume*** **Priority 2**

This annual grass species appears restricted to cracking clays. There are only three collections of *P. retiglume* lodged at the WA Herbarium; two from near Mt. Herbert in the Millstream-Chichester National Park, and one from Moola Bulla in the Kimberley.

P. retiglume was collected twice during the current survey from the area of cracking clay near the BHP quarry (Table 5.4; Appendix 1, map sheet 9). These records represent a south-eastern extension of the known range of this species in the Pilbara.

· ***Stylidium weeliwolli*** **Priority 2**

This annual herb grows to 25 cm and is described as having pink flowers in August to September, although it was flowering in April during this survey and in May during the Chichester Additional Corridor survey (Biota 2004a). It is known from sand or sandy clay at the edges of watercourses, and from damp seepages around granites (Stephen van Leeuwen, DCLM Karratha, pers. comm.). Atkins (2003) lists *S. weeliwolli* as occurring at Mt Augustus and the Barlee Range. According to Florabase, there appear to be three widely-spaced populations of this species (Mt Augustus, Barlee Range and Weeli Wolli Creek), however additional collections have also been made in the western Pilbara (E. Thoma, Hamersley Iron, pers. comm.) and in the Chichester Range (Biota 2004a).

S. weeliwolli was collected once from the proposed FMG rail corridor, from a damp seepage at the lower edge of a granite outcrop (Table 5.4; Appendix 1, map sheet 8).

· ***Abutilon trudgenii*** **ms.** **Priority 3**

This short-lived (1-2 years) species is stimulated by fire and is consequently typically recorded from recently burnt areas. *A. trudgenii* is poorly collected, rather than rare, because of its straggly, open appearance and inconspicuous flowers.

Specimens of *A. trudgenii* are lodged at the WA Herbarium from Cane River, Hillside Station, Goldsworthy and Tom Price. However, according to the Priority Species List this species is known from other locations including Warralong, Woodstock, Point Sampson, Karratha and Pannawonica (Atkins 2003). It has also been recorded from Yanrey Station on the eastern side of the Exmouth Gulf (M. Maier, pers. obs.), west of Dampier (Halpern Glick Maunsell 2000b), south-south-east of Port Hedland (Trudgen et al. 2002), and 23 times by Trudgen and Casson (1998) during the West Angelas surveys.

In the local area, *A. trudgenii* was recorded seven times during the initial survey of the Hope Downs rail corridor (Biota and Trudgen 2002), and once from the Hamersley Range Extension to the Hope Downs rail corridor (Biota 2004b).

During the current survey, this species was recorded from one site and two opportunistic collections; on the Turner River (Appendix 1, map sheet 4), and on a low stony hill within the area of clay near the BHP quarry (map sheet 9). Two of the location records from the Hope Downs rail corridor (Biota and Trudgen 2002) also lie within the proposed FMG rail corridor (Appendix 1, map sheets 1 and 4).

***Abutilon trudgenii* ms.: growth form, leaf, and fruit (note reflexed pedicels).**

· ***Bulbostylis burbidgeae*** **Priority 3**

Collections of this small sedge species lodged with the Western Australian Herbarium are from outcrops on the Abydos-Woodstock Reserve, Mt. Edgar Station and near Hillside Station. It is likely to occur more frequently in granitic habitats in the region than current collections indicate.

B. burbidgeae was recorded numerous times during the current survey, always in sheltered habitats at the base of granite boulder rockpiles (Table 5.4). It was recorded four times during the Hope Downs rail corridor survey, from identical habitat (Biota and Trudgen 2002), and two of these locations lie within the proposed FMG rail corridor. While *B. burbidgeae* forms dense stands comprising hundreds of individuals, its restriction to isolated soil pockets means that this species contributed less than 1% cover overall at the sites where it was recorded.

***Bulbostylis burbidgeae*: typical habitat at base of granite boulders, and growth form.**

· ***Eriachne tenuiculmis*** **Priority 3**

This perennial grass is known from gullies, gorge bases and creeks, usually in coarse sand but also in clay loam. It grows to 60 cm tall, but is often washed flat by the high velocity flows that occur in its preferred habitat.

Atkins (2003) lists this species as occurring in the Dampier Archipelago, Hamersley Range and Mt Edgar Station. According to Florabase, there are only three to four populations of this species, however this species is actually very common and widespread (see below), and is one of the typical and often dominant species to be found in flowlines in the Hamersley Range.

E. tenuiculmis has been collected in a number of creeks in the Newman area (Biota 2001); is common in creeklines on the Burrup Peninsula where it has been recorded 22 times (Trudgen 2002); was recorded twice from Cape Preston, west of Dampier (see Halpern Glick Maunsell 2000b); was recorded 69 times during the West Angelas ERMP botanical survey (Trudgen and Casson 1998); is common and widespread in Marillana, Homestead and Yandicoogina creeks and tributaries (K. McCreery, pers. obs.); and has also been recorded near Paraburdoo (M. Maier, pers. obs.) and Pannawonica (K. McCreery, pers. obs.). This species is thus poorly collected rather than uncommon.

E. tenuiculmis was recorded from six locations within the proposed FMG rail corridor, always within defined creekline habitats (Table 5.4). It typically occurred as scattered clumps but was not uncommon. In the vicinity, this species was also recorded from 10 locations within the Hope Downs rail corridor (Biota and Trudgen 2002), and five locations within the Hamersley Range Extension to that corridor (Biota 2004b).

· ***Goodenia nuda*** **Priority 3**

This species is an erect herb to 50 cm, with yellow flowers in April to August. Specimens lodged previously with the WA Herbarium are from localities including Weeli Wolli Creek, Roy Hill Station, Mulga Downs Homestead and near Tom Price. *G. nuda* appears to be widespread but uncommon, and restricted to creeklines.

Although not recorded during the current survey, scattered individuals of *G. nuda* were recorded from a creekline in the southern Chichester Range area during the initial survey of the Hope Downs rail corridor (Biota and Trudgen 2002). This location is also within the proposed FMG rail corridor (Appendix 1, map sheet 9)

· ***Gymnanthera cunninghamii*** **Priority 3**

This tall, multi-stemmed shrub is known from several locations in the Pilbara including Boodarie, 80 Mile Beach, the Dampier Archipelago, the Burrup Peninsula (Trudgen 2002) and the Shaw River (Trudgen et al. 2002). Although uncommon in the Fortescue Botanical District, *G. cunninghamii* is very widespread, also occurring in the Midwest, the Northern Territory and Queensland (Atkins 2003). This species appears to occur as clones of a few stems, but mostly of one individual.

During the current survey, *G. cunninghamii* was recorded as scattered individuals from two locations within the proposed FMG rail corridor (Table 5.4; Appendix 1, map sheets 1 and 8). It was also recorded from three locations during the initial survey of the Hope Downs rail corridor (Biota and Trudgen 2002), all of which are outside the FMG rail corridor.

· ***Hibiscus brachysiphonius*** **Priority 3**

This low spreading herb appears to be restricted to cracking clays. There are specimens of *H. brachysiphonius* lodged with the WA Herbarium from several Pilbara locations including Minilya River, Tom Price, Karratha and Millstream, and this species was also recorded from five sites at Cape Preston, west of Dampier (Halpern Glick Maunsell 2000b). *H. brachysiphonius* is also known from the Kimberley and Midwest (Atkins 2003).

This species was recorded six times within the FMG rail corridor during the current survey (Table 5.4), always as scattered individuals on the clay soils in the vicinity of the BHP rail quarry (Appendix 1, map sheet 9). It was also recorded at nine locations within the Hope Downs rail corridor, extending through the Chichester Range and Fortescue Valley (Biota and Trudgen 2002).

· ***Phyllanthus aridus*** **Priority 3**

This small perennial herb / sub-shrub is known from sandstone, gravel and red sand. Atkins (2003) lists this species as occurring in the West Kimberley, Chichester Range,

West Angelas, Pardoo, Shay Gap, Doongan Homestead and the Durack River. According to Florabase, there are 19 populations of this species, predominantly in the Kimberley.

This species was first recorded in the Pilbara during the West Angelas rail corridor survey (Trudgen and Casson 1998), where it occurred not uncommonly in creeks of the southern slopes of the Chichester Range (twelve populations were recorded). During the initial Hope Downs Rail Corridor survey (Biota and Trudgen 2002), this species occurred as scattered individuals at three locations in creek and plain habitat north of the East Turner River. This species is best considered as uncommon, but not rare, in the Fortescue Botanical District.

Although not recorded during the current survey, two of the populations located during the Hope Downs rail corridor survey also lie within the proposed FMG rail corridor (Table 5.4; Appendix 1, map sheet 1).

· ***Polymeria* sp. Hamersley (M.E. Trudgen 11353)** **Priority 3**

This small herb is known from cracking clays from a small number of locations including Hamersley Station, Wittenoom and Marandoo. A single specimen was collected from the Fortescue Valley, from an area of cracking clay north of FMG18 (Table 5.4; Appendix 1, map sheet 10).

· ***Sida* sp. Wittenoom (W.R. Barker 1962)** **Priority 3**

This medium-height, spreading shrub is known from several populations; specimens are lodged with the WA Herbarium from both the western and eastern Pilbara, and this species is also known from Wittenoom and Roy Hill in the central Pilbara. It is most commonly recorded from areas of hummock grassland in the first few years following a fire (or other disturbance).

During the current survey *Sida* sp. Wittenoom was recorded from nine locations within the proposed FMG rail corridor (Table 5.4), between the Yule River (Appendix 1, map sheet 7) and the Fortescue Marsh (map sheet 10). In the vicinity, it was also recorded from two sites during a survey of the Hamersley Range Extension to the Hope Downs rail corridor (Biota 2004b).

· ***Themeda* sp. Hamersley Station (ME Trudgen 11,431)** **Priority 3**

This perennial tussock grass is from 1.3 to 1.8 m tall, and grows in red cracking clay in tussock grasslands or in clayey creeks. It often occurs as an occasional specimen but may form dense grasslands over large areas of cracking clay plains. It differs from the more common and widespread *Themeda triandra* by its larger size and sturdier culms and its pale bluish colouring (*T. triandra* has yellowish colouring).

Atkins (2003) lists *Themeda* sp. Hamersley Station as occurring at Karratha, Millstream, Hamersley Station, West Angelas and Coondewanna Flats. According to Florabase, there appear to be eight records of this species. It has also recently been observed at West Angelas, and at Wannamunna Flats (50km south-east of West Angelas) (Kelli McCreery, pers. obs.).

During the current survey, *Themeda* sp. Hamersley Station was recorded twelve times from the area of cracking clay in the vicinity of the BHP rail quarry (Table 5.4; Appendix 1, map sheet 9). This species was also recorded from three locations within the Hope Downs rail corridor; twice in creeklines and once on cracking clay (Biota and Trudgen 2002).

· ***Goodenia stellata*** **Priority 4**

This small rhizomatous perennial herb has been recorded from several localities in the West Angelas area (Trudgen and Casson 1998), and is known from numerous populations in the vicinity of Yandi (Weston and Trudgen 1995; Halpern Glick Maunsell 1997). It is also known from a number of additional Pilbara locations including Yampire Gorge,

Sandstone and Erlistoun Station (Atkins 2003), and extends to the South Carnarvon Range in the Little Sandy Desert. Of concern with respect to this species is that what appear to be populations of numerous individuals (rosettes) may in fact be clones of one or a few individuals.

During the current survey, this species was recorded once from a creekline on the southern side of the Chichester Range (Table 5.4; Appendix 1, map sheet 9). In the vicinity, it was also recorded from a single opportunistic collection approximately 6 km to the west within the Hope Downs rail corridor (Biota and Trudgen 2002).

5.2.2 Other Flora of Conservation Interest

In addition to the DRF and Priority Flora categories, some other 'Flora of Conservation Interest' have been identified. These are flora species that are not listed as DRF or Priority species by DCLM, but which are poorly known and/or could not be identified to species level for reasons other than poor condition of specimens. Details of these flora are given below and summarised in Table 5.5.

5.2.2.1 Apparently undescribed taxa

- ***Abutilon, Hibiscus, Sida, Corchorus* spp.**

The Malvaceae and Tiliaceae plant families have a high diversity in the Pilbara, and most entities are poorly collected. As a consequence, undescribed taxa of the genera listed above are routinely recorded on Pilbara surveys. Given the current lack of collections, little can be said regarding the distribution or status of these taxa.

The taxon *Hibiscus* sp. (site 316) was recorded once from north of Chinnamon Creek within the proposed FMG rail corridor during the initial survey of the Hope Downs rail corridor (Biota and Trudgen 2002). It has also been recorded once from West Angelas (M. Trudgen, pers. comm.). This taxon should be considered to be at least very uncommon, and probably rare.

- ***Acacia* aff. *aneura* taxa**

Mulga *Acacia "aneura"* in the Pilbara contains numerous distinct entities, most of which are currently undescribed and poorly collected. The portion of the FMG rail corridor between the southern edge of the Chichester Range and the southern rail loop contains a variety of vegetation types dominated by Mulga, particularly on the clayey plains of the Fortescue Valley, and numerous different forms of *A. "aneura"* were collected. Given the current lack of collections, little can be said regarding the distribution or status of these taxa.

- ***Amaranthus* spp.**

There are several more taxa referable to *Amaranthus* in the Fortescue Botanical District than are currently recognised in the literature. It is likely that most of these taxa are fairly common, but some are poorly collected and may be uncommon or geographically restricted. The taxon *Amaranthus* sp (HD102) was recorded twice within and a further five times outside the FMG rail corridor during the initial survey of the Hope Downs rail corridor (Biota and Trudgen 2002). This taxon is likely to be poorly collected rather than rare.

Table 5.4: Summary of Priority flora locations within the FMG rail corridor.

Species	No. of Records within the FMG Rail Corridor (March/April 2004)	Additional Previous Records within the FMG Rail Corridor
Priority 1 Flora		
Eremophila spongiocarpa	5 (site FMG15; releves FMG-BD, FMG-MF and FMG-ML; and near FMG-MF)	2 (†2)
Goodenia omearana	3 (site FMG60, releve FMG-MI, and outside FMG60)	-
Josephinia ?sp. Marandoo (ME Trudgen 1554)	1 (site FMG17)	-
Priority 2 Flora		
Euphorbia clementii	-	1 (†1)
Gonocarpus ephemerus	7 (sites FMG23, FMG24 and FMG74; releves FMG-MU, FMG-RE and FMG-RF; and 687517 mE, 7648033 mN)	-
Indigofera ixocarpa ms.	-	1 (†1)
Ischaemum albovillosum	1 (site FMG20)	-
Olearia fluvialis	-	1 (†1)
Paspalidium retiglume	2 (releve FMG-KH and at ~707800 mE, 7554100 mN)	-
Stylidium weeliwolli	1 (releve FMG-RE)	-
Priority 3 Flora		
Abutilon trudgenii ms.	3 (site FMG39, and releves FMG-BF and FMG-ME)	2 (†1)
Bulbostylis burbidgeae	12 (sites FMG36 and FMG90; releves FMG-BA, FMG-BC, FMG-MT and FMG-MU; and 700497 mE, 7582050 mN; 697300 mE, 7588322 mN; 696159 mE, 7608448 mN; 687507 mE, 7648023 mN; 673876 mE, 7686520 mN; 674179 mE, 7686294 mN)	2 (†1)
Eriachne tenuiculmis	6 (711723 mE, 7542286 mN; 711891 mE, 7542342 mN; 711928 mE, 7542354 mN; 712895 mE, 7543659 mN; 711292 mE, 7543448 mN; 709744 mE, 7543457 mN)	
Goodenia nuda	-	1 (†1)
Gymnanthera cunninghamii	2 (site FMG25, and at ~701800 mE, 7578920)	-
Hibiscus brachysiphonius	6 (sites FMG20F, FMG58 and FMG71; releve FMG-KF; and 707663 mE, 7555037 mN; 707666 mE, 7555083 mN)	-
Phyllanthus aridus	-	2 (†1)
Polymeria sp. Hamersley (M.E. Trudgen 11353)	1 (~708660 mE, 7534700 mN)	-
Sida sp. Wittenoom (W.R. Barker 1,962)	9 (sites FMG60 and FMG81; and 694408 mE, 7603561 mN; 694529 mE, 7603627 mN; 705721 mE, 7522803 mN; 705690 mE, 7522762 mN; 694747 mE, 7603457 mN; 695000 mE, 7603500 mN; 694562 mE, 7603645 mN)	-
Themeda sp. Hamersley Station (ME Trudgen 11,431)	12 (sites FMG20 and FMG23; releves FMG-BF and FMG-KF; and 706920 mE, 7553923 mN; 706934 mE, 7553902 mN; 707109 mE, 7553800 mN; 707427 mE, 7554041 mN; 707534 mE, 7554051 mN; 707868 mE, 7554162 mN; 707904 mE, 7554204 mN; 707654 mE, 7554949 mN)	-
Priority 4 Flora		
Goodenia stellata	1 (711720 mE, 7542288 mN)	-

†1 Hope Downs rail corridor from Port Hedland to Weeli Wolli; Biota and Trudgen 2002.
†2 Records from searches of DCLM / WA Herbarium databases.

· ***Bonamia* sp. (HD94-6)**

Identification of species in the genus *Bonamia* is currently quite difficult due to lack of a recent revision.

Bonamia sp. (HD94-6) was recorded six times from the FMG rail corridor during the current survey (Table 5.5). It was also recorded four times within and a further 15 times outside the FMG corridor during the initial survey of the Hope Downs rail corridor (Biota and Trudgen 2002), and six times during another survey south-south-east of Port Hedland (Trudgen et al. 2002). This taxon is apparently locally common where it occurs, but not widely distributed.

· ***Cassia* spp.**

Unnamed taxa of *Cassia (Senna)* are routinely recorded during Pilbara surveys, particularly within *Cassia "oligophylla" (Senna artemisioides* subsp. *"oligophylla").* In addition, hybrids and hybrid backcrosses of *Cassia* species are frequently encountered. All of the *Cassia* taxa identified within the FMG rail corridor have been recorded previously on other surveys in the area, and none are considered to be uncommon.

· ***Eriachne* sp. Port Hedland**

Eriachne sp. Port Hedland was recorded five times from the FMG rail corridor during the current survey (Table 5.5). This taxon was common (24 records) on the Abydos Plain from Port Hedland to just south of the Yule River during the initial survey of the Hope Downs rail corridor, including eight records within the area of the proposed FMG rail corridor (Biota and Trudgen 2002). It has also been recorded from south-south-east of Port Hedland, and from the Great Northern Highway south of Port Hedland (Trudgen et al. 2002). This taxon was identified as *Eriachne* sp. (Mitchell 4199) by Bryan Simon of the Queensland Botanic Gardens. It is locally common, but apparently geographically restricted.

· **Euphorbiaceae spp.**

A *Phyllanthus* species collected from two locations on granite outcrops and a *Sauropus* species collected from a sandy river bed could not be identified to species level (Table 5.5). These will be sent to a specialist (Dr Jeremy Bruhl, University of New England) for identification, however at present it is not possible to say whether these specimens are of undescribed taxa.

The genus *Euphorbia* in the Pilbara contains numerous distinct taxa, particularly within *E. "australis"* and *E. "drummondii".* All of the taxa identified to date within the FMG rail corridor have been recorded previously on other surveys in the area, and none are considered to be uncommon.

· ***Indigofera monophylla* forms**

Indigofera "monophylla" in the Pilbara contains numerous distinct taxa that are currently undescribed. The forms collected from the FMG rail corridor have not yet been determined, however those collected from the adjacent Hope Downs rail corridor were considered not uncommon in the region (Biota and Trudgen 2002).

· ***Mallotus ?dispersus***

This taxon was recorded during the initial survey of the Hope Downs rail corridor from a single granite outcrop between Chinnamon Creek and the East Turner River (Biota and Trudgen 2002); a location that is also within the proposed FMG rail corridor. While common in the Kimberleys, this taxon is uncommon in the Fortescue Botanical District.

· ***Tephrosia* spp.**

The genus *Tephrosia* in the Pilbara contains numerous distinct taxa, particularly within *T. "clementii", T. "densa", T. "rosea"* and *T. "supina".*

Tephrosia aff. *supina* (HD88-4) was recorded once from a hillslope north of the East Turner River during the initial survey of the Hope Downs rail corridor (Biota and Trudgen 2002), and this location is also within the proposed FMG rail corridor. This taxon is possibly uncommon, or poorly collected. The other *Tephrosia* species within the FMG rail corridor have been recorded on other surveys in the area, and are not considered to be uncommon.

· ***Triodia* spp.**

Most of the specimens that have been listed in this report as *T. basedowii* and four of the specimens listed as *T. lanigera* show morphological characters intermediate between these two taxa. All of these specimens were from locations between the southern edge of the Chichester Range and the southern rail loop. It is our opinion that there is an intergrade between these two taxa in the area of the Fortescue Valley.

The *Triodia* aff. *basedowii* taxon is widespread in the Pilbara, occurring on skeletal soils on top of ranges, particularly in association with Snappy Gum *Eucalyptus leucophloia*. Specimens were sent to specialist grass taxonomists, Bryan Simon (Queensland Botanic Gardens) and Surrey Jacobs (Royal Botanic Gardens, Sydney), for consideration. They determined the specimens as *T. lanigera,* however we believe that they differ significantly from this species (and also *T. basedowii*), both in floret morphology and growth habit.

Two specimens of *T.* aff. *lanigera* were collected from low stony hillslopes north of the East Turner River. This taxon has floret characters that are similar to *T. lanigera* but differ in the degree of hairiness and the relative sizes of the lemma lobes. It has a dwarf growth form and bluish foliage similar to *T.* aff. *basedowii,* and it is possible that specimens of "*T.* aff. *basedowii*" collected from this area during the Hope Downs rail corridor survey were actually of this taxon.

All unusual specimens of *Triodia* will be lodged with the relevant herbaria to allow future research.

5.2.2.2 Poorly collected species

· ***Trichodesma zeylanicum* var. *grandiflorum***

Compared to the more common variety of this species (*T. zeylanicum* var. *zeylanicum*), *T. zeylanicum* var. *grandiflorum* is larger, more robust and apparently longer-lived. The foliage is green rather than grey, and the flowers are often white rather than blue. It is described as occurring mainly on sands, especially on coastal sand dunes and in creekbeds (Paczkowska and Chapman 2000).

Specimens of *T. zeylanicum* var. *grandiflorum* lodged with the Western Australian Herbarium are from a broad range of largely coastal locations including Onslow, Shark Bay, Carnarvon, Geraldton, Halls Creek and Broome, with one record from Wiluna. Within the FMG rail corridor, this species was only recorded from the sand dunes at the junction of the Fortescue Valley and Hamersley Range (Table 5.5). This taxon was recorded three times from similar habitat during the initial survey of the Hope Downs rail corridor (Biota and Trudgen 2002). It appears to be rare in the inland areas of the Fortescue Botanical District.

5.2.2.3 Range extensions

Distribution maps on the WA Herbarium's on-line database, Florabase (http://www.florabase.calm.wa.gov.au), are based on all lodged specimens. These maps were consulted to assess whether any species records from the FMG rail corridor

represented range extensions. Note that records from the Hope Downs rail corridor were also utilised, as these specimens have not yet been submitted to the Herbarium.

A number of species recorded from the FMG corridor were 50km or more outside of their known range.

Triodia latzii is a new record for Western Australia, previously being known only from the Northern Territory (Table 5.5). Apparently new records for the Pilbara included *Chionachne hubbardiana, Digitaria gibbosa, Eriachne sulcata, Eriocaulon pusillum, Euphorbia* sp. B Kimberley Flora (BJ Carter 629) and *Rotala occultiflora* (Table 5.5). All of these species were previously only known from the Kimberley.

Within the Pilbara, southern range extensions included the Priority 2 grass *Paspalidium retiglume* (see Table 5.4) and *Aristida hygrometrica*, while *Paspalidium reflexum* had only previously been recorded in the far south-east of the Pilbara. Numerous other species were near their northern, southern, western or eastern limit of distribution. This is a reflection of the location of the study area (ie. near the junction of the northern and southern botanical districts, and near the junction of the Hamersley Plateau with the central desert country).

Table 5.5: Distribution of other flora of conservation interest within the survey area.

Species	No. of Records within the FMG Rail Corridor (March/April 2004)	Additional Previous Records within the FMG Rail Corridor †1
Apparently Undescribed Taxa		
Amaranthus sp. (HD102)	-	2
Bonamia sp. (HD94-6)	6 (sites FMG25F, FMG33, FMG79, FMG92, FMG93; and 669638 mE, 7697731 mN)	4
Eriachne sp. Port Hedland	5 (sites FMG79, FMG103 and FMG99; releve FMG-ME; and south of FMG-BF)	8
Hibiscus sp. (Site 316)	-	1
Mallotus ?dispersus	-	1
Phyllanthus sp.	2 (releve FMG-RF, and 692474 mE, 7635386 mN)	-
Sauropus sp.	1 (site FMG23)	-
Tephrosia aff. *supina* (HD88-4)	-	1
Range Extensions (State or Regional Level)		
Triodia latzii	1 (714690 mE, 7543733 mN)	-
Chionachne hubbardiana	1 (site FMG58)	-
Digitaria gibbosa	2 (site FMG90 and releve FMG-RE)	-
Eriachne sulcata	2 (site FMG32 and releve FMG-MB)	-
Eriocaulon pusillum	1 (releve FMG-RE)	-
Euphorbia sp. B Kimberley Flora (BJ Carter 629)	3 (707599 mE, 7554463 mN; 707616 mE, 7554524 mN; 706678 mE, 7555849 mN)	-
Rotala occultiflora	1 (releve FMG-RF)	-
Other Poorly Collected Species		
Trichodesma zeylanicum var. *grandiflorum*	2 (site FMG53 and sand dune north of FMG48)	-

†1 Hope Downs rail corridor from Port Hedland to Weeli Wolli; Biota and Trudgen 2002.

5.3 Introduced Flora

Eleven species of introduced flora have been recorded from the project area (see Table 5.6), none of which is listed as a Declared Plant under the *Agriculture and Related Resources Protection Act 1999*. The weed species recorded are mostly common and widespread species in the Pilbara region:

- Buffel grass **Cenchrus ciliaris* and the less common Birdwood grass **C. setigerus* were introduced as fodder species by pastoralists. While these highly invasive perennial species have demonstrated allelopathic capacities (whereby they release chemicals which inhibit growth of other species), they are not listed as Declared Weeds due to their importance to the pastoral industry. **Cenchrus ciliaris* was widespread in disturbed areas adjacent to the existing BHP rail line, and dense grasslands were also recorded along creeklines and on floodplains, and in soil pockets on some rockpiles. Scattered individuals of **Cenchrus ciliaris* were recorded from many of the remaining sites (see Table 5.6). This species was similarly widespread within the Hope Downs rail corridor (Biota and Trudgen 2002), and 22 of the records from that survey also occur within the proposed FMG rail corridor. **Cenchrus setigerus* was less common, being recorded at only two locations within the proposed FMG rail corridor during the current survey (Table 5.6), and at one site within and eight sites outside the FMG corridor during the initial survey of the Hope Downs rail corridor (Biota and Trudgen 2002);
- Feathertop Rhodes grass or Windmill grass **Chloris virgata* is a tufted perennial grass that was introduced from tropical Africa (Hussey et al. 1997). This species was recorded from a single location near Weeli Wolli Creek (Table 5.6);
- Whorled pigeon grass **Setaria verticillata* was recorded as scattered individuals from four sites and a releve within the FMG rail corridor (Table 5.6). This species was recorded 12 times during the original survey of the Hope Downs rail corridor (Biota and Trudgen 2002), and two of these records are within the proposed FMG rail corridor. Most records were from creeklines or floodplains. In good seasons, this species may be abundant in such habitats;
- Kapok **Aerva javanica* was widespread and abundant in places along the existing BHP rail line and was also recorded from numerous additional locations within the FMG rail corridor (Table 5.6). This species was recorded from 29 sites during the original survey of the Hope Downs rail corridor (Biota and Trudgen 2002), and six of these records are within the proposed FMG rail corridor. Records were mainly from sandy plains or associated with creekline and floodplain habitats, with some records from rocky outcrops, and one from a cracking clay site;
- The low perennial pea Verano stylo **Stylosanthes hamata* was recorded as scattered individuals from two sites on the northern Abydos Plain during the initial survey of the Hope Downs rail corridor (Biota and Trudgen 2002). One of these sites is also located within the proposed FMG rail corridor;
- Spiked Malvastrum **Malvastrum americanum* was recorded from several sites within the FMG rail corridor, typically as scattered individuals (Table 5.6). The main habitat was the clayey plains in the Fortescue Valley area, with additional records from flowlines and floodplains. This species was also recorded from 21 sites during the original survey of the Hope Downs rail corridor (Biota and Trudgen 2002), of which five locations are within the proposed FMG rail corridor. **M. americanum* can be abundant in some habitats, particularly in good seasons;
- Native thornapple **Datura leichhardtii* was recorded once within the FMG rail corridor, from a releve on the eastern floodplain of Weeli Wolli Creek (Table 5.6). As indicated by the common name, this species was originally thought to be native, however it is actually a native of Mexico (Hussey et al. 1997). While it remains a Declared Plant in other regions of Western Australia, **D. leichhardtii* was removed from Agwest's Declared Plants list for the Eastern Pilbara in 2004 (Agwest 2004);
- Black berry nightshade **Solanum nigrum* was recorded as scattered individuals from a single site on the northern Abydos Plain during the initial survey of the Hope Downs rail corridor (Biota and Trudgen 2002). This location is also within the proposed FMG rail corridor area;
- The cucurbid creeper Colocynth **Citrullus colocynthis* was collected from three locations in the FMG rail corridor (Table 5.6). This species was also recorded outside

this area as scattered individuals from two flowline sites on the northern Abydos Plain during the original survey of the Hope Downs rail corridor (Biota and Trudgen 2002);

- Beggar's ticks **Bidens bipinnata* was recorded from 16 locations within the FMG rail corridor (Table 5.6), and was also recorded during the original survey of the Hope Downs rail corridor (Biota and Trudgen 2002). This annual daisy is found mainly in creeklines and in Mulga vegetation. It can be very dense after good rains, especially in shaded areas, and can crowd out native flora species.

Creeklines and mesic Mulga habitats are particularly susceptible to weed invasion, and the majority of sites with significant weed invasion (both in terms of numbers of species and in the degree of cover) were located in or adjacent to such habitats.

Table 5.6: Distribution of introduced flora within the proposed FMG rail corridor.

Introduced Flora	No. of Records within the FMG Rail Corridor (March/April 2004)	Additional Previous Records within the FMG Rail Corridor†1
Poaceae		
**Cenchrus ciliaris* (Buffel grass)	55+ (sites FMG13, 17, 18, 19, 23, 24, 26, 26F, 38, 40, 42, 44, 45, 48, 49, 50, 51, 52, 53, 54, 55, 56, 60, 65, 66, 68, 76, 77, 78, 80, 82, 83, 88, 90, 96; releves FMG-BE, FMG-BG, FMG-KC, FMG-KF, FMG-KH and FMG-RA; 661593 mE, 7743242 mN; 720027 mE, 7508206 mN; 720773 mE, 7507855 mN; 720977 mE, 7508336 mN; 720894 mE, 7508474 mN; 719712 mE, 7508376 mN; 726094 mE, 7506587 mN; 725755 mE, 7505534 mN; 733403 mE, 7499955 mN; 707191 mE, 7553793 mN; 707633 mE, 7554804 mN; 707663 mE, 7555037 mN; 694374 mE, 7603564 mN; 695412 mE, 7608690 mN; and numerous locations along the existing BHP rail line (not recorded))	22
**Cenchrus setigerus* (Birdwood grass)	2 (site FMG52 and releve FMG-KC)	1
**Chloris virgata* (Feathertop Rhodes grass)	1 (site FMG66)	-
**Setaria verticillata* (Whorled pigeon grass)	5 (sites FMG13, 18, 49 and 55; and releve FMG-MJ)	2
Amaranthaceae		
**Aerva javanica* (Kapok)	17+ (sites FMG18, 19, 26, 56, 85, 90; releves FMG-KF and FMG-RA; 661593 mE, 7743242 mN; 668493 mE, 7710815 mN; 669643 mE, 7697663 mN; 669398 mE, 7697720 mN; 681629 mE, 7667103 mN; 681968 mE, 7666842 mN; 707191 mE, 7553793 mN; 707663 mE, 7555037 mN; 695412 mE, 7608690 mN; and numerous locations along the existing BHP rail line (not recorded))	6
Papilionaceae		
**Stylosanthes hamata* (Verano stylo)	-	1
Malvaceae		
**Malvastrum americanum* (Spiked malvastrum)	13 (sites FMG17, 18, 19, 51, 52, 55, 66, 68, 80, 85; releves FMG-KG and FMG-KH; and 707649 mE, 7554998 mN)	5
Solanaceae		
**Datura leichhardtii* (Native thornapple)	1 (releve FMG-KC)	-
**Solanum nigrum* (Black berry nightshade)	-	1
Cucurbitaceae		
**Citrullus colocynthis* (Colocynth)	3 (site FMG26, releve FMG-RB, and 725854 mE, 7506430 mN)	-
Asteraceae		
**Bidens bipinnata* (Beggar's ticks)	16 (sites FMG17, 18, 19, 23, 24, 42, 45, 49, 54, 55, 74, 85; releve FMG-KD; and 711551 mE, 7542304 mN; 711788 mE, 7542327 mN; and 705570 mE, 7522100 mN)	1

†1 (Hope Downs rail corridor from Port Hedland to Weeli Wolli Creek; Biota and Trudgen 2002).

6.0 Terrestrial Vegetation Conservation Significance Assessment

6.1 Approach of the Assessment

Assessment of the conservation significance of the vegetation units defined by this study is limited by the lack of regional mapping of either geology, Land Systems or vegetation at a similar scale.

Vegetation is strongly related to geology and topography, and such features could therefore be used to predict the likely distribution of vegetation types. However, as for the previous survey of the Hope Downs rail corridor, geological mapping of the study area was found to be of only limited use. The scale of resolution of the geological mapping was typically not sufficiently detailed to match appropriately with the flora sampling sites (eg. localised habitats such as rocky outcrops and creeklines were not shown). This made it difficult to correlate particular geological types with the vegetation units identified by the current study. Geological mapping was therefore of limited use in assisting with the assessment of the conservation value of vegetation of the project area, and is not discussed further.

As geology and topography are major attributes on which Land Systems are defined, mapping of the latter could be used in a similar manner. Land System mapping from 1:50,000 scale aerial photography has been prepared for the region including the project area (Agwest 2002), however it is not generally available and the description of the vegetation of the land systems and land units is still being prepared. In addition, the scale of this mapping is such that small occurrences of some Land Systems have not been mapped. Land Systems mapping is discussed broadly under Section 6.2.

The only published vegetation mapping of the region encompassing the project area is the 1:1,000,000 scale mapping of Beard (1975) for the Pilbara. The broad vegetation types identified by Beard (1975) within the project area are listed in Section 2.4.2.

While Beard's mapping provides a useful context in describing the general range of vegetation in the Pilbara, his broadly defined units are of limited use for environmental impact assessment. Beard's units are typically somewhere above the 'vegetation formation' level, and do not distinguish finer-scale variation in the vegetation unless it is extremely different. Beard's mapping had a low intensity of ground truthing and the consequent scale of the mapping meant that the vegetation units had to be defined at a broad level for his mapping to be practical. This meant that much of the variation in the vegetation was ignored. A discussion relating Beard's work to the vegetation units defined by the current survey is contained in Section 6.2.

Finally, a discussion of the perceived conservation significance of the individual mapping units defined by the current study is given in Section 6.3, on the basis of the authors' knowledge of the vegetation of the region.

6.2 Assessment on the Basis of Beard's Vegetation Mapping and Agwest Land Systems Mapping

At the level of mapping prepared by Beard (1975) and Agwest (2002), the vegetation of the study area is relatively typical of that occurring on corresponding geomorphic units (eg. cracking clays, rivers, hills etc) occurring elsewhere in the region within the same physiographic units. However, the broad level of the mapping units defined in the two studies masks a large amount of variation in the vegetation.

6.2.1 Abydos Plain Physiographic Unit

Beard's mangrove and tidal mudflat units correspond to vegetation units Am (mangals; discussed in detail in Section 8.0) and As (low shrublands of samphire and other halophytic species) as described in this report. According to Beard's mapping, mangrove and tidal mudflat vegetation is broadly distributed in the region, but restricted to small patches of suitable habitat along the coast. These correspond to the Littoral Land System (Agwest 2002).

Beard's *Acacia stellaticeps* dwarf shrubs over *Triodia epactia* hummock grassland unit (a18Zr.t1Hi) encompassed fifteen vegetation units as defined by this survey (Apt1, 3, 9, 10, 11, 13, 14, 15; Aps6; Ac1, 8, 10, 11, 14; Ar6). These were predominately spinifex-dominated vegetation types (Apt codes), typically with *Triodia epactia* as the dominant species, but some areas also had *T. schinzii* or *T. lanigera*. Vegetation of the creeklines (Ac codes) and the quartz rocky outcrops (Ar6) was not mapped by Beard. This lack of fine-scale resolution in Beard's mapping is entirely expected given the broader level of his study: he mapped the entire Pilbara at 1:1,000,000 scale, which necessarily involved amalgamation of small-scale variability and a focus on common, widespread vegetation types. Beard's a18Zr.t1Hi unit appears relatively widely distributed along coastal sections of the Abydos Plain, extending some 80 km to the west and 50km to the east of Port Hedland. It is thus likely that the vegetation units identified for this area are relatively well represented in the area, with the exception of those restricted to specific habitats (eg. Ar6). However, the low level of ground-truthing by Beard means some uncertainty must remain. This area is mapped as being the Uaroo Land System, which is widely distributed along the northern portion of the Abydos Plain.

The remainder of the Abydos Plain south to the Chichester Range was mapped by Beard as *Acacia inaequilatera* shrubs over *Triodia epactia* hummock grassland (a2Sr.t1Hi), with *Eucalyptus victrix* and *E. camaldulensis* var. *obtusa* woodland in the major drainage systems. Beard's a2Sr.t1Hi vegetation unit again encompassed many different units as defined by the current study. The a2Sr.t1Hi unit was mapped by Beard as being extremely widespread, extending 70 km to the west and over 200 km to the east. It is thus probable that most of the vegetation units defined for this area by the current study are likely to be well represented, with the exception of those restricted to habitats that are uncommon, or with a small total area (eg. the granite outcrop vegetation types, Ar1-4). From Beard's mapping, the woodlands of the major drainage systems can be seen to be relatively widely distributed across the region, but clearly make up a relatively small proportion of the area. These major creeklines are also much more variable in terms of structure and floristic composition than is indicated by their broad designation as '*Eucalyptus victrix* and *E. camaldulensis* var. *obtusa* woodland'. This area was mapped variously as the Uaroo, Mallina, Talga, Macroy, Boolaloo, Oakover and Granitic Land Systems, with occurrences of the River Land System in major riverine systems (Agwest 2002). With the exception of Talga and Oakover, all of these Land Systems are widespread.

6.2.2 Chichester Range Physiographic Unit

The vegetation of the Chichester Range was mapped by Beard as three main types:

- *Acacia inaequilatera* shrubs over mixed *Triodia epactia* and *Triodia wiseana* hummock grassland on the northern and central ranges (a2Sr.t1,3Hi);
- Patches of short grassland on cracking clays (xGc);
- *Eucalyptus leucophloia* scattered trees over *Triodia wiseana* hummock grassland, with Mulga *Acacia aneura* low woodland in valleys, on the southern side of the range (e16Lr.t3Hi/a1Li).

The northern and central parts of the Chichester Range area encompassed by the rail corridor correspond to the Rocklea and McKay Land Systems, and were mapped mostly as

units Ch1, 2 and 12 in the current study. These vegetation types comprised scattered shrubs of *Acacia inaequilatera* and *Cassia* spp. over hummock grasslands of *Triodia epactia, T. wiseana* or *T. lanigera*, with *T. brizoides* in steep rocky areas. These units thus corresponded broadly with Beard's a2Sr.t1,3Hi mapping unit, which was indicated as being widely distributed across this section of the Chichester Range (extending approximately 100 km to the west and around 190 km to the east). The units are also compatible with the descriptions of the Rocklea and McKay Land Systems, which extend broadly over the northern edge of the Chichester Range. It is therefore likely that these vegetation types are relatively well represented in the Chichester Range area.

The area of cracking clay near the BHP rail quarry was mapped as the xGc unit by Beard (1975) and as the Wona Land System by Agwest (2002). The vegetation units identified for cracking clays of the Chichester area during the current study (Cx codes) included shrublands of *Acacia victoriae, A. xiphophylla* and *Cassia* species, as well as the grasslands identified by Beard. Beard's xGc unit and the Wona Land System (Agwest 2002) are both shown to occur relatively broadly across the Chichester Range. Trudgen and Casson (1998) recognised a very high variation in the floristic composition and vegetation of cracking clay habitats. Some of the units defined by this study that are encompassed by Beard's xGc unit and the Wona Land System are therefore likely to be widespread, however given the extent of regional variation in cracking clay vegetation, others may be restricted (see Sections 4.3.4 and 6.3.3.4).

The main vegetation unit in the southern portion of the Chichester Range, Ch8, comprised *Acacia arida* and *A. ptychophylla* shrublands of varying densities over hummock grasslands of *Triodia lanigera*. Vegetation further to the north was mainly Ch12 (*Triodia brizoides, T. longiceps* hummock grasslands on flats) and Ch11 (scattered trees of *Eucalyptus leucophloia* over *Triodia* aff. *basedowii*) on hillcrests. These vegetation types show only a superficial correspondence to the e16Lr.t3Hi/a1Li unit mapped by Beard for this area, but correspond broadly with the descriptions of the widespread McKay and Newman Land Systems. Vegetation units Ch8 and Ch11 feature common dominant species and are likely to be widespread. Although *T. brizoides* appears to be less well represented than most other spinifex species recorded, it is abundant in the local area; unit Ch12 is therefore unlikely to be restricted.

6.2.3 Fortescue Valley Physiographic Unit

Beard's mapping shows the vegetation of the broad plain surrounding the Fortescue Marshes as Mulga groves (a1Lp). This corresponds with the numerous Mulga dominated units (Fa codes) identified for this area. This area is mapped as various Land Systems by Agwest, some of which do not appear to be well represented in the region (eg. the Christmas and Adrian Land Systems; Agwest 2002). The Land Systems mapping highlights the complex nature of the landforms, substrates and consequently vegetation in this area. While Beard's vegetation unit a1Lp extends broadly to both the south and east, the Mulga units occurring in this section of the project area are not necessarily widespread in the region, particularly given the high level of intraspecific variation observed in *Acacia aneura* (see Trudgen and Casson 1998).

Beard's mapping also shows a vast area of succulent steppe within the Fortescue Marsh, which is mapped as the Marsh and Coolibah Land Systems (Agwest 2002). This corresponds broadly with the vegetation units identified by the current study for the cracking clays (Fx codes) in this area. However, the vegetation observed within the rail corridor is not necessarily well represented in the region. The study area is at the westernmost extent of the marsh, and vegetation in this area is likely to be influenced by the dryer soils and differing surrounding vegetation types.

The area of Calcrete Land System, which corresponds with unit Fh2, appears broadly distributed on the southern side of the Fortescue Marsh. The Fortescue Land System, which corresponds to unit Fh3, appears to have only a single occurrence in the region.

6.2.4 Hamersley Range Physiographic Unit

The hills and low footslopes of the Hamersley escarpment were mapped by Beard as having *Eucalyptus gamophylla* scattered mallees over *Triodia basedowii* hummock grassland (e25Sr.t2Hi). These areas are mainly mapped as the Boolgeeda and Newman Land Systems (Agwest 2002). This corresponds broadly with the variety of spinifex-dominated vegetation types (Hh codes) identified for the plains in this area, which had scattered *Eucalyptus gamophylla* over a variety of different shrubs (particularly *Acacia ancistrocarpa, A. inaequilatera, Hakea chordophylla* and *Gossypium* spp.) over hummock grasslands of *Triodia basedowii*. Beard's e25Sr.t2Hi mapping unit and the Boolgeeda and Newman Land Systems are relatively well distributed in the region, which suggests that most of the vegetation units identified in this area by the current study are likely to be reasonably well represented.

The areas of Fan and Urandy Land System fanning out from the Weeli Wolli Creek system were mapped as groved mulga by Beard (1975), which corresponds broadly with vegetation units Hp3 and Hp4.

The area of Divide Land System at the southern rail loop was mapped as scattered *Eucalyptus gamophylla* over *Triodia basedowii* hummock grassland by Beard (1975), which corresponds broadly with vegetation unit Hp6. The vegetation of the sand dunes (Hd1), which occur at the junction of the Hamersley Range and Fortescue Valley physiographic units within the Divide Land System, is not well represented in the region. Beard (1975) described sand dunes as being scattered in the region, but understandably did not map individual occurrences.

6.3 Assessment at the Level of the Vegetation Types Defined by this Study

6.3.1 Abydos Plain Physiographic Unit

6.3.1.1 Vegetation of littoral areas

Two broadly defined vegetation types were recorded from the littoral zone in the Port Hedland area. The significance of the various mangals (grouped as unit Am) is discussed in Section 8.0.

Unit As (the low shrublands of samphires and other salt-tolerant species) is considered to have moderate conservation significance. While this vegetation is widespread in the region, it is restricted to the mudflats of the littoral fringe along the coast. It is also sensitive to disturbance.

6.3.1.2 Vegetation of sandy areas of the Abydos Plain

Of the spinifex (*Triodia* spp.) dominated vegetation units occurring on sandy areas of the Abydos Plain, all were considered to be common with the exception of Apt5, Apt8, Apt1 and Apt2. Units Apt5 and Apt8 were dominated by *Triodia angusta*, a species that was not common in either the FMG or adjacent Hope Downs rail corridors. *T. angusta* usually occurs in creeklines in ranges, often where the substrate has a calcareous hardpan. Trudgen et al. (2002) have observed that "*T. angusta*" as usually applied is not a single species, but covers several closely related taxa. While it was not possible to determine the taxon of the *T. angusta* complex present in Apt5 and Apt8, this implies that the vegetation of these units is dominated by a taxon of more restricted distribution than *T. angusta* (as this is commonly applied). Units Apt1 and Apt2 were dominated by *Triodia secunda*, a species that was again not particularly common in the study area.

All of the shrub-dominated vegetation types recorded from the proposed FMG rail corridor were considered to be common in the area.

6.3.1.3 Vegetation of stony plains and hills of the Abydos Plain

All of the vegetation types occurring on the stony plains and hills of the Abydos Plain were considered to be common in the area, with the exception of Ah5a. This vegetation type was dominated by a spinifex taxon with affinities to *Triodia lanigera*, which appears to be restricted in distribution in the area (although it is possible that vegetation mapped previously as Ah5 is also dominated by this spinifex). On the basis of current knowledge, it should be considered rare.

6.3.1.4 Vegetation of creeklines of the Abydos Plain

All of the creekline vegetation types were considered to have at least moderate conservation significance given their small total area (narrow creeklines obviously being less well represented than more extensive habitats such as hills and plains). They are also important as they provide habitat for species restricted to creeklines, including several of the Priority flora.

The only creekline vegetation types considered to be restricted were Ac30, which occurred in a single small soak ~12 km north of the East Turner River; and Ac21, an unusual combination of *Acacia ampliceps* over *Triodia secunda*.

6.3.1.5 Vegetation of rocky outcrops and rocky ridges of the Abydos Plain

All of the rockpile vegetation is considered to be of at least moderate conservation significance, given the relatively small area occupied by this habitat. Units Ar1 and Ar2 are relatively common on granite outcrops. Units Ar3 and Ar4 are also common, but have a very minor areal representation. Only a small number of granite ridges, quartz outcrops and dolerite dykes were noted in the FMG rail corridor, and the corresponding vegetation units Ar5, Ar6 and Ar7 are thus likely to be uncommon.

6.3.2 Chichester Range Physiographic Unit

The Chichester Range has a very different geology and geomorphology to the nearby Hamersley Range. The cracking clay habitats found in this physiographic unit are restricted in the region and are most extensively represented within the Chichester Range.

6.3.2.1 Vegetation of stony plains and hills of the Chichester Range

Of the units recorded from the low hills of the Chichester Range, Ch9 and Ch10 are considered to be unusual. The combination of *Corymbia deserticola* and *Acacia aneura* as found in units Ch9 and Ch10 is more commonly found over a hummock grassland of *Triodia epactia*, rather than *T. lanigera*. These two units are likely to be restricted to the southern section of the Chichester Range. Varieties of Mulga were recorded from these two vegetation units, and some of these taxa may be restricted in distribution. While unit Ch13 likely to be less well represented in the region than other vegetation types dominated by more common spinifex species, it is abundant in the local area.

6.3.2.2 Vegetation of sandy plains of the Chichester Range

The Cp1 vegetation unit was considered to have moderate to high significance given the limited amount of sandplain in the area, and the generally excellent condition of this vegetation.

6.3.2.3 Vegetation of minor creeklines and floodplains of the Chichester Range

As for the Abydos Plain, all of the creekline vegetation of the Chichester Range is considered to have moderate conservation significance, given the relatively small total area provided by these habitats. Unit Cc17 is considered to be uncommon, occurring only in the area of cracking clay near the BHP quarry, and unit Cc3 is dominated by *Sorghum plumosum*, an uncommon species in the area.

6.3.2.4 Vegetation of cracking clays of the Chichester Range

The cracking clay vegetation of the Chichester Range is considered to be of moderate to high conservation significance. While large areas of clays occur on the Chichester Plateau,

there is a great variety of associated vegetation types, and these are fairly poorly known. Trudgen and Casson (1998) describe this in more detail.

Within the study area, the cracking clays were usually dominated by variations of vegetation dominated by *Acacia xiphophylla* (unit Cx5) or the grasses *Astrebla pectinata* and *A. latifolia* (unit Cx4). The latter vegetation type is considered likely to be uncommon in the region.

6.3.3 Fortescue Valley Physiographic Unit

The Fortescue Valley is a large valley with unique features such as the seasonal lake system of the Fortescue Marsh and the large alluvial fans spreading out from this. The vegetation types in this physiographic unit are thus likely to be very different from those of surrounding areas, and likely to be restricted in distribution.

6.3.3.1 Vegetation of stony plains and hills of the Fortescue Valley

Vegetation unit Fh1 is considered to be uncommon in the area, given that there are only a small number of hills in this area of the Fortescue Valley. These Mulga shrublands over *Triodia brizoides* hummock grasslands may contain restricted Mulga taxa (see below).

6.3.3.2 Vegetation of clayey / sandy plains of the Fortescue Valley

With the exception of Fa8, which is degraded by dense infestations of Buffel grass, all of the Mulga dominated vegetation units of the Fortescue Valley (Fa1 to Fa7 and Fa9) are of moderate to high significance due to their relative uncommonness. As previously mentioned, there is a high level of variation in the *Acacia aneura* complex of taxa, and some of these taxa are likely to be restricted in distribution. It is therefore quite likely that some of the vegetation units within the FMG rail corridor are uncommon. This vegetation also provides habitat for some flora that are uncommon elsewhere. Mulga vegetation is particularly susceptible to disturbance (fire, grazing and interruption to sheet flow) and is thus frequently degraded.

6.3.3.3 Vegetation of creeklines / drainage areas of the Fortescue Valley

The creekline vegetation of the Fortescue Valley was considered to have moderate to high conservation significance. Unit Fc2 (*Acacia stenophylla* open scrub over *Triodia longiceps* and/or tussock grasses) is considered to be very unusual and is likely to be restricted in distribution.

6.3.3.4 Vegetation of cracking clays of the Fortescue Valley

The cracking clay vegetation of the Fortescue Valley is considered to be of moderate conservation overall given that this habitat has a relatively large representation, however some of the vegetation units identified within this study are quite restricted and of higher value (eg. Fx1 and Fx5). Given the unique status of the Fortescue Marsh itself, however, all of the vegetation types in this area (Fx3–Fx9) should be considered to have high significance; units Fx7 and Fx8 would have a small areal representation compared to the other units identified.

6.3.4 Hamersley Range Physiographic Unit

6.3.4.1 Vegetation of colluvial fans of the Hamersley Range

The vegetation units occurring on the colluvial fans along the escarpment (Hh1 to Hh4) are probably mostly restricted to this junction between the Hamersley Range and Fortescue Valley physiographic units, with smaller occurrences within the range. These may be uncommon, although they are well represented in the local area. Unit Hh5 occurs broadly over stony hills in the Hamersley Range and is considered common.

6.3.4.2 Vegetation of clayey / sandy plains of the Hamersley Range

Of the vegetation types occurring on clayey / sandy plains of the Hamersley Range area, only Hp4 (Mulga groves) was considered to be of moderate to high significance. These groves are dependent on surface sheet flow and are thus susceptible to physical

modification to drainage, and may also support restricted taxa, particularly of Mulga *Acacia aneura*.

6.3.4.3 Vegetation of creeklines and floodplains of the Hamersley Range

Most of the creekline vegetation in the Hamersley Range area was degraded through invasion by Buffel grass. The only units in good condition were Hc17 (*Acacia tumida* open scrub in minor flowlines) and Hc21 (mixed Eucalypt woodland over *Triodia pungens, T. basedowii*).

6.3.4.4 Vegetation of sand dunes of the Hamersley Range / Fortescue Valley

Two sand dunes occurred in the southern portion of the FMG rail corridor, at the junction of the Hamersley Range and Fortescue Valley physiographic units. These are considered to be of high conservation significance.

A small number of sand dunes supporting similar vegetation were recorded further south in the Hope Downs rail corridor (Biota and Trudgen 2002). This vegetation was subsequently nominated for inclusion as a Threatened Ecological Community, however it does not appear that this nomination was approved. As a physiographic unit, the dunes are regionally rare. They are also small, fragile and highly susceptible to over threatening processes (particularly weed invasion and erosion). Many of the other dunes seen in the area (in the broad valley surrounding the lower section of the BHP rail) were degraded, being heavily invaded by Buffel grass **Cenchrus ciliaris*.

6.4 Summary of Vegetation Types of Conservation Significance

The vegetation units considered to be of the highest conservation significance were:

- Hd1 (shrublands on sand dunes) - regionally rare; small, fragile and highly susceptible to overt threatening processes; in good condition in the study area, elsewhere degraded.
- Ar3 and Ar4 (*Tripogon loliiformis* grasslands and *Bulbostylis burbidgeae* sedgelands of granite outcrops) - extremely small proportion of the study area; restricted habitats.
- Ar5, Ar6 and Ar7 (vegetation of granite ridges, quartz outcrops and dolerite dykes respectively) - limited representation in the region; uncommon.
- Ah5a (vegetation dominated by *Triodia* aff. *lanigera* (dwarf form)) - limited representation on the basis of current knowledge; uncommon, possibly rare.
- Cx4 (*Astrebla pectinata, Aristida latifolia* grassland) - unusual cracking clay vegetation type; probably uncommon in the region; limited representation and probably restricted to the Chichester Range.
- Fx1 (*Acacia xiphophylla, Cassia sturtii* shrublands with pockets of *Eragrostis xerophila grassland*) and Fx5 (*Frankenia ?setosa* low shrublands) - uncommon, probably have a restricted areal representation.

Other uncommon vegetation types of high conservation significance were:

- Apt1 and Apt2 (hummock grasslands dominated by *Triodia secunda*, a species not particularly common in the area) - uncommon.
- Apt5 and Apt8 (hummock grasslands dominated by *Triodia angusta*, a species not common in the area) - uncommon.
- Ac21 (unusual combination of *Acacia ampliceps* over *Triodia secunda*) - probably restricted.
- Ac30 (soak vegetation) – isolated occurrence in the rail corridor; uncommon.

- Ch9 and Ch10 (unusual combination of *Corymbia deserticola* and *'Acacia aneura'* over *Triodia lanigera*) - probably restricted to southern Chichester Range; may support restricted Mulga taxa.
- Cc3 (creekline vegetation with *Sorghum plumosum* as a dominant grass) and Cc17 (creekline within cracking clay) - uncommon; small representation in project area; probably restricted.
- Cx5 (shrublands of cracking clays in the Chichester Range) - edaphically restricted; variable; support restricted flora.
- Cp1 (sandplain vegetation) – limited sandplain habitat in area; uncommon.
- Fh1 (Mulga shrublands over *Triodia brizoides* hummock grasslands) - may be restricted in area; may support restricted Mulga taxa.
- Fa1 to Fa7, and Fa9 (Mulga-dominated shrublands to low woodlands of the Fortescue Valley) - uncommon; may support restricted Mulga taxa.
- Fc2 (*Acacia stenophylla* open scrub over *Triodia longiceps* and/or tussock grasses) - very unusual combination; probably restricted.
- Fx3 – Fx9 (various vegetation units of the Fortescue Marsh and surrounding valley) - possibly uncommon and restricted; support restricted taxa.
- Hp4 (Mulga groves in the Hamersley Range area) - may support restricted Mulga taxa; uncommon.

The majority of the remaining vegetation types were of moderate significance, with the exceptions being those areas degraded by weed invasion.

7.0 Terrestrial Flora Conservation Significance Assessment

7.1 Approach to the Assessment

The assessment of conservation significance of the flora of the FMG rail corridor was approached from two main angles:

- The overall value of the site for flora; and
- The value of the site for species of particular conservation significance.

The first approach assesses the value of the general flora populations within the study area, whether or not they are of particular conservation significance. This value varies with several factors including the size of the area, the range of flora habitats present and their representation in the region. It is essentially a qualitative rating.

The second approach assesses the value of the site to selected species that are of particular conservation significance. This value will vary depending on the number of such taxa present, and on the number of populations of the taxa.

Where taxa were not well collected or otherwise well known, these were presumed to be uncommon on the basis of current knowledge.

Note that the current lack of taxonomic description for particular plant groups (eg. *Tephrosia*) precludes confident assessment of the status of some of the taxa recorded from the study area.

7.2 Overall Flora Conservation Value

The FMG rail corridor contains some habitats that have a limited representation in the region (eg. sand dunes, quartz outcrops and cracking clays). Sand dunes have an extremely limited representation and are frequently degraded by weed invasion, such that the good condition examples within the study area are rare in the region. Quartz outcrops would also have a limited representation. Cracking clays are not abundant in the Fortescue Botanical District but have a relatively extensive representation in certain localised areas; particularly the Chichester Range and Fortescue Valley and, to a lesser extent, on parts of the Abydos Plain not based on granite (eg. near Karratha). The vast Fortescue Marsh system also represents a unique physiographic feature in the region. These more restricted habitats increase the conservation value of the study area, as they provide habitat for species with relatively limited distributions in the region (eg. *Trichodesma zeylanicum* var. *grandiflorum*, which occurred only on the sand dunes; numerous species restricted to clays; and various samphires and other species tolerant to inundation that occur only within the Fortescue Marsh).

