# CONTENTS

## PART XI: FLORISTICS OF THE MUNDIJONG ROAD BUSHLAND

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# FLORISTICS OF RESERVES AND BUSHLAND AREAS IN THE PERTH REGION (SYSTEM 6) PART XI: FLORISTICS OF THE MUNDIJONG ROAD BUSHLAND

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## ABSTRACT

The Mundijong Road Bushland forms the longest east - west continuous transects of the vegetation of the Pinjarra Plain in the metropolitan area and is one of two of such transects on the Swan Coastal Plain. Three principal plant communities are present in the area: *Casuarina obesa* Woodland, Marri (*Eucalyptus calophylla*) Woodland and Wetland Mosaic. Four regional floristic community types are represented in the Bushland: type 3a (Marri - *Kingia* woodlands and shrublands), type 3c (Marri - *Xanthorrhoea preissii* woodlands), type 8 (Herb rich shrublands in claypans) and type 9 (Dense shrublands on clay flats). The Bushland contains a vascular flora of 300 taxa; 253 are natives and 47 weeds. Three of these taxa are non-flowering vascular plants, 144 are monocotyledons (115 natives and 29 weeds) and 153 are dicotyledons (135 native and 18 weeds). One species of Declared Rare Flora and seven rare taxa are found in the Bushland. The bushland contains 74 taxa that are characteristic of the heavier soils of the eastern side of the Swan Coastal Plain and at least 12 taxa that are endemic to the eastern side of the Plain. The flora of the bushland is representative of the diverse flora of the communities of the Pinjarra Plain. These plant communities are now rare on the Plain. This supports previous studies that identified the area as an important area of remnant bushland in the metropolitan area. Mundijong Road Bushland together with the north - south transect associated with the Soldiers Road bushland between Mundijong and Brickwood Reserve forms a narrow but extensive transect of many of the plant communities of the Ridge Hill Shelf, Pinjarra Plain and the interface between these two landforms.

## INTRODUCTION

Mundijong Road in the Shire of Serpentine-Jarrahdale (Map 1) transects the eastern side of the Swan Coastal Plain. Since the early 1990's the remnant bushland along Mundijong Road has been recognised as an important area of remnant bushland in the metropolitan area (Shire of Serpentine - Jarrahdale 1992) and, regionally on the Swan Coastal Plain (Keighery and Trudgen 1992, Keighery and Keighery 1992, Gibson *et al.* 1994, Department of Environmental Protection 1994).

The eastern side of the Swan Coastal Plain has been more heavily cleared than any the other geomorphological units on the Plain. Areas of natural vegetation on the eastern side of the Swan Coastal Plain are so restricted that Beard (1990) who surveyed and mapped the vegetation of the entire state noted that there was "..no virgin vegetation left..." on the eastern side of the Swan Coastal Plain. While this is not entirely correct it was estimated by the Department of Conservation and Land Management (1990) that the area was 97% cleared. Recent mapping of the eastern side of the Plain within the metropolitan area by the Perth Environmental Project (Ministry for Planning 1996) has recorded similar levels of clearance. With less than 5% of the vegetation remaining the level of clearing is comparable with that of the Wheatbelt which Beard considered to be 93% cleared.

As a consequence the few scattered intact areas of remnant native vegetation on the eastern side of the Plain are generally associated with poorer soils, sumplands and adjacent damplands, undeveloped townsites, recreation reserves, mines (gravel or sand), transport corridors (roadsides, rail verges), public utilities (SEC lines, drainage channels, rubbish tips).

In recognition of this high level of clearing Keighery and Trudgen (1992) recognised the significant flora conservation values of all remnants on the eastern side of the Swan Coastal Plain with the basic vegetation structure intact or able to be regenerated (Good or better condition). A specific recommendation was made in recognition the flora conservation value of the Mundijong Road roadside:

"CALM liaise urgently with the Local Government Authority to retain and manage the area for its flora conservation values, in accordance with the Management Guidelines recommended by the Roadside Conservation Committee for Roads of High Conservation Value." (Keighery and Trudgen 1992, p29)

The Keighery and Trudgen study was confined to the area of the Swan Coastal Plain between Pinjarra and Gingin. However another more recent regional study of the Swan Coastal Plain from Seabird to the foothills of the Whicher Range (Gibson *et al.* 1994) made similar recommendations

"4) The road and drain reserve on the southern side of Mundijong Road be declared as an A class Nature Reserve. (This area is of regional significance being the second catena of vegetation types across the eastern side of the plain). 5) As a consequence of the small amount of remnant vegetation on the eastern side of the plain, all such remnants in the study area with the basic vegetation intact or able to be regenerated are of high conservation value."

In 1994 response to these two regional studies and as part of the update of the System 6 recommendations (Department of Conservation and Environment 1983) the Department of Environmental Protection identified bushland from Webb Road to Duckpond Road as being a "Threatened and Poorly Reserved Community in need of interim protection".

That is while all vegetation on the eastern side of the Swan Coastal Plain has been established as having regional conservation value the vegetation along Mundijong Road is of regional significance being one of the two catenas of vegetation types across the eastern side of the Swan Coastal Plain. The other catena occurs along Wonnerup Road, north east of Buselton (Gibson *et al.* 1994, Keighery, Keighery and Gibson 1996).

## SURVEY METHOD

Survey work along Mundijong Road was performed over four flowering seasons from 1991 to 1994 in conjunction with field work on the Swan Coastal Plain (Keighery and Trudgen 1992, Gibson *et al.* 1994). Supplementary work was done in 1995 and 1996 for the Shire of Serpentine

- Jarrahdale (Keighery 1996).

Fifteen sites were located and described along Mundijong Road between Mundijong and the intersection with Duckpond Road (Map 2, Appendix 1) to sample the range of plant communities identified using aerial photographs and field interpretation. Ten are permanently located 100m2 study sites used in the regional floristic survey of the Swan Coastal Plain (Gibson *et al.* 1994). Of these sites, three are located in the area between Mundijong Road and Duckpond Road (sites 12 - 14, Map 2) and seven along the southern side of Mundijong Road between Webb Road and Lightbody Road (sites 2 - 4, 6 - 9, Map 2).

Groups of conservation volunteers from the Swan Coastal Plain Survey group, each led by a botanist, recorded information in a set format on physical location, vegetation structure and density and the total flora of the ten permanent study sites (Keighery 1994; Keighery, Keighery and Gibson 1995). These sites were sampled on at least two occasions.

Opportunistic plant collections, that is collections from outside the sites, were made during foot and vehicular transects of the roadside at various times of the year over the five years of survey. Identification of plant collections was made by the volunteers and the coordinators and verified at the W.A. Herbarium. A field herbarium has been prepared for the area. It is considered that approximately 90% of the flora has been documented.

## GEOMORPHOLOGY AND SOILS

The Mundijong Road Bushland is located on the Swan Coastal Plain where the Pinjarra Plain is up to 15 kilometres broad, Mundijong Road transecting the broadest area of Pinjarra Plain in the Perth Metropolitan Area. The Pinjarra Plain is a "flat to very gently undulating plain comprising predominantly Pleistocene fluviatile sediments and some Holocene alluvium" (Van Gool 1990). The soils along Mundijong Road range from slight rises of sandy loams over clay to the clays and loams of the seasonally inundated flats (Appendix 1). The entire area is poorly drained and most soils are waterlogged, if not inundated in winter and spring, forming areas of floodplain and palusplain (Semeniuk 1987). Water collects and persists into late spring or early summer in any natural or man made depressions or sumplands (Semeniuk 1987).

Jordan (1986) and Churchward and McArthur (1980) map the area in less detail with the entire area being covering by their alluvium or Guildford complex units.

## VEGETATION

### The Vegetation Map

The vegetation map (Map 2) shows the distribution of the principal plant communities based on the vegetation structure descriptions of the fifteen sites (Appendix 1).

Three principal plant communities are mapped: *Casuarina obesa* Woodlands, Marri Woodlands and Wetland Mosaic. These units relate to the soils and drainage. However the entire area of the Pinjarra Plain is so flat and drainage so poor that even these broad divisions are at times arbitrary and all of the vegetation could be described as a mosaic of the various communities described at the sites (Appendix 1).

**Marri Forest to Woodlands** (Sites 1, 3, 8, 9, 12 & 13)
On the poorly drained very slight rises of sandy loams to loams Marri Open Forest to Woodland is found. The characteristic structure of the understorey of this community is low open shrubland over closed herbland to herbland and closed sedgeland to sedgeland.

