VEGETATION SURVEY OF RESERVE NO. 16418 AND PART RESERVE NO. 18672 WONGAN HILLS AREA

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1.0 SUMMARY AND CONCLUSIONS

The Water Reserve No. 16418 (985 hectares) and remnant bushland on the Experimental Farm No. 18672 (620 hectares) were surveyed for vegetation and flora. The intricate mosaic of vegetation on the reserves is linked to the complex variation in soils, topography and underlying rock formations. The reserves lie in the Guangan Vegetation System which refers to the classical Guangan of James Drummond and is named with his original spelling which has now been standardised under the term "kwongan". Kwongan associations (shrubland and heath formations) occur on deeper sands and lateritic soils, mallee associations are found on duplex soils and salmon gum and York gum woodlands on heavier loam soils. Twenty seven vegetation associations are mapped and described including woodlands (6), mallee (3), kwongan (16), a lithic complex (granite) and salt complex (samphire).

A total of 366 plant species have been identified for the Water Reserve. This includes 5 species of gazetted rare flora (*Acacia semicircinalis, Conostylis wonganensis, Gastrolobium glaucum, Hemigenia viscida, Stylidium coroniforme*) and 9 Department of Conservation and Land Management priority species. A total of 376 species have been identified for the block of bushland on the Experimental Farm including 4 species of gazetted rare flora (*Conostylis wonganensis, Daviesia euphorbioides, Gastrolobium glaucum, Gastrolobium hamulosum*) and 8 Department of Conservation and Land Management priority species.

Both areas surveyed have a high level of floristic diversity and occur in an area which is famous botanically for its rich and unique flora. The 7 gazetted rare plants recorded during the survey are confined to the kwongan associations which are species rich and extensive. However, all the vegetation associations mapped during the survey are of considerable importance to nature conservation as the surrounding district has been extensively cleared. Of special significance are the York gum (*Eucalyptus loxophleba*) and salmon gum (*Eucalyptus salmonophloia*) woodlands which grow in the heavier soils of loam and clay loam. These soil types were the first to be cleared and remaining woodland areas are now a top conservation priority in the wheatbelt. The priority species *Scaevola tortuosa* also occurs in the York gum woodlands on the Water reserve. Because of the high conservation value of these vegetation remnants the total area of the Water Reserve and the bushland block on the Experimental Farm are nominated for listing on the Register of the National Estate and it is strongly recommended that these areas be vested in the National Parks and Nature Conservation Authority for the purpose of nature conservation.

2.0 INTRODUCTION

2.1 Project Description

The aim of this project is to map the vegetation types and locate populations of rare flora on Reserve No. 16418 (Water Railway Supply, 985 ha) and part Reserve No. 18672 (Experimental Farm, 620 ha) in the Wongan-Ballidu Shire.

Reserve Nos 16418 and 18672 adjoin about 3000 ha of remnant vegetation on the 'Wongan Hills'. The actual hills have been listed on the Register of the National Estate since 1978.

The Wongan Hills include a large number of endemic species and are internationally known as an area of high flora conservation value. To date, vegetation surveys by the WA Naturalists Club and consultants employed by CALM have concentrated on the hills themselves. Coates (1988) located 12 gazetted rare flora and an additional 20 geographically restricted species in the hills. Of these, 14 species are endemic to the Wongan Hills.

However, the vegetation on Reserve Nos 16418 and 18672 differs markedly from the adjoining hills area. These Reserves have seven species of gazetted rare flora of which six are restricted to the sand plain soils and not found in the hills. No vegetation surveys have been undertaken for Reserve No. 16418 and only a preliminary flora collection by the WA Herbarium (Coates 1989 Appendix 4) for reserve 18672.

In addition, the two reserves adjoin the Wongan Hills townsite and are regularly visited by local people and tourists, particularly during the spring wildflower displays. If formal bush walks or pamphlets are to be developed they must be planned and implemented in a way which protects the vegetation and rare flora.

The vegetation survey is essential to:

a. better document the conservation values of the reserves;

b. complete vegetation mapping of the Wongan Hills area initiated by Coates (1988);

c. provide information to guide detailed ground surveys for rare flora by CALM staff and volunteers from the WA Naturalists Club in the Spring of 1991;

d. provide data for management of the area; and

e. provide sufficient information to prepare nominations of significant areas for the Register of the National Estate.

2.2 Project Requirements

The objectives of this project are to:

1. map the vegetation types within remnant native vegetation on Reserves Nos 16418 and 18672;

2. locate and describe populations of rare flora on the reserves; and

3. prepare nominations of significant areas for the Register of the National Estate.

2.3 History of the Areas Surveyed

A detailed account of the history of the Wongan Hills area can be found in "The Natural History of the Wongan Hills" edited by K F Kenneally. The account refers to a letter written by James Drummond to Hooker at the Royal Botanic Gardens Kew in June 1836 describing the sand plain country north and east of the Toodyay Valley and extending for 200 miles. This description of "Guangan" would have included areas of residual sand plain occurring in the Wongan Hills District.

The flora and fauna of the Wongan Hills area has attracted a number of naturalists, botanists and ornithologists over the years. From some of the collections made new species were subsequently described for which the hills or surrounds are the type locality, for example, *Acacia orbifolia, Acacia semicircinalis, Astartea heteranthera, Caladenia drummondii, Eremophila sargentii, Stylidium coroniforme* and *Phebalium brachycalyx* (Kenneally 1977).

The red clay soils and their associated woodlands around the hills attracted first the pastoralists then the agriculturalists. As early as the 1920s concern was being expressed at the diminishing flora in and around the Wongan Hills but even so, over the following years, large areas were cleared for agriculture.

a) Agricultural Experimental Farm Reserve 18672

Reserve No. 18672 was gazetted on 18 June 1924 for the purpose of "experimental farm" and vested in the Minister for Agriculture. The current vesting (4 August 1989) is with the Chief Executive Officer of the Department of Agriculture. The original area of 6 682 hectares has now been reduced to 6 186 hectares. The farm has been extensively cleared with approximately 620 hectares remaining in a block in the western section.

In the Report of the Conservation through Reserves Committee to the Environmental Protection Authority (1974), the Committee recommended that: "The Department of Agriculture be approached with a view to obtaining the release of portions of Reserve No. 18672 Experimental Farm still in their natural state for addition to Reserve No. A 25808 (Elphin Reserve). This recommendation was approved by Cabinet in 1976.

b) Wongan Hills Water Reserve No. 16418

Reserve No. 16418 was gazetted on 5 April 1957 for the purpose of "Water Railway Supply" and vested in the minister for water resources. The area had previously been utilised by the then Department of Public Works. The original area was 2 584 hectares which has gradually been reduced to the present area of 971.6 hectares.

2.4 Physical Environment

a) Climate

The area has a typical wheatbelt climate with hot dry summers and mild wet winters. Rainfall recorded at the Wongan Hills Experimental Farm (referred to as the Research Station) between 1937 and 1990 gives a mean annual rainfall of 352 mm. Most of the rain falls in winter from May to August with occasional thunderstorms in summer.

Mean maximum and minimum temperatures for each season taken from data recorded at the Wongan Hills Research Station are as follows:

	Maximum	**Minimum**
Autumn (March to May)	25.4°C	13.0°C
Winter (June to August)	16.6°C	6.7°C
Spring (September to November)	23.9°C	9.8°C
Summer (December to February)	32.9°C	16.7°C

(Bureau of Meteorology, 1991)

The mean annual 900H recording of relative humidity is 69%, with the highest recordings in July (88%) and the lowest in January (51%).

This type of regime with wet winters and dry summers is known as a Mediterranean climate and Beard (1979) classifies this area with its 7 dry months as Dry Warm Mediterranean following the classification system of Bagnouls and Gaussen (1957).

b) Geology and soils

The Wongan Hills District is underlain by the Archaean rocks of the Darling Plateau which are part of the Yilgarn Block, a stable nucleus composed mainly of granite and gneisses with some altered volcanics and sediments known as "greenstone belts" (Carter and Lipple 1982). The granite and gneiss form gently undulating country with few topographic features. Granite domes and tors are not common in the general area but are confined to a few specific localities (Beard 1979) principally around and to the east of the Wongan Hills townsite including the southern section of the Water Reserve No. 16418.

An extensive cover of laterite soil developed on the plateau probably during the late cretaceous and tertiary. This tertiary duricrust is now eroded but is still preserved along drainage divides and is bounded in places by breakaways and scarp slopes (Chin 1986).

At one time the Darling Plateau was capped by an undulating sand plain (now largely eroded) overlying the tertiary duricrust. This sand plain is now extensively reworked so that the sand veneer is much thinner on the top of the hills than on the flanks where it accumulates as colluvial deposits. The sand is derived by degradation of the underlying duricrust and has not been transported far (Chin 1986).

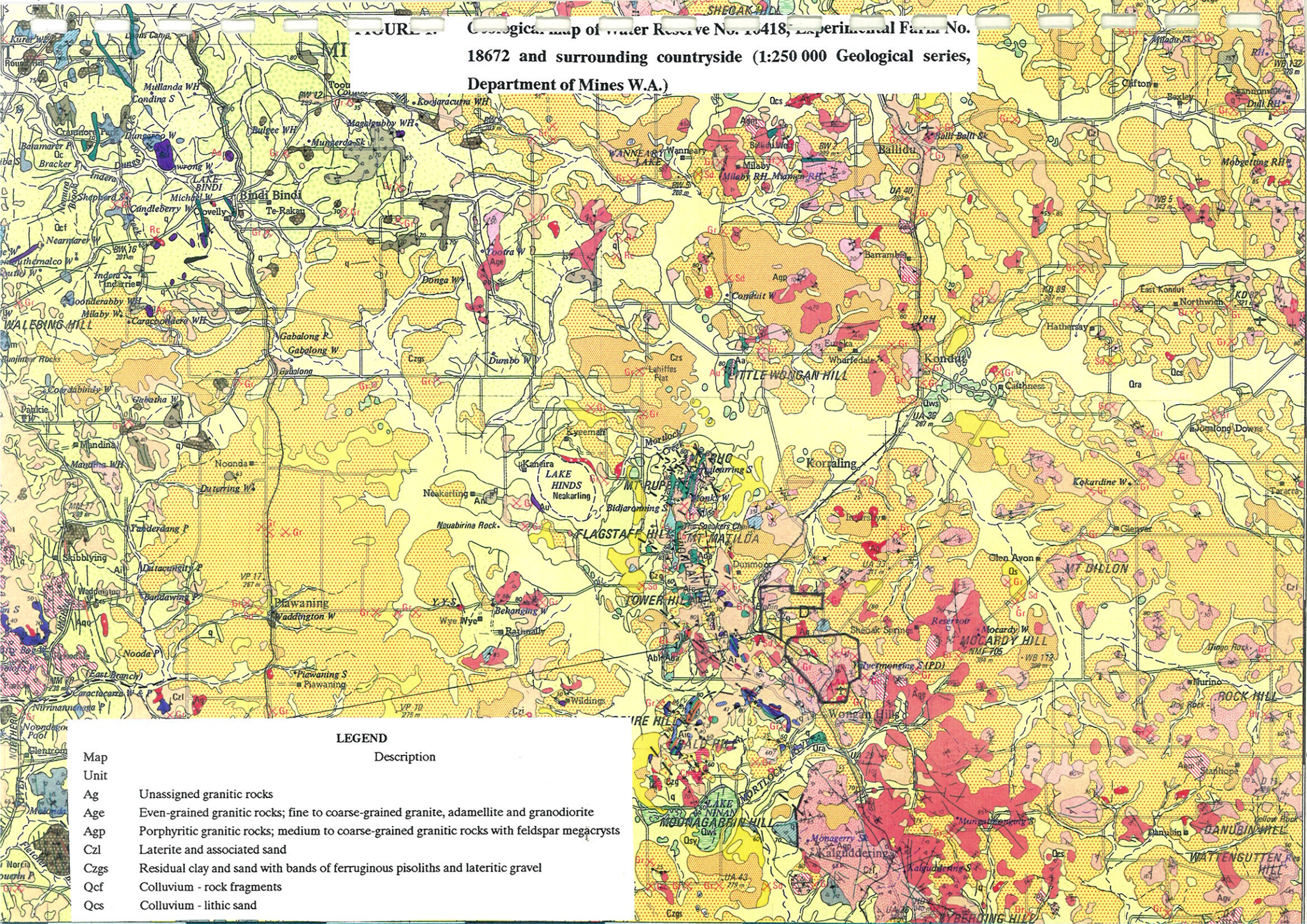
Except locally where granite resistant to weathering approaches the surface or forms outcrops the country rock is deeply weathered and covered with a thick overburden of kaolinised material known as the "pallid zone" which is capped either by soil or massive laterite, ironstone gravel and sand (Beard 1979).

Figure 1 has been taken from the Moora grid square of the 1:250 000 Geological Survey series. Table 1 provides descriptions of the map units covering the water reserve and remnant vegetation on the experimental farm.

Table 1: A Description of the geological map units covering Reserves 18672 and 16418. 1:250 000 Geological series, Department of Mines W.A.

Map Unit	Description
Ag	Unassigned granitic rocks
Age	Even-grained granitic rocks; fine to coarse-grained granite, adamellite and granodiorite
Agp	Porphyritic granitic rocks; medium to coarse-grained granitic rocks with feldspar megacrysts
Czl	Laterite and associated sand
Czgs	Residual clay and sand with bands of ferruginous pisoliths and lateritic gravel
Qcf	Colluvium - rock fragments
Qcs	Colluvium - lithic sand

FIGURE 1. Geological map of Water Reserve No. 10418, Experimental Farm No. 18672 and surrounding countryside (1:250 000 Geological series, Department of Mines W.A.)



The southern section of the bushland remaining on the experimental farm is covered by map units Czgs and Qcs, the eastern section by map unit Czgs, the northern section adjacent to the western boundary by Agp and the central area by Czl. The southern section of the water reserve is covered by map units Agp and Age with areas in the northern section covered by units Czl and Czgs. Qcf covers a small area adjacent to the railway line.

The soils of the Darling Plateau are considerably varied with gravel and ironstone on uplands. Yellow earths appear in residual sand plains on higher ground and in patches of aeolian sand plain which occur in the valleys. Hard-setting loamy soils are characteristic of the lower slopes under eucalypt woodlands and saline soils are found in the depressions (Beard 1979).

The soils of the Wongan Hills district are included in sheet 5 of the Atlas of Australian Soils (Northcote *et al*, 1967). The landscape/map units covering the reserves are listed below. The block of bushland remaining on Reserve No. 18672 is covered by map unit Ms10 and Reserve No. 16418 by map units Ms10 (northern section) and Ub98 (southern section).

Ms10 Gently sloping to gently undulating plateau areas or uplands with long and very gentle slopes and, in places abrupt erosional scarps: chief soils on depositional slopes are sandy, acidic, and neutral yellow earths (Gn 2.21, Gn 2.22, Gn 2.25 and Gn 2.35) and yellow earthy sands (Uc 5.22), all containing some ironstone gravels or underlain by indurated ironstone gravel pans. Associated on erosional ridges and slopes are (Uc 2.12), (Uc 2.21), and (Uc 4.11) soils all containing some ironstone gravels and underlain by indurated ironstone gravel pans or hardened mottled-zone materials.

Ub98 Hilly with granitic and gneissic rock outcrops: chief soils are hard neutral yellow mottled soils (Dy 3.42). Small areas of other soils are likely.

The Department of Agriculture has recently completed a soil survey of the Experimental Farm. This survey has not been published but information relating to the block of uncleared bushland has been made available. Figure 2 (back folder) shows the portion of the soil map covering the remnant vegetation and Appendix 3 presents descriptions of the soil types and associations mapped.

The uncleared land was surveyed at a scale of 1:25 000 by free survey method, using a site observation density of one observation per 7 hectares. Soils of the Yaling series generally have textures of gravelly sand to clayey sand. The soil type gravelly loam

(Ylg) usually has a ferruginous hardpan at a depth of 40 cm. The Wongan series is divided into two types although intergrades between the two soil types is common.

Wls deep yellowish-brown clayey sand to sandy loam with firm to hard setting surface conditions

Ws light yellowish-brown to yellow sand to clayey sand with soft to loose surface conditions.

Elphin series soils are loamy sand to sand over gravel at various depths. The gravel content of these soils is highly variable and transitions between Elphin and Yaling series are common.

Soils in the Mocardy series are generally pale coloured gritty sands to clayey sands overlying a massive sandy clay subsoil. Fine textured soils include soil type 10, a shallow duplex soil with massive or coarse structured subsoils, Soil type 7 which is associated with basic parent materials and Soil type 8, shallow to moderately deep, gritty red-brown to brown sands associated with granite outcrops. Soil unit A soils are loamy sand to clayey sand grading into sandy loam to sandy clay at depth.

2.5 Location and Physical Features of the Areas Surveyed

a) Remnant Vegetation on Reserve No. 18672

The remnant bushland on the experimental farm is situated approximately 3.75 kilometres north west of the townsite of Wongan Hills. Approximately 620 hectares of bush remains in the block which is irregular in shape (see Figure 4). The reserve is situated in the Shire of Wongan-Ballidu. Cadastral and topographical information for the area is available from the Department of Land Administration lithographs including 1:25 000 Wongan Hills NE 2236-111 (cadastral) and 1:100 000 Wongan 2236 (topographical, see Figure 3).

The lowest point on the block of remnant bushland is in the north eastern section at 300 metres above sea level. This area is covered by sandy soils and drainage lines. The block grades to 320 metres in the southern section which consists mainly of residual laterite and a small breakaway. Areas of granite pavements and small outcrops are present in the block with the largest area adjacent to the western boundary.

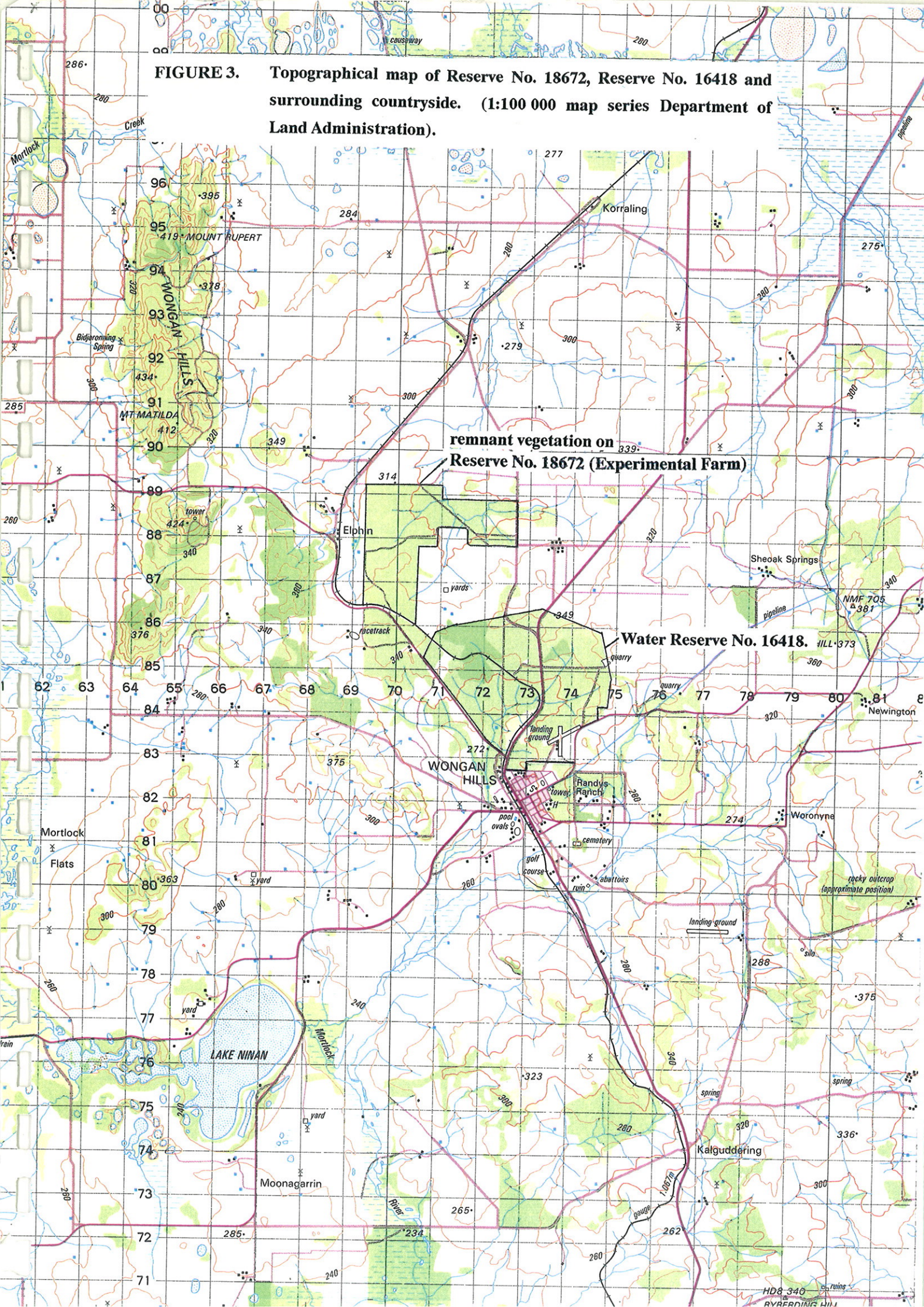
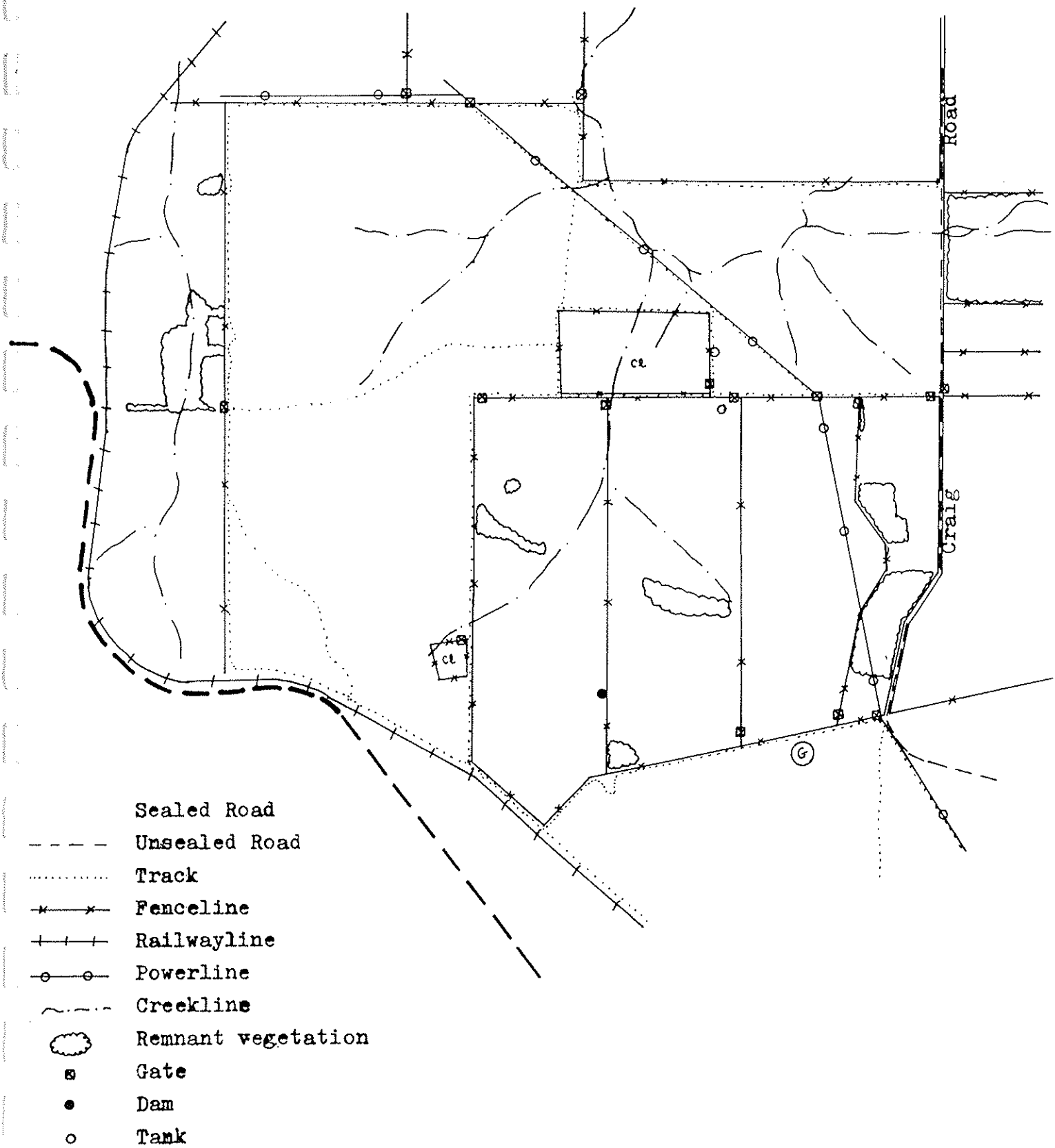


FIGURE 3. **Topographical map of Reserve No. 18672, Reserve No. 16418 and surrounding countryside. (1:100 000 map series Department of Land Administration).**

FIGURE 4. **Human Usage Plan for area covered by remnant vegetation on Reserve No. 18672.**



There is good access to sections of the remnant bushland. Tracks are situated on the perimeter and through central areas (Figure 4). Craig Road runs along part of the eastern boundary and the railway line runs along the southern boundary.

b) Water Reserve No. 16418

Reserve No. 16418 is situated in the Shire of Wongan-Ballidu, adjacent to the Wongan Hills townsite, and covers an area of 971.6 hectares. Cadastral and topographical information for the area covered by the reserves include the following Department of Land Administration lithographs: 1:100 000 Wongan 2336 (topographical, see figure 3) and 1:25 000 Wongan Hills NE 2236-111, 1:10 000 57/80, 1:2 000 2423 (cadastral).

The reserve slopes from a high point of 349 metres above sea level in the northern section to 300 metres in the south eastern section. This gradual slope includes high areas of residual laterite to low areas of granite and associated soils with heavier soils in the south west section.

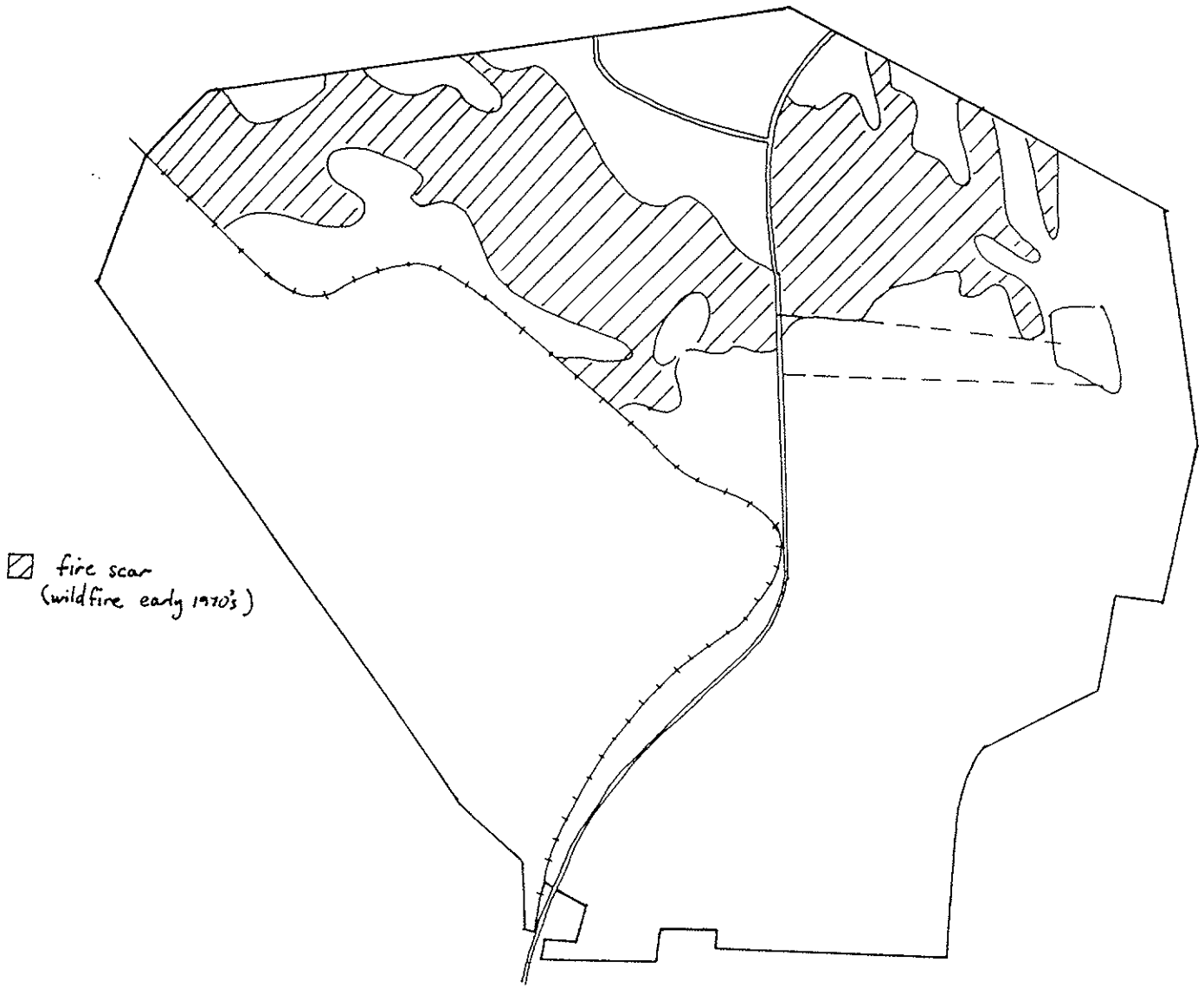
There is good access to all sections of the reserve with peripheral and central tracks. The Wongan-Ballidu Road passes through the centre of the reserve and the railway line passes through the western section. Numerous services also traverse the area including powerlines, water pipe lines and Telecom cables. Two large gravel pits and seven smaller gravel or sand pits are also situated on the reserve. These pits appear to be no longer in use. The airfield is adjacent to the south eastern corner of the area and a water supply dam is situated near the south western boundary. Tourists also visit the area and a nature walk has been developed to Christmas Rock. An area east of the dam has been previously cleared.