While rivers and major creeklines also have distinct suites of species, these are not restricted in the same way as the previous habitats; although they make up a small proportion of the Fortescue Botanical District, they are relatively widespread in the region. However, creeklines are frequently degraded through weed invasion (particularly Buffel grass **Cenchrus ciliaris*) and good condition examples such as those in the Chichester Range portion of the study area are not overly common.

A total of 762 taxa of native terrestrial vascular flora has been recorded from the proposed FMG rail corridor, together with five mangroves. Both the species richness and the broad floristic composition of the FMG rail corridor are comparable to those recorded from the

Hope Downs rail corridor, which is as expected give the similar scale and location of the two projects. Together the above features suggest that, at a regional level, the overall value of the FMG rail corridor for flora conservation is moderate, with particular areas of higher value (ie. the habitats outlined above that have restricted flora).

7.3 Conservation Value for Significant Flora

No Declared Rare Flora have been recorded from the proposed FMG rail corridor, however 21 Priority species are known to occur. While some of these are poorly collected rather than genuinely rare (eg. *Abutilon trudgenii* ms., *Eriachne tenuiculmis* and *Goodenia stellata*), others are relatively restricted and uncommon (eg. *Euphorbia clementii*, *Ischaemum albovillosum* and *Themeda* sp. Hamersley Station). Some of the species were represented by relatively numerous, healthy populations (eg. *Bulbostylis burbidgeae*, *Gonocarpus ephemerus* and *Hibiscus brachysiphonius*). Several other poorly known or poorly collected species were also collected. The distribution and status of the flora of particular conservation significance are summarised in Table 7.1.

Table 7.1: Summary of flora of conservation significance.

Priority taxa	**Priority**	**Range**	**Status**
Eremophila spongiocarpa ms.	1	Restricted	Rare
Goodenia omearana ms.	1	Fairly restricted	Uncommon
*Josephinia ?*sp. Marandoo (ME Trudgen 1554)	1	Fairly restricted	Uncommon
Euphorbia clementii	2	Fairly restricted	Uncommon
Gonocarpus ephemerus	2	Widespread	Uncommon
Indigofera ixocarpa ms.	2	Widespread	Quite uncommon
Ischaemum albovillosum	2	Fairly restricted	Uncommon
Olearia fluvialis	2	Fairly widespread	Quite uncommon
Paspalidium retiglume	2	Widespread	Uncommon
Stylidium weeliwolli	2	Fairly widespread	Uncommon
Abutilon trudgenii ms.	3	Widespread	Not uncommon
Bulbostylis burbidgeae	3	Fairly restricted	Uncommon
Eriachne tenuiculmis	3	Widespread	Not uncommon
Goodenia nuda	3	Widespread	Uncommon
Gymnanthera cunninghamii	3	Very widespread	Quite uncommon,
Hibiscus brachysiphonius	3	Widespread	Uncommon
Phyllanthus aridus	3	Widespread	Uncommon
Polymeria sp. Hamersley (ME Trudgen 11353)	3	Fairly restricted	Uncommon
Sida sp. Wittenoom (WR Barker 1962)	3	Widespread	Not uncommon
Themeda sp. Hamersley Station	3	Fairly restricted	Uncommon
Goodenia stellata	4	Widespread	Not uncommon
Other taxa	**Range**	**Status**	
Amaranthus sp. (HD102)	Fairly restricted	Not uncommon	
Bonamia sp. (HD94-6)	Fairly restricted	Not uncommon	
Eriachne sp. Port Hedland	Fairly restricted	Locally common	
Hibiscus sp. (Site 316)	Fairly restricted	Very uncommon, probably rare	
Mallotus ?dispersus	Quite widespread	Uncommon in Pilbara, more common in Kimberleys	
Tephrosia aff. *supina* (HD88-4)	Fairly widespread	Possibly uncommon, poorly collected	
Trichodesma zeylanicum var. *grandiflorum*	Widespread	Uncommon, rare in inland areas of the Fortescue Botanical District	

The conservation value of the FMG rail corridor for flora of particular conservation significance is considered to be moderate given that:

- there are numerous populations of Priority flora (although some of these are simply poorly collected rather than genuinely uncommon); and
- there are several poorly known taxa, some of which are apparently restricted and uncommon (on the basis of current knowledge).

However there are clearly particular areas that have a higher value for conserving significant flora (eg. the Fortescue Marsh, areas of cracking clays, creeklines, rockpiles and sand dunes).

8.0 Mangroves

8.1 Mangrove Species Pool

Seven species of mangroves are known to occur in coastal environments in the Pilbara region (Semeniuk et al. 1978; Kenneally 1982), and six of these are documented as occurring in Port Hedland Harbour (Paling et al. 2003). The species recorded from the vicinity of the proposed FMG port facilities were:

- *Avicennia marina* White (or Grey) Mangrove;
- *Ceriops tagal* Yellow-leaved Spurred Mangrove;
- *Rhizophora stylosa* Stilt-rooted Mangrove;
- *Aegialitis annulata* Club Mangrove; and
- *Aegiceras corniculatum* Horned Mangrove.

The only other species known for the area, *Bruguiera exaristata* Rib-fruited Orange Mangrove, occurs only as scattered individuals, largely in the eastern portion of the harbour (Paling et al. 2003).

The most abundant and widespread species in the proposed development area were *Avicennia marina* (dominant or codominant in most assemblages in the study area) and *Rhizophora stylosa* (which formed dense stands in more seaward areas, either as a monospecific unit or in association with taller *A. marina*). *Ceriops tagal* was recorded less commonly, typically on eroding banks associated with South-west Creek. *Aegialitis annulata* and *Aegiceras corniculatum* were largely restricted in occurrence to depositional bank areas, as is typical with these species (Biota and Trudgen 2002).

8.2 Mangals

The location of the proposed FMG stockpile and port facilities is immediately adjacent to the proposed Hope Downs port facilities, which were surveyed by the same study team as part of an earlier assessment (Biota and Trudgen 2002, Hope Downs Management Services 2002). The mangrove associations are therefore very similar to those previously documented for the earlier proposal.

The local occurrence of mangrove assemblages within the FMG development area was consistent with distribution patterns observed elsewhere in the region in relation to species occurrence in the tidal range, local geomorphology and substrate (Paling et al. 2003, Semeniuk 1985, Biota and Trudgen 2002). Areas of cyanobacterial mats ('algal mats': Paling et al. 1989, Paling and McComb 1994) also occurred patchily on some tidal flat areas, particularly in the area proposed to accommodate the stockpile. These mats have a documented ecological function related to nitrogen fixation and input into coastal systems, and occur throughout similar habitats along the Pilbara coastline (Paling et al. 1989). Active nitrogen fixation was observed on these mats during field surveys and their distribution is mapped in Figure 9.1. A total of 207 ha of algal mats occur within the Port Hedland harbour area (Paling et al. 2003).

Mangrove assemblages identified from the port and stockpile area were categorised as listed below in Table 8.1. The assemblages were divided based on species composition, vegetation structure and physiognomy, substrate and geomorphology. The assemblage types are mapped in Figure 9.1 in Section 9.3.

Table 8.1: Occurrence of mangrove associations within the proposed FMG port site and their wider representation within Port Hedland Harbour (after Paling et al. 2003; see also Figure 9.1 (Section 9.3)).

Association	Area within the FMG port facilities (ha)	Area within Port Hedland Harbour (ha)
1. Closed canopy woodland of *Rhizophora stylosa*	77.5	203
2. Closed canopy woodland of *R. stylosa* and *Avicennia marina*	21.6	152
3. Closed canopy woodland of *A. marina* (seaward fringe)	17.0	37
4. Closed canopy woodland of *A. marina* (landward margins)	33.0	451
5. Low open woodland of *A. marina* on saline flats	70.0	241
6. Low scattered *A. marina* and scattered samphires	170.0	
9. Low, dense *Aegiceras corniculatum*	1.2	10
10. Low open *Ceriops tagal*	0.9	3
11. Low dense *Aegialitis annulata*	4.1	11
Total:	395.3	**1,108**

The more structurally complex, species rich and dense mangal occurred in areas closer to the margins of major and minor creeks, where *Rhizophora stylosa* was typically dominant or codominant with *Avicennia marina*. The denser taller mangrove associations in these areas comprised pure stands of *R. stylosa*, mixed *R. stylosa* and *A. marina*, or purer tall *A. marina* in a narrow band along the most seaward areas of the major creeks (see Figure 9.1 in Section 9.3).

All the mangrove associations recorded were in good to very good condition, and seemed to be sufficiently removed from existing dust sources (such as Finucane Island) to not be affected (cf. the findings of Hope Downs Management Services 2002). All the associations recorded from the study area also occur elsewhere within Port Hedland Harbour (Paling et al. 2003; Table 5). Mangal habitats were typically backed by open to very open samphire and halophyte communities on hypersaline flats and low rises, dominated by an open to patchily dense cover of *Halosarcia halocnemoides* subsp. *tenuis*, *Muellerolimon salicorniaceum*, *Frankenia ambita* and *Sporobolus virginicus*.

9.0 Potential Impacts of the Development on Native Vegetation and Flora

9.1 Introduction

Given the similarities between the proposed FMG rail corridor and the previously assessed Hope Downs rail corridor, the impacts associated with the current proposal are essentially the same in nature as those presented by the earlier proposal (Biota and Trudgen 2002, Hope Downs Management Services 2002). Note that it is FMG's position that only one more railway would ultimately be constructed along this corridor (FMG 2004). This section therefore only considers the construction of the proposed FMG railway adjacent to the existing BHP Billiton line and not the cumulative impact of these two lines in addition to the proposed Hope Downs railway (Hope Downs Management Services 2002).

The significance of an ecological impact is dependent on the conservation status and reservation of the vegetation types and individual flora species potentially affected. It is also dependent on the intensity, nature and duration of the impact. The significant terrestrial vegetation and flora of the proposed rail corridor have been identified in Sections 6.0 and 7.0. These are summarised briefly in Section 9.2 to provide a context for the assessment of potential impacts resulting from the proposed rail construction (Section 9.3). Proposed management measures to address the impacts discussed below are also addressed in subsequent sections.

9.2 Terrestrial Features of Conservation Significance

9.2.1 Vegetation Types

As previously noted, it is difficult to assess the conservation significance of the terrestrial vegetation of the survey area with the lack of comparable data for the region. However, the vegetation types considered by this assessment to be of the highest conservation significance are listed in Section 6.0. Briefly, these were:

- restricted hummock grassland vegetation of the Abydos Plain (Ah5a, Apt1, Apt2, Apt5, Apt8);
- granite, quartz and dolerite outcrop vegetation types on the Abydos plain (Ar4-7);
- restricted soak and drainage vegetation of the Abydos plain (Ac21, Ac30);
- the northernmost limit of associations containing mulga in Chichester Range (Ch9 and Ch10);
- restricted sandplain and creekline vegetation of the Chichester Range (Cp1, Cc3, Cc17);
- cracking clay vegetation types of the Chichester Range (Cx4 and Cx5);
- vegetation of the cracking clays of the Fortescue Marsh and surrounding valley (Fx1 – Fx9);
- Mulga dominated vegetation types of the Fortescue Valley (Fa1-Fa7, Fa9) and isolated hills in the area (Fh1);
- unusual creekline vegetation of the Fortescue Valley (Fc2); and
- Mulga groves on plains at the base of the Hamersley Range (Hp4); and
- shrublands restricted to isolated linear dunes at the junction of the Fortescue Valley and Hamersley Range (Hd1).

The survey area supports a rich and diverse terrestrial flora (see Section 5.0). Flora of conservation significance occurring along the rail corridor include:

- three Priority 1 species (*Eremophila spongiocarpa, Goodenia omearana, Josephinia* ?sp. Marandoo (ME Trudgen 1554);

- seven Priority 2 species (*Euphorbia clementii, Gonocarpus ephemerus, Indigofera ixocarpa* ms., *Ischaemum albovillosum, Olearia fluvialis, Paspalidium retiglume Stylidium weeliwolli*);
- ten Priority 3 species (*Abutilon trudgenii* ms., *Bulbostylis burbidgeae, Eriachne tenuiculmis, Goodenia nuda, Gymnanthera cunninghamii, Hibiscus brachysiphonius, Phyllanthus aridus, Polymeria* sp. Hamersley (ME Trudgen 11353), *Sida* sp. Wittenoom (WR Barker 1962), *Themeda* sp. Hamersley Station (ME Trudgen 11,431));
- one Priority 4 species (*Goodenia stellata*); and
- several other poorly known or collected species.

The potential impacts that the proposed development presents to terrestrial vegetation and flora are discussed in Section 9.3. These are essentially the same in nature irrespective of the conservation status of the vegetation or taxa affected. The significance of the impact is, however, greater in the event that higher conservation significance features may be affected. In recognition of this, this report recommends an approach of avoidance of impact on these higher conservation significance features by treating them as design constraints (see Section 10.0).

9.3 Potential Impact Mechanisms

9.3.1 Vegetation Clearing

Clearing of vegetation will be required along the proposed railway, and for establishment of infrastructure such as borrow pits, laydown areas, water bores, dams and access tracks. Some significant cut and fill may be required where the proposed rail corridor traverses ridges and valleys respectively, which would extend the limit of clearing beyond the immediate vicinity of the rail line. To estimate the representative impact of the clearing on a local scale, the nominal alignment within the rail corridor was buffered by 25 m within the 2 km buffered rail corridor mapped during the field survey. The construction of the railway will result in the clearing of approximately 1,845 ha of vegetation, affecting most vegetation types along the corridor. An indicative breakdown of the area of each vegetation type affected by the proposed railway arising from the proposal is provided in Appendix 2.

Additional impacts on vegetation may result from other project-related activities including off-road driving and fire (see below). Spinifex (*Triodia* spp.) is particularly susceptible to physical damage from vehicle movements and may take extended periods to recover.

9.3.2 Introduction and/or Spread of Weeds

Eleven introduced flora species were recorded from the rail corridor, at least one of which is a significant environmental weed (Buffel grass **Cenchrus ciliaris*). Earthworks, disturbance to vegetation, vehicle movement and other factors have the potential to introduce additional weeds to the area and to spread existing populations of introduced flora along the length of the rail corridor. The field survey suggests that this has been the case for some species of exotic flora along the existing BHP rail line. The Hamersley Range sand dunes and mesic environments such as major creeklines and floodplains are particularly susceptible to weed invasion. The potential for significant degradation due to weed invasion would be enhanced for the strip of land isolated between the two rail lines, as this would be subject to weed invasion from two edges.

9.3.3 Disturbance of Surface Hydrology

The proposed rail corridor crosses several large river systems including the Yule, Turner and Fortescue Rivers, and Chinnamon and Coonarrie Creeks, and numerous minor tributaries and floodplains also intersect the project area. Disturbance to surface drainage flow has the potential to negatively impact downstream vegetation in such creeklines.

Large areas of Mulga are also present towards the southern end of the corridor (south of the Chichester Range, particularly in association with the Fortescue River basin). These are reliant on surface sheet flow, and interruption to such flow has the potential to cause substantial degradation and mulga mortality by either restriction of water input downstream of the rail or ponding upstream. Apparent drainage shadow effects were evident at points along the existing BHP rail (see plates below), although these areas may also be influenced by fire and grazing history.

Mulga vegetation along existing rail line at 719998 mE, 7508303 mN: photo of western side (upstream) and eastern side (downstream).

Mulga vegetation along existing rail line at the 266 km mark: photo of western side (upstream) and eastern side (downstream).

9.3.4 Erosion

Clearing of vegetation has the potential to lead to increased rates of erosion. Susceptible vegetation types within the project area include the cracking clays and the heavier soils underlying the Mulga communities, particularly in the Fortescue Valley. The sand dune communities in the Hamersley Range section would also be susceptible to any increases in erosional processes.

9.3.5 Fire

The frequency of fires in the vicinity of the proposed rail corridor is already likely to be higher than in the surrounding region due to the increased fire frequency resulting from track-grinding maintenance on the existing BHP Billiton rail line. The increase in similar activities in the area associated with the FMG during rail construction also has the potential to contribute to more frequent fires in the locality.

The level of impact on vegetation associated with this potential increase in fire frequency is dependent on the structure of the affected vegetation. The hummock grassland

vegetation types that dominate the northern half of the rail corridor are typically very flammable, but are also adapted to fire and recover relatively quickly. Increased frequency of fires can, however, lead to changes in floristic composition and a prevalence of early seral stages of the vegetation (the climax vegetation is prevented from developing; Biota and Trudgen 2002). Mulga communities may be killed by hot fires; the Mulga woodlands and tall shrublands along the southern section of the rail corridor would be particularly susceptible to damage from fires, particularly if there was also strong grazing pressure or other stress presented by modification to the existing hydrological regime (see above).

9.3.6 Dust

Dust generated during the construction, operation and maintenance of the rail has the potential to negatively affect surrounding vegetation, but this is considered likely to be a minor impact provided standard dust suppression measures are implemented (see Section 10.0).

9.4 Impacts on Mangals

The proposal includes the development of a rail loop, car dumper, iron ore stockpiles, conveyor and ore handling facilities, port infrastructure and settlement ponds for dredge spoil (FMG 2004).

Specific mechanisms that may cause mangrove decline that may operate in the project area include:

- reduction in tidal flushing in creeks and reduction in extent of mudflat inundation under high water of springs. This typically results in loss of mangroves in marginal fringing environments that have high salinities under natural conditions;
- changes in erosion or accretion, which may result in the undermining of fringing mangroves, the reduction of tidal flushing to mangroves, or burial of pneumatophores by altered sedimentation patterns;
- impoundment of water at higher than natural levels, which can result in mangrove decline and death due to sustained inundation of pneumatophores and a decline in water quality;
- direct construction related impacts and physical removal of mangroves; and
- longer term indirect impacts that may reduce mangrove condition, such as alteration of freshwater surface drainage hydrology and dust deposition on mangrove communities.

The development of the proposed FMG rail loop, stockpile port facilities presents a range of potential impacts to mangrove communities as discussed in the following sub-sections.

9.4.1 Clearing of Mangals during Construction

The proposed development would result in the clearing of approximately 22.0 ha of mangroves (approximately 2% of the total mangal habitat within Port Hedland Harbour; Paling et al. 2003), in addition to a further 87 ha of open mudflat with scattered samphires and occasional low *Avicennia marina* (the more open form of association 4B of Paling et al. 2003). A breakdown of this total of 109 ha of intertidal clearing impacts on mangroves by association type is provided in Table 9.1 with the affected mangrove units shown in Figure 9.1. The total clearing would amount to approximately 10% of the harbour's current mangrove assemblage cover; a similar impact to that presented by the proposed Hope Downs port site (Hope Downs Management Services 2002). Most of this clearing (80%), however, impacts on a very low mangrove cover unit at the top end of the tidal range (see Table 9.1).

Table 9.1: Areas of mangrove associations to be cleared to accommodate the proposed FMG port site, and their wider representation within Port Hedland Harbour (after Paling et al. 2003; % in brackets indicates relative loss for Port Hedland harbour; see also Figure 9.1).

Association	Area to be cleared (ha)	Area within Port Hedland Harbour (ha)
Closed canopy woodland of *Rhizophora stylosa*	0.5 (0.2%)	203
Closed canopy woodland of *R. stylosa* and *Avicennia marina*	3.0 (2.0%)	152
Closed canopy woodland of *A. marina* (seaward fringe)	9.6 (26%)	37
Closed canopy woodland of *A. marina* (landward margins)	0.3 (0.1%)	451
Low open shrubland of *A. marina* on saline flats	8.6	241
Mudflat, patches of samphires with *occasional A. marina*	87.0 (39%)	
Total:	109.0	1,108

The most affected unit is the open mudflat with scattered samphires and occasional *A. marina (*unit 4B of Paling et al. 2003), with 39% of its cover in the harbour affected (primarily by the dredge spoil basin; Figure 9.1). None of the mangrove associations that would be affected by the proposed development are restricted to this part of the harbour. The clearing will also remove 49 ha of algal mat from the area south of Anderson Point (Figure 9.1). This represents approximately 24% of the mapped extent of algal mat in Port Hedland harbour (Paling et al. 2003). Given the mat's role in nitrogen fixing (Paling and McComb 1994), this is likely to result in a proportional reduction of nutrient input to intertidal systems in the harbour. The ecological significance of this reduction is difficult to quantify.

The principal sources of mangrove clearing associated with the proposal are the footprint of the rail loop and the causeway linking the stockpile area with the load facility over Anderson Point (see Figure 9.1). Some mangrove colonisation is likely to occur along the perimeter of the completed works areas and this may partially offset the mangroves removed during initial clearing activities.

When considered in combination with the proposed Hope Downs port site (Hope Downs Management Services 2002), the local clearing of mangrove communities within the harbour for the two ports totals 198 ha. The cumulative impact of both port sites being constructed would therefore reduce total mangal cover within the harbour to 910 ha (an 18% reduction).

9.4.2 Changes to Tidal Exchange and Hydrodynamics

The construction of the proposed rail loop, conveyor access causeway and dredge spoil bund walls and other infrastructure all have the potential to alter local tidal hydrodynamics. Mangroves rely on regular tidal flushing to ensure that soil salinities are maintained within their tolerance limits (Galloway 1982, Gordon 1987). Several key locations were identified early in project design where proposed infrastructure would potentially alter tidal flushing and therefore impact on mangrove communities. The locations where tidal exchange could be significantly affected in the area are primarily associated with the rail loop (which crosses South-west Creek at two major tidal channel openings) and a smaller creek system on Anderson Point that would be traversed by the proposed load-out access causeway (see Figure 9.1).

The construction of the rail embankment and causeway structures has the potential to affect tidal hydrodynamics and flushing in local mangrove habitats. The extent of this impact is largely dependent on the nature and alignment of the constructed embankments and the extent to which they obstruct or modify tidal flow and wetting and drying regimes.

To better assess this issue and refine project design, hydrodynamic modelling of the harbour was completed by Worley (2004). This model provided for quantification of wetting and drying regimes under existing conditions in the project area and then superimposed the proposed port design. This has resulted in the drainage and tidal exchange management design outcomes discussed in Section 10.2.3.

9.4.3 Dust Deposition

The presence of iron stockpiles, materials handling, vehicle movement and other project activities all have the potential to generate dust. Mangrove communities in the area may therefore experience increased dust deposition levels as a result. Mangroves in the locality are currently in good condition and generally unaffected by the dust that coats mangroves in other parts of the harbour (Hope Downs Management Services 2002). Studies have demonstrated that iron ore dust in particular does not appear to cause any significant structural damage to mangrove leaf structures, as had previously been suggested (Paling et al. 2001). Dust deposition may still cause other loss of condition in mangroves through effects relating to increased heat or reductions in gas exchange (research is continuing in this area; Dr. E. Paling, pers. comm.). Given the proposed dust suppression measures to be implemented at the port and stockpile (FMG 2004), the risk of significant dust impacts occurring to mangroves as a result of this proposal appears to be acceptable.

9.4.4 Effluent Discharge and Changes in Surface Hydrology

Discharge of runoff water from stockpiles, drainage water and other effluents has the potential to degrade mangroves in areas adjacent to the proposed facility. The release of effluent from the dredge spoil storage basin also has the potential to affect water quality or increase sediment loads in mangrove creeks. Given the management measures to be applied for dredge spoil handling, testing and release of pond effluent (FMG 2004), no significant impact is expected to arise from this as a result of the proposed stockpile and port development.

9.4.5 Alteration to Groundwater Regimes

The proposed port developments may also present some potential changes to local groundwater regimes. These primarily relate to the potential for hypersaline groundwater seepage, water-logging or acidic drainage associated with the construction of the dredge spoil basin and levee banks. The extent to which this will affect mangal in the harbour is not clear but only a relatively small percentage of the bund wall abuts mangrove habitat. In a study of similar phenomena associated with saltfield bund walls, Gordon et al. (1995) found that water-logging and other groundwater related changes were typically limited to mangroves less than 50 m from the bunds. In the case of the FMG port, the areas where the dredge spoil bunds will be this close to mangroves are generally in the part of the elevation range where they would receive regular tidal flushing.

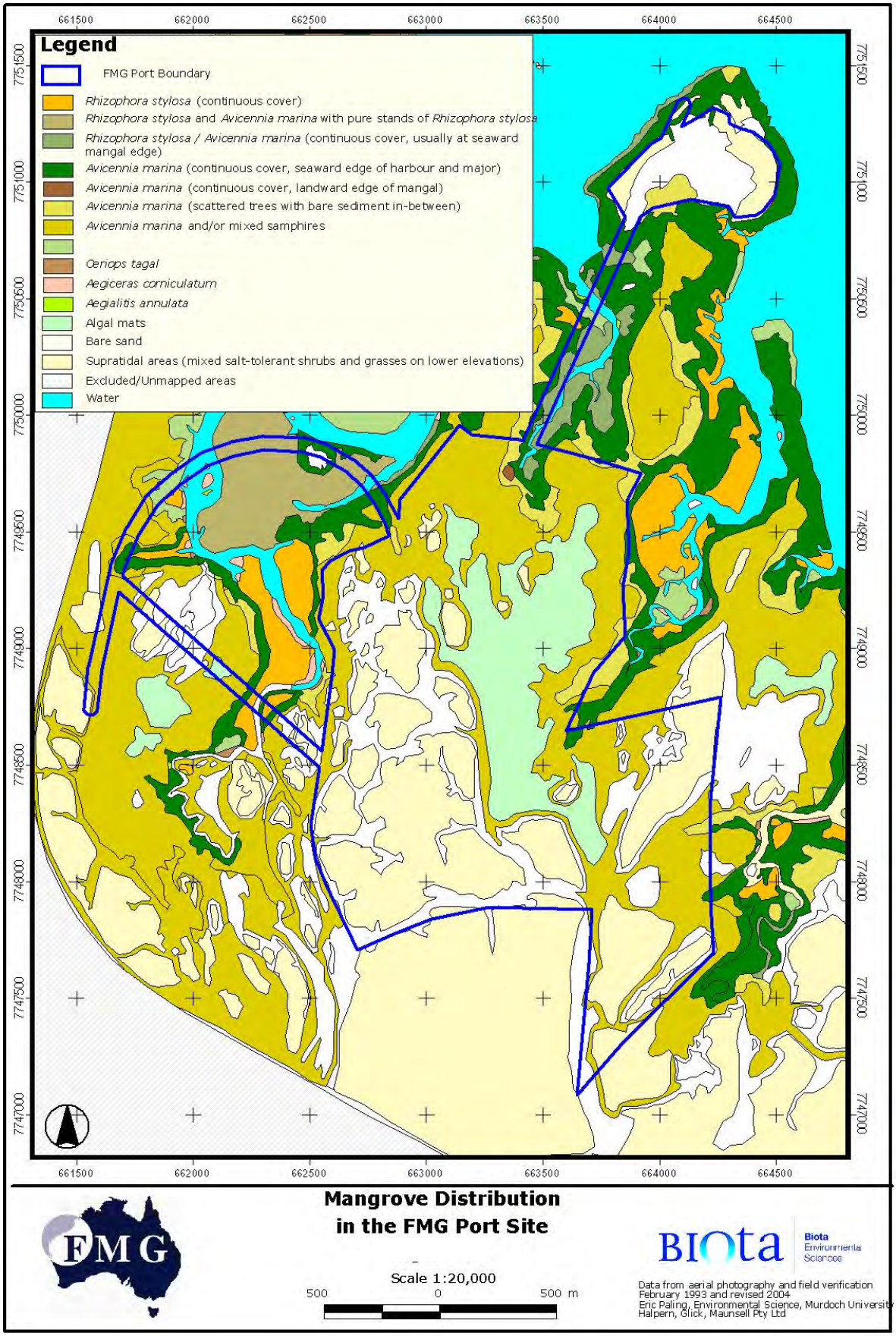

Figure 9.1: Mangrove associations and potential impact area of the proposed FMG port site.

10.0 Conclusions and Management Recommendations

10.1 Management of Terrestrial Vegetation and Flora

A variety of management measures exist to address the potential impacts presented by the proposed railway. These should be implemented as part of the design, construction and operation of the proposed railway to reduce the potential impacts to terrestrial vegetation and flora.

Recommended management measures for the proposal include:

1) The design of the rail alignment should be refined, taking into account the locations of significant vegetation types and populations of Priority flora (Sections 6.0 and 7.0), with the objective of avoiding these through final design.

2) The drainage design for the railway should take into account local hydrological patterns that may have ecological significance. This includes adequate provision for drainage line habitats to ensure that back-water or flow restriction does not occur. In most areas this would probably be met by mirroring the drainage design of the existing BHPBIO railway (when adjacent), and following best practice drainage design in other areas.

3) The rail alignment and drainage design must ensure that interruption to existing sheet flow is kept to a minimum. This is required to ensure that sensitive vegetation both upstream and downstream (primarily mulga) is not adversely affected. This will be a consideration south of the Chichester Range, particularly where the rail passes through mulga vegetation in the Fortescue basin. This aspect of the drainage design will need to be finalised to the satisfaction of the DCLM regional office and we recommend close liaison with them. It is noted that design of the rail entry to Mindy Mindy has already been modified as a result of initial discussions to minimise the potential for disruption to sheet flow in this area.

4) Vegetation clearing should be kept to the minimum necessary for safe construction and operation of the railway, particularly in areas adjacent to vegetation of higher conservation significance. Clearing limits should be marked on all design drawings and pegged in the field prior to any clearing works commencing. This would then constitute a hold-point for the site supervisor to review and provide written approval prior to clearing works commencing;

5) Off-road driving should be strictly prohibited, with all staff to be informed of this (and significant environmental issues generally) as part of an on-site induction programme;

6) Weed control measures should be developed and implemented to ensure that exotic flora species identified from the rail corridor are not spread as part of the construction of the railway. This may include targeted control of more aggressive weed species where these are intersected by the final rail alignment. A Weed Hygiene and Management Plan should be prepared in consultation with DCLM prior to construction commencing.

7) Fire management should be addressed as part of the Environmental Management Plans (EMPs) prepared for construction, operation and maintenance of the railway. A key objective of these management measures should be to reduce the risk of unplanned fires and provide contingency measures to minimise any impacts in the event that a fire is started. This could include measures to address normal construction activities including the use of heavy plant and equipment in dry vegetated areas, welding, grinding and other activities with the potential to start fires. Management of track maintenance and the fire risk associated with track-grinding activities would be an

important consideration. Spark shields should be specified for all rail maintenance contracts, with fire tender vehicles equipped with fire fighting equipment to follow the track grinder in order to address any spot fires started.

8) A Topsoil Management and Rehabilitation Plan should be prepared for all non-permanent cleared areas, in liaison with DCLM, DOE and DOIR, prior to the commencement of construction activities. This plan should include use of provenance collected native seed, characterisation and management of topsoil, and the respreading of cleared vegetative material. Recovery monitoring should also be carried out, with any rehabilitation failure subject to additional treatment to a suitable standard.

9) Standard dust suppression measures should be implemented across the project area during construction to minimise effects on surrounding vegetation.

10) The location of borrow pits and other materials sourcing sites were not known in detail at the time of preparing this report. Given that all biological surveys are based on representative sampling only, there will always be areas within the corridor that have not been adequately ground-truthed. It is therefore possible that borrow pits may ultimately be located in areas that have not been specifically surveyed. Once pit locations are identified, the location of these sites should be subject to targeted surveys for any threatened flora species or vegetation types of conservation significance prior to clearing commencing. The location of materials sourcing sites may then need to be revised as appropriate based on the findings of this work in liaison with the DCLM regional office.

11) Off-sets should be considered in consultation with the DCLM regional office. These could include contribution of funds to relevant taxonomic research (eg. research into *Acacia "aneura"* in the Pilbara, or some of the other poorly known taxa such as the Malvaceae and Tiliaceae).

10.2 Management of Mangroves

10.2.1 Management Policy Framework

Port Hedland Harbour is not specifically identified in the EPA's "Guidance Statement for the protection of tropical arid zone mangroves along the Pilbara coastline" (EPA 2001). However, a site-specific survey of conservation significance, condition and ecological function of mangrove communities of the project area was still undertaken. The proposed development has sought to apply the principals of this guidance statement in the design of the facilities and planned construction and post-construction management measures. The design approach adopted treated the mangrove systems present within Port Hedland harbour in accordance with Guideline 4 of EPA (2001), 'All other mangrove areas within designated industrial and associated port areas'.

10.2.2 Outcomes of Hydrodynamic Modelling for Mangrove Systems

The hydrodynamic modelling work completed for the project was done in a staged fashion. Given the grid size of the model, the initial scenarios including the presence of the FMG port infrastructure assumed totally transmissive cells at key exchange points on South-west Creek and other tidal channels (Worley 2004). Running this model suggested that there would be no significant change to wetting and drying regimes, provided this level of exchange could be achieved (Worley 2004). A culvert size was developed for FMG by Worley to ensure that hydrodynamic exchange would not be impeded (FMG 2004).

10.2.3 Project Design and Management Measures

The relevant EPA Guidance statements require that the impact of development on mangroves and their ecological function is reduced to the minimum practicable level (EPA

2001). To this end, FMG has included a range of project design and management measures in the design of the proposed port, including:

1 Situation and alignment of the stockpile area such that as much of the footprint as possible occupies supratidal land;

2 All structures that cross tidal channels will be designed in accordance with the outcomes of the modelling work completed for the project to ensure hydrodynamic exchange such that tidal flushing of upstream mangrove systems is not inhibited (particularly in the mangrove habitats of South-west Creek within the rail loop);

3 Modification of the dredge spoil storage bund walls to minimise direct impacts on mangroves. Initial concept designs were square in nature but these have now been customised to follow the boundary of the mangrove zone to reduce clearing requirements.

4 Detailed design of the port and stockpile infrastructure will aim to minimise impacts on mangrove areas wherever possible. All final design drawings will show clearing limits and these will be pegged in the field prior to clearing commencing.

5 Detailed design of the facility will include best practice management of all surface drainages including run-off from stockpile facilities and surface stabilisation of the dredge spoil bund walls (FMG 2004).

6 Best practice dust-suppression technology will be installed on stockpile facilities and associated areas to ensure that dust deposition on mangroves is minimised (FMG 2004).

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- Mr Paul Wilson (Western Australian Herbarium) identified the *Halosarcia* and some other Chenopodiaceae specimens;
- Mr Bruce Maslin (Western Australian Herbarium) identified some of the *Acacia* specimens;
- Mr Allen Lowrie (private consultant) identified specimens of *Byblis*, *Drosera* and *Stylidium*;
- Ms Jo Palmer (Australian National Herbarium, Canberra) confirmed the *Gomphrena* identifications; and
- Mr Greg Leach (Northern Territory Herbarium) determined the *Eriocaulon pusillum* specimen.

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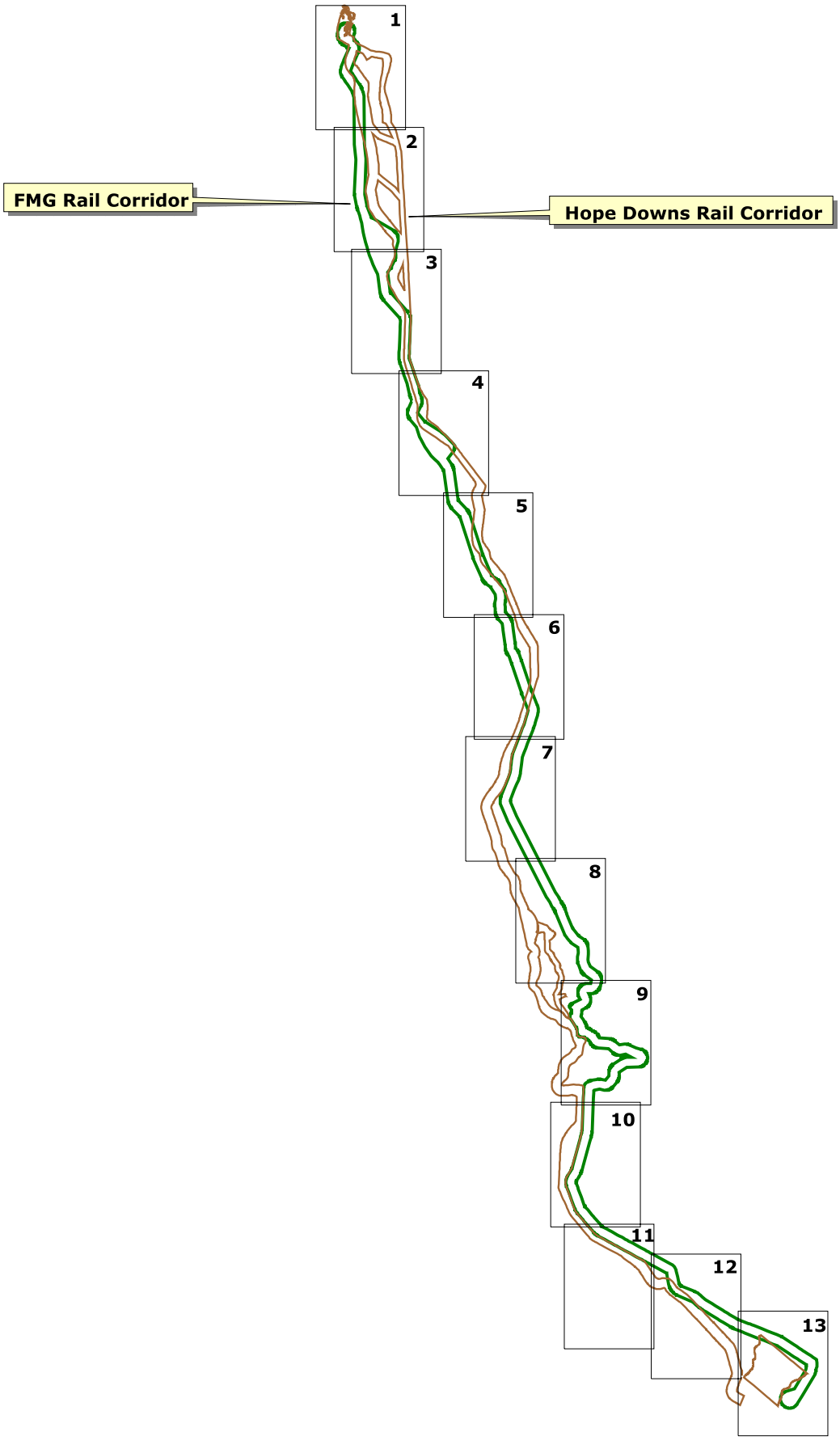
Vegetation of the FMG Stage A Rail Corridor

Appendix 1

BIOta



FMG and Hope Downs Rail Corridors:
1:100,000 Map Sheets
Sheet 1 of 1
Scale 1:1,200,000

0 10 20 30 40 50 60 km

Biota Environmental Sciences

Abydos Plain

Littoral Vegetation - Shrub Dominated

Am Mangals

As *Halosarcia* spp., *Frankenia ambita* scattered low shrubs to low open shrubland

Sandy Plain Vegetation - Spinifex Dominated

Apt1 *Triodia epactia, T. secunda* mid-dense hummock grassland

Apt2 *Triodia secunda* mid-dense hummock grassland

Apt3 *Triodia epactia* hummock grassland to mid-dense hummock grassland

Apt4 *Triodia longiceps, T. epactia* mid-dense hummock grassland

Apt5 *Triodia angusta* mid-dense hummock grassland

Apt6 *Acacia stellaticeps, Pluchea ferdinandi-muelleri* low open shrubland over *Triodia lanigera* mid-dense hummock grassland

Apt7 *Acacia* spp., *Pluchea ferdinandi-muelleri* scattered shrubs over *Triodia longiceps* mid-dense hummock grassland

Apt8 *Acacia stellaticeps, Pluchea ferdinandi-muelleri* low open shrubland over *Triodia angusta, T. lanigera* mid-dense hummock grassland

Apt9 *Acacia stellaticeps* scattered shrubs to low shrubland over *Triodia epactia, T. schinzii* dense hummock grassland

Apt10 *Acacia stellaticeps* scattered shrubs to low shrubland over *Triodia epactia* dense hummock grassland

Apt11 *Acacia* spp. scattered tall schrubs over *Acacia stellaticeps* low open shrubland over *Triodia lanigera* hummock grassland

Apt12 *Acacia inaequilatera* scattered tall shrubs over *Triodia lanigera* mid-dense hummock grassland

Apt13 *Acacia ancistrocarpa* open shrubland to open heath over *Triodia lanigera* hummock grassland

Apt14 *Acacia inaequilatera* scattered tall shrubs to high open shrubland over *Triodia epactia* hummock grassland to mid-dense hummock grassland

Apt15 *Acacia inaequilatera, A. ancistrocarpa* scattered tall shrubs over *Triodia epactia, T. lanigera* hummock grassland

Apt16 *Acacia colei, A. tumida* high open shrubland over *Triodia epactia* hummock grassland

Apt17 *Acacia inaequilatera* scattered tall shrubs over *Tephrosia rosea* var. *clementii, Indigofera rugosa* low open shrubland over *Triodia epactia* hummock grassland

Apt18 *Acacia inaequilatera, A. ancistrocarpa* scattered tall shrubs over *Triodia basedowii* closed hummock grassland

Sandy Plain Vegetation - Tree/Shrub Dominated

Aps1 *Acacia orthocarpa* high open shrubland to open scrub over *Triodia epactia* mid-dense hummock grassland

Aps2 *Acacia orthocarpa* high shrubland to open scrub over *Triodia lanigera* mid-dense hummock grassland

Aps3 *Acacia orthocarpa* high open shrubland to high shrubland over *Triodia wiseana* mid-dense hummock grassland

Aps4 *Corymbia hamersleyana* scattered low trees over *Acacia adsurgens* high shrubland to open scrub over *Triodia epactia* mid-dense hummock grassland

Aps5 *Corymbia hamersleyana* scattered low trees over *Acacia colei* shrubland over *Triodia lanigera* hummock grassland

Aps6 *Acacia tumida* open shrubland to shrubland over *Triodia schinzii* hummock grassland

Aps7 *Acacia colei* high shrubland over *Triodia epactia, T. lanigera* mid-dense hummock grassland

Aps8 *Acacia maitlandii* open scrub over *Triodia lanigera* mid-dense hummock grassland

Aps9 *Cullen leucochaites* shrubland over *Triodia epactia* mid-dense hummock grassland

Aps10 *Cajanus cinereus* shrubland over *Triodia epactia* mid-dense hummock grassland

Stony Plain & Hill Vegetation - Spinifex Dominated

Ah1 *Acacia inaequilatera* scattered tall shrubs over *Triodia wiseana* hummock grassland to mid-dense hummock grassland

Ah2 *Acacia bivenosa, A. ancistrocarpa* open shrubland over *Triodia wiseana, T. lanigera* mid-dense hummock grassland

Ah3 *Acacia bivenosa, Melaleuca eleuterostachya* scattered shrubs over *Triodia lanigera* mid-dense hummock grassland

Ah4 *Acacia ancistrocarpa, A. inaequilatera* scattered tall shrubs over *Triodia brizoides* mid-dense hummock grassland

Ah5 *Corymbia hamersleyana* scattered low trees over *Triodia* aff. *basedowii* mid-dense to closed hummock grassland

Ah5a *Acacia inaequilatera* scattered tall shrubs over *Triodia* aff. *lanigera* mid-dense hummock grassland

Ah6 *Acacia ancistrocarpa* scattered shrubs over *A. stellaticeps* scattered low shrubs over *Triodia epactia, T. schinzii* mid-dense hummock grassland

Drainage & Sandy Plain Vegetation - Tree/Shrub Dominated

Major Creeklines

Ac1 *Eucalyptus camaldulensis, Melaleuca argentea* low woodland to low open woodland

Ac2 *Eucalyptus camaldulensis* scattered low trees over *Melaleuca argentea* low open forest over *Melaleuca linophylla, Acacia ampliceps* high shrubland

Ac3 *Eucalyptus camaldulensis* woodland over *Melaleuca* spp. high shrubland to open scrub over *Triodia epactia,* tussock grasses and patches of sedges

Ac4 *Eucalyptus victrix* scattered low trees to open woodland over *Melaleuca glomerata* high shrubland to open scrub over *Triodia epactia,* tussock grasses and patches of sedges

Ac5 *Eucalyptus camaldulensis* low open woodland over *Acacia trachycarpa* high shrubland over *Triodia epactia* mid-dense hummock grassland and **Cenchrus ciliaris* very open tussock grassland

Ac6 *Eucalyptus victrix* scattered trees over *Acacia coriacea* subsp. *pendens, Atalaya hemiglauca, Hakea lorea* subsp.*lorea* high open shrubland over **Cenchrus ciliaris* tussock grassland

Ac7 Scoured creek bed

Abydos Plain

Minor Creeklines, Drainage Areas and Floodplains

Ac8 *Eucalyptus victrix* scattered low trees over *Acacia trachycarpa* open scrub over *Triodia epactia* mid-dense hummock grassland or **Cenchrus ciliaris* open to closed tussock grassland

Ac9 *Corymbia* spp. scattered low trees over *Acacia trachycarpa* open scrub over *Triodia lanigera* mid-dense hummock grassland and **Cenchrus ciliaris* tussock grassland

Ac10 *Eucalyptus victrix* scattered trees over *Acacia tumida* high shrubland over *Triodia epactia* hummock grassland

Ac11 *Corymbia* spp. scattered low trees over *Acacia tumida, A. colei* open scrub over *Triodia epactia* hummock grassland

Ac12 *Corymbia hamersleyana* scattered low trees over *Acacia tumida* high shrubland over *Triodia lanigera, T. epactia* mid-dense hummock grassland

Ac13 *Corymbia hamersleyana* scattered low trees over *Acacia tumida* closed scrub over *Triodia lanigera* mid-dense hummock grassland

Ac14 *Eucalyptus victrix, Corymbia* spp. scattered trees to low open woodland over *Acacia colei* open scrub over *Triodia epactia* dense hummock grassland

Ac15 *Eucalyptus victrix* low open woodland to woodland over *Acacia colei* scattered tall shrubs to high open shrubland over *Triodia epactia* scattered hummock grasses and *Eriachne* spp. tussock grasses

Ac16 *Corymbia hamersleyana* scattered low trees over *Acacia colei* open scrub over *A. stellaticeps* low open shrubland over *Triodia lanigera* hummock grassland and *Chrysopogon fallax, Eriachne obtusa* open tussock grassland

Ac17 *Acacia tumida, A. colei* open scrub over mixed tussock grassland

Ac18 *Acacia colei, A. trachycarpa, A. inaequilatera* high shrubland over *Triodia lanigera* mid-dense hummock grassland

Ac19 *Corymbia hamersleyana* scattered low trees over *Acacia ampliceps, A. tumida* high shrubland over *Triodia lanigera, T. epactia* mid-dense hummock grassland

Ac20 *Acacia ampliceps* open scrub over *A. trachycarpa* shrubland over **Cenchrus ciliaris, Diplachne fusca* closed tussock grassland

Ac21 *Acacia ampliceps* open scrub over *Triodia secunda* hummock grassland

Ac22 *Corymbia* spp. low open woodland over *Acacia acradenia, A. ancistrocarpa* open scrub over *Triodia epactia* open hummock grassland and *Chrysopogon fallax, Themeda triandra* tussock grassland

Ac23 *Corymbia hamersleyana* scattered low trees over *Acacia acradenia, A. ancistrocarpa, A. bivenosa* high open shrubland over *Acacia stellaticeps*

Ac24 *Acacia acradenia, A. colei* open scrub to high shrubland over *Triodia lanigera* mid-dense hummock grassland

Ac25 *Atalaya hemiglauca* low woodland over **Cenchrus ciliaris* open tussock grassland

Ac26 *Corymbia hamersleyana* scattered low trees over *Acacia bivenosa* shrubland over *Acacia stellaticeps* low shrubland over *Triodia wiseana* mid-dense hummock grassland

Ac27 *Acacia ancistrocarpa* open scrub over *Triodia epactia* mid-dense hummock grassland

Ac28 *Acacia bivenosa* open heath over *Triodia lanigera* hummock grassland

Ac29 *Acacia farnesiana, A. sclerosperma* scattered tall shrubs over **Cenchrus ciliaris, Chrysopogon fallax* closed tussock grassland

Ac30 *Corymbia hamersleyana, C. candida* low open woodland over *Acacia colei, A. tumida* scattered tall shrubs over *Triodia epactia* hummock grassland and very open herbland

Ac31 *Acacia bivenosa* shrubland to open heath over *Triodia longiceps* mid-dense hummock grassland

Outcrop / Rocky Ridge Vegetation

Granite Outcrop Vegetation

Ar1 *Ficus brachypoda, Flueggea virosa* subsp. *melanthesoides, Terminalia canescens, Clerodendrum* spp. scattered shrubs over *Triodia epactia* hummock grassland and **Cenchrus ciliaris* tussock grassland

Ar2 *Acacia tumida* high shrubland to open scrub over *Triodia epactia* hummock grassland

Ar3 *Trigopon loliiformis* dwarf open grassland

Ar4 *Bulbostylis burbidgeae* sedgeland

Granite Ridge Vegetation

Ar5 *Acacia inaequilatera* scattered tall shrubs over *Gossypium australe* open shrubland over *Triodia epactia* hummock grassland

Quartz Ridge Vegetation

Ar6 *Acacia tumida, Grevillea wickhamii* subsp. *aprica* scattered shrubs to open shrubland over *Triodia epactia* open hummock grassland to hummock grassland

Dolerite Dyke Vegetation

Ar7 *Cajanus cinereus* shrubland over *Triodia epactia* hummock grassland

Chichester Range

Stony Plain & Hill Vegetation - Spinifex Dominated

Ch1 *Acacia inaequilatera, Cassia* spp. scattered tall shrubs over *Triodia epactia* mid-dense hummock grassland

Ch2 *Acacia inaequilatera, Cassia* spp. scattered tall shrubs over *Triodia wiseana* mid-dense hummock grassland

Ch3 *Triodia wiseana, T. longiceps* mid-dense hummock grassland

Ch4 *Cassia glutinosa* scattered shrubs over *Triodia brizoides, T. epactia* mid-dense hummock grassland

Ch5 *Corymbia hamersleyana* scattered low trees over *Atalaya hemiglauca, Acacia aneura, A. pruinocarpa* scattered tall shrubs to high open shrubland over *Cymbopogon ambiguus* tussock grassland and/or *Triodia epactia* open hummock grassland

Ch6 *Acacia inaequilatera* scattered tall shrubs over *Indigofera rugosa* low open heath over *Triodia wiseana* hummock grassland

Ch7 *Acacia inaequilatera* scattered tall shrubs over *Indigofera rugosa* low open heath over *Triodia epactia* closed hummock grassland

Ch8 *Corymbia hamersleyana* scattered low trees over *Acacia arida, A. ptychophylla* low open heath over *Triodia lanigera* closed hummock grassland

Ch9 *Corymbia deserticola* scattered low trees over *Acacia aneura* high open shrubland over *Triodia lanigera* closed hummock grassland

Ch10 *Corymbia deserticola* scattered low trees over *Acacia aneura* high shrubland to low woodland over *Triodia lanigera* closed hummock grassland

Ch11 *Eucalyptus leucophloia* scattered low trees over *Triodia* aff. *basedowii* hummock grassland

Ch12 *Eucalyptus leucophloia* scattered low trees over *Acacia hilliana* scattered low shrubs over *Triodia lanigera* mid-dense hummock grassland

Ch13 *Triodia brizoides, T. longiceps* mid-dense hummock grassland

Drainage Vegetation - Tree/Shrub Dominated

Minor Creeklines and Floodplains

Cc1 *Acacia coriacea* open woodland over *Petalostylis labicheoides, Acacia acradenia, A. bivenosa* high open shrubland over *Themeda triandra* open tussock grassland

Cc2 *Eucalyptus victrix, Corymbia hamersleyana* scattered low trees over *Acacia tumida, Petalostylis labicheoides* open scrub over *Triodia epactia* mid-dense hummock grassland

Cc3 *Eucalyptus victrix* low woodland over *Melaleuca linophylla* open shrubland over *Sorghum plumosum* open tussock grassland and *Triodia longiceps* very open hummock grassland

Cc4 *Corymbia hamersleyana* scattered low trees over *Acacia tumida* open heath over *Sorghum plumosum, Themeda triandra* closed tussock grassland

Cc5 *Corymbia hamersleyana* scattered trees over *Acacia bivenosa* high open shrubland over *Triodia epactia, T. longiceps* open tussock grassland

Cc6 *Corymbia hamersleyana* scattered low trees over *Acacia pyrifolia* shrubland over *Triodia epactia* hummock grassland

Cc7 *Corymbia hamersleyana* scattered low trees over *Acacia acradenia* open scrub over *Triodia longiceps, T. lanigera* mid-dense hummock grassland and *Paraneurachne muelleri* grassland

Cc8 *Eucalyptus victrix* scattered low trees over *Acacia bivenosa* open heath over *Triodia epactia* mid-dense hummock grassland and patches of *Themeda triandra* tussock grassland

Cc9 *Corymbia* spp. scattered trees over *Grevillea wickhamii* subsp. *aprica* high open shrubland over *Acacia maitlandii* open heath over *Triodia epactia* mid-dense hummock grassland

Cc11 *Acacia bivenosa* open scrub over *Triodia wiseana* open hummock grassland

Cc12 *Acacia acradenia* open scrub over *Triodia wiseana* mid-dense hummock grassland

Cc13 *Cullen leucanthum* closed scrub over *Cymbopogon procerus, *Cenchrus ciliaris* very open tussock grassland

Cc14 *Acacia pyrifolia, A. bivenosa* open shrubland over *Sorghum plumosum* tussock grassland and *Triodia epactia* very open hummock grassland

Cc16 *Corymbia hamersleyana* scattered low trees over *Acacia tumida, Grevillea wickhamii, Petalostylis labicheoides* open scrub to tall shrubland over *Triodia epactia* open hummock grassland

Cc17 *Acacia synchronicia, A. farnesiana* open shrubland over *Eriachne benthamii, Chrysopogon fallax* closed tussock grassland

Cracking Clay Vegetation

Cx1 *Acacia victoriae* high open shrubland over *Aristida latifolia, Cymbopogon ambiguus* grassland

Cx2 *Acacia victoriae* open shrubland to high shrubland over *Cassia oligophylla* scattered shrubs over *Sida* aff. *fibulifera* low open shrubland

Cx3 *Cassia oligophylla* scattered shrubs over *Sida* aff. *fibulifera* low open shrubland over *Streptoglossa bubakii* open to very open herbland

Cx4 *Astrebla pectinata, Aristida latifolia* tussock grassland

Cx5 *Acacia xiphophylla* open to closed scrub over *Rhagodia eremaea* open shrubland

Sandy Plain Vegetation

Cp1 *Acacia inaequilatera* scattered tall shrubs over *Triodia schinzii* mid-dense hummock grassland

Fortescue Valley

Stony Plain & Hill Vegetation - Spinifex Dominated

Fh1 *Acacia aneura* high open shrubland to high shrubland over *Triodia brizoides* mid-dense hummock grassland

Fh2 *Acacia victoriae* scattered tall shrubs over *Triodia longiceps* mid-dense hummock grassland

Fh3 *Acacia aneura* scattered low trees over *Acacia synchronicia* tall shrubland to scattered tall shrubs over **Cenchrus ciliaris* tussock grassland

Fh4 *Eucalyptus gamophylla* low open woodland over *Acacia sclerosperma* high open shrubland over *Triodia basedowii* mid-dense hummock grassland

Clayey/Sandy Plain Vegetation - Mulga Dominated

Fa1 *Acacia aneura* open scrub to low forest over *Dodonaea petiolaris, Eremophila forrestii* subsp. *forrestii, Cassia helmsii, Sida calyxhymenia* open heath with *Enneapogon polyphyllus* annual very open grassland

Fa2 *Acacia aneura* low woodland over *A. aneura, A. atkinsiana* high open shrubland over *Eremophila forrestii* subsp. *forrestii* open shrubland over *Triodia epactia* mid-dense hummock grassland

Fa3 *Acacia xiphophylla, A. aneura* high open shrubland to low woodland over *Acacia victoriae, Eremophila forrestii* subsp. *forrestii, Cassia* spp. open shrubland to open heath over *Aristida latifolia* grassland with *Enneapogon polyphyllus, Aristida contorta* annual grassland

Fa4 *Acacia aneura, A. pruinocarpa* closed scrub over *Dodonaea petiolaris* open shrubland over *Aristida inaequiglumis* open grassland

Fa5 *Acacia pruinocarpa, A. aneura* high open shrubland over *Dodonaea petiolaris, Cassia luerssenii* open shrubland over *Triodia epactia* hummock grassland with *Aristida inaequiglumis* grassland

Fa6 *Acacia aneura, A. citrinoviridis* open scrub over *Eremophila lanceolata* low open shrubland to low shrubland

Fa7 *Corymbia deserticola* scattered low trees over *Acacia aneura, A. pruinocarpa* high open shrubland to low open woodland over *Triodia basedowii* hummock grassland and *Digitaria brownii* open tussock grassland

Fa8 *Acacia aneura* low open forest over **Cenchrus ciliaris* closed tussock grassland

Fa9 *Acacia aneura* high open shrubland over *Triodia longiceps* mid-dense hummock grassland

Drainage Vegetation - Tree/Shrub Dominated

Minor Creeklines and Floodplains

Fc2 *Eucalyptus victrix* scattered low trees over *Acacia stenophylla* open scrub over *Triodia longiceps* mid-dense hummock grassland and/or mixed tussock grassland

Fc3 *Eucalyptus victrix* low woodland over *Acacia sclerosperma* subsp. *sclerosperma* high open shrubland over *Eulalia aurea, Eriachne benthamii, Themeda triandra, Chrysopogon fallax* closed tussock grassland

Cracking Clay Vegetation

Fx1 *Acacia xiphophylla* open scrub over *Cassia sturtii* shrubland to low open heath over *Eragrostis xerophila* open tussock grassland

Fx2 *Acacia xiphophylla* scattered tall shrubs to high open shrubland over *Sclerolaena cuneata* herbland