The presence of *Kingia australis* in the understorey is a distinctive feature of the much of this Marri Woodland. However towards the western side of the Pinjarra Plain the presence of *Kingia* declines and *Xanthorrhoea preissii* is more common. Characteristic species of this community are *Mesomelaena tetragona*, *Caesia micrantha*, *Cyathochaeta avenacea*, *Grevillea pilulifera* and a robust form of *Drosera macrantha.*

***Casuarina obesa* Forest to Woodlands** (Sites 6 & 10)
In some areas *Casuarina obesa* is the dominant tree. Unfortunately in most of these areas the understorey has been almost totally or totally destroyed and replaced by weeds (for example site 10). However, where the understorey is intact it is very similar to that of the wetland mosaic (for example site 6) and are described below.

**Wetland Mosaic** (Sites 2, 4, 5, 7, 11 & 14)
Relatively small changes in topography and drainage in the seasonally waterlogged and inundated areas has resulted in a complex series of communities in the areas mapped as Wetland Mosaic.

The Wetland Mosaic area can be divided into three units according to the presence of sand and clay and the degree of inundation (Keighery and Trudgen 1992) but in general these are not mapped as the structure of the communities is very similar (Appendix 1).

Very poorly drained loams and clay flats (Sites 6 and 10)
*Casuarina obesa* Low Open Woodland to Low Woodland is characteristic of the very poorly drained loams and clay flats. The *Casuarina* Low Woodlands is associated with a mosaic of

smaller plant communities similar to those described for the clayey areas subject to ponding (see below). These communities are: *Melaleuca* Shrublands and Low Shrublands, Sedgelands and Herblands.

Sandier inundated flats (patches of this community occur along the roadside)
The characteristic vegetation of these flats are *Pericalymma* Heath or *Regelia ciliata* Heath These are generally associated with the wetland areas with sand over clay and may also occur patchily in the more clayey communities.

Characteristic shrub species are *Kingia australis, Actinostrobus pyramidalis, Hakea sulcata, Hakea varia, Mesomelaena tetragona, Leptocarpus canus* and *Leptocarpus coangustatus.*

Clayey flats subject to ponding (Sites 4, 5, 7, 8, 9, 11 and 14)
These clayey areas are vegetated with a complex mosaics of communities.
The characteristic communities in these mosaics are:
- *Viminaria juncea* High Shrubland, generally over *Melaleuca* Open Heath.
- *Melaleuca* Open Heath to Shrubland. Characteristic species of this community are: *Melaleuca rhaphiophylla, Hakea varia, Kingia australis, Kunzea recurva, Actinostrobus pyramidalis, M. viminea, M. lateritia, M. uncinata, M. lateriflora* and *M. incana.*
- Mixed Low Open Heath. Characteristic species of this community are: *Pericalymma ellipticum, Kunzea micrantha, Melaleuca* species, *Regelia ciliata, Actinostrobus pyramidalis, Verticordia plumosa, Verticordia lindleyi* and *Verticordia acerosa.*
- Sedgelands. Characteristic species of this community are: *Leptocarpus canus* and *Leptocarpus coangustatus.*
- Herblands. Characteristic species of this community are: *Wurmbea* species, *Tribonanthes* species, *Polypompholyx multifida, Stylidium* species and many annual and geophytic species of Asteraceae, Restionaceae, Apiaceae, Cyperaceae and Centrolepidaceae.

Several patches of *Eucalyptus rudis* and *Melaleuca rhaphiophylla* Woodland to Open Forest and *Eucalyptus rudis* Woodland occur along the roadside in association with poorly defined drainage lines.

## Floristic Community Types

The regional study of the floristic variation of the Swan Coastal Plain by Gibson *et al.* (1994) identified four floristic community types in the Mundijong Road Bushland (Table 1): type 3a (Marri - *Kingia* woodlands and shrublands), type 3c (Marri - *Xanthorrhoea preissii* woodlands), type 8 (Herb rich shrublands in claypans) and type 9 (Dense shrublands on clay flats).

While the mapping units are structural units they are broadly related to the floristic units identified

by Gibson *et al.* (Table 1). However the floristic grouping (Table 1) of three sites does not match the structural units (Map 2). That is Site 2, mapped structurally as Wetland Mosaic but floristically grouped with floristic community type 3a (Marri Woodlands); Sites 8 and 9, mapped structurally as Marri Woodland but floristically grouped with floristic community type 8 (Herb rich shrublands in claypans). This illustrates

- the mosaic nature of the communities (Sites 8 and 9)
- how a floristic community type is related to a group of shared species rather than a single dominant species (Site 2).

**Table 1:** Floristic Community Types in the Study Area
The relationship between the structural units used for mapping and the floristic units determined in the regional survey (Gibson *et al.* 1994).
A * indicates that the floristic community type is inferred.

| Vegetation Mapping Unit | Sites | Floristic Community Type |
|---|---|---|
| Marri Woodland | | |
| | Sites 2 & 3 | 3a (Marri - *Kingia* woodlands and shrublands) |
| | Sites 1*, 12 & 13 | 3c (Marri - *Xanthorrhoea preissii* woodlands) |
| | Sites 8 & 9 | 8 (Herb rich shrublands in claypans) |
| *Casuarina obesa* Woodlands | | |
| | Sites 6 | 8 (Herb rich shrublands in claypans) |
| | Site 10* | * 9 (Dense shrublands on clay flats) |
| Wetland Mosaic | | |
| | Sites 2 | 3a (Marri - *Kingia* woodlands and shrublands) |
| | Sites 4, 5*, 6 & 7 | 8 (Herb rich shrublands in claypans) |
| | Site 14 | 9 (Dense shrublands on clay flats) |

## FLORA

The Mundijong Road bushland contains a vascular flora of 300 taxa (Appendix 2). Of these 250 are natives and 47 weeds. Three of these taxa are non-flowering vascular plants, 144 are monocotyledons (115 natives and 29 weeds) and 153 are dicotyledons (135 native and 18 weeds). The Myrtaceae (25 native taxa), Cyperaceae (22 native taxa, 2 weeds), Poaceae (17 native taxa, 13 weeds), Asteraceae (10 native taxa, 5 weeds), Anthericaceae (20 native taxa), Papilionaceae (11 native taxa, 5 weeds), Proteaceae (16 native taxa), Stylidiaceae (13 native taxa), Restionaceae (11 native taxa), Haemodoraceae (10 native taxa) and the Goodeniaceae (10 native taxa) are the most species diverse families.

### Significant Flora

One species of Declared Rare Flora, the aquatic herb Stalked Water Ribbons (*Aponogeton hexatepalus*) is found in the Mundijong Road Bushland. This species is characteristic of clay based seasonally inundated wetlands (sumplands) on the eastern side of the Swan Coastal Plain.

Seven rare taxa are also present in the Mundijong Road Bushland (Atkins 1996, Appendix 2): *Eryngium pinnatifidum* subsp. *palustre* ms, *Myriophyllum echinatum*, *Baeckea tenuifolia*, *Verticordia plumosa* var. *pleiobotrya*, *Anthotium junciforme*, *Stylidium longitubum* and *S. mimeticum*. Seventy four taxa are characteristic of the heavier soils of the eastern side of the Swan Coastal Plain and at least 12 taxa are endemic to the eastern side of the Plain.

**Significant taxa of particular interest**

*Angianthus drummondii - preissianus - micropodioides* Group (Asteraceae)

On the southern Swan Coastal Plain five taxa were clearly distinguished in this group in the field: *A.* aff. *drummondii*, *A. drummondii*, *A. preissianus* (green prostrate and upright forms) and *A. micropodioides* (Gibson *et al.* 1994). The two forms of *A. preissianus* were combined for the Gibson *et al.* study but both are recorded along Mundijong Road. All are taxa of the seasonally waterlogged and inundated heavy soils of the Pinjarra Plain.

*Podolepis gracilis* (Swamp form) (Asteraceae)

A robust glabrous form of this species with large pink or white flowers from the seasonally waterlogged and inundated heavy soils of the Pinjarra Plain from Gingin to Busselton. Further studies on this form are required to establish if it can be distinguished taxonomically.

*Pogonolepis stricta* "long bract form" (Asteraceae)

*Pogonolepis stricta* is an annual daisy species typical of slightly saline seasonally inundated soils of the Pinjarra Plain from Gingin to Busselton. A distinctive form of this species with long bracts around the flower head is also found in similar locations. The two forms often occur together. This long bract form was first recognised along Mundijong Road (G. J. Keighery pers. comm.)

*Drosera macrantha* subsp. *macrantha* (Swan Coastal Plain form) (Droseraceae)

A tall robust densely glandular hairy form of *Drosera macrantha* from Marri Woodland on the eastern side of the Plain.

*Schoenus* sp 2 (Cyperaceae)

A recently recognised annual *Schoenus* species (B. L. Rye pers. comm.) found on the seasonally waterlogged and inundated heavy soils of the Pinjarra Plain from Gingin to Busselton.

*Myriophyllum echinatum* (Haloragaceae)

A poorly collected tiny aquatic found on the seasonally inundated heavy soils of the Pinjarra Plain. This species is rare (Priority 3, Appendix 2).