2.6 Fire History of the Areas Surveyed

There is no evidence of recent fire in the remnant vegetation on Reserve No. 18672. Part of the northern section of Water Reserve No. 16418 was burnt in the early 1970s. The fire is reported to have started near the gravel pit in the north eastern section and spread in a westerly direction. Figure 5 indicates the approximate boundaries of the fire scar.

Control burns have been carried out in salmon gum and York gum woodland near the water supply dam.

FIGURE 5. Fire History of Water Reserve No. 16418.



3.0 METHOD

The ground survey of the vegetation and flora of Water Reserve No. 16418 and Experimental Farm No. 18672 was carried out during September 1991

General vegetation divisions were noted using colour aerial photography at a scale of 1:25 000. Areas of interest thus delineated were examined in the field and the vegetation and soils at selected sites described. Because of time limitations some areas were not covered in detail in the ground survey and mapping was carried out by extrapolation of known vegetation associations using aerial photographs.

Vegetation association descriptions were based on the classification system devised by Muir (1977) which was specifically designed for describing wheatbelt vegetation (Table 2).

Voucher specimens of most plant species encountered were collected and identified using keys and by comparison with specimens at the Western Australian Herbarium. Experts involved in revising particular genera were consulted wherever possible to ensure accuracy with identification.

TABLE 2 - MUIR SYSTEM OF VEGETATION CLASSIFICATION

LIFE FORM/HEIGHT CLASS	CANOPY COVER			
	DENSE 70 - 100%	MID DENSE 30 - 70%	SPARSE 10 - 30%	VERY SPARSE 2 - 10%
T Trees > 30 metres M Trees 15 - 30 metres LA Trees 5 - 15 metres LB Trees < 5 metres	Dense Tall Forest Dense Forest Dense Low Forest A Dense Low Forest B	Tall Forest Forest Low Forest A Low Forest B	Tall Woodland Woodland Low Woodland A Low Woodland B	Open Tall Woodland Open Woodland Open Low Woodland A Open Low Woodland B
KT Mallee tree form KS Mallee shrub form	Dense Tree Mallee Dense Shrub Mallee	Tree Mallee Shrub Mallee	Open Tree Mallee Open Shrub Mallee	Very Open Tree Mallee Very Open Shrub Mallee
S Shrubs > 2 metres SA Shrubs 1.5 - 2.0 metres SB Shrubs 1.0 - 1.5 metres SC Shrubs 0.5 - 1.0 metres SD Shrubs 0.0 - 0.5 metres	Dense Thicket Dense Heath A Dense Heath B Dense Low Heath C Dense Low Heath D	Thicket Heath A Heath B Low Heath C Low Heath D	Scrub Low Scrub A Low Scrub B Dwarf Scrub C Dwarf Scrub D	Open Scrub Open Low Scrub A Open Low Scrub B Open Dwarf Scrub C Open Dwarf Scrub D
P Mat plants H Hummock Grass GT Bunch grass > 0.5 metres GL Bunch grass < 0.5 metres J Herbaceous spp.	Dense Mat Plants Dense Hummock Grass Dense Tall Grass Dense Low Grass Dense Herbs	Mat Plants Mid Dense Hummock Grass Tall Grass Low Grass Herbs	Open Mat Plants Hummock Grass Open Tall Grass Open Low Grass Open Herbs	Very Open Mat Plants Open Hummock Grass Very Open Tall Grass Very Open Low Grass Very Open Herbs
VT Sedges > 0.5 metres VL Sedges < 0.5 metres	Dense Tall Sedges Dense Low Sedges	Tall Sedges Low Sedges	Open Tall Sedges Open Low Sedges	Very Open Tall Sedges Very Open Low Sedges
X Ferns, Mosses, Liverwort	Dense Ferns Dense Mosses	Ferns Mosses	Open Ferns Open Mosses	Very Open Ferns Very Open Mosses

4.0 VEGETATION SURVEY

4.1 Previous Surveys

The remnant vegetation on Reserve No. 18672 and the Water Reserve No. 16418 is situated within the Guangan Vegetation system which is a subdivision of the Avon botanical district. This system is the classical Guangan of James Drummond and is named with his original spelling (Beard 1979). Beard (1976) has discussed the various spellings of the word "Guangan" in the literature and suggests that it should be standardised under the spelling "kwongan" as a term for the south western Australian sandplains and their shrubland vegetation.

The area covered by the Guangan Vegetation System consists mainly of residual sand plain underlain by granite. The sand plain is dominated by outcropping granite domes. The valleys are saline and occupied by salt lakes. Beard (1979) describes the intricate mosaic formed by the vegetation types which are not in the usual catenary sequence but linked to the intricate pattern of soil types. The residual sand plain is described as broadly *Allocasuarina* thicket with emergent mallee, with mallee becoming more prominent on duplex soils of sand over clay. Woodland of *Eucalyptus loxophleba, Eucalyptus salmonophloia* and *Eucalyptus salubris* are found on patches of red loam with thickets of *Melaleuca uncinata* and other *Melaleuca* species with scattered *Eucalyptus* also occurring.

Beard describes the uncleared land on the Experimental Farm and Water Reserve as follows:

> The areas are "the only substantial remnant of natural vegetation in the Guangan System. The vegetation is best described as *Casuarina campestris* Thicket with patches of heath, floristically as thicket with elements of the Banksia-Xylomelum alliance..... The soil is a yellow sand overlying ironstone gravel. When long unburnt the bush thickens to 3 metres in height, dense, with the *Casuarinas* dominant..... *Eucalyptus loxophleba* and *Eucalyptus salmonophloia* are present in the valley close to the town, with mallee higher up the slope. Granite outcrops occur with *Casuarina huegeliana, Acacia acuminata, Verticordia preissii* and *Waitzia aurea.*"

The remnant vegetation on both reserves is situated within the Moora and Hill river Grid square mapped by Beard (1979) at a scale of 1:250 000. The map unit covering the remnant vegetation on the Experimental Farm and the northern section of the water reserve is "Mallee and Casuarina Thicket" (ecSc). The water reserve is also covered by the map units $e8^{6}$Mi, York gum and salmon gum (south west corner) and areas of rock outcrops.

In October 1984 and 1985 field work was carried out by staff from the WA Herbarium to collect plant specimens from the block of bushland remaining on the Wongan Hills Experimental Farm. The consultancy report summarising the information obtained is presented in Appendix 4. Site descriptions for plant collections include some vegetation descriptions based on the classification system of Spect.

4.2 Current Survey

In the present survey the vegetation of the Water Reserve No. 16418 and the block of remnant bushland on the Experimental Farm No. 18672 is analysed in more detail. The plant communities form the intricate mosaic typical of wheatbelt vegetation. The changes in vegetation are linked to topography, pedological and/or geological features.

Plant communities are primarily divided into formations based on the following formation definitions by Muir (1977):

> "**Woodlands** are those formations in which the dominant life-form of the upper stratum is trees, the total canopy cover of which is greater than 2%.
>
> **Mallee** formations are those in which the dominant life-form of the upper stratum is shrub-form or tree-form mallees the total canopy cover of which is greater than 2%.
>
> **Shrublands** are formations where the upper stratum is dominated by shrub life-form and the top of that stratum exceeds 2 metres from the ground and has a total canopy cover exceeding 2%.
>
> **Heaths** are formations where the upper stratum is dominated by the shrub life-form and the top of that stratum does not exceed 2 metres from the ground and has a total canopy cover exceeding 2%.

> **Lithic complexes** are mosaics of cryptogams, shrubs, sedges, trees and other life-forms the nature and distribution of which is directly affected by its proximity to granitic or other rock exposures. The term includes all the species growing in crevices or soil filled depressions and all the annual species occupying rock pools. The term is used where the scale of work is not large enough to map the various component formations of the lithic complex.
>
> **Salt complexes** are those physiognomic groups and species associated with saline sources such as salt pans, lakes and streams or any other place where halophytes are prominent and associated with visible signs of vegetation changes or soil changes resulting from salt accumulation."

The vegetation was then further divided into species associations within these groupings. Table 3 and Table 4 list the vegetation associations described and mapped in this study. The vegetation maps of the Water Reserve and the remnant vegetation on the Experimental Farm are presented in Figures 6 and 7 and Muir descriptions for the vegetation found at selected sites marked on the maps are listed in Appendix 2. A preliminary species list for each vegetation type is presented in Appendix 5 based on data collected at sites selected for vegetation descriptions.

VEGETATION MAP

Stereo pairs of colour aerial photos at a scale of 1:25 000 (1989) were used for mapping the vegetation of the Water Reserve No. 18672 and remnant bushland on Reserve No. 16418. Enlargements to a scale of 1:6 000 were used as a base for the final vegetation maps to compliment maps of the vegetation in the hills and Elphin Nature Reserve No. A25080 (Coates 1988).

The symbol "K" has been used as a map unit indicating Kwongan vegetation, with "M" indicating areas of Mallee and "W" areas of Woodland. Beard (1979) has included areas of *Melaleuca coronicarpa* as kwongan however these areas are mapped as mallee in the present report following the definition by Muir. Areas of this association where mallee is very sparse or scattered cannot be differentiated on the aerial photographs from areas where mallee becomes more prominent. Although the mallee stratum is patchy and discontinuous the association has therefore been mapped as a mallee formation overall. It should be noted that areas where the mallee are scattered or very sparse are usually on breakaway slopes.

Site numbers with the prefix E are situated on the Experimental Farm and those with the prefix W on the Water Reserve.

VEGETATION OF WATER RESERVE NO. 16418

The vegetation associations on the Water Reserve form an intricate mosaic which is linked to the complex variation in soils, topography and underlying rock formations. Areas of residual laterite (or uplands) with abrupt erosional scarps in places cover the northern section with duplex soils on lower slopes and heavy loam soils in the valley area south. Granite outcrops and associated soils are also common in the southern section of the reserve.

The summits and slopes of areas of residual laterite are covered by *Dryandra/Petrophile shuttleworthiana* Thicket (Kdt). This association is similar to areas of Mallee over *Petrophile shuttleworthiana/Allocasuarina campestris* Thicket which is extensive in the hills area (Coates 1988). Both these associations include areas of scattered shrub mallee with *Dryandra* species prominent. *Dryandra* Low Heath (Kdh) also covers summits and areas near erosional scarps growing in gravelly soils over ironstone. Areas of *Dryandra* Low Heath were burnt in the early 1970's and are probably equivalent to areas of *Dryandra/Petrophile shuttleworthiana* Thicket regenerating after fire. Scrub Heath (Kh) is found on the depositional slopes back from the summits on deeper gravelly soils with ironstone in places. *Actinostrobus arenarius* is a characteristic species. The association of Dense Mixed Heath described for Elphin Nature Reserve (Coates 1988) can be included as part of the Scrub Heath association.

Below the uplands of residual laterite on duplex soils of sand over clay, mallee associations become more prominent including Mallee over *Melaleuca uncinata* (broombush) Thicket (Mm) and Mallee over *Melaleuca coronicarpa* Heath (Mc). In some areas especially on escarpment slopes *Melaleuca coronicarpa* becomes dominant with the shrub mallee occurring only as scattered individuals. Interspersed amongst the mallee associations are areas of *Melaleuca scabra* Thicket (Kc) on gravelly surface soils and *Melaleuca* Thicket (Km) covering small areas.

Allocasuarina campestris Thicket (Kt) is mainly associated with granite but also covers areas of gravelly sand. On deeper sandy soils over gravel *Allocasuarina campestris* is jointed by *Hakea erecta* (Ky) with an understorey of *Ecdeiocolea monostachya* in places. The gazetted rare plant *Conostylis wonganensis* is found in this vegetation type and in the Sedges/Heath (Ks) association which also occurs on sandy soils over gravel. The association mapped as Sedges on Elphin Nature Reserve has been broadened to include areas where shrub species also become prominent to form the Sedges/Heath association. Characteristic species include *Ecdeiocolea monostachya,*

Melaleuca aff. *cordata, Mesomelaena preissii* and *Melaleuca conothamnoides. Allocasuarina campestris* Thicket is often interspersed.

Low lying areas in the valley near the townsite with loam and clay loam soils support *Eucalyptus salmonophloia* (salmon gum) Woodland (Ws). *Eucalyptus loxophleba* (York gum) Low Forest (Wl) also covers extensive areas of red brown loam soils in these areas with granite pavement in places. *Acacia acuminata* (jam) commonly forms an understorey (Wla) but is replaced by *Melaleuca* species in drainage lines. *Acacia acuminata* becomes dominant in loam soils adjacent to granite.

The complex pattern of vegetation associations found on the Water Reserve also includes a small area of *Eucalyptus wandoo* (white gum) Low Woodland (Ww) and small areas of the kwongan associations *Beaufortia* Heath (Kb), *Eremaea* Heath (Ke) and *Melaleuca sclerophylla* Low Heath (Kl). *Beaufortia* Heath occurs on gravelly soils with characteristic species include *Beaufortia interstans, Beaufortia squarrosa, Verticordia monadelpha* and *Verticordia venusta. Eremaea pauciflora* becomes prominent on deep grey sandy soils and *Melaleuca sclerophylla* becomes prominent over short distances on clayey sand with rock fragments, often on slopes.

Areas of granite have a characteristic flora with mosses and lichens on the bare rock and *Borya sphaerocephala* forming a mat on flatter areas with shallow soils. Shrubs, ferns, herbs, sedges and grasses are scattered or occur in patches on shallow soil pockets. Commonly occurring species include *Calytrix depressa, Verticordia chrysanthella, Thryptomene australis, Spartochloa scirpoidea, Ecdeiocolea monostachya, Melaleuca fulgens* and *Melaleuca radula. Allocasuarina campestris* Thicket occurs in the deeper soils bordering the rocks with areas of *Hakea petiolaris, Acacia lasiocalyx* and *Allocasuarina huegeliana* in deeper soils receiving run-off at the base of Christmas Rock, a larger outcrop. Small areas of Open Scrub over Herbs/Sedges (Ku) with *Acacia acuminata, Allocasuarina campestris* and *Melaleuca uncinata* over an understorey with *Borya sphaerocephala, Loxocarya aspera* and *Lepidobolus* species prominent also occurs in shallow soils in association with granite.

VEGETATION OF REMNANT BUSHLAND ON EXPERIMENTAL FARM NO. 18672

The vegetation associations on the Experimental Farm are not in catenary sequence but form an intricate mosaic which is linked to the complex soil mix, topography and underlying rock formations in the remnant bushland block.

Only small areas of residual laterite with gravelly soils over ironstone remain in the area and these support *Dryandra/Petrophile shuttleworthiana* Thicket (Kdt) with a small patch of Scrub Heath (Kh) in the south east corner growing in deeper gravelly soils. Duplex soils of sand and sandy loam over clay are extensive and are dominated by mallee associations including Mallee over *Melaleuca uncinata* Thicket (Mm) and Mallee over *Melaleuca coronicarpa* Heath (Mc). *Melaleuca* Thicket (Km) is also found interspersed within the mallee associations often on poorly drained soils and along streamlines. *Melaleuca uncinata* is usually dominant but *Melaleuca hamulosa, Melaleuca adnata, Melaleuca lateriflora* and *Melaleuca undulata* are also characteristic species. Also interspersed within the mallee areas on gravelly surface soils is *Melaleuca scabra* Heath (Kc). This association is very variable and patchy with *Melaleuca conothamnoides* or *Melaleuca sclerophylla* prominent as understorey species in places.

Areas of clayey sand to clay loam soils over clay (Soil Type 7) support *Eucalyptus salmonophloia* (salmon gum)/*Eucalyptus salubris* (Gimlet) Woodland (Wsg) with small areas of Mallee over *Melaleuca* (Me) in adjacent areas where rock fragments are numerous. Understorey species in the Mallee over *Melaleuca* association include *Callitris canescens, Melaleuca uncinata* and *Melaleuca coronicarpa.*

Allocasuarina campestris (Kt) is extensive and covers soils associated with granite (Soil Type 8), Elphin series soils, Yaling gravelly loam and Mocardy sand. *Calothamnus aspera/Allocasuarina campestris* Thicket (Ka) covers a small area growing in sandy clay soils with rock outcrops in places. This vegetation type is extensive in the hills area where it is very variable ranging from Thicket to a more open formation. *Allocasuarina campestris* is also joined by *Hakea meisneriana* (Kg) on Elphin series (hard pan phase) soils.

On deeper sandy soils over gravel in places Sedges/Heath (Ks) is found. The gazetted rare plant *Conostylis wonganensis* occurs within this association. *Nuytsia floribunda* over Low Heath (Kn) is also found on sandy soils including some spillway sands and Mocardy sand which has a massive sandy clay sub soil and is imperfectly drained. The gazetted rare plants *Gastrolobium glaucum* and *Gastrolobium hamulosum* occur in these two vegetation associations and also in open areas amongst the *Allocasuarina campestris* Thicket in the north east section.

Other associations covering only small areas include *Allocasuarina acutivalvis* Thicket (Kv) on sandy soils with gravel, often covering areas too small to map. *Eucalyptus wandoo* (white gum) Low Woodland (Ww) covers an area of sandy loam on the northern boundary and *Eucalyptus loxophleba* (York gum) Low Forest (Wl) a small area of red brown loam. A salt affected area in the north of the block has been mapped as Samphire (S).

Small granite outcrops occur in the block of remnant bushland and are surrounded by *Allocasuarina campestris* Thicket growing in the deeper border soils. The bare rocks are covered with mosses and lichens with *Borya sphaerocephala* and *Borya laciniata* forming a mat on shallow soils on flat surfaces. Shallow soils receiving run-off support shrubs, herbs, sedges and ferns including *Calytrix depressa* and *Verticordia chrysanthella.*

TABLE 3 - VEGETATION ASSOCIATIONS OF THE REMNANT BUSHLAND ON EXPERIMENTAL FARM No. 18672

	Map Unit
Woodland Formations	
Eucalyptus salmonophloia (salmon gum)/*Eucalyptus salubris* (gimlet) Woodland	Wsg
Eucalyptus wandoo (white gum) Low Woodland	Ww
Eucalyptus loxophleba (York gum) Low Forest	Wl
Mallee Formations	
Mallee over *Melaleuca uncinata* (broombush) Thicket	Mm
Mallee over *Melaleuca coronicarpa* Heath	Mc
Mallee over *Melaleuca*	Me
Shrubland and Heath Formations	
Dryandra/Petrophile shuttleworthiana Thicket	Kdt
Scrub Heath	Kh
Allocasuarina campestris Thicket	Kt
Allocasuarina campestris/Calothamnus aspera Thicket	Ka
Allocasuarina campestris/Hakea meisneriana Thicket	Kg
Allocasuarina acutivalvis Thicket	Kv
Melaleuca Thicket	Km
Melaleuca scabra Heath	Kc
Sedges/Heath	Ks
Nuytsia floribunda over Low Heath	Kn
Lithic Complex	
Granite rock - Herbs, Shrublands	G
Salt Complex	
Samphire	S

TABLE 4 - VEGETATION ASSOCIATIONS OF WATER RESERVE No. 16418

Woodland Formations	
Eucalyptus salmonophloia (salmon gum) Woodland	Ws
Eucalyptus salmonophloia (salmon gum)/*Eucalyptus salubris* (gimlet) Woodland	Wsg
Eucalyptus wandoo (white gum) Low Woodland	Ww
Eucalyptus loxophleba (York gum) Low Forest	Wl
Eucalyptus loxophleba (York gum) Low Forest over *Acacia acuminata* (jam)	Wla
Acacia acuminata Low Forest	Wa
Mallee Formations	
Mallee over *Melaleuca uncinata* (broombush) Thicket	Mm
Mallee over *Melaleuca coronicarpa* Heath	Mc
Shrubland and Heath Formations	
Dryandra/Petrophile shuttleworthiana Thicket	Kdt
Dryandra Low Heath	Kdh
Scrub Heath	Kh
Allocasuarina campestris Thicket	Kt
Allocasuarina campestris/Hakea erecta Heath (unburnt)	Ky1
Allocasuarina campestris/Hakea erecta Heath (burnt)	Ky2
Melaleuca Thicket	Km
Melaleuca scabra Heath	Kc
Melaleuca sclerophylla Low Heath	Kl
Eremaea Heath	Ke
Beaufortia Heath	Kb
Sedges/Heath	Ks
Open Scrub over Herbs/Sedges	Ku
Lithic Complex	
Granite, Herbs, Shrublands	G

WOODLAND FORMATIONS

Ws ***Eucalyptus salmonophloia*** **(salmon gum) Woodland**

Diagnosis Woodland (Forest) over variable understorey including *Eucalyptus loxophleba* Open Low Woodland A to Low Forest A or Open Scrub to Thicket and/or over Low Heath C/Dwarf Scrub C over Herbs in places.

Sites W38, W41, W48, W55, W57

Description

Stratum 1 Woodland, occasionally Forest or rarely Open Woodland, of *Eucalyptus salmonophloia* 12 to 25 metres.

Stratum 2 In some areas Open Low Woodland A to Low Forest A of *Eucalyptus loxophleba* to 10 metres forms a lower stratum.

Stratum 3 Open Scrub to Scrub of mixed shrub species or Open Scrub to Thicket, rarely Dense Thicket, of *Melaleuca* species to 3 metres in places. Stratum 3 species include *Acacia ligustrina, Acacia acuminata, Acacia aestivalis, Dodonaea inaequifolia, Melaleuca acuminata, Melaleuca adnata, Melaleuca coronicarpa, Melaleuca uncinata, Melaleuca undulata* and *Santalum acuminatum.*

Lower Stratum Low Heath C to Dwarf Scrub C in some areas, with herbaceous species prominent in spring. Lower stratum species include *Acacia erinacea, Acacia orbifolia, Arthropodium capillipes, Avena* sp., *Cephalipterum drummondii, Dianella revoluta, Enchylaena lanata, Erymophyllum tenellum, *Ehrharta calycina, Hyalosperma glutinosum, Podolepis lessonii, Rhagodia drummondii, Rhagodia preissii, Templetonia sulcata, Trachymene cyanopetala* and *Trachymene ornata.*

Comments

Eucalyptus salmonophloia (salmon gum) Woodland is found on the Water Reserve No. 16418 growing in heavy loam soils in the low lying portion of the landscape. In some areas the woodland has been disturbed leaving open areas in the understorey. Regular control burns have been carried out near the dam and the Wongan Hills-Ballidu Road.

Photograph 1: *Eucalyptus salmonophloia* Woodland on the Water Reserve

Wsg ***Eucalyptus salmonophloia*** **(salmon gum)/*Eucalyptus salubris*** **(gimlet) Woodland**

Diagnosis

Woodland over Shrub Mallee/Open Shrub Mallee in places or over Open Scrub/Scrub over Open Dwarf Scrub C to Low Heath C over Herbs/Low Heath D in places.

Sites

E5, E8, E23, E25, W42

Description

Stratum 1

Woodland, occasionally Forest, or Low Woodland A/Open Low Woodland A at the edges of the association. *Eucalyptus salmonophloia* and *Eucalyptus salubris*, 15 to 25 metres, are dominant. On the Water Reserve *Eucalyptus salubris* forms a lower stratum of Low Woodland A/Low Forest A.

Stratum 2

Shrub Mallee/Open Shrub Mallee (to 8 metres) in some areas. Mallee species include *Eucalyptus arachnaea, Eucalyptus celastroides, Eucalyptus loxophleba, Eucalyptus plauricaulis, Eucalyptus semivestita* and *Eucalyptus sheathiana.*

Stratum 3

Open Scrub (Open Low Scrub A) to Scrub of mixed shrub species form a patchy lower stratum in most places with occasional areas of *Melaleuca* Thicket. Stratum 3 species include *Acacia acuminata, Acacia ligustrina, Melaleuca acuminata, Melaleuca adnata, Melaleuca coronicarpa* and *Santalum acuminatum. Melaleuca acuminata* Thicket is often found on the edge of the association.

Stratum 4

Low Heath C to Open Dwarf Scrub C in some areas. Stratum 4 species include *Acacia dura, Acacia jacksonii, Acacia orbifolia, Grevillea huegelii, Rhagodia drummondii, Rhagodia preissii* and *Templetonia sulcata.*

Stratum 5

Herbs/Low Heath D in some areas. Lower stratum species include *Acacia erinacea, Chamaescilla corymbosa, Helipterum lindleyi, Hyalosperma glutinosum, Olearia muelleri, Podotheca gnaphalioides, Senecio glomeratus, Trachymene cyanopetala, Trachymene ornata and Wilsonia humilis.*

Comments

Eucalyptus salmonophloia (salmon gum), *Eucalyptus salubris* (gimlet) Woodland occurs on the Experimental Farm growing in soil type 7. This soil type consists of clayey sand to silty clay loam (sometimes with gravel) over clay. The association covers only a small area on the Water Reserve where *Eucalyptus salmonophloia* Woodland without gimlet is more extensive.

Photograph 2: *Eucalyptus salubris* (gimlet) and *Eucalyptus salmonophloia* (salmon gum) at site E8 on the Experimental Farm

Ww ***Eucalyptus wandoo*** **(white gum) Low Woodland**

Diagnosis Low Woodland A over Open Scrub/Thicket over Open Herbs/Herbs

Sites E37, W37

Description

Stratum 1 Low Woodland A of *Eucalyptus wandoo* to 15 metres forms a patchy stratum to Open Low Woodland A in places. Scattered trees of *Eucalyptus loxophleba* and *Acacia acuminata* were also recorded.

Stratum 2 Open Scrub (Site E37) or Thicket (Site W37) of mixed shrub species including *Acacia ?fragilis, Allocasuarina campestris, Melaleuca uncinata* and *Santalum acuminatum.*

Lower Stratum Scattered Shrubs, Open Herbs to Herbs, Open Low Grass or *Ecdeiocolea monostachya* Tall Sedges in places. Scattered shrubs or sub shrubs include *Astroloma serratifolium, Baeckea ?crispiflora, Diplolaena microcephala* and *Hibbertia rupicola.* Species of grasses include **Aira cupaniana* and **Bromus species* and herbaceous species recorded include *Angianthus tomentosus, Blennospora drummondii, Borya sphaerocephala, Caladenia flava, Caladenia roei, Cyanicula gemmata, Dianella revoluta, Helipterum verecundum, Muehlenbeckia adpressa, Podolepis canescens, Podolepis lessonii, Podotheca angustifolia, *Ursinia anthemoides, Waitzia acuminata* and *Waitzia citrina.*

Comments *Eucalyptus wandoo* covers only two small areas, one on the Experimental Farm and the other on the Water Reserve. The association occurs on sandy loam soils in low lying areas and is more extensive on Elphin Nature Reserve No. A 25808 nearby.

Photograph 3: *Eucalyptus wandoo* **(white gum) covering a small area on the Experimental Farm at site E37**

W1 ***Eucalyptus loxophleba* Low Forest**

Diagnosis Low Forest A (Tree Mallee) over *Melaleuca* Scrub/Thicket in places over Dwarf Scrub C/Dwarf Scrub D/Herbs.

Sites E29, W33, W39, W43, W60

Description

Stratum 1 Low Forest A, occasionally to Low Forest B of *Eucalyptus loxophleba* to 12 metres in height. The York gum appears to grow as Tree Mallee or Shrub Mallee in places. Scattered trees of *Eucalyptus salmonophloia* to 15 metres are present as emergents in some areas. Other occasional stratum 1 species include *Acacia acuminata, Eucalyptus arachnaea* and *Eucalyptus erythronema.*

Stratum 2 Thicket, Scrub to Open Scrub occasionally, with *Melaleuca uncinata* prominent in drainage lines. Other stratum 2 species include *Acacia ligustrina, Allocasuarina campestris, Melaleuca adnata, Melaleuca lateriflora* and *Melaleuca undulata.*

Stratum 3 In some areas scattered shrubs to 1 metre form a stratum of Open Dwarf Scrub C to Low Heath C. Commonly occurring species include *Acacia ?chrysella, Acacia leptospermoides, Astroloma serratifolium, Dodonaea viscosa, Melaleuca radula* and *Templetonia sulcata.*

Stratum 4 Open Dwarf Scrub D, Herbs/Open Herbs occasionally to Dense Herbs. Shrub species include *Acacia jacksonii, Acacia lasiocarpa* var. *bracteolata, Acacia orbifolia, Rhagodia drummondii, Rhagodia preissii* and *Verticordia acerosa* ssp. *preissii.* Herbaceous species include *Borya sphaerocephala, Chamaescilla corymbosa, Dampiera lavandulacea, Erymophyllum tenellum, Erodium cygnorum, Gnephosis tenuissima, Helichrysum lindleyi, Helipterum splendidum, Helipterum verecundum, Helipterum manglesii, Hyalosperma glutinosum, Podolepis lessonii, Trachymene cyanopetala, Trachymene ornata, Thysanotus dichotomus, Waitzia acuminata* and *Waitzia aurea.* Species of grasses recorded include **Briza maxima*, **Avena* sp. and *Spartochloa scirpoidea.*

Comments

Eucalyptus loxophleba Low Forest covers low lying areas on red-brown loam to clay loam soils with *Melaleuca* species forming an understorey in drainage lines. The association covers only a small area on the Experimental Farm mapped as soil types 7 and 8 (fine textured soils).