Fx3 *Acacia xiphophylla, A. victoriae* high open shrubland over *Maireana triptera* low shrubland and *Sclerolaena cuneata* open herbland

Fx4 *Maireana triptera* low shrubland

Fx6 *Eragrostis xerophila, Eriachne benthamii* closed tussock grassland

Fx7 *Eragrostis falcata* grassland

Fx8 Mixed annual sedgeland

Fx9 Samphire low shrubland

Hamersley Range

Stony Plain & Hill Vegetation - Spinifex Dominated

Hh1 *Corymbia* spp., *Eucalyptus gamophylla* scattered low trees over *Acacia ancistrocarpa* scattered shrubs to open shrubland over *Triodia basedowii* mid-dense hummock grassland

Hh2 *Corymbia hamersleyana, Eucalyptus gamophylla* scattered low trees over *Acacia inaequilatera, Hakea chordophylla* scattered tall shrubs over *Triodia basedowii* hummock grassland with *Aristida holathera* var. *holathera* annual open grassland

Hh3 *Eucalyptus gamophylla* scattered low mallees over *Gossypium australe, Grevillea wickhamii* subsp. *aprica* scattered tall shrubs over *Triodia basedowii* hummock grassland with *Aristida holathera* var. *holathera* annual open grassland

Hh4 *Petalostylis cassioides* high open shrubland over mid-dense hummock grassland and with *Aristida holathera* var. *holathera* annual open grassland

Hh5 *Eucalyptus leucophloia* scattered trees to low open woodland over *Acacia hilliana* scattered low shrubs to low open shrubland over *Triodia* aff. *basedowii* moderately dense hummock grassland

Drainage Vegetation - Tree / Shrub Dominated

Major Creeklines and Floodplains

Hc1 *Eucalyptus victrix* woodland over *Acacia citrinoviridis* open scrub over **Cenchrus ciliaris* open tussock grassland

Hc2 *Eucalyptus victrix* scattered low trees over *Acacia citrinoviridis* high open shrubland over **Cenchrus ciliaris* closed tussock grassland

Minor Creeklines and Floodplains

Hc3 *Corymbia hamersleyana* scattered low trees over *Acacia tumida, Gossypium robinsonii* open scrub over **Cenchrus ciliaris* closed tussock grassland

Hc4 *Corymbia hamersleyana* scattered low trees over *Acacia tumida, Gossypium robinsonii* high open scrubland to open scrub over mixed open tussock grassland and *Triodia epactia* open hummock grassland

Hc5 *Acacia tumida, Grevillea wickhamii* subsp. *aprica* high shrubland over **Cenchrus ciliaris* very open tussock grassland and *Triodia epactia* open hummock grassland

Hc6 *Eucalyptus leucophloia* low woodland over *Cassia glutinosa, Mirbelia viminalis, Acacia spondylophylla* scattered shrubs over *Triodia epactia, T.* aff. *basedowii* hummock grassland

Hc7 *Acacia pyrifolia* high open shrubland over **Cenchrus ciliaris* open tussock grassland and *Triodia epactia* open hummock grassland

Hc8 *Gossypium robinsonii* high open shrubland over *Gossypium australe* open shrubland over *Triodia basedowii* hummock grassland

Hc17 *Acacia tumida* var. *pilbarensis* open scrub over *Triodia pungens* hummock grassland

Hc21 *Eucalyptus victrix* scattered low trees over *Eucalyptus xerothermica, Corymbia hamersleyana* low open woodland over *Pluchea ferdinandi-muelleri* low shrubland over *Triodia pungens, T. basedowii* hummock grassland

Sand Dune Vegetation

Hd1 *Acacia dictyophleba* scattered tall shrubs over *Crotalaria cunninghamii, Trichodesma zeylanicum* var. *grandiflorum* open shrubland

Vegetation of Clayey / Sandy Plains

Hp3 *Acacia aneura, A. pruinocarpa* scattered tall shrubs over *Eremophila forrestii* subsp. *forrestii* scattered low shrubs over *Triodia* spp. scattered hummock grasses and *Aristida contorta* open annual grassland

Hp4 *Acacia aneura* groved low open forest over *Eremophila forrestii* subsp. *forrestii* scattered low shrubs over *Triodia pungens* scattered hummock grasses and *Aristida contorta, Enneapogon polyphyllus* open annual grassland

Hp5 *Corymbia hamersleyana, Eucalyptus gamophylla* scattered low trees over *Acacia ancistrocarpa, A. dictyophleba, A. pachyacra, Hakea* spp. high open shrubland over *Triodia pungens* hummock grassland

Hp6 *Eucalyptus gamophylla* scattered low trees over *Triodia basedowii, T. schinzii* hummock grassland

Miscellaneous

dist	Cleared areas

Declared Rare Flora and Weeds

●	Species code(s) for Priority Flora, indicated by a red circle / dot
○	Species code(s) for Weeds, indicated by a green circle / dot
1	Records from Biota (2004)
2	Records from Biota and Trudgen (2002)
3	Records from DCLM database search

Vegetation Sites

●	FMG Flora Sites (Biota 2004)
●	Hope Downs Flora Sites (Biota and Trudgen 2002)

Priority Flora Species Codes

Ab	*Abutilon trudgenii* ms.
Bb	*Bulbostylis burbidgeae*
Ch	*Cynanchum* sp. Hamersley (ME Trudgen 2302)
Es	*Eremophila spongiocarpa*
Et	*Eriachne tenuiculmis*
Gpu	*Gomphrena pusilla*
Ge	*Gonocarpus ephemerus*
Gn	*Goodenia nuda*
Go	*Goodenia omearana*
Gs	*Goodenia stellata*
Ii	*Indigofera ixocarpa* ms.
Ia	*Ischaemum albovillosum*
Jm	*Josephina* ?sp. Marandoo (ME Trudgen 1554)
Lc	*Lepidium catapycnon*
Of	*Olearia fluvialis*
Pr	*Paspalidium retiglume*
Pa	*Phyllanthus aridus*
Ph	*Polymeria* sp. Hamersley (ME Trudgen 11353)
Ss	*Sida* sp. Wittenoom (W.R. Barker 1,962)
Sw	*Stylidium weeliwolli*
Ts	*Themeda* sp. Hamersley Station (ME Trudgen 11,431)
Tl	*Triumfetta leptacantha*

Weed Species Codes

Aj	*Aerva javanica*
Ao	*Argemone ochroleuca*
Bb	*Bidens bipinnata*
Cec	*Cenchrus ciliaris*
Cs	*Cenchrus setigerus*
Cic	*Citrullus colocynthis*
Ec	*Echinochloa colona*
Em	*Eragrostis minor*
Ma	*Malvastrum americanum*
Os	*Opuntia stricta*
Sv	*Setaria verticillata*
Sio	*Sigesbeckia orientalis*
Sn	*Solanum nigrum*
Soo	*Sonchus oleraceus*
Sh	*Stylosanthes hamata*
Tp	*Tridax procumbens*

Infrastructure

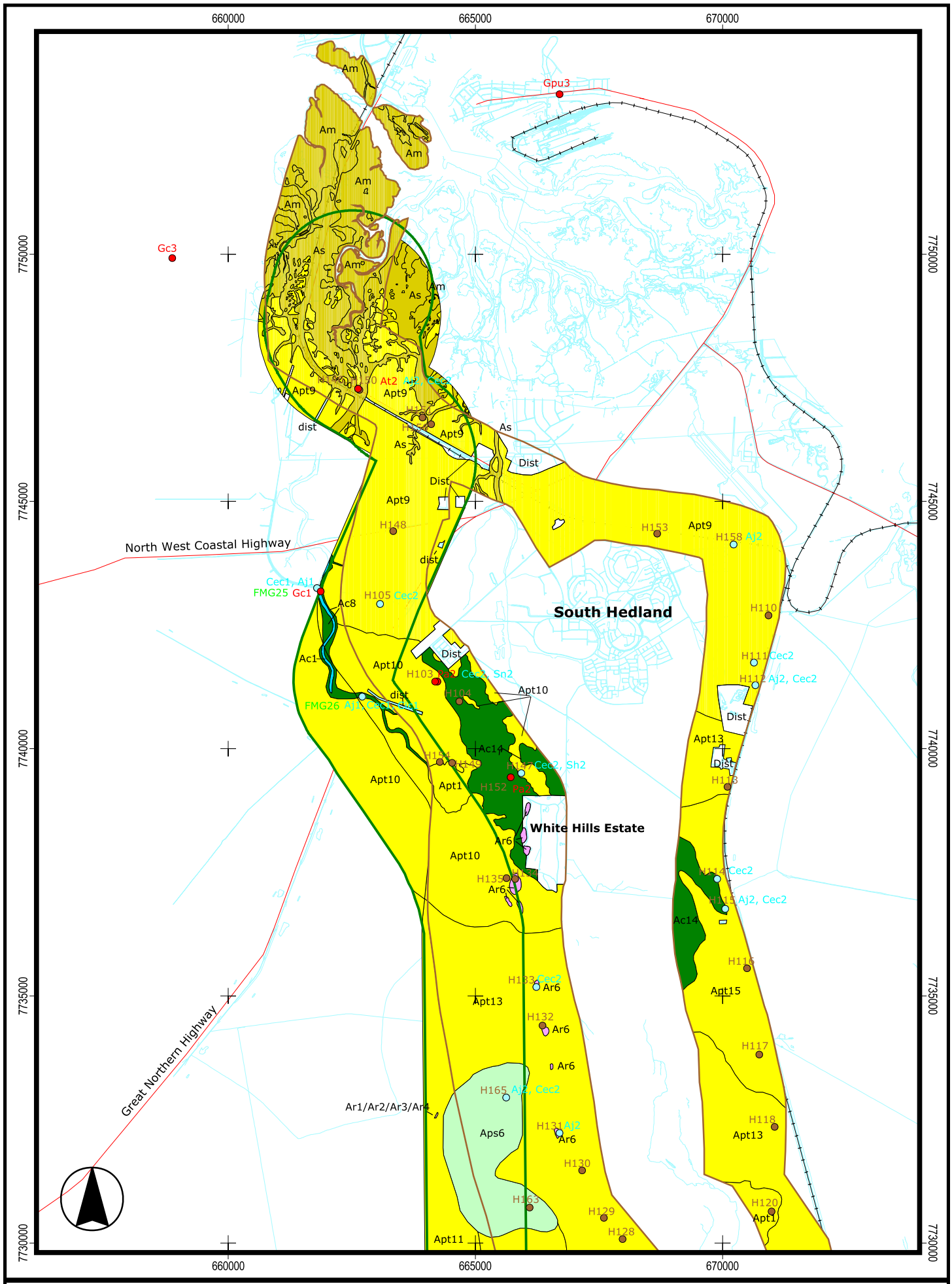
	FMG Rail Corridor
	Hope Downs Rail Corridor
	Roads
	BHP Rail
	Drainage

FMG

Vegetation Mapping of the FMG Railway Corridor

Legend Sheet 6 of 6

Biota Environmental Sciences



Vegetation Mapping of the FMG Railway Corridor

Sheet 1 of 13

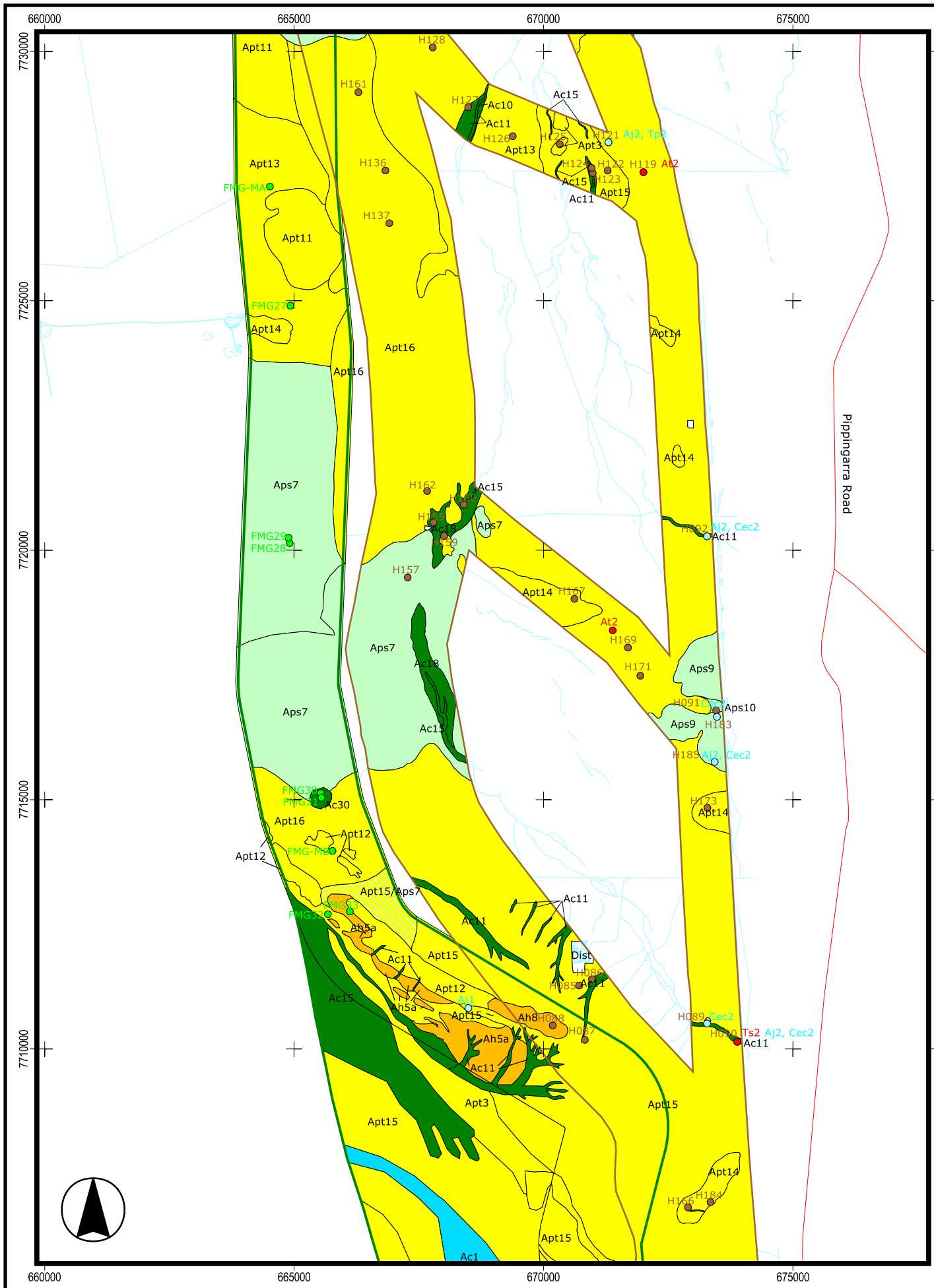
Scale 1:100,000

0 1 2 3 4 5 km

See Legend and Overview sheets for more information

Biota Environmental Sciences

Some mapping sourced from Biota and Trudgen (2002). Refer to Overview Sheet for Data Sources



Vegetation Mapping of the FMG Railway Corridor

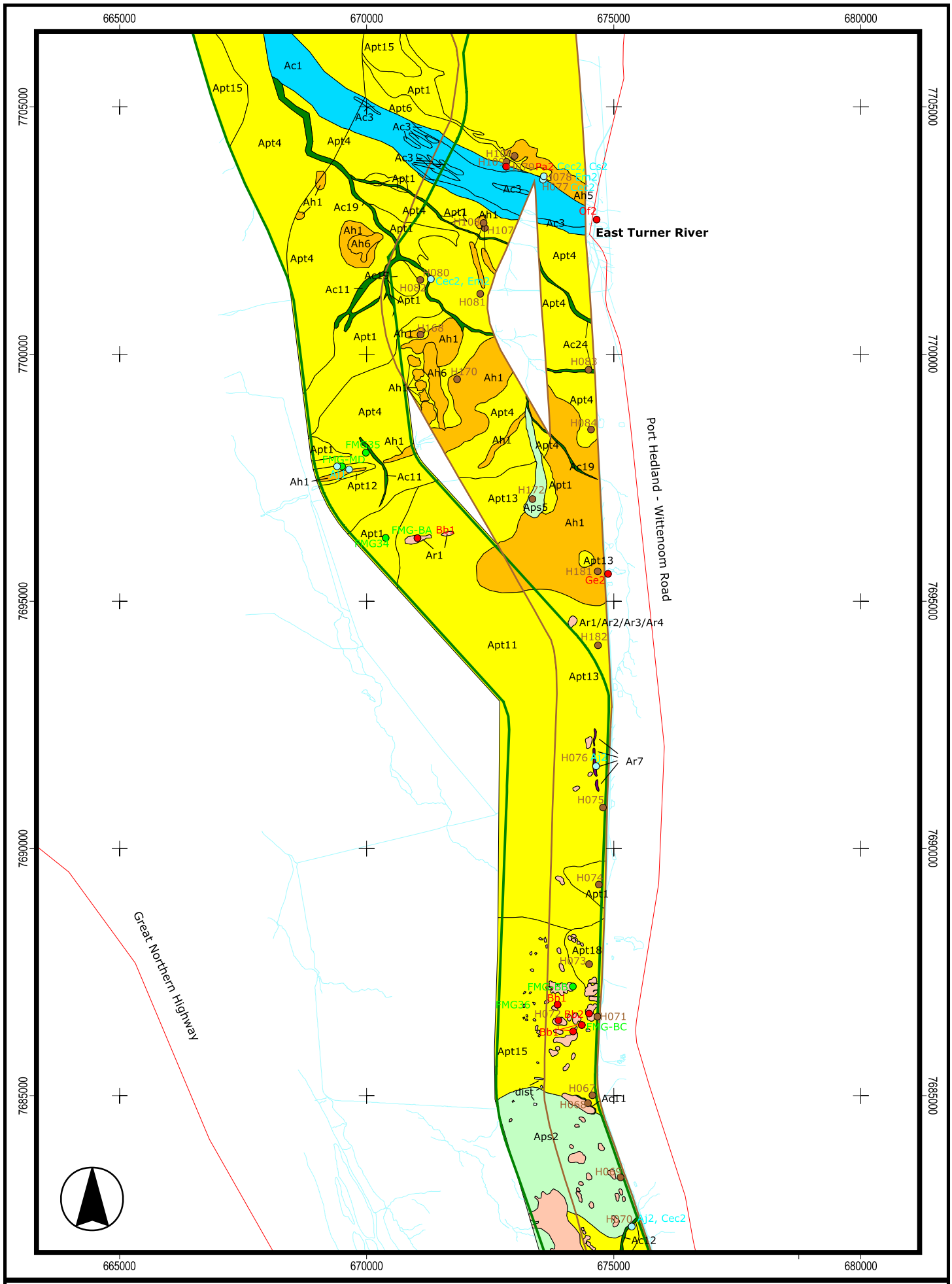
Sheet 2 of 13

Scale 1:100,000

0 1 2 3 4 5 km

See Legend and Overview sheets for more information

Some mapping sourced from Biota and Trudgen (2002). Refer to Overview Sheet for Data Sources



Vegetation Mapping of the FMG Railway Corridor

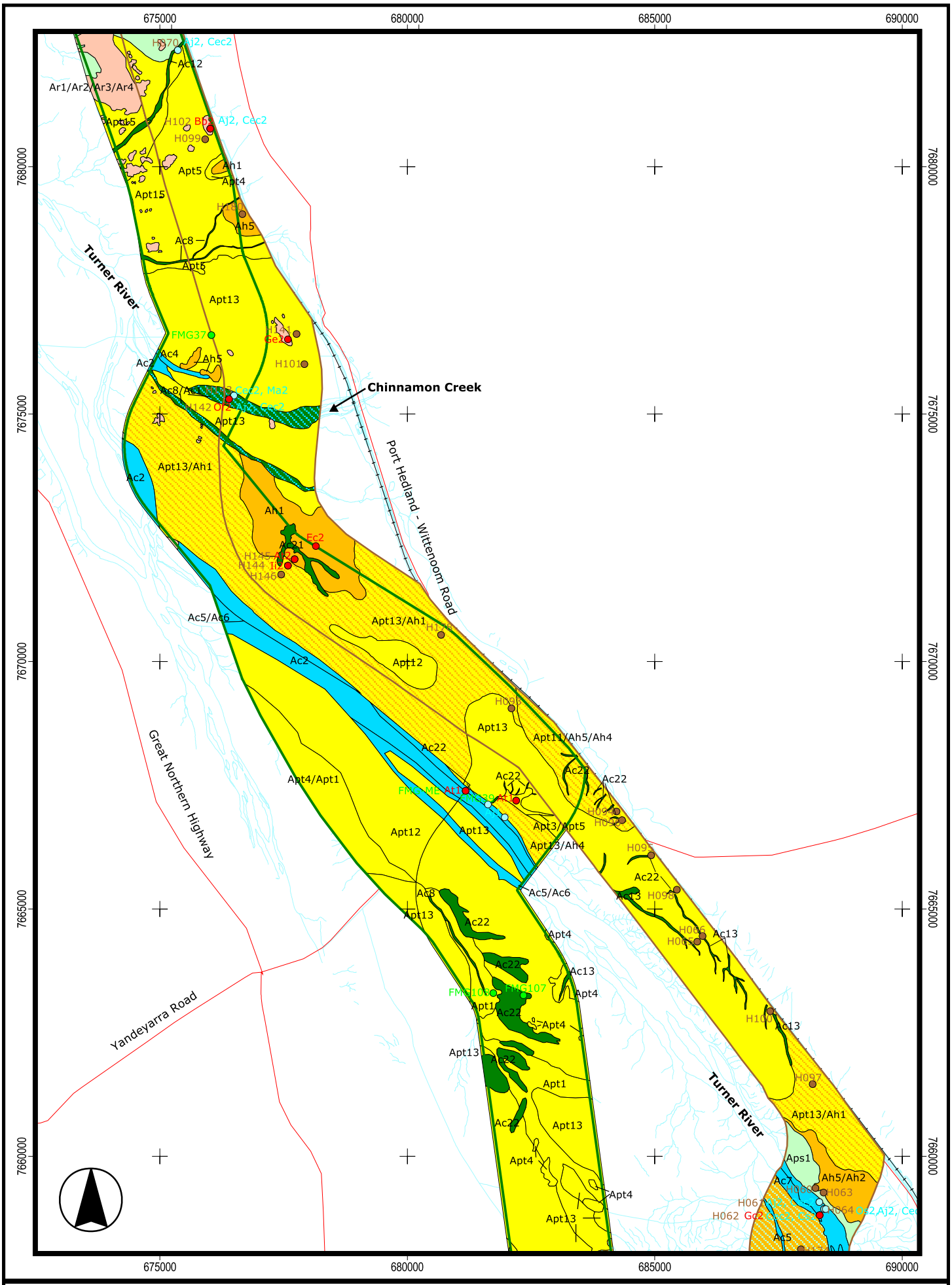
Sheet 3 of 13

Scale 1:100,000

0 1 2 3 4 5 km

See Legend and Overview sheets for more information

Some mapping sourced from Biota and Trudgen (2002). Refer to Overview Sheet for Data Sources



Vegetation Mapping of the FMG Railway Corridor

Sheet 4 of 13

Scale 1:100,000

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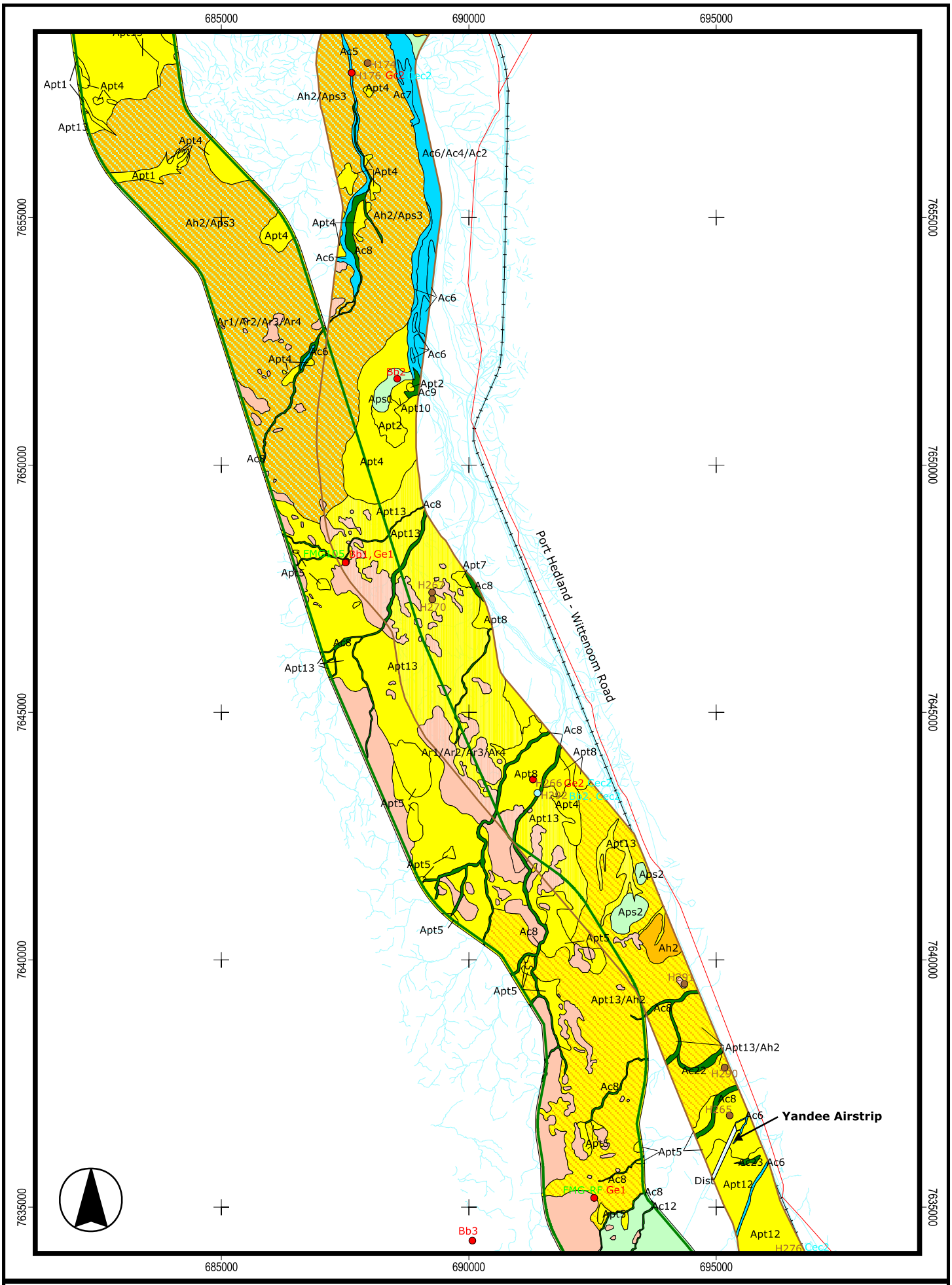
See Legend and Overview sheets for more information

Some mapping sourced from Biota and Trudgen (2002). Refer to Overview Sheet for Data Sources



Vegetation Mapping of the FMG Railway Corridor

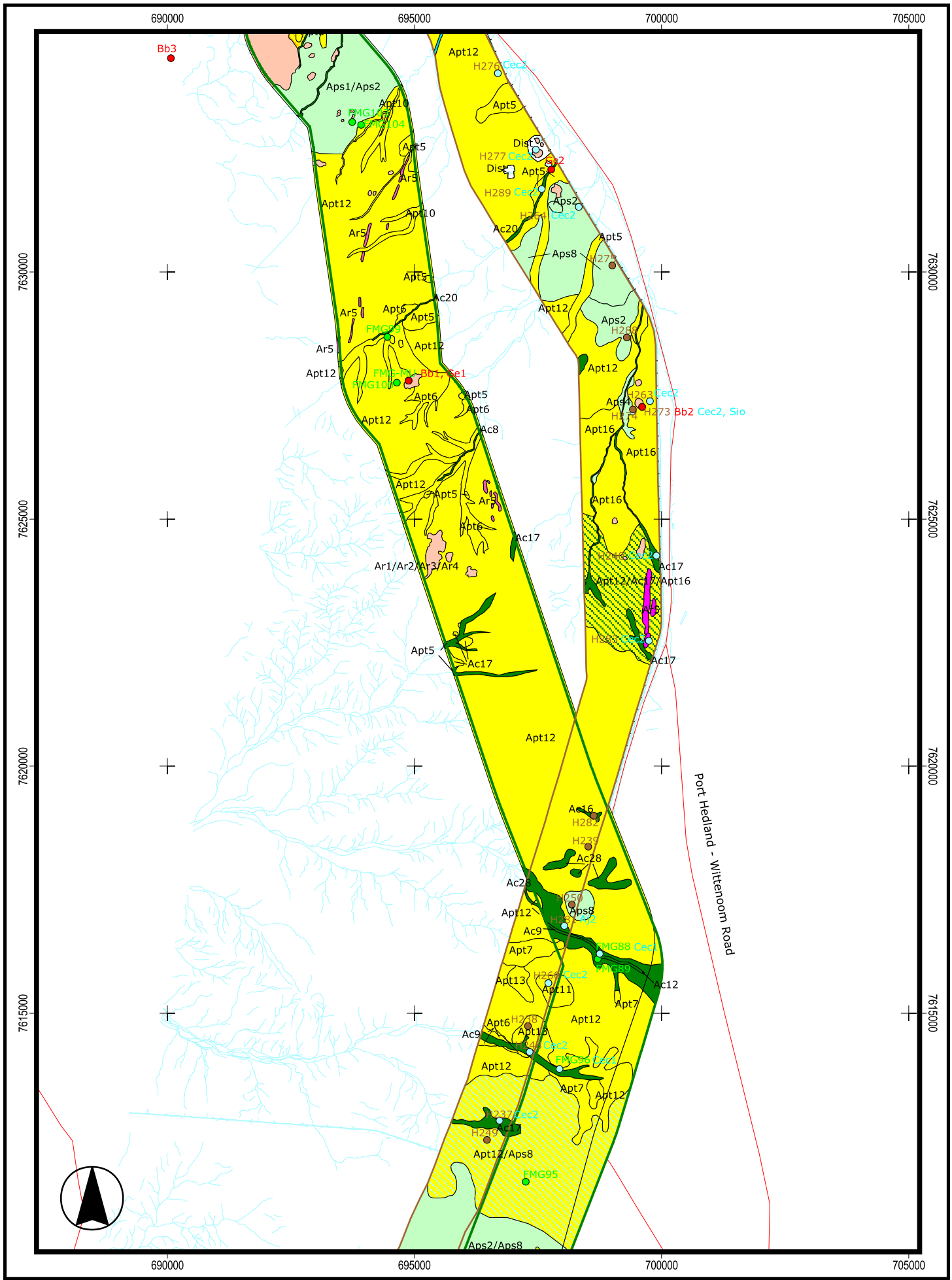
Sheet 5 of 13

Scale 1:100,000

0 1 2 3 4 5 km

See Legend and Overview sheets for more information

Some mapping sourced from Biota and Trudgen (2002). Refer to Overview Sheet for Data Sources



Vegetation Mapping of the FMG Railway Corridor

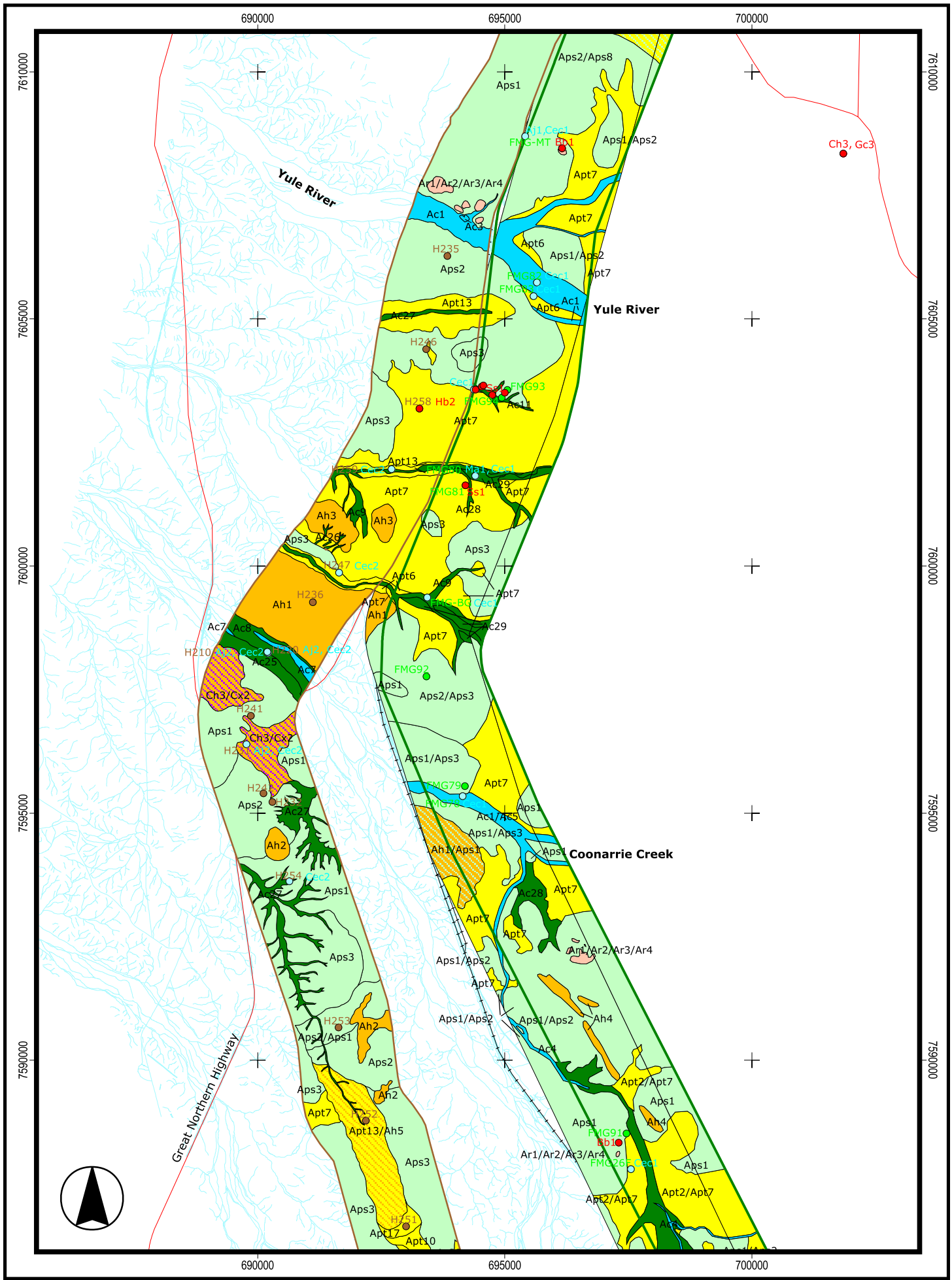
Sheet 6 of 13

Scale 1:100,000

0 1 2 3 4 5 km

See Legend and Overview sheets for more information

Some mapping sourced from Biota and Trudgen (2002). Refer to Overview Sheet for Data Sources



Vegetation Mapping of the FMG Railway Corridor

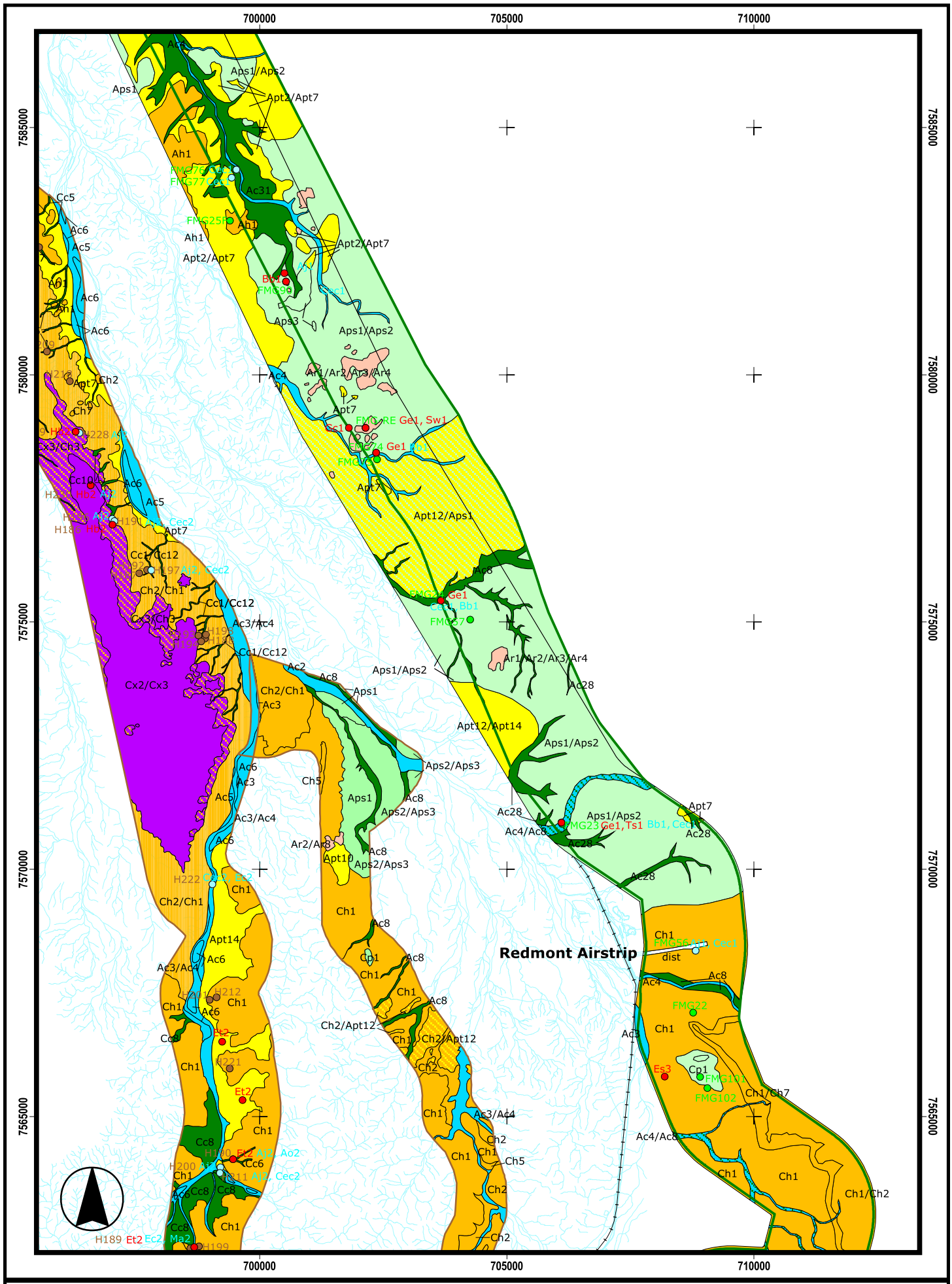
Sheet 7 of 13

Scale 1:100,000

0 1 2 3 4 5 km

See Legend and Overview sheets for more information

Some mapping sourced from Biota and Trudgen (2002). Refer to Overview Sheet for Data Sources



Vegetation Mapping of the FMG Railway Corridor

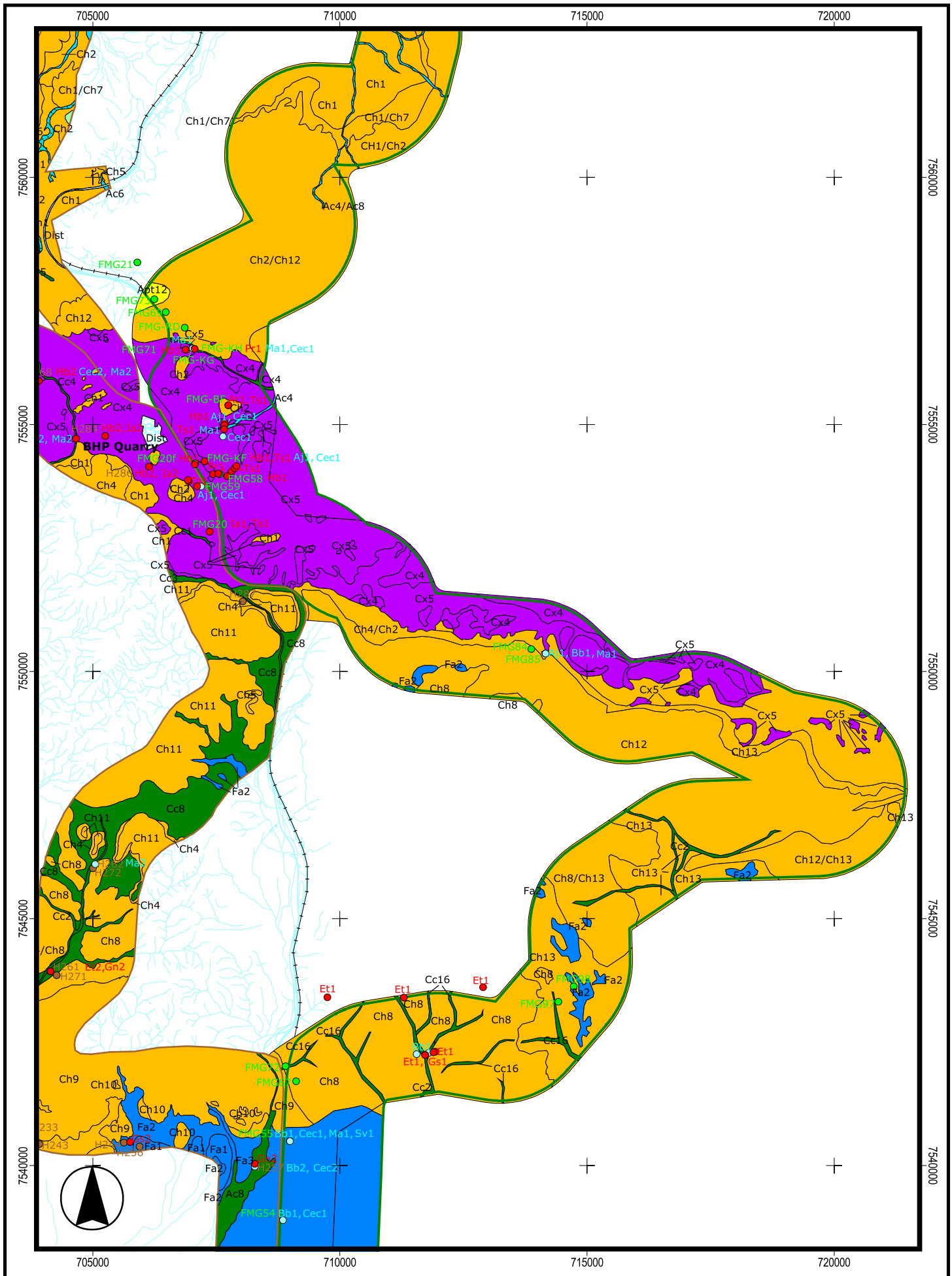
Sheet 8 of 13

Scale 1:100,000

0 1 2 3 4 5 km

See Legend and Overview sheets for more information

Some mapping sourced from Biota and Trudgen (2002). Refer to Overview Sheet for Data Sources



Vegetation Mapping of the FMG Railway Corridor

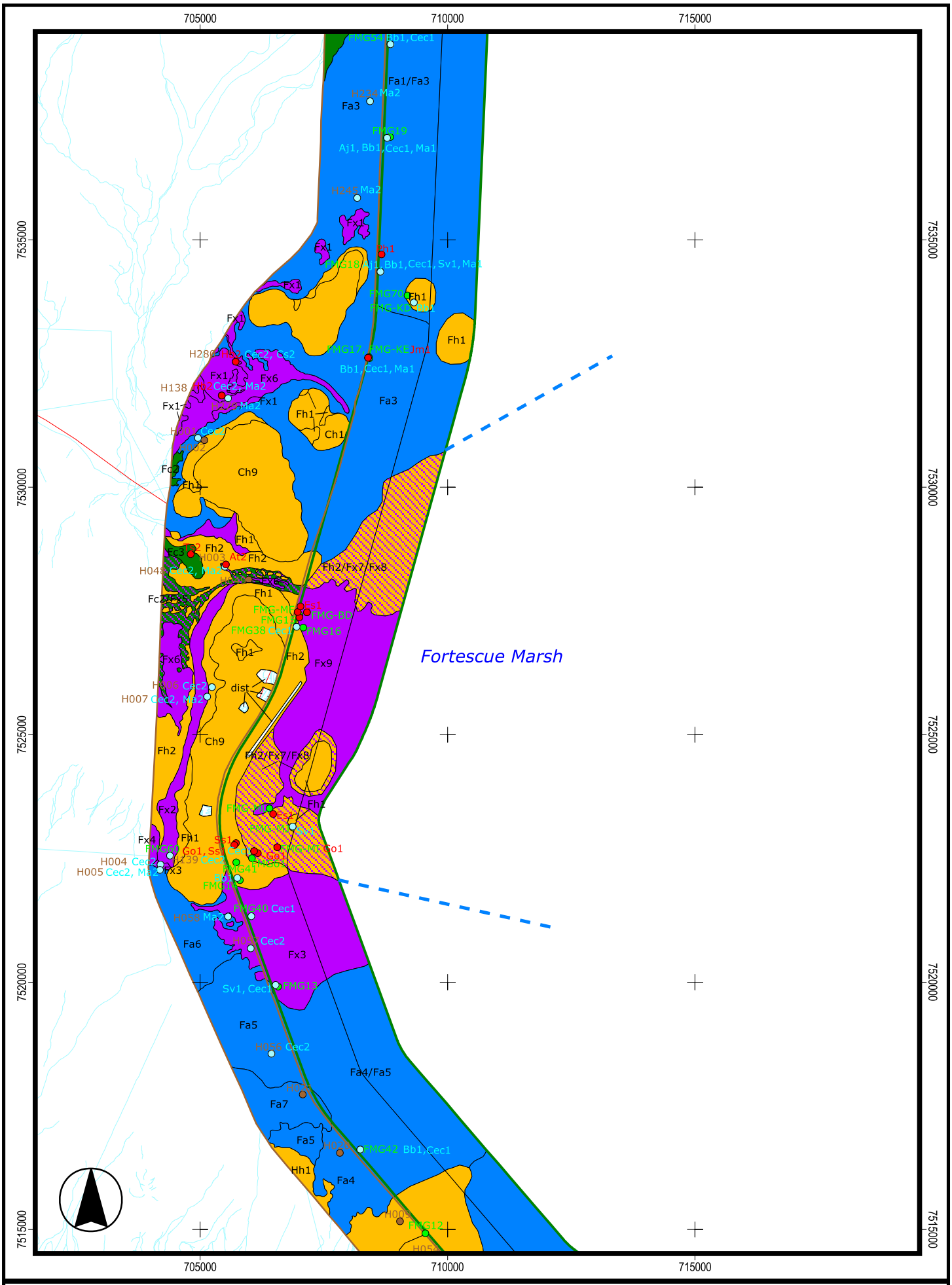
Sheet 9 of 13

Scale 1:100,000

0 1 2 3 4 5 km

See Legend and Overview sheets for more information

Some mapping sourced from Biota and Trudgen (2002). Refer to Overview Sheet for Data Sources



Vegetation Mapping of the FMG Railway Corridor

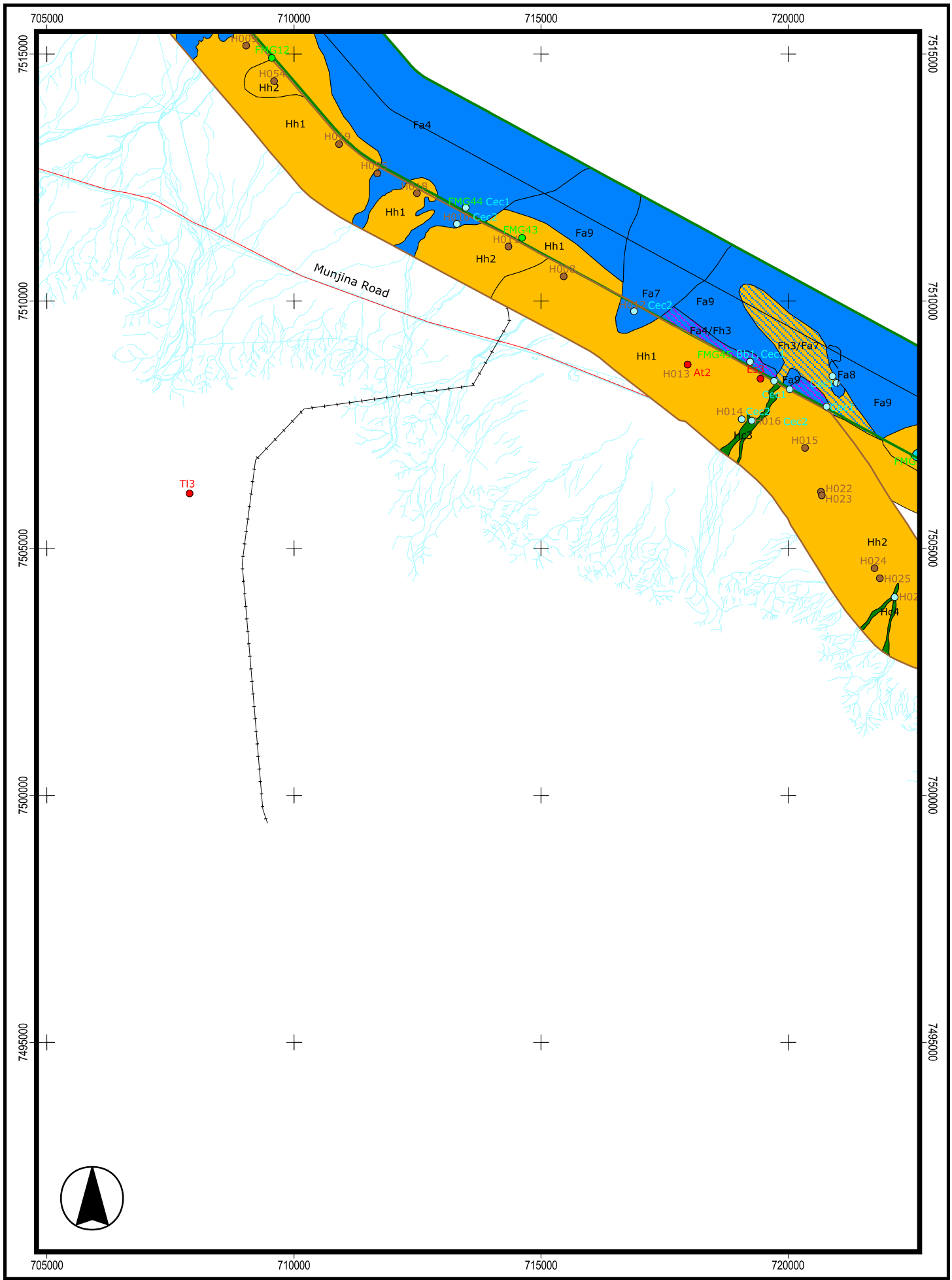
Sheet 10 of 13

Scale 1:100,000

0 1 2 3 4 5 km

See Legend and Overview sheets for more information

Some mapping sourced from Biota and Trudgen (2002). Refer to Overview Sheet for Data Sources



Vegetation Mapping of the FMG Railway Corridor

Sheet 11 of 13

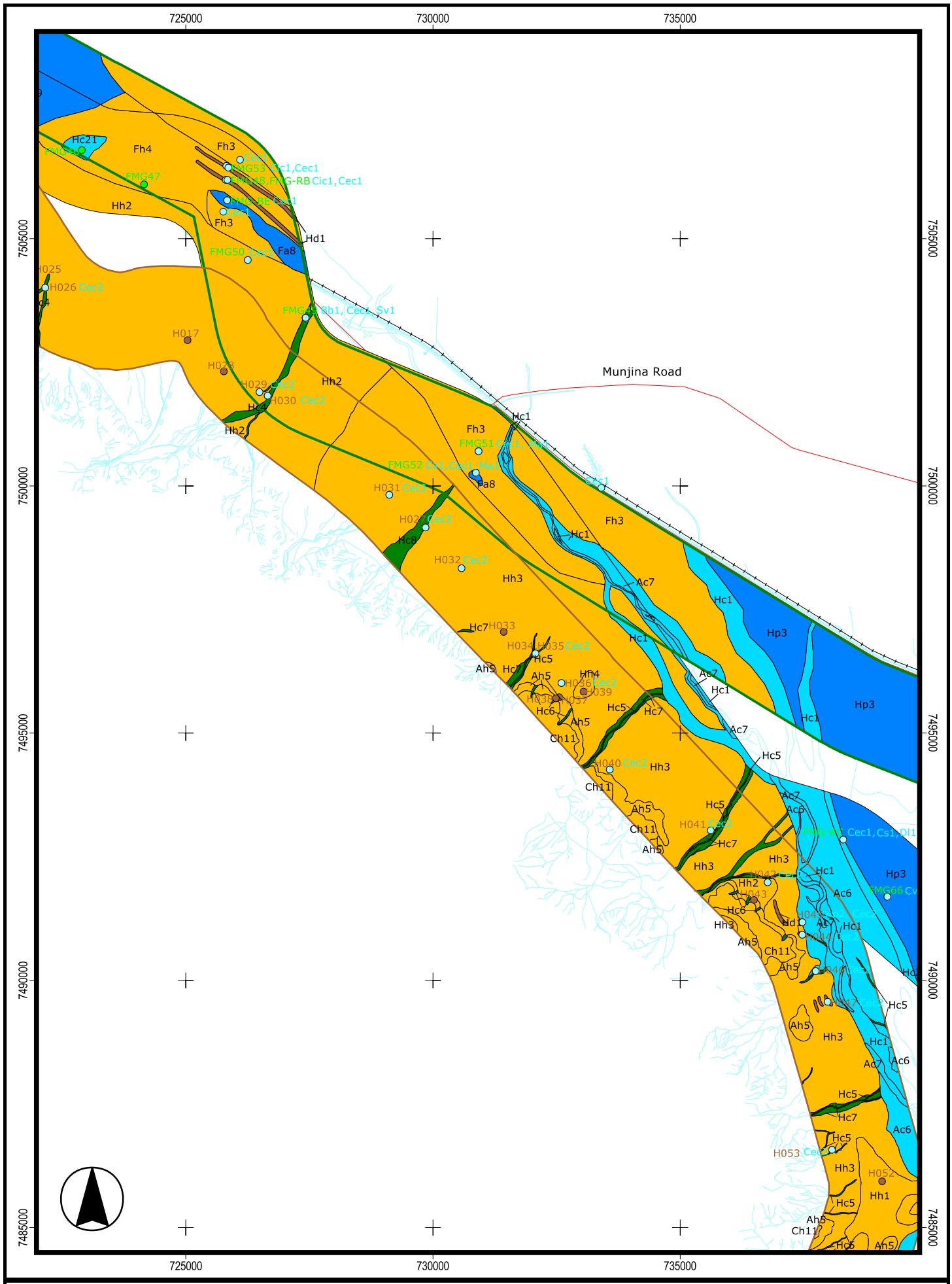
Scale 1:100,000

0 1 2 3 4 5 km

See Legend and Overview sheets for more information

Biota Environmental Sciences

Some mapping sourced from Biota and Trudgen (2002). Refer to Overview Sheet for Data Sources



Vegetation Mapping of the FMG Railway Corridor

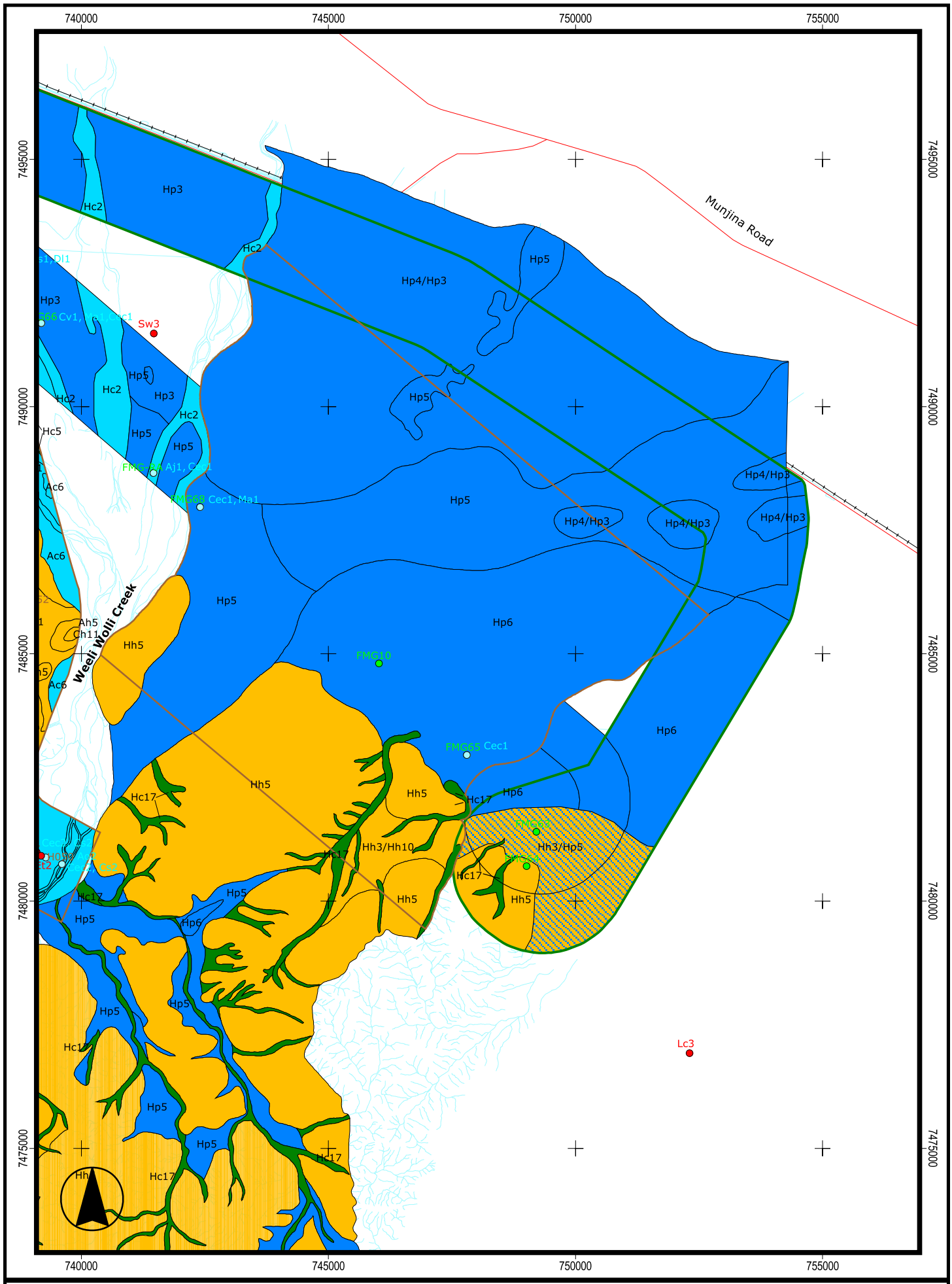
Sheet 12 of 13

Scale 1:100,000

0 1 2 3 4 5 km

See Legend and Overview sheets for more information

Some mapping sourced from Biota and Trudgen (2002). Refer to Overview Sheet for Data Sources



Vegetation Mapping of the FMG Railway Corridor

Sheet 13 of 13

Scale 1:100,000

0 1 2 3 4 5 km

See Legend and Overview sheets for more information

Some mapping sourced from Biota and Trudgen (2002). Refer to Overview Sheet for Data Sources

Apt1: *Triodia epactia, T. secunda* mid-dense hummock grassland (site FMG34).