*Acacia lasiocarpa* (Mimosaceae)

There are two varieties of this wattle recorded on the Swan Coastal Plain. *Acacia lasiocarpa* var. *lasiocarpa* is found in near coastal areas generally on Tamala surfaces near the coast but also characteristic of the Beach Ridge Plain in the Rockingham area. The other variety, *Acacia*

*lasiocarpa* var. b*racteolata* (long peduncle) is endemic to the Swan Coastal Plain being found on the seasonally waterlogged and inundated heavy soils of the Pinjarra Plain.

*Baeckea tenuifolia* (Myrtaceae)
The populations of this species along Mundijong Road are the most southern populations of this species and the only occurrence of this species in the Metropolitan Region. The species is also only known from this locality and several other localities to the north of the Metropolitan Region. This is a rare species (Priority 3, Appendix 2).

*Verticordia plumosa* var. *pleiobotrya* (Myrtaceae)
This variety of one of the pink feather flowers is only known from the Mundijong area. While there are some small populations on other roadsides, the Mundijong Road populations are the largest known. This variety is not known from any conservation reserve and is a rare taxon (Priority 1).

*Themeda triandra* Kangaroo Grass (Poaceae)
Roadside populations of this species are found on the eastern side of the Swan Coastal Plain from Gingin to Dardanup. Most commonly these populations are associated with Wandoo Woodlands but along Mundijong Road this species forms a layer in Marri Woodland (Site 15). The occurrence of *Themeda* at the Duckpond Road turnoff along Mundijong Road is the most westerly occurrence of this species on the Swan Coastal Plain in the Metropolitan Region.

## VEGETATION CONDITION

### General Condition

The southern vegetated roadside is effectively very wide being contiguous with an old rail reserve, while the northern roadside is very narrow (approximately 1 - 2m). The condition of the vegetation is variable ranging from completely degraded to excellent (Map 2 and Appendix 1). However the area south of Mundijong Road between Webb and Lightbody Roads and the triangle of land to the north of Mundijong Road at the intersection with Duckpond Road are generally in very good to excellent condition even though there are areas within these sections that have been subject to severe localised disturbance.

In general the severe localised disturbance is associated with localised clearing caused by: roadworks, rail access, intersecting roads, electric wire poles, drains and underground services (telecommunications, gas pipeline). Such localised clearing generally totally removes all vegetation cover, "improves" drainage and breaks up the soil. Well drained disturbed areas act as a 'nursery' for weed establishment and subsequent invasion of adjacent relatively undisturbed areas. This situation is further aggravated by the formation of piles of well drained soils (for

example soil piles associated with the power poles).

### Weeds

Forty seven weeds are recorded for the study roads (Appendix 2). All of these weeds are non-native taxa.

The principal weeds are
(i) Marri Woodland - Love Grass (*Eragrostis curvula*), Perennial Veld Grass (*Ehrharta calycina*), Natal Red Top (*Pennisetum clandestinum*), Wild Oats (*Avena fatua)* and Blowfly Grass (*Briza maxima*) and *Watsonia* species.
(iii) Wetland Mosaic - Love Grass (*Eragrostis curvula*), *Gladiolus angustatus*, *Sparaxis bulbillifera*, *Babiana stricta* and *Watsonia* species.
(iii) verges and cleared areas - Love Grass (*Eragrostis curvula*)
There are also occasional occurrences of Bamboo (*Arundo donax*).

A series of non-local Australian trees and shrubs have been planted in the southern roadside along Mundijong Road in intact vegetation. None of these plantings were observed to be invading surrounding vegetation so they have not been listed as weeds in Appendix 2. However these plantings of non - local taxa detract from the values of the local vegetation and have the potential to contribute to the weed flora (some of the planted species are known to be invasive, Dixon and Keighery 1995 and Keighery 1995). The planted species include *Melaleuca viminalis* (eastern Australian), *Eucalyptus platypus* (invasive), *Agonis flexuosa* (invasive), *Hakea laurina* (invasive), *Melaleuca nesophila* and *Acacia longifolia* (invasive). Also, the soil disturbance associated with planting in intact vegetation provides a disturbed area in which weeds can become established.

## DISCUSSION

### Vegetation

All remaining natural vegetation on the eastern side of the Swan Coastal Plain has conservation value (see Introduction). Also the condition and complexity of the vegetation along Mundijong Road identifies the area as being of regional conservation value. The Mundijong Road bushland has been identified in a series of studies (Keighery and Trudgen 1992, Shire of Serpentine - Jarrahdale 1992, Keighery and Keighery 1992, Gibson *et al.* 1994, Keighery 1996).

The four floristic community types identified in the regional floristic study of the southern Swan Coastal Plain (Table 1) are all considered to be "vulnerable" (Table 2). That is they are all likely to move into the endangered category in the near future if factors leading to the loss of this

community type continue to operate. Also, these community types are greater than 90% cleared. The presence of these community types along Mundijong Road and the generally intact condition of the vegetation gives the vegetation along the road regional significance as

"...it is one of the last two remaining continuous transects of the study area (the Swan Coastal Plain) showing the catena of original vegetation types on the eastern side of the plain." (Gibson *et al.* 1994).

The two catenas identified are along Mundijong Road and Wonnerup Road between Capel and Busselton (Introduction, Gibson *et al.* 1994, Keighery, Keighery and Gibson 1996).

**Table 2:**
Regional Conservation Status of the Floristic Community Types from Gibson *et al.* 1994.

| Floristic Community Type | Reservation Status* | Conservation Status |
|---|---|---|
| **Marri Woodland** | | |
| 3a Marri - *Xanthorrhoea preissii* woodlands | Not Present in a Conservation Reserve | Vulnerable |
| 3c Marri - *Xanthorrhoea preissii* woodlands | Present in one Conservation Reserve | Vulnerable |
| ***Casuarina obesa* Woodlands and Wetland Mosaic** | | |
| 8 Herb rich shrublands in claypans | Present in two or more Cons. Reserves | Vulnerable |
| 9 Dense shrublands on clay flats | Present in two or more Cons. Reserves | Vulnerable |

* Conservation Reserves are National Parks or Nature Reserves

The bushland along Mundijong Road has added significance as it connects to an additional N - S bushland corridor (Map 1). This corridor lies principally along the eastern side of Soldiers Road and includes areas of railway and road reserve as well as adjacent bushland blocks to the east and west of Soldiers road: Bella Cumming Reserve (west), Norman Road bushland (east), Cardup Nature Reserve and adjacent bushland (west) and Brickwood Bushland (west ). This bushland corridor from Mundijong town site to Brickwood Reserve represents the only N - S almost continuous transect of the Swan Coastal Plain showing a catena of many of the original vegetation types on the eastern side of the Plain in the area of the Ridge Hill Shelf and its interface with the Pinjarra Plain (Keighery 1996).

Consideration of the two broad plant communities highlights various aspects of the flora conservation values of the Mundijong Road bushland.

### Marri Woodlands

Marri Open Forest to Woodland appears to have been the predominant community of much of the Pinjarra Plain as indicated by the topography and presence of remnant Marri over much of the area (Keighery and Trudgen 1992 and Gibson *et al.* 1994). The small remnants of Marri Woodlands along Mundijong Road are some of the best examples of these woodlands.

The flora of these Marri Woodlands indicates a close association with the Scarp and Plateau and many of the species found in these small remnants are commonly thought to be confined to the Scarp and Plateau (see Appendix 2). The Marri Open Forest at the Mundijong and Duckpond Rd intersection is a particularly significant example of this woodland as it contains:

- *Opercularia apiciflora* and *Hypericum japonicum* - two species not commonly found on the Plain and previously not identified in the Perth Region (Marchant *et al.* 1987)

- *Kennedia stirlingii* which occurs rarely on the Plain, especially this far west

- *Themeda australis* understorey (see Flora).

Also this remnant is the western most area of Marri Woodland on the Swan Coastal Plain north of Mandurah.

**Wetland Mosaic**

Wetland Mosaic appears to have been the predominant community of the seasonally waterlogged and inundated areas of the Pinjarra Plain (Keighery and Trudgen 1992 and Gibson *et al.* 1994). The remnants of Wetland Mosaic along Mundijong Road is one of the best examples of the complex combinations of woodlands, shrublands, sedgelands and herblands characteristic of the Pinjarra Plain.

Of particular significance along Mundijong Road is the presence of *Casuarina obesa* Low Open Woodland to Low Woodland with a relatively intact understorey. *Casuarina obesa* Low Open Woodland to Low Woodland is characteristic of the very poorly drained loams and clay flats and has been almost completely cleared. Only along Mundijong, Lightbody, Abernathy and Orton Roads (and one small pocket of private land on Abernathy Rd) has some understorey been observed to be associated with the trees. The area along Mundijong Road is in the best condition.