Photograph 4: ***Eucalyptus loxophleba*** **(York gum) at site W39**

Wla ***Eucalyptus loxophleba*** **Low Forest over** ***Acacia acuminata*** **(jam)**

Diagnosis Low Forest A (Tree Mallee) over Low Forest B over Dwarf Scrub C in places over Herbs.

Sites W40, W44, W47a, W47b, W58.

Description

Stratum 1 Low Forest A, occasionally to Low Woodland A, of *Eucalyptus loxophleba* growing as mallee in some situations. Scattered trees of *Eucalyptus salmonophloia* emergent to 20 metres are rare.

Stratum 2 Low Forest B, occasionally to Low Woodland B, of *Acacia acuminata.* Other species present as scattered individuals include *Acacia ?multispicata, Allocasuarina campestris, Allocasuarina huegeliana, Hakea preissii, Melaleuca radula* and *Santalum acuminatum.*

Stratum 3 Scattered shrubs to 1 metre occasionally form a lower stratum of Dwarf Scrub C. Shrub species include *Acacia erinacea, Astroloma serratifolium, Grevillea paniculata, Hibbertia ?rupicola, Rhagodia drummondii, Rhagodia preissii* and *Verticordia acerosa* ssp. *preissii.*

Stratum 4 Herbs to Dense Herbs form a patchy stratum with Low Grass in some areas. Species of grasses include **Aira cupaniana*, **Avena* sp., **Briza maxima*, **Bromus diandrus* and *Neurachne alopecuroidea.* Herbaceous species include **Arctotheca calendula, Arthropodium capillipes, Borya sphaerocephala, Chamaescilla corymbosa, Conostylis prolifera, Dianella revoluta, Dampiera oligophylla, Erodium cygnorum, Erymophyllum tenellum, Helichrysum lindleyi, Helipterum manglesii, Opercularia vaginata, Podolepis canescens, Podolepis capillaris, Podolepis lessonii, Ptilotus spathulata, Trachymene cyanopetala, Trachymene ornata, *Ursinia anthemoides, Waitzia acuminata, Waitzia aurea,* and *Waitzia citrina.* Also recorded were sedges including *Loxocarya aspera* and *Lepidosperma ?leptophyllum* and a fern *Chleianthes austrotenuifolia.*

Comments

Eucalyptus loxophleba Low Forest over *Acacia acuminata* covers extensive areas on low lying terrain on the Water Reserve. The association is found on red-brown loam soils with granite pavement in some areas.

Photograph 5: *Eucalyptus loxophleba* (York gum) with an understorey of *Acacia acuminata* (jam) at site W58

Photograph 6: *Acacia acuminata* (jam) at site W46.

Wa ***Acacia acuminata*** **Low Forest**

Diagnosis Low Forest B over Herbs

Sites W46, W56

Description

Stratum 1 Low Forest B, rarely Low Forest A, of *Acacia acuminata* to 6 metres in height. Scattered *Eucalyptus loxophleba, Acacia saligna* and *Santalum spicatum* may also be present.

Lower Stratum Scattered sedges and shrubs to 1.5 metres of mixed species including *Acacia restiacea, Allocasuarina campestris, Astroloma serratifolium, Calytrix depressa, Chorizema genistoides, Hakea lissocarpha, Hibbertia rupicola, Hypocalymma angustifolium, Loxocarya aspera, Melaleuca radula* and *Mirbelia ramulosa.*

Herbs to Dense Herbs in places or Tall Grass of *Avena* sp., **Aira cupaniana* and **Briza maxima.* Herbaceous species include *Borya sphaerocephala, Burchardia umbellata, Chamaescilla spiralis, Cyanicula gemmata, Dianella revoluta, Drosera subhirtella, Drosera macrantha, Helichrysum lindleyi, Podolepis canescens, Podolepis lessonii, Stylidium calcaratum, Stypandra glauca* and *Tribonanthes longipetala.*

Comments *Acacia acuminata* usually becomes dominant in areas adjacent to granite outcrops growing in red-brown loam soils. The association covers only small areas on the Water Reserve interspersed with *Eucalyptus loxophleba* Low Forest.

MALLEE FORMATIONS

Mm Mallee over *Melaleuca uncinata* Thicket

Diagnosis Open Shrub Mallee (Shrub Mallee) over Thicket (Heath B to Dense Thicket) over Open Low Sedges/Dwarf Scrub D in places.

Sites E4, E15, W8, W11, W14, W28, W32

Description

Stratum 1 Open Shrub Mallee, occasionally to Shrub Mallee, with Tree Mallee/Open Tree Mallee at site W32. This stratum is patchy and discontinuous. Mallee species recorded include *Eucalyptus arachnaea, Eucalyptus erythronema, Eucalyptus flocktoniae, Eucalyptus hypoclamydea, Eucalyptus plauricaulis, Eucalyptus rigidula, Eucalyptus semivestita, Eucalyptus sheathiana* and *Eucalyptus subangusta.*

Stratum 2 Thicket, occasionally Dense Thicket, to Heath B with *Melaleuca uncinata* prominent. Heath C occurs in areas regenerating after fire (early 1970s). Other stratum 2 species include *Acacia leptospermoides, Allocasuarina campestris, Gastrolobium parviflorum, Hypocalymma angustifolium, Leptospermum erubescens, Melaleuca acuminata, Melaleuca adnata, Melaleuca coronicarpa, Melaleuca ctenoides, Melaleuca laxiflora, Melaleuca scabra, Melaleuca spicigera, Microcorys obovata, Phebalium ambiguum, Phebalium filifolium, Phebalium tuberculosum, Santalum acuminatum* and *Thryptomene ramulosa.*

Stratum 3 In some areas scattered shrubs and sedges to 0.5 metres form a lower stratum of Open Low Sedges/Dwarf Scrub D. Stratum 3 species include *Acacia bidentata, Acacia ericksonii, Acacia orbifolia, Astroloma serratifolium, Bossiaea eriocarpa, Cryptandra leucophracta, Dodonaea bursariifolia, Dodonaea pinifolia, Hibbertia rostellata* and *Lepidosperma ?leptophyllum.* Herbaceous species recorded include *Cyanicula gemmata, Helichrysum lindleyi, Helipterum manglesii, Pimelea leucantha, Podolepis capillaris, Podolepis lessonii, Stylidium crassifolium, Stylidium leptophyllum* and *Waitzia acuminata.*

Comments

Mallee over *Melaleuca uncinata* occurs on duplex soils in low lying areas below the lateritic plateau on sloping or flat terrain. The association is a major component of the vegetation on the Experimental Farm covering smaller areas on the Water Reserve. Soil types associated with areas of Mallee over *Melaleuca uncinata* on the Experimental farm include 7, 7b, 10 and A (shallow duplex soils) and to a lesser extent Elphin series soils of loamy sandy to sandy clay loam with laterite at depth and Mocardy series sols with massive sandy clay sub soils.

Photograph 7: Mallee over *Melaleuca uncinata* at site W14. The area was burnt in the early 1970s

Mc Mallee over *Melaleuca coronicarpa* Heath

Diagnosis Open Shrub Mallee (Very Open Shrub Mallee) over *Melaleuca uncinata* Scrub/Open Scrub in places over Heath B to Low Heath C/Dense Low Heath C.

Sites E9, E19, E21, E22, W6, W9, W15, W16

Description

Stratum 1 Open Shrub Mallee, occasionally to Very Open Shrub Mallee, to 8 metres in height forms a patchy and discontinuous stratum. This stratum may be absent with mallee present only as scattered individuals in some areas, usually on scarp slopes. Scattered *Callitris canescens* form a patchy stratum of Open Low woodland B at site E22. Mallee species recorded include *Eucalyptus celastroides, Eucalyptus eremophila, Eucalyptus erythronema, Eucalyptus pluricaulis* ssp. *pluricaulis* and *Eucalyptus subangusta.*

Stratum 2 Scattered shrubs of *Melaleuca uncinata* to 3 metres in height may form a stratum of Scrub to Open Scrub occasionally.

Stratum 3 Heath B or Heath C, occasionally to Dense Heath B or Dense Heath C, with *Melaleuca coronicarpa* ssp. *coronicarpa* dominant. Other species occurring as scattered individuals include *Acacia orbifolia, Acacia sulcata* ssp. *platyphylla, Astroloma serratifolium, Dodonaea bursariifolia, Gastrolobium parviflorum, Gastrolobium spinosum, Hibbertia rostellata, Melaleuca adnata, Melaleuca undulata, Phebalium filifolium* and *Phebalium tuberculosum.* Low Heath D occurs in areas regenerating after fire (early 1970s).

Comments Mallee over *Melaleuca coronicarpa* Heath is found on scarp slopes immediately below the breakaway and on flat terrain. The association favours duplex soils or shallow red soils overlying the residual laterite debris associated with breakaways, The upper stratum of Mallee may be absent on scree slopes.

Me Mallee over *Melaleuca*

Diagnosis Shrub Mallee (Tree Mallee) over *Callitris canescens* Open Low Woodland B/Low Woodland B in places over Open Low Scrub A to Low Scrub B.

Sites E11, E24, E27

Description

Stratum 1 Shrub Mallee, occasionally Tree Mallee, to 10 metres in height. Mallee species recorded include *Eucalyptus ?arachnaea, Eucalyptus pluricaulis, Eucalyptus semivestita, Eucalyptus sheathiana* and *Eucalyptus subangusta.*

Stratum 2 Scattered *Callitris canescens* to 4 metres in height form a patchy stratum of Open Low Woodland B to Low Woodland B in some areas.

Stratum 3 Open Low Scrub A to Open Low Scrub B, occasionally Low Scrub B of *Melaleuca species, with Melaleuca coronicarpa* and *Melaleuca uncinata* prominent, form a patchy stratum. Open Low Scrub A of *Melaleuca uncinata* may form a separate stratum in some areas. Other commonly occurring species include *Melaleuca acuminata, Melaleuca adnata* and *Melaleuca undulata. Occasional* species include *Acacia sulcata, Astroloma serratifolium, Dodonaea bursariifolia, Gastrolobium parviflorum* and *Melaleuca sclerophylla.*

Comments Mallee over *Melaleuca* covers only small areas on the Experimental Farm adjacent to areas of salmon gum and gimlet. The association favours soil type 7 with rock fragments commonly occurring.

Photograph 8: Mallee over *Melaleuca coronicarpa at site W9*

Photograph 9: Mallee over *Melaleuca* at site E24

SHRUBLAND AND HEATH FORMATIONS

Kdt ***Dryandra/Petrophile shuttleworthiana*** **Thicket**

Diagnosis Heath A (Dense Heath A) to Heath B (Dense Heath B) over Open Dwarf Scrub C/Dwarf Scrub C in places.

Sites E42, W4, W22, W30

Description

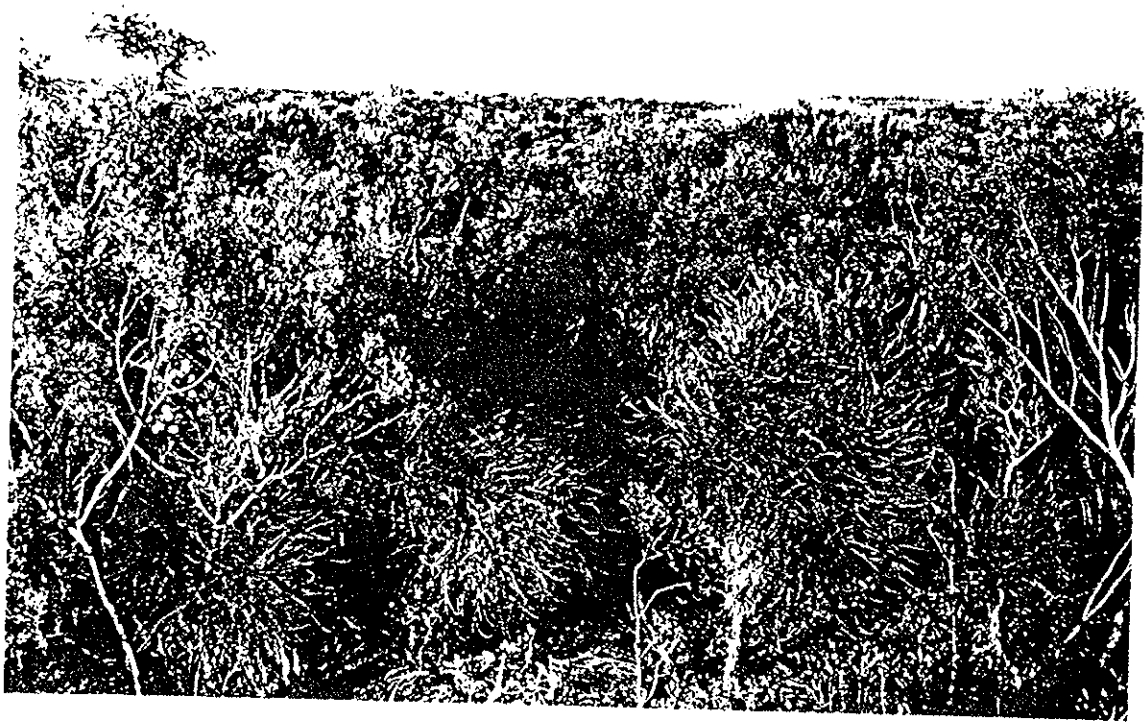
Stratum 1 Heath A or Heath B, occasionally Dense Heath A or Dense Heath B. Low Heath C was recorded in an area regenerating after fire. Scattered shrub mallee emergent to 6 metres may be present, forming Very Open Shrub Mallee over a small area at site W30. Mallee species recorded include *Eucalyptus ?hypoclamydea, Eucalyptus pyriformis, Eucalyptus semivestita* and *Eucalyptus subangusta.* Prominent stratum 1 species occurring frequently within the association include *Allocasuarina drummondiana, Allocasuarina campestris, Dryandra purdieana, Hakea scoparia, Melaleuca scabra* and *Petrophile shuttleworthiana.* Other characteristic species include *Dryandra comosa, Chamelaucium drummondii, Grevillea armigera, Grevillea petrophiloides, Hakea gilbertii, Hakea meisneriana, Isopogon divergens, Isopogon scabriusculus* and *Melaleuca pungens.*

Lower Stratum Open Dwarf Scrub C to Dwarf Scrub C of shrubs, sub shrubs and scattered herbaceous species occur in some areas. Commonly occurring species include *Acacia jacksonii, Beaufortia bracteosa, Conostylis androstemma, Cryptandra leucophracta, Calytrix leschenaultii, Dampiera lindleyi, Daviesia* aff. *daphnoides, Goodenia pinifolia, Hibbertia exasperata, Hibbertia huegelii, Lysinema ciliatum, Melaleuca conothamnoides, Petrophile media, Persoonia quinquenervis* and *Verticordia chrysantha.*

Comments

Dryandra/Petrophile shuttleworthiana Thicket covers the summits and upper slopes of areas of residual laterite which, for the most part, have remained unburnt for some time. The association in related to the Mallee over *Petrophile shuttleworthiana/Allocasuarina campestris* Thicket which covers extensive areas on the summits and slopes of the Wongan Hills (Coates 1988). The similarity between the associations is most obvious when comparing *Dryandra/Petrophile shuttleworthiana* Thicket with areas of the hills association where mallee are scattered and *Dryandra* species become more prominent.

Photograph 10: *Dryandra/Petrophile shuttleworthiana* Thicket at site W30 with *Dryandra comosa* and *Petrophile shuttleworthiana* in the foreground.



Kdh ***Dryandra*** **Low Heath**

Diagnosis Low Heath D to Low Heath C (Dense Low Heath C)

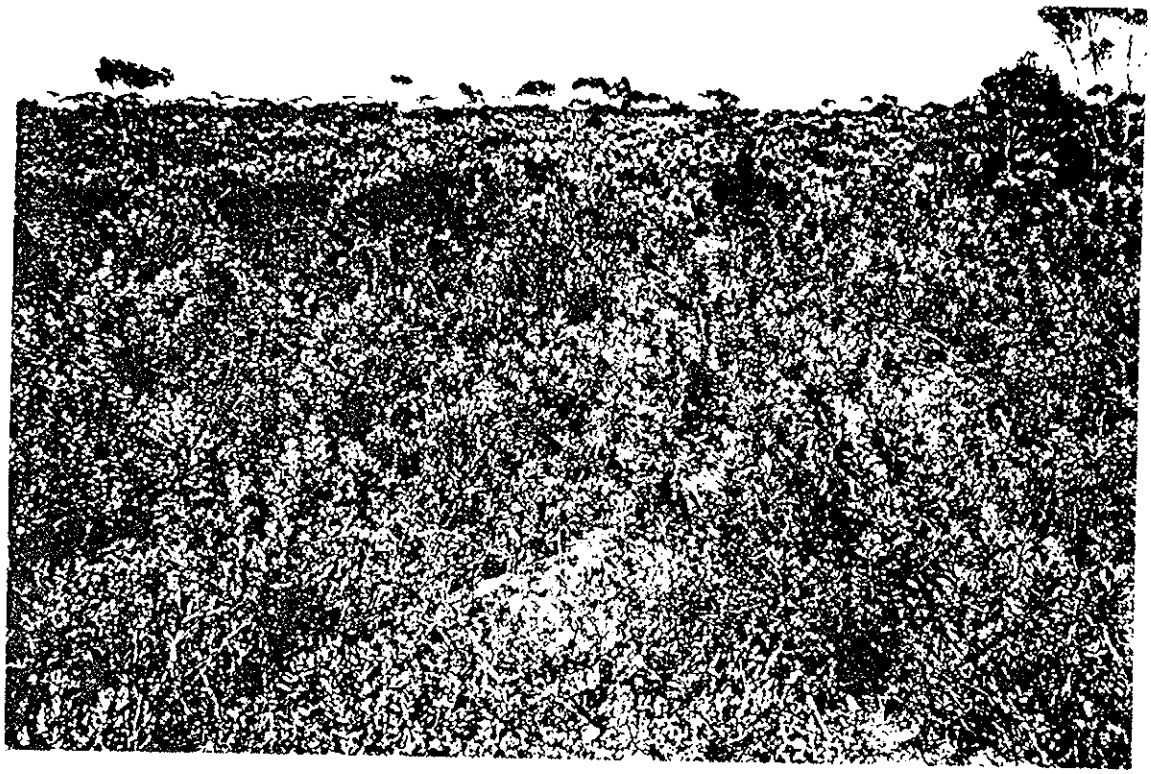
Sites W5, W7, W12, W18

Description

Stratum 1 Low Heath D to Low Heath C, Dense Low Heath occasionally. Scattered emergents include *Eucalyptus flocktoniae, Eucalyptus pyriformis* and *Eucalyptus ?rigidula.* Frequently occurring species which may be prominent in some areas include *Allocasuarina campestris, Dryandra purdieana, Hakea gilbertii, Hakea scoparia, Melaleuca conothamnoides, Melaleuca holosericea, Melaleuca scabra* and *Petrophile shuttleworthiana.* Other characteristic species include *Acacia jacksonii, Beaufortia interstans, Calytrix leschenaultii, Conostylis androstemma, Cryptandra leucophracta, Chamelaucium drummondii, Dampiera oligophylla, Grevillea armigera, Grevillea integrifolia* ssp. *shuttleworthiana, Grevillea petrophiloides, Hibbertia exasperata, Hibbertia huegelii, Isopogon scabriusculus, Melaleuca pungens, Petrophile media, Synaphea* sp., *Thryptomene racemulosa* and *Verticordia chrysantha.*

Comments *Dryandra* Low Heath occurs on residual laterite, frequently above breakaways and benched slopes. The association is found only in areas regenerating after the fire which burnt extensive areas in the northern section of the Water Reserve. *Dryandra* Low Heath is probably equivalent to burnt areas of the *Dryandra/Petrophile shuttleworthiana* Thicket but as some uncertainty exists with this interpretation the associations have been mapped separately.

Photograph 11: *Dryandra* **Low Heath at site W18. The area was burnt in the early 1970s**



Kh Scrub Heath

Diagnosis

Open Scrub over Heath A/Heath B (Dense Heath B).
Regeneration - Open Low Scrub A/Open Low Scrub B over Low Heath C.

Sites

E1, W1, W20, W21, W23

Description

Stratum 1

Open Scrub to 3 metres with Open Low Scrub A to Open Low Scrub B in areas regenerating after fire. *Actinostrobus arenarius* is usually prominent. This stratum may be absent in some areas with shrubs and Shrub Mallee only present as scattered individuals. Other species, occasional in stratum 1, include *Acacia multispicata, Exocarpos sparteus, Eucalyptus eudesmioides, Eucalyptus pyriformis, Eucalyptus rigidula, Grevillea armigera* and *Leptospermum erubescens.*

Stratum 2

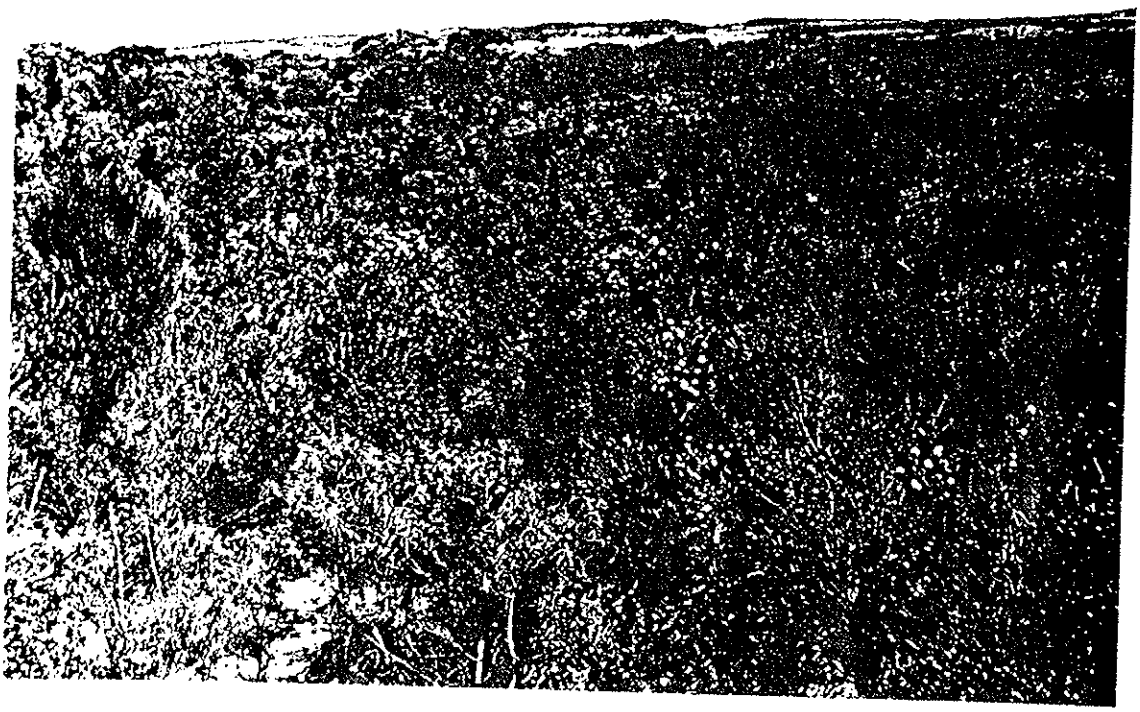
Heath A to Heath B, occasionally to Dense Heath B. Heath C, occasionally to Dense Heath C, occurs in areas regenerating after fire. Characteristic species occurring frequently within the association and prominent in some areas include *Allocasuarina campestris, Dryandra purdieana, Eremaea pauciflora, Melaleuca pungens, Melaleuca scabra* and *Petrophile shuttleworthiana.* Other characteristic species include *Acacia phaeocalyx, Beaufortia elegans, Beaufortia interstans, Calothamnus sanguineus, Calytrix violacea, Chamelaucium drummondii, Conostylis setigera, Dampiera oligophylla* ssp. *juncea, Daviesia* aff. *daphnoides, Daviesia nudiflora, Grevillea uncinulata, Hakea gilbertii, Hakea incrassata, Hakea trifurcata, Hakea lissocarpha, Hibbertia hypericoides, Isopogon dubius, Lysinema ciliatum, Melaleuca* aff. *cordata, Petrophile ericifolia, Petrophile media, Stylidium repens, Synaphea "constricta", Verticordia chrysantha, Verticordia eriocephala,* and *Verticordia picta.*

Comments

Scrub Heath favours areas of residual sandplain with sandy gravel soils over gravel or ironstone on the slopes back from the plateau summits. The association tends to merge with *Dryandra* Low Heath or *Dryandra/Petrophile shuttleworthiana* Thicket which occur on upper slopes and summits. Mixed Dense Heath described and mapped for Elphin Nature Reserve (Coates 1988) is included in this vegetation type.

Photograph 12: Scrub Heath at site W21

Photograph 13: Scrub Heath regenerating after fire (early 1970s) at site W23



Kt ***Allocasuarina campestris*** **Thicket**

Diagnosis Thicket to Heath B over *Ecdeiocolea* Very Open Tall Sedges to Tall Sedges in places over Open Low Sedges/Dwarf Scrub D in places over Very Open Herbs to Herbs.

Sites E3, E13, E17, E33, E47, W13, W35, W49, W53

Description

Stratum 1 Thicket to Heath B, occasionally to Dense Heath B or Dense Heath A, with *Allocasuarina campestris* dominant. Scattered trees and Shrub Mallee emergent to 6 metres are present in some areas forming Very Open Shrub Mallee at site W13 where shrubs are regenerating after fire. Species include *Eucalyptus loxophleba* (near granite) and *Eucalyptus pyriformis* (gravel soils). Other occasional species include *Acacia fragilis, Acacia lasiocalyx* (granite), *Hakea meisneriana, Hakea scoparia, Hypocalymma angustifolium, Leptospermum erubescens, Melaleuca scabra, Melaleuca uncinata, Petrophile seminuda* and *Santalum acuminatum.*

Stratum 2 Very Open Tall Sedges to Tall Sedges of *Ecdeiocolea monostachya* form a variable stratum in some areas.

Lower Stratum Open Low Sedges/Dwarf Scrub D, occasionally Dwarf Scrub C, form a patchy stratum in places with areas of *Borya sphaerocephala* Very Open Herbs to Herbs. Shrubs, sedges with scattered herbaceous species and grasses include *Astroloma serratifolium, Baeckea ?crispiflora, Baeckea ?preissiana, Caladenia flava, Calytrix depressa, Chamaescilla spiralis, Chamaescilla corymbosa, Cyanicula gemmata, Diuris* aff. *corymbosa, Dodonaea divaricata, Drosera macrophylla, Drosera subhirtella, Elythranthera brunonis, Grevillea tridentifera, Hibbertia exasperata, Hibbertia rostellata, Isotoma hypocrateriformis, Loxocarya aspera, Mesomelaena preissii, Microcorys obovata, Podolepis canescens, Spartochloa scirpoidea, Stylidium neglectum, Verticordia brachypoda, Verticordia eriocephala* and *Waitzia aurea.*

Comments

Allocasuarina campestris is extensive on the Experimental Farm surrounding granite outcrops and covering areas of sandy loam with gravel. The association is also common on the Water Reserve where it is usually associated with granite. Soil types recorded in areas covered by *Allocasuarina campestris* Thicket include soil type 8 (granite), Elphin series soils, Yaling gravelly loam and Mocardy sand.