Apt2: *Triodia secunda* mid-dense hummock grassland (site FMG26F).

Apt7: *Acacia* spp., *Pluchea ferdinandi-muelleri* scattered shrubs over *Triodia longiceps* mid-dense hummock grassland (site FMG81).

Apt12: *Acacia inaequilatera* scattered tall shrubs over *Triodia lanigera* mid-dense hummock grassland (site FMG100).

Aps1: *Acacia orthocarpa* high open shrubland to open scrub over *Triodia epactia* mid-dense hummock grassland (site FMG103).

Aps7: *Acacia colei* high shrubland over *Triodia epactia, T. lanigera* mid-dense hummock grassland (site FMG28).

Ah5a: ***Acacia inaequilatera*** **scattered tall shrubs over** ***Triodia*** **aff.** ***lanigera*** **mid-dense hummock grassland (site FMG33).**

Ac1: ***Eucalyptus victrix, Melaleuca argentea*** **low woodland to low open woodland (site FMG82).**

Ac4: ***Eucalyptus victrix*** **scattered low trees to low open woodland over** ***Melaleuca glomerata*** **high shrubland to open scrub over** ***Triodia epactia,*** **tussock grasses and patches of sedges (site FMG74).**

Ac8: ***Eucalyptus victrix*** **scattered low trees over** ***Acacia trachycarpa*** **open scrub over** ***Triodia epactia*** **mid-dense hummock grassland or** ****Cenchrus ciliaris*** **open to closed tussock grassland (site FMG26).**

Ac30: ***Corymbia hamersleyana, C. candida*** **low open woodland over** ***Acacia colei, A. tumida*** **scattered tall shrubs over** ***Triodia epactia*** **hummock grassland and very open herbland (site FMG31 - middle of soak).**

Ar1: ***Ficus brachypoda, Flueggea virosa*** **subsp.** ***melanthesoides, Terminalia canescens,*** ***Clerodendrum*** **spp. scattered shrubs over** ***Triodia epactia*** **hummock grassland and** ****Cenchrus ciliaris*** **tussock grassland (site FMG90).**

Ch1: ***Acacia inaequilatera, Cassia*** **spp. scattered tall shrubs over** ***Triodia epactia*** **mid-dense hummock grassland (site FMG22).**

Ch12: ***Eucalyptus leucophloia*** **scattered low trees over** ***Acacia hilliana*** **scattered low shrubs over** ***Triodia lanigera*** **mid-dense hummock grassland (site FMG84).**

Cp1: ***Acacia inaequilatera*** **scattered tall shrubs over** ***Triodia schinzii*** **mid-dense hummock grassland (site FMG101).**

Cx4: ***Astrebla pectinata, Aristida latifolia*** **tussock grassland (site FMG58).**

Cx5: ***Acacia xiphophylla*** **open to closed scrub over** ***Rhagodia eremaea*** **open shrubland.**

Fh1: ***Acacia aneura*** **high open shrubland to high shrubland over** ***Triodia brizoides*** **mid-dense hummock grassland (releve FMG-MJ).**

Fh2: *Acacia synchronicia* scattered tall shrubs over *Triodia longiceps* mid-dense hummock grassland (site FMG38).

Fh3: *Acacia aneura* scattered low trees over *Acacia synchronicia* tall shrubland to scattered tall shrubs over **Cenchrus ciliaris* tussock grassland.

Fa2: *Acacia aneura* low woodland over *A. aneura, A. atkinsiana* high open shrubland over *Eremophila forrestii* subsp. *forrestii* open shrubland over *Triodia epactia* mid-dense hummock grassland (site FMG98).

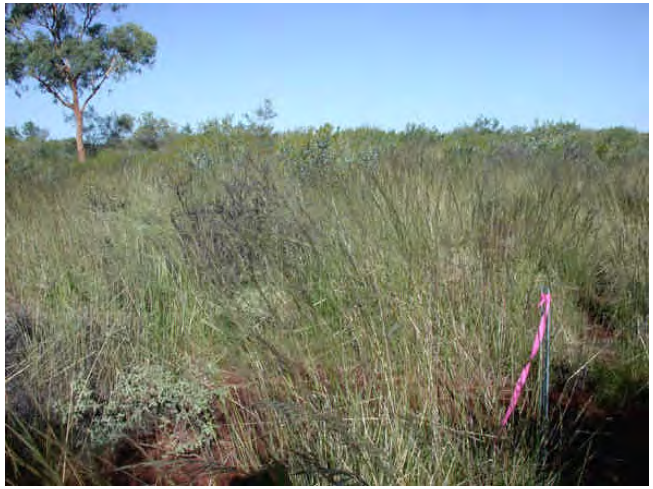
Fa3: *Acacia xiphophylla, A. aneura* high open shrubland to low woodland over *Acacia victoriae, Eremophila forrestii* subsp. *forrestii, Cassia* spp. open shrubland to open heath over *Aristida latifolia* grassland with *Enneapogon polyphyllus, Aristida contorta* annual grassland (site FMG18).

Fa9: *Acacia aneura* high open shrubland over *Triodia longiceps* mid-dense hummock grassland.

Fx3: *Acacia xiphophylla, A. victoriae* high open shrubland over *Maireana triptera* low shrubland and *Sclerolaena cuneata* open herbland (site FMG40).

Fx9: Samphire low shrubland (site FMG16).

Hh1: *Corymbia* spp., *Eucalyptus gamophylla* scattered low trees over *Acacia ancistrocarpa* scattered shrubs to open shrubland over *Triodia basedowii* mid-dense hummock grassland (site FMG43).



Hp6: *Eucalyptus gamophylla* scattered low trees over *Triodia basedowii, T. schinzii* hummock grassland (site FMG65).

Hc4: *Corymbia hamersleyana* scattered low trees over *Acacia tumida, Gossypium robinsonii* high open shrubland to open scrub over mixed open tussock grassland and *Triodia epactia* open hummock grassland (site FMG49).

Hc21: *Eucalyptus victrix* scattered low trees over *Eucalyptus xerothermica, Corymbia hamersleyana* low open woodland over *Pluchea ferdinandi-muelleri* low shrubland over *Triodia pungens, T. basedowii* hummock grassland (site FMG46).

Hd1: *Acacia dictyophleba* scattered tall shrubs over *Crotalaria cunninghamii, Trichodesma zeylanicum* var. *grandiflorum* open shrubland (site FMG48).

Areal Representation of Vegetation Types along the Proposed FMG Rail Corridor

Appendix 2

BIOta

Vegetation Code	Vegetation Description	Total area mapped in Hope Downs and FMG rail corridors (ha)	Indication of area impacted * (ha)
Am	Mangals; described separately in Section 8.0.		6.35
As	*Halosarcia* spp., *Frankenia ambita* scattered low shrubs to low open shrubland	743.5	13.99
Apt1	*Triodia epactia* , *T. secunda* mid-dense hummock grassland	1269.2	26.29
Apt2	*Triodia secunda* mid-dense hummock grassland	40.4	
Apt2/Apt7	see Apt2 / Apt7	761.4	21.76
Apt3	*Triodia epactia* hummock grassland to mid-dense hummock grassland	213.9	8.16
Apt3/Apt5	see Apt3 / Apt5	15.6	1.63
Apt4	*Triodia longiceps, T. epactia* mid-dense hummock grassland	2690.0	49.41
Apt5	*Triodia angusta* mid-dense hummock grassland	1003.7	26.26
Apt6	*Acacia stellaticeps, Pluchea ferdinandi-muelleri* low open shrubland over *Triodia lanigera* mid-dense hummock grassland	429.1	8.12
Apt7	*Acacia* spp., *Pluchea ferdinandi-muelleri* scattered shrubs over *Triodia longiceps* mid-dense hummock grassland	2590.8	29.16
Apt8	*Acacia stellaticeps, Pluchea ferdinandi-muelleri* low open shrubland over *Triodia angusta, T. lanigera* mid-dense hummock grassland	175.3	
Apt9	*Acacia stellaticeps* scattered shrubs to low shrubland over *Triodia epactia* , *T. schinzii* dense hummock grassland	2516.2	37.06
Apt10	*Acacia stellaticeps* scattered shrubs to low shrubland over *Triodia epactia* dense hummock grassland	1167.8	36.23
Apt11	*Acacia* spp. scattered tall shrubs over *A. stellaticeps* low open shrubland over *Triodia lanigera* hummock grassland	1945.8	41.02
Apt11/Ah5/Ah4	see Apt11 / Ah5 / Ah4	184.9	<0.01
Apt12	*Acacia inaequilatera* scattered tall shrubs over *Triodia lanigera* mid-dense hummock grassland	5722.0	150.29
Apt12/Aps1	see Apt12 / Aps1	664.5	13.91
Apt12/Aps8	see Apt12 / Aps8	717.5	14.78
Apt12/Apt14	see Apt12 / Apt14	157.3	
Apt13	*Acacia ancistrocarpa* open shrubland to open heath over *Triodia lanigera* hummock grassland	10657.5	126.01
Apt13/Ah1	see Apt13 / Ah1	1850.8	45.37
Apt13/Ah2	see Apt13 / Ah2	1466.4	24.50
Apt13/Ah4	see Apt13 / Ah4	64.8	1.54
Apt14	*Acacia inaequilatera* scattered tall shrubs to high open shrubland over *Triodia epactia* hummock grassland to mid-dense hummock grassland	582.7	
Apt15	*Acacia inaequilatera, A. ancistrocarpa* scattered tall shrubs over *Triodia epactia, T. lanigera* hummock grassland	5636.7	53.75
Apt15/Aps7	see Apt15 / Aps7	113.9	1.07
Apt16	*Acacia colei, A. tumida* high open shrubland over *Triodia epactia* hummock grassland	2835.9	6.44

Vegetation Code	Vegetation Description	Total area mapped in Hope Downs and FMG rail corridors (ha)	Indication of area impacted * (ha)
Apt18	*Acacia inaequilatera, A. ancistrocarpa* scattered tall shrubs over *Triodia basedowii* closed hummock grassland	77.3	0.32
Aps1	*Acacia orthocarpa* high open shrubland to open scrub over *Triodia epactia* mid-dense hummock grassland	1672.3	4.65
Aps1/Aps2	see Aps1 / Aps2	3220.5	92.82
Aps1/Aps3	see Aps1 / Aps3	276.2	10.15
Aps2	*Acacia orthocarpa* high shrubland to open scrub over *Triodia lanigera* mid-dense hummock grassland	1742.1	23.02
Aps2/Aps3	see Aps2 / Aps3	649.5	11.82
Aps2/Aps8	see Aps2 / Aps8	481.4	15.14
Aps3	*Acacia orthocarpa* high open shrubland to high shrubland over *Triodia wiseana* mid-dense hummock grassland	1364.4	0.44
Aps6	*Acacia tumida* open shrubland to shrubland over *Triodia schinzii* hummock grassland	488.9	15.89
Aps7	*Acacia colei* high shrubland over *Triodia epactia, T. lanigera* mid-dense hummock grassland	2461.7	43.98
Aps8	*Acacia maitlandii* open scrub over *Triodia lanigera* mid-dense hummock grassland	316.6	1.94
Ah1	*Acacia inaequilatera* scattered tall shrubs over *Triodia wiseana* hummock grassland to mid-dense hummock grassland	1861.6	3.02
Ah1/Aps1	see Ah1 / Aps1	137.2	
Ah2	*Acacia bivenosa, A. ancistrocarpa* open shrubland over *Triodia wiseana, T. lanigera* mid-dense hummock grassland	124.8	
Ah2/Aps3	see Ah2 / Aps3	2688.2	41.14
Ah4	*Acacia ancistrocarpa, A. inaequilatera* scattered tall shrubs over *Triodia brizoides* mid-dense hummock grassland	48.9	1.16
Ah5	*Corymbia hamersleyana* scattered low trees over *Triodia* aff. *basedowii* mid-dense to closed hummock grassland	490.5	2.20
Ah5a	*Acacia inaequilatera* scattered tall shrubs over *Triodia* aff. *lanigera* mid-dense hummock grassland	231.8	7.99
Ah6	*Acacia ancistrocarpa* scattered shrubs over *Acacia stellaticeps* scattered low shrubs over *Triodia epactia , T. schinzii* mid-dense hummock grassland	62.1	
Ac1	*Eucalyptus victrix, Melaleuca argentea* low woodland to low open woodland	558.0	12.58
Ac2	*Eucalyptus camaldulensis* scattered low trees over *Melaleuca argentea* low open forest over *Melaleuca linophylla, Acacia ampliceps* high shrubland	259.0	6.28
Ac3	*Eucalyptus camaldulensis* woodland over *Melaleuca* spp. high shrubland to open scrub over *Triodia epactia* , tussock grasses and patches of sedges	132.6	0.04
Ac4	*Eucalyptus victrix* scattered low trees to low open woodland over *Melaleuca glomerata* high shrubland to open scrub over *Triodia epactia* , tussock grasses and patches of sedges	145.5	5.77
Ac4/Ac8	see Ac4 / Ac8	103.3	1.36
Ac1/Ac5	see Ac1 / Ac5	94.9	2.52

Vegetation Code	Vegetation Description	Total area mapped in Hope Downs and FMG rail corridors (ha)	Indication of area impacted * (ha)
Ac5	*Eucalyptus camaldulensis* low open woodland over *Acacia trachycarpa* high shrubland over *Triodia epactia* mid-dense hummock grassland and **Cenchrus ciliaris* very open tussock grassland	113.4	
Ac5/Ac6	see Ac5 / Ac6	70.0	1.64
Ac6	*Eucalyptus victrix* scattered trees over *Acacia coriacea* subsp. *pendens, Atalaya hemiglauca, Hakea lorea* subsp. *lorea* high open shrubland over **Cenchrus ciliaris* tussock grassland	753.0	
Ac7	Scoured creek bed	225.9	0.51
Ac8	*Eucalyptus victrix* scattered low trees over *Acacia trachycarpa* open scrub over *Triodia epactia* mid-dense hummock grassland or **Cenchrus ciliaris* open to closed tussock grassland	666.3	7.26
Ac8/Ac1	see Ac8 / Ac1	118.6	1.32
Ac9	*Corymbia* spp. scattered low trees over *Acacia trachycarpa* open scrub over *Triodia lanigera* mid-dense hummock grassland and **Cenchrus ciliaris* tussock grassland	144.9	1.87
Ac11	*Corymbia* spp. scattered low trees over *Acacia tumida, A. colei* open scrub over *Triodia epactia* hummock grassland	235.7	4.77
Ac12	*Corymbia hamersleyana* scattered low trees over *Acacia tumida* high shrubland over *Triodia lanigera, T. epactia* mid-dense hummock grassland	34.0	0.62
Ac13	*Corymbia hamersleyana* scattered low trees over *Acacia tumida* closed scrub over *Triodia lanigera* mid-dense hummock grassland	44.5	
Ac14	*Eucalyptus victrix, Corymbia* spp. scattered trees to low open woodland over *Acacia colei* open scrub over *Triodia epactia* dense hummock grassland	500.5	
Ac15	*Eucalyptus victrix* low open woodland to woodland over *Acacia colei* scattered tall shrubs to high open shrubland over *Triodia epactia* scattered hummock grasses and *Eriachne* spp. tussock grasses	166.6	11.1
Ac16	*Corymbia hamersleyana* scattered low trees over *Acacia colei* open scrub over *A. stellaticeps* low open shrubland over *Triodia lanigera* hummock grassland and *Chrysopogon fallax, Eriachne obtusa* open tussock grassland	4.3	
Ac17	*Acacia tumida, A. colei* open scrub over mixed tussock grassland	123.5	1.22
Ac19	*Corymbia hamersleyana* scattered low trees over *Acacia ampliceps, A. tumida* high shrubland over *Triodia lanigera, T. epactia* mid-dense hummock grassland	52.3	0.23
Ac20	*Acacia ampliceps* open scrub over *A. trachycarpa* shrubland over **Cenchrus ciliaris, Diplachne fusca* closed tussock grassland	14.1	0.17
Ac21	*Acacia ampliceps* open scrub over *Triodia secunda* hummock grassland	29.7	
Ac22	*Corymbia* spp. low open woodland over *Acacia acradenia, A. ancistrocarpa* open scrub over *Triodia epactia* open hummock grassland and *Chrysopogon fallax, Themeda triandra* tussock grassland	215.3	5.86
Ac24	*Acacia acradenia, A. colei* open scrub to high shrubland over *Triodia lanigera* mid-dense hummock grassland	29.0	0.18
Ac27	*Acacia ancistrocarpa* open scrub over *Triodia epactia* mid-dense hummock grassland	186.4	

Vegetation Code	Vegetation Description	Total area mapped in Hope Downs and FMG rail corridors (ha)	Indication of area impacted * (ha)
Ac28	*Acacia bivenosa* open heath over *Triodia lanigera* hummock grassland	300.0	10.36
Ac29	*Acacia farnesiana, A. sclerosperma* scattered tall shrubs over **Cenchrus ciliaris, Chrysopogon fallax* closed tussock grassland	42.0	1.91
Ac30	*Corymbia hamersleyana, C. candida* low open woodland over *Acacia colei, A. tumida* scattered tall shrubs over *Triodia epactia* hummock grassland and very open herbland	14.3	0.43
Ac31	*Acacia bivenosa* shrubland to open heath over *Triodia longiceps* mid-dense hummock grassland	361.9	1.18
Ar1	*Ficus brachypoda, Flueggea virosa* subsp. *melanthesoides , Terminalia canescens, Clerodendrum* spp. scattered shrubs over *Triodia epactia* hummock grassland and **Cenchrus ciliaris* tussock grassland	7.8	0.59
Ar2	*Acacia tumida* high shrubland to open scrub over *Triodia epactia* hummock grassland		
Ar3	*Tripogon loliiformis* dwarf open grassland		
Ar4	*Bulbostylis burbidgeae* sedgeland		
Ar1/Ar2/Ar3/Ar4	see Ar1 / Ar2 / Ar3 / Ar4	1690.1	24.60
Ar5	*Acacia inaequilatera* scattered tall shrubs over *Gossypium australe* (Whim Creek form) open shrubland over *Triodia epactia* hummock grassland	37.9	
Ar6	*Acacia tumida, Grevillea wickhamii* scattered shrubs to open shrubland over *Triodia epactia* open hummock grassland to hummock grassland	23.0	
Ar7	*Cajanus cinereus* shrubland over *Triodia epactia* hummock grassland	5.0	
Ch1	*Acacia inaequilatera, Cassia* spp. scattered tall shrubs over *Triodia epactia* mid-dense hummock grassland	3993.7	44.99
Ch1/Ch2	see Ch1 / Ch2	443.1	
Ch1/Ch7	see Ch1 / Ch7	382.5	2.58
Ch2	*Acacia inaequilatera, Cassia* spp. scattered tall shrubs over *Triodia wiseana* mid-dense hummock grassland	190.2	1.74
Ch2/Ch12	see Ch1 / Ch12	1285.2	31.15
Ch4	*Cassia glutinosa* scattered shrubs over *Triodia brizoides, T. epactia* mid-dense hummock grassland	154.9	
Ch4/Ch2	see Ch4 / Ch2	284.0	16.06
Ch7	*Acacia inaequilatera* scattered tall shrubs over *Indigofera rugosa* low open heath over *Triodia epactia* closed hummock grassland	5.4	
Ch8	*Corymbia hamersleyana* scattered low trees over *Acacia arida, A. ptychophylla* low open heath over *Triodia lanigera* closed hummock grassland	1405.5	22.59
Ch8/Ch13	see Ch8 / Ch13	360.1	9.78
Ch9	*Corymbia deserticola* scattered low trees over *Acacia aneura* high open shrubland over *Triodia lanigera* closed hummock grassland	2251.4	2.79
Ch10	*Corymbia deserticola* scattered low trees over *Acacia aneura* high shrubland to low woodland over *Triodia lanigera* closed hummock grassland	228.8	
Ch11	*Eucalyptus leucophloia* scattered low trees over *Triodia* aff. *basedowii* hummock grassland	958.1	

Vegetation Code	Vegetation Description	Total area mapped in Hope Downs and FMG rail corridors (ha)	Indication of area impacted * (ha)
Ch12	*Eucalyptus leucophloia* scattered low trees over *Acacia hilliana* scattered low shrubs over *Triodia lanigera* mid-dense hummock grassland	1478.9	39.90
Ch12/Ch13	see Ch12 / Ch13	238.2	
Ch13	*Triodia brizoides, T. longiceps* mid-dense hummock grassland	1116.4	29.90
Cp1	*Acacia inaequilatera* scattered tall shrubs over *Triodia schinzii* mid-dense hummock grassland	52.7	3.99
Cc1	*Acacia coriacea* open woodland over *Petalostylis labicheoides, Acacia acradenia, A. bivenosa* high open shrubland over *Themeda triandra* open tussock grassland	3.1	
Cc2	*Eucalyptus victrix, Corymbia hamersleyana* scattered low trees over *Acacia tumida, Petalostylis labicheoides* open scrub over *Triodia epactia* mid-dense hummock grassland	79.2	1.64
Cc3	*Eucalyptus victrix* low woodland over *Melaleuca linophylla* open shrubland over *Sorghum plumosum* open tussock grassland and *Triodia longiceps* very open hummock grassland	20.0	
Cc8	*Eucalyptus victrix* scattered low trees over *Acacia bivenosa* open heath over *Triodia epactia* mid-dense hummock grassland and patches of *Themeda triandra* tussock grassland	719.3	
Cc16	*Corymbia hamersleyana* scattered low trees over *Acacia tumida, Grevillea wickhamii, Petalostylis labicheoides* open scrub to tall shrubland over *Triodia epactia* open hummock grassland	61.2	1.87
Cc17	*Acacia synchronicia, A. farnesiana* open shrubland over *Eriachne benthamii, Chrysopogon fallax* closed tussock grassland	9.9	0.21
Cx4	*Astrebla pectinata, Aristida latifolia* tussock grassland	2259.4	26.52
Cx5	*Acacia xiphophylla* open to closed scrub over *Rhagodia eremaea* open shrubland	597.6	15.08
Fh1	*Acacia aneura* high open shrubland to high shrubland over *Triodia brizoides* mid-dense hummock grassland	333.9	
Fh2	*Acacia victoriae* scattered tall shrubs over *Triodia longiceps* mid-dense hummock grassland	555.1	20.18
Fh2/Fx7/Fx8	see Fh2 / Fx7 / Fx8	329.9	10.62
Fh3	*Acacia aneura* scattered low trees over *Acacia synchronicia* tall shrubland to scattered tall shrubs over **Cenchrus ciliaris* tussock grassland	683.8	30.31
Fh3/Fa7	see Fh3 / Fa7	160.3	6.16
Fh4	*Eucalyptus gamophylla* low open woodland over *Acacia sclerosperma* high open shrubland over *Triodia basedowii* mid-dense hummock grassland	505.7	17.12
Fa1	*Acacia aneura* open scrub to low open forest over *Dodonaea petiolaris, Eremophila forrestii* subsp. *forrestii, Cassia helmsii, Sida calyxhymenia* open heath with *Enneapogon polyphyllus* annual very open grassland		
Fa1/Fa3	see Fa1 / Fa3	832.3	35.74
Fa2	*Acacia aneura* low woodland over *A. aneura, A. atkinsiana* high open shrubland over *Eremophila forrestii* subsp. *forrestii* open shrubland over *Triodia epactia* mid-dense hummock grassland	288.2	1.42
Fa3	*Acacia xiphophylla, A. aneura* high open shrubland to low woodland over *Acacia victoriae, Eremophila forrestii* subsp. *forrestii, Cassia* spp. open shrubland to open heath over *Aristida latifolia* grassland with *Enneapogon polyphyllus, Aristida contorta* annual grassland	1786.0	25.45

Vegetation Code	Vegetation Description	Total area mapped in Hope Downs and FMG rail corridors (ha)	Indication of area impacted * (ha)
Fa4	*Acacia aneura, A. pruinocarpa* closed scrub over *Dodonaea petiolaris* open shrubland over *Aristida inaequiglumis* open grassland	739.0	9.14
Fa4/Fa5	see Fa4 / Fa5	503.4	19.84
Fa4/Fh3	see Fa4 / Fh3	85.8	17.54
Fa5	*Acacia pruinocarpa, A. aneura* high open shrubland over *Dodonaea petiolaris, Cassia luerssenii* open shrubland over *Triodia epactia* hummock grassland with *Aristida inaequiglumis* grassland	370.1	
Fa6	*Acacia aneura, A. citrinoviridis* open scrub over *Eremophila lanceolata* low open shrubland to low shrubland	187.8	
Fa7	*Corymbia deserticola* scattered low trees over *Acacia aneura, A. pruinocarpa* high open shrubland to low open woodland over *Triodia basedowii* hummock grassland and *Digitaria brownii* open tussock grassland	328.3	7.92
Fa8	*Acacia aneura* low open forest over **Cenchrus ciliaris* closed tussock grassland	84.6	2.33
Fa9	*Acacia aneura* high open shrubland over *Triodia longiceps* mid-dense hummock grassland	486.6	1.99
Fc2	*Eucalyptus victrix* scattered low trees over *Acacia stenophylla* open scrub over *Triodia longiceps* mid-dense hummock grassland and/or mixed tussock grassland		
Fc2/Fx5	see Fc2 / Fx5	122.5	
Fx1	*Acacia xiphophylla* open scrub over *Cassia sturtii* shrubland to low open heath over *Eragrostis xerophila* open tussock grassland	166.9	
Fx3	*Acacia xiphophylla, A. victoriae* high open shrubland over *Maireana triptera* low shrubland and *Sclerolaena cuneata* open herbland	360.0	12.29
Fx5	*Frankenia ?setosa* low shrubland		
Fx6	*Eragrostis xerophila , Eriachne benthamii* closed tussock grassland	260.2	
Fx7	*Eragrostis falcata* grassland		
Fx8	Mixed annual sedgelands		
Fx9	Samphire low shrubland	322.8	3.45
Hh1	*Corymbia* spp., *Eucalyptus gamophylla* scattered low trees over *Acacia ancistrocarpa* scattered shrubs to open shrubland over *Triodia basedowii* mid-dense hummock grassland	2169.2	38.89
Hh2	*Corymbia hamersleyana, Eucalyptus gamophylla* scattered low trees over *Acacia inaequilatera, Hakea chordophylla* scattered tall shrubs over *Triodia basedowii* hummock grassland with *Aristida holathera* var. *holathera* annual open grassland	3237.8	20.08
Hh3	*Eucalyptus gamophylla* scattered low mallees over *Gossypium australe, Grevillea wickhamii* subsp. *aprica* scattered tall shrubs over *Triodia basedowii* hummock grassland with *Aristida holathera* var. *holathera* annual open grassland	3865.6	9.75
Hh3/Hp5	see Hh3 / Hp5	344.1	22.48
Hh4	*Petalostylis cassioides* high open shrubland over *Triodia basedowii* mid-dense hummock grassland with *Aristida holathera* var. *holathera* annual grassland	16.1	

Vegetation Code	Vegetation Description	Total area mapped in Hope Downs and FMG rail corridors (ha)	Indication of area impacted * (ha)
Hh5	*Eucalyptus leucophloia* scattered trees to low open woodland over *Acacia hilliana* scattered low shrubs to low open shrubland over *Triodia* aff. *basedowii* moderately dense hummock grassland	16273.3	5.84
Hp3	*Acacia aneura, A. pruinocarpa* scattered tall shrubs over *Eremophila forrestii* subsp. *forrestii* scattered low shrubs over *Triodia* spp. scattered hummock grasses and *Aristida contorta* open annual grassland	546.2	41.18
Hp4/Hp3	see Hp4 / Hp3	4906.4	51.16
Hp4	*Acacia aneura* groved low open forest over *Eremophila forrestii* subsp. *forrestii* scattered low shrubs over *Triodia pungens* scattered hummock grasses and *Aristida contorta, Enneapogon polyphyllus* open annual grassland		
Hp5	*Corymbia hamersleyana, Eucalyptus gamophylla* scattered low trees over *Acacia ancistrocarpa, A. dictyophleba, A. pachyacra, Hakea* spp. high open shrubland over *Triodia pungens* hummock grassland	5039.1	17.42
Hp6	*Eucalyptus gamophylla* scattered low trees over *Triodia basedowii, T. schinzii* hummock grassland	2987.3	28.68
Hc1	*Eucalyptus victrix* woodland over *Acacia citrinoviridis* open scrub over **Cenchrus ciliaris* open tussock grassland	363.4	6.09
Hc2	*Eucalyptus victrix* scattered low trees over *Acacia citrinoviridis* high open shrubland over **Cenchrus ciliaris* closed tussock grassland	592.4	3.05
Hc3	*Corymbia hamersleyana* scattered low trees over *Acacia tumida, Gossypium robinsonii* open scrub over **Cenchrus ciliaris* closed tussock grassland	27.1	
Hc4	*Corymbia hamersleyana* scattered low trees over *Acacia tumida, Gossypium robinsonii* high open shrubland to open scrub over mixed open tussock grassland and *Triodia epactia* open hummock grassland	57.5	0.63
Hc5	*Acacia tumida, Grevillea wickhamii* high shrubland over **Cenchrus ciliaris* very open tussock grassland and *Triodia epactia* open hummock grassland	42.7	
Hc7	*Acacia pyrifolia* high open shrubland over **Cenchrus ciliaris* open tussock grassland and *Triodia epactia* open hummock grassland	108.0	
Hc8	*Gossypium robinsonii* high open shrubland over *Gossypium australe* open shrubland over *Triodia basedowii* hummock grassland	43.4	
Hc17	*Acacia tumida* var. *pilbarensis* open scrub over *Triodia pungens* hummock grassland	1856.0	0.86
Hc21	*Eucalyptus victrix* scattered low trees over *Eucalyptus xerothermica, Corymbia hamersleyana* low open woodland over *Pluchea ferdinandi-muelleri* low shrubland over *Triodia pungens, T. basedowii* hummock grassland	28.5	2.98
Hd1	*Acacia dictyophleba* scattered tall shrubs over *Crotalaria cunninghamii, Trichodesma zeylanicum* var. *grandiflorum* open shrubland	44.4	
* Impact area based on nominal 25m buffer either side of centreline of FMG rail corridor, as indicated on plans; does not include borrow pits etc.			

Site Data from Quadrats Sampled in the FMG Rail Corridor

Appendix 3

BIOta

Vegetation Structural Classes*

Stratum	Canopy Cover (%)				
	70-100%	30-70%	10-30%	2-10%	<2%
Trees over 30 m	Tall closed forest	Tall open forest	Tall woodland	Tall open woodland	Scattered tall trees
Trees 10-30 m	Closed forest	Open forest	Woodland	Open woodland	Scattered trees
Trees under 10 m	Low closed forest	Low open forest	Low woodland	Low open woodland	Scattered low trees
Shrubs over 2 m	Tall closed scrub	Tall open scrub	Tall shrubland	Tall open shrubland	Scattered tall shrubs
Shrubs 1-2 m	Closed heath	Open heath	Shrubland	Open shrubland	Scattered shrubs
Shrubs under 1 m	Low closed heath	Low open heath	Low shrubland	Low open shrubland	Scattered low shrubs
Hummock grasses	Closed hummock grassland	Mid-dense hummock grassland	Hummock grassland	Open hummock grassland	Scattered hummock grasses
Grasses, Sedges, Herbs	Closed tussock grassland / sedgeland / herbland	Tussock grassland / sedgeland / herbland	Open tussock grassland / sedgeland / herbland	Very open tussock grassland / sedgeland / herbland	Scattered tussock grasses / sedges / herbs

* Based on (Muir 1977), and Aplin's (1979) modification of the vegetation classification system of Specht (1970): Aplin T.E.H. (1979). The Flora. Chapter 3 *In* O'Brien, B.J. (ed.) (1979). *Environment and Science*. University of Western Australia Press; Muir B.G. (1977). Biological Survey of the Western Australian Wheatbelt. Part II: Vegetation and habitat of Bendering Reserve. *Records of the Western Australian Museum, Suppl.* No. 3; Specht R.L. (1970). Vegetation. *In The Australian Environment*. 4th edn (Ed. G.W. Leeper). Melbourne.

Vegetation Condition Scale *

E = Excellent (=Pristine of BushForever)
Pristine or nearly so; no obvious signs of damage caused by the activities of European man.

VG = Very Good (= Excellent of BushForever)
Some relatively slight signs of damage caused by the activities of European man. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds such as **Ursinia anthemoides* or **Briza* spp., or occasional vehicle tracks.

G = Good (= Very Good of BushForever)
More obvious signs of damage caused by the activities of European man, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or by selective logging. Weeds as above, possibly plus some more aggressive ones such as **Ehrharta* spp.

P = Poor (= Good of BushForever)
Still retains basic vegetation structure or ability to regenerate to it after very obvious impacts of activities of European man, such as grazing, partial clearing (chaining) or frequent fires. Weeds as above, probably plus some more aggressive ones such as **Ehrharta* spp.

VP = Very Poor (= Degraded of BushForever)
Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species including very aggressive species.

D = Completely Degraded (= Completely Degraded of BushForever)
Areas that are completely or almost completely without native species in the structure of their vegetation; ie. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.

* Based on Trudgen M.E. (1988). A Report on the Flora and Vegetation of the Port Kennedy Area. Unpublished report prepared for Bowman Bishaw and Associates, West Perth.

FMG N-S Rail FMG010 Described by KMDate 26/03/04 Quadrat Size 50x50m
AMG Zone 50 746022mE, 7484800mN 746073mE, 7484787mN 746062mE, 7484734mN 746012mE, 7484744mN
Habitat Low sand plain
Vegetation *Eucalyptus gamophylla* low open woodland over *Acacia inaequilatera, A. ancistrocarpa* open shrubland over *Corchorus tectus* low open shrubland over *Triodia lanigera* mid-dense hummock grassland
Veg Condition Excellent Fire Age > 7 years
Soil Type Red clayey sand Rock Type Ironstone
Dominant species: Acacia ancistrocarpa, Corchorus tectus, Eucalyptus gamophylla, Triodia lanigera, T. schinzii
Associated species: Acacia bivenosa (wispy/weeping form), A. coriacea subsp. pendens, A. dictyophleba, A. pachyacra, Aristida holathera var. holathera, Cassia helmsii, C. notabilis, C. oligophylla, Cleome viscosa, Corymbia hamersleyana, Cullen leucochaites, Dicrastylis georgei, Eragrostis eriopoda, Eriachne aristidea, Euphorbia coghlanii, Euphorbia sp., Gomphrena cunninghamii, Hakea chordophylla, H. lorea subsp. lorea, Indigofera monophylla, Mollugo molluginis, Mukia maderaspatana, Paraneurachne muelleri, Phyllanthus erwinii, Portulaca oleracea, Ptilotus astrolasius var. astrolasius, P. polystachyus var. polystachyus, Scaevola parvifolia subsp. pilbarae, S. spinescens (broad form), Sida aff. cardiophylla (site 1215), S. echinocarpa, Solanum lasiophyllum, S. sturtianum, Trianthema pilosa, Tribulus hirsutus, Yakirra australiensis var. australiensis

FMG N-S Rail FMG012 Described by BMDate 24/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 709623mE, 7514999mN, 709596mE, 7515041mN, 709638mE, 7515068mN, 709665mE, 7515026mN
Habitat Flat to very gently undulating plain
Vegetation *Corymbia deserticola, Eucalyptus gamophylla* scattered low trees over *Acacia ancistrocarpa* scattered tall shrubs over *Corchorus sidoides* subsp. *sidoides, Dicrastylis georgei* low open shrubland over *Triodia basedowii* mid-dense hummock grassland
Veg Condition Excellent Fire Age >5-7 years since burnt
Soil Type Red-brown sand Rock Type Ironstone?
Dominant species: Acacia ancistrocarpa, Corchorus sidoides subsp. sidoides, Corymbia deserticola, Dicrastylis georgei, Eucalyptus gamophylla, Triodia basedowii,
Associated species: Acacia adsurgens, A. dictyophleba, A. pruinocarpa, A. pyrifolia, A. synchronicia, A. trachycarpa, A. tumida, Aristida contorta, A. holathera var. holathera, Bonamia rosea, Cassia glutinosa, C. notabilis, C. oligophylla, Cleome viscosa, Cymbopogon obtectus, Eragrostis eriopoda, Eriachne aristidea, Euphorbia sp., Goodenia microptera, Hakea lorea subsp. lorea, Heliotropium pachyphyllum, Indigofera monophylla, Mukia maderaspatana, Paraneurachne muelleri, Portulaca oleracea, Ptilotus obovatus var. obovatus, Scaevola parvifolia subsp. pilbarae, Sida aff. cardiophylla (site 1215), Solanum phlomoides, Trianthema pilosa, Tribulus hirsutus, Trichodesma zeylanicum var. zeylanicum

FMG N-S Rail FMG013 Described by BMDate 23/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 706523mE, 7519934mN, 706568mE, 7519956mN, 706590mE, 7519910mN, 706543mE, 7519888mN
Habitat Flat plain
Vegetation *Acacia xiphophylla* low open woodland over *Acacia synchronicia* scattered tall shrubs over *Eremophila cuneifolia, E. forrestii* subsp. *forrestii, Maireana pyramidata* open shrubland over *Maireana* aff. *georgei, Ptilotus obovatus* open shrubland
Veg Condition Excellent Fire Age Burnt >8-10 years ago; large old snakewood shrubs
Soil Type Red-brown gravelly sandy loam with ironstone gravel on surface Rock Type Ironstone
Dominant species: Acacia xiphophylla, Portulaca oleracea, Aristida contorta, Boerhavia coccinea, Maireana pyramidata, Ptilotus obovatus var. obovatus, Trianthema oxycalyptra var. oxycalyptra, T. triquetra
Associated species: Abutilon sp., Acacia synchronicia, Atriplex bunburyana, Cassia glutinosa, C. aff. oligophylla (thinly sericeous form), *Cenchrus ciliaris, Chloris pectinata, Cleome viscosa, Dactyloctenium radulans, Enneapogon polyphyllus, Enteropogon acicularis, Eremophila cuneifolia, E. forrestii subsp. forrestii, E. latrobei, Maireana aff. georgei, Porana commixta, Ptilotus exaltatus var. exaltatus, Salsola tragus, *Setaria verticillata, Solanum lasiophyllum, Sporobolus australasicus, Tribulus astrocarpus

FMG N-S Rail FMG014 Described by BMDate 24/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 705814mE, 7520493mN, 705854mE, 7522104mN, 705885mE, 7520486mN, 705846mE, 7520455mN
Habitat Flat area of gently undulating plain
Vegetation *Cassia luerssenii, Eremophila cuneifolia* scattered shrubs over *Maireana triptera* scattered low shrubs over *Triodia longiceps* mid-dense hummock grassland
Veg Condition Excellent Fire Age >7 years since burnt
Soil Type Red-brown sandy loam
Notes Small patches of Mulga on the plain
Dominant species: Triodia longiceps
Associated species: Abutilon sp., Acacia synchronicia, Atriplex bunburyana, Brachyachne prostrata, Bulbostylis barbata, Calandrinia sp., Cassia helmsii, C. luerssenii, Cheilanthes sieberi subsp. sieberi, Dactyloctenium radulans, Eragrostis cumingii, Eremophila cuneifolia, E. forrestii subsp. forrestii, Eriachne pulchella subsp. dominii, Euphorbia tannensis subsp. eremophila (Hamersley, Maireana tomentosa, M. triptera, Perotis rara, Portulaca oleracea, Pterocaulon ?sphaeranthoides x sphacelatum, Ptilotus exaltatus var. exaltatus, Rhagodia eremaea, Solanum lasiophyllum, Sporobolus australasicus, Stemodia grossa, Trianthema oxycalyptra var. oxycalyptra, T. triquetra, Tripogon loliiformis, Xerochloa laniflora

FMG N-S Rail FMG015 Described by KMDate 23/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 707003mE, 7527367mN, 707053mE, 7527372mN, 707058mE, 7527322mN, 707007mE, 7527313mN
Habitat Clay floodplain flat (Fortescue Marsh)
Vegetation *Halosarcia indica* subsp. *leiostachya, H.* sp. nov. aff. *pergranulata* low open heath over *Eragrostis falcata, E. pergracilis* open tussock grassland and very open mixed herbland
Veg Condition Excellent Fire Age Unknown; no evidence of recent fire
Soil Type Reddish brown sandy clay Rock Type ?Granite and ironstone (Chichester and Hamersley Ranges)
Dominant species: Cyperus bulbosus, Eragrostis falcata, E. pergracilis, Halosarcia indica subsp. leiostachya, Halosarcia sp. nov. aff pergranulata
Associated species: Atriplex semilunaris, Boerhavia coccinea, Bulbostylis barbata, Cullen cinereum, Dactyloctenium radulans, Dysphania plantaginella, Eremophila spongiocarpa, Flaveria australasica, Frankenia ?ambita, Gomphrena cunninghamii,

Halosarcia auriculata, Lawrencia densiflora, Maireana sp. nov. aff luehmannii, Nicotiana sp., Panicum decompositum, Portulaca oleracea, Pterocaulon ?sphaeranthoides x sphacelatum, Ptilotus exaltatus var. exaltatus, P. gomphrenoides var. gomphrenoides, Solanum sturtianum, Sporobolus australasicus, Swainsona kingii

FMG N-S Rail FMG016 Described by BM Date 23/03/04 Quadrat Size 35 x 71 m

AMG Zone 50 707078mE, 7527161mN, 707109mE, 7527172mN, 707136mE, 7527107mN, 707105mE, 7527095mN
Habitat Drainage flats - Fortescue valley
Vegetation *Halosarcia indica* subsp. *leiostachya, H. halocnemoides* subsp. *tenuis* low closed heath over *Eragrostis pergracilis* very open grassland
Veg Condition Excellent Fire Age >7 years; no signs of recent fire
Soil Type Reddish brown loam
Notes Old dead shrub to 50-60 cm. Some small areas of white 'salt'? deposition on surface.
Dominant species: Eragrostis pergracilis, Halosarcia halocnemoides subsp. tenuis, H. indica subsp. leiostachya
Associated species: Atriplex semilunaris, Bulbostylis barbata, Cucumis melo subsp. agrestis, Cullen cinereum, Cyperus bulbosus, C. squarrosus, Dysphania plantaginella, Flaveria australasica, Halosarcia auriculata, Iseilema vaginiflorum, Lawrencia densiflora, Maireana sp. nov. aff luehmannii, Nicotiana sp., Ptilotus exaltatus var. exaltatus, P. gomphrenoides var. gomphrenoides, Swainsona kingii, Triumfetta aff. chaetocarpa (PAN3/4)

FMG N-S Rail FMG017 Described by RO Date 27/03/04 Quadrat Size 50 x 50 m

AMG Zone 50 708391mE, 7532608mN, 708440mE, 7532592mN, 708423mE, 7532544mN, 708376mE, 7532560mN
Habitat Clay plain
Vegetation *Acacia aneura* woodland over *Acacia xiphophylla* scattered low trees over mixed open tussock grassland
Veg Condition Very good - few signs of cattle and only scattered weeds Fire Age No obvious signs of fire
Soil Type Red clay with ironstone pebbles on surface Rock Type Ironstone
Dominant species: Acacia aneura var. ?aneura/intermedia
Associated species: Abutilon sp., Acacia bivenosa, A. synchronicia, A. tetragonophylla, A. trachycarpa, A. xiphophylla, Alysicarpus muelleri, Aristida burbidgeae, A. contorta, A. latifolia, *Bidens bipinnata, Blumea tenella, Boerhavia coccinea, Bulbostylis turbinata, Cassia helmsii, C. luerssenii, C. aff. oligophylla (thinly sericeous form), *Cenchrus ciliaris, Centipeda minima, Chenopodium melanocarpum, Chloris pectinata, Chrysopogon fallax, Cleome viscosa, Corchorus tridens, Crotalaria dissitiflora subsp. benthamiana, Cucumis melo subsp. agrestis, Cullen cinereum, Cyperus iria, C. squarrosus, Dactyloctenium radulans, Dichanthium sericeum subsp. humilius, Digitaria ctenantha, Dodonaea petiolaris, Enchylaena tomentosa, Enneapogon caerulescens var. caerulescens, E. polyphyllus, Eragrostis leptocarpa, E. tenellula, Eragrostis sp., Eremophila cuneifolia, E. lanceolata ms, E. latrobei subsp. filiformis ms, E. longifolia, Eriachne benthamii, E. mucronata, Euphorbia coghlanii, Euphorbia sp., Evolvulus alsinoides var. villosicalyx, Gomphrena affinis subsp. pilbarensis, Goodenia muelleriana, G. prostrata, Goodenia sp., Hibiscus burtonii, Iseilema eremaeum, Josephinia ?sp. Marandoo (M.E. Trudgen 1554), Lotus cruentus, *Malvastrum americanum, Marsilea hirsuta, Melhania sp. (CH15-39), Mimulus gracilis, Perotis rara, Phyllanthus erwinii, Portulaca oleracea, Psydrax latifolia, P. suaveolens, Ptilotus exaltatus var. exaltatus, P. gaudichaudii var. gaudichaudii, P. gomphrenoides var. gomphrenoides, Rhagodia eremaea, Rhynchosia minima var. australis, Sclerolaena cornishiana, Sida sp., Solanum lasiophyllum, Spermacoce brachystema, Sporobolus australasicus, Stemodia kingii, Tragus australianus, Tribulus astrocarpus, Urochloa gilesii subsp. gilesii (hairy florets), Vigna sp. Central(M.E. Trudgen 1626)

FMG N-S Rail FMG018 Described by MM Date 29/03/04 Quadrat Size 50 x 50 m

AMG Zone 50 708643mE, 7534351mN, 708693mE, 7534351mN, 708693mE, 7534301mN, 708643mE, 7534301mN
Habitat Clayey plain
Vegetation *Acacia xiphophylla* tall shrubland over *Cassia* aff. *oligophylla (*thinly sericeous) open shrubland over *Dichanthium sericeum* ssp. *humilius, Enneapogon caerulescens* very open annual grassland
Veg Condition Good; a number of weed species but not huge covers of any; signs of cattle
Soil Type Red brown clay with continuous surface layer of ironstone pebbles
Fire Age Burnt > 5 years ago Rock Type Ironstone
Dominant species: Acacia xiphophylla, Cassia aff. oligophylla (thinly sericeous form), *Malvastrum americanum
Associated species: Abutilon fraseri, A. otocarpum, Acacia aff. aneura (scythe-shaped; MET 15,743), A. farnesiana, A. maitlandii, A. tetragonophylla, *Aerva javanica, Amaranthus sp., Aristida contorta, *Bidens bipinnata, Boerhavia coccinea, Brachyachne prostrata, Bulbostylis turbinata, Cassia helmsii, C. luerssenii, C. oligophylla x helmsii, *Cenchrus ciliaris, Chloris pectinata, Chrysopogon fallax, Cleome viscosa, Corchorus tridens, Cucumis melo subsp. agrestis, Cyperus iria, Dactyloctenium radulans, Dichanthium sericeum subsp. humilius, Dodonaea petiolaris, Enneapogon caerulescens var. caerulescens, E. polyphyllus, Enteropogon acicularis, Eragrostis leptocarpa, E. setifolia, Eremophila forrestii subsp. forrestii, E. longifolia, Eriachne benthamii, E. pulchella subsp. dominii, Euphorbia coghlanii, Euphorbia sp., Evolvulus alsinoides var. villosicalyx, Flaveria australasica, Goodenia muelleriana, Hibiscus burtonii, Iseilema eremaeum, Maireana planifolia, Paspalidium clementii, Perotis rara, Porana commixta, Portulaca oleracea, Ptilotus exaltatus var. exaltatus, P. gomphrenoides var. gomphrenoides, P. obovatus var. obovatus, Rhagodia eremaea, Rhynchosia sp. King Bay (B181-13), Sclerolaena cornishiana, *Setaria verticillata, Sida sp., Solanum horridum, S. lasiophyllum, Sporobolus australasicus, Tephrosia aff. clementii (9) (HD284-6), Tragus australianus

FMG N-S Rail FMG019 Described by BM Date 27/03/04 Quadrat Size 50 x 50 m

AMG Zone 50 708773mE, 7537056mN, 708772mE, 7537106mN, 708822mE, 7537106mN, 708822mE, 7537056mN
Habitat Flat plains
Vegetation *Acacia aneura* low open forest over *Acacia synchronicia* tall open shrubland over *Eremophila forrestii* subsp. *forrestii, Dodonaea petiolaris* scattered shrubs over *Aristida contorta, Digitaria ctenantha, Dichanthium sericeum* subsp. *humilius* open annual grassland
Veg Condition Very Good Soil Type Red-brown clay
Dominant species: Acacia aneura (flat curved; MET 15 548), A. synchronicia, Aristida contorta, Boerhavia coccinea, Cleome viscosa, Dichanthium sericeum subsp. humilius, Digitaria ctenantha, Enneapogon polyphyllus, Eremophila forrestii subsp. forrestii
Associated species: Abutilon sp., Acacia tetragonophylla, *Aerva javanica, Amaranthus sp., *Bidens bipinnata, Bulbostylis turbinata, Calandrinia sp., Cassia aff. oligophylla (thinly sericeous form), C. oligophylla, C. oligophylla x helmsii, *Cenchrus ciliaris, Chenopodium melanocarpum, Chloris pectinata, Chrysopogon fallax, Convolvulus angustissimus subsp. angustissimus, Cucumis melo subsp. agrestis, Cyperus iria, Dodonaea petiolaris, Enneapogon caerulescens var. caerulescens, Eragrostis cumingii, E. tenellula, Eriachne mucronata, E. pulchella subsp. dominii, Eulalia aurea, Euphorbia biconvexa, Euphorbia sp.,

Evolvulus alsinoides var. villosicalyx, Gomphrena cunninghamii, Hakea lorea subsp. lorea, Hibiscus burtonii, H. gardneri, H. sturtii var. aff. campylochlamys (FMG 55-21), Iseilema eremaeum, Maireana planifolia, *Malvastrum americanum, Nicotiana sp., Panicum laevinode, Paspalidium clementii, Perotis rara, Phyllanthus erwinii, Polycarpaea corymbosa var. corymbosa, Porana commixta, Portulaca oleracea, Psydrax latifolia, Ptilotus exaltatus var. exaltatus, P. gomphrenoides var. gomphrenoides, P, helipteroides var. helipteroides, Rhagodia eremaea, Rhyncharrhena linearis, Rhynchosia sp. King Bay (B181-13), Salsola tragus, Sclerolaena cornishiana, *Setaria dielsii, Sida cardiophylla, Sida sp., Solanum lasiophyllum, Spermacoce brachystema, Sporobolus australasicus, Stemodia grossa, Tragus australianus, Tribulus astrocarpus

FMG N-S Rail FMG20 Described by KM & RO Date 28/03/04 Quadrat Size 50 x 50 m

AMG Zone 50	707361mE, 7552880mN, 707366mE, 7552829mN, 707316mE, 7552825mN, 707311mE, 7552875mN
Habitat	Cracking clay plain on a slight rise in an elevated area (surrounded by hills and some *Acacia xiphophylla* wetland in clay drainage areas)
Vegetation	Mixed herbland
Veg Condition	Very good to Excellent (cattle do graze in this area) Fire Age No evidence of fire
Soil Type	Red cracking fine-grained clay with ironstone pebbles and rocks on soil surface.
Rock Type	Ironstone

Dominant species: Aristida latifolia, Ptilotus gomphrenoides var. gomphrenoides, Swainsona sp. Hamersley Station (A.A.Mitchell 196)

Associated species: Alysicarpus muelleri, Astrebla elymoides, A. pectinata, Boerhavia sp., Bulbostylis turbinata, Cassia oligophylla, Chrysopogon fallax, Cleome viscosa, Commelina ensifolia, Corchorus tridens, Crotalaria dissitiflora subsp. benthamiana, C. medicaginea, Desmodium aff. campylocaulon, D. muelleri, Digitaria ctenantha, Enneapogon oblongus, E. polyphyllus, Eriachne mucronata, Euphorbia coghlanii, Euphorbia sp. Harding (MET 15,683), Flaveria sp.Tom Price(M.E.Trudgen 11246), Gomphrena cunninghamii, Goodenia muelleriana, Heliotropium crispatum, Heliotropium sp., Ipomoea lonchophylla, Ischaemum albovillosum, Iseilema vaginiflorum, Kennedia sp. Barowana Hill (M.E. Trudgen 15,617), Mukia sp.D Flora of Australia(A.A.Mitchell PRP 1121), Neptunia dimorphantha, Operculina aequisepala, Paspalidium clementii, Phyllanthus erwinii, Polygala sp., Portulaca oleracea, Ptilotus carinatus, Rhynchosia minima var. australis, Sida sp., Streptoglossa bubakii, Striga curviflora, Tephrosia aff. clementii (9) (HD284-6), Themeda sp.Hamersley Station(M.E.Trudgen 11431), Tribulus terrestris, Trichodesma zeylanicum var. latisepalum, Trichosanthes cucumerina, Vigna sp. Central(M.E. Trudgen 1626)

FMG N-S Rail FMG20F Described by RO Date 28/03/04 Quadrat Size releve

AMG Zone 50	707061mE, 7554241mN
Habitat	Mildly sloping plain of crabholes in clay.
Vegetation	Mixed herbland
Veg Condition	Excellent; signs of cattle but no obvious grazing Fire Age No evidence of recent fire
Soil Type	Fine clay (cracking) with large ironstone rocks on surface Rock Type Ironstone / basalt
Notes	Rockpiles at end of transect.

Species: Acacia farnesiana, A. tetragonophylla, Astrebla elymoides, Brachyachne convergens, Cassia oligophylla (thinly sericeous form), Euphorbia sp., Heliotropium crispatum, Hibiscus brachysiphonius, Ipomoea lonchophylla, Neptunia dimorphantha, Operculina aequisepala, Phyllanthus maderaspatensis, Tribulus terrestris, Trichodesma zeylanicum var. zeylanicum

FMG N-S Rail FMG022 Described by MM Date 29/03/04 Quadrat Size 50 x 50 m

AMG Zone 50	708766mE, 7567092mN, 708735mE, 7567131mN, 708774mE, 7567162mN, 708805mE, 7567123mN
Habitat	Plain
Vegetation	*Acacia inaequilatera* scattered tall shrubs over *Acacia ancistrocarpa, A. bivenosa* open shrubland over *Triodia epactia* mid-dense hummock grassland
Veg Condition	Very Good to Excellent; signs of cattle. Fire Age Burnt >4 years ago
Soil Type	Orange-brown sandy loam with continuous surface layer of granite-derived gravel, pebbles and stones.
Rock Type	Granite-derived

Dominant species: Acacia ancistrocarpa, A. bivenosa, A. inaequilatera, Triodia epactia

Associated species: Acacia maitlandii, A. stellaticeps, Alternanthera nana, Amaranthus sp., Aristida contorta, Boerhavia coccinea, Bonamia rosea, Bulbostylis barbata, Cassia glutinosa, C. luerssenii, C. notabilis, Cleome viscosa, Corchorus aff. lasiocarpus subsp. parvus, Cymbopogon ambiguus, Dampiera candicans, Digitaria ctenantha, Dysphania rhadinostachya, Eragrostis cumingii, Euphorbia aff. australis, Evolvulus alsinoides var. villosicalyx, Gomphrena cunninghamii, Goodenia forrestii, G. lamprosperma, Gossypium australe (Burrup Peninsula form), Grevillea wickhamii, Hibiscus aff. coatesii, H. sturtii var. aff. platychlamys, Indigofera monophylla, Paraneurachne muelleri, Paspalidium clementii, Phyllanthus erwinii, Pluchea dentex, P. ferdinandi-muelleri, P. tetranthera, Polycarpaea holtzei, Pterocaulon sphaeranthoides, Sida aff. cardiophylla (FMG102-7), Solanum diversiflorum, S. horridum, S. lasiophyllum, Stemodia grossa, Trachymene oleracea subsp. oleracea, Triumfetta aff. chaetocarpa (PAN3/4)

FMG N-S Rail FMG023 Described by BM Date 28/03/04 Quadrat Size 50 x 50 m

AMG Zone 50	706105mE, 7570936mN, 706137mE, 7570895mN, 706177mE, 7570927mN, 706146mE, 7570966mN
Habitat	Sandy river bed including sand-drift islands within main river banks.
Vegetation	*Eucalyptus victrix, Erythrina vespertilio* scattered trees over *Melaleuca glomerata, Acacia trachycarpa*, A. *tumida* tall shrubland over *Crotalaria cunninghamii* scattered shrubs over *Triodia epactia* very open hummock grassland
Veg Condition	Very good; scattered weeds Fire Age Burnt >7-10 years ago
Soil Type	Pale brown sand
Notes	Quadrat includes sandy river bed (largely bare) and sand-drift islands up to 1 m high; does not include rocky loamy river banks.