*Casuarina obesa* is generally considered, in the literature, to indicate the presence of saline soils. However along the Mundijong Road and other roads in the area *Casuarina obesa* was not found with other species, such as samphires, that are associated with saline soils. These *Casuarina* Low Woodlands are the result of the waterlogging rather than salinity.

## Flora

Detailed studies dealing with aspects of the flora and vegetation of the eastern side of the Plain (Keighery and Keighery 1991, Keighery and Trudgen 1992 and Gibson *et al.* 1994) have established that the flora of Pinjarra Plain has special significance related to some interesting relationships and features. The flora of the Mundijong Road illustrates four of these features:

(i) High level of species diversity.

The Pinjarra Plain communities have high levels of species diversity. The Marri Woodlands contain a diverse shrub and herb flora. This shrub flora is particularly rich in species of Proteaceae, Myrtaceae and Anthericaceae. The communities of the Wetland Mosaic are rich in herb and sedge species with significant representations from the Stylidiaceae, Apiaceae, Droseraceae, Anthericaceae, Cyperaceae and Restionaceae.

Gibson *et al.* (1994) found that the average species richness of the floristic based communities was highest on the eastern side of the Plain. For those floristic community types recorded along Mundijong Road the average number of species per 100m2 study site ranges from 58.9 to 48 for woodlands and 52 to 35.5 for wetlands. Along Mundijong Road the actual number of species per 100m2 study site ranges from 41 to 80. The flora of Mundijong Road is especially significant as these taxa are located in such a small area of vegetation.

The floristic diversity in the wetlands is related to the seasonal changes within the wetlands. These cycles of waterlogging and drying and the small changes in topography and drainage within the one location provide a series of conditions that will support a varied flora. A series of observations from Site 4 on Mundijong Road illustrate this diversity:

- early winter: sedges and rushes flower on the soils which are just wet
- winter: Pincushions (*Borya* species), Early Nancy (*Wurmbea* species) and Flannel Flowers (*Tribonanthes* species) flower on the waterlogged soils
- spring: numerous shrubs, Triggerplants (*Stylidium* species), annual daisies (Asteraceae species, many genera) and annual sedges (Centrolepidaceae and Cyperaceae species) grow and flower in the wet and drying soils
- early summer: another suite of Triggerplants (*Stylidium* species), annual daisies Asteraceae species, many genera) and annual sedges (Centrolepidaceae and Cyperaceae species) as well as many Myrtaceous species (*Verticordia, Baeckea* and *Melaleuca* species) flower on the dry soils.

Many of these species are inconspicuous except when they are growing and flowering as they are:

- geophytes being annually renewed from bulbs, tubers and corms, for example Early Nancy (*Wurmbea* species) and Flannel Flowers (*Tribonanthes* species)
- annuals being annually renewed from seed, for example annual daisies Asteraceae species, many genera) and annual sedges (Centrolepidaceae and Cyperaceae species)
- dormant in summer (aestivate), for example some Triggerplants (*Stylidium* species), Pincushions (*Borya* species).

As a consequence up to 70% of the flora of such areas is not detectable in mid-summer.

Many other taxa that are present in the study area show these same patterns such as *Aponogeton hexatepalus, Amphibromus neesii* (Swamp Wallaby Grass) and Apiaceae species.

(ii) Close association of the flora with the flora of the Darling Scarp. The Pinjarra Plain and the Scarp share many taxa (Keighery and Trudgen 1992). These taxa are predominantly taxa that show a preference for heavy soils and are able to tolerate seasonal waterlogging. Mundijong Road supports of many of these taxa (Appendix 2).

(iii) Apparent high degree of endemism

Thirty one taxa are apparently endemic to eastern side of the Swan Coastal Plain (Gibson *et al.*

1994). These taxa are predominantly dependant on the heavy seasonally inundated soils of the wetlands. Twelve of these taxa were recorded along Mundijong Road (Appendix 2).

(iv) Large number of rare and poorly known taxa

One species of Declared Rare Flora and seven species of rare flora are found in the Bushland. Eleven taxa are newly described or recently recognised undescribed taxa (Appendix 2) which were not treated in the Flora of the Perth Region (Marchant *et al.* 1987). While some of these taxa are sufficiently distinct to be considered separate species, others are less distinctive and will be described as subspecies or varieties.

## Vegetation Condition

The presence of substantial areas of vegetation along Mundijong Roads in excellent to very good condition within a matrix of vegetation completely lacking in native taxa indicates that the communities of the Pinjarra Plain have a substantial ability to maintain themselves. This ability to resist weed invasion appears to be related to:

- the density of cover of the plant communities
- seasonal inundation
- the dry impenetrable nature of most of the soils of the eastern side of the Plain in summer.

Together these factors create conditions that are resistant to weed invasion. When any of these factors is altered weed invasion is evident. Localised clearing impacts on all three factors and is a primary cause of the decline in vegetation condition along Mundijong Road.

## CONCLUSION

Mundijong Road bushland is regionally significant and of outstanding conservation value as it forms the longest east - west continuous transects of the vegetation of the Pinjarra Plain in the metropolitan area and is one of two of such transects on the Swan Coastal Plain. Also the flora of the bushland is representative of the diverse flora of the communities of the Pinjarra Plain. This supports previous studies that identified the area as an important area of remnant bushland in the metropolitan area (Shire of Serpentine - Jarrahdale 1992) and, regionally on the Swan Coastal Plain (Keighery and Trudgen 1992, Keighery and Keighery 1992, Gibson *et al.* 1994, Department of Environmental Protection 1994).

Also Mundijong Road bushland together with the north - south transect associated with the Soldiers Road bushland between Mundijong and Brickwood Reserve forms a narrow but extensive transect of many of the plant communities of the Ridge Hill Shelf, Pinjarra Plain and the interface between the two.

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## Appendix 1: Vegetation Descriptions and Condition

### General Information

Broad mapping units are used for the vegetation mapping (Map 2 ). The determination of these units is based on vegetation descriptions from the sites. The actual location of the sites is indicated on the map. The vegetation descriptions for each of the mapped units are from the areas considered to best illustrate these units, being 'typical' and in the best condition.

Sites are grouped on the basis of the mapping units and the floristic community type. An * indicates that the floristic community type for the unit and/or site has been inferred from the floristics.

Keys to the terminology used for the vegetation descriptions and specific condition ratings are given in Keighery (1994).

### Site Descriptions

#### Floristic Community Type 3a

#### Mapping Unit - Wetland Mosaic

**Site 2** (Quadrat Mud 4, Gibson *et al.* 1994)
*Hakea varia* Shrubland over *Hypocalymma angustifolium* Low Heath C over Open Grassland, Open Herbland and Open Sedgeland
Condition Rating Very good
Comments: Only Marri seedlings in the site but there are adjacent Marri trees to the west. Condition of this general roadside is good to degraded with some patches in excellent to very good condition. Principal weeds are Perennial Veld Grass (*Ehrharta calycina*), Annual Veld Grass (*Ehrharta calycina*), Blowfly Grass (*Briza maxima*), *Sparaxis bulbillifera*, *Lotus angustissimus* and *Watsonia* species.
Soil: sandy clay, P1d (Van Gool, 1990)
Drainage: poor, waterlogged Aspect: flat

#### Mapping Unit - Marri Woodlands

**Site 3** (Quadrat Mud 5, Gibson *et al.* 1994)
*Hakea trifurcata*, *Pericalymma ellipticum* and *Melaleuca viminea* Shrubland over mixed Open Low Heath over Open Grassland, Open Herbland and Open Sedgeland
Condition Rating Excellent to very good
Comments: Adjacent Marri trees forming a woodland. Weeds are Couch (*Cynodon dactylon*), Blowfly Grass (*Briza maxima*)and *Gladiolus angustatus.*
Soil: sandy clay, P1d (Van Gool, 1990)
Drainage: poor, waterlogged Aspect: flat

#### Floristic Community Type 3c

#### Mapping Unit - Marri Woodland

**Site 1**
Marri Forest to Woodland over *Xanthorrhoea* Low Shrubland over Herbland and Sedgeland
Condition Rating Good
Comments: Condition of this general roadside is good to degraded with some patches in

excellent to very good condition. Principal weeds are Love Grass (*Eragrostis curvula*), Perennial Veld Grass (*Ehrharta calycina*), Natal Red Top (*Pennisetum clandestinum*), Wild Oats (*Avena fatua*) and Blowfly Grass (*Briza maxima*) and *Watsonia* species.
Soil: sandy loam, P1b, c &d (Van Gool, 1990)
Drainage: moderate Aspect: flat