Photograph 14: ***Allocasuarina campestris*** **Thicket at site W35**

Ka ***Allocasuarina campestris/Calothamnus aspera*** **Thicket**

Diagnosis Thicket

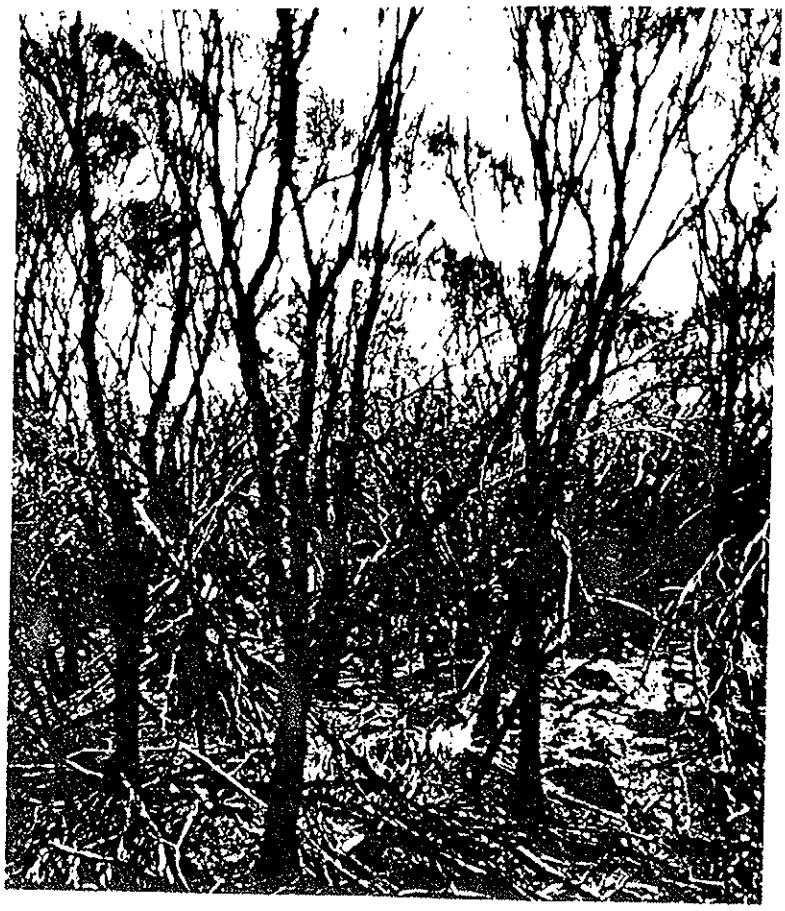
Sites E26

Description

Stratum 1 Thicket of *Allocasuarina campestris* and *Calothamnus aspera* to 4 metres in height. Scattered shrubs, sedges, grasses, ferns and herbaceous species include *Acacia ulicina, Acacia lasiocalyx, Astroloma serratifolium, Cheilanthes austrotenuifolia, Chamaescilla corymbosa, Diuris* sp., *Drosera macrophylla, Dodonaea divaricata, Hakea scoparia, Melaleuca radula, Spartochloa scirpoidea.*

Comments *Allocasuarina campestris/Calothamnus aspera* Thicket covers a small area on the Experimental Farm. The association is very variable in the hills area ranging from Thicket to a more open formation with an understorey of *Melaleuca radula* and *Spartochloa scirpoidea. Calothamnus aspera* joins *Allocasuarina campestris* on sandy clay soils with rock outcrops in places. The gazetted rare plants *Acacia pharangites* and *Eriostemon wonganensis* occur in this vegetation type in the hills area but were not found during the present survey.

Photograph 15: ***Allocasuarina campestris*** **and** ***Calothamnus aspera*** **Thicket at site E26**



Kg ***Allocasuarina campestris/Hakea meisneriana*** **Thicket**

Diagnosis Scrub/Thicket over Heath A (Low Scrub A) over *Ecdeiocolea* Tall Sedges to Very Open Tall Sedges in places or over Low Heath C to Open Dwarf Scrub C.

Sites E40, E41

Description

Stratum 1 Scrub, occasionally to Thicket of *Allocasuarina campestris* and *Hakea meisneriana* to 3 metres in height. Scattered shrubs of *Santalum acuminatum* were also recorded.

Stratum 2 Heath A, Low Scrub A in places. Characteristic species include *Allocasuarina campestris, Melaleuca scabra* and *Petrophile shuttleworthiana.* Occasional species include *Acacia sulcata* ssp. *platyphylla, Dryandra purdieana* and *Petrophile seminuda.*

Stratum 3 Tall Sedges to Very Open Tall Sedges of *Ecdeiocolea monostachya* in some areas.

Stratum 4 Low Heath C to Open Dwarf Scrub C forms a patchy stratum. Stratum 4 species include *Beaufortia bracteosa, Conostylis androstemma, Cryptandra leucophracta, Darwinia purpurea, Gastrolobium calycinus, Hakea circumalata, Hakea incrassata, Hibbertia exasperata, Hemigenia westringioides, Melaleuca conothamnoides, Melaleuca* aff. *cordata* and *Petrophile media.*

Comments *Allocasuarina campestris* is joined by *Hakea meisneriana* on gravel soils on the Experimental Farm. The association occurs on an area of residual laterite on soil type Elphin hardpan which consists of sand to sandy loam with gravel at ~10 cm over a ferruginous hardpan.

Photograph 16: *Allocasuarina campestris/Hakea meisneriana* **Thicket at site E40**

Ky ***Allocasuarina campestris/Hakea erecta*** **Heath**

Ky1 Unburnt

Diagnosis Heath A (Heath B) over Very Open Tall Sedges to Tall Sedges over Open Dwarf Scrub D (Open Low Scrub C).

Sites W25, W27, W63

Description

Stratum 1 Heath A, occasionally Heath B, with *Allocasuarina campestris* and *Hakea erecta* prominent. Scattered shrubs greater than 2 metres in height form Open Scrub at site W63. Commonly occurring species include *Acacia filifolia, Actinostrobus arenarius, Grevillea didymobotrya, Hakea platysperma, Hakea circumalata, Petrophile ericifolia* and *Santalum acuminatum.*

Stratum 2 Tall Sedges to Very Open Tall Sedges of *Ecdeiocolea monostachya* form a patchy stratum variable at different localities.

Stratum 3 Open Dwarf Scrub D, occasionally Open Low Scrub C, occurs in most areas together with scattered sedges and herbaceous species. Stratum 3 species include *Boronia coerulescens, Baeckea ?crispiflora, Baeckea ?preissiana, Conospermum stoechadis, Conospermum brownii, Comesperma scoparia, Conostylis wonganensis, Cryptandra glabriflora, Darwinia purpurea, Grevillea uncinulata, Hibbertia exasperata, Isopogon scabriusculus, Jacksonia macrocalyx, Melaleuca conothamnoides, Melaleuca* aff. *cordata, Mesomelaena preissii, Stylidium repens, Verticordia chrysantha, Verticordia eriocephala* and *Verticordia picta.*

Ky2 Regeneration

Diagnosis Open Low Scrub A in places over Heath B/Low Heath C over Tall Sedges/Low Sedges over Dwarf Scrub D.

Sites W2, W24, W29

Description

Stratum 1 Open Low Scrub A, occasionally Open Scrub, of mixed shrub species including *Acacia filifolia, Acacia latipes, Acacia multispicata, Actinostrobus arenarius, Grevillea armigera, Grevillea didymobotrya* and *Hakea platysperma.*

Stratum 2 Low Heath C to Heath B, Low Scrub B occasionally, with *Hakea erecta* and *Allocasuarina campestris* prominent. Other characteristic species include *Conospermum stoechadis, Dryandra purdieana, Daviesia uniflora, Grevillea tridentifera, Hakea cygna, Hakea scoparia, Isopogon scabriusculus, Melaleuca platycalyx, Petrophile ericifolia, Petrophile media* and *Petrophile seminuda.*

Stratum 3 Tall Sedges to Low Sedges of *Ecdeiocolea monostachya*. This stratum may be absent in some areas with *Ecdeiocolea* forming one stratum with Low Heath C of Low Heath D.

Stratum 4 Low Heath D to Dwarf Scrub D with scattered herbaceous species. Stratum 4 species include *Boronia coerulescens, Burchardia umbellata, Baeckea ?preissiana, Calytrix gracilis, Calytrix leschenaultii, Conostylis wonganensis, Dampiera oligophylla, Darwinia purpurea, Drosera spilos, Jacksonia fasciculata, Grevillea eryngioides, Grevillea uncinulata, Glischrocaryon* sp., *Leucopogon hamulosus, Melaleuca* aff. *cordata, Mesomelaena preissii, Mirbelia spinosa, Psammomoya choretroides, Prasophyllum sargentii, Stylidium repens, Stypandra glauca, Synaphea* sp. and *Verticordia picta.*

Comments *Allocasuarina campestris* is joined by *Hakea erecta* and other species on yellow sandy soils over gravel at depth. The association covers extensive areas on the Water Reserve. The gazetted rare plant *Conostylis wonganensis* is found in this vegetation type.

Photograph 17: *Allocasuarina campestris/Hakea erecta* **Heath (unburnt) at site W25**

Photograph 18: *Allocasuarina campestris/Hakea erecta* **Heath regenerating after fire at site W29**

Kv ***Allocasuarina acutivalvis*** **Thicket**

Diagnosis Thicket over Open Scrub in places over Dwarf Scrub C (Low Heath C).

Sites E6, E10, E44

Description

Stratum 1 Thicket of *Allocasuarina acutivalvis* to 6 metres in height.

Stratum 2 Scattered shrubs to 2.5 metres of mixed species form Open Scrub at site E10. Stratum 2 species include *Allocasuarina campestris, Grevillea didymobotrya, Grevillea petrophiloides, Hakea scoparia, Hypocalymma angustifolium, Isopogon scabriusculus, Melaleuca uncinata* and *Thryptomene racemulosa.*

Stratum 3 Dwarf Scrub C, rarely to Low Heath C, forms a patchy stratum in some areas. Commonly occurring species include *Astroloma serratifolium, Cryptandra leucophracta, Cyanicula gemmata, Dianella revoluta, Elythranthera brunonis, Hakea incrassata, Hibbertia exasperata, Hibbertia rostellata, Leucopogon* species, *Melaleuca conothamnoides, Psammomoya choretroides, Waitzia acuminata* and *Waitzia paniculata.*

Comments *Allocasuarina acutivalvis* occurs on top of breakaways and covers small areas of sandy loam with gravel on the Experimental Farm. Areas of *Allocasuarina acutivalvis* are often too small to map.

Km ***Melaleuca*** **Thicket**

Diagnosis Thicket (Dense Thicket) over Low Scrub B in places over Low Heath D to Open Dwarf Scrub D or Herbs/Low Grass in places.

Sites E20, E35, E36, W52, W59

Description

Stratum 1 Thicket, occasionally to Dense Thicket or Heath A, with *Melaleuca uncinata* usually prominent. Other *Melaleuca* species recorded include *Melaleuca acuminata, Melaleuca adnata, Melaleuca coronicarpa, Melaleuca ctenoides, Melaleuca hamulosa* (streamline), *Melaleuca lateriflora, Melaleuca laxiflora, Melaleuca platycalyx, Melaleuca scabra, Melaleuca spicigera and Melaleuca undulata* ssp. *undulata. Melaleuca coronicarpa* and *Melaleuca ctenoides* form a lower stratum of Low Scrub B at site E20. Other stratum 1 species include *Allocasuarina campestris, Callitris canescens, Gastrolobium parviflorum, Hypocalymma angustifolium* and *Santalum acuminatum.*

Lower Stratum Low Heath D to Open Dwarf Scrub D forms a lower stratum in places. Areas of Herbs or Low Grass may also occur in some areas. Shrubs, sub shrubs, herbaceous species, sedges and grasses forming the lower stratum include *Acacia ericksonii, *Avena species, Baeckea ?preissiana, *Briza maxima, *Bromus diandrus, Borya sphaerocephala, Ecdeiocolea monostachya, Halosarcia ?lepidosperma, Halosarcia ?pergranulata, Hibbertia rostellata, Helichrysum lindleyi, Isotoma hypocrateriformis, Lepidosperma* sp., **Lolium rigidum, Loxocarya aspera, *Mesembryanthemum nodiflorum, Podolepis lessonii, Spartochloa scirpoidea, Stypandra glauca* and *Waitzia acuminata.*

Comments *Melaleuca* Thicket covers small areas on the Experimental Farm and the Water Reserve in low lying areas including streamlines. The association occurs amongst areas of Mallee over *Melaleuca uncinata* on shallow duplex soils of clayey sand over clay, often poorly drained, including soil types 10 and A.

Photograph 19: *Allocasuarina acutivalvis* **Thicket at site E44**

Photograph 20: *Melaleuca* **Thicket on the Water Reserve No. 16418**

Kc ***Melaleuca scabra*** **Heath**

Diagnosis Open Low Scrub B to Open Scrub over Low Heath C to Heath A (Low Scrub A) over Dwarf Scrub D to Dwarf Scrub C (Low Heath C).

Sites E7, E12, E16, E43, E45, E46, W17, W31

Description

Stratum 1 Scattered shrubs form Open Scrub to Open Low Scrub B in places. This stratum is patchy and discontinuous with *Callitris canescens* forming Open Low Woodland B occasionally. Stratum 1 species include *Allocasuarina campestris, Melaleuca uncinata* and *Petrophile shuttleworthiana.* Patches of Shrub Mallee may also occur.

Stratum 2 Low Heath C to Heath A/Low Scrub A with *Melaleuca scabra* prominent. This stratum is also very variable and patchy with *Melaleuca scabra* present as scattered individuals over short distances. Other stratum 2 species include *Acacia leptospermoides, Hakea scoparia, Hemigenia westringioides, Hypocalymma angustifolium, Isopogon scabriusculus, Melaleuca uncinata, Petrophile seminuda* and *Thryptomene racemulosa.*

Stratum 3 Dwarf Scrub D to Dwarf Scrub C, Low Heath C occasionally. *Melaleuca conothamnoides* (gravel soil) or *Melaleuca sclerophylla* are prominent in some areas. Other commonly occurring species include *Beaufortia bracteosa, Conostylis androstemma, Cryptandra leucophracta, Drosera glanduligera, Drosera subhirtella, Hibbertia exasperata, Kunzea limnicola, Persoonia striata, Psammomoya choretroides* and *Verticordia chrysantha.*

Comments *Melaleuca scabra* Heath is very patchy and variable and is interspersed with Mallee over *Melaleuca uncinata* in some areas. The association is more extensive on the Experimental Farm on duplex soils of sand with gravel over clay and occasionally on Yaling series soils.

Photograph 21: ***Melaleuca scabra*** **Heath at site E7**

Kl ***Melaleuca sclerophylla* Low Heath**

Diagnosis Low Heath D.

Sites W26, W34, W50

Description

Stratum 1 Low Heath D with *Melaleuca sclerophylla* and in some areas *Kunzea limnicola* prominent. Scattered shrubs and shrub mallee are emergent including *Allocasuarina campestris, Dryandra purdieana, Hakea marginata, Hakea scoparia, Melaleuca coronicarpa, Melaleuca uncinata, Petrophile seminuda* and *Santalum acuminatum.* Other stratum 1 species include *Acacia lasiocarpa, Acacia pulchella* ssp. *goadbyi, Andersonia* sp., *Beaufortia bracteosa, Comesperma volubile, Dampiera lindleyi, Drosera glanduligera, Elythranthera brunonis, Gastrolobium calycinus, Hakea erinacea, Hibbertia exasperata, Isopogon scabriusculus, Melaleuca scabra, Nemcia obovata* and *Stylidium nungarinense.*

Comments *Melaleuca sclerophylla* Low Heath covers small areas on the Water Reserve on clayey sands with rock fragments. The association occurs on sloping terrain often adjacent to areas of Mallee over *Melaleuca uncinata.*

Photograph 22: *Melaleuca sclerophylla* Low Heath at site W50

Ke ***Eremaea*** **Heath**

Diagnosis Open Scrub/Open Low Scrub A in places over Dwarf Scrub D in places.

Sites W3, W45, W64

Description

Stratum 1 Scattered shrubs to 2.5 metres in height form Open Scrub or Open Low Scrub A in some areas. Characteristic species include *Actinostrobus arenarius, Grevillea armigera, Grevillea eriostachya, Grevillea ?integrifolia* ssp. *biformis* and *Leptospermum erubescens.*

Stratum 2 Low Heath C with *Eremaea pauciflora* prominent. Other commonly occurring species include *Adenanthos drummondii, Allocasuarina humilis, Calothamnus quadrifidus, Conospermum stoechadis, Dampiera oligophylla, Dicrastylis velutina, Glischrocaryon* sp., *Grevillea uncinulata, Hakea incrassata, Hakea lissocarpha, Hakea trifurcata, Jacksonia fasciculata, Lysinema ciliatum, Melaleuca* aff. *cordata, Pileanthus peduncularis, Petrophile ericifolia, Petrophile media* and *Verticordia eriocephala.*

Stratum 3 Dwarf Scrub D in some areas with scattered sedges and herbaceous species. Stratum 3 species include *Allocasuarina microstachya, Anigozanthos humilis, Borya sphaerocephala, Brunonia australis, Burchardia umbellata, Caladenia flava, Calytrix violacea, Conostylis setigera, Conostylis villosa, Dampiera spicigera, Lechenaultia biloba, Loxocarya ?myrioclada, Loxocarya parthenica, Opercularia vaginata, Podolepis canescens, Stylidium repens* and *Waitzia aurea.*

Comments *Eremaea* Heath covers only small areas on the Water Reserve on grey sands to gravel at depth.

Kb ***Beaufortia*** **Heath**

Diagnosis Open Low Scrub A/Low Scrub A over Low Scrub C/Heath C over Open Dwarf Scrub D in places.

Sites W62

Description

Stratum 1 Open Low Scrub A to Low Scrub A,, occasionally to Heath A, forms a patchy discontinuous stratum. Commonly occurring species include *Acacia ?filifolia, Grevillea armigera* and *Grevillea didymobotrya.* Occasional species include *Allocasuarina campestris, Actinostrobus arenarius, Dryandra purdieana, Eucalyptus pyriformis, Grevillea eriostachya, Grevillea integrifolia* ssp. *shuttleworthiana* and *Hakea erecta.*

Stratum 2 Low Heath C to Dwarf Scrub C of mixed shrub species form a patchy stratum. Characteristic species include *Baeckea* sp. 9, *Beaufortia interstans, Beaufortia squarrosa, Conospermum stoechadis, Grevillea eryngioides, Grevillea paniculata, Hakea ?cygna, Isopogon scabriusculus, Melaleuca conothamnoides, Melaleuca* aff. *cordata, Petrophile ericifolia, Petrophile media, Petrophile seminuda, Verticordia chrysantha, Verticordia eriocephala, Verticordia monadelpha* and *Verticordia venusta.*

Stratum 3 Open Dwarf Scrub D in some areas of mixed species including *Baeckea ?preissiana, Conostylis androstemma, Calytrix sapphirina, Hibbertia huegelii* and *Glischrocaryon aureum.*

Comments *Beaufortia* Heath covers a small area on the Water Reserve upslope on residual laterite on gravelly soils.

Photograph 23: *Eremaea pauciflora* **Heath at site W45**

Photograph 24: *Beaufortia* **Heath at site W62**

Ks Sedges/Heath

Diagnosis Open Low Scrub B to Low Scrub A in some areas over Tall Sedges/Low Heath C or Tall Sedges/Open Tall Sedges over Low Heath D.

Sites E2, E18, E30, E32, E38, W10, W19

Description

Stratum 1 In some areas *Allocasuarina campestris* forms a patchy stratum of Open Low Scrub B to Low Scrub A. *Allocasuarina campestris* Thicket occurs in adjacent areas and may form a mosaic with the Sedge/Heath association. Other shrubs occurring as scattered individuals include *Acacia filifolia, Calothamnus quadrifidus, Grevillea arnigera, Grevillea didymobotrya, Grevillea eriostachya, Hakea platysperma* and *Santalum acuminatum.*

Stratum 2 Tall Sedges/Low Heath C with *Ecdeiocolea monostachya, Melaleuca* aff. *cordata* and *Mesomelaena preissii* prominent. *Melaleuca conothamnoides* and *Melaleuca sclerophylla* may become prominent in areas with surface gravel. In some places a separate stratum of Tall Sedges over Low Heath D occurs. Open Herbs to Very Open Herbs of *Borya sphaerocephala* may also occur in some areas. Other stratum 2 species include *Allocasuarina microstachya, Baeckea ?crispiflora, Boronia coerulescens, Burchardia umbellata, Calytrix leschenaultii, Conospermum incurvum, Conospermum stoechadis, Conostylis wonganensis, Dampiera lavandulacea, Dampiera lindleyi, Dampiera oligophylla, Daviesia nudiflora, Elythranthera brunonis, Gastrolobium glaucum, Gastrolobium hamulosum, Grevillea teretifolia, Hakea incrassata, Hibbertia exasperata, Mirbelia spinosum, Psammomoya choretroides, Stylidium repens, Stypandra glauca, Synaphea* sp., *Verticordia chrysantha* and *Verticordia eriocephala.*

Comments The association mapped and described as Sedges on Elphin Nature Reserve (Coates 1988) has here been broadened to include areas where shrub species also become prominent. The association occurs on yellow sands ±gravel. The gazetted rare plant *Conostylis wonganensis* occurs in this vegetation association. Soil types covered by this association on the Experimental Farm include Wongan loamy sand, Wongan sand, Mocardy sand and a small area of spillway sand.

Photograph 25: Sedges/Heath at site W10 with *Ecdeiocolea monostachya* prominent

Photograph 26: Sedges/Heath at site E38 with *Melaleuca* aff. *cordata*, *Ecdeiocolea monostachya* and *Mesomelaena preissii* prominent

Kn ***Nuytsia floribunda*** **Over Low Heath**

Diagnosis Open Scrub to Open Low Scrub B in places over Low Scrub C/Low Scrub B to Open Low Scrub B over Low Heath D (Low Sedge).

Sites E31, E34

Description

Stratum 1 Scattered shrubs form Open Scrub to Open Low Scrub B in some areas. Characteristic species include *Acacia filifolia, Acacia acuminata, Allocasuarina campestris, Leptospermum oligandrum* and *Nuytsia floribunda.*

Stratum 2 Low Scrub C to Low Scrub B, occasionally Open Low Scrub B of mixed shrub species including *Allocasuarina humilis, Baeckea* aff. *crispiflora A, Calothamnus quadrifidus, Calothamnus sanguineus, Daviesia nudiflora, Ecdeiocolea monostachya, Hakea incrassata, Hakea trifurcata* and *Melaleuca* aff. *cordata.*

Stratum 3 Low Heath D and in places Low Sedges including scattered herbaceous plants. Commonly occurring species include *Mesomelaena preissii, Allocasuarina microstachya, Daviesia hakeoides* and *Lepidobolus* sp. Other stratum 3 species include *Acacia lasiocarpa, Boronia coerulescens, Borya sphaerocephala, Burchardia umbellata, Beaufortia bracteosa, Calytrix depressa, Chamaescilla corymbosa, Chamaescilla spiralis, Dampiera lavandulacea, Dampiera oligophylla, Goodenia trichophylla, Grevillea uncinulata, Jacksonia* sp., *Microcorys ericifolia, Nemcia obovata, Persoonia quinquenervis, Podolepis canescens, Podotheca angustifolia, Podotheca gnaphalioides, Stylidium leptophyllum, Stypandra glauca, Verticordia acerosa* ssp. *preissii, Verticordia chrysantha, Verticordia brachypoda, Verticordia densiflora, Verticordia huegelii, Verticordia picta, Waitzia acuminata* and *Waitzia paniculata.*

Comments *Nuytsia floribunda* over Low Heath covers a relatively small area in the north eastern section of the Experimental Farm bushland. The association favours sandy soils including Mocardy sand and spillway sand which are imperfectly drained.

Ku Open Scrub Over Herbs/Sedges

Diagnosis Open Scrub in places over Open Dwarf Scrub D in places over Herbs/Low Sedges.

Sites W51

Description

Stratum 1 Scattered trees and shrubs forming Open Scrub in places. Stratum 1 species include *Acacia acuminata, Allocasuarina campestris, Melaleuca uncinata* and *Santalum spicatum.*

Stratum 2 Open Dwarf Scrub D of mixed shrub species including *Acacia ericksonii, Acacia restiacea, Astroloma serratifolium, Allocasuarina microstachya, Baeckea ?preissiana, Chorizema aciculare, Chorizema genistoides, Cryptandra spinescens, Dampiera oligophylla, Hakea incrassata, Hibbertia exasperata, Nemcia obovata* and *Verticordia chrysanthella.*

Stratum 3 Herbs with *Borya sphaerocephala* prominent and Low Sedges with *Loxocarya aspera* and *Lepidobolus ?chaetocephalus* frequent. Other stratum 3 species include **Briza maxima, Burchardia umbellata, Caladenia roei, Cyanicula gemmata, Drosera subhirtella, Diuris laxiflora, Helipterum manglesii, Mesomelaena preissii, Opercularia vaginata, Podolepis lessonii, Prasophyllum cyphochilum, Stylidium neglectum, Stylidium periscelianthum, Trachymene cyanopetala* and *Trachymene ornata.*

Comments Open Scrub over Herbs/Sedges covers small areas on the Water Reserve occurring on sandy soils associated with granite and interspersed with areas of *Allocasuarina campestris* Thicket.

Photograph 27: *Nuytsia floribunda* **Heath at site E34**

Photograph 28: Open Scrub over Herbs/Sedges at site W51

LITHIC COMPLEX

G Granite Rock

Sites E14, E28, W36, W53, W54, W61, W61a

Rock Surface

- Shallow Soil *Borya sphaerocephala* and *Borya laciniata* Herbs/(Dense Herbs) form a mat on flat areas of the rock surface.

Rock Crevices

- Shallow Soil Low Heath D to Low Heath C of *Calytrix depressa* and/or *Verticordia chrysanthella.*

Other herbaceous species growing in shallow soils include *Arthropodium capillipes, Blennospora drummondii, Bulbine semibarbata, Caladenia dimidia, Caladenia microchila, Caladenia roei, Cyanicula gemmata, Diuris picta, Diuris* aff. *corymbosa, Drosera macrantha, Drosera glanduligera, Drosera subhirtella, Elythranthera brunonis, Helipterum manglesii, Helichrysum lindleyi, Millotia myosotidifolia, Podolepis lessonii, Stackhousia monogyna, Stypandra glauca, Stylidium neglectum, Stylidium breviscapum, Thelymitra antennifera, Thysanotus dichotomus, Thysanotus patersonii* and *Tribonanthes longipetala.* Scattered grasses including **Aira cupaniana, *Briza maxima* and **Pentaschistis airoides* and the fern *Cheilanthes austrotenuifolia* also occurs with *Spartochloa scirpoidea* Tall Grass in places.

Ecdeiocolea monostachya Tall Sedges occur in border soils in some areas. Other "sedges" include *Lepidosperma ?leptophyllum* and *Loxocarya aspera.* Scattered shrubs occur in patches in rock crevices including *Acacia lasiocalyx, Acacia acuminata, Calothamnus quadrifidus, Dodonaea viscosa, Hibbertia glomerosa, Hibbertia rupicola, Kunzea pulchella, Leptospermum erubescens, Leptospermum oligandrum, Melaleuca fulgens, Melaleuca radula* and *Thryptomene australis.*

Deeper Soil-border of Rock Outcrop

Dense Thicket/Thicket to Heath A/Dense Heath A of *Allocasuarina campestris.*

Allocasuarina huegeliana Low Forest B (site W61a) *Hakea petiolaris/Acacia lasiocalyx* Dense Thicket/Thicket (site W61).

Comments

Areas of outcropping granite have a characteristic flora including mosses and lichens. *Borya* species form a mat on shallow soils on the rock surface with scattered shrubs in crevices and soil pockets and species such as *Thryptomene australis, Verticordia chrysanthella* and *Calytrix depressa* in run off zones. *Allocasuarina campestris* Thicket occurs in deeper soils surrounding the rock and at the base of large outcrops such as Christmas Rock on the Water Reserve *Allocasuarina huegeliana* Low Forest and *Hakea petiolaris/Acacia lasiocalyx* Thicket are formed. Soils associated with granite include soil type 8 and Mocardy sand.

Photograph 29: Granite outcrop at site E28 with a mat of *Borya* Herbs, areas of *Verticordia chrysanthella* and *Calytrix depressa* and *Allocasuarina campestris* Thicket in the background

Photograph 30: *Acacia lasiocalyx* and *Hakea petiolaris* Thicket at Christmas Rock (site W61)

Photograph 31: *Allocasuarina huegeliana* at site W61a (Christmas Rock)

SALT COMPLEX

S Samphire

Diagnosis Low Heath D.

Sites E39

Description

Stratum 1 Low Heath D of *Halosarcia lepidosperma* and/or *Halosarcia pergranulata*. Scattered shrubs of Melaleuca uncinata *and* Allocasuarina campestris emergent to 2 metres also occur. Other species recorded include *Rhagodia drummondii* and *Scaevola helmsii*.

Comments Samphire covers only small areas on the Experimental Farm.

Photograph 32: Samphire on the Experimental Farm at site E39

5.0 FLORA SURVEY

Plant species recorded for the block of remnant vegetation on the Experimental Farm No. 18672 and the Water Reserve No. 16418 are listed in Appendix 1. Manuscript names (ms) have been included to help differentiate between undescribed species within a particular genus. Identifications with the generic name followed by "?" are uncertain due to a lack of flowering or fruiting material or to confusion in the current taxonomy of the group concerned. Affinity or "aff." is used in relation to undescribed species which are very similar to named species yet different enough to be kept as separate taxa. The nomenclature follows that of Green (1985) and Supplement 7 (November 1988 unpublished) unless otherwise specified below. Six species included in the species list have been described since the completion of Supplement 7. These species include:

> *Eucalyptus pluricaulis, Eucalyptus subangusta* (Brooker and Hopper 1991)
>
> *Verticordia chrysanthella, Verticordia eriocephala, Verticordia venusta* and *Verticordia wonganensis* (George 1991).

The nomenclature further differs from Green (1985) and Supplement 7 in including the new combinations in *Nemcia* and *Gastrolobium* (Crisp and Weston 1987).

5.1 Flora of the Remnant Vegetation on the Experimental Farm No. 18672

A total of 376 plant species are recorded in Appendix 1 as occurring in the block of remnant vegetation on the Experimental Farm, including 3 species of moss, 1 species of fern, 2 gymnosperms and 370 angiosperms. Twenty of the species recorded are exotic or introduced.

Field trips were undertaken in October 1984 and 1985 by staff from the Western Australian Herbarium to collect plant specimens from the remnant vegetation on the Experimental Farm. The information accumulated during the field work is presented in Appendix 4. Fifty one of the species listed in Appendix 1 were not found during the present survey but were collected during the Herbarium field trips. The identity of some of these species is in doubt due to changes in the taxonomy of many groups since the time of recording. Time restrictions did not allow for the checking of voucher specimens collected. However some corrections have been made to the original report (Coates 1989) where re-identification of voucher specimens was noted during herbarium work.

The families with the largest representatives of genera and species are listed below.