Dominant species: Acacia trachycarpa, Cyperus hesperius, Eucalyptus victrix, Melaleuca glomerata, Triodia epactia

Associated species: Acacia ancistrocarpa x trachycarpa, A. coriacea subsp. pendens, A. pyrifolia, A. tumida, *Bidens bipinnata, Bonamia media var. ?media, B. pannosa, Bulbostylis barbata, Calandrinia sp., Cassia notabilis, Cassytha capillaris, *Cenchrus ciliaris, Chrysopogon fallax, Cleome viscosa, Corchorus sp., Crotalaria cunninghamii, Cymbopogon bombycinus, Cyperus bulbosus, C. iria, C. squarrosus, Digitaria sp., Enneapogon polyphyllus, Eragrostis cumingii, Eriachne benthamii, E. ciliata, E. obtusa, Erythrina vespertilio, Eulalia aurea, Euphorbia coghlanii, E. tannensis subsp. eremophila (Hamersley form), Euphorbia sp. (site 1089), Evolvulus alsinoides var. villosicalyx, Fimbristylis microcarya, F. rara, Gonocarpus ephemerus, Goodenia lamprosperma, G. stobbsiana, Heliotropium chrysocarpum, H. tenuifolium, Hibiscus sturtii var. aff. campylochlamys

(FMG 55-21), H. sturtii var. aff. platychlamys, Hybanthus aurantiacus, Indigofera colutea, I. hirsuta, I. monophylla, Ipomoea coptica, I. plebeia, I. polymorpha, Isotropis atropurpurea, Lipocarpha microcephala, Melaleuca linophylla, Mollugo molluginis, Paspalidium rarum, Perotis rara, Phyllanthus erwinii, P. maderaspatensis, Pluchea dentex, P. rubelliflora, Polycarpaea holtzei, Portulaca oleracea, Pterocaulon ?sphaeranthoides x sphacelatum, Sauropus sp., Sida clementii, Stemodia grossa, Themeda sp.Hamersley Station(M.E.Trudgen 11431), Trachymene oleracea subsp. oleracea, Triumfetta aff. chaetocarpa (HD123), Triumfetta aff. chaetocarpa (PAN3/4), Vigna lanceolata var. lanceolata, Wahlenbergia tumidifructa, Waltheria indica

FMG N-S Rail FMG024 Described by MM Date 29/03/04 Quadrat Size 04 x 110 m
AMG Zone 50 703665mE, 7575426mN, 703791mE, 7575383mN, 703776mE, 7575370mN, 703677mE, 7575413mN
Habitat Creek bank and island
Vegetation *Eucalyptus victrix, Acacia coriacea* subsp. *pendens* scattered low trees over *Acacia trachycarpa* tall shrubland over *Triodia epactia, T. longiceps* mid-dense hummock grassland
Veg Condition Good; some buffel and other weeds, signs of cattle. Fire Age Burnt >5 years ago
Soil Type Tan sand
Dominant species: Acacia trachycarpa, *Cenchrus ciliaris, Chrysopogon fallax, Melaleuca linophylla, Triodia epactia, T. longiceps
Associated species: Abutilon sp., Acacia ancistrocarpa x trachycarpa, A. bivenosa, A. coriacea subsp. pendens, A. inaequilatera, A. maitlandii, A. stellaticeps, A. tumida, Alternanthera nana, Ammannia multiflora, Atalaya hemiglauca, *Bidens bipinnata, Boerhavia coccinea, Bonamia media var. villosa, Bulbostylis barbata, B. turbinata, Calandrinia sp., Cassia notabilis, Chloris pumilio, Cleome viscosa, Commelina ensifolia, Corchorus sp., Crotalaria cunninghamii, Cymbopogon procerus, Cyperus bulbosus, C. hesperius, C. squarrosus, Dactyloctenium radulans, Digitaria ctenantha, Enneapogon oblongus, Eragrostis cumingii, Eriachne obtusa, Erythrina vespertilio, Eucalyptus victrix, Eulalia aurea, Euphorbia aff. australis, E. coghlanii, Euphorbia sp. (site 1089), Evolvulus alsinoides var. decumbens, Fimbristylis dichotoma, F. microcarya, F. rara, Flaveria australasica, Gomphrena leptoclada subsp. leptoclada, G. sordida, Gonocarpus ephemerus, Goodenia lamprosperma, Grevillea wickhamii, Heliotropium skeleton, Hybanthus aurantiacus, Indigofera colutea, I. linnaei, Ipomoea polymorpha, Jasminum didymum subsp. lineare, Lipocarpha microcephala, Mollugo molluginis, Mukia maderaspatana, Paspalidium rarum, Perotis rara, Phyllanthus erwinii, P. maderaspatensis, Pluchea dentex, P. rubelliflora, P. tetranthera, Pterocaulon ?sphaeranthoides x sphacelatum, Ptilotus fusiformis var. fusiformis, Rhynchosia minima var. australis, Setaria surgens, Sporobolus actinocladus, Stemodia viscosa, Streptoglossa liatroides, Swainsona kingii, Trachymene oleracea subsp. oleracea, Trianthema triquetra, Trichodesma zeylanicum var. zeylanicum, Triumfetta aff. chaetocarpa (PAN3/4), Waltheria indica, Yakirra australiensis var. australiensis

FMG N-S Rail FMG025 Described by BM Date 17/03/04 Quadrat Size 25 x 100 m
AMG Zone 50 661669mE, 7743175mN, 661645mE, 7743176mN, 661661mE, 7743077mN, 661687mE, 7743075mN
Habitat Sandy bed of river
Vegetation *Melaleuca argentea, Eucalyptus victrix* low open woodland over *Acacia trachycarpa* high open shrubland over *Corchorus* sp. scattered low shrubs over *Triodia epactia* open hummock grassland
Veg Condition Excellent Fire Age < 5-7 years Soil Type Red-brown sand
Notes Sandy islands with *Triodia epactia* and other veg; bare sand flow areas in between. *Corymbia* on adjacent banks. Large area of bare ground.
Dominant species: Acacia trachycarpa, Eucalyptus victrix, Melaleuca argentea, Triodia epactia
Associated species: Acacia ampliceps, A. colei var. colei, A. stellaticeps, Adriana urticoides var. urticoides, Aristida holathera var. holathera, Boerhavia sp., Bonamia media var. ?media, Carissa spinarum, Cassia notabilis, Cassytha capillaris, Chrysopogon fallax, Cleome viscosa, Corchorus sp., Corynotheca pungens, Crotalaria cunninghamii, Eriachne obtusa, Eulalia aurea, Euphorbia coghlanii, Goodenia lamprosperma, Gymnanthera cunninghamii, Hakea lorea subsp. lorea, Heliotropium cunninghamii, Hybanthus aurantiacus, Ipomoea muelleri, Pluchea ferdinandi-muelleri, Pterocaulon ?sphaeranthoides x sphacelatum, Ptilotus fusiformis var. fusiformis, Sesbania cannabina, Sida spinosa, Stemodia grossa, Tephrosia sp.B Kimberley Flora(C.A.Gardner 7300), Triumfetta aff. chaetocarpa (HD123), T. aff. chaetocarpa (PAN3/4), Wahlenbergia tumidifructa, Waltheria indica

FMG N-S Rail FMG025F Described by BM Date 31/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 699423mE, 7583126mN, 699473mE, 7583126mN, 699473mE, 7583076mN, 699423Me, 7583076mN
Habitat Very gently undulating plain, NW facing slope.
Vegetation *Acacia bivenosa* scattered shrubs over *Triodia wiseana* mid-dense hummock grassland
Veg Condition Excellent Fire Age > 5 years since burnt
Soil Type Pale brown sandy loam Rock Type Quartz
Notes *Acacia bivenosa* occurs in small patches on plain.
Dominant species: Acacia bivenosa, Triodia wiseana
Associated species: Acacia synchronicia (narrow phyllode form), Bonamia sp. (HD94-6), Cassia symonii, Corymbia candida, Dysphania sphaerosperma, Eragrostis desertorum, Heliotropium chrysocarpum, Pluchea ferdinandi-muelleri, Scaevola aff. browniana, Sclerolaena sp. nov. aff densiflora, Sporobolus australasicus

FMG N-S Rail FMG026 Described by MM Date 17/03/04 Quadrat Size 80 x 30 m
AMG Zone 50 662512mE, 7741046mN, 662529mE, 7741072mN, 662446mE, 7741081mN, 662738mE, 7741054mN
Habitat Sandy creek bank
Vegetation *Eucalyptus victrix* scattered low trees over *Acacia trachycarpa* tall closed scrub over *Triodia epactia* scattered hummock grasses to open hummock grassland
Veg Condition Very good; ?rabbit/goat droppings; occasional weeds. Fire Age Burnt recently (?2 years ago).
Soil Type Orange sand
Notes Percent covers reconstructed for pre-fire situation.
Dominant species: Acacia trachycarpa, A. tumida, Eucalyptus victrix, Triodia epactia
Associated species: Acacia ampliceps, Achyranthes aspera, *Aerva javanica, Aristida holathera var. holathera, Boerhavia coccinea, Bonamia media var. ?media, Bulbostylis barbata, Cassia notabilis, *Cenchrus ciliaris, Chloris pumilio, Chrysopogon fallax, *Citrullus colocynthis, Cleome viscosa, Corchorus sp., Crotalaria cunninghamii, Cyperus ?conicus, Dactyloctenium radulans, Desmodium aff. muellerii (MET 15,346), Dolichandrone heterophylla, Eragrostis cumingii, E. eriopoda, Eriachne aristidea, E. obtusa, Eulalia aurea, Euphorbia aff. australis, E. coghlanii, Fimbristylis rara, Goodenia lamprosperma, Heliotropium cunninghamii, Hybanthus aurantiacus, Ipomoea muelleri, I. polymorpha, Melaleuca lasiandra, Mollugo molluginis, Paspalidium basicladum, P. reflexum, Perotis rara, Pluchea ferdinandi-muelleri, Polygala sp., Polymeria sp. (site 1365), Portulaca oleracea, P. pilosa, Ptilotus gaudichaudii var. gaudichaudii, Rhynchosia minima var. australis, Schoenoplectus laevis, Sesbania cannabina, Sida rohlenae subsp. rohlenae, Sida sp., Solanum phlomoides, Synaptantha tillaeacea var. tillaeacea, Trianthema pilosa, Waltheria indica

FMG N-S Rail FMG026F Described by MM Date 1/04/04 Quadrat Size 25 x 100 m
AMG Zone 50 697549mE, 7587790mN, 697574mE, 7587790mN, 697575mE, 7587690mN, 697549mE, 7587690mN
Habitat Sluggishly-drained plain
Vegetation *Triodia secunda* mid-dense hummock grassland
Veg Condition Very good; scattered Buffel grass, signs of cattle Fire Age Not evident
Soil Type Orange-brown sandy loam
Dominant species: Triodia longiceps, T. secunda
Associated species: Alysicarpus muelleri, Calandrinia sp., Cassia notabilis, Cassytha capillaris, *Cenchrus ciliaris, Cyperus squarrosus, Dactyloctenium radulans, Dysphania plantaginella, Eragrostis cumingii, E. dielsii, Euphorbia coghlanii, Fimbristylis dichotoma, Gomphrena cunninghamii, G. sordida, Heliotropium crispatum, Oldenlandia crouchiana, Phyllanthus erwinii, Pluchea rubelliflora, Portulaca pilosa, Sida sp., Sporobolus actinocladus, Streptoglossa liatroides, Swainsona kingii, Trianthema cussackiana, T. triquetra

FMG N-S Rail FMG027 Described by BM Date 18/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 664924mE, 7724893mN, 664929mE, 7724943mN, 664979mE, 7724943mN, 664924mE, 7724893mN
Habitat Flat sand plain
Vegetation *Acacia tumida, (A. inaequilatera)* tall open scrub over *Acacia ancistrocarpa* open shrubland over *Corchorus* sp., *Sida cardiophylla, Indigofera monophylla* FMG27-3 low open shrubland over *Triodia lanigera* hummock grassland
Veg Condition Excellent; no weeds, no physical disturbance. Fire Age Burnt 4-7 years ago
Soil Type Red-brown sand
Notes Pockets of *Acacia ancistrocarpa* open scrub amongst the *Acacia tumida* dominated open to closed scrub
Dominant species: Acacia inaequilatera, A. tumida, Aristida holathera var. holathera, Corchorus sp., Indigofera monophylla, Sida cardiophylla
Associated species: Acacia ancistrocarpa, A. stellaticeps, Boerhavia coccinea, Bonamia linearis, B. rosea, Bulbostylis barbata, Cassia oligophylla x helmsii, Cassytha capillaris, Eragrostis eriopoda, Eriachne obtusa, E. pulchella subsp. dominii, Euphorbia sp., Fimbristylis neilsonii, Gossypium australe (Burrup Peninsula form), Hakea lorea subsp. lorea, Heliotropium pachyphyllum, Mollugo cerviana, M. molluginis, Paraneurachne muelleri, Polycarpaea corymbosa var. corymbosa, Polygala linariifolia, Polymeria calycina, Portulaca oleracea, Ptilotus astrolasius var. astrolasius, Tinospora smilacina, Trianthema pilosa, Triodia lanigera, Triumfetta aff. chaetocarpa (HD123), Yakirra australiensis var. australiensis

FMG N-S Rail FMG028 Described by MM Date 18/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 664909mE, 77041332mN, 664959mE, 7704133mN, 664959mE, 7704083mN, 664909mE, 7704083mN
Habitat Sandy plain
Vegetation *Acacia colei, A. ancistrocarpa* tall open scrub over *Triodia lanigera* open hummock grassland
Veg Condition Excellent Fire Age Burnt 4+ years ago?
Soil Type Orange-brown sand over sandy clay loam
Dominant species: Acacia ancistrocarpa, A. colei var. colei, Triodia lanigera
Associated species: Abutilon sp., Acacia inaequilatera, A. sphaerostachya, A. stellaticeps, A. tumida, Aristida holathera var. holathera, Boerhavia coccinea, Bonamia linearis, Bulbostylis barbata, Cassia notabilis, Corchorus sp., Eragrostis eriopoda, Eriachne obtusa, Euphorbia aff. australis, Mollugo cerviana, Owenia reticulata, Paraneurachne muelleri, Polymeria calycina, Solanum lasiophyllum, Yakirra australiensis var. australiensis

FMG N-S Rail FMG029 Described by BM Date 18/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 664886mE, 7704241mN, 664887mE, 7704291mN, 664837mE, 7704291mN, 664836 mE, 7704241mN
Habitat Flat plain
Vegetation *Acacia inaequilatera, A. colei, Hakea lorea* scattered tall shrubs over *Acacia stellaticeps* low open heath over *Triodia lanigera* mid-dense hummock grassland
Veg Condition Excellent Fire Age Burnt >3-4 years ago
Soil Type Red-brown sand
Dominant species: Acacia colei var. colei, A. inaequilatera, A. stellaticeps, Hakea lorea subsp. lorea, Triodia lanigera
Associated species: Acacia ancistrocarpa, Aristida holathera var. holathera, Bonamia linearis, Bulbostylis barbata, Cassia notabilis, Corchorus sp., Eragrostis eriopoda, Gossypium australe (Burrup Peninsula form), Hybanthus aurantiacus, Mollugo molluginis, Sida arenicola, Sida sp., Solanum phlomoides, Trianthema pilosa

FMG N-S Rail FMG030 Described by MM Date 19/03/04 Quadrat Size 100 x 25m
AMG Zone 50 665528mE, 7715124mN, 665606mE, 7715189mN, 665618mE, 7715167mN, 665542mE, 7715104mN
Habitat Seasonally inundated soak
Vegetation *Corymbia hamersleyana, C. candida* low woodland over *Triodia epactia* open hummock grassland and *Goodenia lamprosperma* very open herbland
Veg Condition Very good; sheep tracks present. Fire Age Burnt >4 years ago
Soil Type Red-brown heavy clay Rock Type Scatters of ironstone rocks
Dominant species: Corymbia candida, C. hamersleyana, Goodenia lamprosperma, Marsilea hirsuta, Triodia epactia
Associated species: Acacia colei var. colei, A. tumida, Carissa spinarum, Chrysopogon fallax, Dentella minutissima, Eriachne benthamii, Peplidium muelleri, Pluchea tetranthera, Rotala diandra, Schoenoplectus laevis, Sida cardiophylla

FMG N-S Rail FMG031 Described by BM Date 19/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 665549mE, 7715029mN, 665550mE, 7714979mN, 665599mE, 7715029mN, 665599mE, 7714979mN
Habitat Seasonally inundated soak
Vegetation *Acacia colei* scattered shrubs over *Triodia epactia* hummock grassland
Veg Condition Very good; cattle in area. Fire Age not recorded
Soil Type Reddish-brown loamy clay to light clay with scattered gravel, pebbles and cobbles
Notes Soil very damp; this area was very recently inundated. Plants in juvenile stage; cover estimate is for likely cover in a few weeks time when plants are more developed.
Dominant species: Acacia colei var. colei, Goodenia lamprosperma, Marsilea hirsuta, Schoenoplectus laevis, Triodia epactia
Associated species: Peplidium muelleri, Pluchea tetranthera

FMG N-S Rail FMG032 Described by MM Date 19/03/04 Quadrat Size 50 x

50
AMG Zone 50 665675mE, 7712694mN, 665724mE, 7712694mN, 665725mE, 7712644mN, 665675mE, 7712644mN
Habitat Clayey plain east of drainage
Vegetation *Triodia epactia* mid-dense hummock grassland with patches of *Eriachne benthamii* tussock grassland
Veg Condition Excellent Fire Age Burnt ?3 years ago
Soil Type Orange-brown clay
Dominant species: Eragrostis setifolia, Eriachne benthamii, Triodia epactia
Associated species: Acacia colei var. colei, Bulbostylis turbinata, Cassia notabilis, C. aff. oligophylla (thinly sericeous form), Corchorus tridens, Corchorus sp., Cyperus iria, Desmodium muelleri, Eragrostis leptocarpa, Eriachne sulcata, Fimbristylis sp., Neptunia dimorphantha, Oldenlandia crouchiana, Operculina aequisepala, Phyllanthus maderaspatensis, Portulaca oleracea, Ptilotus gomphrenoides var. gomphrenoides, Schoenoplectus laevis, Sesbania cannabina, Sida sp., Sporobolus australasicus, Stemodia kingii

FMG N-S Rail FMG033 Described by BM Date 19/03/04 Quadrat Size 50 x 50
AMG Zone 50 666118mE, 7712748mN, 666144mE, 7712706mN, 666101mE, 7712681mN, 666076mE, 7712723mN
Habitat Crest of low stony rise.
Vegetation *Acacia colei* scattered tall shrubs over *Solanum lasiophyllum* scattered low shrubs over *Triodia* aff. *lanigera* (dwarf habit) mid-dense hummock grassland
Veg Condition Excellent Fire Age Burnt 5-7+ years ago.
Soil Type Red-brown sand
Rock Type Quartz pebbles across hill top and outcropping of a light grey shale. Also some granite outcropping.
Notes Just off crest on gentle slopes are some small sandy patches with *Bulbostylis, Aristida, Sporobolus, Polycarpaea.*
Dominant species: Acacia colei var. colei, Triodia aff. lanigera (dwarf habit)
Associated species: Acacia ancistrocarpa, Aristida holathera var. holathera, Bonamia sp. (HD94-6), Bulbostylis barbata, Cassia notabilis, Eragrostis eriopoda, Euphorbia sp., Mollugo cerviana, Paraneurachne muelleri, Pluchea tetranthera, Polycarpaea corymbosa var. corymbosa, Ptilotus incanus, Solanum lasiophyllum, Sporobolus australasicus

FMG N-S Rail FMG034 Described by MM Date04/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 670384mE, 7696276mN, 670435mE, 7696276mN, 670435mE, 7696226mN, 670383mE, 7696226mN
Habitat Sluggish plain
Vegetation *Triodia secunda, T. epactia* mid-dense hummock grassland
Veg Condition Excellent; horses present in area Fire Age Burnt >5 years ago
Soil Type Shallow (5cm) orange sand over orange-brown hard-packed ?clay.
Notes Outside plot; scattered *Pluchea tetranthera, Pluchea ferdinandi-muelleri* and *Acacia colei.*
Dominant species: Triodia epactia, T. secunda
Associated species: Acacia colei var. colei, Boerhavia coccinea, Brachyachne prostrata, Bulbostylis barbata, Calandrinia sp., Cassia notabilis, Centipeda minima, Cyperus iria, C. squarrosus, Dysphania plantaginella, Eragrostis leptocarpa, Fimbristylis rara, Goodenia lamprosperma, Marsilea hirsuta, Peplidium muelleri, Pluchea ferdinandi-muelleri, P. rubelliflora, P. tetranthera, Portulaca oleracea, Portulaca sp., Pterocaulon ?sphaeranthoides x sphacelatum, Salsola tragus, Solanum horridum, Sporobolus australasicus, Trianthema triquetra

FMG N-S Rail FMG035 Described by BM Date 04/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 669979mE, 7697998mN, 667008mE, 7697957mN, 669970mE, 7697928mN, 669939mE, 7697967mN
Habitat Flat sand plain
Vegetation *Triodia longiceps, T. secunda* mid-dense hummock grassland
Veg Condition Excellent Fire Age Burnt <3 years ago
Soil Type Red-brown gravelly pebbly sand.
Dominant species: Triodia longiceps, T. secunda
Associated species: Bulbostylis barbata, Euphorbia sp., Portulaca sp., Sporobolus australasicus, Trianthema triquetra

FMG N-S Rail FMG036 Described by MM Date 21/03/04 Quadrat Size releve includes entire rocky outcrop
AMG Zone 50 673859mE, 7686836mN
Habitat Boulder outcrop
Vegetation *Acacia tumida, Flueggea virosa* subsp. *melanthesoides, Mallotus nesophilus, Ficus brachypoda* high open shrubland over *Cajanus cinereus, Triumfetta maconochieana* low open shrubland over *Triodia epactia* open hummock grassland
Veg Condition Excellent Fire Age Burnt >3-4 years ago
Soil Type Orange coarse sand Rock Type Granite
Notes Annual herbland / sedgeland / grassland around base of outcrop
Dominant species: Acacia tumida, Cajanus cinereus, Ficus brachypoda, Fimbristylis dichotoma, Flueggea virosa subsp. melanthesoides, Mallotus nesophilus, Triodia epactia, Tripogon loliiformis, Triumfetta maconochieana
Associated species: Abutilon sp., Acacia pyrifolia, Acrachne racemosa, Amaranthus pallidiflorus, Boerhavia coccinea, Bulbostylis barbata, B. burbidgeae, Calandrinia sp., Cassia notabilis, Cleome viscosa, Clerodendrum floribundum var. angustifolium, Corchorus sp., Cymbopogon sp., Cyperus cunninghamii subsp. cunninghamii, Ehretia saligna var. saligna, Eragrostis eriopoda, Evolvulus alsinoides var. villosicalyx, Gomphrena leptoclada subsp. leptoclada, Hibiscus sturtii var. aff. Platychlamys, Indigofera colutea, I. linifolia, Mollugo cerviana, Perotis rara, Tephrosia spechtii, Tinospora smilacina

FMG N-S Rail FMG037 Described by BM Date 21/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 676037mE, 7676588mN, 676038mE, 7676638mN, 675988mE, 7676638mN, 675988mE, 7676588mN
Habitat Flat plain
Vegetation *Acacia inaequilatera* scattered tall shrubs over *A. ancistrocarpa* tall shrubland over *Corchorus tectus, Isotropis atropurpurea* low open shrubland over *Triodia lanigera* mid-dense hummock grassland
Veg Condition Excellent Fire Age <2 years since burnt
Soil Type Red-brown sand Rock Type none (granite nearby)
Dominant species: Acacia ancistrocarpa, A. inaequilatera, Corchorus tectus, Isotropis atropurpurea, Triodia lanigera
Associated species: Acacia adsurgens, A. pyrifolia, Boerhavia coccinea, Bonamia linearis, B. rosea, Bulbostylis barbata, Cleome uncifera, Corchorus sp., Cyperus blakeanus, Eriachne pulchella subsp. dominii, Fimbristylis dichotoma, Hakea lorea subsp. lorea, Heliotropium sp., Hybanthus aurantiacus, Indigofera monophylla, Mollugo molluginis, Ptilotus astrolasius var. astrolasius, P. calostachyus var. calostachyus, P. fusiformis var. fusiformis, Sida cardiophylla, Stemodia grossa, Tephrosia sp.

Bungaroo Creek (M.E.Trudgen 11601), Triumfetta aff. chaetocarpa (HD123)

FMG N-S Rail FMG038 Described by MM Date 24/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 706945mE, 7527173mN, 706997mE, 7527173mN, 706995mE, 7527123mN, 706945mE, 7527123mN
Habitat Stony plain
Vegetation *Acacia sclerosperma, Melaleuca glomerata* scattered shrubs to open shrubland over *Triodia longiceps* mid-dense hummock grassland
Veg Condition Very good Fire Age Burnt >4 years ago
Soil Type Red-brown clay loam with surface layer of quartzy stones Rock Type Quartz
Notes Stony plain fringing hills to west and bordering samphire flats to east.
Dominant species: Acacia sclerosperma subsp. sclerosperma, Melaleuca glomerata, Triodia longiceps
Associated species: Acacia aneura var. ?aneura/intermedia, A. bivenosa, A. tetragonophylla, Brachyachne prostrata, Bulbostylis barbata, Calandrinia sp., Cassia notabilis, C. oligophylla, *Cenchrus ciliaris, Cleome viscosa, Corchorus sidoides subsp. sidoides, Cucumis melo subsp. agrestis, Dactyloctenium radulans, Eragrostis eriopoda, E. falcata, Euphorbia aff. australis, E. biconvexa, E. boophthona, Evolvulus alsinoides var. villosicalyx, Goodenia cusackiana, G. forrestii, Gossypium australe (Burrup Peninsula form), Indigofera colutea, I. monophylla, Maireana carnosa, Paraneurachne muelleri, Polycarpaea corymbosa var. corymbosa, Portulaca oleracea, Pterocaulon ?sphaeranthoides x sphacelatum, Ptilotus astrolasius var. astrolasius, P. exaltatus var. exaltatus, P. gomphrenoides var. gomphrenoides, P. obovatus var. obovatus, Solanum sturtianum, Sporobolus australasicus, Stemodia grossa, Streptoglossa bubakii, Trachymene oleracea subsp. oleracea, Trianthema turgidifolia

FMG N-S Rail FMG039 Described by BM Date 21/03/04 Quadrat Size 43 x 50 m
AMG Zone 50 6821997mE, 7667181mN, 682184mE, 7667138mN, 682132mE, 7667162mN, 682152mE, 7667041mN
Habitat Very slight depression (broad) along a gently NW-facing slope
Vegetation *Sclerolaena hostilis, Pluchea ferdinandi-muelleri, Pluchea tetranthera* low shrubland over *Triodia epactia* mid-dense hummock grassland
Veg Condition Very good to Excellent (signs of cattle grazing). Fire Age Burnt 5-7 years ago
Soil Type Red-brown sand
Notes Very variable vegetation in this general area; dominants include *Acacia bivenosa, A. acradenia* or *Triodia angusta*.
Dominant species: Dactyloctenium radulans, Pluchea ferdinandi-muelleri, P. tetranthera, Sclerolaena hostilis, Triodia epactia
Associated species: Abutilon trudgenii, Acacia stellaticeps, Boerhavia coccinea, Bulbostylis barbata, Cleome viscosa, Corchorus tridens, Cyperus squarrosus, Eragrostis dielsii, E. leptocarpa, Euphorbia coghlanii, Fimbristylis dichotoma, Gossypium australe (Burrup Peninsula form), Paspalidium basicladum, Portulaca oleracea, Pterocaulon ?sphaeranthoides x sphacelatum, Solanum diversiflorum, Sporobolus australasicus, Stemodia grossa, Trianthema triquetra, Triodia angusta

FMG N-S Rail FMG040 Described by MM Date 25/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 706031mE, 7521322mN, 706081mE, 7521322mN, 706081mE, 7521272mN, 706031mE, 7521272mN
Habitat Clayey plain
Vegetation *Acacia xiphophylla* tall open shrubland over *Maireana triptera, M. pyramidata* low open shrubland and *Portulaca oleracea, Trianthema oxycalyptra* open herbland
Veg Condition Good to Very good; some small pockets of Buffel grass. Fire Age Burnt >5 years ago
Soil Type Red-brown clay loam with continuous surface layer of ironstone pebbles. Rock Type Ironstone
Dominant species: Acacia xiphophylla, Maireana pyramidata, M. triptera, Portulaca oleracea, Trianthema oxycalyptra var. oxycalyptra
Associated species: Abutilon sp., Acacia synchronicia, Aristida contorta, Atriplex bunburyana, Boerhavia coccinea, Boerhavia sp., Brachyachne prostrata, Cassia aff oligophylla (thinly sericeous form), *Cenchrus ciliaris, Cleome viscosa, Cucumis melo subsp. agrestis, Dactyloctenium radulans, Enchylaena tomentosa, Enneapogon polyphyllus, Enteropogon acicularis, Eremophila cuneifolia, E. forrestii subsp. forrestii, Goodenia prostrata, Maireana aff. georgei, M. tomentosa, Ptilotus exaltatus var. exaltatus, P. obovatus var. obovatus, Sclerolaena cuneata, Solanum lasiophyllum, Sporobolus australasicus, Trianthema triquetra, Tribulus astrocarpus, Xerochloa laniflora

FMG N-S Rail FMG041 Described by BM Date 23/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 705726mE, 7522412mN, 705727mE, 7522362mN, 705676mE, 7522362mN, 705677mE, 7522412mN
Habitat Flat area of gently undulating plain adjacent to samphire drainage basin.
Vegetation *Maireana* aff. *georgei* scattered low shrubs over *Triodia longiceps* mid-dense hummock grassland
Veg Condition Excellent Fire Age Burnt >7 years ago
Soil Type Red-brown gravelly pebbly clay-loam
Dominant species: Maireana aff. georgei, Triodia longiceps
Associated species: Acacia bivenosa, A. synchronicia, Brachyachne prostrata, Bulbostylis barbata, B. turbinata, Cassia notabilis, Centipeda minima, Cheilanthes sieberi subsp. sieberi, Enneapogon polyphyllus, Eragrostis cumingii, Eremophila cuneifolia, Eriachne pulchella subsp. dominii, Euphorbia boophthona, Polycarpaea corymbosa var. corymbosa, Portulaca oleracea, Pterocaulon ?sphaeranthoides x sphacelatum, Ptilotus exaltatus var. exaltatus, Sporobolus australasicus, Stemodia grossa, Trianthema oxycalyptra var. oxycalyptra, Xerochloa laniflora

FMG N-S Rail FMG042 Described by MM Date 25/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 708234mE, 7516612mN, 708274mE, 7516644mN, 708307mE, 7516605mN, 708266mE, 7516573mN
Habitat Clayey plain
Vegetation *Acacia aneura, A. pruinocarpa* tall open shrubland over *Dodonaea petiolaris* low open shrubland over *Aristida inaequiglumis, *Cenchrus ciliaris, Chrysopogon fallax* tussock grassland
Veg Condition Poor to Very Poor. Fire Age Burnt ~3 years ago
Soil Type Red-brown fine clay loam with continuous surface layer of ironstone pebbles
Notes Appears to be frequently burnt; quite a lot of buffel grass; possibly drainage shadow effects.
Dominant species: Acacia aneura var. ?aneura/intermedia, A. aneura var. ?, A. pruinocarpa, Aristida inaequiglumis, *Cenchrus ciliaris, Chrysopogon fallax, Dodonaea petiolaris
Associated species: Abutilon fraseri, A. otocarpum, Acacia ancistrocarpa, A. bivenosa, A. pyrifolia, Aristida contorta, *Bidens bipinnata, Boerhavia coccinea, Boerhavia sp., Cassia glaucifolia, C. oligophylla x helmsii, Cleome viscosa, Corchorus sp., Cucumis melo subsp. agrestis, Dactyloctenium radulans, Digitaria brownii, D. ctenantha, Enneapogon polyphyllus, Eremophila forrestii subsp. forrestii, Eriachne pulchella subsp. dominii, Eulalia aurea, Euphorbia biconvexa, Evolvulus alsinoides var. villosicalyx,

Glycine canescens, Gossypium australe (Burrup Peninsula form), Hibiscus sturtii var. platychlamys, Indigofera georgei, Iseilema eremaeum, Maireana planifolia, Mukia maderaspatana, Perotis rara, Portulaca oleracea, Psydrax latifolia, Pterocaulon ?sphaeranthoides x sphacelatum, Ptilotus exaltatus var. exaltatus, P. obovatus var. obovatus, Salsola tragus, Sida sp., Solanum lasiophyllum, Tragus australianus, Tribulus astrocarpus, T. macrocarpus, Trichodesma zeylanicum var. zeylanicum

FMG N-S Rail FMG043 Described by BM Date 24/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 714615mE, 7511275mN, 714615mE, 7511325mN, 714665mE, 7511325mN, 714665mE, 7511275mN
Habitat Flat plain
Vegetation *Corymbia deserticola* scattered low trees over *Acacia ancistrocarpa* tall open scrub over *Corchorus tectus, Dicrastylis georgei, Bonamia rosea* low open shrubland over *Triodia basedowii* mid-dense hummock grassland
Veg Condition Excellent Fire Age <4-5 years ago
Soil Type Red-brown gravelly sand Rock Type Very fine ironstone gravel on surface
Dominant species: Acacia ancistrocarpa, Bonamia rosea, Corchorus tectus, Corymbia deserticola, Dicrastylis georgei, Triodia basedowii
Associated species: Acacia adsurgens, A. coriacea subsp. pendens, A. inaequilatera, A. tumida, Anthobolus leptomerioides, Aristida holathera var. holathera, A. inaequiglumis, Cassia notabilis, C. oligophylla, Cleome viscosa, Cymbopogon bombycinus, C. obtectus, Eragrostis eriopoda, Eriachne aristidea, Gomphrena cunninghamii, Goodenia microptera, Hakea lorea subsp. lorea, Hybanthus aurantiacus, Indigofera monophylla, Portulaca oleracea, Ptilotus exaltatus var. exaltatus, P. polystachyus var. polystachyus, Sida aff. cardiophylla (site 1215), Solanum lasiophyllum

FMG N-S Rail FMG044 Described by MM Date 25/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 713476mE, 7511880mN, 713501mE, 7511924mN, 713546mE, 7511902mN, 713522mE, 7511857mN
Habitat Clayey plain
Vegetation *Acacia aneura, A. pruinocarpa* tall open shrubland over *Dodonaea petiolaris* scattered low shrubs over *Aristida inaequiglumis, Chrysopogon fallax* closed tussock grassland
Veg Condition Poor; has been repeatedly burnt, some Buffel grass invasion. Fire Age Burnt ?3-4 years ago
Soil Type Red-brown fine clay loam
Dominant species: Acacia aneura var. ?aneura/intermedia, A. aff. aneura (scythe-shaped; MET 15,743), A. pruinocarpa, Aristida inaequiglumis, *Cenchrus ciliaris, Chrysopogon fallax
Associated species: Abutilon fraseri, Abutilon sp., Acacia ancistrocarpa, A. tumida, Aristida contorta, A. holathera var. holathera, Cassia glaucifolia, C. glutinosa, C. helmsii, C. luerssenii, C. oligophylla, Chenopodium melanocarpum, Cleome viscosa, Corchorus sidoides subsp. sidoides, Dactyloctenium radulans, Digitaria brownii, D. ctenantha, Dodonaea petiolaris, Enneapogon polyphyllus, Eremophila forrestii subsp. forrestii, E. latrobei subsp. filiformis ms, Eriachne aristidea, E. mucronata, Euphorbia biconvexa, E. tannensis subsp. eremophila (Hamersley, Evolvulus alsinoides var. villosicalyx, Gossypium australe (Burrup Peninsula form), G. robinsonii, Hybanthus aurantiacus, Indigofera monophylla, Ipomoea muelleri, Iseilema eremaeum, Paspalidium rarum, Porana commixta, Portulaca oleracea, Psydrax latifolia, Pterocaulon ?sphaeranthoides x sphacelatum, Ptilotus exaltatus var. exaltatus, P. polystachyus var. polystachyus, Rhynchosia minima var. australis, Sida sp. 'rugose', Sida sp., Solanum lasiophyllum, Tephrosia sp., Tragus australianus, Trichodesma zeylanicum var. zeylanicum, Triodia pungens

FMG N-S Rail FMG045 Described by BM Date 25/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 719227mE, 7508766mN, 719227mE, 7508816mN, 719277mE, 7508816mN, 719277mE, 7508766mN
Habitat Flat plain
Vegetation *Acacia pruinocarpa, A. aneura* low open woodland over *Dodonaea petiolaris, Eremophila forrestii* open shrubland over *Sida* sp. low open shrubland over *Aristida inaequiglumis, Aristida contorta* open tussock grassland
Veg Condition Good to very good; some buffel grass present and numerous deaths of trees in mulga, apparently due to drainage shadow effect from existing rail line
Fire Age Burnt>5-7yearsago Soil Type Red-brown clay loam
Dominant species: Acacia aff. aneura (grey flat recurved tips; MET 15,828), A. pruinocarpa, Aristida contorta, A. inaequiglumis, *Cenchrus ciliaris, Dodonaea petiolaris, Eremophila forrestii subsp. forrestii, Sida sp.
Associated species: Abutilon fraseri, Abutilon sp., Acacia aneura var. ?aneura/intermedia, A. aff. aneura (scythe-shaped; MET 15,743), A. synchronicia, Anthobolus leptomerioides, Aristida holathera var. holathera, *Bidens bipinnata, Boerhavia coccinea, Cassia glutinosa, C. luerssenii, C. notabilis, C. aff. oligophylla (thinly sericeous form), Cleome viscosa, Corchorus sidoides subsp. sidoides, Cymbopogon obtectus, Digitaria ctenantha, Enneapogon caerulescens var. caerulescens, E. polyphyllus, Eremophila latrobei subsp. filiformis ms, Eriachne mucronata, Eulalia aurea, Euphorbia biconvexa, Evolvulus alsinoides var. villosicalyx, Glycine canescens, Hibiscus burtonii, H. gardneri, Maireana planifolia, Mukia maderaspatana, Portulaca oleracea, Pterocaulon ?sphaeranthoides x sphacelatum, Ptilotus exaltatus var. exaltatus, P. polystachyus var. polystachyus, Rhagodia eremaea, Rhynchosia minima var. australis, Sclerolaena cornishiana, Sida clementii, S. echinocarpa, Solanum lasiophyllum, Sporobolus australasicus, Tephrosia sp., Tribulus astrocarpus, T. macrocarpus, Trichodesma zeylanicum var. zeylanicum, Triodia basedowii, T. longiceps

FMG N-S Rail FMG046 Described by MM Date 26/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 722890mE, 7506782mN, 722942mE, 7506782mN, 722941mE, 7506732mN, 722891mE, 7506732mN
Habitat Broad drainage area within loamy plain.
Vegetation *Eucalyptus xerothermica, Corymbia hamersleyana (Eucalyptus victrix)* low open woodland over Acacia *ancistrocarpa* open shrubland over *Pluchea ferdinandi-muelleri* low open shrubland over *Triodia pungens, T. basedowii* hummock grassland and *Chrysopogon fallax* open tussock grassland
Veg Condition Very good; signs of cattle, but no weeds. Fire Age 3 years ago?
Soil Type Red brown sandy loam Notes Buffel only near road.
Dominant species: Acacia ancistrocarpa, Chrysopogon fallax, Corymbia hamersleyana, Eucalyptus xerothermica, Pluchea ferdinandi-muelleri, Triodia basedowii, T. pungens
Associated species: Acacia adsurgens, A. aneura var. ?, A. aneura var. ?aneura/intermedia, A. coriacea subsp. sericophylla, A. inaequilatera, A. sclerosperma subsp. sclerosperma, A. synchronicia, Anthobolus leptomerioides, Aristida holathera var. holathera, A. inaequiglumis, Bonamia rosea, Bulbostylis barbata, B. turbinata, Cassia glutinosa, C. notabilis, Chloris pectinata, Cleome viscosa, Corchorus tectus, Cymbopogon obtectus, Dactyloctenium radulans, Eragrostis falcata, Eriachne aristidea, Eucalyptus victrix, Eulalia aurea, Goodenia microptera, Hakea lorea subsp. lorea, Hibiscus burtonii, H. sturtii var. platychlamys, Indigofera monophylla, Petalostylis cassioides, Portulaca oleracea, Ptilotus astrolasius var. astrolasius, P. exaltatus var. exaltatus, Rhyncharrhena linearis, Sida arenicola, S. echinocarpa, Sida sp., Solanum lasiophyllum, Sporobolus australasicus, Trianthema triquetra, Tribulus macrocarpus

FMG N-S Rail FMG047 Described by BM Date 25/04/04 Quadrat Size 50 x 50 m

AMG Zone 50 724151mE, 7506087mN, 724151mE, 7506137mN, 724041mE, 7506137mN, 724041mE, 7506087mN
Habitat Very slight depression in a very gently undulating plain.
Vegetation *Eucalyptus gamophylla* low open mallee woodland over *Acacia sclerosperma* high open shrubland over *Triodia basedowii* mid-dense hummock grassland
Veg Condition Very good; some tracks nearby.
Soil Type Red-brown sand with covering of fine ironstone-derived sand.
Fire Age West side of plot burnt <3 years ago; remainder burnt >5-7 years ago.
Dominant species: Acacia sclerosperma subsp. sclerosperma, Eucalyptus gamophylla, Triodia basedowii
Associated species: Aristida inaequiglumis, Bonamia rosea, Corchorus tectus, Dicrastylis georgei, Eriachne aristidea, E. pulchella subsp. dominii, Goodenia microptera, G. stobbsiana, Hakea lorea subsp. lorea, Hibiscus brachychlaenus, Petalostylis cassioides, Portulaca sp., Ptilotus astrolasius var. astrolasius, P. exaltatus var. exaltatus, Scaevola parvifolia subsp. pilbarae, Sida aff. cardiophylla (site 1215), S. echinocarpa, Stylobasium spathulatum, Tephrosia sp.Bungaroo Creek(M.E.Trudgen 11601), Trianthema pilosa

FMG N-S Rail FMG048 Described by MM Date 26/03/04 Quadrat Size 35-50 x 65 m
AMG Zone 50 725804mE, 7506178mN, 725758mE, 7506221mN, 725786mE, 7506245mN, 725831mE, 7506204mN
Habitat 3-4 m tall sand dune
Vegetation *Acacia dictyophleba* tall shrubland over *Triodia basedowii, T. schinzii* hummock grassland
Veg Condition Good; signs of cattle and some Buffel grass, otherwise appears intact.
Fire Age Area containing plot was burnt >4 years ago; area east of track was burnt 1-2 years ago
Soil Type Red-brown fine sand
Dominant species: Acacia dictyophleba, Triodia basedowii, T. schinzii
Associated species: Acacia sclerosperma subsp. sclerosperma, Aristida holathera var. holathera, Bonamia rosea, Cassia notabilis, *Cenchrus ciliaris, Cleome viscosa, Corchorus tectus, Crotalaria cunninghamii, Eragrostis eriopoda, Eriachne aristidea, E. helmsii, Hakea lorea subsp. lorea, Hibiscus brachychlaenus, Indigofera monophylla, Petalostylis cassioides, Ptilotus polystachyus var. polystachyus, Scaevola parvifolia subsp. pilbarae, Sida aff. cardiophylla (site 1215), Solanum lasiophyllum, Stylobasium spathulatum, Trianthema pilosa, Yakirra australiensis var. australiensis

FMG N-S Rail FMG049 Described by BM Date 26/03/04 Quadrat Size 150 x 15-04 m
AMG Zone 50 727418mE, 7503392mN
Habitat Medium-sized creek bed and immediate banks
Vegetation *Acacia tumida* tall open scrub over *Waltheria indica* scattered low shrubs over **Cenchrus ciliaris, Aristida holathera* tussock grassland and *Triodia pungens* very open hummock grassland
Veg Condition Poor; invaded by Buffel grass. Fire Age Burnt >7 years ago
Soil Type Red-brown pebbly / cobbly loamy sand
Dominant species: Acacia tumida, Aristida holathera var. holathera, *Cenchrus ciliaris, Trichodesma zeylanicum var. zeylanicum, Triodia pungens, Waltheria indica
Associated species: Abutilon otocarpum, Acacia ancistrocarpa, A. dictyophleba, A. pruinocarpa, A. pyrifolia, Aristida contorta, Atalaya hemiglauca, *Bidens bipinnata, Boerhavia coccinea, Bonamia rosea, Cassia notabilis, Chrysopogon fallax, Cleome viscosa, Corchorus aff. lasiocarpus subsp. lasiocarpus, C. tectus, Cymbopogon sp., Digitaria brownii, D. ctenantha, Enneapogon clelandii, Eriachne aristidea, Euphorbia biconvexa, E. tannensis subsp. eremophila (Hamersley, Euphorbia sp. (site 1089), Glycine canescens, Gomphrena cunninghamii, Goodenia microptera, Gossypium robinsonii, Grevillea wickhamii, Heliotropium cunninghamii, Hybanthus aurantiacus, Indigofera monophylla, Mukia maderaspatana, Paspalidium rarum, Polymeria aff. calycina, Pterocaulon sphaeranthoides, Ptilotus astrolasius var. astrolasius, P. polystachyus var. polystachyus, *Setaria verticillata, Sida aff. cardiophylla (site 1215), Sida sp., Solanum phlomoides, Stemodia grossa, Stylobasium spathulatum, Tephrosia rosea var. glabrior, Themeda triandra, Tribulus macrocarpus, Triodia basedowii

FMG N-S Rail FMG050 Described by MM Date 27/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 726253mE, 7504562mN, 726303mE, 7504562mN, 726303mE, 7504512mN, 726253mE, 7504512mN
Habitat Sandy plain
Vegetation *Hakea lorea* scattered low trees to tall shrubs over *Acacia pachyacra, A. synchronicia* tall open shrubland over *Triodia lanigera* mid-dense hummock grassland
Veg Condition Good; scattered individuals of Buffel grass, plus 1 or 2 largish patches. Fire Age Burnt >5 ya
Soil Type Red-brown fine sandy loam
Dominant species: Acacia pachyacra, A. synchronicia, Hakea lorea subsp. lorea, Triodia lanigera
Associated species: Acacia ancistrocarpa, A. aff. aneura (grey flat recurved tips; MET 15,828, A. dictyophleba, A. inaequilatera, A. pruinocarpa, Aristida holathera var. holathera, A. latifolia, Boerhavia coccinea, Cassia notabilis, Cassia oligophylla, *Cenchrus ciliaris, Cleome viscosa, Corchorus tectus, Cullen leucochaites, Dactyloctenium radulans, Eragrostis eriopoda, Eriachne aristidea, Eucalyptus gamophylla, Mukia maderaspatana, Paspalidium basicladum, Portulaca oleracea, Psydrax latifolia, Pterocaulon ?sphaeranthoides x sphacelatum, Ptilotus polystachyus var. polystachyus, Rhagodia eremaea, Sida aff. cardiophylla (site 1215), Solanum lasiophyllum, Trianthema pilosa, Tribulopis angustifolia, Tribulus macrocarpus, T. terrestris, Trichodesma zeylanicum var. zeylanicum, Triodia schinzii

FMG N-S Rail FMG051 Described by BM Date 26/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 730919mE, 7500692mN, 730869mE, 7500692mN, 730868mE, 7500742mN, 730919mE, 7500742mN
Habitat Flat plain
Vegetation *Acacia synchronicia* tall shrubland over *Corchorus sidoides* subsp. *sidoides* scattered low shrubs over **Cenchrus ciliaris, Aristida holathera* tussock grassland
Veg Condition Poor; heavily infested with Buffel grass and heavy cattle grazing (150 m from stock watering point)
Fire Age Burnt >3-4 years ago Soil Type Red-brown clay
Dominant species: Acacia synchronicia, Aristida holathera var. holathera, *Cenchrus ciliaris, Corchorus sidoides subsp. sidoides, Cullen leucanthum, Dactyloctenium radulans
Associated species: Abutilon otocarpum, Abutilon sp., Acacia ancistrocarpa, A. aneura (flat curved; MET 15 548), A. dictyophleba, A. inaequilatera, A. pruinocarpa, A. contorta, Boerhavia coccinea, Cassia aff. oligophylla (thinly sericeous form), Chloris pectinata, Chrysopogon fallax, Cleome viscosa, Corchorus tridens, Cullen lachnostachys, Enneapogon polyphyllus, Eulalia aurea, Euphorbia sp. (site 1089), Euphorbia sp., Evolvulus alsinoides var. villosicalyx, Hakea lorea subsp. lorea, Indigofera linnaei, Iseilema eremaeum, *Malvastrum americanum, Perotis rara, Portulaca oleracea, Pterocaulon ?sphaeranthoides x sphacelatum, Ptilotus obovatus var. obovatus, Rhagodia eremaea, Rhynchosia minima var. australis, Sclerolaena cornishiana, Sida sp., Tragus australianus

FMG N-S Rail FMG052 Described by MM Date 27/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 730864mE, 7500256mN, 730913mE, 7500255mN, 730913mE, 7500045mN, 730864mE, 7500045mN
Habitat Plain
Vegetation *Acacia aneura* closed scrub over **Cenchrus ciliaris*, **C. setigerus* closed tussock grassland
Veg Condition Poor; heavily infested with weeds Fire Age No evidence of recent fire
Soil Type Red-brown fine clay loam
Dominant species: Acacia aneura var. ?aneura/intermedia, *Cenchrus ciliaris, *C. setigerus
Associated species: Abutilon fraseri, A. otocarpum, Abutilon sp., Acacia citrinoviridis, A. inaequilatera, Amaranthus sp., Amyema fitzgeraldii, Aristida holathera var. holathera, Boerhavia sp., Cassia oligophylla, C. aff. oligophylla (thinly sericeous form), Chenopodium melanocarpum, Chloris pectinata, Chrysopogon fallax, Cleome viscosa, Corchorus sidoides subsp. sidoides, C. tridens, Corymbia hamersleyana, Cucumis melo subsp. agrestis, Cullen leucanthum, Cullen sp., Dactyloctenium radulans, Dichanthium sericeum subsp. humilius, Enneapogon polyphyllus, Eremophila lanceolata ms, Eulalia aurea, Euphorbia coghlanii, Euphorbia sp. (site 1089), Evolvulus alsinoides var. villosicalyx, Gossypium australe (Burrup Peninsula form), Hakea lorea subsp. lorea, Ipomoea muelleri, Iseilema eremaeum, *Malvastrum americanum, Mukia maderaspatana, Nicotiana sp., Pluchea tetranthera, Porana commixta, Portulaca oleracea, Pterocaulon ?sphaeranthoides x sphacelatum, Ptilotus macrocephalus, P. obovatus var. obovatus, Rhynchosia minima var. australis, Salsola tragus, Sida sp., Solanum lasiophyllum, Tragus australianus

FMG N-S Rail FMG053 Described by BM Date 26/03/04 Quadrat Size 100 x 25 m
AMG Zone 50 725819mE, 7506463mN, 725832mE, 7506488mN, 725750mE, 7506544mN, 725735mE, 7506519mN
Habitat Upper slope and crest of low sand dune (orientated NW-SE)
Vegetation *Acacia dictyophleba, Stylobasium spathulatum* tall shrubland over *Crotalaria cunninghamii* scattered shrubs over *Triodia schinzii, T. basedowii* hummock grassland
Veg Condition Very good; some Buffel grass. Fire Age No evidence of recent fire
Soil Type Red sand
Dominant species: Acacia dictyophleba, Crotalaria cunninghamii, Stylobasium spathulatum, Triodia basedowii, T. schinzii
Associated species: Aristida holathera var. holathera, Boerhavia sp., Bonamia rosea, Cassia notabilis, *Cenchrus ciliaris, Cleome viscosa, Corchorus tectus, Eragrostis eriopoda, Eriachne aristidea, Hakea lorea subsp. lorea, Hibiscus brachychlaenus, Paractaenum refractum, Paraneurachne muelleri, Petalostylis cassioides, Ptilotus polystachyus var. polystachyus, Scaevola parvifolia subsp. pilbarae, Sida sp., Trianthema pilosa, Trichodesma zeylanicum var. grandiflorum

FMG N-S Rail FMG054 Described by MM Date 28/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 708846mE, 7538944mN, 708892mE, 7538964mN, 708914mE, 7538921mN, 708868mE, 7538898mN
Habitat Clayey plain
Vegetation *Acacia aneura* tall shrubland over *Acacia synchronicia* tall open shrubland over *Eremophila forrestii* scattered shrubs over *Aristida contorta* annual grassland
Veg Condition Very good; some **Bidens*, signs of cattle. Fire Age Burnt >5 years ago?
Soil Type Red-brown clay with continuous surface layer of ironstone pebbles
Dominant species: Acacia aneura var. ?aneura/intermedia, A. synchronicia, Aristida contorta, Boerhavia coccinea, Eremophila forrestii subsp. forrestii
Associated species: Abutilon sp., Acacia aff. catenulata, A. tetragonophylla, A. xiphophylla, *Bidens bipinnata, Boerhavia sp., Bulbostylis barbata, B. turbinata, Cassia helmsii, C. luerssenii, C. aff. oligophylla (thinly sericeous form), C. oligophylla x helmsii, *Cenchrus ciliaris, Chenopodium melanocarpum, Chrysopogon fallax, Cleome viscosa, Corchorus tridens, Cucumis melo subsp. agrestis, Cymbopogon ambiguus, Dichanthium sericeum subsp. humilius, Digitaria ctenantha, Dodonaea petiolaris, Enneapogon polyphyllus, Eragrostis leptocarpa, E. setifolia, E. tenellula, Eremophila lanceolata ms, E. latrobei subsp. filiformis ms, E. longifolia, Eriachne mucronata, E. pulchella subsp. dominii, Euphorbia aff. australis, E. biconvexa, Evolvulus alsinoides var. villosicalyx, Gomphrena affinis subsp. pilbarensis, G. cunninghamii, G. kanisii, Goodenia prostrata, Heliotropium heteranthum, Hibiscus burtonii, H. sturtii var. aff. Campylochlamys (FMG 55-21), Indigofera linifolia, Iseilema vaginiflorum, Mukia maderaspatana, Paspalidium clementii, Perotis rara, Polycarpaea corymbosa var. corymbosa, Portulaca oleracea, Psydrax latifolia, Pterocaulon ?sphaeranthoides x sphacelatum, Ptilotus aervoides, P. exaltatus var. exaltatus, P. gomphrenoides var. gomphrenoides, P. helipteroides var. helipteroides, Sclerolaena cornishiana, Sida sp., Solanum horridum, S. lasiophyllum, Spermacoce brachystema, Sporobolus australasicus, Stemodia grossa, Streptoglossa bubakii, Tephrosia sp., Tragus australianus, Tribulus astrocarpus, Urochloa gilesii subsp. gilesii (hairy florets)

FMG N-S Rail FMG055 Described by BM Date 27/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 708985mE, 7540541mN, 708985mE, 7540591mN, 709035mE, 7540591mN, 709035mE, 7540541mN
Habitat Flat plain
Vegetation *Acacia aneura* low open forest over *Eremophila forrestii, Dodonaea petiolaris* open shrubland over *Aristida contorta, Digitaria ctenantha* grassland
Veg Condition Very good to excellent Fire Age Burnt >7 years ago Soil Type Red clay
Dominant species: Acacia aneura (flat curved; MET 15 548), Aristida contorta, Boerhavia coccinea, Digitaria ctenantha, Dodonaea petiolaris, Eremophila forrestii subsp. forrestii
Associated species: Abutilon macrum, A. otocarpum, Abutilon sp., Acacia pruinocarpa, A. synchronicia, A. tetragonophylla, Amaranthus sp., Anthobolus leptomerioides, Aristida inaequiglumis, A. latifolia, A. obscura, *Bidens bipinnata, Bulbostylis turbinata, Calandrinia sp., Cassia luerssenii, C. oligophylla (thinly sericeous form), C. aff. oligophylla (thinly sericeous form), *Cenchrus ciliaris, Cheilanthes sieberi subsp. sieberi, Chenopodium melanocarpum, Chloris pectinata, Chrysopogon fallax, Cleome viscosa, Convolvulus angustissimus subsp. angustissimus, Corchorus tridens, Cucumis melo subsp. agrestis, Cymbopogon ambiguus, Cyperus iria, Dichanthium sericeum subsp. humilius, Digitaria brownii, Enchylaena tomentosa Enneapogon caerulescens var. caerulescens, E. polyphyllus, Eragrostis cumingii, E. tenellula, Eremophila lanceolata ms, E. latrobei subsp. filiformis ms, Eriachne mucronata, Eulalia aurea, Euphorbia coghlanii, Euphorbia sp., Evolvulus alsinoides var. villosicalyx, Fimbristylis dichotoma, Gomphrena cunninghamii, G. kanisii, Goodenia prostrata, Gossypium australe (Burrup Peninsula form), Hakea lorea subsp. lorea, Heliotropium sp., Hibiscus burtonii, H. aff. coatesii, H. sturtii var. aff. Campylochlamys (FMG 55-21), Iseilema vaginiflorum, Maireana planifolia, *Malvastrum americanum, Nicotiana sp., Paspalidium clementii, P. rarum, Perotis rara, Phyllanthus erwinii, Polycarpaea corymbosa var. corymbosa, Porana commixta, Portulaca oleracea, Psydrax latifolia, P. suaveolens, Pterocaulon ?sphaeranthoides x sphacelatum, Ptilotus exaltatus var. exaltatus, P. gaudichaudii var. gaudichaudii, P. gomphrenoides var. gomphrenoides, P. helipteroides var. helipteroides, P. obovatus var. obovatus, Rhagodia eremaea, Rhynchosia sp. King Bay (B181-13), Salsola tragus, Sclerolaena cornishiana, *Setaria verticillata, Sida sp., Solanum horridum, S. lasiophyllum, Sporobolus australasicus, Stemodia grossa, Tribulus astrocarpus, Trichodesma zeylanicum var. zeylanicum