**Site 12** (Quadrat Duck 1, Gibson *et al.* 1994)
Marri Woodland over *Jacksonia sternbergiana* and *Hakea prostrata* Tall Open Shrubland over *Xanthorrhoea preissii* Low Shrubland over *Arthropodium capillipes* Closed Herbland and *Mesomelaena tetragona* Closed Sedgeland
Condition Rating Excellent to very good
Comments: There is no bare ground in the area, possibly the vegetation of the "grassy plains" of the early European Settlers.
Soil: red brown loam, P3 (Van Gool 1990)
Drainage: poor, waterlogged Aspect: gentle slope to south east

**Site 13** (Quadrat Duck 2, Gibson *et al.* 1994)
*Jacksonia sternbergiana* Tall Shrubland over *Phyllanthus calycinus* Low Shrubland over Open Herbland and *Mesomelaena tetragona* Sedgeland
Adjacent: Marri and Flooded Gum.
Condition Rating Excellent to very good
Soil: red brown loam, P3 (Van Gool 1990)
Drainage: poor, waterlogged Aspect: gentle slope to south east

**Site 15***
Marri Open Forest to Woodland over *Themeda australis* Closed Grassland and Herbland.
Condition Rating Very good
Comments: There is no bare ground in the area, possibly the vegetation of the "grassy plains" of the early European Settlers.
Soil: red brown loam, P3 (Van Gool 1990)
Drainage: poor, waterlogged Aspect: gentle slope to south

**Floristic Community Type 8**

**Mapping Unit - Wetland Mosaic**

**Site 4** (Quadrat Mud 9, Gibson *et al.* 1994)
*Melaleuca uncinata* Open Shrubland over *Verticordia* species Low Shrubland over *Borya scirpoidea* and *Stylidium* species Herbland and *Leptocarpus canus* and *Chorizandra enodis* Sedgeland
Adjacent: areas to the west have clumps of *Actinostrobus pyramidalis*, *Calothamnus hirsutus*, *Viminaria juncea* and *Melaleuca* species.
Condition Rating Excellent to very good
Comments: Weeds - *Briza maxima, Briza minor, Romulea rosea, Parentucellia viscosa, Sparaxis bulbillifera, Lotus angustissimus, Gladiolus angustatus* and *Babiana stricta.*
Soil: clay, P3 (Van Gool, 1990)
Drainage: poor, waterlogged Aspect: flat

**Site 5***
Open Low Heath with scattered Marri, *Viminaria juncea* and *Actinostrobus pyramidalis* over Open Herbland and Open Sedgeland
Condition Rating Excellent to very good
Soil: clay, P3 (Van Gool, 1990)
Drainage: poor, waterlogged Aspect: flat

**Site 7** (Quadrat Mud 3, Gibson *et al.* 1994)
*Viminaria juncea* and *Melaleuca lateriflora* Tall Shrubland over *Acacia lasiocarpa* var. *bracteolata* Low Shrubland over mixed Herbland and *Leptocarpus aristatus* and *Chorizandra enodis* Sedgeland.

Condition Rating Excellent
Comments: Weeds - Guildford Grass (*Romulea rosea*), *Parentucellia viscosa*, *Sparaxis bulbillifera*, *Lotus angustissimus* and *Watsonia* species
Soil: clay, P3 (Van Gool, 1990)
Drainage: poor, waterlogged Aspect: flat

**Mapping Unit - *Casuarina obesa* Forest to Woodland**

**Site 6** (Quadrat Mud 2, Gibson *et al.* 1994)
Scattered *Casuarina obesa* over *Melaleuca uncinata* Shrubland over *Acacia lasiocarpa* var. *bracteolata* Low Shrubland over Very Open Grassland, mixed Herbland and *Leptocarpus* Sedgeland
Condition Rating Very good to good
Comments: Weeds - *Briza maxima*, *Briza minor*, *Romulea rosea*, *Parentucellia viscosa*, *Sparaxis bulbillifera*, *Lotus angustissimus* and *Oxalis glabra*.
Soil: clay, P3 (Van Gool, 1990)
Drainage: poor, waterlogged Aspect: flat

**Site 10***
*Casuarina obesa* Low Woodland over *Watsonia* Herbland
Condition Rating Degraded to completely degraded
Comments: Burnt too frequently, soil disturbed and weed invaded.
Soil: clay, P4 (Van Gool, 1990)
Drainage: poor, inundated Aspect: flat

**Mapping Unit - Marri Woodlands**

**Site 8** (Quadrat Mud 6, Gibson *et al.* 1994)
*Hypocalymma angustifolium* Open Heath over *Kunzea micrantha* Low Open Shrubland over *Neurachne alopecuroidea* Very Open Grassland, Very Open Herbland and *Mesomelaena tetragona* Sedgeland.
Condition Rating Excellent to very good
Comments: Weeds - Shivery Grass (*Briza minor*), Guildford Grass (*Romulea rosea*), *Parentucellia viscosa* and Perennial Veld Grass (*Ehrharta calycina*).
Soil: clay, P3 (Van Gool, 1990)
Drainage: poor, waterlogged Aspect: flat

**Site 9** (Quadrat Mud 7, Gibson *et al.* 1994)
Scattered *Viminaria juncea* over *Hakea trifurcata* Tall Shrubland over *Hypocalymma angustifolium* and *Kunzea micrantha* Open Low Heath over *Neurachne alopecuroidea* Very Open Grassland, Very Open Herbland and *Leptocarpus canus* Open Sedgeland
Condition Rating Excellent to very good
Comments: Weeds - Blowfly Grass (*Briza maxima*), Shivery Grass (*Briza minor*), Guildford Grass (*Romulea rosea*) and *Watsonia* species.
Soil: clay, P3 (Van Gool, 1990)
Drainage: poor, waterlogged Aspect: flat

**Floristic Community Type 9**

**Mapping Unit - *Casuarina obesa* Forest to Woodland**

**Site 11***
*Melaleuca* Shrubland with scattered *Casuarina obesa* and Marri over *Watsonia*
Condition Rating Completely degraded
Comments: Burnt too frequently, soil disturbed and weed invaded
Soil: clay, P1d (Van Gool, 1990)
Drainage: poor, waterlogged Aspect: flat

**Mapping Unit - Wetland Mosaic**

**Site 14** (Quadrat Duck 3, Gibson *et al.* 1994)
*Melaleuca viminea* and *Hakea varia* Open Shrubland over mixed Open Herbland and *Lepyrodia muirii* and *Leptocarpus co-angustatus* Closed Sedgeland
Comments: *Melaleuca viminea* occurs in a clump, *Aponogeton hexatepalus* grows under these shrubs. In adjacent areas there are patches of Herbland and Sedgeland.
Condition Rating Excellent to very good.
Comments: In 1991 some of the plants appeared to be rotting, inundation is probably greater than average, collects off the road.
Soil: clay loam , P3 (Van Gool 1990)
Drainage: inundated, water to 25cm Aspect: flat

## Appendix 2: Flora List

All taxa (species, subspecies and varieties) observed along the study roads are listed. The study road on which the taxa are found is indicated as well as various features of the flora (see below). These features were selected as they highlight the conservation values of the flora.

## Key

### Column 1: Family, Conservation Status and Regional distributions

**Conservation Status**
Conservation and Land Management Declared Rare Flora and Priority Taxa (Atkins 1996)
**R** = Declared Rare Flora
**1** = Priority 1: Poorly Known Taxa
**2** = Priority 2: Poorly Known Taxa
**3** = Priority 3: Poorly Known Taxa
**4** = Priority 4: Rare Taxa

**Regional distributions**
Regional ecological preferences
e = taxa endemic to the eastern side of the Swan Coastal Plain*
H = taxa characteristic of sandy clay soils on the eastern side of the Swan Coastal Plain*
s = taxa characteristic of sandy soils on the eastern side of the Swan Coastal Plain*
I = taxa confined to inundated areas (sumplands/claypans)
P = non-local planted taxa
* southern side south of Busselton

Geographical Location (range ends)
N = population at the northern limit of their known geographic range
S = population at the southern limit of their known geographic range
D = populations disjunct from their known geographic range

### Column 2: Taxon

Names follow Gibson *et al.* (1994) unless indicated otherwise. Taxa yet to be named have an attached reference collection number from the relevant collector. A * preceding the name indicates a weed. An "ms" after the name indicates that this is a manuscript name which is yet to be published.