Family	No. of Species	No. of Genera	No. of Exotics
Myrtaceae (Eucalyptus etc)	73	16	0
Proteaceae (Banksia, Dryandra etc)	40	8	0
Asteraceae (daisies)	27	20	2
Papilionaceae (pea flowers)	26	10	1
Mimosaceae (wattles)	23	1	0
Goodeniaceae (Lechenaultia, etc)	14	6	0
Poaceae (grasses)	12	11	9
Orchidaceae (orchids)	11	5	0
Anthericaceae (lilies)	7	4	0

The families Myrtaceae, Proteaceae, Asteraceae, Papilionaceae and Mimosaceae were the most strongly represented in the flora of the Experimental Farm. Of the monocotyledons, members of the Poaceae, Orchidaceae and Anthericaceae are the most common.

Using the present data, the overall floristic diversity of the remnant bushland can be estimated at 68 species/square kilometre. This is high indicating a rich flora when compared to other reserves such as Bendering Nature Reserve (5.9 species/square kilometre) and Tutanning Nature Reserve (22 species/square kilometre) but in part reflects the extent to which the area has been studied and the small size of the block. The overall floristic diversity of the hills was estimated at 20.5 species/square kilometre and of Elphin Nature Reserve No. A 25808 at 87 species/square kilometre (Coates 1988). As Muir (1977) points out such estimates will depend on the distribution of vegetation types within the reserve boundary and reserve size, both of which are largely fortuitous.

5.2 Flora of the Water Reserve No. 16418

A total of 366 plant species are recorded in Appendix 1 as occurring in the area of the Water Reserve No. 16418, including 1 species of fern, 2 gymnosperms and 363 angiosperms. Nineteen of the species recorded are exotic or introduced.

The families with the largest representatives of genera and species are listed below:

Family	No. of Species	No. of Genera	No. of Exotics
Myrtaceae (Eucalyptus, bottlebrushes etc)	67	16	0
Proteaceae (Banksia, Dryandra etc)	47	9	0
Mimosaceae (wattles)	29	1	0
Asteraceae (daisies)	26	16	2
Papilionaceae (pea flowers)	23	10	1
Orchidaceae (orchids)	10	5	0
Anthericaceae (lilies)	8	5	0
Poaceae (grasses)	8	7	5

The families Myrtaceae, Proteaceae, Mimosaceae and Papilionaceae were the most strongly represented in the flora of the Water Reserve. Of the monocotyledons, members of the family Orchidaceae, Anthericaceae and Poaceae are the most common.

Using the present data, the overall floristic diversity of the reserve can be estimated at 38 species/square kilometre. This is high when compared to other reserves such as Bendering Nature Reserve (5.9 species/square kilometre) and Tutanning Nature Reserve (22 species/square kilometre) but not as high as the estimate for the remnant bushland on the Experimental Farm (68 species/square kilometre) and Elphin Nature Reserve No. A 25808 at 87 species/square kilometre (Coates 1988). The Water Reserve has a very rich flora with extensive areas of species rich kwongan. The diversity estimate reflects in part the time constraints of the present survey and Appendix 1 only represents part of the flora of the area. Information from other field work carried out in the area was not available. The area is also much larger than Elphin Nature Reserve (198 hectares). The diversity figure will reflect the size, distribution of vegetation types within the boundaries and the extent to which the area has been studied.

5.3 Species of Interest

Plant species of interest recorded for remnant vegetation on the Experimental Farm No. 18672 and Water Reserve No. 16418 are listed in Table 5. These species have been classified by the Department of Conservation and Land Management into categories which reflect their conservation status. These categories are listed below.

CONSERVATION CODES

R: Declared Rare Flora - Extant Taxa
Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.

X: Declared Rare Flora - Presumed Extinct Flora
Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which known wild populations have been destroyed more recently, and have been gazetted as such.

1: Priority One - Poorly Known Taxa
Taxa which are known from one or a few (generally <5) populations, which are under threat either due to small population size, or being on lands under immediate threat, eg. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, eg. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

2: Priority Two - 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 immediate threat (ie. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

3: Priority Three - Poorly Known Taxa
Taxa which are known from several populations, at least some of which are not believed to be under immediate threat (ie. not currently endangered). Such taxa are under consideration for declaration as 'rare flora' but are in need of further survey.

TABLE 5: DECLARED RARE AND PRIORITY FLORA

Species	Conservation Status	Geographical Distribution
Acacia drewiana ssp. minor	2	Wongan Hills, Newdegate - Lake King
Acacia dura	2	Piawaning, Wongan Hills, Yerecoin
Acacia filifolia	3	Wongan Hills, Burracoppin, Southern Cross
Acacia phaeocalyx	3	Kellerberrin, Tammin, Wongan Hills
Acacia semicircinalis	R	Wongan Hills
Conostylis wonganensis	R	Wongan Hills, Manmanning
Daviesia euphorbioides	R	Cadoux - Wongan Hills
Dryandra comosa	2	Wongan Hills
Gastrolobium glaucum	R	Wongan Hills
Gastrolobium hamulosum	R	Wongan Hills
Gompholobium asperulum	1	Wongan Hills, Mullewa
Goodenia trichophylla	2	Eneabba, Lake Grace, Cascades
Hemiandra coccinea	3	Mullewa, Tardun
Hemigenia viscida	R	Wongan Hills - Quairading
Melaleuca sclerophylla	3	New Norcia, Dalwallinu, Moora, Manmanning, Marchagee, Wongan Hills
Scaevola tortuosa	1	Kellerberrin, Wyola
Stylidium coroniforme	R	Wongan Hills, Latham
Stylidium neglectum	X	Dragon Rocks NR, Wongan Hills
Verticordia venusta	3	Perenjori to Moonijin, Wongan Hills
Verticordia wonganensis	3	Wongan Hills

a) Gazetted Rare Flora

Seven gazetted rare plants were recorded for the areas surveyed. Five species including *Acacia semicircinalis, Conostylis wonganensis, Gastrolobium glaucum, Hemigenia viscida* and *Stylidium coroniforme* occur on Water Reserve No. 16418 and four species including *Conostylis wonganensis, Daviesia euphorbioides, Gastrolobium glaucum* and *Gastrolobium hamulosum* occur on Experimental Farm No. 18672. Of these species only *Acacia semicircinalis* is known to occur in the hills area. The localities of these rare plants are marked on the vegetation maps (Figures 6 and 7).

Acacia semicircinalis has been previously recorded at six major localities in the Wongan Hills area including Reserve No. A 33530, Fowlers Gully, the television translator tower, Telecom access road, along the Wongan Hills-Piawaning Road and Water Reserve No. 16418 at site W30. Details of seven new populations found on the Water Reserve during the present survey are detailed below. Plant numbers given are the number of plants seen during general field work. Due to time limitations no detailed surveys of rare flora populations were carried out. *Acacia semicircinalis* is illustrated in Figure 8.

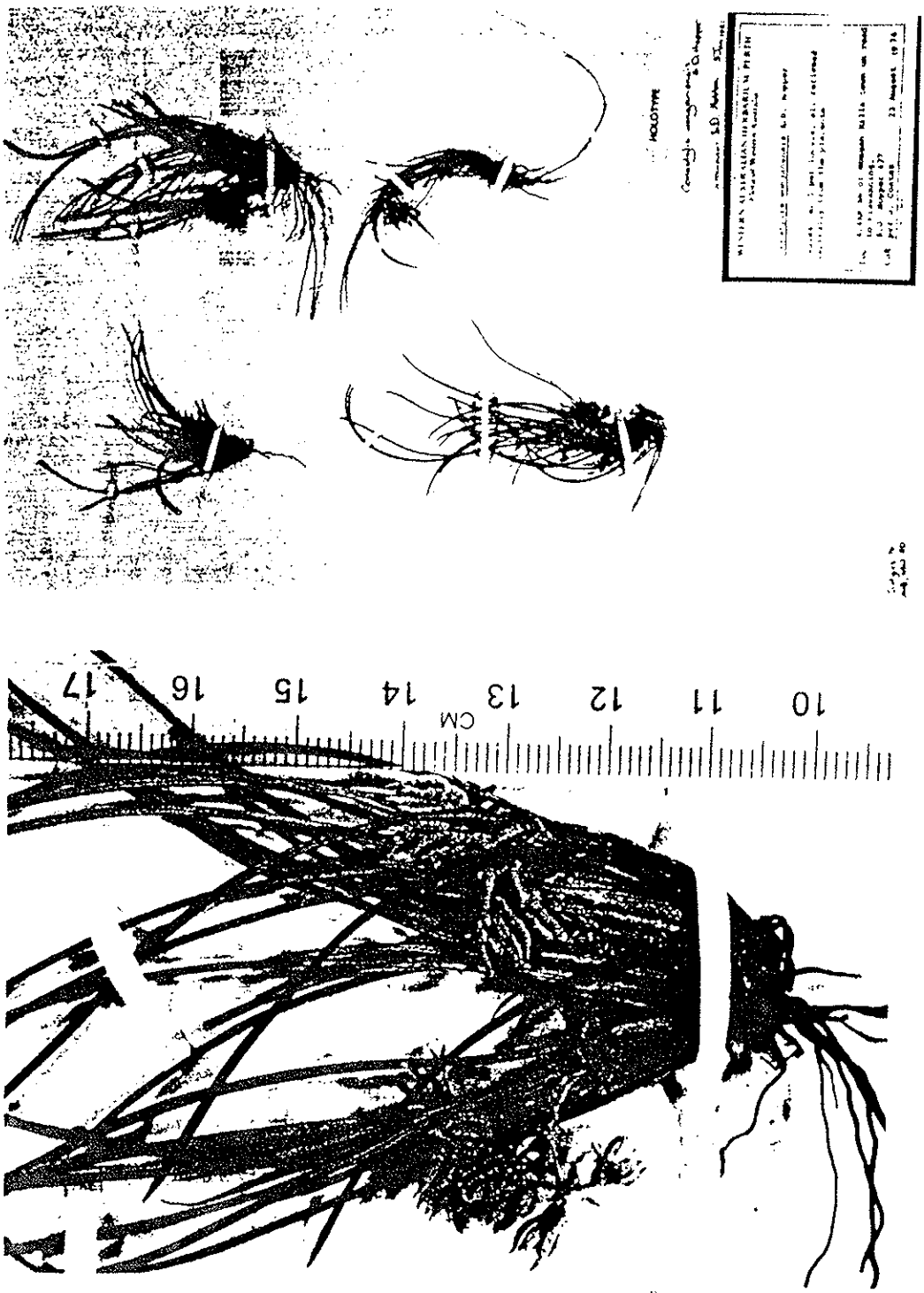
Location	Vegetation Association	Soil Type	Plant Numbers
Site W1	Scrub Heath	gravelly sand	30
Site W7	*Dryandra* Low Heath	sandy gravel, ironstone in places	10
Edge of sand pit near site W10	disturbed area	sand over gravel	20
Site W12 and along track	*Dryandra* Low Heath	gravel soils, ironstone in places	~40
Near site 18 adjacent to gravel pit	*Dryandra* Low Heath	gravel soils	4
SE of site W30 along track to escarpment edge	*Dryandra/Petrophile shuttleworthiana* Thicket	gravel soils, ironstone in places	32
Site W31	*Melaleuca scabra* Heath	gravelly sand	4

Figure 8: **Line drawing of *Acacia semicircinalis***

Conostylis wonganensis is known only from the Wongan Hills district and Manmanning. Populations of this species were recorded during a survey of Elphin Nature Reserve No. A 25808 at sites 18, 20 and 26 and along the roadside verge (Coates 1988). Ten new populations were found on the Water Reserve No. 16418 and Experimental Farm bushland during the present survey. Details of these new populations are presented below. *Conostylis wonganensis* plants were rare to occasional within the vegetation associations covering the localities listed. The plants were found growing in sandy soils (often yellow) sometimes with gravel over gravel at depth including Wongan loamy sands, Wongan sand and Mocardy sand. *Conostylis wonganensis* is illustrated in Figure 9.

Location	Associated Vegetation
Site E2	Sedges/Heath
Site E18	Sedges/Heath
Site E30	Sedges/Heath
Site E34	*Nuytsia floribunda* over Low Heath
Site W10	Sedges/Heath
NE of site W18	*Allocasuarina campestris/Hakea erecta* Heath
Site W24 and surrounding area	*Allocasuarina campestris/Hakea erecta* Heath
Site W25	*Allocasuarina campestris/Hakea erecta* Heath
Site W29 and surrounding area	*Allocasuarina campestris/Hakea erecta* Heath
West of site W45	Sedges/Heath

Figure 9: *Conostylis wonganensis.* **Top - holotype sheet (*S.D. Hopper* 427 per *D. Coates*). Bottom - enlargement of upper right hand specimen on the holotype sheet. Illustrated in Nuytsia Vol 4, No. 1 (1982).**



Daviesia euphorbioides has been recorded at nine localities from Wongan Hills to Cadoux. One of these localities is the south eastern corner of the Experimental Farm bushland extending into the railway reserve. This species also occurs on Elphin Nature Reserve No. A 25808 in two areas near the boundary with Water Reserve No. 16418. Populations of *Daviesia euphorbioides* have been surveyed by Rare Flora Volunteers in 1991. No new populations were discovered during the present survey.

Gastrolobium glaucum has previously been known from three localities which are listed below:

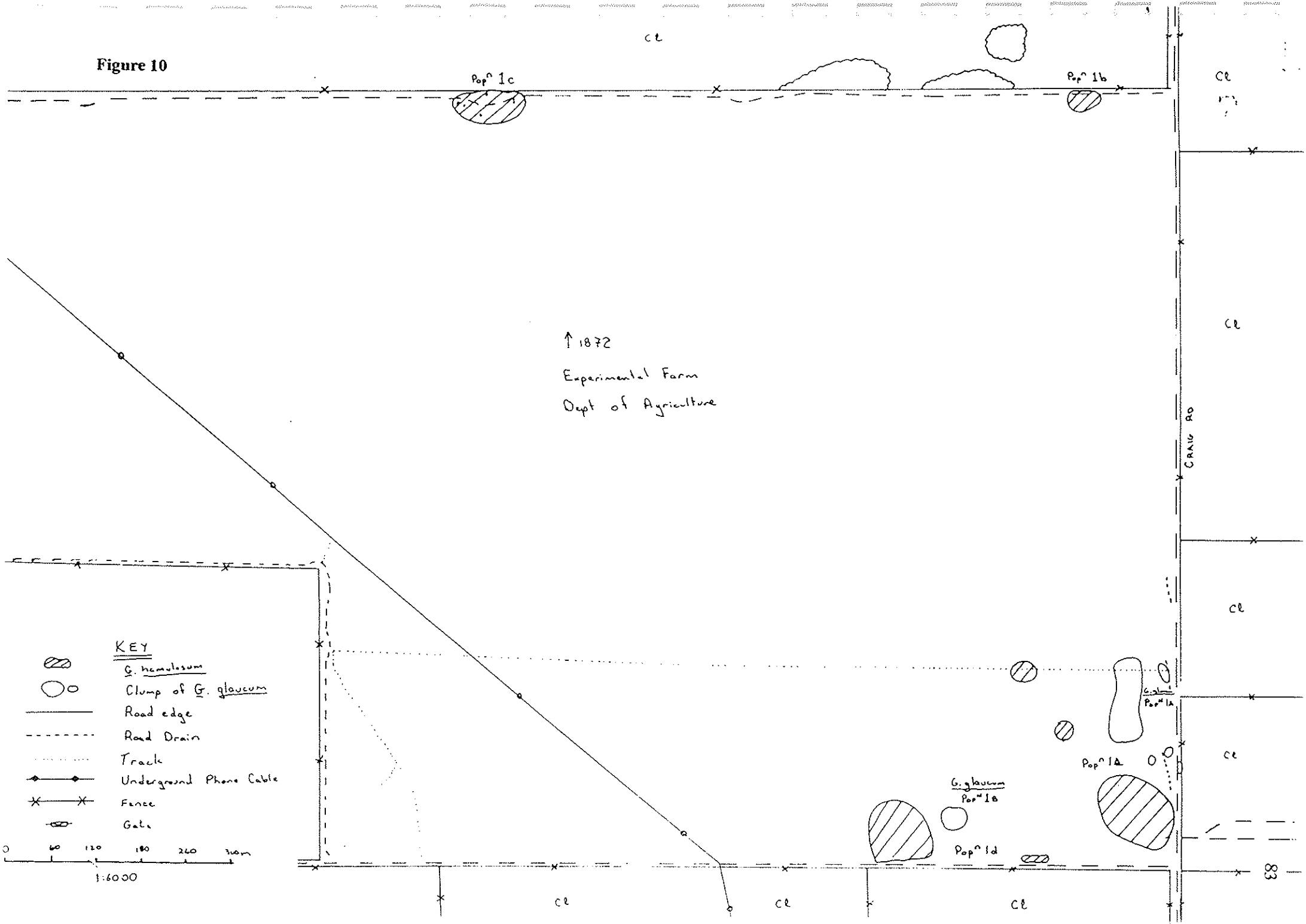
1. north eastern corner of the Experimental Farm bushland Populations 1a (768 plants) and 1b (46 plants) were surveyed by Rare Flora Volunteers in 1991 (see Figures 10 and 11);

2. Water Reserve No. 16418. Along a track (with powerlines) running south from site W22; and

3. Manmanning road verge.

A new population of *Gastrolobium glaucum* was found during the present survey adjacent to a sand and gravel pit north of site W64 on the Water Reserve. The area has been disturbed and only 3 "patches" were observed. Another "patch" of *Gastrolobium glaucum* was recorded at site E34 on the Experimental Farm bushland further west of the other plants mapped by Rare Flora Volunteers (Figures 10 and 11). On the Experimental Farm the plants occur mainly in areas of Sedges/Heath and open spaces in the *Allocasuarina campestris* Thicket. *Nuytsia floribunda* over Low Heath occurs at site E34. These vegetation associations cover sandy soils with gravel at depth.

Figure 10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G. hamulosum
Clump of G. glaucum
Road edge
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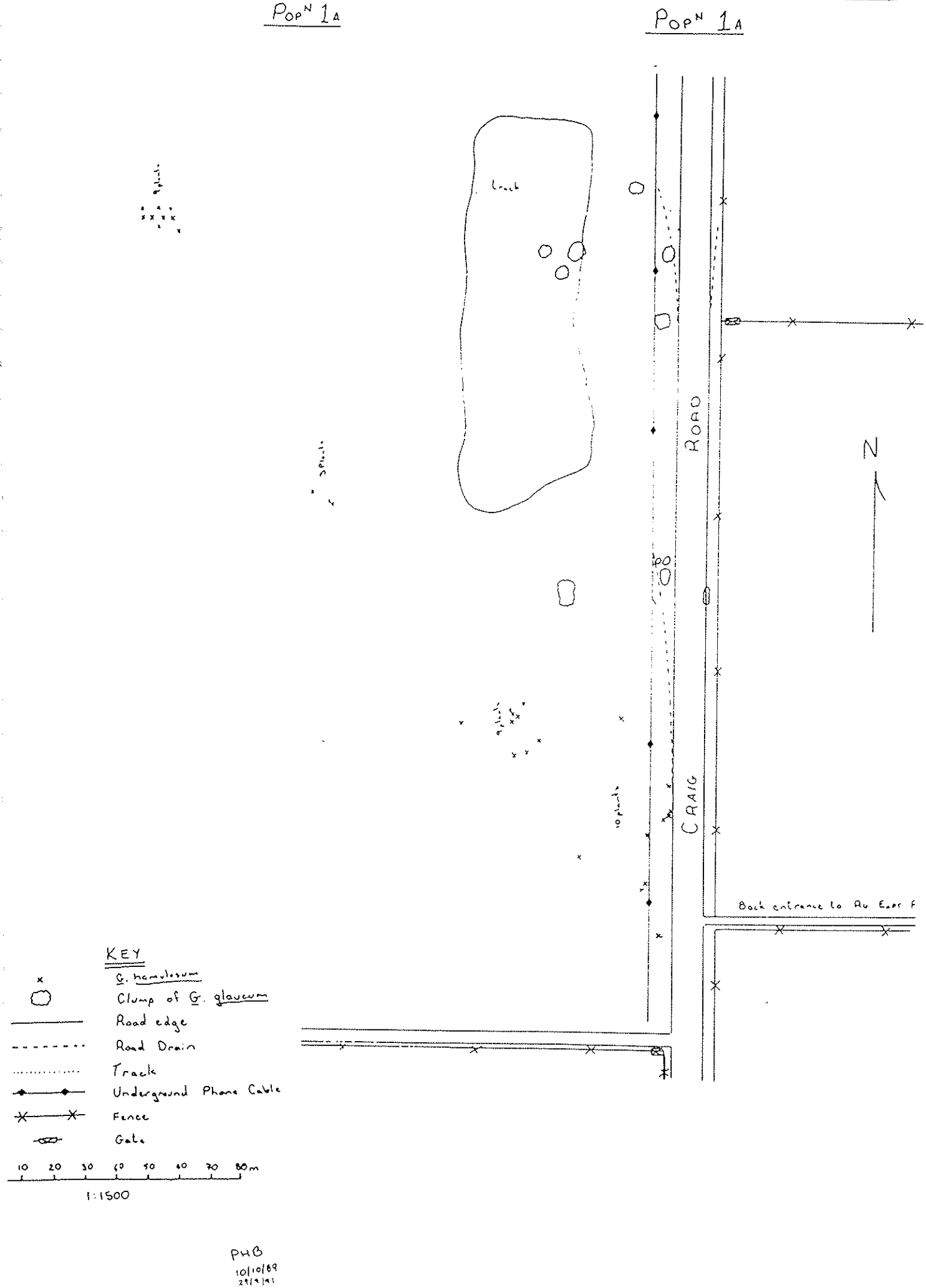
Figure 11 GASTROLOBIUM HAMULOSUM — GASTROLOBIUM GLAUCUM



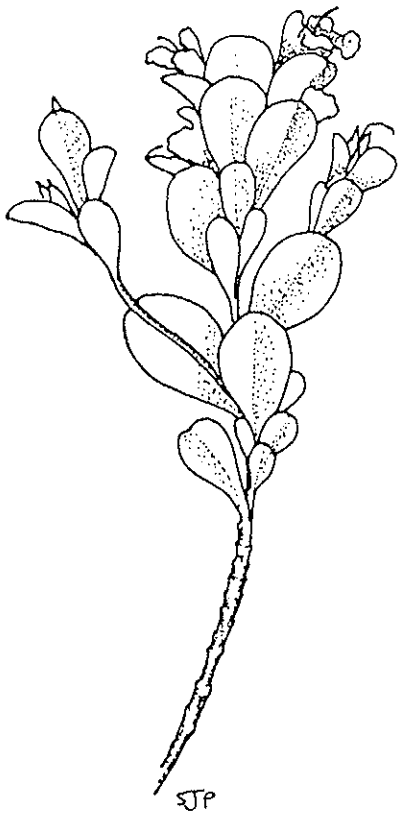
PHB
10/10/89
29/9/91

Gastrolobium hamulosum is restricted to two populations in the Wongan Hills area. Population 1a (33 plants), 1b (11 plants), 1c (6 plants) and 1d (74 plants) occur in the north eastern section of the Experimental Farm bushland and have been mapped by Rare Flora Volunteers in 1991 (Figures 10 and 11). The plants occur in the Sedges/Heath vegetation association and in open spaces in *Allocasuarina campestris* Thicket growing in sandy soils over gravel.

Hemigenia viscida has been previously located on Charles Gardner Reserve No. A 20041, Elphin Nature Reserve No. A 25808 and Water Reserve No. 16418 (between sites W22 and W26). The plants on Elphin Nature Reserve occur in the north eastern section near the boundary with the Water Reserve and the Railway Reserve. Three new populations were discovered on the Water Reserve during the present survey. Details of these new populations are presented below. *Hemigenia viscida* is illustrated in Figure 12.

Location	Vegetation Association	Soil Type	Plant Numbers
adjacent to track (with power lines) ~350 metres NE of site W64	*Dryandra* Low Heath. *Dryandra purdieana* and *Melaleuca scabra* prominent	gravelly sand	12
between sites W20 and W21 (track with power lines)	Scrub Heath adjacent	sandy gravel, ironstone in places	4
near site W30	*Dryandra/Petrophile shuttleworthiana* Thicket	sandy gravel, over ironstone	1

Figure 12: **Line drawing of *Hemigenia viscida***



Stylidium coroniforme occurs at three localities within the Wongan Hills district:

1. west of Elphin Nature Reserve No. A 25808, adjacent to the race track - 30 plants (1991);

2. northern edge of gravel pit at site W30 - 260 plants (1991); and

3. south of site W26 on track with power lines - 100 plants (1991).

Stylidium coroniforme is found in disturbed areas adjacent to *Dryandra/Petrophile shuttleworthiana* Thicket, *Dryandra* Low Heath and Scrub Heath growing in gravelly soils over ironstone in places. No new populations were discovered during the present survey.

b) X: Declared Rare flora - Presumed Extinct

Stylidium neglectum was recorded on granite outcrops on both the Water Reserve and Experimental Farm bushland. This species has been classified as Presumed Extinct due to past confusion in the taxonomy of this group. Voucher specimens collected were identified by Allen Lowrie.

c) Other Species of Interest

Table 6 presents information on location, soil type, associated vegetation and an estimate of abundance for Department of Conservation and Land Management priority species found on the Water Reserve (9 species) and the Experimental Farm bushland (8 species).