FMG N-S Rail FMG056 Described by MM Date 29/03/04 Quadrat Size 50 x 50 m

AMG Zone 50 708822mE, 7568345mN, 708872mE, 7568345mN, 708872mE, 7568295mN, 708822mE, 7568295mN
Habitat Stony plain (gently undulating)
Vegetation *Acacia inaequilatera* scattered tall shrubs to tall open shrubland over *Gossypium australe, Indigofera monophylla* low open shrubland over *Triodia epactia* hummock grassland
Veg Condition Very good; very occasional Kapok and Buffel grass individuals Fire Age Burnt >5 years ago
Soil Type Orange-brown sandy loam with continuous surface layer of granite-derived gravel, pebbles and stones.
Notes Scattered **Aerva javanica* around airstrip.
Dominant species: Acacia inaequilatera, Gossypium australe (Burrup Peninsula form), Indigofera monophylla, Triodia epactia
Associated species: Acacia bivenosa, A. pruinocarpa, *Aerva javanica, Amyema preissii, Aristida contorta, Boerhavia coccinea, Bonamia media var. villosa, Bulbostylis barbata, Cassia glutinosa, C. helmsii, *Cenchrus ciliaris, Chrysopogon fallax, Cleome viscosa, Corchorus aff. walcottii (H251-3), Crotalaria medicaginea, Dactyloctenium radulans, Ehretia saligna var. saligna, Enneapogon caerulescens var. caerulescens, Eragrostis cumingii, E. eriopoda, Euphorbia sp. (site 1089), Evolvulus alsinoides var. villosicalyx, Fimbristylis dichotoma, Gomphrena cunninghamii, Goodenia microptera, Heliotropium tenuifolium, Indigofera colutea, I. linifolia, Mollugo molluginis, Perotis rara, Phyllanthus erwinii, Polycarpaea corymbosa var. corymbosa, P. holtzei, Sida sp., Tephrosia aff. supina (HD237-23), Tephrosia sp., Trachymene oleracea subsp. oleracea, Trichodesma zeylanicum var. zeylanicum, Yakirra australiensis var. australiensis

FMG N-S Rail FMG057 Described by BM Date 28/03/04 Quadrat Size 50 x 40 m
AMG Zone 50 704256mE, 7575040mN, 704223mE, 7575016mN, 704189mE, 7575053mN, 704222mE, 7575077mN
Habitat Hill crest and upper slope (SW facing)
Vegetation *Corymbia hamersleyana* scattered low trees over *Acacia orthocarpa* tall open scrub over *Indigofera monophylla* scattered low shrubs over *Triodia lanigera* mid-dense hummock grassland
Veg Condition Excellent Fire Age Burnt < 5 years ago.
Soil Type Brown gravelly pebbly sand Rock Type Quartz rock (cobbles and pebbles present).
Notes Irregular plot size because general area undulating and dissected; area to NE was burnt; and vegetation changes to NW and SE.
Dominant species: Acacia orthocarpa, Corymbia hamersleyana, Indigofera monophylla, Triodia lanigera
Associated species: Acacia maitlandii, A. pyrifolia, Bulbostylis barbata, Dysphania rhadinostachya, Eriachne pulchella subsp. dominii, Euphorbia sp. (site 1089), Fimbristylis dichotoma, Gomphrena cunninghamii, Goodenia stobbsiana, G. triodiophila, Hybanthus aurantiacus, Polycarpaea corymbosa var. corymbosa, P. holtzei, Portulaca oleracea, Ptilotus fusiformis var. fusiformis, Salsola tragus, Triodia epactia, Tripogon loliiformis

FMG N-S Rail FMG058 Described by MM Date 31/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 707715mE, 7554000mN, 707764mE, 7554000mN, 707765mE, 7553950mN, 707714mE, 7553950mN
Habitat Clayey upland area
Vegetation *Astrebla pectinata* tussock grassland
Veg Condition Very good to excellent; signs of cattle Fire Age No evidence of recent fire
Soil Type Red-brown clay with numerous stones and rocks Rock Type Basalt
Dominant species: Astrebla pectinata
Associated species: Alysicarpus muelleri, Aristida latifolia, Boerhavia sp., Chionachne hubbardiana, Cleome viscosa, Commelina ensifolia, Corchorus tridens, Crotalaria dissitiflora subsp. benthamiana, C. medicaginea, Cucumis melo subsp. agrestis, Desmodium aff. campylocaulon, D. muelleri, Digitaria ctenantha, Eragrostis setifolia, Eriachne mucronata, Euphorbia coghlanii, Flaveria sp.Tom Price(M.E.Trudgen 11246), Goodenia muelleriana, Heliotropium crispatum, Hibiscus brachysiphonius, Ipomoea lonchophylla, Mukia sp.D Flora of Australia (A.A. Mitchell PRP 1121), Oldenlandia sp. 'gilgai', Operculina aequisepala, Panicum laevinode, Phyllanthus maderaspatensis, Polygala sp., Ptilotus gomphrenoides var. gomphrenoides, Rhynchosia minima var. australis, Sida sp., Streptoglossa bubakii, Striga curviflora, Swainsona sp.Hamersley Station (A.A. Mitchell 196), Trichodesma zeylanicum var. latisepalum, Vigna sp. Central(M.E. Trudgen 1626)

FMG N-S Rail FMG059 Described by BM Date 30/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 707566mE, 7554044mN, 707566mE, 7554094mN, 707616mE, 7554094mN, 707616mE, 7554044mN
Habitat Clayey upland area (W-facing)
Vegetation *Vigna* sp. Central (M.E. Trudgen 1626), *Kennedia* sp. Barowana Hill (M.E. Trudgen 15,617), *Cucumis melo* subsp. *agrestis*, *Heliotropium crispatum* open herbland to herbland
Veg Condition Excellent Fire Age No evidence of recent fire Soil Type Red clay
Notes Cracking clay plant communities vary in structure (dominants) greatly over space. This area was fairly consistent.
Dominant species: Cucumis melo subsp. agrestis, Euphorbia coghlanii, Heliotropium crispatum, Kennedia sp. Barowana Hill (M.E. Trudgen 15,617), Vigna sp. Central(M.E. Trudgen 1626)
Associated species: Alysicarpus muelleri, Aristida latifolia, Astrebla pectinata, Boerhavia sp., Cassia helmsii, Cleome viscosa, Commelina ensifolia, Corchorus tridens, Crotalaria medicaginea, Eriachne mucronata, Flaveria sp.Tom Price (M.E. Trudgen 11246), Goodenia muelleriana, Heliotropium sp., Indigofera trita, Mukia sp.D Flora of Australia (A.A. Mitchell PRP 1121), Neptunia dimorphantha, Oldenlandia sp. 'gilgai', Phyllanthus maderaspatensis, Polygala sp., Ptilotus carinatus, P. gomphrenoides var. gomphrenoides, Sida sp., Streptoglossa bubakii, Striga curviflora, Swainsona sp.Hamersley Station(A.A.Mitchell 196), Tephrosia aff. clementii (9) (HD284-6), Tephrosia sp., Trichodesma zeylanicum var. latisepalum

FMG N-S Rail FMG060 Described by KM and RO Date 23/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 706086mE, 7522639mN, 706136mE, 7522646mN, 706141mE, 7522597mN, 706091mE, 7522590mN
Habitat Low rise on a broad plain.
Vegetation *Corchorus sidoides* subsp. *sidoides* low shrubland over *Triodia longiceps* mid-dense hummock grassland
Veg Condition Very good; occasional Buffel grass. Fire Age Burnt 3-4 years ago.
Soil Type Pink-brown clay loam; hard surface crust with loose calcrete on surface. Rock Type Calcrete
Notes Total vegetation cover in quadrat approx. 70%
Dominant species: Corchorus sidoides subsp. sidoides, Eragrostis eriopoda, Triodia longiceps
Associated species: Alysicarpus muelleri, Boerhavia coccinea, Cassia oligophylla, *Cenchrus ciliaris, Eremophila longifolia, Goodenia forrestii, G. omearana, Heliotropium chrysocarpum, Hibiscus sturtii var. aff. campylochlamys (FMG 55-21), Hybanthus aurantiacus, Melaleuca glomerata, Paraneurachne muelleri, Polygala aff. isingii, Pterocaulon sphaeranthoides, Rhynchosia

minima var. australis, Sida echinocarpa, S. sp.Wittenoom (W.R. Barker 1962), Sporobolus actinocladus, Stemodia grossa, Tephrosia sp., Trianthema triquetra

FMG N-S Rail FMG061 Described by KM Date 23/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 706044mE, 7522499mN, 706093mE, 7522494mN, 706086mE, 7522441mN, 706037mE, 7522449mN
Habitat Low-lying plain
Vegetation *Triodia longiceps* open hummock grassland
Veg Condition Excellent Fire Age No evidence of recent fire
Soil Type Orange-brown clayey sand with patches of clay. Rock Type Mix; quartz (from granite)
Dominant species: Eragrostis falcata, Sporobolus australasicus, Triodia longiceps
Associated species: Atriplex codonocarpa, Brachyachne prostrata, Bulbostylis barbata, B. turbinata, Calandrinia sp., Crotalaria medicaginea, Dactyloctenium radulans, Eragrostis dielsii, Maireana sp. nov. aff luehmannii, Melaleuca glomerata, Pluchea ferdinandi-muelleri, Portulaca oleracea, Salsola tragus, Sclerolaena cuneata, S. eriacantha, Streptoglossa bubakii, Trianthema oxycalyptra var. oxycalyptra, T. triquetra, T. turgidifolia

FMG N-S Rail FMG063 Described by KM and RO Date 24/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 749048mE, 7481394mN, 749255mE, 7481400mN, 749265mE, 7481358mN, 749216mE, 7481349mN
Habitat Mildly sloping plain
Vegetation *Acacia dictyophleba, Grevillea wickhamii, Hakea chordophylla* tall open shrubland over *Triodia basedowii* mid-dense hummock grassland
Veg Condition Excellent Fire Age No evidence of recent fire
Soil Type Red sandy clay with small amount of ironstone pebbles on surface. Rock Type Ironstone
Dominant species: Acacia dictyophleba, Grevillea wickhamii subsp. hispidula, Hakea chordophylla, Triodia basedowii
Associated species: Acacia pachyacra, Aristida holathera var. holathera, Cassia notabilis, Corchorus sidoides subsp. sidoides, Cullen leucochaites, Cymbopogon ?obtectus, Eriachne aristidea, Euphorbia sp., Goodenia microptera, Indigofera sp., Petalostylis cassioides, Pterocaulon ?sphaeranthoides x sphacelatum, Ptilotus aervoides, P. calostachyus var. calostachyus, P. polystachyus var. polystachyus, Scaevola parvifolia subsp. pilbarae, Sida aff. cardiophylla (site 1215), Tephrosia sp. Bungaroo Creek (M.E. Trudgen 11601), Trianthema pilosa, Trichodesma zeylanicum var. zeylanicum, Triodia schinzii

FMG N-S Rail FMG064 Described by KM Date 24/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 749010mE, 7480701mN, 749050mE, 7480732mN, 749082mE, 7480695mN, 749043mE, 7480661mN
Habitat Mid-slope of ironstone range.
Vegetation *Eucalyptus leucophloia* low open woodland over *Acacia hilliana* low shrubland over *Triodia* aff. *basedowii* closed hummock grassland
Veg Condition Excellent Fire Age No evidence of recent fire
Soil Type Red stony (80% coarse fraction) sandy clay loam. Rock Type Ironstone
Dominant species: Acacia hilliana, Eucalyptus leucophloia, Fimbristylis sp., Triodia aff. basedowii
Associated species: Acacia adoxa var. adoxa, A. bivenosa, A. dictyophleba, Amphipogon caricinus, Aristida holathera var. holathera, Cassia glutinosa, C. oligophylla, C. pruinosa, Dampiera candicans, Dodonaea coriacea, Eriachne lanata, E. mucronata, E. pulchella subsp. dominii, Gompholobium polyzygum, Goodenia stobbsiana, Grevillea wickhamii, Hakea chordophylla, Heliotropium tenuifolium, Paraneurachne muelleri, Ptilotus calostachyus var. calostachyus, Tephrosia sp. Pilbara Ranges (S. van Leeuwen 4246), Trianthema glossostigma, Tribulus suberosus

FMG N-S Rail FMG065 Described by KM and RO Date 24/03/04 Quadrat Size 50 x 50 m
AMG Zone 50 747802mE, 7482948mN, 747850mE, 7482965mN, 747866mE, 7482918mN, 747817mE, 7482900mN
Habitat Mildly sloping sand plain
Vegetation *Corymbia hamersleyana* scattered trees over *Acacia dictyophleba, A. pachyacra* tall shrubland over *Corchorus tectus* low open shrubland over *Triodia schinzii* mid-dense hummock grassland
Veg Condition Very good; scattered Buffel grass. Fire Age No evidence of recent fire
Soil Type Red fine grained clayey sand over clay. Rock Type Ironstone
Dominant species: Acacia dictyophleba, Corchorus tectus, Corymbia hamersleyana, Triodia schinzii
Associated species: Acacia pachyacra, Anthobolus leptomerioides, Aristida holathera var. holathera, Bonamia rosea, Cassia notabilis, *Cenchrus ciliaris, Cleome viscosa, Dicrastylis cordifolia, Eragrostis eriopoda, Eriachne aristidea, Gomphrena cunninghamii, Scaevola parvifolia subsp. pilbarae, Sida aff. cardiophylla (site 1215), Solanum lasiophyllum, Trianthema pilosa, Tribulus hirsutus, Trichodesma zeylanicum var. zeylanicum, Triodia basedowii, Yakirra australiensis var. australiensis

FMG N-S Rail FMG066 Described by RO Date 25/03/04 Quadrat Size 50m x 50m
AMG Zone 50 739192mE, 7491681mN, 739234mE, 7491655mN, 739049mE, 7491613mN, 739166mE, 7491638mN
Habitat Flat clayey plain (alluvial).
Vegetation *Acacia aneura, A. pruinocarpa* low open woodland over *Corchorus sidoides* subsp. *sidoides*, *Sida platycalyx* low shrubland over *Triodia pungens* hummock grassland and open mixed herbland.
Veg Condition Good to Very Good. Fire Age No evidence of recent fire.
Soil Type Red alluvial clay. Rock Type Ironstone
Dominant species: Acacia aneura (flat curved; MET 15 548), A. aneura var. ?, A. pruinocarpa, Aristida contorta, Corchorus sidoides subsp. sidoides, Sida platycalyx, Triodia pungens
Associated species: Abutilon otocarpum, Abutilon sp., A. tumida var. pilbarensis, Aristida holathera var. holathera, Boerhavia coccinea, Boerhavia sp., Cassia helmsii, C. notabilis, *Cenchrus ciliaris, Chloris pectinata, C. virgata, Chrysopogon fallax, Cleome oxalidea, C. viscosa, Dactyloctenium radulans, Digitaria brownii, Enneapogon polyphyllus, Eragrostis eriopoda, Eremophila forrestii subsp. forrestii, E. lanceolata ms, Eriachne aristidea, E. pulchella subsp. pulchella, Euphorbia coghlanii, Evolvulus alsinoides var. villosicalyx, Goodenia prostrata, Heliotropium inexplicitum, Hibiscus sturtii var. platychlamys, Indigofera colutea, I. linifolia, I. linnaei, Iseilema dolichotrichum, *Malvastrum americanum, Mukia maderaspatana, Paspalidium rarum, Perotis rara, Portulaca oleracea, Pterocaulon ?sphaeranthoides x sphacelatum, Ptilotus exaltatus var. exaltatus, P. helipteroides var. helipteroides, Salsola tragus, Sclerolaena cornishiana, Sida sp. Wittenoom (W.R. Barker 1962), Sida sp., Solanum lasiophyllum, Tephrosia sp., Trianthema pilosa, Tribulus astrocarpus, T. macrocarpus, Trichodesma zeylanicum var. zeylanicum

FMG N-S Rail FMG067 Described by RO Date 27/03/04 Quadrat Size 50m x 50m

AMG Zone 50 709109mE, 7541758mN, 709156mE, 7541774mN, 709175mE, 7541728mN, 709130mE, 7541712mN
Habitat Hilltop (lower rise)
Vegetation *Corymbia deserticola, Eucalyptus leucophloia* scattered low trees over *Acacia atkinsiana, A. arida* shrubland to tall shrubland over *Triodia lanigera* hummock grassland
Veg Condition Excellent - no signs of weeds or grazing; disturbance by fire only. Fire Age Burnt ~1 year ago.
Soil Type Red fine-grained clay with ironstone pebbles on surface Rock Type Ironstone
Dominant species: Acacia arida, A. atkinsiana, Corymbia deserticola, Eucalyptus leucophloia, Triodia lanigera
Associated species: Acacia adoxa var. adoxa, A. maitlandii, A. marramamba, Bulbostylis barbata, Calytrix carinata, Cassia glutinosa, C. luerssenii, C. notabilis, Corchorus aff. lasiocarpus subsp. lasiocarpus, C. aff. lasiocarpus subsp. parvus, Dampiera candicans, Eriachne lanata, E. pulchella subsp. dominii, Gompholobium polyzygum, Gomphrena cunninghamii, Goodenia stobbsiana, G. triodiophila, Grevillea wickhamii, Hakea chordophylla, Hibiscus aff. sturtii, Hybanthus aurantiacus, Indigofera monophylla, Petalostylis labicheoides, Polycarpaea holtzei, Pterocaulon ?sphaeranthoides x sphacelatum, Ptilotus astrolasius var. astrolasius, P. calostachyus var. calostachyus, P. fusiformis var. fusiformis, Rhyncharrhena linearis, Scaevola aff. browniana, Sida arenicola, Solanum phlomoides, Triodia pungens

FMG N-S Rail FMG068 Described by KM Date 26/03/04 Quadrat Size 50m x 50m
AMG Zone 50 742404mE, 7487958mN, 742444mE, 7487926mN, 742414mE, 7487887mN, 742374mE, 7487916mN
Habitat Plain
Vegetation *Corymbia hamersleyana* scattered low trees over *Acacia inaequilatera* high open shrubland over *Acacia pachyacra* open shrubland over *Triodia pungens* open hummock grassland
Veg Condition Excellent to Very good; evidence of cattle Fire Age Burnt >5 years ago
Soil Type Red sandy clay with a surface layer of loose sand Rock Type Ironstone
Notes *Acacia pruinocarpa* occasionally replaces *A. inaequilatera*. *Triodia* cover variable - in clumps or scattered, with some areas without.
Dominant species: Acacia inaequilatera, A. pachyacra, Aristida holathera var. holathera, Corymbia hamersleyana, Eragrostis eriopoda, Paraneurachne muelleri, Triodia pungens
Associated species: Abutilon sp., Acacia arida, A. sclerosperma subsp. sclerosperma, Boerhavia coccinea, Cassia helmsii, C. luerssenii, C. notabilis, *Cenchrus ciliaris, Cleome viscosa, Corchorus sidoides subsp. sidoides, Eriachne aristidea, Euphorbia coghlanii, Euphorbia sp. (site 1089), Euphorbia sp., Evolvulus alsinoides var. villosicalyx, Gomphrena cunninghamii, Goodenia microptera, G. prostrata, Hakea lorea subsp. lorea, Hibiscus leptocladus, H. sturtii var. platychlamys, Indigofera monophylla, *Malvastrum americanum, Perotis rara, Portulaca oleracea, Ptilotus astrolasius var. astrolasius, P. exaltatus var. exaltatus, P. helipteroides var. helipteroides, Ptilotus polystachyus var. polystachyus, Sida echinocarpa, S. platycalyx, Solanum lasiophyllum, Tephrosia sp. Bungaroo Creek (M.E.Trudgen 11601), Tephrosia sp., Trianthema pilosa, Tribulus macrocarpus, Trichodesma zeylanicum var. zeylanicum, Waltheria indica, Yakirra australiensis var. australiensis

FMG N-S Rail FMG069 Described by RO Date 28/03/04 Quadrat Size 50m x 50m
AMG Zone 50 706476mE, 7557321mN, 706481mE, 7557271mN, 706530mE, 7557275mN, 706527mE, 7557325mN
Habitat Low stony hill
Vegetation *Eucalyptus leucophloia* low open woodland over *Acacia hilliana* low shrubland over *Triodia lanigera* mid-dense hummock grassland
Veg Condition Excellent; some earthworks near rail. Fire Age No evidence of recent fire
Soil Type Red sandy clay loam with high coarse fraction (>80%) Rock Type Ironstone
Dominant species: Acacia hilliana, Eucalyptus leucophloia, Fimbristylis dichotoma, Indigofera monophylla, Triodia lanigera
Associated species: Acacia adoxa var. adoxa, A. inaequilatera, A. monticola, A. pruinocarpa, A. tenuissima, Bonamia rosea, Cassia glutinosa, C. luerssenii, Clerodendrum floribundum var. angustifolium, Corymbia hamersleyana, Dicladanthera forrestii, Evolvulus alsinoides var. villosicalyx, Goodenia stobbsiana, Hibiscus aff. sturtii, Hybanthus aurantiacus, Iseilema dolichotrichum, Panicum decompositum, Paspalidium clementii, Polycarpaea holtzei, Ptilotus fusiformis var. fusiformis, Rhagodia eremaea, Sida excedentifolia, Tephrosia aff. supina (HD133-20), Themeda triandra, Trachymene oleracea subsp. oleracea

FMG N-S Rail FMG070 Described by KM Date 27/03/04 Quadrat Size 50m x 50m
AMG Zone 50 709187mE, 7533867mN, 709235mE, 7533875mN, 709242mE, 7533824mN, 709193mE, 7533819mN
Habitat Prominent low stony hill within mulga flats
Vegetation *Corymbia deserticola* low open woodland over *Acacia arrecta* low shrubland over *Triodia brizoides* closed hummock grassland
Veg Condition Excellent Fire Age No evidence
Soil Type Red sandy clay loam with high coarse fraction (>80%; stones and rocks)
Rock Type Ironstone and ?granite
Dominant species: Acacia arrecta, Corymbia deserticola, Triodia brizoides
Associated species: Acacia aff. aneura (grey flat recurved tips; MET 15,828), A. pruinocarpa, Amaranthus sp., Anthobolus leptomerioides, Bonamia media var. villosa, B. rosea, Calytrix carinata, Cassia glutinosa, C. luerssenii, Corchorus aff. lasiocarpus subsp. parvus, Corymbia candida, Cucumis melo subsp. agrestis, Euphorbia boophthona, Fimbristylis dichotoma, F. simulans, Grevillea berryana, Hakea chordophylla, Indigofera monophylla, Mollugo molluginis, Polygala aff. isingii, Ptilotus calostachyus var. calostachyus, Solanum lasiophyllum, Trachymene oleracea subsp. oleracea

FMG N-S Rail FMG071 Described by RO Date 30/03/04 Quadrat Size 50m x 50m
AMG Zone 50 706873mE, 7556562mN, 706904mE, 7556543mN, 706851mE, 7556517mN
Habitat Cracking clay plain - gentle slope
Vegetation *Astrebla pectinata, A. elymoides* open tussock grassland
Veg Condition Excellent; signs of cattle, but no obvious grazing effects Fire Age No evidence of recent fire
Soil Type Red Fine-grained clay Rock Type Ironstone
Notes Surrounded by low hill and snakewood-dominated lower drainage areas
Dominant species: Astrebla pectinata, A. elymoides, Polymeria lanata
Associated species: Acacia synchronicia, Alysicarpus muelleri, Boerhavia sp., Brachyachne convergens, Cleome viscosa, Commelina ensifolia, Corchorus tridens, Crotalaria dissitiflora subsp. benthamiana, C. medicaginea, Cucumis melo subsp. agrestis, Dichanthium sericeum subsp. humilius, Eragrostis xerophila, Euphorbia coghlanii, Euphorbia sp., Flaveria sp. Tom Price (M.E. Trudgen 11246), Goodenia muelleriana, Heliotropium crispatum, Hibiscus brachysiphonius, Iseilema vaginiflorum, Mukia sp.D Flora of Australia(A.A.Mitchell PRP 1121), Oldenlandia sp. 'gilgai', Operculina aequisepala, Phyllanthus maderaspatensis,

Polygala sp., Ptilotus carinatus, P. gomphrenoides var. gomphrenoides, Rhynchosia sp. King Bay (B181-13), Sporobolus australasicus, Streptoglossa bubakii, Striga curviflora, Swainsona sp. Hamersley Station (A.A. Mitchell 196), Trichodesma zeylanicum var. latisepalum

FMG N-S Rail FMG072 Described by KM Date 27/03/04 Quadrat Size 25m x 100m
AMG Zone 50 708899mE, 7540463mN, 708996mE, 7540496mN, 709005mE, 7540472mN, 708906mE, 7540439mN
Habitat Broad creek bed and immediate bank
Vegetation *Corymbia hamersleyana* scattered low trees over *Acacia tumida, Grevillea wickhamii, Gossypium robinsonii, Petalostylis labicheoides* shrubland over *Triodia epactia* open hummock grassland
Veg Condition Excellent Fire Age Burnt 1-2 years ago
Soil Type Red stony sand with some clay patches Rock Type Ironstone
Notes Steep-sided creek - no broad floodbanks
Dominant species: Acacia tumida, Corymbia hamersleyana, Eragrostis tenellula, Gompholobium polyzygum, Gossypium robinsonii, Grevillea wickhamii, Petalostylis labicheoides, Triodia epactia
Associated species: Acacia hilliana, A. maitlandii, A. monticola, A. pyrifolia, Aristida latifolia, Bulbostylis barbata, Cassia glutinosa, C. oligophylla, C. pruinosa, Clerodendrum floribundum var. angustifolium, Corchorus sp., Cymbopogon ambiguus, Dampiera candicans, Digitaria brownii, Enneapogon polyphyllus, Eragrostis cumingii, Eriachne mucronata, E. pulchella subsp. dominii, Evolvulus alsinoides var. villosicalyx, Ficus brachypoda, Gomphrena cunninghamii, Hakea chordophylla, Hibiscus aff. sturtii, Hybanthus aurantiacus, Jasminum didymum subsp. lineare, Paraneurachne muelleri, Paspalidium clementii, Phyllanthus erwinii, Porana commixta, Ptilotus astrolasius var. astrolasius, P. clementii, P. obovatus var. obovatus, Rulingia kempeana, Santalum lanceolatum, Sida cardiophylla, S. echinocarpa, Sida sp. A Kimberley Flora (P.A. Fryxell & L.A. Craven), Sida sp., Solanum horridum, S. lasiophyllum, Sporobolus australasicus, Tephrosia rosea var. glabrior, T. aff. uniovulata (HD76), Themeda triandra, Triumfetta clementii, T. maconochieana

FMG N-S Rail FMG073 Described by RO Date 30/03/04 Quadrat Size 50m x 50m
AMG Zone 50 706242mE, 7557584mN, 706295mE, 7557593mN, 706298mE, 7557542mN, 706247mE, 7557534mN
Habitat Low hill crest - gradual slope
Vegetation *Acacia inaequilatera* scattered tall shrubs over *Cassia glutinosa* scattered shrubs over *Triodia lanigera, T. epactia* mid-dense hummock grassland
Veg Condition Excellent Fire Age No evidence of recent fire
Soil Type Red fine-grained clay with quartz and ironstone pebbles on surface
Dominant species: Acacia inaequilatera, Cassia glutinosa, Triodia epactia, T. lanigera
Associated species: Acacia hilliana, A. monticola, Aristida contorta, Bonamia media var. villosa, Bulbostylis barbata, Cassia luerssenii, C. oligophylla, C. pruinosa, Corchorus lasiocarpus subsp. lasiocarpus, Corymbia hamersleyana, Cymbopogon ambiguus, Dampiera candicans, Dichanthium sericeum subsp. humilius, Enneapogon caerulescens var. caerulescens, E. polyphyllus, Eremophila forrestii subsp. forrestii, Eriachne lanata, E. pulchella subsp. dominii, Eucalyptus leucophloia, Euphorbia sp., Fimbristylis dichotoma, Gomphrena cunninghamii, Goodenia microptera, G. stobbsiana, Grevillea pyramidalis, Hybanthus aurantiacus, Indigofera monophylla, Iseilema sp., Paspalidium clementii, Polycarpaea holtzei, Portulaca oleracea, Ptilotus exaltatus var. exaltatus, P. obovatus var. obovatus, P. rotundifolius, Scaevola amblyanthera var. centralis, Sclerolaena cornishiana, Sida echinocarpa, Solanum lasiophyllum, S. phlomoides, Sporobolus australasicus, Tephrosia aff. supina (HD133-20), Trachymene oleracea subsp. oleracea, Tribulus suberosus, Trichodesma zeylanicum var. zeylanicum, Triodia wiseana

FMG N-S Rail FMG074 Described by KM Date 31/03/04 Quadrat Size 15m x 160m
AMG Zone 50 702356mE, 7578418mN, 702360mE, 7578403mN, 702222mE, 7578337mN, 702228mE, 7578323mN
Habitat Creek
Vegetation *Eucalyptus victrix* low open woodland over *Acacia eriopoda* scattered tall shrubs over *Melaleuca linophylla* open shrubland over *Triodia epactia* open hummock grassland and *Eriachne* sp. aff. *festucacea* very open tussock grassland
Veg Condition Excellent; evidence of cattle but no obvious signs of grazing Fire Age No evidence of recent fire
Soil Type Orange coarse quartzy sand with coarse fraction (15%) Rock Type Granite
Dominant species: Acacia eriopoda, Eriachne sp. aff. festucacea, Eucalyptus victrix, Melaleuca linophylla, Triodia epactia
Associated species: Acacia arida, A. bivenosa, A. coriacea subsp. pendens, A. pyrifolia, Alternanthera sp., *Bidens bipinnata, Bulbostylis barbata, Calandrinia sp., Cassia notabilis, Cheilanthes sieberi subsp. sieberi, Chrysopogon fallax, Cleome viscosa, Corchorus sp., Crotalaria cunninghamii, C. medicaginea, Cymbopogon dependens, Cynanchum floribundum, Cyperus iria, C. pulchellus, C. squarrosus, Cyperus sp., Dactyloctenium radulans, Digitaria ctenantha, Drosera indica, Dysphania kalpari, D. plantaginella, Eragrostis cumingii, Erythrina vespertilio, Eulalia aurea, Euphorbia coghlanii, Evolvulus alsinoides var. decumbens, Fimbristylis depauperata, F. microcarya, Flaveria australasica, Gomphrena sordida, Gonocarpus ephemerus, Goodenia lamprosperma, Heliotropium cunninghamii, H. pachyphyllum, Hybanthus aurantiacus, Ipomoea coptica, I. polymorpha, Lipocarpha microcephala, Mukia maderaspatana, Oldenlandia galioides, Phyllanthus erwinii, P. maderaspatensis, Pluchea dentex, Polycarpaea corymbosa var. corymbosa, Polymeria aff. calycina, Ptilotus fusiformis var. fusiformis, P. polystachyus var. polystachyus, Rhynchosia minima var. australis, Sesbania cannabina, Setaria surgens, Stemodia grossa, S. viscosa, Striga curviflora, Swainsona kingii, Synaptantha tillaeacea var. tillaeacea, Trachymene oleracea subsp. oleracea, Trichodesma zeylanicum var. zeylanicum, Vigna lanceolata var. lanceolata

FMG N-S Rail FMG075 Described by RO Date 31/03/04 Quadrat Size 50m x 50m
AMG Zone 50 702370mE, 7578280mN, 702386mE, 7578328mN, 702432mE, 7578315mN, 702421mE, 7578268mN
Habitat Hillslope (moderate slope)
Vegetation *Acacia inaequilatera* scattered tall shrubs over *Triodia lanigera* mid-dense hummock grassland
Veg Condition Excellent Fire Age No evidence of recent fire
Soil Type Red medium-grained clay-silt with many variously-sized, granite pebbles on surface.
Rock Type Granite
Dominant species: Acacia inaequilatera, Triodia lanigera
Associated species: Acacia pyrifolia, Bonamia media var. villosa, Bulbostylis barbata, Cassia glutinosa, Corchorus lasiocarpus subsp. lasiocarpus, C. aff. walcottii (H251-3), Eriachne pulchella subsp. dominii, Fimbristylis dichotoma, Goodenia stobbsiana, Gossypium australe (Burrup Peninsula form), Indigofera monophylla, Paspalidium clementii, Polycarpaea corymbosa var. corymbosa, P. holtzei, Portulaca oleracea, Tribulus suberosus, Triodia epactia, Tripogon loliiformis

FMG N-S Rail FMG076 Described by KM Date 31/03/04 Quadrat Size 50m x 50m
AMG Zone 50 699526mE, 7584144mN, 699559mE, 7584179mN, 699597mE, 7584145mN, 699564mE, 7584110mN
Habitat Broad floodbank of creek
Vegetation *Corymbia hamersleyana* scattered low trees over *Acacia bivenosa* open heath over *Triodia longiceps* mid-dense hummock grassland and *Chrysopogon fallax* open tussock grassland
Veg Condition Excellent to Very good; occasional Buffel grass only (<1%) Fire Age No evidence of recent fire
Soil Type Pale brown sandy clay Rock Type Granite
Dominant species: Acacia bivenosa, A. trachycarpa, Chrysopogon fallax, Corymbia hamersleyana, Eragrostis cumingii, Triodia longiceps
Associated species: Acacia coriacea subsp. pendens, A. pyrifolia, Alysicarpus muelleri, Amaranthus pallidiflorus, Atalaya hemiglauca, Bulbostylis barbata, Cassia oligophylla, Cassytha capillaris, *Cenchrus ciliaris, Corchorus lasiocarpus subsp. parvus, C. tridens, Crotalaria medicaginea, Cyperus squarrosus, Dactyloctenium radulans, Dichanthium sericeum subsp. humilius, D. sericeum subsp. sericeum, Dichrostachys spicata, Eragrostis eriopoda, E. tenellula, Eremophila longifolia, Eriachne obtusa, Eucalyptus victrix, Euphorbia sp., Evolvulus alsinoides var. villosicalyx, Fimbristylis dichotoma, Hakea lorea subsp. lorea, Hybanthus aurantiacus, Indigofera colutea, I. linnaei, Mukia maderaspatana, Perotis rara, Phyllanthus erwinii, Pluchea ferdinandi-muelleri, Polycarpaea corymbosa var. corymbosa, Portulaca oleracea, Rhynchosia minima var. australis, Scaevola spinescens (broad form), Sporobolus actinocladus, S. australasicus, Trianthema triquetra

FMG N-S Rail FMG077 Described by RO Date 31/03/04 Quadrat Size 50m x 50m
AMG Zone 50 699431mE, 7583980mN, 699472mE, 7583949mN, 699439mE, 7583909mN, 699400mE, 7583941mN
Habitat Plain - gently sloping down to floodplain
Vegetation *Acacia bivenosa* open shrubland over *Melaleuca eleuterostachya* scattered low shrubs over *Triodia secunda, T. longiceps* mid-dense hummock grassland
Veg Condition Very good; occasional Buffel grass Fire Age Burnt >5 years ago
Soil Type Pale brown / grey silty sand (decomposed granite) with some pebbles on surface
Rock Type Granite
Notes May have seasonal water flow towards the drainage line (FMG76)
Dominant species: Acacia bivenosa, Melaleuca eleuterostachya, Triodia longiceps, T. secunda
Associated species: Cassia oligophylla (thinly sericeous form), Cassytha capillaris, *Cenchrus ciliaris, Corchorus sp., Corymbia hamersleyana, Dactyloctenium radulans, Enneapogon caerulescens var. caerulescens, Eragrostis eriopoda, Eremophila longifolia, Goodenia sp., Haloragis gossei, Heliotropium chrysocarpum, Lawrencia densiflora, Paraneurachne muelleri, Pluchea ferdinandi-muelleri, Salsola tragus, Scaevola spinescens (broad form), Sclerolaena sp. nov. aff densiflora, Sporobolus actinocladus, S. australasicus, Trianthema cussackiana, T. triquetra

FMG N-S Rail FMG078 Described by KM Date 31/03/04 Quadrat Size 50m x 50m
AMG Zone 50 694148mE, 7595338mN, 694198mE, 7595342mN, 694044mE, 7595292mN, 694154mE, 7595290mN
Habitat River
Vegetation *Eucalyptus camaldulensis, E. victrix, Melaleuca argentea* low woodland over *Acacia coriacea* subsp. *pendens, A. trachycarpa* high open shrubland over **Cenchrus ciliaris, Chrysopogon fallax, Eulalia aurea, Eriachne* sp. aff. *festucacea* open tussock grassland
Veg Condition Very Good; Buffel Grass on 'islands' within river Fire Age No evidence of recent fire
Soil Type Tan coarse river sand Rock Type Granite
Dominant species: Acacia coriacea subsp. pendens, A. trachycarpa, *Cenchrus ciliaris, Chrysopogon fallax, Eriachne sp. aff. festucacea, Eucalyptus camaldulensis var. obtusa, E. victrix, Eulalia aurea, Melaleuca argentea
Associated species: Ammannia multiflora, Atalaya hemiglauca, Bulbostylis barbata, Calandrinia sp., Centipeda minima, Cleome viscosa, Commelina ensifolia, Convolvulus angustissimus subsp. angustissimus, Corchorus tridens, Corchorus sp., Crotalaria cunninghamii, Cymbopogon dependens, Cyperus ixiocarpus, C. squarrosus, C. vaginatus, Dactyloctenium radulans, Digitaria ctenantha, Eragrostis cumingii, E. tenellula, Eriachne obtusa, Erythrina vespertilio, Euphorbia coghlanii, Fimbristylis microcarya, Gomphrena cunninghamii, G. sordida, Goodenia lamprosperma, Hibiscus panduriformis, Hybanthus aurantiacus, Ipomoea muelleri, Lipocarpha microcephala, Mukia maderaspatana, Perotis rara, Phyllanthus maderaspatensis, Pluchea dentex, Podolepis capillaris, Portulaca sp., Stemodia grossa, Stemodia viscosa, Trachymene oleracea subsp. oleracea, Triodia epactia, Triumfetta aff. chaetocarpa (PAN3/4), Vigna lanceolata var. lanceolata, Wahlenbergia tumidifructa

FMG N-S Rail FMG079 Described by RO Date 31/03/04 Quadrat Size 50m x 50m
AMG Zone 50 694193mE, 7595515mN, 694240mE, 7595538mN, 694261mE, 7595488mN, 694215mE, 7595466mN
Habitat Hillslope - gentle slope down to major drainage line
Vegetation *Corymbia hamersleyana* scattered low trees over *Acacia orthocarpa* scattered shrubs over *Triodia epactia, T. wiseana* hummock grassland
Veg Condition Excellent Fire Age Burnt 3-5 years ago
Soil Type Pale brown sandy-silt with coarse-grained sand and granite pebbles on surface Rock Type Granite
Notes Fair amount of bare ground, with much decomposed exposed granite at
Dominant species: Acacia orthocarpa, Corymbia hamersleyana, Triodia epactia, T. wiseana
Associated species: Acacia inaequilatera, A. stellaticeps, Bonamia sp. (HD94-6), Bulbostylis barbata, Cassia glutinosa, Chloris pectinata, Cleome viscosa, Corchorus lasiocarpus subsp. lasiocarpus, Dichanthium sericeum subsp. humilius, Eriachne pulchella subsp. dominii, Eriachne sp. Port Hedland, Erythrina vespertilio, Euphorbia coghlanii, Fimbristylis dichotoma, Goodenia stobbsiana, G. triodiophila, Indigofera monophylla, Keraudrenia nephrosperma, Mollugo molluginis, Pluchea ferdinandi-muelleri, Polycarpaea corymbosa var. corymbosa, Sida cardiophylla, S. clementii, Solanum phlomoides, Sporobolus australasicus, Stackhousia intermedia, Tephrosia aff. clementii (10) (HD88-3), Triumfetta aff. chaetocarpa (PAN3/4)

FMG N-S Rail FMG080 Described by RO Date 1/04/04 Quadrat Size 50m x 50m
AMG Zone 50 694402mE, 7601815mN, 694456mE, 7601817mN, 694461mE, 7601767mN, 694409mE, 7601766mN
Habitat Floodplain dissected by runnels
Vegetation *Acacia farnesiana, A. sclerosperma* scattered shrubs over **Cenchrus ciliaris, Chrysopogon fallax* closed tussock grassland

Veg Condition Good; invaded by Buffel grass Fire Age Burnt 2-4 years ago
Soil Type Orange sandy clay on plain; clay in runnels Rock Type Granite
Notes Runnels filled with water at time of survey
Dominant species: Acacia farnesiana, A. sclerosperma subsp. sclerosperma, *Cenchrus ciliaris, Chrysopogon fallax, Eragrostis setifolia, Triodia longiceps
Associated species: Abutilon sp., Acacia ancistrocarpa, A. stellaticeps, A. synchronicia, A. tumida var. pilbarensis, Alysicarpus muelleri, Aristida holathera var. holathera, Blumea tenella, Boerhavia coccinea, Boerhavia sp., Bonamia rosea, Brachyachne convergens, Bulbostylis barbata, B. turbinata, Calandrinia sp., Cassia notabilis, Cassia aff. oligophylla (thinly sericeous form), Centipeda minima, Chloris pectinata, Cleome viscosa, Corchorus tridens, Corchorus sp., Corymbia flavescens, Cullen leucanthum, Cyperus iria, Dactyloctenium radulans, Desmodium filiforme, Dichanthium sericeum subsp. humilius, Enneapogon polyphyllus, Eragrostis cumingii, E. dielsii, E. eriopoda, E. leptocarpa, E. tenellula, Eremophila longifolia, Eriachne aristidea, E. benthamii, E. obtusa, Euphorbia coghlanii, Euphorbia sp. (site 1089), Evolvulus alsinoides var. villosicalyx, Fimbristylis sp., Gomphrena sordida, Goodenia microptera, G. muelleriana, Gossypium australe (Burrup Peninsula form), Heliotropium cunninghamii, H. pachyphyllum, Hibiscus leptocladus, H. panduriformis, H. sturtii var. aff. Campylochlamys (FMG 55-21), Hybanthus aurantiacus, Indigofera colutea, I. hirsuta, I. linnaei, I. monophylla, Ipomoea coptica, I. muelleri, I. polymorpha, Lipocarpha microcephala, *Malvastrum americanum, Marsilea hirsuta, Mollugo molluginis, Neptunia dimorphantha, Panicum decompositum, Paspalidium basicladum, Perotis rara, Phyllanthus erwinii, Pluchea ferdinandi-muelleri, P. rubelliflora, P. tetranthera, Portulaca oleracea, P. pilosa, Pterocaulon sphaeranthoides, Ptilotus axillaris, P. exaltatus var. exaltatus, P. obovatus var. obovatus, Rhynchosia minima var. australis, Sclerolaena costata, Sida clementii, S. sp. Wittenoom (W.R. Barker 1962), S. spinosa, Sida sp., Solanum phlomoides, Sporobolus australasicus, Stemodia grossa, S. viscosa, Streptoglossa decurrens, Tephrosia sp., Themeda triandra, Trianthema triquetra, Tribulopis angustifolia, Tribulus macrocarpus, Waltheria indica, Yakirra australiensis var. australiensis

FMG N-S Rail FMG081 Described by KM Date 1/04/04 Quadrat Size 50m x 50m
AMG Zone 50 694045mE, 7601627mN, 694253mE, 7601610mN, 694237mE, 7601564mN, 694190mE, 7601579mN
Habitat Floodplain - gently sloping
Vegetation *Triodia longiceps, T. wiseana* mid-dense hummock grassland
Veg Condition Excellent; signs of cattle but no obvious grazing Fire Age Burnt 2-4 years ago
Soil Type Pale brown / grey fine- to medium-grained silt with white quartzitic granite pebbles on soil
Rock Type Decomposed granite (quartzitic)
Dominant species: Triodia longiceps, T. wiseana
Associated species: Acacia bivenosa, A. stellaticeps, A. synchronicia, Aristida contorta, A. holathera var. holathera, Brachyachne prostrata, Cassia luerssenii, C. aff. oligophylla (thinly sericeous form), C. pruinosa, Cassytha capillaris, Chrysopogon fallax, Codonocarpus cotinifolius, Corchorus lasiocarpus subsp. lasiocarpus, Corymbia hamersleyana, Enneapogon caerulescens var. caerulescens, Eremophila forrestii subsp. forrestii, Eriachne mucronata, Euphorbia sp. (site 1089), Goodenia sp., Heliotropium chrysocarpum, Hibiscus aff. sturtii, Hibiscus sp., Paraneurachne muelleri, Pluchea ferdinandi-muelleri, P. rubelliflora, Polygala aff. isingii, Pterocaulon sp. (PAN1-47), Ptilotus axillaris, P. exaltatus var. exaltatus, Salsola tragus, Scaevola amblyanthera var. centralis, Sclerolaena sp. nov. aff densiflora, Sida sp.vWittenoom (W.R. Barker 1962), Solanum phlomoides, Sporobolus australasicus, Stemodia grossa, Streptoglossa bubakii, Tephrosia sp. Bungaroo Creek (M.E. Trudgen 11601), Tribulus hirsutus, Tripogon loliiformis

FMG N-S Rail FMG082 Described by KM Date 3/04/04 Quadrat Size 50m x 50m
AMG Zone 50 695650mE, 7605730mN, 695700mE, 7605728mN, 695698mE, 7605678mN, 695647mE, 7605680mN
Habitat Yule River (~040m wide)
Vegetation *Eucalyptus camaldulensis Melaleuca argentea* low woodland over **Cenchrus ciliaris, Eulalia aurea, Eriachne* sp. aff. *festucacea* a open tussock grassland
Veg Condition Very good; some Buffel grass on banks and islands Fire Age No evidence of recent fire
Soil Type Tan coarse river sand with clayey deposits on islands and banks Rock Type Granite
Dominant species: *Cenchrus ciliaris, Eriachne sp. aff. festucacea, Eucalyptus camaldulensis var. obtusa, Eulalia aurea, Melaleuca argentea
Associated species: Acacia coriacea subsp. pendens, A. holosericea, A. trachycarpa, Aristida holathera var. holathera, Bonamia media var. ?media, Bulbostylis barbata, Calandrinia sp., Cassia notabilis, Chrysocephalum apiculatum, Cleome viscosa, Crotalaria cunninghamii, Cyperus ?conicus, C. ixiocarpus, C. vaginatus, Digitaria longiflora, Eragrostis speciosa, Erythrina vespertilio, Euphorbia coghlanii, Euphorbia sp. (site 1089), Evolvulus alsinoides var. villosicalyx, Goodenia muelleriana, Heliotropium crispatum, Hibiscus panduriformis, Hybanthus aurantiacus, Ipomoea muelleri, Lipocarpha microcephala, Melaleuca linophylla, Phyllanthus maderaspatensis, Pluchea dentex, P. rubelliflora, Rhynchosia minima var. australis, Sesbania cannabina, Stemodia grossa, S. viscosa, Triodia epactia, Vigna lanceolata var. lanceolata, Wahlenbergia tumidifructa

FMG N-S Rail FMG083 Described by RO Date 3/04/04 Quadrat Size 50m x 50m
AMG Zone 50 695579mE, 7605451mN, 695633mE, 7605446mN, 695628mE, 7605395mN, 695579mE, 7605399mN
Habitat Floodplain of Yule River
Vegetation *Hakea lorea* low open woodland over *Acacia trachycarpa* high open shrubland over *Triodia lanigera* closed hummock grassland and **Cenchrus ciliaris* open tussock grassland
Veg Condition Good; obvious signs of grazing by cattle; dense patches of Buffel grass in some parts
Fire Age No evidence of recent fire
Soil Type Red-brown silt with small fraction of fine- to medium-grained sand
Dominant species: Acacia trachycarpa, *Cenchrus ciliaris, Hakea lorea subsp. lorea, Triodia lanigera
Associated species: Abutilon otocarpum, Acacia ancistrocarpa, A. bivenosa, A. sclerosperma subsp. sclerosperma, A. stellaticeps, Aristida holathera var. holathera, Boerhavia coccinea, Bonamia linearis, Bulbostylis barbata, Cassia notabilis, Chrysopogon fallax, Cleome uncifera, C. viscosa, Corchorus aff. walcottii (H251-3), Corchorus sp., Corymbia hamersleyana, Cullen martinii, Eragrostis eriopoda, Eriachne obtusa, Euphorbia sp. (site 1089), Evolvulus alsinoides var. decumbens, Goodenia lamprosperma, Goodenia sp., Hibiscus leptocladus, Indigofera colutea, I. linifolia, I. linnaei, Ipomoea polymorpha, Mollugo molluginis, Paraneurachne muelleri, Perotis rara, Pluchea ferdinandi-muelleri, Polycarpaea corymbosa var. corymbosa, Portulaca oleracea, P. pilosa, Sida sp., Tephrosia bidwillii, Trianthema pilosa, Tribulopis angustifolia, Tribulus hirsutus, Waltheria indica, Yakirra australiensis var. australiensis, Zornia albiflora

FMG N-S Rail FMG084 Described by KM Date 2/04/04 Quadrat Size 50m x 50m
AMG Zone 50 713872mE, 7550504mN, 713904mE, 7550500mN, 713917mE, 7550450mN, 713867mE, 7550456mN

Habitat Rocky hillcrest
Vegetation *Eucalyptus leucophloia* low open woodland over patches of *Acacia maitlandii, A. monticola* tall shrubland over *Triodia lanigera, T. brizoides* mid-dense hummock grassland and *Paraneurachne muelleri, Eriachne lanata* very open tussock grassland
Veg Condition Excellent Fire Age No evidence of recent fire
Soil Type Orange to red-brown skeletal sandy clay loam Rock Type Basalt or dolorite?
Dominant species: Acacia maitlandii, A. monticola, Eriachne lanata, Eucalyptus leucophloia, Paraneurachne muelleri, Triodia brizoides, T. lanigera
Associated species: Abutilon macrum, Acacia arida, A. hilliana, A. monticola hybrid, A. spondylophylla, A. tetragonophylla, Bonamia media var. villosa, B. rosea, Bulbostylis barbata, Capparis umbonata, Cymbopogon ambiguus, Dampiera candicans, Dodonaea coriacea, Eremophila longifolia, Eriachne mucronata, Goodenia triodiophila, Grevillea pyramidalis, G. wickhamii, Hybanthus aurantiacus, Indigofera monophylla, Keraudrenia nephrosperma, Psydrax latifolia, Ptilotus obovatus var. obovatus, Cassia glutinosa, Cassia pruinosa, Solanum lasiophyllum, S. phlomoides, Tephrosia sp. Pilbara Ranges (S. van Leeuwen 4246), Themeda triandra, Trachymene oleracea subsp. oleracea, Tribulus suberosus, Triodia epactia

FMG N-S Rail FMG085 Described by RO Date 2/04/04 Quadrat Size 50m x 50m
AMG Zone 50 714160mE, 7550410mN, 714211mE, 7550412mN, 714216mE, 7550362mN, 714152mE, 7550363mN
Habitat Hillslope - moderate slope (~10 degrees)
Vegetation *Acacia xiphophylla, A. aneura* low woodland over *Ptilotus obovatus* low open shrubland over *Triodia epactia, T. lanigera* very open hummock grassland
Veg Condition Very good; some non-aggressive weeds Fire Age No evidence of recent fire
Soil Type Red silty clay with many granite pebbles on surface Rock Type Granite
Dominant species: Acacia aneura (flat curved; MET 15 548), A. xiphophylla, Ptilotus obovatus var. obovatus, Triodia epactia, T. lanigera
Associated species: Abutilon fraseri, Abutilon sp., Acacia bivenosa, A. tetragonophylla, *Aerva javanica, Alternanthera nana, Bidens bipinnata, Boerhavia coccinea, Brachyachne convergens, B. prostrata, Bulbostylis barbata, Cassia glutinosa, C. helmsii, C. luerssenii, C. oligophylla, C. pruinosa, Chrysopogon fallax, Corchorus tridens, Corchorus sp., Cucumis melo subsp. agrestis, Cymbopogon sp., Dichanthium sericeum subsp. humilius, Diplatia grandibractea, Enchylaena tomentosa, Enneapogon caerulescens var. caerulescens, E. polyphyllus, Eragrostis cumingii, Eremophila cuneifolia, E. latrobei subsp. filiformis ms, E. longifolia, Eriachne mucronata, E. pulchella subsp. dominii, Eucalyptus leucophloia, Evolvulus alsinoides var. villosicalyx, Gomphrena cunninghamii, Goodenia muelleriana, Hibiscus burtonii, H. gardneri, H. aff. sturtii, Hibiscus sp., Iseilema eremaeum, Jasminum didymum subsp. lineare, Leptopus decaisnei var. decaisnei, Maireana aff. georgei, M. planifolia, *M. americanum, Panicum laevinode, Paraneurachne muelleri, Paspalidium clementii, Perotis rara, Polycarpaea longiflora, Porana commixta, Portulaca oleracea, Psydrax latifolia, P. suaveolens, Pterocaulon ?sphaeranthoides x sphacelatum, Ptilotus exaltatus var. exaltatus, Rhagodia eremaea, Salsola tragus, Sclerolaena cornishiana, Sida cardiophylla, Sida sp., Solanum lasiophyllum, Sporobolus australasicus, Trachymene oleracea subsp. oleracea, Tragus australianus, Tribulus suberosus, Triodia brizoides, Urochloa gilesii subsp. gilesii (glabrous florets)

FMG N-S Rail FMG088 Described by RO Date 3/04/04 Quadrat Size 25m x 100m
AMG Zone 50 698744mE, 7616198mN, 698767mE, 7616046mN, 698855mE, 7616158mN, 698849mE, 7616134mN
Habitat Creekline and surrounding floodplain
Vegetation Creekline has *Acacia tumida* tall open scrub over *Themeda triandra, Chrysopogon fallax* open tussock grassland; floodplain has *Acacia tumida, A. bivenosa* shrubland over *Acacia stellaticeps* low open shrubland over *Triodia lanigera* mid-dense hummock grassland
Veg Condition Very good; occasional weeds Fire Age Creek burnt >5 years ago; floodplain poss. burnt 3-5 years ago
Soil Type Red medium- to coarse-grained sand with granite pebbles in creekbed; fine- to medium-grained sand on floodplain Rock Type Granite
Dominant species: Acacia bivenosa, A. stellaticeps, A. tumida, Chrysopogon fallax, Themeda triandra, Triodia lanigera
Associated species: Acacia ancistrocarpa, A. orthocarpa, A. trachycarpa, Aristida holathera var. holathera, Bonamia rosea, Cassia glutinosa, C. symonii, *Cenchrus ciliaris, Corchorus sp., Corymbia hamersleyana, Digitaria brownii, Dolichandrone heterophylla, Eriachne aristidea, Euphorbia coghlanii, Grevillea wickhamii, Hakea lorea subsp. lorea, Heliotropium pachyphyllum, Hibiscus sturtii var. aff. Platychlamys, Hybanthus aurantiacus, Indigofera monophylla, Ipomoea muelleri, Mollugo molluginis, Panicum decompositum, Paraneurachne muelleri, Pluchea dentex, P. ferdinandi-muelleri, Sida clementii

FMG N-S Rail FMG089 Described by KM Date 3/04/04 Quadrat Size 50m x 50m
AMG Zone 50 682702mE, 7616090mN, 698750mE, 7616079mN, 698741mE, 7616030mN, 698691mE, 7616041mN
Habitat Low stony undulating plain
Vegetation *Acacia stellaticeps, A. bivenosa* low shrubland over *Triodia lanigera* mid-dense hummock grassland
Veg Condition Excellent Fire Age No evidence of recent fire
Soil Type Orange coarse sandy loam with a high coarse fraction (50%) Rock Type Granite
Dominant species: Acacia bivenosa, A. stellaticeps, Triodia lanigera
Associated species: Acacia inaequilatera, Bonamia rosea, Brachyachne prostrata, Bulbostylis barbata, Cassia pruinosa, Cleome uncifera, Corchorus parviflorus, C. aff. walcottii (H251-3), Corymbia hamersleyana, Eriachne pulchella subsp. dominii, Goodenia stobbsiana, Hakea chordophylla, Indigofera monophylla, Paraneurachne muelleri, Polycarpaea corymbosa var. corymbosa, P. holtzei, Portulaca oleracea, Ptilotus astrolasius var. astrolasius, P. calostachyus var. calostachyus, Salsola tragus, Sida cardiophylla, Tephrosia sp. Bungaroo Creek (M.E. Trudgen 11601), Triodia wiseana

FMG N-S Rail FMG090 Described by MM Date 1/04/04 Quadrat Size Entire boulder pile
AMG Zone 50 700530mE, 7581880mN,
Habitat Boulder pile
Vegetation *Acacia pyrifolia, A. coriacea, Atalaya hemiglauca* scattered tall shrubs over *Triodia epactia* open hummock grassland
Veg Condition Very Good; scattered weeds Fire Age No evidence
Soil Type Orange sandy loam in pockets amongst boulders Rock Type Granite
Notes Site takes in entire boulder pile to ground level (~50m diameter)
Dominant species: Acacia coriacea subsp. pendens, A. pyrifolia, Atalaya hemiglauca, Triodia epactia
Associated species: Abutilon sp., Acacia ancistrocarpa, A. bivenosa, A. orthocarpa, A. stellaticeps, A. tumida, *Aerva

javanica, Amaranthus pallidiflorus, Amaranthus sp., Bonamia media var. villosa, Bulbostylis barbata, B. burbidgeae, Cajanus cinereus, Cassia glutinosa, C. notabilis, C. pruinosa, *Cenchrus ciliaris, Chenopodium melanocarpum, Cleome viscosa, Cymbopogon procerus, Cynanchum floribundum, Cyperus cunninghamii subsp. cunninghamii, Digitaria gibbosa, Dodonaea coriacea, Eremophila longifolia, Euphorbia sp. (site 1089), Evolvulus alsinoides var. villosicalyx, Fimbristylis dichotoma, Gomphrena cunninghamii, Gossypium australe (Burrup Peninsula form), Grevillea wickhamii subsp. hispidula, Indigofera colutea, I. monophylla, Jasminum didymum subsp. lineare, Mollugo molluginis, Mukia maderaspatana, Nicotiana benthamiana, Paspalidium clementii, Phyllanthus erwinii, Polycarpaea corymbosa var. corymbosa, Portulaca oleracea, Rhodanthe margarethae, Rhynchosia minima var. australis, Schizachyrium fragile, Tephrosia aff. rosea (CH3-47), T. aff. rosea (HD292-37), T. spechtii, Tinospora smilacina, Trachymene oleracea subsp. oleracea, Tribulus macrocarpus, Tripogon loliiformis, Triumfetta maconochieana