### Columns 3 - 8: Plant Communities

Mundijong Road

MU = Marri Woodland

MW = Wetland Mosaic

(C) = confined to *Casuarina obesa* area

Mundijong/Duckpond Road Intersection

DU = Marri Woodland

DW = Wetland Mosaic (not mapped)

D = disturbed area

| | MU | MW | DU | DW |
|---|---|---|---|---|
| Amaranthaceae | | | | |
| H Ptilotus drummondii | | | • | |
| H Ptilotus manglesii | | • | | • |
| Anthericaceae | | | | |
| H Agrostocrinum scabrum | • | | • | |
| H Borya scirpoidea | | • | | • |
| H Borya sphaerocephala | | • | | • |
| Caesia micrantha | • | | • | |
| H Caesia micrantha "blue" (GJK 10857) | | • | | |
| Chamaescilla corymbosa | • | • | | |
| Dichopogon capillipes | | | • | |
| H Dichopogon preissii | | | | • |
| Laxmannia ramosa | | • | | |
| Laxmannia squarrosa | • | | | |
| Sowerbaea laxiflora | • | | • | |
| Thysanotus dichotomus | • | | | |
| Thysanotus manglesianus | • | | • | |
| Thysanotus multiflorus | | • | | |
| Thysanotus patersonii | • | | | |
| Thysanotus sparteus | • | | | |
| Thysanotus thyrsoideus | | • | | • |
| Thysanotus triandrus | | | • | |
| Tricoryne elatior | • | | • | |
| Tricoryne humilis | • | | • | |
| Apiaceae | | | | |
| e2HEryngium pinnatifidum subsp. palustre ms | | | | • |
| Hydrocotyle alata | | | | • |
| Hydrocotyle callicarpa | | • | | • |
| Hydrocotyle diantha | | • | | |
| H Schoenolaena juncea | | • | | • |
| Xanthosia huegelii | | | • | |
| Aponogetonaceae | | | | |
| eRH Aponogeton hexatepalus | | | | • |
| Asparagaceae | | | | |
| * Myrsiphyllum asparagoides | • | | • | |
| Araceae | | | | |
| * Zantedeschia aethiopica | | | | • |
| Asteraceae | | | | |
| H Angianthus drummondii | | • | | • |
| H Brachyscome bellidioides | | • | | • |
| Brachyscome iberidifolia | | • | | |
| * Conyza bonariensis | • | • | • | • |
| Cotula cotuloides | | • | | |
| * Dittrichia graveolens | • | • | • | • |
| Hyalosperma cotula | • | | • | |
| * Hypochaeris glabra | • | • | • | • |
| Olearia elaeophila | | | • | • |
| eH Podolepis gracilis (Swamp form GJK 13126) | | • | | • |
| eH Pogonolepis stricta "long bract form" (GJK 13226) | | | | • |

| | MU | MW | DU | DW |
|---|---|---|---|---|
| Siloxerus humifusus | • | • | • | • |
| * Sonchus oleraceus | • | • | • | • |
| H Trichocline spathulata | | | • | |
| * Ursinia anthemoides | • | • | • | • |
| Casuarinaceae | | | | |
| Allocasuarina humilis | • | | | |
| D Allocasuarina microstachya | | • | | |
| Casuarina obesa | | • | | |
| Centrolepidaceae | | | | |
| Aphelia cyperoides | | • | | • |
| H Brizula drummondii | | | | • |
| H Brizula nutans | | • | | |
| Centrolepis aristata | | • (C) | | • |
| Centrolepis humillima | | • | | |
| Centrolepis inconspicua | | • | | |
| H Centrolepis mutica | | • | | |
| Colchicaceae | | | | |
| Burchardia congesta ( = B. umbellata Gibson *et al.*) | • | | • | |
| Burchardia multiflora | | • | | • |
| Crassulaceae | | | | |
| Crassula pedicellosa | | • | | |
| Cuscutaceae | | | | |
| * Cuscuta epithymum | | • | | |
| Cyperaceae | | | | |
| H Chorizandra enodis | | • (C) | | |
| H Cyathochaeta avenacea | | • | | |
| * Cyperus tenellus | | • | | • |
| * Isolepis hystrix | • | | | |
| Isolepis oldfieldiana | | • | | • |
| Lepidosperma angustatum | • | | • | |
| Lepidosperma sp eastern terete (BJ & NG 232) | | • | | |
| Lepidosperma leptostachyum | • | | | |
| Lepidosperma longitudinale | | • | | |
| E Mesomelaena tetragona | • | • | • | • |
| H Schoenus bifidus | | • | | |
| Schoenus brevisetis | | • | | |
| Schoenus humilis | | • | | |
| Schoenus nanus | | • | | |
| Schoenus odontocarpus | | • | | • |
| Schoenus rigens | | • | | |
| Schoenus sp. 2 (GJK 5739) | | | | |
| Schoenus sp. aff. breviculmis | | • | | |
| Schoenus subflavus | • | | | |
| Schoenus tenellus | | • | | • |
| Schoenus unispiculatus | | • | | |
| Tetraria capillaris | | • | | • |
| Tetraria octandra | • | | • | |
| Tricostularia neesii var. neesii | | • | • | |

| | MU | MW | DU | DW |
|---|---|---|---|---|
| Dasypogonaceae | | | | |
| HNCalectasia grandiflora | | • | | |
| Kingia australis | • | • | | |
| Lomandra caespitosa | • | • | | |
| Lomandra micrantha | | • | | |
| Lomandra sonderi | | | | • |
| Lomandra suaveolens | • | | • | |
| Dilleniaceae | | | | |
| Hibbertia acerosa | • | | • | |
| Hibbertia commutata | • | | • | |
| Hibbertia hypericoides | • | | | |
| Droseraceae | | | | |
| Drosera erythrorhiza | | | • | |
| Drosera gigantea | | • | | • |
| Drosera heterophylla | | • | | |
| eH Drosera macrantha (Swan Coastal Plain form BJK&NG 228) | • | | • | |
| Drosera menziesii subsp. penicillaris | • | | | |
| Drosera menziesii subsp. menziesii | | • | | |
| H Drosera rosulata | | • | | • |
| H Drosera tubaestylis | | | | • |
| Epacridaceae | | | | |
| Astroloma ciliatum | • | | • | |
| Astroloma pallidum | | | • | |
| Leucopogon squarrosus | | • | | |
| Euphorbiaceae | | | | |
| Phyllanthus calycinus | • | | • | |
| Gentianaceae | | | | |
| * Cicendia filiformis | | • | | • |
| Geraniaceae | | | | |
| Geranium retrorsum | | | • | |
| Goodeniaceae | | | | |
| 4H Anthotium junciforme | | • | | • |
| Dampiera alata | | | | |
| Dampiera linearis | | | • | |
| Goodenia caerulea | | | • | |
| Goodenia micrantha | | | | • |
| Lechenaultia biloba | | | • | |
| Lechenaultia expansa | | | | • |
| H Scaevola lanceolata | | | | • |
| Scaevola phlebopetala | | | • | |
| Scaevola pilosa | | • (C) | | |
| Haemodoraceae | | | | |
| H Anigozanthos viridis | | • | | • |
| Conostylis aculeata | | | • | |
| Haemodorum brevisepalum | • | | | |
| Haemodorum laxum | | | • | |
| Haemodorum sparsiflorum | • | | • | |

| | MU | MW | DU | DW |
|---|---|---|---|---|
| H Haemodorum simplex | • | | | • |
| Haemodorum spicatum | • | | • | |
| Tribonanthes australis | | • | | • |
| H Tribonanthes brachypetala | | • | | |
| H Tribonanthes violacea | | • | | |
| Haloragaceae | | | | |
| H Myriophyllum drummondii | | • | | |
| e3HMyriophyllum echinatum | | | | • |
| Hydatellaceae | | | | |
| H Trithuria bibracteata | | • | | • |
| Hypericaceae | | | | |
| Hn Hypericum japonicum | | | | • |
| Hypoxidaceae | | | | |
| H Hypoxis occidentalis | | • | | • |
| Iridaceae | | | | |
| * Babiana disticha | | • | | |
| * Gladiolus angustus | | • | | |
| * Gladiolus caryophyllaceus | • | | | |
| * Homeria flaccida | • | | | |
| Patersonia occidentalis | • | • | • | |
| Patersonia occidentalis (swamp form NG&ML 544) | | • (C) | | |
| * Romulea rosea | | • | | • |
| * Sparaxis bulbifera | | • | | |
| * Watsonia marginata | • | • | | |
| * Watsonia bulbillifera | • | • | • | • |
| Isoetaceae | | | | |
| H Isoetes drummondii | | | | |
| Juncaceae | | | | |
| Juncus bufonius | | • | | |
| * Juncus capitatus | | • | | |
| Juncus pauciflora | | | | • |
| Luzula meridionalis | | | | • |
| Juncaginaceae | | | | |
| Triglochin procerum | | | | • |
| Lauraceae | | | | |
| Cassytha flava | | | | |
| Cassytha glabella | | | | • |
| Lentibulariaceae | | | | |
| H Polypompholyx multifida | | • | | • |
| H Polypompholyx tenella | | • | | |
| Lobeliaceae | | | | |
| Lobelia tenuior | | | • | |
| * Monopsis debilis | | • | | • |