TABLE 6: DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT PRIORITY SPECIES OCCURRING ON RESERVE NO. 16418 AND PART RESERVE NO. 18672 WONGAN HILLS AREA

SPECIES	PRIORITY CODE	LOCATION	ASSOCIATED VEGETATION	SOIL TYPE	ABUNDANCE
Gompholobium asperulum	1	site E34 Collection CP193 site 1 = Near site E32	Sedges/Heath, ***Nuytsia floribunda*** over Low Heath	sandy soils	Rare to Occasional
Scaevola tortuosa	1	adjacent to track running north to dam from the Wongan Hills-Piawaning Road	***Eucalyptus loxophleba*** (York gum) Low Forest	loam to clay loam soils	Rare
***Acacia drewiana* ssp. minor**	2	sites E1, W1, between W22 and W23	Scrub Heath ***Dryandra/Petrophile shuttleworthiana*** Thicket	gravelly soils, over ironstone in places	Occasional
Acacia dura	2	sites E5, E23, north east of E26	***Eucalyptus salmonophloia /Eucalyptus salubris*** Woodland	Soil type 7, clayey sand to clay loam over clay	Occasional
Dryandra comosa	2	site W30, ~200 metres north of site W28	***Dryandra/Petrophile shuttleworthiana*** Thicket	gravel soils with ironstone in places	Occasional to Frequent
Goodenia trichophylla	2	site E34	***Nuytsia floribunda*** over Low Heath	sandy soils poorly drained	Rare

SPECIES	PRIORITY CODE	LOCATION	ASSOCIATED VEGETATION	SOIL TYPE	ABUNDANCE
Acacia filifolia	3	sites E2, E30, E31, E34, W2, W24, W25	Sedges/Heath, ***Nuytsia floribunda*** over Low Heath ***Allocasuarina campestris/Hakea erecta*** Heath	sandy soils over gravel at depth	Occasional
Acacia phaeocalyx	3	sites E1, W1, W3, SE of site W20 (track with power lines)	Scrub Heath, ***Eremaea*** Heath	gravelly sand and sand over gravel	Occasional
Hemiandra coccinea	3	site E1, Near site W21 (track with power lines)	Scrub Heath	gravelly sand	Rare
Melaleuca sclerophylla	3	commonly occurring in listed vegetation associations	***Melaleuca sclerophylla*** Low Heath, ***Melaleuca scabra*** Heath, Sedges/Heath	gravelly soils, sand over gravel	Abundant to Occasional
Verticordia venusta	3	east of W18, W62	***Dryandra*** Low Heath Scrub Heath ***Beaufortia*** Heath	gravelly soils	Occasional to Frequent
Verticordia wonganensis	3	~60 metres NW site W3	***Eremaea*** Heath	grey sand	Occasional

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APPENDIX 1 - PLANT SPECIES LIST FOR RESERVE NO. 16418 AND REMNANT VEGETATION ON RESERVE NO. 18672 - WONGAN HILLS AREA

ms Manuscript name
* Introduced Species
1234 Collecting Number for Voucher specimen
C.P. Collected by C Parker
K.K. Collected by K Knight

	Reserve No. 16418	Reserve No. 18672
BRYOPHYTA (Mosses)		
Campylopus introflexus		X
Eccremidium pulchellum		X
Brachymenium preissianum		X
PTERIDOPHYTA (Ferns)		
ADIANTACEAE		
Cheilanthes austrotenuifolia 2750	X	X
GYMNOSPERMAE		
CUPRESSACEAE		
Actinostrobus arenarius	X	X
Callitris canescens 2740	X	X
MONOCOTYLEDONAE		
POACEAE		
Amphipogon strictus C.P. 178		X
* Aira cupaniana 3090a	X	X
* Avena sativa	X	X
* Briza maxima 3074	X	X
* Briza minor	X	X
* Bromus diandrus		X

	Reserve No. 16418	Reserve No. 18672
* Ehrharta calycina	X	
* Hordeum marinum C.P. 303, K.K. 325		X
* Lolium rigidum		X
Neurachne alopecuroidea	X	X
* Pentaschistis airoides 3090b	X	X
* Polypogon monspeliensis C.P. 221		X
Spartochloa scirpoidea	X	X
CYPERACEAE		
Caustis ?dioica		X
Caustis pentandra K.K. 366		X
Lepidosperma ?letophyllum 2791	X	X
Lepidosperma ?resinosum 2978	X	
Mesomelaena preissii 3010	X	X
Schoenus aff. obtusifolius C.P. 276		X
RESTIONACEAE		
Ecdeiocolea monostachya 2693	X	X
Empodisma gracillimum K.K. 362		X
Lepidobolus chaetocephalus 3086	X	X
Lepidobolus preissianus K.K. 304		X
Loxocarya aspera (ms) 2818	X	X
Loxocarya parthenica (ms) 2686	X	X
Loxocarya myrioclada (ms) 2675	X	X
JUNCACEAE		
Juncus sp. C.P. 222		X
PHORMIACEAE		
Dianella revoluta	X	X
Stypandra glauca	X	X
ANTHERICACEAE		
Arthropodium capillipes 3055	X	
Borya laciniata 2780a		X
Borya sphaerocephala 3091	X	X
Chamaescilla corymbosa 2730	X	X
Chamaescilla spiralis	X	X

	Reserve No. 16418	Reserve No. 18672
Laxmannia grandiflora 2968	X	X
Thysanotus dichotomus 3058	X	
Thysanotus patersonii	X	X
Thysanotus ?thyrsoideus 3554	X	
Thysanotus sp. K.K. 303		X
ASPHODELACEAE		
Bulbine semibarbata 3076	X	
COLCHICACEAE		
Burchardia umbellata 2912	X	X
HAEMODORACEAE		
Anigozanthos humilis 2927	X	X
Conostylis androstemma 2783	X	X
Conostylis prolifera 3042	X	X
Conostylis setigera 2680	X	X
Conostylis villosa 3441	X	
Conostylis wonganensis 2969	X	X
Haemodorum ?sp.		X
Tribonanthes longipetala 3073	X	
IRIDACEAE		
* Homeria ?sp.	X	
Patersonia drummondii 3035	X	
Patersonia umbrosa K.K. 361		X
Patersonia sp.		X
* Romulea rosea	X	
ORCHIDACEAE		
Caladenia dimidia (ms) 2779		X
Caladenia flava	X	X
Caladenia microchila (ms) 2781a		X
Caladenia roei 3059	X	
Caladenia longicauda x ?hoffmannii hybrid 2999	X	
Cyanicula amplexans (ms) 2716		X
Cyanicula gemmata (ms)		X
Diuris aff. corymbosa 2731		X

	Reserve No. 16418	Reserve No. 18672
Diuris laxiflora 3086a	X	
Diuris picta 3073a	X	
Diuris ?setacea		X
Elythranthera brunonis 2718	X	X
Prasophyllum cyphochilum 3086c	X	
Prasophyllum ringens (ms) 3073b	X	
Thelymitra antennifera 2822	X	X
Thelymitra campanulata 2966	X	X
Thelymitra fuscolutea var. fuscolutea C.P. 347		X
DICOTYLEDONAE		
CASUARINACEAE		
Allocasuarina acutivalvis	X	X
Allocasuarina campestris	X	X
Allocasuarina drummondiana 2673	X	X
Allocasuarina huegeliana	X	
Allocasuarina humilis 2925	X	X
Allocasuarina microstachya 2970, 2997	X	X
Casuarina obesa K.K. 322		X
PROTEACEAE		
Adenanthos drummondii 3002	X	
Conospermum brownii 3011	X	X
Conospermum incurvum 2971	X	X
Conospermum stoechadis 2664	X	X
Dryandra comosa	X	
Dryandra fraseri	X	
Dryandra purdieana (ms) 2685	X	X
Grevillea acerosa 3447		X
Grevillea armigera 2682	X	X
Grevillea didymobotrya ssp. didymobotrya 3013	X	X
Grevillea eriostachya	X	X
Grevillea eryngioides	X	X
Grevillea hakeoides ssp. stenophylla 2958	X	
Grevillea huegelii 2761		X
Grevillea integrifolia ssp. shuttleworthiana	X	X
Grevillea ?integrifolia ssp. biformis	X	

	Reserve No. 16418	Reserve No. 18672
Grevillea paniculata 2790, 3077	X	X
Grevillea petrophiloides	X	X
Grevillea pterosperma 3425	X	
Grevillea teretifolia 2712	X	X
Grevillea tridentifera 2671	X	X
Grevillea umbellulata 3014	X	
Grevillea uncinulata ssp. uncinulata 2687	X	X
Hakea circumalata 2706	X	X
Hakea coriacea 2772	X	X
Hakea cygna ssp. cygna 2885	X	
Hakea erecta 2824	X	X
Hakea erinacea 3020	X	
Hakea gilbertii	X	X
Hakea incrassata 2908	X	X
Hakea lissocarpha	X	X
Hakea marginata 3089	X	
Hakea meisneriana 2788	X	X
Hakea petiolaris	X	
Hakea platysperma	X	X
Hakea preissii	X	
Hakea scoparia	X	X
Hakea ?sulcata K.K. 376		X
Hakea trifurcata	X	X
Isopogon divergens 2904	X	X
Isopogon ?drummondii C.P. 273		X
Isopogon dubius 2665	X	X
Isopogon scabriusculus 2699	X	X
Persoonia coriacea 3426	X	
Persoonia quinquenervis 3453	X	X
Persoonia scabrella 2789		X
Persoonia striata 2771		X
Petrophile ericifolia 2690	X	X
Petrophile media 2898	X	X
Petrophile seminuda 3044	X	X
Petrophile shuttleworthiana 2681	X	X
Petrophile striata 3068	X	X
Synaphea constricta (ms) 2979	X	X

	Reserve No. 16418	Reserve No. 18672
SANTALACEAE		
Exocarpos sparteus 2905	X	
Santalum acuminatum	X	X
Santalum spicatum	X	
POLYGONACEAE		
Muehlenbeckia adpressa	X	X
OLACACEAE		
Olax benthamiana	X	
LORANTHACEAE		
Nuytsia floribunda		X
CHENOPODIACEAE		
Enchylaena lanata 2946	X	X
Halosarcia lepidosperma 3461		X
Halosarcia pergranulata K.K. 326, C.P. 295		X
Maireana carnosa 3056	X	X
Maireana georgei C.P. 293		X
Rhagodia drummondii 3057	X	X
Rhagodia preissii ssp. preissii 2755	X	X
Sclerolaena diacantha 3412	X	
AMARANTHACEAE		
Ptilotus declinatus C.P. 229		X
Ptilotus polystachyus		X
Ptilotus spathulatus 3040	X	X
Ptilotus stirlingii K.K. 364		X
Ptilotus sp. C.P. 363		X
AIZOACEAE		
* Mesembryanthemum nodiflorum	X	X
PORTULACACEAE		
Calandrinia ?sp. 3076	X	

	Reserve No. 16418	Reserve No. 18672
CARYOPHYLLACEAE		
* Petrorhagia velutina	X	
* Spergularia rubra C.P. 219, 305		X
LAURACEAE		
Cassytha aurea var. hirta 2697		X
Cassytha glabella 3028	X	X
Cassytha melantha 2787		X
Cassytha ?pubescens C.P. 277	X	X
FUMARIACEAE		
* Fumaria muralis		X
BRASSICACEAE		
* Raphanus raphanistrum	X	X
DROSERACEAE		
Drosera glanduligera 2779b	X	X
Drosera ?leucoblasta C.P. 320		X
Drosera macrantha 3074	X	X
Drosera macrophylla 2812	X	X
Drosera ?parvula C.P. 325		X
Drosera spilos 2694	X	X
Drosera subhirtella ssp. subhirtella 2717	X	X
CRASSULACEAE		
Crassula colorata 3082	X	X
PITTOSPORACEAE		
Billardiera coriacea 2937	X	
Billardiera erubescens 3026	X	
MIMOSACEAE		
Acacia acuaria 2944	X	
Acacia acuminata 2753	X	X
Acacia aestivalis 3080	X	
Acacia bidentata 2960	X	
Acacia ?chrysella 3065	X	

	Reserve No. 16418	Reserve No. 18672
Acacia cupularis 3007	X	
Acacia drewiana ssp. minor 2689	X	X
Acacia dura 2765		X
Acacia erinacea 2762	X	X
Acacia ericksonii 2719	X	X
Acacia filifolia 2709	X	X
Acacia fragilis 2809	X	X
Acacia jacksonioides 3030	X	X
Acacia lasiocalyx	X	X
Acacia lasiocarpa var. bracteolata 2720	X	X
Acacia latipes 2920	X	X
Acacia leptospermoides ssp. leptospermoides 2919	X	X
Acacia ligustrina 2972	X	X
Acacia multispicata 2702	X	X
Acacia neurophylla 3411	X	
Acacia nigripilosa ssp. nigripilosa 2676	X	X
Acacia orbifolia 2763	X	X
Acacia phaeocalyx 2688	X	X
Acacia pulchella ssp. goadbyi 3019	X	
Acacia resinosa C.P. 210, 312		X
Acacia restiacea 3409, 2663	X	X
Acacia saligna 3071	X	X
Acacia semicircinalis 2907	X	
Acacia stereophylla 3085	X	
Acacia sulcata var. platyphylla 2721	X	X
Acacia ulicina		X
Acacia sp. 2782, 3458		X
PAPILIONACEAE		
Bossiaea eriocarpa	X	X
Chorizema aciculare	X	X
Chorizema genistoides 3069	X	
Daviesia benthamii	X	
Daviesia aff. daphnoides	X	X
Daviesia euphorbioides		X
Daviesia ?hakeoides 2710	X	X
Daviesia nudiflora	X	X

	Reserve No. 16418	Reserve No. 18672
Daviesia ?pachyphylla K.K. 356		X
Daviesia sp. 2956	X	
Gastrolobium calycinus	X	X
Gastrolobium glaucum 3004	X	X
Gastrolobium hamulosum		X
Gastrolobium parviflorum 2936	X	X
Gastrolobium spinosum	X	X
Gastrolobium trilobum		X
Gompholobium asperulum 3452		X
Gompholobium obcordatum	X	X
Gompholobium tomentosum C.P. 269		X
Jacksonia ?lehmannii K.K. 314		X
Jacksonia macrocalyx 3433b	X	
Jacksonia fasciculata 2926	X	
Jacksonia ?sericea C.P. 188, 244		X
Jacksonia ?spinosa K.K. 372		X
Jacksonia sp. 3433	X	X
* Lupinus sp.	X	
Mirbelia dilatata	X	
Mirbelia floribunda 2701	X	X
Mirbelia ramulosa 3070	X	
Mirbelia spinosa 3009	X	X
Nemcia hookeri 2801		X
Nemcia obovata 3016	X	X
Templetonia sulcata	X	X
* Trifolium arvense C.P. 232		X
GERANIACEAE		
Erodium cygnorum 3063	X	
RUTACEAE		
Boronia coerulescens ssp. spinescens 2713	X	X
Boronia ramosa ssp. anethifolia 2691		X
Diplolaena microcephala 3050	X	
Phebalium ambiguum 2795		X
Phebalium filifolium 2959	X	
Phebalium tuberculosum 2732	X	X

	Reserve No. 16418	Reserve No. 18672
POLYGALACEAE		
Comesperma calymega K.K. 367		X
Comesperma drummondii 2896	X	
Comesperma integerrimum 3060	X	
Comesperma scoparium	X	X
Comesperma volubile 2729	X	X
CELASTRACEAE		
Psammomoya choretroides 2679	X	X
STACKHOUSIACEAE		
Stackhousia monogyna 2975	X	X
Stackhousia scoparia 3039	X	X
Tripterococcus brunonis C.P. 246		X
SAPINDACEAE		
Dodonaea bursariifolia 2955	X	X
Dodonaea divaricata 2724		X
Dodonaea inaequifolia 3079	X	
Dodonaea aff. microzyga 2963	X	
Dodonaea pinifolia 2804	X	X
Dodonaea viscosa ssp. angustissima 3408	X	X
RHAMNACEAE		
Cryptandra glabriflora 2668	X	X
Cryptandra leucophracta	X	X
Cryptandra pomaderroides C.P. 255		X
Cryptandra pungens 2667	X	X
MALVACEAE		
Alyogyne hakeifolia	X	X
STERCULIACEAE		
Commersonia pulchella 3027	X	
Guichenotia micrantha 3094	X	
Guichenotia sarotes 3542	X	
Keraudrenia integrifolia 3541	X	X
Lasiopetalum molle 2951	X	

	Reserve No. 16418	Reserve No. 18672
Lysiosepalum rugosum 2794		X
Rulingia densiflora 3438	X	
DILLENIACEAE		
Hibbertia acerosa 3017	X	X
Hibbertia drummondii 3012	X	
Hibbertia enervia 3031	X	
Hibbertia exasperata 2678	X	X
Hibbertia glomerata C.P. 238		X
Hibbertia glomerosa 2726	X	X
Hibbertia huegelii 2950	X	X
Hibbertia hypericoides 2895	X	X
Hibbertia rostellata 2725		X
Hibbertia rupicola 3048	X	X
THYMELAEACEAE		
Pimelea avonensis 2811	X	X
Pimelea brevifolia 2995	X	
Pimelea ?brevistyla C.P. 334		X
Pimelea imbricata var. piligera 3100	X	X
Pimelea leucantha 2984	X	
Pimelea sulphurea 2784	X	X
MYRTACEAE		
Baeckea crispiflora 2714	X	X
Baeckea aff. crispiflora A. 3455		X
Baeckea muricata 3436	X	
Baeckea aff. preissiana 2923	X	
Baeckea sp. 9 3006	X	
Baeckea sp. 2776		X
Beaufortia bracteosa 3437	X	X
Beaufortia elegans 3445	X	X
Beaufortia interstans 3427	X	X
Beaufortia squarrosa 3428	X	
Calothamnus quadrifidus 3000	X	X
Calothamnus sanguineus 2695	X	X
Calothamnus sp. 2774, 3018	X	X
Calytrix ?angulata C.P. 183, 309		X

	Reserve No. 16418	Reserve No. 18672
Calytrix depressa 3406	X	X
Calytrix gracilis 2918	X	
Calytrix leschenaultii 2986	X	X
Calytrix sapphirina 3430	X	X
Calytrix violacea 2924	X	X
Chamelaucium drummondii ssp. hallii 2674	X	X
Darwinia purpurea 3466b	X	X
Eremaea pauciflora 2892	X	X
Eucalyptus arachnaea 2816	X	X
Eucalyptus celastroides 2942	X	X
Eucalyptus eremophila 2987	X	X
Eucalyptus erythronema	X	X
Eucalyptus eudesmioides	X	X
Eucalyptus flocktoniae 2953	X	
Eucalyptus hypoclamydea ssp. edysiustes 2918	X	X
Eucalyptus longicornis		X
Eucalyptus loxophleba 2758	X	X
Eucalyptus myriadena 2815		X
Eucalyptus pluricaulis ssp. pluricaulis 2797b	X	X
Eucalyptus pyriformis	X	X
Eucalyptus rigidula 2698	X	X
Eucalyptus aff. rigidula C.P. 224		X
Eucalyptus salmonophloia	X	X
Eucalyptus salubris		X
Eucalyptus semivestita ssp. "western" 2764	X	X
Eucalyptus sheathiana 2756		X
Eucalyptus subangusta 3448		X
Eucalyptus wandoo	X	X
Hypocalymma angustifolium	X	X
Kunzea limnicola (ms) 3045	X	X
Kunzea pulchella	X	
Leptospermum erubescens 2670	X	X
Leptospermum oligandrum		X
Melaleuca acuminata ssp. websteri 2941	X	X
Melaleuca adnata	X	X
Melaleuca conothamnoides 2770	X	X
Melaleuca aff. cordata 2826	X	X
Melaleuca coronicarpa ssp. coronicarpa (ms) 3398	X	X

	Reserve No. 16418	Reserve No. 18672
Melaleuca ctenoides (ms) 3532, 2768		X
Melaleuca fulgens 3407	X	X
Melaleuca holosericea 3465	X	X
Melaleuca lateriflora	X	X
Melaleuca laxiflora 2962	X	X
Melaleuca ?pentagona C.P. 192, K.K. 379		X
Melaleuca platycalyx	X	X
Melaleuca pungens	X	X
Melaleuca radula 2777	X	X
Melaleuca sclerophylla 2981	X	X
Melaleuca scabra 2962	X	X
Melaleuca spicigera	X	X
Melaleuca uncinata	X	X
Melaleuca undulata ssp. undulata "Wongan biotype" 2803	X	X
Micromyrtus racemosa ssp. racemosa 2785	X	X
Pileanthus peduncularis 3440	X	
Scholtzia drummondii 2982	X	X
Thryptomene australis 3098	X	X
Thryptomene ?prolifera C.P. 287		X
Thryptomene racemulosa 2704	X	X
Verticordia acerosa ssp. preissii 2727		X
Verticordia brachypoda 3415, 3422	X	X
Verticordia chrysantha 2915	X	X
Verticordia chrysanthella 3405	X	X
Verticordia densiflora 3439	X	X
Verticordia eriocephala 3431	X	X
Verticordia huegelii var. stylosa 3451		X
Verticordia monadelpha 3420	X	X
Verticordia picta	X	X
Verticordia ?pritzellii K.K. 303		X
Verticordia venusta 3429	X	
Verticordia wonganensis 3444	X	
HALORAGACEAE		
Glischrocaryon aureum 3435	X	X
Glischrocaryon flavescens 3404	X	

	Reserve No. 16418	Reserve No. 18672
APIACEAE		
Actinotus ?superbus 3546	X	
Daucus glochidiatus 2749	X	X
Trachymene cyanopetala 2807b	X	X
Trachymene ornata 3090	X	X
Platysace ?maxwellii	X	X
EPACRIDACEAE		
Andersonia lehmanniana ssp. pubescens 2992	X	
Astroloma serratifolium 2775	X	X
Leucopogon ?conostephioides 3540	X	X
Leucopogon gracillimus 2722		X
Leucopogon hamulosum 2825	X	X
Leucopogon ?planifolius 3446	X	X
Leucopogon ?tamminensis C.P. 259		X
Lysinema ciliatum	X	X
PRIMULACEAE		
* Anagallis arvensis var. caerulea	X	X
LOGANIACEAE		
Logania flaviflora C.P. 323, K.K. 347		X
Mitrasacme paradoxa	X	X
GENTIANACEAE		
* Centaurium erythraea 3417b	X	X
APOCYNACEAE		
Alyxia buxifolia 2773		X
CONVOLVULACEAE		
Wilsonia humilis 2766	X	X
BORAGINACEAE		
* Echium plantagineum	X	
Halgania sp. 3466	X	X

	Reserve No. 16418	Reserve No. 18672
CHLOANTHACEAE		
Cyanostegia angustifolia	X	
Dicrastylis velutina 3443	X	
LAMIACEAE		
Hemiandra coccinea 2700	X	X
Hemigenia sericea 3084	X	
Hemigenia viscida	X	
Hemigenia westringioides 3032	X	X
Microcorys obovata 2957	X	X
SOLANACEAE		
Solanum oldfieldii 3072	X	
* Solanum hystrix K.K. 371		X
SCROPHULARIACEAE		
* Parentucellia latifolia	X	
MYOPORACEAE		
Eremophila decipiens 2752		X
Eremophila lehmanniana 2817	X	X
Eremophila sp. 2820		X
PLANTAGINACEAE		
* Plantago coronopus ssp. commutata K.K. 382		X
RUBIACEAE		
Opercularia vaginata	X	X
CAMPANULACEAE		
* Wahlenbergia capensis 3076b	X	
LOBELIACEAE		
Isotoma hypocrateriformis		X
Lobelia rarifolia C.P. 216		X

	Reserve No. 16418	Reserve No. 18672
GOODENIACEAE		
Brunonia australis	X	X
Dampiera lavandulacea 2980	X	X
Dampiera lindleyi 2669	X	X
Dampiera oligophylla ssp. juncea 2897	X	X
Dampiera spicigera 3442	X	X
Dampiera ?teres C.P. 322, K.K. 329		X
Dampiera wellsiana 2976	X	X
Goodenia caerulea 3402b	X	X
Goodenia helmsii 3462	X	X
Goodenia pinifolia 3424	X	X
Goodenia trichophylla 3457b		X
Lechenaultia biloba	X	X
Scaevola arenaria C.P. 212		X
Scaevola hamiltonii 3419	X	
Scaevola spinescens	X	
Scaevola tortuosa 3083	X	
Verreauxia reinwardtii C.P. 281		X
STYLIDIACEAE		
Levenhookia stipitata C.P. 236		X
Stylidium breviscapum 3043	X	X
Stylidium bulbiferum C.P. 217, 288, 307		X
Stylidium crassifolium 2965	X	
Stylidium calcaratum	X	X
Stylidium coroniforme	X	
Stylidium leptophyllum 3416	X	X
Stylidium ?macrocarpum C.P. 274, 351		X
Stylidium neglectum 3416b	X	X
Stylidium nungarinense 2947	X	X
Stylidium periscelianthum 2807	X	X
Stylidium petiolare 2736		X
Stylidium repens 2707	X	X

		Reserve No. 16418	Reserve No. 18672
ASTERACEAE			
*	Arctotheca calendula	X	X
	Angianthus tomentosus 3403	X	X
	Blennospora drummondii	X	X
	Brachycome bellidioides C.P. 298		X
	Brachycome iberidifolia 2990b	X	
	Cephalipterum drummondii 3082b	X	
	Chthonocephalus pseudevax 2807b	X	X
	Cotula coronopifolia		X
	Erymophyllum tenellum 3401	X	X
	Erymophyllum ramosum K.K. 387		X
	Gnephosis tenuissima 3401b	X	X
	Helichrysum lindleyi 2769	X	X
	Helipterum manglesii	X	X
	Helipterum splendidum 3401	X	
	Helipterum verecundum 3058b	X	
	Hyalosperma cotula	X	X
	Hyalosperma glutinosum 3041	X	X
	Millotia myosotidifolia 2780		X
	Olearia muelleri	X	X
	Olearia ?revoluta 2934	X	
	Podolepis capillaris	X	X
	Podolepis canescens 3051	X	X
	Podolepis lessonii	X	X
	Podotheca angustifolia	X	X
	Podotheca gnaphalioides	X	X
	Pogonolepis stricta C.P. 220		X
	Senecio glomeratus 2747		X
*	Ursinia anthemoides	X	X
	Waitzia acuminata	X	X
	Waitzia aurea 3078	X	X
	Waitzia citrina 3052	X	X
	Waitzia paniculata	X	X

APPENDIX 2 - MUIR VEGETATION DESCRIPTIONS

Eucalyptus salmonophloia Woodland

Site W38 Woodland (patchy) over Herbs (Low Grass) (surrounded by *Eucalyptus loxophleba* Low Forest A)

Site W41 Woodland (Forest) over Open Scrub/Scrub over Low Scrub C in places. Area of Shrub Mallee and *Melaleuca acuminata* Thicket

Site W48 Open Woodland (Low Woodland A) over *Eucalyptus loxophleba* Low Forest A (patchy) over Scrub (patchy) over Dwarf Scrub C (Herbs)

Site W55 Woodland over *Melaleuca adnata, Melaleuca undulata* Thicket (Dense Thicket)

Site W57 Woodland/Forest (patchy) over *Eucalyptus loxophleba* Open Low Woodland A over *Melaleuca coronicarpa* Thicket in places. Area of *Melaleuca acuminata* Scrub

Eucalyptus salmonophloia/Eucalyptus salubris Woodland

Site E5 Open Low Woodland A over *Melaleuca acuminata* Thicket/Dense Thicket over Heath A of *Melaleuca adnata/Melaleuca coronicarpa* in places

Site E8 Woodland over Open Scrub/Open Low Scrub A over Open Dwarf Scrub C over Herbs/Low Heath D. Area of Shrub Mallee

Site E23 Woodland over Low Heath C in places (scattered shrubs to 2.5 metres). Areas of *Melaleuca acuminata, Melaleuca adnata* Thicket/Dense Thicket and Shrub Mallee

Site E25 Low Woodland A over *Melaleuca acuminata* Thicket

Site W42 Forest over *Eucalyptus salubris* Low Woodland A/Low Forest A with Open Tree Mallee over Scrub (patchy) over Low Heath C

Eucalyptus wandoo Low Woodland

Site E37 Low Woodland A (patchy) over Open Scrub over Low Grass/Herbs (patchy)

Site W37 Low Woodland A (Open Low Woodland A) over Thicket over Herbs/Open Herbs (patchy) area of *Ecdeiocolea monostachya* Tall sedges

Eucalyptus loxophleba Low Forest

Site E29 Low Forest A over *Melaleuca uncinata* Scrub/Thicket

Site W33 Low Forest A (Shrub Mallee) over Thicket over Open Dwarf Scrub D/Open Herbs

Site W39 Low Forest A (Tree Mallee) over *Melaleuca uncinata* Thicket over Dwarf Scrub C in places over Herbs (streamline)

Site W43 Low Forest A (Tree Mallee) over *Melaleuca uncinata* Thicket over Low Heath C near track over Herbs

Site W60 Low Forest A (Tree Mallee) over Open Scrub over Open Dwarf Scrub C over Open Dwarf Scrub D over Herbs (Dense Herbs) in places

Eucalyptus loxophleba Low Forest over *Acacia acuminata*

Site W40 Low Forest A (Tree Mallee) over Low Woodland B over Herbs (scattered *Eucalyptus salmonophloia* at edge)

Site W44 Low Forest A (Tree Mallee) over Low Forest B over Herbs

Site W47a) Low Woodland A over Low Forest B over Dwarf Scrub C in places over Herbs

Site W47b) Low Forest A over Low Forest B over Dwarf Scrub C in places over Herbs/Low Grass

Site W58 Low Woodland A (Open Tree Mallee) over Low Forest B over Herbs/Dense Herbs (patchy)

Acacia acuminata Low Forest

Site W46 Low Forest A/Low Forest B over Herbs (Dense Herbs) (scattered shrubs)

Site W56 Low Forest B (scattered *Eucalyptus loxophleba)* over Herbs/Tall Grass

Mallee over *Melaleuca uncinata*

Site E4 Open Shrub Mallee (patchy) over Thicket over Open Low Sedge/Dwarf Scrub D

Site E15 Open Shrub Mallee (patchy) over Thicket/Dense Thicket

Site W8 Open Shrub Mallee (patchy) over Heath B

Site W11 Open Shrub Mallee over Heath A/Thicket over Open Dwarf Scrub D in places

Site W14 Open Shrub Mallee (patchy) over Heath C (regeneration)

Site W28 Open Shrub Mallee/Shrub Mallee over Heath A over Dwarf Scrub D in places

Site W32 Tree Mallee/Open Tree Mallee over Thicket (Dense Thicket in places)

Mallee over *Melaleuca coronicarpa*

Site E9 Very Open Shrub Mallee/Open Shrub Mallee (patchy) over Heath B (Dense Heath B)

Site E19 Very Open Shrub Mallee (scattered in places) over Dense Heath B/Heath B (breakaway slope)

Site E21 Open Shrub Mallee/Very Open Shrub Mallee (patchy) over Dense Low Heath C

Site E22 Very Open Shrub Mallee/Shrub Mallee over *Melaleuca uncinata* Scrub/Open Scrub over Low Heath C. Area of *Callitris canescens* Open Low Woodland B (patchy)

Site W6 Low Heath C (scattered mallee) (breakaway slope)

Site W9 Open Shrub Mallee (patchy) over Dense Heath B (Heath A in places)

Site W15 Open Shrub Mallee over Low Heath D - regeneration (scattered *Melaleuca uncinata* to 1.5 metres)

Site W16 Open Shrub Mallee over *Melaleuca uncinata* Scrub over Heath B

Mallee over *Melaleuca*

Site E11 Shrub Mallee over Open Low Scrub A of *Melaleuca coronicarpa* and *Melaleuca adnata*

Site E24 Shrub Mallee over Open Low Woodland B of *Callitris canescens* (patchy) over *Melaleuca uncinata* Open Low Scrub A over Open Low Scrub B/Low Scrub B of *Melaleuca coronicarpa* (patchy)

Site E27 Shrub Mallee/Tree Mallee over Low Woodland B of *Callitris canescens* (patchy) in places over Open Low Scrub A of *Melaleuca coronicarpa, Melaleuca undulata* and *Melaleuca uncinata*

***Dryandra/Petrophile shuttleworthiana* Thicket**

Site E42 Heath A (Dense Heath A) over Dwarf Scrub C

Site W4 Heath B/Dense Heath B

Site W30 Very Open Shrub Mallee in places over Heath A over Open Dwarf Scrub C

Site W22 Low Heath C (Dense Low Heath C) to Heath B in places

***Dryandra* Low Heath**

Site W5 Low Heath D (Dense Low Heath D) to Low Heath C in places

Site W7 Low Heath C (Dense Low Heath C)

Site W12 Low Heath C (scattered mallee)

Site W18 Low Heath C/Low Heath D (scattered mallee)

Scrub Heath

Site E1 Open Low Scrub A/Open Low Scrub B in places over Heath B (Low Heath C) [scattered *Eucalyptus pyriformis]*

Site W1 Open Low Scrub A/Open Low Scrub B in places over Low Heath C [scattered *Eucalyptus pyriformis]*

Site W20 Open Scrub over Heath A

Site W21 Open Scrub in places over Heath A/Heath B (Dense Heath B) [scattered mallee]

Site W23 Open Scrub in places over Heath C (Dense Heath C)

***Allocasuarina campestris* Thicket**

Site E3 Thicket patchy over Open Dwarf Scrub D over *Borya sphaerocephala* Open Herbs in places

Site E13 Heath A (Thicket around granite) over Dwarf Scrub D

Site E17 Heath B/Low Scrub B over *Ecdeiocolea monostachya* Tall Sedges/Open Tall Sedges in places over Open Herbs of *Borya sphaerocephala*

Site E33 Heath A (Thicket) over *Ecdeiocolea monostachya* Very Open Tall Sedges/Open Tall Sedges over Open Low Sedges/Dwarf Scrub D *(Borya sphaerocephala* Herbs in places)

Site E47 Thicket (scattered mallee) over Dwarf Scrub C (patchy)

Site W13 Very Open Shrub Mallee over Dense Heath B (regeneration)

Site W35 Dense Heath A/Heath A (Heath B in places) over *Ecdeiocolea monostachya* Very Open Tall Sedges in places over *Borya sphaerocephala* Herbs in places. *Eucalyptus loxophleba* scattered - near granite

Site W49 Dense Heath B to Dense Heath A of *Ecdeiocolea monostachya* Open Tall Sedges in places

Site W53 Heath A over Dwarf Scrub D - adjacent to granite

***Allocasuarina campestris/Calothamnus aspera* Thicket**

Site E26 Thicket/Dense Thicket

***Allocasuarina campestris/Hakea meisneriana* Thicket**

Site E40 Scrub/Thicket over Heath A (Low Scrub A) over Low Heath C/Dwarf Scrub C

Site E41 Scrub over Heath A over Open Dwarf Scrub C

***Allocasuarina campestris/Hakea erecta* Heath - Unburnt**

Site W25 Heath A over *Ecdeiocolea monostachya* Tall Sedges (patchy) over Open Dwarf Scrub D in places.