FMG N-S Rail FMG091 Described by BM Date 31/03/04 Quadrat Size 50m x 50m
AMG Zone 50 697460mE, 7588508mN, 697485mE, 7588464mN, 697531mE, 7588488mN, 697506mE, 7588531mN
Habitat Crest of low rise
Vegetation *Acacia orthocarpa* high open shrubland over *Triumfetta* sp. (HD292), *Indigofera monophylla* scattered low shrubs over *Triodia epactia* mid-dense hummock grassland
Veg Condition Excellent Fire Age Burnt >5-6 years ago
Soil Type Brown sand Rock Type Granite; extensive rock outcropping through plot
Dominant species: Acacia orthocarpa, Indigofera monophylla, Triodia epactia, Triumfetta sp. (HD292)
Associated species: Alysicarpus muelleri, Bonamia linearis, B. pannosa, Bulbostylis barbata, Cassia notabilis, Commelina ensifolia, Corchorus sp., Dampiera candicans, Eragrostis cumingii, Eriachne pulchella subsp. dominii, Fimbristylis dichotoma, Gomphrena leptoclada subsp. leptoclada, Goodenia cusackiana, G. microptera, Grevillea wickhamii, Heliotropium skeleton, Mitrasacme connata, Mollugo molluginis, Paspalidium rarum, Polycarpaea corymbosa var. corymbosa, P. holtzei, Polygala linariifolia, Portulaca oleracea, Ptilotus auriculifolius, P. exaltatus var. exaltatus, P. fusiformis var. fusiformis, Scaevola aff. browniana, Schizachyrium fragile, Solanum lasiophyllum, S. phlomoides, Trachymene oleracea subsp. oleracea, Tribulus hirsutus, Triodia longiceps, Yakirra australiensis var. australiensis

FMG N-S Rail FMG092 Described by MM Date 1/04/04 Quadrat Size 50 x 50 m
AMG Zone 50 693410mE, 7597758mN, 693460mE, 7597758mN, 693460mE, 7597708mN, 693410mE, 7597708mN
Habitat Low stony rise
Vegetation *Acacia orthocarpa* shrubland over *Triodia lanigera* mid-dense hummock grassland
Veg Condition Excellent Fire Age Burnt 2-3 years ago
Soil Type Red-brown sandy loam with continuous surface layer of quartz pebbles, and granite pebbles and rocks.
Dominant species: Acacia orthocarpa, Triodia lanigera
Associated species: Acacia inaequilatera, Bonamia rosea, Bonamia sp. (HD94-6), Bulbostylis barbata, Corchorus lasiocarpus subsp. lasiocarpus, Enneapogon caerulescens var. caerulescens, Eriachne pulchella subsp. dominii, Fimbristylis dichotoma, Fimbristylis sp., Goodenia microptera, G. stobbsiana, Haloragis gossei, Heliotropium skeleton, Indigofera monophylla, Isotropis atropurpurea, Mollugo molluginis, Polycarpaea corymbosa var. corymbosa, P. holtzei, Ptilotus astrolasius var. astrolasius, P. calostachyus var. calostachyus, P. exaltatus var. exaltatus, Sida cardiophylla, Solanum lasiophyllum, Sporobolus australasicus, Tribulus hirsutus, Triodia epactia, T. wiseana

FMG N-S Rail FMG093 Described by BM Date 1/04/04 Quadrat Size 50 x 50 m
AMG Zone 50 695051mE, 7603559mN, 695032mE, 7603499mN, 695082mE, 7603499mN, 695080mE, 7603511mN
Habitat Very gently sloping, south facing lower slope of broad low rise.
Vegetation *Acacia orthocarpa* tall open scrub over *Corchorus parviflorus* scattered low shrubs over *Triodia lanigera* mid-dense hummock grassland
Veg Condition Excellent Fire Age Burnt ~2 years ago
Soil Type Red-brown gravelly pebbly sand Rock Type Quartz
Dominant species: Acacia orthocarpa, Corchorus parviflorus, Triodia lanigera
Associated species: Acacia ancistrocarpa, A. bivenosa, A. stellaticeps, Bonamia rosea, Bonamia sp. (HD94-6), Cleome viscosa, Dampiera candicans, Eragrostis ?elongata, Eragrostis eriopoda, Eriachne pulchella subsp. dominii, Evolvulus alsinoides var. villosicalyx, Fimbristylis dichotoma, Goodenia microptera, Heliotropium pachyphyllum, Hibiscus sp., Indigofera monophylla, Mollugo molluginis, Paraneurachne muelleri, Polycarpaea corymbosa var. corymbosa, Ptilotus calostachyus var. calostachyus, Scaevola aff. browniana, Sida cardiophylla, Solanum phlomoides, Tephrosia sp. Bungaroo Creek (M.E. Trudgen 11601), Tribulus hirsutus, Triodia epactia, T. wiseana

FMG N-S Rail FMG094 Described by MM Date 1/04/04 Quadrat Size 25m x 100m
AMG Zone 50 694939mE, 7603400mN, 695032mE, 7603409mN, 695032mE, 7603385mN, 694939mE, 7603375mN
Habitat Sandy flowline
Vegetation *Corymbia hamersleyana* scattered trees over *Acacia tumida* tall closed scrub over *Corchorus* sp., *Indigofera monophylla*, *Dampiera candicans* low open shrubland over *Triodia epactia* open hummock grassland and *Chrysopogon fallax* very open tussock grassland
Veg Condition Excellent; no weeds, signs of cattle but no obvious grazing Fire Age Burnt ~2 years ago
Soil Type Orange-brown coarse sand Rock Type Granite-derived
Notes Flowline between stony undulating rises with *Acacia orthocarpa* overstorey
Dominant species: Acacia tumida, Chrysopogon fallax, Corchorus sp., Corymbia hamersleyana, Dampiera candicans, Indigofera monophylla, Triodia epactia
Associated species: Acacia orthocarpa, A. stellaticeps, Aristida holathera var. holathera, Boerhavia coccinea, Bonamia linearis, B. rosea, Cyperus blakeanus, Enneapogon caerulescens var. caerulescens, Euphorbia coghlanii, Fimbristylis dichotoma, Goodenia microptera, Hakea lorea subsp. lorea, Heliotropium chrysocarpum, Hibiscus sturtii var. aff. Campylochlamys (FMG 55-21), Hibiscus sp., Hybanthus aurantiacus, Isotropis atropurpurea, Mollugo molluginis, Paraneurachne muelleri, Phyllanthus erwinii, Pimelea ammocharis, Pluchea dentex, P. ferdinandi-muelleri, P. tetranthera, Ptilotus exaltatus var. exaltatus, Sida cardiophylla, Solanum phlomoides, Tephrosia sp. Bungaroo Creek (M.E. Trudgen 11601), Tribulus hirsutus, Triumfetta aff. chaetocarpa (PAN3/4)

FMG N-S Rail FMG095 Described by BM Date 1/04/04 Quadrat Size 50m x 50m
AMG Zone 50 697247mE, 7611585mN, 697246mE, 7611535mN, 697297mE, 7611535mN, 697298mE, 7611585mN
Habitat Flat plain
Vegetation *Acacia inaequilatera* scattered tall shrubs over *Indigofera monophylla, Bonamia rosea* scattered low shrubs over *Triodia lanigera* mid-dense hummock grassland

Veg Condition Excellent Fire Age No evidence of recent fire
Soil Type Red-brown sand
Dominant species: Acacia inaequilatera, Bonamia rosea, Indigofera monophylla, Triodia lanigera
Associated species: Acacia ancistrocarpa, A. colei var. colei, Aristida holathera var. holathera, Bonamia linearis, Bulbostylis barbata, Corchorus parviflorus, Cymbopogon obtectus, Euphorbia sp. (site 1089), Goodenia forrestii, G. stobbsiana, Gossypium australe (Burrup Peninsula form), Hakea lorea subsp. lorea, Mukia maderaspatana, Paraneurachne muelleri, Pimelea ammocharis, Polycarpaea corymbosa var. corymbosa, Ptilotus astrolasius var. astrolasius, Sida clementii, Sida sp., Streptoglossa macrocephala, Tephrosia sp.Bungaroo Creek(M.E.Trudgen 11601), Triumfetta aff. chaetocarpa (PAN3/4), Yakirra australiensis var. australiensis

FMG N-S Rail FMG096 Described by MM Date 1/04/04 Quadrat Size 04-50m x 50m
AMG Zone 50 697933mE, 7613863mN, 697980mE, 7613830mN, 697984mE, 7613813mN, 697934mE, 7613813mN
Habitat Drainage area
Vegetation *Acacia trachycarpa* tall open scrub (prior to fire) over **Cenchrus ciliaris* tussock grassland
Veg Condition Very Poor; weed infested; trampled and grazed by cattle; coupled with recent burn
Fire Age Burnt 2-3 years ago Soil Type Orange-brown sandy loam
Notes Odd-shaped plot to fit drainage habitat. Spherical fungi collected from northern portion of corridor are also present here.
Dominant species: Acacia stellaticeps, A. trachycarpa, *Cenchrus ciliaris, Triodia lanigera
Associated species: Acacia colei var. colei, A. farnesiana, A. sclerosperma subsp. sclerosperma, Chrysopogon fallax, Corchorus tridens, Corchorus sp., Crotalaria cunninghamii, Dactyloctenium radulans, Eragrostis cumingii, E. leptocarpa, Eremophila longifolia, Eriachne obtusa, Euphorbia coghlanii, Evolvulus alsinoides var. villosicalyx, Fimbristylis dichotoma, Goodenia lamprosperma, Hakea lorea subsp. lorea, Hibiscus panduriformis, Hybanthus aurantiacus, Indigofera colutea, I. hirsuta, I. linnaei, I. monophylla, Ipomoea polymorpha, Marsilea hirsuta, Mukia maderaspatana, Panicum decompositum, Perotis rara, Pluchea ferdinandi-muelleri, P. rubelliflora, Solanum phlomoides, Trichodesma zeylanicum var. zeylanicum

FMG N-S Rail FMG097 Described by BM Date 2/04/04 Quadrat Size 50m x 40m
AMG Zone 50 714419mE, 7543364mN, 714460mE, 7543367mN, 714469mE, 7543325mN, 714426mE, 7543316mN
Habitat Crest and slopes of low rise
Vegetation *Eucalyptus leucophloia* scattered low trees over *Cassia pruinosa* scattered shrubs over *Triodia brizoides, T. longiceps* mid-dense hummock grassland
Veg Condition Excellent Fire Age No evidence of recent fire Soil Type Brown gravelly, very pebbly clay
Dominant species: Cassia pruinosa, Eucalyptus leucophloia, Triodia brizoides, T. longiceps
Associated species: Acacia aneura var. ?aneura/intermedia, A. bivenosa, A. pruinocarpa, A. synchronicia, Bulbostylis barbata, Dysphania rhadinostachya, Eriachne pulchella subsp. dominii, Fimbristylis dichotoma, Gomphrena cunninghamii, Grevillea berryana, Polycarpaea holtzei, Polygala aff. isingii, Portulaca oleracea, Ptilotus aervoides, P. schwartzii var. schwartzii, Salsola tragus, Solanum horridum, S. lasiophyllum, Trianthema glossostigma, Trichodesma zeylanicum var. zeylanicum, Triodia aff. basedowii

FMG N-S Rail FMG098 Described by MM Date 2/04/04 Quadrat Size 50m x 50m
AMG Zone 50 714727mE, 7543678mN, 714777mE, 7543678mN, 714777mE, 7543628mN, 714727mE, 7543628mN
Habitat Plain
Vegetation *Eucalyptus leucophloia* scattered low trees over *Acacia aneura* (various forms) tall closed scrub over *Triodia epactia* hummock grassland
Veg Condition Excellent; donkey scats, but no other signs of disturbance Fire Age No evidence of recent fire
Soil Type Orange-brown clay loam with a continuous surface layer of pebbles
Notes Old fence out east side of plot. Stone flakes at 714718 mE, 7543704 mN.
Dominant species: Acacia aneura (flat curved; MET 15 548), A. aff. aneura (scythe-shaped; MET 15,743), A. ayersiana, A. pruinocarpa, Eucalyptus leucophloia, Triodia epactia
Associated species: Acacia aneura var. ?, A. atkinsiana, A. marramamba, A. rhodophloia, Cassia luerssenii, Dodonaea petiolaris, Eremophila forrestii subsp. forrestii, E. latrobei subsp. filiformis ms, Eriachne mucronata, E. pulchella subsp. dominii, Grevillea berryana, Hibiscus burtonii, H. gardneri, Keraudrenia nephrosperma, Petalostylis labicheoides, Polycarpaea holtzei, Polygala aff. isingii, Porana commixta, Psydrax suaveolens, Sida atrovirens, Triodia brizoides, T. longiceps

FMG N-S Rail FMG099 Described by BM Date 3/04/04 Quadrat Size 60m x 40m
AMG Zone 50 694448mE, 7628679mN, 694488mE, 7628679mN, 694489mE, 7628619mN, 694448mE, 7628619mN
Habitat Valley floor
Vegetation *Pluchea tetranthera* low open shrubland over *Triodia lanigera* open hummock grassland
Veg Condition Excellent Fire Age Burnt 2-3 years ago Soil Type Red-brown sand
Notes Valley floor has very gentle west aspect, adjacent to creekline.
Dominant species: Eriachne obtusa, Eriachne sp. Port Hedland, Pluchea tetranthera, Triodia lanigera
Associated species: Acacia inaequilatera, A. stellaticeps, Aristida holathera var. holathera, Boerhavia coccinea, Bonamia pannosa, Bulbostylis barbata, Calandrinia sp., Cassia helmsii, Cassia notabilis, Cleome uncifera, C. viscosa, Corchorus sp., Cymbopogon obtectus, Dichrostachys spicata, Eragrostis cumingii, E. dielsii, Eriachne aristidea, E. pulchella subsp. dominii, Euphorbia sp. (site 1089), Evolvulus alsinoides var. decumbens, E. alsinoides var. villosicalyx, Fimbristylis dichotoma, Gomphrena leptoclada subsp. leptoclada, Goodenia microptera, Hibiscus leptocladus, Indigofera monophylla, Isotropis atropurpurea, Mollugo molluginis, Paspalidium rarum, Perotis rara, Pluchea ferdinandi-muelleri, Polycarpaea corymbosa var. corymbosa, Portulaca oleracea, Ptilotus astrolasius var. astrolasius, Salsola tragus, Sida clementii, Solanum diversiflorum, S. phlomoides, Stemodia grossa, Tephrosia sp. Bungaroo Creek (M.E. Trudgen 11601), Trianthema pilosa, Tribulus hirsutus, Urochloa holosericea subsp. velutina, Yakirra australiensis var. australiensis

FMG N-S RAIL FMG100 Described by MMDate 3/04/04 Quadrat Size 50m x 50m
AMG Zone 50 694640mE, 7627752mN, 694689mE, 7627752mN, 694690mE, 7627702mN, 694641mE, 7627702mN
Habitat Sandy plain
Vegetation *Acacia inaequilatera* scattered tall shrubs to high open shrubland over *Corchorus parviflorus*, *Bonamia rosea* low open shrubland over *Triodia lanigera*, *T. epactia* hummock grassland

Veg Condition Excellent Fire Age Burnt 2-3 years ago Soil Type Orange-brown sandy loam (granite derived)
Dominant species: Acacia inaequilatera, Bonamia rosea, Corchorus parviflorus, Ptilotus astrolasius var. astrolasius, Triodia epactia, T. lanigera
Associated species: Acacia eriopoda, A. maitlandii, A. orthocarpa, A. tumida, Boerhavia coccinea, Bonamia linearis, B. pannosa, Bulbostylis barbata, Cassia notabilis, Cleome uncifera, C. viscosa, Cyperus blakeanus, Eriachne obtusa, E. pulchella subsp. dominii, Euphorbia sp. (site 1089), Fimbristylis dichotoma, Goodenia lamprosperma, G. microptera, Gossypium australe (Burrup Peninsula form), Grevillea pyramidalis, G. wickhamii, Heliotropium skeleton, Hibiscus sturtii var. aff. platychlamys, Hybanthus aurantiacus, Indigofera monophylla, Isotropis atropurpurea, Mollugo molluginis, Pluchea dentex, P. ferdinandi-muelleri, P. tetranthera, Polycarpaea corymbosa var. corymbosa, P. holtzei, Portulaca oleracea, Sida aff. cardiophylla (site 1086), Solanum phlomoides, Stemodia grossa, Tephrosia aff. rosea (HD292-37), T. spechtii, Tephrosia sp.Bungaroo Creek(M.E.Trudgen 11601), Tribulus hirsutus, Trichodesma zeylanicum var. zeylanicum, Triumfetta aff. chaetocarpa (PAN3/4), Triumfetta sp. (HD292), Yakirra australiensis var. australiensis

FMG N-S RAIL FMG101 Described by BMDate 3/04/04 Quadrat Size 50m x 50m
AMG Zone 50 708909mE, 7565792mN, 708858mE, 7565792mN, 708859mE, 7565842mN, 708910mE, 7565842mN
Habitat Flat plain
Vegetation *Hakea lorea* scattered low trees over *Indigofera monophylla, Pluchea tetranthera* low shrubland over *Triodia schinzii* hummock grassland
Veg Condition Excellent to Very good; some grazing Fire Age Burnt <4-5 years ago Soil Type Red-brown sand
Notes Very gentle west aspect
Dominant species: Eragrostis eriopoda, Hakea lorea subsp. lorea, Indigofera monophylla, Pluchea tetranthera, Triodia schinzii
Associated species: Acacia trachycarpa, Alternanthera nana, Amaranthus pallidiflorus, Aristida holathera var. holathera, Boerhavia coccinea, Bonamia media var. ?media, Bulbostylis barbata, Cajanus marmoratus, Cassia helmsii, Corchorus sp., Crotalaria medicaginea, Cymbopogon obtectus, Cyperus blakeanus, Dactyloctenium radulans, Digitaria bicornis, Eragrostis cumingii, Euphorbia coghlanii, Euphorbia sp. (site 1089), Euphorbia sp., Evolvulus alsinoides var. villosicalyx, Fimbristylis dichotoma, Gomphrena cunninghamii, Goodenia lamprosperma, G. microptera, Gossypium australe (Burrup Peninsula form), Indigofera colutea, I. linifolia, Mollugo cerviana, M. molluginis, Mukia maderaspatana, Paspalidium rarum, Perotis rara, Phyllanthus erwinii, Pluchea dentex, P. ferdinandi-muelleri, Polycarpaea corymbosa var. corymbosa, P. holtzei, Portulaca oleracea, Sida sp., Solanum diversiflorum, S. lasiophyllum, Sporobolus australasicus, Stemodia grossa, Tephrosia aff. supina (HD237-23), Tribulus hirsutus, Trichodesma zeylanicum var. zeylanicum, Urochloa holosericea subsp. velutina, Waltheria indica

FMG N-S RAIL FMG102 Described by MMDate 3/04/04 Quadrat Size 25m x 100m
AMG Zone 50 709059mE, 7565570mN, 709084mE, 7565570mN, 709084mE, 7565470mN, 709059mE, 7565470mN
Habitat Low stony footslopes
Vegetation *Acacia inaequilatera* scattered tall shrubs over *Indigofera monophylla, Sida echinocarpa* low open shrubland over *Triodia epactia* hummock grassland
Veg Condition Excellent Fire Age Burnt ?2 years ago Soil Type Orange-brown sandy loam (granite-derived)
Notes Quadrat shape modified to avoid *Triodia schinzii* to east
Dominant species: Acacia inaequilatera, Indigofera monophylla, Sida echinocarpa, Triodia epactia
Associated species: Acacia ancistrocarpa, A. bivenosa, Amaranthus sp., Bonamia media var. villosa, Bulbostylis barbata, Cassia glutinosa, C. luerssenii, C. pruinosa, Cleome viscosa, Corchorus aff. walcottii (H251-3), Eragrostis cumingii, Eriachne pulchella subsp. dominii, Fimbristylis dichotoma, Goodenia stobbsiana, Gossypium australe (Whim Creek form), Hakea lorea subsp. lorea, Heliotropium pachyphyllum, Indigofera colutea, I. linifolia, Mollugo molluginis, Mukia maderaspatana, Polycarpaea corymbosa var. corymbosa, P. holtzei, Portulaca oleracea, Ptilotus astrolasius var. astrolasius, Sida cardiophylla, S. aff. cardiophylla (FMG102-7), Solanum phlomoides, Tephrosia aff. rosea (HD292-37), T. aff. uniovulata (HD76), Tribulus suberosus, Trichodesma zeylanicum var. zeylanicum

FMG N-S RAIL FMG103 Described by BMDate 4/04/04 Quadrat Size 40m x 62m
AMG Zone 50 693737mE, 7633026mN, 693772mE, 7633006mN, 693736mE, 7632956mN, 693699mE, 7632977mN
Habitat Gentle slope of low ridge (SE aspect)
Vegetation *Acacia orthocarpa* tall open scrub over *Corchorus* sp. scattered low shrubs over *Triodia epactia, (T. lanigera)* mid-dense hummock grassland
Veg Condition Excellent Fire Age Most of plot unburnt for >4-5 years; west side burnt <2 years ago
Soil Type Red-brown gravelly, pebbly sand Rock Type Granite (~5% outcropping)
Dominant species: Acacia orthocarpa, Corchorus sp., Triodia epactia, T. lanigera
Associated species: Acacia arida, A. bivenosa, A. inaequilatera, A. maitlandii, A. pyrifolia, Aristida holathera var. holathera, Bonamia linearis, B. pannosa, B. rosea, Bulbostylis barbata, Cleome uncifera, Cucumis melo subsp. agrestis, Cyperus blakeanus, Dampiera candicans, Eriachne pulchella subsp. dominii, Eriachne sp. Port Hedland, Fimbristylis dichotoma, Gomphrena leptoclada subsp. leptoclada, Goodenia stobbsiana, Grevillea wickhamii, Hibiscus aff. sturtii, H. leptocladus, Hibiscus sp., Hybanthus aurantiacus, Indigofera monophylla, Mollugo molluginis, Pluchea dentex, Polycarpaea corymbosa var. corymbosa, P. holtzei, Polymeria sp. (site 1365), Scaevola aff. browniana, Sida cardiophylla, Tephrosia sp.Bungaroo Creek(M.E.Trudgen 11601), Tribulus hirsutus, T. platypterus

FMG N-S RAIL FMG104 Described by MMDate 4/04/04 Quadrat Size 50m x 50m
AMG Zone 50 693918mE, 7632971mN, 693967mE, 7632971mN, 693967mE, 7632921mN, 693917mE, 7632921mN
Habitat Stony undulating plain
Vegetation *Acacia inaequilatera* scattered tall shrubs over *Acacia stellaticeps* low open shrubland over *Triodia epactia* hummock grassland
Veg Condition Excellent Fire Age Most of plot burnt ~3 years ago; SE corner of plot burnt ~1 year ago
Soil Type Orange-brown sandy loam with scatters of pebbles and stones at surface
Dominant species: Acacia stellaticeps, Triodia epactia, T. lanigera
Associated species: Acacia bivenosa, A. colei var. colei, A. inaequilatera, A. maitlandii, A. sphaerostachya, Aristida holathera var. holathera, Bonamia linearis, Bulbostylis barbata, Cassia notabilis, Cleome uncifera, Corchorus sp., Corymbia hamersleyana, Cullen lachnostachys, Eriachne aristidea, Euphorbia sp. (site 1089), Evolvulus alsinoides var. villosicalyx, Fimbristylis dichotoma, Hibiscus leptocladus, Hybanthus aurantiacus, Indigofera monophylla, Mollugo molluginis, Paspalidium rarum, Pluchea tetranthera, Polycarpaea holtzei, Polygala sp., Polymeria sp. (site 1365), Scaevola aff. browniana, Solanum horridum, Tephrosia sp.Bungaroo Creek(M.E.Trudgen 11601), Tribulus macrocarpus, Trichodesma zeylanicum var. zeylanicum, Tripogon loliiformis

FMG N-S RAIL FMG105 Described by MM Date 5/04/04 Quadrat Size 50m x 50m
AMG Zone 50 687516mE, 7648052mN, 687556mE, 7648080mN, 687584mE, 7648038mN, 687542mE, 7648009mN
Habitat Sandy plain
Vegetation *Pluchea ferdinandi-muelleri, Acacia stellaticeps* scattered low shrubs over *Triodia lanigera (T. longiceps, T. epactia)* mid-dense hummock grassland
Veg Condition Excellent; signs of cattle but no obvious grazing
Fire Age Plot was burnt >5 years ago, but surrounding area was burnt 1-2 years ago
Soil Type Orange-brown sandy loam (granite-derived)
Notes Quadrat not pegged
Dominant species: Acacia stellaticeps, Pluchea ferdinandi-muelleri, Triodia epactia, T. lanigera, T. longiceps
Associated species: Bulbostylis barbata, Byblis filifolia, Calandrinia sp., Cassytha capillaris, Cleome viscosa, Commelina ensifolia, Corchorus sp., Cyperus castaneus var. brevimucronatus, C. squarrosus, Eragrostis cumingii, Eriachne obtusa, Fimbristylis dichotoma, F. rara, Gomphrena leptoclada subsp. leptoclada, G. sordida, Goodenia lamprosperma, Lepidium pholidogynum, Paspalidium basicladum, Pluchea dentex, Pterocaulon ?sphaeranthoides x sphacelatum, Ptilotus fusiformis var. fusiformis, Solanum gabrielae, Streptoglossa bubakii, Stylidium desertorum, Trachymene oleracea subsp. oleracea, Trianthema oxycalyptra var. oxycalyptra, T. triquetra, Tribulus hirsutus, Yakirra australiensis var. australiensis, Zornia muelleriana subsp. congesta

FMG N-S Rail FMG107 Described by RO Date 5/04/04 Quadrat Size 50m x 50m
AMG Zone 50 682343mE, 7663246mN, 682393mE, 7663252mN, 682399mE, 7663044mN, 682351mE, 7663197mN
Habitat Sandy plain (flat to gently sloping)
Vegetation *Corymbia zygophylla* scattered low trees over *Acacia acradenia* open heath over *Triodia schinzii* mid-dense hummock grassland
Veg Condition Excellent Fire Age Burnt ~2 years ago Soil Type Red-brown sandy silt
Dominant species: Acacia acradenia, Corymbia zygophylla, Triodia schinzii
Associated species: Acacia ancistrocarpa, A. inaequilatera, Boerhavia coccinea, Bonamia linearis, B. rosea, Bulbostylis barbata, Cassytha capillaris, Chrysopogon fallax, Cleome uncifera, Eragrostis eriopoda, Goodenia lamprosperma, G. microptera, Goodenia stobbsiana, Gossypium australe (Burrup Peninsula form), Hakea lorea subsp. lorea, Heliotropium sp., Indigofera monophylla, Isotropis atropurpurea, Mollugo molluginis, Mukia maderaspatana, Paraneurachne muelleri, Paspalidium clementii, Ptilotus astrolasius var. astrolasius, P. axillaris, Ptilotus fusiformis var. fusiformis, Sida cardiophylla, Solanum diversiflorum, S. phlomoides, S. phlomoides, Solanum sp., Stemodia grossa, Streptoglossa bubakii, Tephrosia sp.Bungaroo Creek(M.E.Trudgen 11601), Zornia muelleriana subsp. congesta

FMG N-S Rail FMG108 Described by KM Date 5/04/04 Quadrat Size 50m x 50m
AMG Zone 50 681735mE, 7663294mN, 681784mE, 7663302mN, 681792mE, 7663252mN, 681743mE, 7663243mN
Habitat Low, scalded, sluggish plain - braided drainage plain
Vegetation *Triodia secunda (T. epactia)* mid-dense hummock grassland
Veg Condition Excellent; some fresh cattle tracks but no signs of grazing Fire Age No evidence of recent fire
Soil Type Orange coarse quartzy clayey sand with ~15% coarse fraction
Dominant species: Sporobolus australasicus, Triodia epactia, T. secunda
Associated species: Acacia sphaerostachya, A. stellaticeps, Brachyachne prostrata, Calandrinia sp., Dactyloctenium radulans, Eragrostis dielsii, E. eriopoda, Portulaca oleracea, Portulaca sp., Sporobolus actinocladus, Trianthema triquetra

FMG N-S Rail FMGBA Described by BM Date 21/03/04 Quadrat Size releve
AMG Zone 50 671024mE, 7696274mN,
Habitat South facing steep rocky slope of granite ridge.
Vegetation *Acacia coriacea, A. pruinocarpa, Ficus brachypoda, F. opposita* scattered tall shrubs over *Cajanus cinereus, Cullen stipulaceum* high open shrubland over *Abutilon* sp. open shrubland over *Triodia schinzii, Cymbopogon ?obtectus* scattered hummock / tussock grasses
Veg Condition Very good to excellent; 1x **Aerva javanica* found on a slope. Fire Age Burnt <12-18 months ago
Soil Type Red-brown sandy loam Rock Type Granite
Notes Regeneration after fire
Dominant species: Abutilon sp., Acacia coriacea subsp. pendens, A. pruinocarpa, Boerhavia coccinea, Cajanus cinereus, Cassia notabilis, Cleome viscosa, Cullen stipulaceum, Cymbopogon ?obtectus, Cynanchum floribundum, Ficus brachypoda, F. opposita, Triodia schinzii
Associated species: Amaranthus pallidiflorus, Bulbostylis barbata, B. burbidgeae, Cassia venusta, Corchorus sp., Cyperus cunninghamii subsp. cunninghamii, Eriachne mucronata, Gomphrena cunninghamii, Ipomoea muelleri, Paspalidium clementii, P. tabulatum (Whim Creek form), Perotis rara, Tinospora smilacina, Tribulus hirsutus, Triumfetta maconochieana

FMG N-S Rail FMGBB Described by BM Date 21/03/04 Quadrat Size releve
AMG Zone 50 674168mE, 7687043mN
Habitat Margin of flat plain at base of granite outcrop.
Vegetation *Tripogon loliiformis, Fimbristylis dichotoma* open grassland / sedgeland
Veg Condition Excellent Fire Age Burnt < 2 years ago
Soil Type Red sand Rock Type Granite
Notes Releve over the small area of this habitat at base of outcrop (~3-5 m wide strip around base).
Dominant species: Fimbristylis dichotoma, Gomphrena leptoclada subsp. leptoclada, Perotis rara, Tripogon loliiformis
Associated species: Acacia colei var. colei, Bulbostylis barbata, Desmodium aff. muellerii (MET 15,346), Eriachne pulchella subsp. dominii, Heliotropium cunninghamii, Indigofera linnaei, Polycarpaea corymbosa var. corymbosa, Triodia lanigera

FMG N-S Rail FMGBC Described by BM Date 21/03/04 Quadrat Size releve
AMG Zone 50 674351mE, 7686423mN
Habitat Broken low granite bouldery outcrop.
Vegetation *Terminalia canescens* scattered low trees over *Acacia tumida* tall open shrubland over *Triodia epactia* hummock grassland
Veg Condition Excellent Fire Age
Soil Type Red sand Rock Type Granite

Notes Vegetation in crevices and gaps between boulders / outcrop. *Bulbostylis burbidgeae* found in shade along bottom of granite boulder overhangs.
Dominant species: Acacia tumida, Terminalia canescens, Triodia epactia
Associated species: Abutilon sp., Amaranthus pallidiflorus, Amaranthus sp., Aristida holathera var. holathera, Boerhavia coccinea, Bulbostylis barbata, B. burbidgeae, Cassia venusta, Cheilanthes brownii, Cleome viscosa, Corchorus sp., Cymbopogon sp., Eragrostis pergracilis, Flueggea virosa subsp. melanthesoides, Hibiscus leptocladus, Hybanthus aurantiacus, Mallotus nesophilus, Mukia maderaspatana, Perotis rara, Sida aff. cardiophylla (FMGM-42), Tephrosia sp.B Kimberley Flora (C.A. Gardner 7300), Tinospora smilacina, Triumfetta maconochieana, Triumfetta sp. (HD292)

FMG N-S Rail FMGBD Described by BM Date 23/03/04 Quadrat Size releve
AMG Zone 50 707158mE, 7527466mN
Habitat Drainage flats in the Fortescue Valley (samphire flats).
Vegetation *Halosarcia halocnemoides* subsp. *tenuis, H. indica* subsp. *leiostachya* low open shrubland over *Cyperus bulbosus* closed annual sedgeland and *Eragrostis pergracilis* open annual grassland
Veg Condition Excellent Fire Age No evidence of recent fire Soil Type Red-brown clay
Dominant species: Cyperus bulbosus, Eragrostis pergracilis, Halosarcia halocnemoides subsp. tenuis, H. indica subsp. leiostachya
Associated species: Atriplex semilunaris, Eremophila spongiocarpa, Flaveria australasica, Frankenia ?magnifica, Halosarcia auriculata, Lawrencia densiflora, Maireana sp. nov. aff luehmannii, Nicotiana sp., Swainsona kingii

FMG N-S Rail FMGBE Described by BM Date 25/03/04 Quadrat Size releve
AMG Zone 50 725834mE, 7505766mN
Habitat Flat plain
Vegetation *Acacia aneura* low open forest over *Acacia synchronicia* tall open shrubland over **Cenchrus ciliaris* closed tussock grassland
Veg Condition Poor; invaded by Buffel grass Fire Age No evidence of recent fire
Soil Type Red-brown loamy clay
Notes 80 m from windmill - old cattle stock area.
Dominant species: Acacia aneura var. ?, A. synchronicia, Boerhavia coccinea, *Cenchrus ciliaris, Dactyloctenium radulans
Associated species: Abutilon otocarpum, Abutilon sp., Acacia coriacea subsp. pendens, A. farnesiana, A. sclerosperma subsp. sclerosperma, A. tetragonophylla, Amyema fitzgeraldii, Aristida contorta, A. inaequiglumis, Cassia notabilis, Chloris pectinata, Chrysopogon fallax, Cleome viscosa, Corchorus sidoides subsp. sidoides, Cucumis melo subsp. agrestis, Cullen leucochaites, Enneapogon polyphyllus, Eremophila latrobei, Eulalia aurea, Evolvulus alsinoides var. villosicalyx, Gomphrena affinis subsp. pilbarensis, Hibiscus sturtii var. platychlamys, Ipomoea muelleri, Maireana planifolia, Portulaca sp., Ptilotus macrocephalus, Rhagodia eremaea, Scaevola spinescens (broad form), Sida platycalyx, Solanum lasiophyllum, Triodia basedowii

FMG N-S Rail FMGBF Described by BM Date 30/03/04 Quadrat Size releve
AMG Zone 50 707740mE, 7555436mN
Habitat Upper slope of rounded low hill, south-facing.
Vegetation *Acacia inaequilatera (Grevillea pyramidalis)* scattered tall shrubs over *Corchorus* sp. scattered low shrubs over *Triodia wiseana* mid-dense hummock grassland
Veg Condition Excellent Fire Age No evidence of recent fire Soil Type Red loam
Dominant species: Acacia inaequilatera, Corchorus sp., Grevillea pyramidalis, Triodia wiseana
Associated species: Abutilon trudgenii, Cassia helmsii, Cheilanthes sieberi subsp. sieberi, Crotalaria novae-hollandiae, Cymbopogon ambiguus, Dysphania rhadinostachya, Euphorbia coghlanii, Evolvulus alsinoides var. villosicalyx, Gomphrena cunninghamii, Hibiscus sturtii var. aff. Campylochlamys (FMG 55-21), Hibiscus sp., Hybanthus aurantiacus, Paraneurachne muelleri, Paspalidium clementii, Polygala aff. isingii, Portulaca oleracea, Ptilotus exaltatus var. exaltatus, Solanum lasiophyllum, Sporobolus australasicus, Themeda sp. Hamersley Station (M.E. Trudgen 11431), Trachymene oleracea subsp. oleracea, Tragus australianus

FMG N-S Rail FMGBG Described by BM Date 31/03/04 Quadrat Size releve
AMG Zone 50 693431mE, 7599355mN
Habitat River flood bank
Vegetation *Eucalyptus victrix* scattered trees over *Corymbia hamersleyana* scattered low trees over *Acacia trachycarpa* tall shrubland over **Cenchrus ciliaris* closed tussock grassland
Veg Condition Poor; heavily infested with buffel grass. Fire Age No evidence of recent fire Soil Type Brown sa
Dominant species: Acacia trachycarpa, *Cenchrus ciliaris, Chrysopogon fallax, Corymbia hamersleyana, Eucalyptus victrix
Associated species: Acacia ancistrocarpa x trachycarpa, A. colei var. colei, A. coriacea subsp. pendens, A. sclerosperma subsp. sclerosperma, A. stellaticeps, A. tumida, Alternanthera nana, Cassia notabilis, Corchorus sp., Corymbia candida, Crotalaria cunninghamii, Cullen martinii, Dactyloctenium radulans, Eragrostis cumingii, Eriachne obtusa, Eulalia aurea, Euphorbia coghlanii, Euphorbia sp. (site 1089), Goodenia lamprosperma, Hakea lorea subsp. lorea, Heliotropium chrysocarpum, Hibiscus panduriformis, Hybanthus aurantiacus, Indigofera monophylla, Isotropis atropurpurea, Pluchea ferdinandi-muelleri, P. tetranthera, Pterocaulon ?sphaeranthoides x sphacelatum, Rhynchosia minima var. australis, Sida sp., Striga curviflora, Swainsona kingii, Themeda triandra, Trichodesma zeylanicum var. zeylanicum, Triodia lanigera, T. longiceps, Triumfetta aff. chaetocarpa (PAN3/4), Vigna lanceolata var. lanceolata, Waltheria indica

FMG N-S Rail FMGKC Described by KM Date 25/03/19 Quadrat Size releve
AMG Zone 50 738297mE, 7492840mN
Habitat Broad floodplain of Weeli Wolli Creek.
Vegetation *Acacia pruinocarpa, A. citrinoviridis, Corymbia hamersleyana* low woodland over **Cenchrus ciliaris, *C. setigerus* closed tussock grassland
Veg Condition Poor; invaded by **Cenchrus*. Soil Type Sandy clay Rock Type Ironstone
Dominant species: Acacia citrinoviridis, A. pruinocarpa, *Cenchrus ciliaris, *C. setigerus, Corymbia hamersleyana
Associated species: Abutilon otocarpum, Acacia coriacea subsp. pendens, A. inaequilatera, A. sclerosperma subsp. sclerosperma, Amaranthus pallidiflorus, Boerhavia coccinea, Chenopodium melanocarpum, Chrysopogon fallax, Cleome viscosa, Corchorus sidoides subsp. sidoides, Cucumis melo subsp. agrestis, Cullen leucochaites, Dactyloctenium radulans, *Datura leichhardtii, Digitaria ctenantha, Enneapogon polyphyllus, Euphorbia coghlanii, Evolvulus alsinoides var. villosicalyx, Hakea lorea subsp. lorea, Ipomoea muelleri, Iseilema eremaeum, Perotis rara, Portulaca oleracea, Pterocaulon ?sphaeranthoides x sphacelatum, Sclerolaena cornishiana, Sesbania cannabina, Solanum lasiophyllum, Sporobolus australasicus, Streptoglossa bubakii, Tragus australianus, Tribulus hirsutus, Trichodesma zeylanicum var. zeylanicum

FMG N-S Rail FMGKD Described by KM Date 27/03/04 Quadrat Size releve
AMG Zone 50 709304mE, 7533730mN
Habitat Hill crest
Vegetation *Acacia rhodophloia* tall shrubland over *Cassia luerssenii* shrubland over *Triodia brizoides* hummock grassland
Veg Condition Very good; occasional weed. Fire Age No evidence of recent fire
Soil Type Red-orange sandy clay loam, coarse fracture >90% (stones, rocks). Rock Type Quartz and granite
Dominant species: Acacia rhodophloia, Cassia luerssenii, Fimbristylis dichotoma, Triodia brizoides
Associated species: Acacia aneura (flat curved; MET 15 548), A. marramamba, A. pruinocarpa, Anthobolus leptomerioides, *Bidens bipinnata, Bulbostylis barbata, Cassia glutinosa, Cassia sp., Cheilanthes sieberi subsp. sieberi, Cucumis melo subsp. agrestis, Digitaria ctenantha, Enneapogon polyphyllus, Eragrostis cumingii, Eremophila pachomai, Eriachne pulchella subsp. dominii, Evolvulus alsinoides var. villosicalyx, Gomphrena cunninghamii, Paspalidium clementii, P. rarum, Perotis rara, Portulaca oleracea, Psydrax latifolia, Solanum lasiophyllum, Stenopetalum decipiens

FMG N-S Rail FMGKE Described by KM Date 27/03/04 Quadrat Size releve
AMG Zone 50 708416mE, 7532599mN
Habitat Clay pans scattered through mulga
Vegetation *Eriachne benthamii, Chrysopogon fallax* open tussock grassland and *Ptilotus gomphrenoides* open annual herbland
Veg Condition Excellent Fire Age None evident
Soil Type Red cracking clay Rock Type Ironstone and granite
Dominant species: Centipeda minima, Chrysopogon fallax, Eragrostis tenellula, Eriachne benthamii, Ptilotus gomphrenoides var. gomphrenoides
Associated species: Alysicarpus muelleri, Blumea tenella, Bulbostylis turbinata, Chloris pectinata, Crotalaria dissitiflora subsp. benthamiana, Cullen graveolens, Cyperus iria, C. squarrosus, Dichanthium sericeum subsp. humilius, Eragrostis setifolia, Eulalia aurea, Gomphrena affinis subsp. pilbarensis, G. kanisii, Iseilema eremaeum, Mimulus gracilis, Mukia sp.D Flora of Australia(A.A. Mitchell PRP 1121), Stemodia kingii

FMG N-S Rail FMGKF Described by KM Date 28/03/04 Quadrat Size releve
AMG Zone 50 707259mE, 7554300mN,
Habitat Low rocky rises amongst cracking clays (basaltic tablelands)
Vegetation *Acacia xiphophylla* open scrub over *Cassia* spp. low open shrubland
Veg Condition Very good; some grazing
Soil Type Red sandy clay loam with high coarse fraction (>80 %) Rock Type Basalt
Notes Detailed enough to use as a site
Dominant species: Acacia xiphophylla, Cassia helmsii, C. luerssenii, C. oligophylla, C. oligophylla (thinly sericeous form), C. sturtii, Cassia sp. Hamersley, Cassia sp. Hamersley x sp. Karijini, Cassia sp.
Associated species: *Aerva javanica, Astrebla pectinata, Boerhavia sp., *Cenchrus ciliaris, Chrysopogon fallax, Cleome viscosa, Digitaria brownii, D. ctenantha, Dipteracanthus aff. australasicus, Enchylaena tomentosa, Eremophila longifolia, Euphorbia coghlanii, Goodenia muelleriana, Hakea lorea subsp. lorea, Hibiscus brachysiphonius, Portulaca oleracea, Ptilotus exaltatus var. exaltatus, P. gomphrenoides var. gomphrenoides, Rhagodia eremaea, Sporobolus australasicus, Stemodia grossa, Streptoglossa bubakii, Themeda sp. Hamersley Station (M.E.Trudgen 11431), Trichosanthes cucumerina, Triodia epactia

FMG N-S Rail FMGKG Described by KM Date 30/03/04 Quadrat Size releve
AMG Zone 50 707015mE, 7556588mN
Habitat Creek flood area
Vegetation *Acacia xiphophylla* tall shrubland over *Cassia* spp. low open shrubland
Veg Condition Very good; evidence of cattle Fire Age No evidence of recent fire
Soil Type Red clay Rock Type Ironstone / Granite / Basalt
Dominant species: Acacia synchronicia, A. xiphophylla, Cassia aff. oligophylla (thinly sericeous form), Ptilotus gomphrenoides var. gomphrenoides
Associated species: Acacia farnesiana, Aristida inaequiglumis, Astrebla elymoides, A. pectinata, Boerhavia sp., Cassia helmsii, C. oligophylla, Cassia sp. Hamersley x sp. Karijini, Chrysopogon fallax, Cleome viscosa, Commelina ensifolia, Crotalaria dissitiflora subsp. benthamiana, Cullen cinereum, C. graveolens, Desmodium aff. campylocaulon, Dichanthium sericeum subsp. humilius, Eragrostis setifolia, Eriachne benthamii, Flaveria sp. Tom Price (M.E. Trudgen 11246), *Malvastrum americanum, Neptunia dimorphantha, Operculina aequisepala, Panicum decompositum, Polymeria lanata, Portulaca oleracea, Ptilotus exaltatus var. exaltatus, Rhagodia eremaea, Solanum lasiophyllum, Sporobolus australasicus, Stemodia grossa, Streptoglossa bubakii, Trichosanthes cucumerina, Vigna lanceolata var. lanceolata

FMG N-S Rail FMGKH Described by KM Date 30/03/04 Quadrat Size releve
AMG Zone 50 707055mE, 7556574mN
Habitat Creek
Veg Condition Very good; signs of cattle. Fire Age No evidence of recent fire
Soil Type Clay Rock Type Granite / Basalt?
Dominant species: Acacia farnesiana, A. synchronicia, Chrysopogon fallax, Eriachne benthamii, Ptilotus gomphrenoides var. gomphrenoides
Associated species: Astrebla pectinata, Bothriochloa ewartiana, Brachyachne convergens, Bulbostylis turbinata, *Cenchrus ciliaris, Cleome viscosa, Commelina ensifolia, Corchorus tridens, Crotalaria dissitiflora subsp. benthamiana, Cullen cinereum, C. graveolens, Dichanthium sericeum subsp. humilius, Eragrostis setifolia, E. tenellula, Eremophila longifolia, Euphorbia coghlanii, Hibiscus trionum, Indigofera linifolia, *Malvastrum americanum, Neptunia dimorphantha, Oldenlandia sp. 'gilgai', Operculina aequisepala, Panicum laevinode, Panicum sp., Paspalidium retiglume, Phyllanthus maderaspatensis, Polymeria lanata, Rhynchosia sp. King Bay (B181-13), Santalum lanceolatum, Scaevola spinescens (broad form), Sida spinosa, Sporobolus australasicus, Stemodia grossa, Swainsona sp. Hamersley Station (A.A. Mitchell 196), Themeda triandra, Trichosanthes cucumerina, Urochloa gilesii subsp. gilesii (glabrous florets)

FMG N-S Rail FMGMA Described by MM Date 18/03/04 Quadrat Size releve
AMG Zone 50 664516mE, 7727283mN
Habitat Plain
Vegetation *Acacia tumida* high open shrubland over *Acacia ancistrocarpa* open heath over *Triodia lanigera* hummock

grassland
Veg Condition Excellent Fire Age Burnt 4-5 years ago?
Soil Type Red-brown fine sandy loam to fine sand
Dominant species: Acacia ancistrocarpa, A. tumida, Triodia lanigera
Associated species: Acacia inaequilatera, A. stellaticeps, Aristida hygrometrica, Boerhavia coccinea, Bonamia linearis, B. rosea, Bulbostylis barbata, Cassia notabilis, Chrysopogon fallax, Corchorus sp., Eriachne obtusa, E. pulchella subsp. dominii, Euphorbia sp., Grevillea sp., Heliotropium chrysocarpum, Hybanthus aurantiacus, Indigofera monophylla, Mollugo molluginis, Paraneurachne muelleri, Polycarpaea corymbosa var. corymbosa, Polygala linariifolia, Polymeria aff. calycina, Portulaca oleracea, Ptilotus astrolasius var. astrolasius, Sida cardiophylla, Trianthema pilosa, Tribulopis angustifolia, Urochloa holosericea subsp. velutina, Yakirra australiensis var. australiensis

FMG N-S Rail FMGMB Described by MM Date Quadrat Size Releve
AMG Zone 50 665766mE, 7713964mN
Habitat Clayey patch within general plain
Vegetation Patches of *Eriachne benthamii* closed tussock grassland, within scattered *Pluchea tetranthera* low shrubs over *Triodia epactia* mid-dense hummock grassland
Veg Condition Excellent Soil Type Orange-brown clay
Notes Do not use in analysis; opportunistic collections only
Species: Bulbostylis turbinata, Cyperus iria, C. pulchellus, Eriachne benthamii, E. sulcata, Fimbristylis depauperata, F. dichotoma, Ipomoea coptica, Lipocarpha microcephala, Neptunia dimorphantha

FMG N-S Rail FMGMD Described by MM Date Quadrat Size Releve
AMG Zone 50 669643 mE, 7697663 mN
Habitat Steep upper slopes of ironstone ridge
Vegetation *Acacia inaequilatera* high open shrubland over *Triumfetta maconochieana* low open shrubland
Veg Condition Good; patches of weeds (Kapok)
Species: Amaranthus pallidiflorus, Boerhavia coccinea, Bulbostylis barbata, Cassia venusta, Cullen stipulaceum, Cyperus cunninghamii subsp. cunninghamii, Eriachne mucronata, Ficus brachypoda, Gomphrena cunninghamii, Mukia maderaspatana, Paspalidium clementii, Perotis rara, Ptilotus obovatus var. obovatus, Solanum horridum, Triumfetta maconochieana

FMG N-S Rail FMGME Described by MM Date 21/03/04 Quadrat Size releve
AMG Zone 50 681173mE, 7667382mN
Habitat Turner River; major river bank.
Vegetation *Eucalyptus camaldulensis* woodland over *Acacia trachycarpa, Atalaya hemiglauca* tall shrubland over **Cenchrus ciliaris* tussock grassland
Veg Condition Poor; invaded by Buffel grass. Soil Type Red-brown sandy loam with cobbles
Dominant species: Acacia trachycarpa, Atalaya hemiglauca, *Cenchrus ciliaris, Eucalyptus camaldulensis var. obtusa
Associated species: Abutilon trudgenii, Acacia ampliceps, Cajanus cinereus, Cassytha capillaris, Chrysopogon fallax, Cleome viscosa, Corchorus tridens, Corynotheca pungens, Crotalaria cunninghamii, Cyperus ?conicus, C. hesperius, C. vaginatus, Dactyloctenium radulans, Eriachne sp. Port Hedland, Eulalia aurea, Euphorbia coghlanii, Euphorbia sp. (site 1089), Goodenia lamprosperma, Hakea lorea subsp. lorea, Hibiscus panduriformis, Hybanthus aurantiacus, Petalostylis labicheoides, Phyllanthus maderaspatensis, Pluchea dentex, Polymeria aff. calycina, Pterocaulon ?sphaeranthoides x sphacelatum, Rhynchosia minima var. australis, Santalum lanceolatum, Sesbania cannabina, Solanum phlomoides, Stemodia grossa, Synaptantha tillaeacea var. tillaeacea, Vigna lanceolata var. lanceolata

FMG N-S Rail FMGMJ Described by MM Date Quadrat Size Releve
AMG Zone 50 706870 mE, 7523139 mN
Habitat Low stony rise, isolated within Fortescue Marsh
Vegetation *Acacia* aff. *aneura, A. rhodophloia* tall shrubland over *Cassia pruinosa* scattered shrubs over *Triodia brizoides* hummock grassland
Veg Condition Very good; occasional weed Soil Type Red-brown clay loam
Dominant species: Acacia aff. aneura (grey flat recurved tips; MET 15,828), A. aff. aneura (scythe-shaped; MET 15,743), A. rhodophloia, Boerhavia coccinea, C. pruinosa, Triodia brizoides
Associated species: Acacia arrecta, A. tetragonophylla, Bulbostylis barbata, B. turbinata, Cassia helmsii, Enneapogon polyphyllus, Eragrostis cumingii, Eremophila latrobei subsp. filiformis ms, Grevillea berryana, Hibiscus burtonii, Maireana planifolia, Portulaca oleracea, Ptilotus helipteroides var. helipteroides, Sarcostemma viminale subsp. australe, Setaria verticillata, Solanum lasiophyllum, Tragus australianus, Trichodesma zeylanicum var. zeylanicum

FMG N-S Rail FMGMT Described by MM Date 1/04/04 Quadrat Size releve
AMG Zone 50 696159mE, 7608448mN
Habitat Granite boulder rockpile
Vegetation *Mallotus nesophilus* scattered tall shrubs over *Triumfetta maconochieana, Abutilon* sp. open shrubland over **Cenchrus ciliaris* tussock grassland and *Triodia epactia* open hummock grassland
Veg Condition Poor; invaded by Buffel grass. Soil Type Orange-brown loam Rock Type Granite
Notes Incomplete, but could be included in analysis.
Dominant species: Abutilon sp., Mallotus nesophilus, Triodia epactia, Triumfetta maconochieana
Associated species: Acacia coriacea subsp. pendens, Amaranthus pallidiflorus, Aristida burbidgeae, Boerhavia coccinea, *Cenchrus ciliaris, Bulbostylis barbata, B. burbidgeae, Cajanus cinereus, Cassia notabilis, Cheilanthes brownii, Cleome viscosa, Corchorus sp., Cymbopogon ?ambiguus, Cyperus cunninghamii subsp. cunninghamii, Digitaria brownii, Evolvulus alsinoides var. villosicalyx, Ficus brachypoda, Gomphrena cunninghamii, Hibiscus sp., Indigofera colutea, Ipomoea muelleri, Mollugo molluginis, Nicotiana benthamiana, Rhodanthe margarethae, Rhynchosia minima var. australis, Solanum diversiflorum, S. lasiophyllum, Trichodesma zeylanicum var. zeylanicum, Trichosanthes cucumerina, Tripogon loliiformis

FMG N-S Rail FMGMU Described by MM Date 3/04/04 Quadrat Size releve
AMG Zone 50 694877mE, 7627794mN
Habitat Granite sheet outcropping
Vegetation Various; *Tripogon loliiformis* annual grassland; *Acacia tumida* open heath over *Triodia epactia* mid-dense hummock grassland; mixed sedgeland/herbland in seepage areas
Veg Condition Excellent Fire Age Burnt ~2-3 years ago. Soil Type Orange-

brown loam
Notes No sign of *Stylidium weeliwolli* in seepage area
Dominant species: Acacia tumida, Triodia epactia
Associated species: Amaranthus pallidiflorus, Amaranthus sp., Aristida holathera var. holathera, Bulbostylis barbata, B. burbidgeae, B. turbinata, Cassia notabilis, Cassia venusta, Cheilanthes brownii, C. sieberi subsp. sieberi, Cleome viscosa, Corchorus parviflorus, Crotalaria medicaginea, Cymbopogon ambiguus, Cyperus pulchellus, C. squarrosus, Eragrostis cumingii, Eriachne ciliata, E. mucronata, Euphorbia boophthona, Evolvulus alsinoides var. villosicalyx, Fimbristylis dichotoma, Gomphrena cunninghamii, Gonocarpus ephemerus, Grevillea wickhamii, Lipocarpha microcephala, Mukia maderaspatana, Paspalidium clementii, Perotis rara, Phyllanthus erwinii, Polycarpaea corymbosa var. corymbosa, P. holtzei, P. longiflora, Portulaca oleracea, Rhodanthe margarethae, Schizachyrium fragile, Tephrosia simplicifolia, T. spechtii, Trachymene oleracea subsp. oleracea, Tribulus suberosus, Tripogon loliiformis, Triumfetta maconochieana

FMG N-S Rail FMGRA Described by RO Date 26/03/04 Quadrat Size releve
AMG Zone 50 741462mE, 7488650mN
Habitat Seasonal drainage area in a very mildly sloping plain area.
Vegetation *Acacia pruinocarpa, A. citrinoviridis* low open woodland over **Cenchrus ciliaris* tussock grassland
Veg Condition Poor to Good; grazing and invasion by Buffel grass. Soil Type Red clay Rock Type Ironstone
Fire Age No sign of recent fire
Dominant species: Acacia citrinoviridis, A. pruinocarpa, *Cenchrus ciliaris
Associated species: Acacia sclerosperma subsp. sclerosperma, A. synchronicia, *Aerva javanica, Amaranthus pallidiflorus, Aristida contorta, Atalaya hemiglauca, Boerhavia coccinea, Bulbostylis barbata, Cassia helmsii, Chloris pectinata, Cleome viscosa, Corchorus crozophorifolius, Dactyloctenium radulans, Digitaria ctenantha, Enneapogon caerulescens var. caerulescens, Eragrostis cumingii, E. leptocarpa, E. tenellula, Eremophila longifolia, Eriachne aristidea, E. pulchella subsp. dominii, Evolvulus alsinoides var. villosicalyx, Hakea lorea subsp. lorea, Perotis rara, Porana commixta, Portulaca oleracea, Pterocaulon sphaeranthoides, Ptilotus obovatus var. obovatus, Sida sp., Solanum lasiophyllum, Tribulus terrestris, Trichodesma zeylanicum var. zeylanicum, Triodia pungens, Waltheria indica

FMG N-S Rail FMGRB Described by RO Date 26/03/04 Quadrat Size releve
AMG Zone 50 725842mE, 7506178mN
Habitat Linear sand dune
Vegetation *Acacia dictyophleba* high open shrubland
Soil Type Red sand
Dominant species: Acacia dictyophleba
Associated species: Acacia sclerosperma subsp. sclerosperma, Amyema preissii, Atalaya hemiglauca, Boerhavia coccinea, Boerhavia sp., *Citrullus colocynthis, Corchorus tectus, Eragrostis eriopoda, Eriachne aristidea, Goodenia microptera, Gossypium australe (Burrup Peninsula form), Indigofera monophylla, Petalostylis cassioides, Ptilotus obovatus var. obovatus, Rhyncharrhena linearis, Sida sp., Stylobasium spathulatum, Trichodesma zeylanicum var. zeylanicum, Yakirra australiensis var. australiensis

FMG N-S Rail FMGRD Described by RO Date 30/03/04 Quadrat Size releve
AMG Zone 50 706859mE, 7557008mN
Habitat Stony hill
Vegetation *Acacia ancistrocarpa* high open shrubland over *Triodia wiseana* mid-dense hummock grassland
Veg Condition Excellent Soil Type Red-brown clay loam
Dominant species: Acacia ancistrocarpa, Paraneurachne muelleri, Triodia wiseana
Associated species: Acacia colei var. colei, A. elachantha, A. inaequilatera, A. monticola, A. tenuissima, Alternanthera nana, Aristida contorta, A. inaequiglumis, Bulbostylis barbata, Capparis umbonata, Cassia glutinosa, C. notabilis, Cheilanthes sieberi subsp. sieberi, Codonocarpus cotinifolius, Corchorus lasiocarpus subsp. lasiocarpus, Corymbia hamersleyana, Cymbopogon ambiguus, Enneapogon caerulescens var. caerulescens, E. caerulescens var. caerulescens, E. polyphyllus, Eremophila longifolia, Eriachne pulchella subsp. dominii, Euphorbia coghlanii, Euphorbia sp. (site 1089), Euphorbia sp., Evolvulus alsinoides var. villosicalyx, Fimbristylis dichotoma, Goodenia microptera, G. stobbsiana, Gossypium australe (Burrup Peninsula form), Hakea chordophylla, Heliotropium heteranthum, Hibiscus sturtii var. aff. Campylochlamys (FMG 55-21), Hybanthus aurantiacus, Indigofera monophylla, Isotropis atropurpurea, Jasminum didymum subsp. lineare, Maireana villosa, Mollugo molluginis, Pluchea ferdinandi-muelleri, Polycarpaea corymbosa var. corymbosa, P. holtzei, Polymeria aff. calycina, Portulaca oleracea, Ptilotus aervoides, P. exaltatus var. exaltatus, Salsola tragus, Sclerolaena cornishiana, Sida aff. cardiophylla (site 1086), S. echinocarpa, Sida sp., Solanum lasiophyllum, Sporobolus australasicus, Stemodia grossa, Themeda triandra, Trachymene oleracea subsp. oleracea, Yakirra australiensis var. australiensis