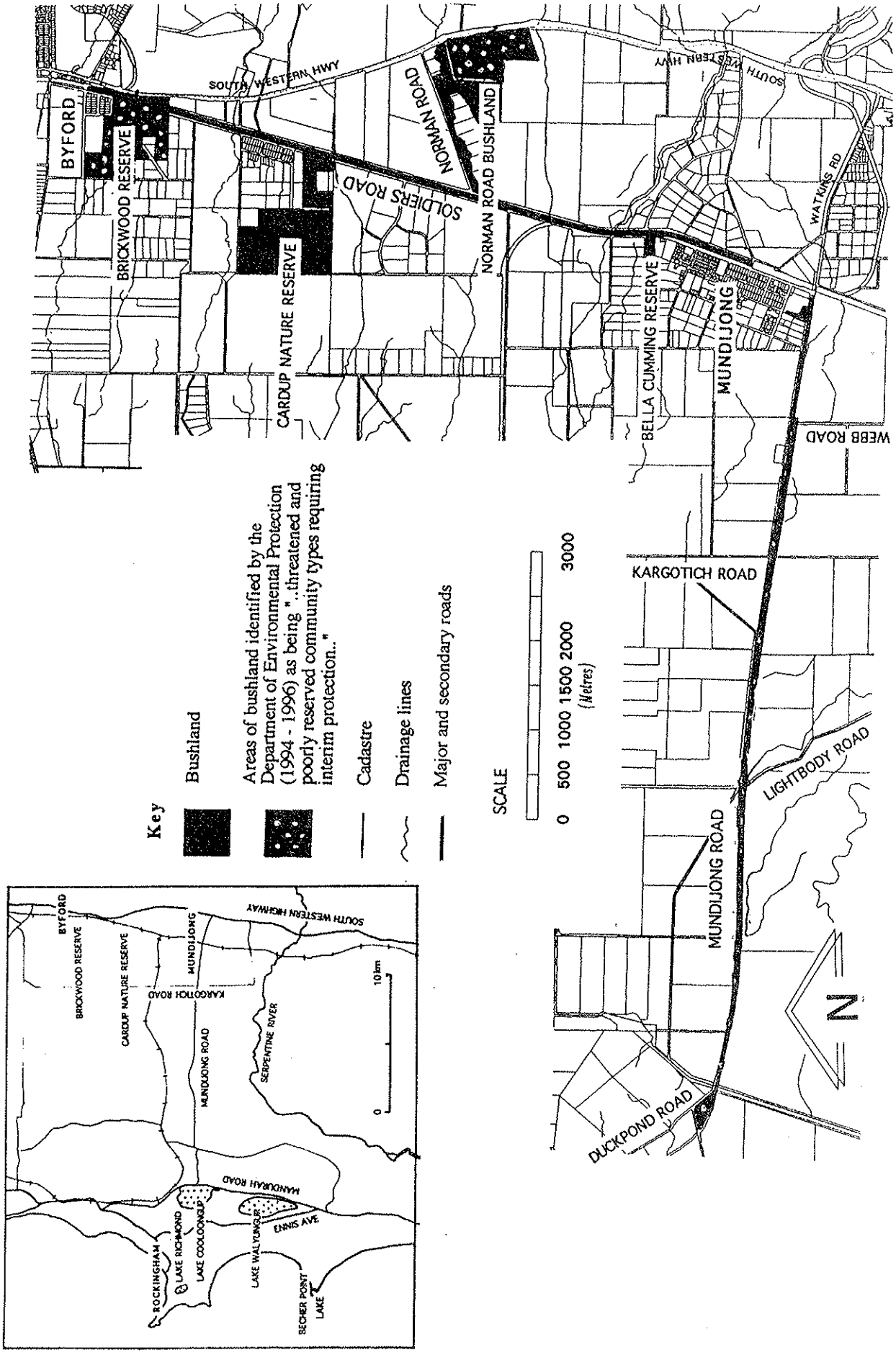
| | MU | MW | DU | DW |
|---|---|---|---|---|
| Loganiaceae | | | | |
| Phyllangium paradoxum (= Mitrasacme paradoxa in Gibson *et al.* 1994, Dunlop 1996) | • | • | • | • |
| Loranthaceae | | | | |
| Nuytsia floribunda | | • | | |
| Mimosaceae | | | | |
| Acacia incurva | | | | • |
| eH Acacia lasiocarpa var. bracteolata | | | | |
| Acacia saligna | | • | | • |
| Acacia stenoptera | • | | • | |
| Myrtaceae | | | | |
| Astartea aff. fascicularis | | • | | • |
| Baeckea camphorosmae | | | • | |
| 3HSBaeckea tenuifolia | | • | | |
| H Calothamnus hirsutus | | • | | |
| H Calytrix aurea | | • | | |
| Eucalyptus calophylla | • | • | • | • |
| Eucalyptus rudis | | • | | • |
| Hypocalymma angustifolium | • | • | • | • |
| Kunzea ericifolium | | • | | • |
| Kunzea micrantha | | | | • |
| Kunzea recurva | | | | • |
| H Melaleuca lateriflora var. acutifolia | | • | | |
| Melaleuca lateritia | | • | | • |
| H Melaleuca leptoclada | | • | | |
| Melaleuca preissiana | | | | • |
| Melaleuca rhaphiophylla | | • | | • |
| H Melaleuca uncinata | | • | | |
| H Melaleuca viminea | | | | • |
| Pericalymma ellipticum | • | • | | |
| Regelia ciliata | | • | | |
| H Verticordia acerosa | | • | | |
| Verticordia densiflora | | • | | |
| H Verticordia huegelii var. huegelii | | • | | |
| H Verticordia pennigera | | • | | |
| e1H Verticordia plumosa var. pleiobotrya | | • | | |
| Orchidaceae | | | | |
| H Caladenia paludosa ms | • | | • | |
| H Diuris carinata | | • | | |
| H Diuris emarginata | | • | | |
| Elythranthera emarginata | • | | | |
| Microtis media | | | | • |
| * Monadenia bracteata | • | • | • | • |
| H Thelymitra antennifera | | • | | • |
| Thelymitra crinita | • | | • | |
| Oxalidaceae | | | | |
| * Oxalis glabra | | • | | |
| * Oxalis pes-caprae | • | | • | |
| Papilionaceae | | | | |
| Daviesia angulata | | | • | |

| | | MU | MW | DU | DW |
|---|---|---|---|---|---|
| | Daviesia physodes | | | • | |
| | Eutaxia virgata | | | | • |
| | Gompholobium marginatum | | | • | |
| | Gompholobium tomentosum | | | • | |
| | Jacksonia furcellata | | | • | |
| e | Jacksonia gracilis ms (= J. aff. sericea swamp form, Gibson *et al.* 1994) | • | • | | |
| | Jacksonia sternbergiana | | | • | |
| | Kennedia stirlingii | | | • | |
| * | Lotus angustissimus | • | • | • | • |
| * | Lotus suaveolens | | | | |
| | Mirbelia spinosa | | | | |
| * | Trifolium angustifolium | | | • | |
| * | Trifolium campestre | | | • | |
| * | Trifolium subterraneum | | | • | |
| | Viminaria juncea | | • | | • |
| | | | | | |
| | Philydraceae | | | | |
| H | Philydrella drummondii | | • | | |
| H | Philydrella pygmaea | | | | • |
| | | | | | |
| | Phormiaceae | | | | |
| | Dianella revoluta var. divaricata | | | • | |
| H | Stypandra glauca | | | • | |
| | | | | | |
| | Poaceae | | | | |
| | Agrostis preissii | | | | • |
| * | Aira caryophyllea | | | | |
| | Amphibromus neesii | | • (C) | | |
| | Amphipogon debilis | | | | |
| | Amphipogon turbinatus | | | | |
| * | Avena barbata | | | • | |
| * | Briza maxima | • | • | • | • |
| * | Briza minor | | | • | • |
| * | Cynodon dactylon | | | | |
| | Danthonia caespitosa | | | | |
| | Danthonia pilosa | | | | |
| | Dichelachne crinita | | • | | • |
| * | Ehrharta calycina | • | | • | |
| * | Ehrharta longiflora | • | | • | |
| | Eragrostis elongata | | | | • |
| * | Eragrostis curvula | | • | | • |
| * | Hordeum leporinum | D | | | |
| * | Lolium perenne | | • | | |
| * | Lolium rigidum | | | | |
| H | Neurachne alopecuroidea | | | • | • |
| * | Paspalum dilatatum | | | | • |
| * | Pennisetum clandestinum | | | | |
| * | Pentaschistis airoides | • | • | • | • |
| | Poa ?poiformis | | | • | |
| | Stipa campylachne | • | | • | |
| | Stipa elegantissima | | | • | |
| | Stipa pycnostachya | • | | • | |
| | Themeda triandra | | | • | |
| * | Vulpia bromoides | | | • | |
| * | Vulpia myuros | | | • | |