Site W27 Heath A over *Ecdeiocolea monostachya* Tall Sedges/Open Tall Sedges (patchy) over Open Dwarf Scrub D in places

Site W63 *Grevillea eriostachya* Open Scrub over Heath B (patchy) over *Ecdeiocolea monostachya* Very Open Tall Sedges/Open Low Scrub C

Allocasuarina campestris/Hakea erecta Heath - Regeneration

Site W2 Open Scrub/scattered shrubs to 3 metres over Low Heath C over Open Low Sedges (Low Sedges)/Dwarf Scrub D (Low Heath D)

Site W24 Open Low Scrub A over Low Heath C/Dwarf Scrub C *(Ecdeiocolea monostachya* Tall Sedges) over Dwarf Scrub D/Low Heath D *(Ecdeiocolea monostachya* Low Sedges)

Site W29 Open Low Scrub A over Low Heath C/Heath B/*Ecdeiocolea monostachya* Tall Sedges over Dwarf Scrub D/*Ecdeiocolea monostachya* Open Low Sedges

Allocasuarina acutivalvis Thicket

Site E6 Thicket over Dwarf Scrub C

Site E10 Thicket over Open Scrub over Dwarf Scrub C

Site E44 Thicket (Dense Thicket) over Dwarf Scrub C/Low Heath C (patchy)

Melaleuca uncinata Thicket

Site E20 Thicket over *Melaleuca coronicarpa, Melaleuca ctenoides* Low Scrub B in places

Site E35 Heath A (Heath B) over Low Heath D (patchy) streamline - Dense Thicket upslope

Site E36 Thicket *(Melaleuca hamulosa, Melaleuca uncinata)*

Site W52 Dense Thicket/Thicket over Open Dwarf Scrub D in places

Site W59 Thicket over Herbs/Low Grass in places

Melaleuca scabra Heath

Site E7 *Melaleuca uncinata* Open Low Scrub A over *Melaleuca scabra* Low Heath C over Dwarf Scrub D *(Melaleuca sclerophylla* prominent) to *Melaleuca uncinata, Melaleuca scabra* Low Scrub B over Low Heath C/Dwarf Scrub C *(Melaleuca sclerophylla* and *Kunzea limnicola* prominent). Scattered *Callitris canescens* to 3 metres forming Open Low Woodland B in places

Site E12 Open Scrub over *Melaleuca scabra* Low Scrub B over *Melaleuca conothamnoides* Low Heath C

Site E16 Open Scrub over *Melaleuca scabra* Low Scrub A/Heath A (patchy) over *Melaleuca conothamnoides* Low Heath C

Site E43 Mosaic of Open Shrub Mallee over *Melaleuca uncinata* Thicket and *Melaleuca scabra* Low Heath C (Heath B) over *Melaleuca sclerophylla* Dwarf Scrub D in places (patchy). Patches of *Callitris canescens* Low Forest B, scattered overall

Site E45 *Melaleuca scabra* Open Low Scrub B (scattered) over *Melaleuca conothamnoides* Low Heath C

Site E46 Open Scrub over *Melaleuca scabra* Heath B over *Melaleuca conothamnoides* Dwarf Scrub C/Heath C

Site W17 Open Low Scrub B/Low Scrub B over *Melaleuca scabra* Low Heath C (scattered shrub mallee)

Site W31 Open Scrub over *Melaleuca scabra* Heath B over *Melaleuca conothamnoides, Melaleuca* aff. *cordata* Dwarf Scrub D (scattered shrub mallee)

Melaleuca sclerophylla Low Heath

Site W26 Low Heath D (scattered shrubs to 1.5 metres)

Site W34 Low Heath D (scattered shrubs to 1.5 metres)

Site W50 Low Heath C (scattered shrubs to 1.5 metres and scattered shrub mallee)

Eremaea Heath

Site W3 Open Scrub in places over Low Heath C over Dwarf Scrub D in places

Site W45 Low Heath C over Dwarf Scrub D/Herbs in places

Site W64 Open Low Scrub A over Low Heath C over Dwarf Scrub D

Beaufortia Heath

Site W62 Open Low Scrub A/Low Scrub A (Heath A) over Low Heath C/Low Scrub C over Open Dwarf Scrub D in places

Sedges/Heath

Site E2 Tall Sedges/Low Heath C. Scattered shrubs to 3 metres including *Allocasuarina campestris. (Allocasuarina campestris* Thicket adjacent)

Site E18 *Allocasuarina campestris* Open Low Scrub B over Tall Sedges over *Borya sphaerocephala* Open Herbs/Very Open Herbs in places

Site E30 Tall Sedges/Low Heath C (scattered shrubs to 3 metres including *Allocasuarina campestris)*

Site E32 Thicket/Heath A Of *Allocasuarina campestris* in adjacent areas and interspersed in places. Tall Sedges/Low Heath C or Open Tall Sedges over Low Heath D

Site E38 *Allocasuarina campestris* Open Low Scrub A in places over Open Low Scrub C *(Ecdeiocolea monostachya* frequent to occasional) over Low Heath D *Melaleuca conothamnoides* prominent
Tall Sedges/Low Heath C in areas of deeper sand

Site W10 Mosaic of *Allocasuarina campestris* Thicket in patches forming Low Scrub A (patchy) over Tall Sedges/Low Heath C

Site W19 *Grevillea didymobotrya* Open Low Scrub B in places over Low Heath D/Low Sedges - regeneration.

***Nuytsia floribunda* over Low Heath**

Site E31 Open Low Scrub B over Low Scrub C over Low Sedges/Low Heath D/Herbs

Site E34 Open Scrub over Open Low Scrub B (Low Scrub B) in places over Low Sedges/Low Heath D/Herbs

Open Scrub over Herbs/Sedges

Site W51 Open Scrub in places over Open Dwarf Scrub D in places over Herbs/Low Sedges

Granite Rock

Site E14 *Borya sphaerocephala/Borya laciniata* Herbs (patchy)
Calytrix depressa Low Heath D
Allocasuarina campestris Thicket

Site E28 *Borya* Herbs (Dense Herbs) patchy
Low Heath D to Low Heath C of *Verticordia chrysanthella, Calytrix depressa*
Tall Grass of *Spartochloa scirpoidea*
Allocasuarina campestris Heath A - scattered *Eucalyptus loxophleba*

Site W36	*Borya* Herbs Low Heath D of *Calytrix depressa, Verticordia chrysanthella,* *Allocasuarina campestris* Heath A (Dense Heath A)
Site W53	*Borya* Herbs (Dense Herbs) *Ecdeiocolea monostachya* Tall Sedges *Verticordia chrysanthella* Low Heath C *Allocasuarina campestris* Thicket
Site W54	*Borya* Herbs (Dense Herbs) Low Heath C *Calytrix depressa, Verticordia chrysanthella* *Allocasuarina campestris* Thicket
Site W61	*Borya* Herbs/Dense Herbs (patchy) scattered shrubs to 1.5 metres Low Heath C of *Verticordia chrysanthella, Calytrix depressa* *Allocasuarina campestris* Thicket/Dense Thicket *Hakea petiolaris/Acacia lasiocalyx* Dense Thicket to 8 metres
Site W61a	*Allocasuarina huegeliana* Low Forest B

Samphire

Site E39	Low Heath D (scattered shrubs to 2 metres)

APPENDIX 3 - DESCRIPTIONS OF SOIL ASSOCIATIONS MAPPED FOR THE REMNANT VEGETATION ON RESERVE 18672 (DEPARTMENT OF AGRICULTURE, UNPUBLISHED)

1. DESCRIPTIONS OF TYPICAL SOIL PROFILES OBSERVED IN A SOIL SURVEY CONDUCTED IN 1945

YALING SERIES

Yaling sandy gravel (Ysg)

Surface is gravelly. Below is light yellowish brown sandy ironstone gravel. This gravel probably overlies massive laterite at depths greater than 60 cm.

Yaling loamy gravel (Ylg)

0-15 cm	Ironstone gravel with matrix of loamy sand or sandy loam.
15+ cm	Hard laterite.

ELPHIN SERIES

Elphin loamy sand (Els)

0-12 cm	Grey loamy sand.
12-35 cm	Yellowish grey to greyish yellow sandy loam to sandy clay loam cemented with slight gravel.
35-68 cm	Mottled light grey yellow and brown sandy clay loam, weakly cemented with slight gravel.
68-152 cm	Mottled and more cemented below 68 cm.

Elphin loamy sand - Hardpan phase (Elsh)

Surface sometimes little gravelly.

0-10 cm	Grey loamy sand.
10-23 cm	Light grey and greyish yellow sandy loam to sandy clay loam.
23-35 cm	Greyish yellow sandy clay loam with much laterite gravel.
35-45 cm	Yellow and brown hardpan of vesicular laterite.
45-180 cm	Yellow, brown and light grey cemented but not as hard as 35-45 cm.

WONGAN SERIES

Wongan loamy sand (Wls)

0-10 cm	Greyish yellow or yellowish grey loamy sand.
10-60 cm	Yellow to bright yellow mellow sandy loam sometimes tending to sandy clay loam.
60-305 cm	Yellow mellow sandy loam with red brown ferruginous soft cemented pockets.

Wongan sand (Ws)

Similar to Wongan loamy sand but lighter in texture. Often runs on to harder gravel below 60 cm.

Note: In the survey of the newly cleared land an area of Ws is shown with gravel at 38-60 cm. This is probably a transition between Ws and Ylg in which the Ws is overlying the Ylg.

MOCARDY SERIES

Mocardy sand (Ms)

0-12 cm	Light grey gritty coarse sand.
12-45 cm	Greyish yellow gritty sand sometimes with quartz gravel below 30 cm.
45-81 cm	Mottled red brown yellow and grey gritty clay.
81-99 cm	Mottled gritty clay with pockets weathered granite rock.

Mocardy loamy sand (Mls)

Much quartz rubble on surface.

0-10 cm	Grey loamy sand with quartz rubble.
10-23 cm	Greyish yellow loamy sand with quartz rubble and grit.
23-38 cm	Greyish yellow gritty clay.
38-45 cm	Grey and yellow gritty clay which shows granite structure and becomes more compacted.

Type 7

0-7 cm Grey brown sandy loam sometimes gravelly.

7-30 cm	Brown gravelly clay. Gravel is very small and is of dark ironstone.
30-70 cm	Brown to light red brown tough clay with slight lime.

This type is probably formed from a more basic intrusion.

Type 8

A very immature soil consisting of 30 cm or so of sand overlying granitic rock. No development of clay horizons.

Type 10

0-15 cm	Grey to yellowish grey sandy loam.
15-45 cm	Brown to light brown tough gritty clay.
45-76 cm	Light brown gritty clay. Rather tough.
76-83 cm	Yellow and grey gritty clay. Compacted and shows rock structure.

This type is not extensive as yet. It may prove more extensive in the portion not surveyed.

2. SOIL PROFILE DESCRIPTIONS FROM RECENT SURVEY WORK

Soil unit:	Wongan loamy sand
Soil classification: Principal profile form -	Uc 5.11
Landform:	Upper-midslopes
Slope:	1-3%
Drainage:	Rapid or well drained
Surface condition when dry:	Firm to hardsetting
Surface gravel/stone/boulders:	Nil
Vegetation:	Allocasaurina shrubland
Limitation:	Subject to soil compaction

PROFILE MORPHOLOGY:

Horizon	Depth range cm Upper Lower	Description
Ap	0-15	Brown to dark brown (10 YR 5/3-4/3, moist); loamy fine to coarse sand to clayey sand; apedal; sandy fabric; pH 5.5-6.0. Gradual boundary to
B1	10-60	Yellowish brown to brownish yellow (10 YR 6/6, 6/8-5/8, moist), loamy fine to coarse sand to clayey sand. Few bleached mottles may be evident; apedal, weak coherence; sandy fabric; pH 6.0-6.5. Diffuse boundary to
B2	30-100	As above, fine to coarse clayey sand to sandy loam; less commonly light sandy clay loam; may contain up to

		10% ferruginous segregations; pseudo earthy fabric; pH 6.5-7.0. Diffuse boundary to
B3	65-200+	Brownish yellow to yellow (10 YR 6/8, 7/8, moist), few red mottles associated with soft iron segregation, clayey sand to sandy loam less commonly sandy clay loam, up to 50% soft and hard ferruginous segregation; pseudo earthy fabric; pH 6.5-7.3.

Soil unit: Wongan sand

Classification:
Principal profile form - Uc 2.21, Uc 4.21, Uc 3.21

Landform: Upper-midslopes

Slope: 1-3%

Drainage: Rapid-excessive

Surface condition when dry: Loose

Surface gravel/stone/boulders: Nil

Vegetation: Shrubland

Limitation: Wind erosion, low AWC and subject to soil compaction

PROFILE MORPHOLOGY:

Horizon	Depth range cm Upper Lower	Description
A1	0-15	Greyish brown to brown (10 YR 5/2-5/3, moist); fine to coarse sand; apedal, loose; sandy; fabric; pH 5.5-6.5. Clear boundary to

A2	15-35	Yellow, light yellowish brown to brownish yellow (10 YR 6/4-6/6, 7/6, moist), (7/4-8/6, dry), up to 20% sporadic bleached mottles (10 YR 7/3-8/3); medium to coarse sand, apedal; sandy fabric; pH 6.0-6.5. Diffuse boundary to
B1	30-100	Yellow to brownish yellow (10 YR 6/6-7/8, 2.5 Y 7/6, moist), mottles as above; fine to coarse sand to loamy sand. Up to 30% rounded ferruginous segregations. Diffuse boundary to
B2	60-200+	As above; fine to coarse loamy sand to clayey sand less commonly sandy loam. Up to 30% soft and hard ferruginous segregations; apedal; sandy fabric; pH 6.5-7.0. Note: Soils may extend to 200 cm+ or a ferruginous gravel layer or dense hardpan may be encountered after 60 cm.
Soil unit:		Elphin hardpan phase (Esh-Elsh)
Classification: Principal profile form -		Uc 3.12, Gn 1.82, Gn 1.85, Uc 2.12
Landform:		Crests to lower slopes
Slope:		0-3%
Drainage:		Moderately well drained
Surface condition when dry:		Loose
Surface gravel/stone/boulders:		< 5%
Vegetation:		Allocasaurina shrubland or mallee heath
Limitation:		Shallow soil depth

PROFILE MORPHOLOGY:

Horizon	Depth range cm Upper Lower	Description
Ap	0-15	Dark greyish brown to brown (10 YR 4/2-5/3, moist); loamy medium to coarse sand, apedal, loose, sandy fabric; pH 6.0-6.5. Clear boundary to
A2/B1	10-35	Pale brown to light yellowish brown (10 YR 6/3-6/5, moist); loamy medium to coarse sand to sandy loam. Up to 10% ferruginous gravel and few soft ferruginous segregations may be present; apedal, weakly coherent to compact; sandy fabric; pH 6.0-6.5. Gradual boundary to
B2	15-50	As above with red and yellowish red mottles (2.5 YR 4/8, 5 YR 5/8), 5-20%; Gravelly clayey sand to light sandy clay loam; apedal, weakly coherent; sandy or earthy fabric; pH 6.5-7.0. Gradual or abrupt boundary to
C	40-50+	As above; gritty sandy clay loam, variably indurated ferruginous pan (mottled zone).
Soil unit:		Els Elphin loamy sand
Classification: Principal profile form -		Uc 6.14
Landform:		Mid-lower slopes
Slope:		0-3%
Drainage:		Well drained
Surface condition when dry:		Loose

Surface gravel/stone/boulders:	Commonly nil or < 10% ferruginous gravel
Vegetation:	Allocasaurina shrubland or mallee shrubland
Limitation:	Subject to soil compaction

PROFILE MORPHOLOGY:

Horizon	Depth range cm Upper Lower	Description
Ap	0-15	Dark greyish brown to brown (10 YR 4/2-5/3, moist); loamy medium to coarse sand; apedal, loose; sandy fabric; pH 5.5. Clear boundary to
A2/B1	10-30	Light yellowish brown to brownish yellow (10 YR 6/4-6/6, moist), (7/4, 7/5, dry); clayey medium to coarse sand to sandy loam; up to 40% ferruginous gravel; apedal, weakly coherent; sandy fabric; pH 5.0-6.0. Gradual boundary to
B2	20-60	As above; up to 60% ferruginous gravel and few to common soft segregations; apedal, coherent; earthy fabric; pH 6.0-7.0. Diffuse boundary to
B3	40-80+	As above, mottled light grey (10 YR 7/2-7/3) and red (2.5 YR 4/8); gravelly sandy loam to sandy clay loam, 40-80% ferruginous gravel; apedal, massive; earthy fabric; may become indurated with depth, pH 6.5-7.0.

Soil unit:	Es Elphin sand
Classification: Principal profile form -	Uc 5.11, Uc 2.21
Landform:	Mid slopes to flats
Slope:	0-3%

Drainage:	Well drained
Surface condition when dry:	Loose
Surface gravel/stone/boulders:	< 10% ferruginous gravel
Vegetation:	Allocasaurina shrubland
Limitation:	Subject to soil compaction, wind erosion.

PROFILE MORPHOLOGY:

Horizon	Depth range cm Upper Lower	Description
Ap	0-15	Dark greyish brown to brown (10 YR 4/2-5/2, 5/3, moist); medium to coarse sand to loamy sand; apedal, loose, sandy fabric; pH 5.0-6.0. Clear boundary to
A2/B1	10-35	Pale brown to light yellowish brown (10 YR 6/3-6/5, moist); loamy medium to coarse sand to clayey sand; may contain up to 60% ferruginous gravel; apedal, loose, sandy fabric; pH 6.0-6.5. Diffuse boundary to
B2	20-70+	As above; gravelly loamy sand to sandy loam, commonly 60-70% ferruginous gravel. Subsoils with sandy loam textures may be mottled (light grey and red); apedal, weak coherence; sandy fabric; pH 6.5.

Soil unit:	Mocardy sand (Ms)
Classification: Principal profile form -	Dg 4.82
Landform:	Mid to lower slopes
Slope:	2-3%

Drainage:	Imperfectly drained
Surface condition when dry:	Loose
Surface gravel/stone/boulders:	< 10% quartz grit and gravel
Vegetation:	Heath
Limitation:	Waterlogging

PROFILE MORPHOLOGY:

Horizon	Depth range cm Upper Lower	Description
Ap	0-10	Dark greyish brown (10 YR 4/2, moist) coarse sand to loamy coarse sand; apedal, loose; sandy fabric; pH 5.5-6.0. Gradual boundary to
A2	10-50	Light grey to light yellowish brown (10 YR 7/2-7/4, 6/4, moist); coarse sand to clayey sand, may contain ferruginous gravel; apedal, loose to weakly coherent; sandy fabric. pH 6.0-7.0. Gradual to clear boundary to
B2	25-80+	Light grey to light yellowish brown (10 YR 7/2, 6/2-6/4, moist), less commonly brownish yellow (10 YR 6/6) mottled red to yellowish red (2.5 YR 4/8, 5 YR 5/8); gritty sandy clay loam to sandy clay, 20-40% ferruginous gravel may be present; apedal, massive; pH 6.5-7.5.

Soil unit:	Yaling gravelly loam (Ylg)
Classification:	
Principal profile form -	Ks-Uc 1.22
Landform:	Crests and upper slopes

Slope:	0-2%
Drainage:	Well drained
Surface condition when dry:	Loose to soft
Surface gravel/stone/boulders:	5-60% ferruginous gravel
Vegetation:	Allocasaurina shrubland and heath
Limitation:	Root development is restricted.

PROFILE MORPHOLOGY:

Horizon	Depth range cm Upper Lower	Description
Ap	0-10	Greyish brown to yellowish brown (10 YR 5/2-5/4, moist); gravelly sand to loamy sand, 5-80% ferruginous gravel (10-30 mm diameter); apedal, loose; sandy fabric; pH 6.0-6.5. Clear boundary to
A12	5-40	Very pale brown to yellowish brown (10 YR 7/4-7/6, 6/5, 5/6-5/8, moist) gravelly sand to clayey sand, 60-80% ferruginous gravel (5-70 mm diameter); apedal, loose to coherent; sandy fabric; pH 6.5. Clear boundary to
C	10-40+	Ferruginous hardpan or laterite.

Soil unit:	Yaling series (Ysb), (Ysg)
Classification:	
Principal profile form -	Uc 1.22
Landform:	Crests to midslopes
Slope:	0-3%

Drainage:	Rapidly drained
Surface condition when dry:	Loose
Surface gravel/stone/boulders:	0-60%
Vegetation:	Allocasaurina shrubland
Limitation:	Wind erosion

PROFILE MORPHOLOGY:

Horizon	Depth range cm Upper Lower	Description
Ap	0-15	Greyish brown to yellowish brown (10 YR 5/2-5/4, moist); sand to gravelly sand; apedal, loose; sandy fabric; pH 6.0-6.5. Clear boundary to
B21	5-30	Yellow to yellowish brown (10 YR 7/6, 6/5, 5/6-5/8, moist); gravelly sand to clayey sand, 40-80% ferruginous gravel (average diameter 20-50 mm), apedal, loose to weakly coherent; sandy fabric; pH 6.5.
B22/D	20-80+	As above; gravel content 60-80%. Lateritic stone or boulders may be present.

Soil unit:	7
Classification:	
Principal profile form:	Dr 2.13, Dr 2.53, Dy 2.52
Landform	Crest-upper slopes and associated with dykes
Slope:	0-3%
Drainage:	Moderate to well drained

Surface condition when dry: Hardsetting to firm

Surface gravel/stone/boulders: Minor ferruginous gravel and rock outcrop

Vegetation: Eucalyptus woodland or mallee shrubland

Limitation: Possible subsoil salinity

PROFILE MORPHOLOGY:

Horizon	Depth range cm Upper Lower	Description
Ap	0-10	Dark reddish brown, dark brown less commonly yellowish brown, (5 YR 3/4, 7/5 4/4, 10 YR 5/5, moist); fine to coarse clayey sand to silty clay loam; weak angular blocky to fine polyhedral structure; rough ped fabric; pH 6.0-7.5. Gradual boundary to
B21	7-40	Yellowish red to yellowish brown (5 YR 4/6, 10 YR 5/5, moist); light sandy clay loam, sandy clay or light medium clay (dark ferruginous gravels (5mm) may be present); weak angular blocky to crumb structure; rough ped fabric; pH 7.0-9.0. Gradual and irregular boundary to
B22	30-70+	Yellowish red to brown (5 YR 5/6-5/8, 7.5 YR 5/5), moist); sandy clay to light medium clay; massive or weak angular blocky structure; lime nodules or segregations may be present; pH 7.5-9.2.

Soil unit: 8

Classification:
Principal profile form - Uc 1.22, Uc 1.23, Uc 5.11

Landform: Upper slopes associated with granite outcrops

Slope:	0-3%
Drainage:	Rapidly drained
Surface condition when dry:	Loose
Surface gravel/stone/boulders:	Granite outcrops - few to common
Vegetation:	Shrubland
Limitation:	Variable soil depth
Comments:	Shallow (< 20 cm) reddish brown sands occur adjacent to the granite outcrops

PROFILE MORPHOLOGY:

Horizon	Depth range cm Upper Lower	Description
A11	0-10	Dark reddish brown to brown (5 YR 3/4, 10 YR 4/3, moist); coarse loamy sand to clayey sand; apedal, weakly coherent; sandy fabric; pH 5.5-6.5. Diffuse boundary to
A12	10-60	Reddish brown to strong brown (5 YR 4/4-4/6, 7.5 YR 5/8, moist); coarse loamy sand to clayey sand; apedal, weakly coherent, sandy fabric; pH 5.5-6.0. Diffuse boundary to
A13	40-70	Yellowish red to brownish yellow (5 YR 5/6, 10 YR 6/8, moist), coarse loamy sand to clayey sand. Up to 60% ferruginous gravel or quartz; apedal, weakly coherent; sandy fabric; pH 6.0-7.0.
C	20+	Granitic substrate.

Soil unit: 10

Classification:
Principal profile form - Dy 3.82, Dy 3.42

Landform: Upperslope

Slope: 1-2%

Drainage: Imperfectly drained

Surface condition when dry: Hardsetting to firm

Surface gravel/stone/boulders: Nil

Vegetation: Mallee shrubland

Limitation: Surface runoff, periodic waterlogging, saline subsoils

PROFILE MORPHOLOGY:

Horizon	Depth range cm Upper Lower	Description
Ap	0-10	Brown (10 YR 4/3, moist); loamy coarse sand to clayey sand; apedal, compact; sandy fabric; pH 6.0-6.5. Clear boundary to
A2	7-20	Pale brown (10 YR 6/3, moist), very pale brown (10 YR 7/3, dry); clayey coarse sand to sandy loam; apedal, cemented and brittle; sandy fabric; pH 6.5-7.0. Clear boundary to
B2	20-55	Pale brown (10 YR 6/3-6/4, 7/3, moist), mottled red (2.5 YR 4/8), yellowish red (5 YR 5/8) and yellowish brown (10 YR 5/8), coarse sandy clay loam to sandy clay. Red mottling increasing with depth. Massive to coarse columnarstructure; pH 7.0-8.0.

Soil unit: A

Classification:
Principal profile form - Gn 1.22

Landform: Upper-midslopes

Slope: 2-3%

Drainage: Moderate to rapidly drained

Surface condition when dry: Loose to soft

Surface gravel/stone/boulders: Minor ferruginous gravel

Vegetation: Shrubland

PROFILE MORPHOLOGY:

Horizon	Depth range cm Upper Lower	Description
Ap	0-10	Brown (10 YR 4/3-4/2.5, moist); loamy medium to coarse sand to clayey sand; < 30% ferruginous gravel (20 mm diameter); apedal, loose; sandy fabric; pH 5.5-6.0. Gradual boundary to
B1	05-50	Yellowish brown (10 YR 5/6-6/8, moist); clayey medium to coarse sand to sandy loam; 60-80% ferruginous gravel; apedal, weakly coherent, sandy fabric; pH 6.0-6.5. Gradual boundary to
B2	50-90	Yellowish brown (10 YR 5/6-6/8, moist); light sandy clay loam to sandy clay loam; < 60% gravel decreasing with depth; apedal, weak crumb structure; pH 6.5-7.0.
B3	90+	As above, few red mottles (2.5 YR 4/8); sandy clay loam to sandy clay.

APPENDIX 4 - HERBARIUM INVENTORY - WONGAN HILLS
(AUGUST 1989 by ANNE COATES)

PROJECT DESCRIPTION

During October 1984 and 1985 field trips were undertaken by staff of the W.A. Herbarium to collect plant specimens from uncleared bushland remaining on the Department of Agriculture Research Station at Wongan Hills. Information from these trips was recorded in field books by C Parker (collections CP 173-294, 23 to 25 October 1984 and CP 295-363, 10 and 11 October 1985) and K Knight (collections KK 300-388, 23 to 25 October 1984).

The information recorded includes data on topography, soil type, vegetation formation, collecting number, plant identification and species abundance. Some discrepancy appears to exist between the descriptions given by the two recorders and frequently more than one vegetation or soil type is described for each site. Vegetation descriptions were generally based on Specht's classification (Table 1) although some of the terminology used in the field books does not relate to this system.

The following sections summarise the available data and include site descriptions and a species list for the areas. Due to time limitations and the difficulties involved in locating some of the plant collections the identifications given in the field books have not been checked. The location of collecting sites and the gazetted rare flora *Daviesia euphorbioides*, *Gastrolobium hamulosum* and *Gastrolobium glaucum* are indicated on the map provided (Figure 1).