FMG N-S Rail FMGRE Described by RO Date 1/04/04 Quadrat Size releve
AMG Zone 50 702139mE, 7578919mN, 701943mE, 7578931mN
Habitat Granite sheet
Vegetation *Triodia epactia* very open hummock grassland / very open herbland / *Tripogon loliiformis* very open grassland
Veg Condition Excellent Fire Age Not evident
Soil Type Coarse sand (in pockets and sheet boundary). Rock Type Granite
Notes *Stylidium weeliwolli;* 2 plants on seepage at 700409, 7578907; about 100 in vicinity
Dominant species: Bulbostylis barbata, Eriachne ciliata, Gomphrena leptoclada subsp. leptoclada, Triodia epactia, Sporobolus australasicus, Tripogon loliiformis
Associated species: Acacia tumida, Alternanthera nana, Amaranthus pallidiflorus, Aristida contorta, Bulbostylis turbinata, Cleome viscosa, Crotalaria medicaginea, Cymbopogon ambiguus, Cyperus iria, C. pulchellus, C. squarrosus, Cyperus sp., Drosera indica, Eragrostis cumingii, Eriachne mucronata, E. pulchella subsp. dominii, Eriocaulon pusillum, Euphorbia coghlanii, E. tannensis subsp. eremophila (Hamersley, Euphorbia sp., Evolvulus alsinoides var. villosicalyx, Fimbristylis dichotoma, F. microcarya, Gomphrena cunninghamii, Gonocarpus ephemerus, Grevillea wickhamii, Heliotropium cunninghamii, Hybanthus aurantiacus, Lipocarpha microcephala, Mitrasacme connata, Mollugo molluginis, Paspalidium clementii, Perotis rara, Phyllanthus erwinii, Polycarpaea corymbosa var. corymbosa, P. holtzei, P. longiflora, Polymeria aff. calycina, Portulaca oleracea, Ptilotus fusiformis var. fusiformis, Sarcostemma viminale subsp. australe, Stemodia sp., Stylidium weeliwolli, Trachymene oleracea subsp. oleracea, Tribulus suberosus, Triumfetta sp. (HD292), Yakirra australiensis var. australiensis

FMG N-S Rail FMGRF Described by KM Date 4/04/04 Quadrat Size releve
AMG Zone 50 692528 mE, 7635185 mN
Habitat Granite outcrop and seepage.
Vegetation *Acacia tumida* scattered tall shrubs over open grassland / open herbland / very open sedgeland

Veg Condition	Excellent	Fire Age	No evidence of recent fire
Soil Type	Quartzy sand	Rock Type	Granite

Dominant species: Acacia tumida, Eragrostis cumingii, Gomphrena leptoclada subsp. leptoclada, Gonocarpus ephemerus, Terminalia canescens, Triodia epactia

Associated species: Abutilon ?hannii, Acacia acradenia, Byblis filifolia, Calandrinia sp., Cassia notabilis, Cheilanthes brownii, Cleome viscosa, Cyperus blakeanus, C. iria, C. pulchellus, C. squarrosus, Digitaria gibbosa, Drosera indica, Eriachne ciliata, Euphorbia coghlanii, Fimbristylis dichotoma, Gomphrena cunninghamii, Ipomoea polymorpha, Lipocarpha microcephala, Paspalidium rarum, Phyllanthus sp., Polycarpaea holtzei, P. longiflora, Rotala diandra, R. occultiflora, Schoenoplectus laevis, Solanum gabrielae, Stemodia lathraia, Tinospora smilacina, Tripogon loliiformis, Triumfetta sp. (HD292)

FMG N-S Rail FMGOPP **Various opportunistic collections**

Species: Acacia aff. aneura (grey flat recurved tips; MET 15,828, A. arida, A. atkinsiana, A. ayersiana, A. bivenosa X ampliceps, A. coriacea subsp. pendens, A. eriopoda, A. pachyacra, A. ptychophylla, A. pyrifolia, A. sphaerostachya, A. stenophylla, A. synchronicia, A. victoriae, A. wanyu, Adriana urticoides var. urticoides, *Aerva javanica, Alysicarpus muelleri, Ammannia multiflora, Amphipogon caricinus, Aristida inaequiglumis, Astrebla elymoides, Atriplex bunburyana, A. codonocarpa, A. semilunaris, *Bidens bipinnata, Bonamia sp. (HD94-6), Brachyachne convergens, Bulbostylis burbidgeae, B. turbinata, Cajanus cinereus, Carissa spinarum, Cassia oligophylla, C. aff. oligophylla (thinly sericeous form), C. sericea, Cassia sp. Hamersley x sp. Karijini, C. symonii, *Cenchrus ciliaris, Chloris pectinata, Citrullus colocynthis, Corchorus elachocarpus, C. aff. lasiocarpus subsp. lasiocarpus, C. parviflorus, C. aff. walcottii (H251-3), Crotalaria dissitiflora subsp. benthamiana, Cucumis melo subsp. agrestis, Cullen cinereum, Cyperus bulbosus, Desmodium filiforme, Dicladanthera forrestii, Digitaria brownii, Dipteracanthus aff. australasicus, Dodonaea petiolaris, Dolichandrone heterophylla, Ehretia saligna var. saligna, Eleocharis sp., Enneapogon caerulescens var. caerulescens, Eragrostis dielsii, E. setifolia, Eremophila lanceolata ms, E. spongiocarpa, Eriachne benthamii, E. lanata, E. obtusa, E. tenuiculmis, Eriachne sp. Port Hedland, Eucalyptus victrix, Euphorbia coghlanii, E. tannensis subsp. eremophila (Hamersley, Euphorbia sp.B Kimberley Flora (B.J.Carter 629), Evolvulus alsinoides var. decumbens, Fimbristylis depauperata, F. dichotoma, Frankenia ?ambita, Frankenia ?magnifica, Gomphrena affinis subsp. pilbarensis, G. canescens subsp. canescens, G. leptoclada subsp. leptoclada, Gonocarpus ephemerus, Goodenia omearana, G. stellata, Gossypium australe (Burrup Peninsula form), Gymnanthera cunninghamii, Halosarcia indica subsp. leiostachya, Heliotropium chrysocarpum, Heteropogon contortus, Hibiscus brachysiphonius, H. goldsworthii, H. leptocladus, H. sturtii var. aff. Platychlamys, H. trionum, Indigofera colutea, I. trita, Ipomoea diamantinensis, Keraudrenia nephrosperma, Lepidium platypetalum, Maireana aff. georgei, M. pyramidata, *Malvastrum americanum, Marsilea hirsuta, Melaleuca argentea, M. glomerata, Mitrasacme connata, Muehlenbeckia florulenta, Mukia sp.D Flora of Australia(A.A.Mitchell PRP 1121), Neptunia dimorphantha, Oldenlandia sp. 'gilgai', Operculina aequisepala, Panicum decompositum, Panicum laevinode, Paspalidium retiglume, Peplidium muelleri, Petalostylis labicheoides, Phyllanthus sp., Pittosporum phylliraeoides, Pluchea rubelliflora, Polygala linariifolia, Polymeria aff. calycina, P. lanata, Polymeria sp.Hamersley (M.E.Trudgen 11353), Polymeria sp. (site 1365), Ptilotus axillaris, P. carinatus, P. latifolius var. latifolius, Rhyncharrhena linearis, Rhynchosia sp. King Bay (B181-13), Scaevola aff. browniana, S. spinescens (broad form), Sclerolaena cuneata, S. diacantha, S. eriacantha, Sclerolaena sp. nov. aff densiflora, Sida aff. cardiophylla (FMG102-7), S. aff. cardiophylla (FMGM-42), S. aff. cardiophylla (site 1086), S. echinocarpa, S. sp.Wittenoom(W.R.Barker 1962), Solanum gabrielae, S. lasiophyllum, Stemodia kingii, Streptoglossa liatroides, Stylobasium spathulatum, Swainsona sp.Hamersley Station(A.A.Mitchell 196), Synaptantha tillaeacea var. tillaeacea, Tephrosia aff. clementii (10) (HD88-3), T. aff. clementii (9) (HD284-6), T. aff. supina (HD133-20), T. aff. supina (HD237-23), T. aff. supina (HD254-5), Tephrosia sp.B Kimberley Flora(C.A.Gardner 7300), Tephrosia sp. Bungaroo Creek (M.E. Trudgen 11601), Terminalia canescens, Themeda sp.Hamersley Station(M.E.Trudgen 11431), Tribulus platypterus, T. terrestris, Trichodesma zeylanicum var. grandiflorum, Triodia angusta, T. epactia, T. latzii, T. pungens, T. secunda, T. wiseana, Triumfetta aff. chaetocarpa (PAN3/4), Urochloa gilesii subsp. gilesii (glabrous florets), Vigna sp. Central(M.E. Trudgen 1626), Xerochloa laniflora

Flora Recorded from the FMG and Hope Downs Rail Corridors

Appendix 4

BIOta

Notes:

* denotes introduced species (weeds)

Correspondence of *Cassia* / *Senna* nomenclature:

Cassia artemisioides	-	*Senna artemisioides* subsp. x *artemisioides*
Cassia glaucifolia	-	*Senna glaucifolia*
Cassia glutinosa	-	*Senna glutinosa* subsp. *glutinosa*
Cassia hamersleyensis	-	*Senna hamersleyensis*
Cassia helmsii	-	*Senna artemisioides* subsp. *helmsii*
Cassia luerssenii	-	*Senna glutinosa* subsp. x *luerssenii*
Cassia notabilis	-	*Senna notabilis*
Cassia oligophylla	-	*Senna artemisioides* subsp. *oligophylla*
Cassia pruinosa	-	*Senna glutinosa* subsp. *pruinosa*
Cassia sericea	-	*Senna sericea*
Cassia 'stricta'	-	*Senna stricta*
Cassia sturtii	-	*Senna artemisioides* subsp. x *sturtii*
Cassia 'symonii'	-	*Senna symonii*
Cassia venusta	-	*Senna venusta*
Cassia sp. Karijini (MET 10,392)	-	*Senna* sp. Karijini (M.E. Trudgen 10392)

Species	Records from FMG rail corridor †1	Total records from Hope Downs rail corridor †2
ALGAE		
Chara sp.		HD
ACANTHACEAE (325)		
Dicladanthera forrestii	FMG	HD
Dipteracanthus aff. *australasicus*	FMG	HD
Rostellularia adscendens		HD
ADIANTACEAE (007)		
Cheilanthes brownii	FMG	HD
Cheilanthes lasiophylla	HD	HD
Cheilanthes sieberi subsp. *sieberi*	FMG	HD
Cheilanthes sp.		HD
AIZOACEAE (110)		
Trianthema cussackiana	FMG	HD
Trianthema glossostigma	FMG	
Trianthema oxycalyptra var. *oxycalyptra*	FMG	HD
Trianthema pilosa	FMG	HD
Trianthema triquetra	FMG	HD
Trianthema turgidifolia	FMG	HD
AMARANTHACEAE (106)		
Achyranthes aspera	FMG	HD
**Aerva javanica*	FMG	HD
Alternanthera angustifolia		HD
Alternanthera nana	FMG	HD
Alternanthera nodiflora	HD	HD
Alternanthera sp.	FMG	
Amaranthus mitchellii	HD	HD
Amaranthus pallidiflorus	FMG	HD
Amaranthus sp. (HD102)	HD	HD
Amaranthus sp.	FMG	HD
Gomphrena affinis subsp. *pilbarensis*	FMG	
Gomphrena canescens subsp. *canescens*	FMG	HD
Gomphrena cunninghamii	FMG	HD
Gomphrena kanisii	FMG	
Gomphrena leptoclada subsp. *leptoclada*	FMG	
Gomphrena sordida	FMG	
Hemichroa diandra	HD	HD
Ptilotus aervoides	FMG	HD
Ptilotus arthrolasius		HD
Ptilotus astrolasius var. *astrolasius*	FMG	HD
Ptilotus auriculifolius	FMG	HD
Ptilotus axillaris	FMG	HD
Ptilotus calostachyus var. *calostachyus*	FMG	HD
Ptilotus carinatus	FMG	HD
Ptilotus clementii	FMG	HD
Ptilotus exaltatus var. *exaltatus*	FMG	HD
Ptilotus fusiformis var. *fusiformis*	FMG	HD
Ptilotus gaudichaudii var. *gaudichaudii*	FMG	
Ptilotus gomphrenoides var. *gomphrenoides*	FMG	HD
Ptilotus helipteroides var. *helipteroides*	FMG	HD

Species	Records from FMG rail corridor †1	Total records from Hope Downs rail corridor †2
Ptilotus incanus	FMG	HD
Ptilotus latifolius var. *latifolius*	FMG	HD
Ptilotus macrocephalus	FMG	
Ptilotus obovatus var. *obovatus*	FMG	HD
Ptilotus polystachyus var. *arthrotrichus*		HD
Ptilotus polystachyus var. *polystachyus*	FMG	HD
Ptilotus rotundifolius	FMG	
Ptilotus schwartzii var. *schwartzii*	FMG	HD
Ptilotus sp.		HD
ANTHERICACEAE (054F)		
Corynotheca pungens	FMG	
APIACEAE (281)		
Trachymene oleracea subsp. *oleracea*	FMG	HD
APOCYNACEAE (304)		
Carissa spinarum	FMG	HD
ASCLEPIADACEAE (305)		
Cynanchum floribundum	FMG	HD
Gymnanthera cunninghamii (Priority 3)	FMG	HD
Marsdenia australis		HD
Rhyncharrhena linearis	FMG	HD
Sarcostemma viminale subsp. *australe*	FMG	HD
ASTERACEAE (345)		
**Bidens bipinnata*	FMG	HD
Blumea tenella	FMG	HD
Centipeda minima	FMG	HD
Chrysocephalum apiculatum	FMG	
Chrysocephalum aff. *apiculatum*		HD
Cyanthillium cinereum		HD
Flaveria australasica	FMG	HD
Flaveria sp. Tom Price (M.E. Trudgen 11246)	FMG	HD
Helichrysum gilesii		HD
Olearia fluvialis (Priority 2)	HD	HD
Pluchea dentex	FMG	HD
Pluchea ferdinandi-muelleri	FMG	HD
Pluchea rubelliflora	FMG	HD
Pluchea tetranthera	FMG	HD
Podolepis capillaris	FMG	HD
Pterocaulon serrulatum	HD	HD
Pterocaulon sphacelatum	HD	HD
Pterocaulon sphaeranthoides	FMG	HD
Pterocaulon ?sphaeranthoides x *sphacelatum*	FMG	HD
Pterocaulon sp. (PAN1-47)	FMG	
Rhodanthe margarethae	FMG	HD
**Sigesbeckia orientalis*		HD
**Sonchus oleraceus*		HD
Streptoglossa adscendens		HD
Streptoglossa bubakii	FMG	HD
Streptoglossa cylindriceps		HD
Streptoglossa decurrens	FMG	HD
Streptoglossa liatroides	FMG	

Species	Records from FMG rail corridor †1	Total records from Hope Downs rail corridor †2
Streptoglossa macrocephala	FMG	HD
Streptoglossa odora	HD	HD
**Tridax procumbens*		HD
Vittadinia arida		HD
Vittadinia dissecta	HD	HD
Vittadinia obovata		HD
Vittadinia virgata		HD
Vittadinia sp. (HD268)		HD
AVICENNIACEAE (312)		
Avicennia marina	HD	HD
BIGNONIACEAE (317)		
Dolichandrone heterophylla	FMG	HD
BORAGINACEAE (310)		
Ehretia saligna var. *saligna*	FMG	HD
Heliotropium chrysocarpum	FMG	HD
Heliotropium ?conocarpum		HD
Heliotropium crispatum	FMG	HD
Heliotropium cunninghamii	FMG	
Heliotropium ?cunninghamii	HD	HD
Heliotropium diversifolium		HD
Heliotropium ?foliatum	HD	HD
Heliotropium heteranthum	FMG	HD
Heliotropium inexplicitum	FMG	HD
Heliotropium ovalifolium		HD
Heliotropium pachyphyllum	FMG	
Heliotropium ?pachyphyllum		HD
Heliotropium ?parviantrum	HD	HD
Heliotropium skeleton	FMG	HD
Heliotropium tenuifolium	FMG	HD
Heliotropium sp.	FMG	
Trichodesma zeylanicum var. *grandiflorum*	FMG	HD
Trichodesma zeylanicum var. *latisepalum*	FMG	HD
Trichodesma zeylanicum var. *zeylanicum*	FMG	HD
BRASSICACEAE (138)		
Lepidium pedicellosum		HD
Lepidium phlebopetalum	HD	HD
Lepidium pholidogynum	FMG	HD
Lepidium platypetalum	FMG	
Stenopetalum decipiens	FMG	HD
BYBLIDACEAE (154)		
Byblis filifolia	FMG	HD
CAESALPINIACEAE (164)		
Cassia artemisioides		HD
Cassia glaucifolia	FMG	
Cassia glutinosa	FMG	HD
Cassia glutinosa x *'stricta'*	HD	HD
Cassia hamersleyensis	FMG	HD
Cassia hamersleyensis x sp. Karijini (M.E. Trudgen 10392)	FMG	HD
Cassia helmsii	FMG	HD
Cassia ?helmsii x *symonii*		HD

Species	Records from FMG rail corridor †1	Total records from Hope Downs rail corridor †2
Cassia luerssenii	FMG	HD
Cassia aff. *luerssenii* (HD227-5)		HD
Cassia luerssenii x *'stricta'*		HD
Cassia notabilis	FMG	HD
Cassia oligophylla	FMG	HD
Cassia aff. *oligophylla* (thinly sericeous)	FMG	HD
Cassia oligophylla x *helmsii*	FMG	HD
Cassia ?oligophylla x *glaucifolia*	HD	HD
Cassia pruinosa	FMG	HD
Cassia sericea	FMG	
Cassia 'stricta'	HD	HD
Cassia sturtii	FMG	HD
Cassia 'symonii'	FMG	HD
Cassia venusta	FMG	HD
Cassia sp. Karijini (MET 10,392)		HD
Cassia sp.	FMG	
Petalostylis cassioides	FMG	HD
Petalostylis labicheoides	FMG	HD
CAMPANULACEAE (339)		
Wahlenbergia tumidifructa	FMG	HD
CAPPARACEAE (137A)		
Capparis spinosa var. *nummularia*	HD	HD
Capparis umbonata	FMG	HD
Cleome oxalidea	FMG	
Cleome uncifera	FMG	HD
Cleome viscosa	FMG	HD
CARYOPHYLLACEAE (113)		
Polycarpaea corymbosa var. *corymbosa*	FMG	HD
Polycarpaea holtzei	FMG	HD
Polycarpaea longiflora	FMG	HD
Polycarpaea longiflora (pale form)		HD
Polycarpaea longiflora (red form)	HD	HD
Polycarpaea sp.		HD
CELASTRACEAE (199)		
Maytenus sp. Mt Windell (S. van Leeuwen 846)		HD
CHENOPODIACEAE (105)		
Atriplex bunburyana	FMG	HD
Atriplex codonocarpa	FMG	HD
Atriplex semilunaris	FMG	
Chenopodium melanocarpum	FMG	HD
Dissocarpus paradoxus		HD
Dysphania kalpari	FMG	HD
Dysphania plantaginella	FMG	HD
Dysphania rhadinostachya	FMG	HD
Dysphania sphaerosperma	FMG	HD
Einadia nutans		HD
Enchylaena tomentosa	FMG	HD
Halosarcia auriculata	FMG	
Halosarcia halocnemoides subsp. *tenuis*	FMG	HD
Halosarcia ?halocnemoides subsp. *tenuis*	HD	HD

Species	Records from FMG rail corridor †1	Total records from Hope Downs rail corridor †2
Halosarcia halocnemoides subsp. nov.	HD	HD
Halosarcia indica subsp. *julacea*	HD	HD
Halosarcia indica subsp. *leiostachya*	FMG	HD
Halosarcia indica subsp. ?		HD
Halosarcia ?pergranulata	HD	HD
Halosarcia ?pterigosperma	HD	HD
Halosarcia sp. nov. aff. *pergranulata* (an undescribed small-seeded form)	FMG	
Maireana carnosa	FMG	HD
Maireana aff. *georgei*	FMG	HD
Maireana melanocoma		HD
Maireana planifolia	FMG	HD
Maireana planifolia x *villosa*		HD
Maireana pyramidata	FMG	HD
Maireana tomentosa	FMG	HD
Maireana triptera	FMG	HD
Maireana villosa	FMG	HD
Maireana sp. nov. aff. *M. luehmannii*	FMG	
Neobassia astrocarpa	HD	HD
Rhagodia eremaea	FMG	HD
Salsola tragus	FMG	HD
Sclerolaena bicornis		HD
Sclerolaena cornishiana	FMG	HD
Sclerolaena costata	FMG	HD
Sclerolaena cuneata	FMG	HD
Sclerolaena densiflora	HD	HD
Sclerolaena sp. nov. aff. *densiflora* (a Pilbara form of the species)	FMG	
Sclerolaena diacantha	FMG	HD
Sclerolaena eriacantha	FMG	HD
Sclerolaena hostilis	FMG	
COMBRETACEAE (272)		
Terminalia canescens	FMG	HD
COMMELINACEAE (047)		
Commelina ensifolia	FMG	
Murdannia graminea	HD	HD
CONVOLVULACEAE (307)		
Bonamia linearis	FMG	HD
Bonamia media var. *?media*	FMG	HD
Bonamia media var. *villosa*	FMG	HD
Bonamia pannosa	FMG	HD
Bonamia rosea	FMG	HD
Bonamia sp. (HD94-6)	FMG	HD
Convolvulus angustissimus subsp. *angustissimus*	FMG	
Convolvulus erubescens		HD
Evolvulus alsinoides var. *decumbens*	FMG	HD
Evolvulus alsinoides var. *villosicalyx*	FMG	HD
Ipomoea coptica	FMG	HD
Ipomoea diamantinensis	FMG	
Ipomoea lonchophylla	FMG	
Ipomoea muelleri	FMG	HD
Ipomoea plebeia	FMG	

Species	Records from FMG rail corridor †1	Total records from Hope Downs rail corridor †2
Ipomoea polymorpha	FMG	HD
Merremia davenportii		HD
Operculina aequisepala	FMG	HD
Polymeria ambigua	HD	HD
Polymeria calycina	FMG	
Polymeria aff. *calycina*	FMG	
Polymeria lanata	FMG	HD
Polymeria sp. Hamersley (M.E. Trudgen 11353) (Priority 3)	FMG	
Polymeria sp. (site 1365)	FMG	HD
Polymeria sp. (HD103-11)	HD	HD
Porana commixta	FMG	HD
CUCURBITACEAE (337)		
**Citrullus colocynthis*	FMG	HD
Cucumis melo subsp. *agrestis*	FMG	HD
Mukia maderaspatana	FMG	HD
Mukia sp. D Flora of Australia (A.A. Mitchell PRP 1121)	FMG	
Trichosanthes cucumerina	FMG	HD
CYPERACEAE (032)		
Bulbostylis barbata	FMG	HD
Bulbostylis burbidgeae (Priority 3)	FMG	HD
Bulbostylis turbinata	FMG	HD
Cyperus blakeanus	FMG	HD
Cyperus bulbosus	FMG	HD
Cyperus castaneus var. *brevimucronatus*	FMG	HD
Cyperus ?conicus	FMG	HD
Cyperus cunninghamii subsp. *cunninghamii*	FMG	HD
Cyperus difformis		HD
Cyperus hesperius	FMG	HD
Cyperus iria	FMG	HD
Cyperus ixiocarpus	FMG	HD
Cyperus pulchellus	FMG	
Cyperus squarrosus	FMG	HD
Cyperus vaginatus	FMG	HD
Cyperus sp.	FMG	
Eleocharis sp.	FMG	
Fimbristylis depauperata	FMG	
Fimbristylis dichotoma	FMG	HD
Fimbristylis microcarya	FMG	HD
Fimbristylis oxystachya	HD	HD
Fimbristylis neilsonii	FMG	HD
Fimbristylis rara	FMG	HD
Fimbristylis simulans	FMG	HD
Fimbristylis sp.	FMG	
Fuirena ciliaris		HD
Lipocarpha microcephala	FMG	HD
Schoenoplectus laevis	FMG	
Schoenoplectus lateriflorus		HD
Schoenoplectus subulatus		HD
DROSERACEAE (143)		
Drosera burmanni	HD	HD

Species	Records from FMG rail corridor †1	Total records from Hope Downs rail corridor †2
Drosera indica	FMG	
ELATINACEAE (235)		
Bergia pedicellaris		HD
Bergia perennis		HD
Bergia trimera	HD	HD
ERIOCAULACEAE (043)		
Eriocaulon pusillum	FMG	
EUPHORBIACEAE (185)		
Adriana urticoides var. *urticoides*	FMG	HD
Euphorbia australis (mid-green form)	HD	HD
Euphorbia aff. *australis* var. 1 (MET 12,337)	HD	HD
Euphorbia aff. *australis* (B191)	HD	HD
Euphorbia aff. *australis*	FMG	
Euphorbia biconvexa	FMG	HD
Euphorbia boophthona	FMG	HD
Euphorbia aff. *boophthona* (large seed form)	HD	HD
Euphorbia clementii (Priority 2)	HD	HD
Euphorbia coghlanii	FMG	HD
Euphorbia aff. *coghlanii* (HD186-18)		HD
Euphorbia aff. *drummondii* (HD195-16)		HD
**Euphorbia hirta*		HD
Euphorbia aff. *myrtoides* (HD47-9)		HD
Euphorbia tannensis subsp. *eremophila* (Panorama form)	HD	HD
Euphorbia tannensis subsp. *eremophila* (Hamersley form)	FMG	HD
Euphorbia sp. B Kimberley Flora (BJ Carter 629)	FMG	
Euphorbia sp. Harding (MET 15,683)	FMG	
Euphorbia sp. (BPBS10-50)	HD	HD
Euphorbia sp. (HD234-15A)	HD	HD
Euphorbia sp. (PAN5-15)	HD	HD
Euphorbia sp. (site 1089)	FMG	HD
Euphorbia sp.	FMG	
Flueggea virosa subsp. *melanthesoides*	FMG	HD
Leptopus decaisnei var. *decaisnei*	FMG	HD
Mallotus ?dispersus	HD	HD
Mallotus nesophilus	FMG	HD
Phyllanthus aridus (Priority 3)	HD	HD
Phyllanthus erwinii	FMG	HD
Phyllanthus maderaspatensis	FMG	HD
Phyllanthus sp.	FMG	
Sebastiania chamaelea		HD
Sebastiana sp.	FMG	
FRANKENIACEAE (236)		
Frankenia ambita	HD	HD
Frankenia ?ambita	FMG	
Frankenia ?magnifica	FMG	
Frankenia ?setosa	HD	HD
Frankenia sp. (HD49)		HD
GOODENIACEAE (341)		
Dampiera candicans	FMG	HD
Goodenia armitiana	HD	HD

Species	Records from FMG rail corridor †1	Total records from Hope Downs rail corridor †2
Goodenia cusackiana	FMG	HD
Goodenia forrestii	FMG	HD
Goodenia heterochila	HD	HD
Goodenia lamprosperma	FMG	HD
Goodenia microptera	FMG	HD
Goodenia muelleriana	FMG	HD
Goodenia nuda (Priority 3)	HD	HD
Goodenia omearana (Priority 1)	FMG	
Goodenia aff. *pascua*		HD
Goodenia prostrata	FMG	HD
Goodenia sepalosa var. *sepalosa*	HD	HD
Goodenia stellata (Priority 4)	FMG	HD
Goodenia stobbsiana	FMG	HD
Goodenia triodiophila	FMG	HD
Goodenia vilmoriniae		HD
Goodenia sp.	FMG	HD
Scaevola acacioides		HD
Scaevola amblyanthera var. *centralis*	FMG	HD
Scaevola aff. *browniana*	FMG	HD
Scaevola parvifolia subsp. *pilbarae*	FMG	HD
Scaevola spinescens (broad form)	FMG	HD
Scaevola spinescens (narrow form)	FMG	
Scaevola spinescens (spiny, fine leaf)		HD
Velleia discophora	HD	HD
GYROSTEMONACEAE (108)		
Codonocarpus cotinifolius	FMG	HD
HALORAGACEAE (276)		
Gonocarpus ephemerus (Priority 2)	FMG	HD
Haloragis gossei	FMG	HD
HYDROCHARITACEAE (029)		
Vallisneria nana		HD
LAMIACEAE (311)		
Clerodendrum floribundum var. *angustifolium*	FMG	HD
Clerodendrum tomentosum var. *lanceolatum*		HD
Dicrastylis cordifolia	FMG	HD
Dicrastylis georgei	FMG	
LAURACEAE (131)		
Cassytha capillaris	FMG	HD
Cassytha filiformis	HD	HD
LOBELIACEAE (340)		
Lobelia quadrangularis		HD
LOGANIACEAE (302)		
Mitrasacme connata	FMG	HD
LORANTHACEAE (097)		
Amyema fitzgeraldii	FMG	HD
Amyema hilliana		HD
Amyema preissii	FMG	HD
Diplatia grandibractea	FMG	
LYTHRACEAE (265)		
Ammannia auriculata		HD

Species	Records from FMG rail corridor †1	Total records from Hope Downs rail corridor †2
Ammannia baccifera	HD	HD
Ammannia multiflora	FMG	
Ammannia sp.		HD
Rotala diandra	FMG	HD
Rotala occultiflora	FMG	
MALVACEAE (221)		
Abutilon amplum		HD
Abutilon cunninghamii		HD
Abutilon aff. *dioicum* (HD195)		HD
Abutilon aff. *dioicum* (HD72-14)	HD	HD
Abutilon fraseri	FMG	HD
Abutilon ?hannii	FMG	
Abutilon lepidum	HD	HD
Abutilon aff. *lepidum* (1) (MET 15 352)	HD	HD
Abutilon leucopetalum	HD	HD
Abutilon macrum	FMG	HD
Abutilon malvifolium		HD
Abutilon otocarpum	FMG	HD
Abutilon oxycarpum subsp. *prostratum*	HD	HD
Abutilon trudgenii (Priority 3)	FMG	HD
Abutilon sp. (HD164)		HD
Abutilon sp. (HD173-3)	HD	HD
Abutilon sp.	FMG	
Gossypium australe (Burrup Peninsula form)	FMG	HD
Gossypium australe (Whim Creek form)	FMG	HD
Gossypium robinsonii	FMG	HD
Hibiscus brachychlaenus	FMG	HD
Hibiscus brachysiphonius (Priority 3)	FMG	HD
Hibiscus burtonii	FMG	HD
Hibiscus coatesii		HD
Hibiscus aff. *coatesii* (site 664)		HD
Hibiscus aff. *coatesii*	FMG	
Hibiscus gardneri	FMG	HD
Hibiscus goldsworthii	FMG	HD
Hibiscus leptocladus	FMG	HD
Hibiscus panduriformis	FMG	HD
Hibiscus sturtii var. aff. *campylochlamys* (site 1398)		HD
Hibiscus sturtii var. aff. *campylochlamys* (FMG 55-21)	FMG	
Hibiscus sturtii var. aff. *grandiflorus*	HD	HD
Hibiscus sturtii var. *platychlamys*	FMG	HD
Hibiscus sturtii var. aff. *platychlamys*	FMG	
Hibiscus aff. *platychlamys* (M35-11)		HD
Hibiscus aff. *platychlamys* (site 1139)	HD	HD
Hibiscus aff. *sturtii* (HD7-11)	HD	HD
Hibiscus aff. *sturtii*	FMG	
Hibiscus trionum	FMG	
Hibiscus sp. (site 316)	HD	HD
Hibiscus sp.	FMG	
Lawrencia densiflora	FMG	
Lawrencia viridigrisea	HD	HD

Species	Records from FMG rail corridor †1	Total records from Hope Downs rail corridor †2
**Malvastrum americanum*	FMG	HD
Sida arenicola	FMG	HD
Sida atrovirens ms.	FMG	HD
Sida billbarkeri ms.	HD	HD
Sida calyxhymenia	HD	HD
Sida cardiophylla	FMG	HD
Sida aff. *cardiophylla* (M79-27)	HD	HD
Sida aff. *cardiophylla* (site 1086)	FMG	
Sida aff. *cardiophylla* (site 1215)	FMG	HD
Sida aff. *cardiophylla* (FMG102-7)	FMG	
Sida aff. *cardiophylla* (FMGM-42)	FMG	
Sida clementii	FMG	HD
Sida echinocarpa	FMG	HD
Sida ?echinocarpa		HD
Sida excedentifolia ms.	FMG	HD
Sida aff. *fibulifera* (B64-13B)		HD
Sida aff. *fibulifera* (grey; MET 15 783)	HD	HD
Sida aff. *fibulifera* (HD12-39)	HD	HD
Sida aff. *fibulifera* (HD148-13)	HD	HD
Sida aff. *fibulifera* (HD186-1)		HD
Sida aff. *fibulifera* (HD200-6)	HD	HD
Sida aff. *fibulifera* (HD234-9)	HD	HD
Sida aff. *fibulifera* (HD237-9)	HD	HD
Sida aff. *fibulifera* (HD36-16)		HD
Sida aff. *fibulifera* (HD47)		HD
Sida aff. *fibulifera* (MET 16,494)	HD	HD
Sida aff. *fibulifera* (oblong; MET 15 220)		HD
Sida platycalyx	FMG	HD
Sida rohlenae subsp. *rohlenae*	FMG	HD
Sida ?rohlenae	HD	HD
Sida spinosa	FMG	
Sida sp. A Kimberley Flora (PA Fryxell & LA Craven 3900)	FMG	
Sida sp. Wittenoom (W.R. Barker 1,962)	FMG	
Sida sp. 'rugose'	FMG	HD
Sida sp. (HD145)	HD	HD
Sida sp.	FMG	HD
MARSILEACEAE (013)		
Marsilea ?drummondii		HD
Marsilea exarata		HD
Marsilea hirsuta	FMG	HD
Marsilea sp.	HD	HD
MELIACEAE (178)		
Owenia reticulata	FMG	HD
MENISPERMACEAE (122)		
Tinospora smilacina	FMG	HD
MIMOSACEAE (163)		
Acacia acradenia	FMG	HD
Acacia adoxa var. *adoxa*	FMG	HD
Acacia adsurgens	FMG	HD
Acacia ampliceps	FMG	HD

Species	Records from FMG rail corridor †1	Total records from Hope Downs rail corridor †2
Acacia ancistrocarpa	FMG	HD
Acacia ancistrocarpa x *trachycarpa*	FMG	HD
Acacia aneura (grey bushy form; MET 15,732)	HD	HD
Acacia aneura var. *?aneura/intermedia*	FMG	HD
Acacia aneura var. *conifera*		HD
Acacia aneura var. aff. *longicarpa* (MET 16,050)	HD	HD
Acacia aneura (flat curved; MET 15 548)	FMG	
Acacia aneura var. ?	FMG	HD
Acacia aff. *aneura* (grey flat recurved tips; MET 15,828	FMG	
Acacia aff. *aneura* (scythe-shaped; MET 15,743)	FMG	HD
Acacia arida	FMG	HD
Acacia arrecta	FMG	
Acacia atkinsiana	FMG	HD
Acacia ayersiana	FMG	HD
Acacia bivenosa	FMG	HD
Acacia bivenosa (wispy/weeping form)	FMG	HD
Acacia bivenosa x *ampliceps*	FMG	
Acacia aff. *catenulata*	FMG	HD
Acacia citrinoviridis	FMG	HD
Acacia colei var. *colei*	FMG	HD
Acacia coriacea subsp. *coriacea*	HD	HD
Acacia coriacea subsp. *pendens*	FMG	HD
Acacia coriacea subsp. *sericophylla*	FMG	HD
Acacia cowleana		HD
Acacia dictyophleba	FMG	HD
Acacia elachantha	FMG	
Acacia elachantha golden hairy variant		HD
Acacia eriopoda	FMG	HD
Acacia farnesiana	FMG	HD
Acacia hilliana	FMG	HD
Acacia holosericea	FMG	
Acacia inaequilatera	FMG	HD
Acacia aff. *inaequilatera* (little phyllode form)		HD
Acacia aff. *inaequilatera* (MET 15,011)	HD	HD
Acacia maitlandii	FMG	HD
Acacia marramamba	FMG	HD
Acacia monticola	FMG	HD
Acacia monticola hybrid	FMG	
Acacia orthocarpa	FMG	HD
Acacia pachyacra	FMG	HD
Acacia pruinocarpa	FMG	HD
Acacia ptychophylla	FMG	HD
Acacia pyrifolia (green)		HD
Acacia pyrifolia (slender, white)	FMG	HD
Acacia retivenia subsp. *clandestina*	HD	HD
Acacia rhodophloia	FMG	
Acacia sabulosa		HD
Acacia sclerosperma subsp. *sclerosperma*	FMG	HD
Acacia sphaerostachya	FMG	HD
Acacia spondylophylla	FMG	HD

Species	Records from FMG rail corridor †1	Total records from Hope Downs rail corridor †2
Acacia stellaticeps	FMG	HD
Acacia stenophylla	FMG	HD
Acacia synchronicia	FMG	HD
Acacia synchronicia (narrow phyllode form)	FMG	
Acacia tenuissima	FMG	HD
Acacia tetragonophylla	FMG	HD
Acacia trachycarpa	FMG	HD
Acacia tumida	FMG	HD
Acacia tumida var. *pilbarensis*	FMG	
Acacia victoriae	FMG	HD
Acacia wanyu	FMG	HD
Acacia xiphophylla	FMG	HD
Acacia sp.	HD	HD
Dichrostachys spicata	FMG	HD
Neptunia dimorphantha	FMG	HD
MOLLUGINACEAE (110A)		
Mollugo cerviana	FMG	HD
Mollugo molluginis	FMG	HD
MORACEAE (087)		
Ficus brachypoda	FMG	HD
Ficus opposita	FMG	HD
MYOPORACEAE (326)		
Eremophila cuneifolia	FMG	HD
Eremophila forrestii subsp. *forrestii*	FMG	HD
Eremophila lanceolata ms.	FMG	HD
Eremophila latrobei	FMG	
Eremophila latrobei subsp. *filiformis* ms.	FMG	HD
Eremophila longifolia	FMG	HD
Eremophila pachomai	FMG	
Eremophila spongiocarpa (Priority 1)	FMG	
Eremophila youngii		HD
Eremophila sp. 1 (poor specimen)		HD
Eremophila sp. 2 (sterile)		HD
MYRSINACEAE (292)		
Aegiceras corniculatum	FMG	
MYRTACEAE (273)		
Calytrix carinata	FMG	HD
Corymbia candida	FMG	HD
Corymbia deserticola	FMG	HD
Corymbia flavescens	FMG	
Corymbia hamersleyana	FMG	HD
Corymbia semiclara	HD	HD
Corymbia zygophylla	FMG	HD
Eucalyptus camaldulensis var. *obtusa*	FMG	HD
Eucalyptus gamophylla	FMG	HD
Eucalyptus leucophloia	FMG	HD
Eucalyptus victrix	FMG	HD
Eucalyptus xerothermica	FMG	HD
Melaleuca argentea	FMG	HD
Melaleuca eleuterostachya	FMG	HD

Species	**Records from FMG rail corridor †1**	**Total records from Hope Downs rail corridor †2**
Melaleuca glomerata	FMG	HD
Melaleuca lasiandra	FMG	HD
Melaleuca linophylla	FMG	HD
NYCTAGINACEAE (107) (pending identifications; most listed as sp. under sites)		
Boerhavia coccinea	FMG	HD
Boerhavia gardneri	FMG	HD
Boerhavia paludosa	FMG	HD
Boerhavia repleta	FMG	HD
Boerhavia schomburgkiana	FMG	HD
OLEACEAE (301)		
Jasminum didymum subsp. *lineare*	FMG	HD
PAPAVERACEAE (135)		
**Argemone ochroleuca*		HD
PAPILIONACEAE (165)		
Alysicarpus muelleri	FMG	HD
Cajanus cinereus	FMG	HD
Cajanus marmoratus	FMG	HD
Crotalaria cunninghamii	FMG	HD
Crotalaria dissitiflora subsp. *benthamiana*	FMG	HD
Crotalaria medicaginea	FMG	HD
Crotalaria novae-hollandiae	FMG	
Crotalaria ramosissima	HD	HD
Cullen cinereum	FMG	HD
Cullen graveolens	FMG	HD
Cullen lachnostachys	FMG	HD
Cullen leucanthum	FMG	HD
Cullen leucochaites	FMG	HD
Cullen martinii	FMG	HD
Cullen pogonocarpum	HD	HD
Cullen stipulaceum	FMG	HD
Cullen sp.	FMG	
Desmodium aff. *campylocaulon*	FMG	HD
Desmodium filiforme	FMG	HD
Desmodium muelleri	FMG	HD
Desmodium aff. *muellerii* (MET 15,346)	FMG	
Erythrina vespertilio	FMG	HD
Glycine canescens	FMG	HD
Glycine tomentella	HD	HD
?Glycine sp.	HD	HD
Gompholobium polyzygum	FMG	HD
Indigastrum parviflorum	HD	HD
Indigofera boviperda		HD
Indigofera colutea	FMG	HD
Indigofera georgei	FMG	HD
Indigofera hirsuta	FMG	
Indigofera ixocarpa ms. (Priority 2)	HD	HD
Indigofera linifolia	FMG	HD
Indigofera linnaei	FMG	HD
Indigofera monophylla (form not determined)	FMG	
Indigofera monophylla (brown calyx form)	HD	HD

Species	Records from FMG rail corridor †1	Total records from Hope Downs rail corridor †2
Indigofera monophylla (small calyx form)	HD	HD
Indigofera monophylla (small leaflet form)	HD	HD
Indigofera aff. *monophylla* (HD195-15)		HD
Indigofera rugosa	FMG	HD
Indigofera trita	FMG	HD
Indigofera sp. (HD19)	HD	HD
Indigofera sp. (HD162-8)		HD
Indigofera sp.	FMG	
Isotropis atropurpurea	FMG	HD
Kennedia sp. Barowana Hill (M.E. Trudgen 15,617)	FMG	HD (listed as *K.* cf. *prorepens*)
Leptosema anomalum		HD
Lotus australis		HD
Lotus cruentus	FMG	HD
Mirbelia viminalis		HD
Rhynchosia minima var. *australis*	FMG	HD
Rhynchosia sp. King Bay (B181-13)	FMG	
Sesbania cannabina	FMG	HD
**Stylosanthes hamata*	HD	HD
Swainsona formosa		HD
Swainsona kingii	FMG	HD
Swainsona stenodonta	HD	HD
Swainsona sp. Hamersley Station (A.A. Mitchell 196)	FMG	HD
Swainsona sp.		HD
Tephrosia arenicola		HD
Tephrosia bidwillii	FMG	HD
Tephrosia aff. *bidwillii* (HD153-5)		HD
Tephrosia aff. *clementii* (10) (HD88-3)	FMG	HD
Tephrosia aff. *clementii* (11)		HD
Tephrosia aff. *clementii* (12) (HD1-32)		HD
Tephrosia aff. *clementii* (2)		HD
Tephrosia aff. *clementii* (7) (HD191-11)		HD
Tephrosia aff. *clementii* (8) (HD106)	HD	HD
Tephrosia aff. *clementii* (9) (HD284-6)	FMG	HD
Tephrosia aff. *densa* (HD31-4)	HD	HD
Tephrosia leptoclada		HD
Tephrosia rosea var. *clementii*		HD
Tephrosia rosea var. *glabrior* ms.	FMG	HD
Tephrosia aff. *rosea* (CH3-47)	FMG	
Tephrosia aff. *rosea* (HD112-18)		HD
Tephrosia aff. *rosea* (HD145-7)	HD	HD
Tephrosia aff. *rosea* (HD292-37)	FMGFMG	HD
Tephrosia simplicifolia	FMG	HD
Tephrosia spechtii	FMG	
Tephrosia aff. *supina* (HD133-20)	FMG	HD
Tephrosia aff. *supina* (HD193-15)		HD
Tephrosia aff. *supina* (HD205-10)	HD	HD
Tephrosia aff. *supina* (HD237-23)	FMG	HD
Tephrosia aff. *supina* (HD254-5)	FMG	HD
Tephrosia aff. *supina* (HD88-4)	HD	HD

Species	Records from FMG rail corridor †1	Total records from Hope Downs rail corridor †2
Tephrosia uniovulata		HD
Tephrosia aff. *uniovulata* (HD76)	FMG	HD
Tephrosia sp. B Kimberley Flora (C.A. Gardner 7,300)	FMG	HD
Tephrosia sp. Bungaroo Creek (M.E. Trudgen 11601)	FMG	HD
Tephrosia sp. Pilbara Ranges (S. van Leeuwen 4246)	FMG	
Tephrosia sp. (HD133)		HD
Tephrosia sp.	FMG	
Vigna lanceolata var. *lanceolata*	FMG	HD
Vigna sp. Central (ME Trudgen 1626)	FMG	
Zornia albiflora	FMG	HD
Zornia muelleriana subsp. *congesta*	FMG	HD
PEDALIACEAE (318)		
Josephinia ?sp. Marandoo (M.E. Trudgen 1554) (Priority 1)	FMG	
PITTOSPORACEAE (152)		
Pittosporum phylliraeoides	FMG	
PLUMBAGINACEAE (294)		
Aegialitis annulata	FMG	
Muellerolimon salicorniaceum	HD	HD
POACEAE (031)		
Acrachne racemosa	FMG	HD
Amphipogon caricinus	FMG	HD
Aristida burbidgeae	FMG	HD
Aristida contorta	FMG	HD
Aristida holathera var. *holathera*	FMG	HD
Aristida hygrometrica	FMG	
Aristida inaequiglumis	FMG	HD
Aristida latifolia	FMG	HD
Aristida obscura	FMG	HD
Astrebla elymoides	FMG	HD
Astrebla pectinata	FMG	HD
Bothriochloa ewartiana	FMG	HD
Brachyachne convergens	FMG	HD
Brachyachne prostrata	FMG	HD
**Cenchrus ciliaris*	FMG	HD
**Cenchrus setigerus*	FMG	HD
Chionachne hubbardiana	FMG	
Chloris pectinata	FMG	HD
Chloris pumilio	FMG	HD
Chloris truncata	HD	HD
**Chloris virgata*	FMG	
Chrysopogon fallax	FMG	HD
Cymbopogon ambiguus	FMG	HD
Cymbopogon ?ambiguus	FMG	
Cymbopogon bombycinus	FMG	
Cymbopogon dependens	FMG	
Cymbopogon obtectus	FMG	HD
Cymbopogon ?obtectus	FMG	
Cymbopogon procerus	FMG	HD
Cymbopogon sp.	FMG	
Dactyloctenium radulans	FMG	HD

Species	Records from FMG rail corridor †1	Total records from Hope Downs rail corridor †2
Dichanthium fecundum		HD
Dichanthium sericeum subsp. *humilius*	FMG	HD
Dichanthium sericeum subsp. *sericeum*	FMG	HD
Digitaria bicornis	FMG	HD
Digitaria brownii	FMG	HD
Digitaria ctenantha	FMG	HD
Digitaria gibbosa	FMG	
Digitaria longiflora	FMG	HD
Digitaria sp.	FMG	
Diplachne fusca	HD	HD
**Echinochloa colona*		HD
Enneapogon caerulescens var. *caerulescens*	FMG	HD
Enneapogon caerulescens var. *occidentalis*	HD	HD
Enneapogon clelandii	FMG	HD
Enneapogon oblongus	FMG	HD
Enneapogon polyphyllus	FMG	HD
Enteropogon acicularis	FMG	HD
Eragrostis cumingii	FMG	HD
Eragrostis desertorum	FMG	HD
Eragrostis dielsii	FMG	HD
Eragrostis ?elongata	FMG	HD
Eragrostis eriopoda	FMG	HD
Eragrostis falcata	FMG	HD
Eragrostis leptocarpa	FMG	
**Eragrostis minor*		HD
Eragrostis parviflora		HD
Eragrostis pergracilis	FMG	
Eragrostis setifolia	FMG	HD
Eragrostis speciosa	FMG	HD
Eragrostis tenellula	FMG	HD
Eragrostis xerophila	FMG	HD
Eragrostis sp.	FMG	
Eriachne aristidea	FMG	HD
Eriachne avenacea	HD	HD
Eriachne benthamii	FMG	HD
Eriachne ciliata	FMG	HD
Eriachne sp. aff. *festucacea*	FMG	HD
Eriachne filiformis		HD
Eriachne helmsii	FMG	HD
Eriachne lanata	FMG	HD
Eriachne mucronata (arid form) (MET 12,736)		HD
Eriachne mucronata (typical form)	FMG	HD
Eriachne obtusa	FMG	HD
Eriachne pulchella	HD	HD
Eriachne pulchella subsp. *dominii*	FMG	HD
Eriachne pulchella subsp. *pulchella*	FMG	
Eriachne sulcata	FMG	
Eriachne tenuiculmis (Priority 3)	FMG	HD
Eriachne sp. Port Hedland	FMG	HD
Eulalia aurea	FMG	HD

Species	Records from FMG rail corridor †1	Total records from Hope Downs rail corridor †2
Heteropogon contortus	FMG	HD
Ischaemum albovillosum (Priority 2)	FMG	HD
Iseilema dolichotrichum	FMG	HD
Iseilema eremaeum	FMG	HD
Iseilema vaginiflorum	FMG	HD
Iseilema sp.	FMG	
Monachather paradoxus		HD
Panicum decompositum	FMG	HD
Panicum laevinode	FMG	HD
Panicum sp.	FMG	
Paractaenum refractum	FMG	HD
Paraneurachne muelleri	FMG	HD
Paspalidium basicladum	FMG	HD
Paspalidium clementii	FMG	HD
Paspalidium constrictum		HD
Paspalidium jubiflorum		HD
Paspalidium aff. *jubiflorum* (MET 15,807)		HD
Paspalidium rarum	FMG	HD
Paspalidium reflexum	FMG	
Paspalidium retiglume (Priority 2)	FMG	
Paspalidium tabulatum (Whim Creek form)	FMG	HD
Perotis rara	FMG	HD
Schizachyrium fragile	FMG	HD
Setaria dielsii	FMG	HD
Setaria surgens	FMG	HD
**Setaria verticillata*	FMG	HD
Sorghum plumosum	HD	HD
Sporobolus actinocladus	FMG	HD
Sporobolus australasicus	FMG	HD
Sporobolus mitchellii		HD
Sporobolus virginicus	HD	HD
Themeda avenacea		HD
Themeda triandra	FMG	HD
Themeda aff. *triandra* (MET 16,046)	HD	HD
Themeda sp. Hamersley Station (M.E.Trudgen 11431) (Priority 3)	FMG	HD
Tragus australianus	FMG	HD
Triodia angusta	FMG	HD
Triodia basedowii	FMG	HD
Triodia aff. *basedowii*	FMG	HD
Triodia brizoides	FMG	HD
Triodia epactia	FMG	HD
Triodia lanigera	FMG	HD
Triodia aff. *lanigera (*dwarf habit)	FMG	
Triodia latzii	FMG	
Triodia longiceps	FMG	HD
Triodia pungens	FMG	
Triodia schinzii	FMG	HD
Triodia secunda	FMG	HD
Triodia wiseana	FMG	HD
Tripogon loliiformis	FMG	HD

Species	Records from FMG rail corridor †1	Total records from Hope Downs rail corridor †2
Triraphis mollis	HD	HD
Urochloa gilesii subsp. *gilesii* (glabrous florets)	FMG	
Urochloa gilesii subsp. *gilesii* (hairy florets)	FMG	
Urochloa holosericea subsp. *velutina*	FMG	HD
Urochloa pubigera		HD
Whiteochloa airoides		HD
Xerochloa laniflora	FMG	HD
Yakirra australiensis var. *australiensis*	FMG	HD
POLYGALACEAE (183)		
Polygala aff. *isingii*	FMG	HD
Polygala linariifolia	FMG	HD
Polygala sp.	FMG	
POLYGONACEAE (103)		
Muehlenbeckia florulenta	FMG	
PORTULACACEAE (111)		
Calandrinia polyandra	HD	HD
Calandrinia pumila	HD	HD
Calandrinia quadrivalvis		HD
Calandrinia stagnensis		HD
Calandrinia sp. (Port Hedland)		HD
Calandrinia sp.	FMG	HD
Portulaca oleracea	FMG	HD
Portulaca pilosa	FMG	HD
Portulaca sp.	FMG	
POTAMOGETONACEAE (029)		
Potamogeton tricarinatus		HD
Ruppia sp.		HD
PROTEACEAE (090)		
Grevillea berryana	FMG	HD
Grevillea pyramidalis	FMG	HD
Grevillea wickhamii	FMG	
Grevillea wickhamii subsp. *aprica*	HD	HD
Grevillea wickhamii subsp. *hispidula*	FMG	
Grevillea sp.	FMG	
Hakea chordophylla	FMG	HD
Hakea lorea subsp. *lorea*	FMG	HD
RHIZOPHORACEAE (269)		
Ceriops tagal	FMG	HD
Rhizophora stylosa	FMG	HD
RUBIACEAE (331)		
Dentella minutissima	FMG	HD
Oldenlandia crouchiana	HD	HD
Oldenlandia galioides	FMG	HD
Oldenlandia sp. 'gilgai'	FMG	HD
Psydrax attenuata	HD	HD
Psydrax latifolia	FMG	HD
Psydrax suaveolens	FMG	HD
Spermacoce brachystema	FMG	HD
Synaptantha tillaeacea var. *tillaeacea*	FMG	HD
SANTALACEAE (092)		

Species	Records from FMG rail corridor †1	Total records from Hope Downs rail corridor †2
Anthobolus leptomerioides	FMG	HD
Santalum lanceolatum	FMG	HD
SAPINDACEAE (207)		
Atalaya hemiglauca	FMG	HD
Dodonaea coriacea	FMG	HD
Dodonaea petiolaris	FMG	HD
SCROPHULARIACEAE (316)		
Mimulus gracilis	FMG	HD
Peplidium muelleri	FMG	
Peplidium sp. E (Flora of Australia)	HD	HD
Stemodia grossa	FMG	HD
Stemodia kingii	FMG	HD
Stemodia lathraia	FMG	HD
Stemodia viscosa	FMG	HD
Stemodia sp.	FMG	
Striga curviflora	FMG	HD
Striga squamigera		HD
SOLANACEAE (315)		
**Datura leichhardtii*	FMG	
Nicotiana benthamiana	FMG	HD
Nicotiana umbratica		HD
Nicotiana sp.	FMG	
Physalis minima	HD	HD
Solanum cleistogamum	HD	HD
Solanum diversiflorum	FMG	HD
Solanum ellipticum		HD
Solanum gabrielae	FMG	HD
Solanum horridum	FMG	HD
Solanum lasiophyllum	FMG	HD
**Solanum nigrum*	HD	HD
Solanum petrophilum		HD
Solanum phlomoides	FMG	HD
Solanum sturtianum	FMG	HD
Solanum sp.	FMG	
STACKHOUSIACEAE (202)		
Stackhousia intermedia	FMG	HD
Stackhousia muricata		HD
STERCULIACEAE (223)		
Brachychiton acuminatus		HD
Keraudrenia nephrosperma	FMG	HD
Melhania oblongifolia	HD	HD
Melhania sp. Burrup		HD
Melhania sp. (Fortescue)		HD
Melhania sp. (CH15-39)	FMG	
Rulingia kempeana	FMG	HD
Waltheria indica	FMG	HD
STYLIDIACEAE (343)		
Stylidium desertorum	FMG	HD
Stylidium weeliwolli (Priority 2)	FMG	
SURIANACEAE (160)		

Species	Records from FMG rail corridor †1	Total records from Hope Downs rail corridor †2
Stylobasium spathulatum	FMG	HD
THYMELAEACEAE (263)		
Pimelea ammocharis	FMG	HD
TILIACEAE (220)		
Corchorus crozophorifolius	FMG	HD
Corchorus elachocarpus	FMG	HD
Corchorus incanus	HD	HD
Corchorus lasiocarpus subsp. *lasiocarpus* ms.	FMG	HD
Corchorus aff. *lasiocarpus* subsp. *lasiocarpus* ms.	FMG	
Corchorus lasiocarpus subsp. *parvus* ms.	FMG	
Corchorus aff. *lasiocarpus* subsp. *parvus* ms.	FMG	
Corchorus parviflorus	FMG	HD
Corchorus sidoides subsp. *sidoides*	FMG	HD
Corchorus tectus ms.	FMG	HD
Corchorus tridens	FMG	HD
Corchorus aff. *walcottii*		HD
Corchorus aff. *walcottii* (H251-3)	FMG	
Corchorus sp. (HD200)	HD	HD
Corchorus sp. (HD260)	HD	HD
Corchorus sp.	FMG	
Triumfetta ?centralis		HD
Triumfetta chaetocarpa	HD	HD
Triumfetta aff. *chaetocarpa* (HD123)	FMG	HD
Triumfetta aff. *chaetocarpa* (PAN3/4)	FMG	
Triumfetta clementii	FMG	HD
Triumfetta maconochieana	FMG	HD
Triumfetta propinqua		HD
Triumfetta sp. (HD292)	FMG	HD
TYPHACEAE (020)		
Typha domingensis		HD
VIOLACEAE (243)		
Hybanthus aurantiacus	FMG	HD
ZYGOPHYLLACEAE (173)		
Tribulopis angustifolia	FMG	
Tribulus astrocarpus	FMG	HD
Tribulus hirsutus	FMG	HD
Tribulus macrocarpus	FMG	HD
Tribulus platypterus	FMG	HD
Tribulus suberosus	FMG	HD
Tribulus terrestris	FMG	HD

†1 FMG = species recorded during March / April 2004
HD = additional records within FMG corridor from Hope Downs survey; Biota and Trudgen (2002)
DCLM = DCLM database record

†2 Total records from Biota and Trudgen (2002) for Hope Downs rail corrido