| | MU | MW | DU | DW |
|---|---|---|---|---|
| Primulaceae | | | | |
| * Anagallis arvensis | | | • | • |
| Proteaceae | | | | |
| H Banksia telmatiaea | | • | | |
| Dryandra lindleyana (D. nivea Gibson *et al.* 1994) | | • | | |
| H Grevillea bipinnatifida | • | | | |
| H Grevillea pilulifera | | | • | |
| Hakea ceratophylla | | • | | |
| Hakea incrassata | | • | | |
| Hakea lissocarpha | | | • | |
| H Hakea marginata | | • | | |
| Hakea prostrata | | | • | |
| Hakea trifurcata | | • | | |
| Hakea varia | | • (C) | | • |
| H Petrophile media var. juncifolius ms | | • | | |
| Petrophile seminuda | | • | | |
| Petrophile squamata | | • | | |
| Synaphea floribunda (= S."stenoloba" fine leaves (BJK&NG 244) Gibson *et al.* 1994) | | • | | |
| Synaphea petiolaris | • | • | • | • |
| Restionaceae | | | | |
| H Harperia lateriflora | | • | | |
| Hypolaena exsulca | • | • | • | • |
| Lepidobolus preissianus | • | | | |
| H Leptocarpus aff. crebriculmis (BJK&NG 236) | | • | | |
| Leptocarpus aristatus | | • | | |
| Leptocarpus canus | | • | | |
| Leptocarpus coangustatus | | • | | |
| Lepyrodia macra | | • (C) | | • |
| Lepyrodia muirii | | • (C) | | • |
| Loxocarya fasciculata | • | • | • | • |
| Loxocarya flexuosa | | | • | |
| Rubiaceae | | | | |
| D Opercularia apiciflora | | | • | |
| Opercularia vaginata | | | • | |
| Rutaceae | | | | |
| Eriostemon spicatus | • | • | | |
| Sellaginellaceae | | | | |
| Selaginella gracillima | | | | • |
| Scrophulariaceae | | | | |
| * Bellardia trixago | | | | |
| Gratiola peruviana | | | | • |
| * Parentucellia viscosa | | | | • |
| Stackhousiaceae | | | | |
| Stackhousia monogyna | | | | |
| Tripterococcus brunonis | | | | |

| | MU | MW | DU | DW |
|---|---|---|---|---|
| Stylidiaceae | | | | |
| Levenhookia pusilla | | | | • |
| Stylidium calcaratum | • | • | • | • |
| H Stylidium canaliculatum | | | | • |
| Stylidium dichotomum | | • | | • |
| Stylidium divaricatum | | | | • |
| H Stylidium inundatum | | • | | • |
| H Stylidium leptophyllum | | | | • |
| 3H Stylidium longitubum | | | | • |
| e3H Stylidium mimeticum | | | | • |
| Stylidium petiolare | | • | | • |
| Stylidium pulchellum | | | | • |
| H Stylidium roseo-alatum | | | | • |
| H Stylidium utricularioides | | • | | • |
| Thymelaeaceae | | | | |
| H Pimelea imbricata var. major | | | | • |
| Xanthorrhoeaceae | | | | |
| Xanthorrhoea preissii | • | | • | |
| Xanthorrhoea brunonis | | | | • |
| Zamiaceae | | | | |
| Macrozamia riedlei | | | • | |

## Map 1: Mundijong Road and connected bushland.



## Map 2: Vegetation and vegetation condition
(modified from Keighery 1996)

A series of symbols and notations are used to map the vegetation, vegetation condition and major weeds.

### Vegetation

——— Marri Forest to Woodland

– – – *Casuarina obesa* Forest to Woodland

∿∿∿ Wetland Mosaic

### Weeds

| | | | |
|---|---|---|---|
| Grasses | mixed | = | P |
| | Love Grass | = | l |
| | Perennial Veldt Grass | = | v |
| | Kikuyu | = | k |
| Geophytes | *Gladiolus angustus* | = | G |
| | *Babiana* | = | B |
| | *Sparaxis* | = | S |
| | *Watsonia* species | = | W |
| General exotics | | = | E |
| Miscellaneous weeds | | = | M |

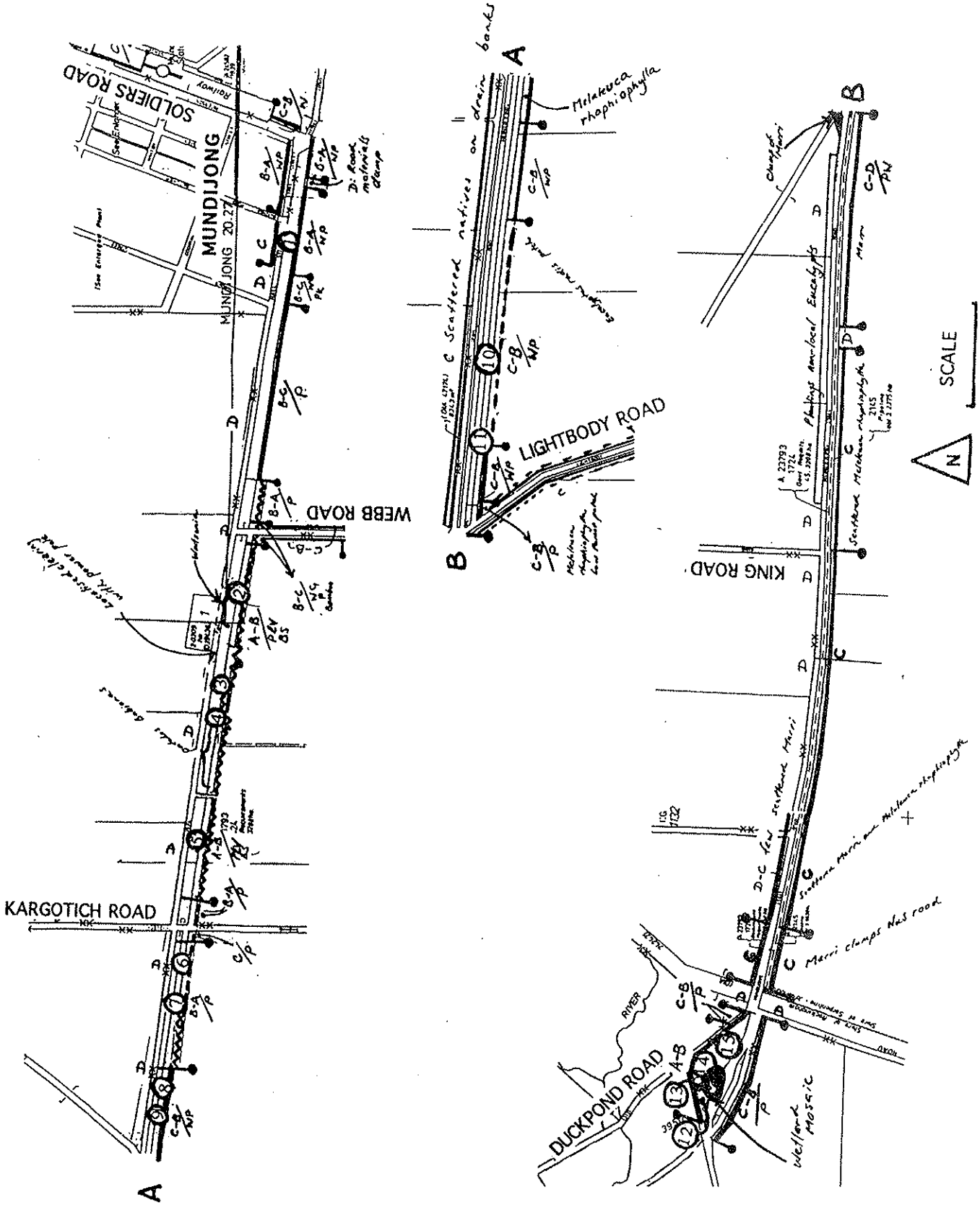
### Vegetation Condition

The vegetation condition ratings used in the site descriptions were designed to be used for specific sites. Four broader condition ratings are used in the mapping.

Changes in vegetation/condition
(Condition is shown above the line with major weeds indicated below)

| | |
|---|---|
| A | Excellent to very good condition.<br>Scattered weeds with occasional patches with severe localised disturbance |
| B | Good to degraded condition.<br>Understorey disrupted to severely disrupted by weed invasion |
| C | Completely degraded.<br>Some native species, generally trees, in an otherwise exotic community. |
| D | No native species remaining. |

**Map 2: Vegetation and vegetation condition**
(modified from Keighery 1996)



# FLORISTICS of RESERVES and BUSHLAND AREAS

# of the

# PERTH REGION (SYSTEM 6)

# PARTS XI - XV

by

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February 1997

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