Key Site Descriptions	
ABUNDANCE	D - dominant
	A - abundant
	F - frequent
	O - occasional
	R - rare
VOUCHER	Collection Number
*	Introduced Species

TABLE 1 - Plant Communities - Major Structural Formations Specht's Classification

Life-form and height of tallest stratum	Foliage cover of tallest stratum (%)	Description
Trees over 30 m	70 - 100	High closed forest
	30 - 70	High open forest
	10 - 30	High woodland
	Under 10	High open woodland
Trees 10 - 30 m	70 - 100	Closed forest
	30 - 70	Open forest
	10 - 30	Woodland
	Under 10	Open woodland
Trees under 10 m	70 - 100	Low closed forest
	30 - 70	Low open forest
	10 - 30	Low woodland
	Under 10	Low open woodland
Shrubs over 2 m	70 - 100	Closed scrub
	30 - 70	Open scrub
	10 - 30	High scrubland
	Under 10	High open scrubland
Shrubs 1 to 2 m	70 - 100	Closed heath
	30 - 70	Open heath
	10 - 30	Shrubland
	Under 10	Open shrubland
Shrubs under 1 m	70 - 100	Low closed heath
	30 - 70	Low open heath
	10 - 30	Low shrubland
	Under 10	Low open shrubland
Herbs	70 - 100	Closed herbland, closed tussock grassland, closed sedgeland etc
	30 - 70	Herbland etc
	10 - 30	Open herbland etc
Hummock grasses	10 - 30	Hummock grassland
	Under 10	Open Hummock grassland

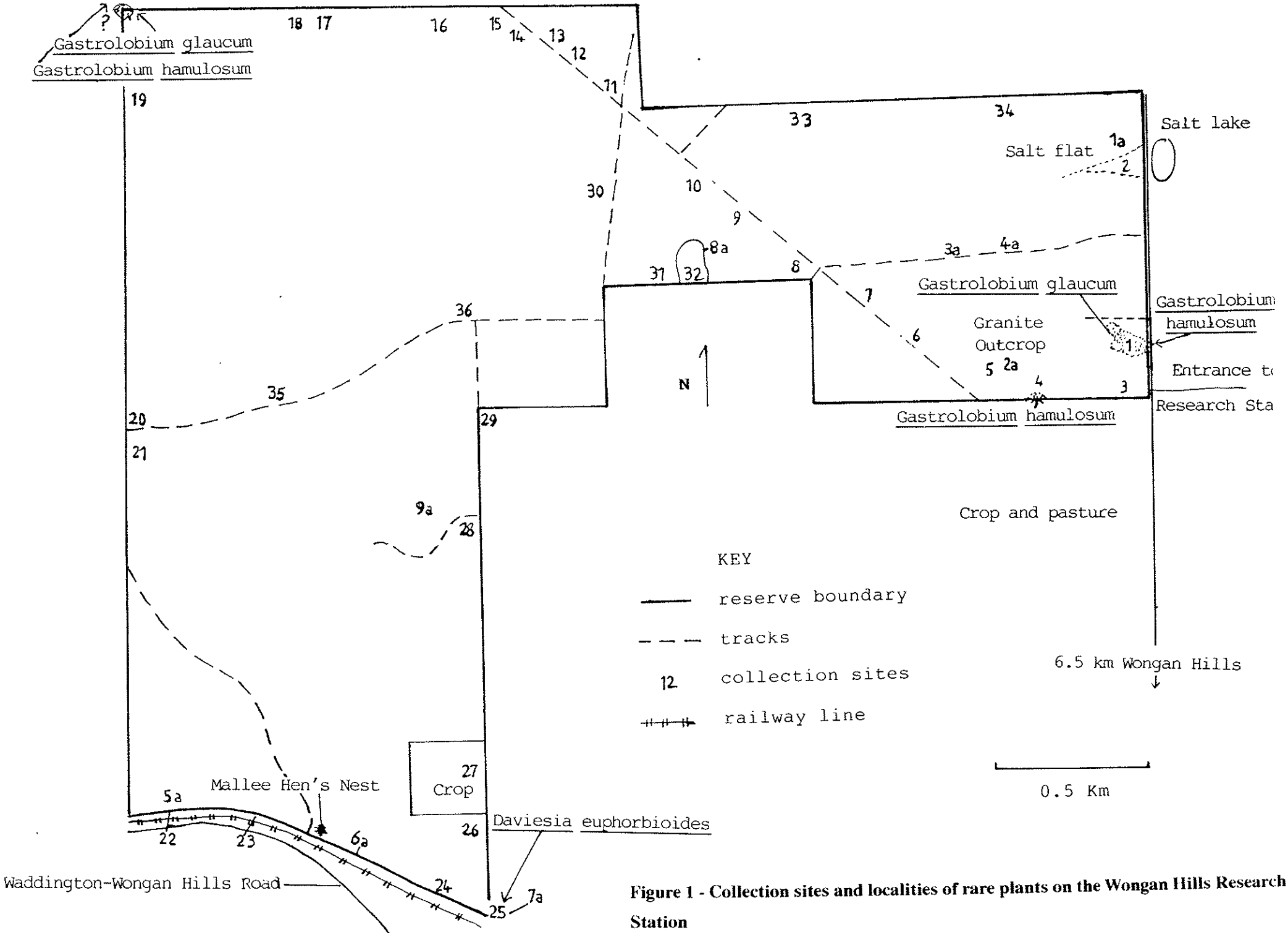


Figure 1 - Collection sites and localities of rare plants on the Wongan Hills Research Station

SITE DESCRIPTIONS

SITE 1

Soil Type: Yellow brown sandy clay over laterite

Topography: Flat to undulating

Vegetation Formation: Open Scrub - Open Heath - Shrubland

Species List:

SPECIES	ABUNDANCE	VOUCHER
Allocasuarina campestris	D	CP 173
Ecdeiocolea monostachya	F	CP 175
Mesomelaena preissii	O	CP 176
Neurachne alopecuroidea	F	CP 177
Amphipogon strictus var. strictus	F	CP 178
Baeckea crispiflora	O	CP 179
Opercularia vaginata	F	CP 180
Melaleuca sp. nov. (aff. cordata)	O	CP 181
Calothamnus quadrifidus	O	CP 182
Calytrix angulata	O	CP 183
Astroloma serratifolium	O	CP 184
Hibbertia rupicola	O	CP 185
Goodenia caerulea	O	CP 186
Pimelea imbricata	O	CP 187
Jacksonia ?sericea	O	CP 188
Acacia filifolia	O	CP 189
Conospermum stoechadis	O	CP 190
Verticordia acerosa var. preissii	O	CP 191
Melaleuca pentagona	O	CP 192
Gompholobium asperulum	O	CP 193
Gastrolobium glaucum	O	CP 194
Waitzia acuminata	O	CP 195
Psammomoya choretroides	O	CP 196
Cassytha glabella	O	CP 197
Petrophile media	O	CP 198
Petrophile seminuda	F	CP 203
Thysanotus patersonii	O	CP 204
Petrophile striata	O	CP 205
Dianella revoluta	O	CP 206

Hakea platysperma	O	CP 207
Gastrolobium calycinum	O	CP 208
Beaufortia bracteosa	O	KK 302
Verticordia pritzelii	O	KK 303
Lepidobolus preissianus	F	KK 304
Lepidobolus chaetocephalus	F	KK 306
Leptospermum oligandrum	F	KK 307
Scholtzia drummondii	O	KK 308
Glischrocaryon aureum	F	KK 309
Calothamnus quadrifidus	F	KK 311
Jacksonia lehmannii	F	KK 314
Chorizema aciculare	O	KK 316
Laxmannia grandiflora	O	KK 317
Ptilotus polystachyus	F	KK 318
Petrophile ericifolia	O	KK 319
Gastrolobium hamulosum	O	-
Lichens		CP 199-202

Identifications were unavailable for plant collections KK 305, KK 310, KK 312, KK 313 and KK 315.

SITE 2

Soil Type: Orange brown sandy clay, salt encrusted near the lake

Topography: Flat

Vegetation Formation: Salt flat and adjacent *Allocasuarina* "Thicket" - Shrubland - Heath

Species List:

SPECIES	ABUNDANCE	VOUCHER
*Mesembryanthemum nodiflorum	O	CP 209
Acacia resinosa	O	CP 210
Comesperma volubile	O	CP 211
Scaevola arenaria	O	CP 212
Melaleuca uncinata	F	CP 213
Billardiera sp.		CP 214
Melaleuca conothamnoides	O	CP 215
Lobelia rarifolia	O	CP 216
Stylidium bulbiferum	O	CP 217
Isotoma hypocrateriformis	O	CP 218
*Spergularia rubra	O	CP 219
Pogonolepis stricta	F	CP 220
*Polypogon monspeliensis	O	CP 221
Juncus sp.	O	CP 222
Santalum acuminatus	O	CP 223
Eucalyptus aff. rigidula	O	CP 224
Astroloma serratifolium	F	KK 321
Casuarina obesa	A	KK 322
Gastrolobium spinosum	O	KK 323
*Hordeum marinum		KK 325
Halosarcia pergranulata	A	KK 326
Dodonaea viscosa		KK 328
Dampiera teres	O	KK 329

Identifications were unavailable for plant collections KK 320, and KK 324.

SITE 3

Soil Type: Yellow brown sandy clay

Vegetation Formation: Shrubland - disturbed roadside vegetation

Species List:

SPECIES	ABUNDANCE	VOUCHER
Acacia saligna		CP 225

SITE 4

Soil Type: Yellow brown sandy clay - White yellow clay sand over laterite

Topography: Flat

Vegetation Formation: Open Scrub of *Allocasuarina campestris, Santalum acuminatum* and *Melaleuca*

Species List:

SPECIES	ABUNDANCE	VOUCHER
Gnephosis tenuissima		CP 226
Melaleuca radula		CP 227
Melaleuca coronicarpa ssp. coronicarpa	O	CP 228
Thysanotus sp.	O	KK 303

At least 10 *Gastrolobium hamulosum* plants were present growing on the road verge in low heath.

SITE 5

Soil Type: Grey sandy clay adjacent to a granite outcrop

Topography: Flat seepage area

Vegetation Formation: Herbland with *Stylidium, Calytrix, and grasses*

Species List:

SPECIES	ABUNDANCE	VOUCHER
Ptilotus declinatus	O	CP 229
Isotoma hypocrateriformis	F	CP 230
Diuris setacea	O	CP 231
Stackhousia huegelii	F	KK 332

SITE 6

Soil Type: Yellow brown sandy clay - clay sand over laterite

Topography: Flat

Vegetation Formation: Open Scrub - shrubland - "Thicket" of *Melaleuca, Allocasuarina campestris* and *Eucalyptus* sp.

Species List:

SPECIES	ABUNDANCE	VOUCHER
*Trifolium arvense	F	CP 232
Stylidium sp.	O	CP 233
*Anagallis arvensis var. caerula		KK 334

Identifications were unavailable for plant collections CP 234, KK 333, and KK 335.

SITE 7

Soil Type: Yellow white clayey sand over laterite

Topography: Flat

Vegetation Formation: - cleared area on roadside

Species List:

SPECIES	ABUNDANCE	VOUCHER
Isopogon divergens	O	KK 336

SITE 8

Soil Type: Yellow brown sandy clay - yellow white clay sand

Topography: Flat

Vegetation Formation: "Thicket" of *Allocasuarina* and *Melaleuca*

Species List:

SPECIES	ABUNDANCE	VOUCHER
Acacia resinosa	O	CP 235
Melaleuca uncinata	A	KK 337

SITE 9

Soil Type: Yellow brown sandy clay

Vegetation Formation: Open scrub of *Allocasuarina campestris*

Species List:

SPECIES	ABUNDANCE	VOUCHER
Levenhookia stipitata	O	CP 236
Hyalosperma cotula	F	CP 237

SITE 10

Soil Type: Yellow white clayey sand over laterite

Vegetation Formation: - cleared area on the roadside

Species List:

SPECIES	ABUNDANCE	VOUCHER
Dampiera teres		KK 338

SITE 11

Soil Type: Yellow brown sandy clay - Yellow white clayey sand over laterite

Topography: Flat

Vegetation Formation: Open Scrub - Heath of *Allocasuarina campestris* and adjacent cleared area

Species List:

SPECIES	ABUNDANCE	VOUCHER
Hibbertia glomerata	O	CP 238
Waitzia paniculata	O	CP 240
Goodenia caerulea	F	CP 241
Verticordia eriocephala	F	KK 339
Calytrix sapphirina	O	KK 340
Verticordia pritzelii	O	KK 341
Verticordia picta	F	KK 342
Haemodorum paniculatum	O	KK 343
Baeckea preissiana	O	KK 344

SITE 12

Soil Type: White sandy clay - yellow white clayey sand

Vegetation Formation: Open Scrub of *Allocasuarina campestris* and *Eucalyptus* sp.

Species List:

SPECIES	ABUNDANCE	VOUCHER
Dryandra ?armata	F	CP 242
Eucalyptus pyriformis	O	CP 243
Jacksonia ?sericea	O	CP 244
Grevillea didymobotrya	O	CP 245
Verticordia sp.	F	KK 345
Hemigenia westringioides		KK 346
Logania flaviflora	F	KK 347

SITE 13

Soil Type: White sandy loam

Vegetation Formation: Open Scrub of *Allocasuarina, Melaleuca* and *Santalum*

Species List:

SPECIES	ABUNDANCE	VOUCHER
Tripterococcus brunonis	F	CP 246

SITE 14

Soil Type: White yellow clay sand

Vegetation Formation: Heath

Species List:

SPECIES	ABUNDANCE	VOUCHER
Verticordia pritzelii	O	KK 348

SITE 15

Soil Type: Yellow brown sandy clay

Vegetation Formation: Open Scrub of *Melaleuca* aff. *cordata*

Species List:

SPECIES	ABUNDANCE	VOUCHER
Grevillea eriostachya	O	CP 247

SITE 16

Soil Type: Yellow brown sandy clay

Vegetation Formation: - firebreak adjacent to an area under crop

Species List:

SPECIES	ABUNDANCE	VOUCHER
Dampiera wellsiana	O	CP 248

SITE 17

Soil Type: Yellow white clayey sand

Vegetation Formation: "Thicket" of *Eucalyptus* mallee

Species List:

SPECIES	ABUNDANCE	VOUCHER
Melaleuca laxiflora	F	KK 349

SITE 18

Soil Type: White sandy clay

Vegetation Formation: Mallee Woodland

Species List:

SPECIES	ABUNDANCE	VOUCHER
Eucalyptus semivestita (ms)	F	CP 249

SITE 19

Soil Type: Red brown sandy clay - brown clayey sand over granite

Topography: Flat

Vegetation Formation: "Thicket" of *Allocasuarina* - Woodland of *Allocasuarina* and *Eucalyptus* species

Species List:

SPECIES	ABUNDANCE	VOUCHER
Keraudrenia integrifolia	O	CP 250
Spartochloa scirpoidea	O	KK 350

SITE 20

Soil Type: Red brown sandy clay - brown clayey sand over granite

Topography: Flat base of hill

Vegetation Formation: Mallee Woodland - Woodland/Scrub of *Eucalyptus* species and *Melaleuca*

Species List:

SPECIES	ABUNDANCE	VOUCHER
Allocasuarina acutivalvis	O	CP 251
Lysiosepalum rugosum	O	CP 252
Grevillea petrophiloides	O	CP 253
Melaleuca acuminata ssp. websteri	A	KK 352
Acacia erinacea	F	KK 353

Identifications were unavailable for plant collections CP 254, KK 351 and KK 354.

SITE 21

Soil Type: Yellow brown clayey sand

Topography: Base of a hill

Vegetation Formation: Shrubland

Species List:

SPECIES	ABUNDANCE	VOUCHER
Darwinia purpurea		

SITE 22

Soil Type: Yellow brown sandy clay - Yellow brown clayey sand over laterite

Vegetation Formation: - disturbed area along the railway line

Species List:

SPECIES	ABUNDANCE	VOUCHER
Cryptandra pomaderroides	O	CP 255
Melaleuca laxiflora	O	CP 256
Cassytha sp.	O	CP 257
Chamelaucium drummondii ssp. drummondii	O	CP 258
Leucopogon tamminensis ssp. tamminensis	O	CP 259
Hibbertia huegelii	O	CP 260
?Daviesia pachyphylla	O	KK 356
Micromyrtus racemosa	O	KK 357
*Mesembrynathemum nodiflorum	O	KK 358
Ptilotus sp.	F	KK 359
Wilsonia humilis		

SITE 23

Soil Type: Yellow brown clayey sand

Vegetation Formation: ?Woodland of Mallee, *Melaleuca* and *Allocasuarina*

Species List:

SPECIES	ABUNDANCE	VOUCHER
Callitris canescens	O	KK 360

Conospermum brownii (CP 290) and *Hakea meisneriana* (KK 385) were collected between Sites 23 and 24.

SITE 24

Soil Type: White sand - White clayey sand over laterite

Topography: Flat

Vegetation Formation: Dense Scrub of *Allocasuarina* - Open Scrub - Shrubland - Heath

Species List:

SPECIES	ABUNDANCE	VOUCHER
Lechenaultia biloba	O	CP 261
Dampiera spicigera	O	CP 262
Hemiandra coccinea	O	CP 263
Eremaea pauciflora	F	CP 264
Grevillea sp.	O	CO 265
Hibbertia sp.	O	CP 266
Petrophile media	O	CO 267
Beaufortia elegans	F	CP 268
Gompholobium tomentosum	O	CP 269
Dampiera lavandulacea	O	CP 271
Melaleuca scabra	O	CP 272
Isopogon drummondii	O	CP 273
Patersonia umbrosa	O	KK 361
Empodisma gracillimum	O	KK 362
Anigozanthos humilis	F	KK 363
Ptilotus stirlingii	O	KK 364
Goodenia caerulea	O	KK 365
Caustis pentandra	F	KK 366

No identification was available for plant collection CP 270.

SITE 25

Soil Type: White sand ;- White sand with laterite

Topography: Flat

Vegetation Formation: KK collections - Shrubland

CP collections - regrowth along a firebreak adjacent to pasture

Species List:

SPECIES	ABUNDANCE	VOUCHER
Stylidium macrocarpum	O	CP 274
Hibbertia acerosa	O	CP 275
Schoenus aff. obtusifolius	O	CP 276
Cassytha pubescens	F	CP 277
Cassytha aurea var. hirta	F	CP 278
Comesperma calymega	O	KK 367
Allocasuarina humilis	O	KK 368
Grevillea tridentifera	O	KK 369
Allocasuarina humilis	F	KK 370
*Solanum hystrix		KK 371

SITE 26

Soil Type: White sand

Vegetation Formation: Open Scrub with *Melaleuca, Calothamnus, Dryandra* and *Santalum*

Species List:

SPECIES	ABUNDANCE	VOUCHER
?Dampiera helmsii	O	CP 279
Grevillea eryngioides	O	CP 280

SITE 27

Soil Type: White sand - white sand with laterite

Topography: Flat

Vegetation Formation: Open Scrub - Shrubland

Species List:

SPECIES	ABUNDANCE	VOUCHER
Verreauxia reinwardtii	O	CP 281
Jacksonia spinosa	F	KK 372

SITE 28

Soil Type: White sand with laterite

Vegetation Formation: Woodland/Scrub of *Allocasuarina* and *Eucalyptus*

Species List:

SPECIES	ABUNDANCE	VOUCHER
Maireana carnosa	O	KK 373

SITE 29

Soil Type: White sand

Vegetation Formation: Mallee Woodland

Species List:

SPECIES	ABUNDANCE	VOUCHER
Microcorys	O	CP 282

SITE 30

Soil Type: Yellow white sand - white clayey sand

Vegetation Formation: "Thicket" - Shrubland of *Allocasuarina*

Species List:

SPECIES	ABUNDANCE	VOUCHER
Stylidium leptophyllum	O	CP 283
Baeckea crispiflora	F	CP 284
Allocasuarina campestris	F	KK 374
Hakea sulcata	A	KK 376
Acacia multispicata	A	KK 377

No identification was available for collection KK 375.

SITE 31

Soil Type: White sandy clay - Grey white clayey sand

Topography: Flat

Vegetation Formation: Scrub of *Melaleuca* species

Species List:

SPECIES	ABUNDANCE	VOUCHER
Melaleuca sp.	O	CP 285
Melaleuca scabra	O	CP 286
Melaleuca scabra var. tuberculata	F	KK 378
Melaleuca pentagona	A	KK 379

Identifications were unavailable for collections KK 380, and KK 381.

SITE 32

Soil Type: Yellow brown clayey sand - Grey white clay sand with laterite

Topography: Flat

Vegetation Formation: Open Scrub - "Thicket" of *Allocasuarina*

Species List:

SPECIES	ABUNDANCE	VOUCHER
Thryptomene prolifera	O	CP 287
Stylidium bulbiferum	F	CP 288
*Centaurium		CP 289
*Plantago coronopus ssp. commutata	F	KK 382

SITE 33

Soil Type: Brown clayey sand over granite

Topography: Flat; area surrounding a granite outcrop

Vegetation Formation: "Thicket" of *Melaleuca* species

Species List:

SPECIES	ABUNDANCE	VOUCHER
Ptilotus spathulata		KK 383

SITE 34

Soil Type: Yellow brown clayey sand

Topography: Flat

Vegetation Formation: *Melaleuca* Heath

Species List:

SPECIES	ABUNDANCE	VOUCHER
Alyogyne hakeifolia	O	KK 384

SITE 35

Soil Type: Yellow brown sandy clay - brown clayey sand

Vegetation Formation: Open Woodland - Woodland

Species List:

SPECIES	ABUNDANCE	VOUCHER
Acacia erinacea	F	CP 291
Eucalyptus celastroides ssp. virella	F	CP 292
Maireana georgei	O	CP 293
Erymophyllum ramosum	F	KK 387
Enchylaena lanata	A	KK 388

No identification was available for plant collection KK 386.

SITE 36

Soil Type: Brown sandy clay

Vegetation Formation: Mallee woodland

Species List:

SPECIES	ABUNDANCE	VOUCHER
Eucalyptus erythronema var. marginata		CP 294

SITE 1a

Soil Type: Brown sandy clay and wet clay at the fringe of a salt flat

Vegetation Formation: Open Heath of *Acacia filifolium* with *Melaleuca uncinata* in places

Species List:

SPECIES	ABUNDANCE	VOUCHER
Halosarcia pergranulata	F	CP 295
Hemigenia	O	CP 296
Brachycome bellidioides	F	CP 298
Blennospora drummondii	F	CP 299
*Anagallis arvensis var. caerulea	O	CP 300
Enchylaena lanata	O	CP 302
*Hordeum marinum	F	CP 303
*Lolium rigidum	O	CP 304
*Spergularia rubra	F	CP 305
Halosarcia pergranulata	F	CP 306
Stylidium bulbiferum var. septentrionale	O	CP 307
Calytrix angulata	F	CP 309
Baeckea crispiflora	O	CP 311
Acacia resinosa	D	CP 312
Hibbertia sp.	O	CP 313

Identifications were unavailable for collections CP 297, CP 301, CP 308 and CP 310.

SITE 2a

Soil Type: Light brown sandy clay over granite

Vegetation Formation: CP 314, 320-322 - Heath/Open Heath of *Allocasuarina campestris* and *Melaleuca uncinata*

CP 315-319 - Herbland with an area of *Borya ?nitida* fringing the granite outcrop

Species List:

SPECIES	ABUNDANCE	VOUCHER
Melaleuca scabra	O	CP 314
Stackhousia huegelii	F	CP 315
Cyanicula gemmata (ms) forma gemmata	O	CP 316
Ecdeiocolea monostachya	F	CP 317
Stypandra glauca	O	CP 318
Baeckea crispiflora	O	CP 319
Drosera leucoblasta	O	CP 320
Stylidium sp.	O	CP 321
Dampiera teres	F	CP 322

SITE 3a

Soil Type: White sandy clay

Vegetation Formation: Open Scrub of *Allocasuarina campestris*

Species List:

SPECIES	ABUNDANCE	VOUCHER
Logania flaviflora		CP 323

SITE 4a

Soil Type: White sandy clay

Vegetation Formation: CP 324, 325 - Low Open Woodland of scattered *Eucalyptus*
CP 326-332, 334, 335 - Open Heath of *Allocasuarina campestris* with *Melaleuca scabra* and *Acacia* sp. nov in places
CP 333 - Mallee Woodland with an understorey of *Melaleuca uncinata*
CP 336 - Mallee Woodland
CP 331-336 were collected along the firebreaks

Species List:

SPECIES	ABUNDANCE	VOUCHER
Drosera parvula	F	CP 325
Brunonia australis	F	CP 326
Calytrix sp.	F	CP 327
Muehlenbeckia adpressa	O	CP 328
Allocasuarina microstachya	F	CP 330
Micromyrtus racemosa	O	CP 332
Eucalyptus erythronema var. marginata	F	CP 333
Pimelea brevistyla	F	CP 334
Stylidium sp.	O	CP 335
Wilsonia humilis	O	CP 336

Identifications were unavailable for collections CP 324 and 331.

SITE 5a

Soil Type: White brown sandy clay - yellow brown sandy clay with laterite

Vegetation Formation: CP 337-341 - Open Woodland with *Allocasuarina acutivalvis* over Heath/Open Heath with *Hakea sulcata, Melaleuca* aff. *conothamnoides, Melaleuca uncinata* and *Santalum*
CP 342-344 - Heath/Open Heath with *Allocasuarina campestris, Grevillea armigera* and *Hakea sulcata*

Species List:

SPECIES	ABUNDANCE	VOUCHER
Microcorys obovata	O	CP 338
Hemigenia westringioides	O	CP 339
Hibbertia rostellata	O	CP 341
Stackhousia scoparia	O	CP 343

Identifications were unavailable for collections CP 337, CP 340, CP 342 and CP 344.

SITE 6a

Soil Type: White brown sandy clay - white sand

Vegetation Formation: CP 345, 346, 349 - Open Heath with *Eremaea pauciflora, Hakea sulcata, Grevillea petrophiloides* and *Dryandra*
CP 347, 348 - "Thicket" of *Allocasuarina campestris*

Species List:

SPECIES	ABUNDANCE	VOUCHER
Dampiera sp.	O	CP 346
Thelymitra fuscolutea var. fuscolutea		CP 347
Hakea meisneriana	A	CP 348
Hakea sp.	O	CP 349

No identification was available for collection CP 345.

SITE 7a

Soil Type: White sand - white sand with gravel

Vegetation Formation: Open Heath with *Melaleuca* aff. *cordata, Eremaea beaufortioides, Grevillea armigera, Anigozanthos humilis, Leptospermum* and *Conospermum*

Species List:

SPECIES	ABUNDANCE	VOUCHER
Stylidium macrocarpum	O	CP 351
Acacia drewiana ssp. minor	F	CP 354
Stylidium sp.		CP 356
Verticordia sp.	F	CP 357

Identifications were unavailable for collections CP 350, CP 352, CP 355 and CP 358.

SITE 8a

Soil Type: Light brown sandy clay - seepage area

Vegetation Formation: Open Heath with *Melaleuca uncinata and ?Thryptomene*

Species List:

SPECIES	ABUNDANCE	VOUCHER
?Conostylis prolifera	F	CP 360
Stylidium calcaratum	O	CP 361

SITE 9a

Soil Type: Brown sandy clay

Vegetation Formation: *Eucalyptus* Woodland

Species List:

Identifications were unavailable for collections CP 362 and CP 363.

SPECIES LIST

*** Introduced species**

CP 123 collecting number

POACEAE		
	Amphipogon strictus	C.P. 178
*	Hordeum marinum	C.P. 303, K.K. 325
*	Lolium rigidum	CP 304
	Neurachne alopecuroidea	CP 177
*	Polypogon monspeliensis	CP 221
	Spartochloa scirpoidea	KK 350
CYPERACEAE		
	Caustis pentandra	KK 366
	Mesomelaena preissii	CP 176
	Schoenus aff. obtusifolius	CP 276
RESTIONACEAE		
	Ecdeiocolea monostachya	CP 175, 316
	Empodisma gracillimum	KK 362
	Lepidobolus chaetocephalus	KK 306
	Lepidobolus preissianus	KK 304
JUNCACEAE		
	Juncus sp.	CP 222
PHORMIACEAE		
	Dianella revoluta	CP 206
	Stypandra glauca	CP 318
ANTHERICACEAE		
	Laxmannia grandiflora	KK 317
	Thysanotus patersonii	CP 204
	Thysanotus sp.	KK 303
HAEMODORACEAE		
	Anigozanthos humilis	KK 363
	?Conostylis prolifera	CP 360

IRIDACEAE

Patersonia umbrosa	KK 361

ORCHIDACEAE

Cyanicula gemmata forma gemmata	CP 316
Diuris setacea	CP 231
Thelymitra fuscolutea var. fuscolutea	CP 347

DICOTYLEDONAE

CASUARINACEAE

Allocasuarina acutivalvis	CP 251
Allocasuarina campestris	KK 374, CP 173
Allocasuarina humilis	KK 368, 370
Allocasuarina microstachya	CP 330
Casuarina obesa	KK 322

PROTEACEAE

Conospermum brownii	CP 290
Conospermum stoechadis	CP 190
Dryandra ?armata	CP 242
Grevillea armigera	-
Grevillea didymobotrya	CP 245
Grevillea eriostachya	CP 247
Grevillea eryngioides	CP 280
Grevillea petrophiloides	CP 253
Grevillea tridentifera	KK 369
Grevillea sp.	CP 265
Hakea meisneriana	CP 348, KK 385
Hakea platysperma	CP 207
Hakea sulcata	KK 376
Hakea sp.	CP 349
Isopogon divergens	KK 336
Isopogon drummondii	CP 273
Petrophile ericifolia	KK 319
Petrophile media	CP 267, CP 198
Petrophile seminuda	CP 203

Petrophile striata	CP 205
SANTALACEAE	
Santalum acuminatum	CP 223
POLYGONACEAE	
Muehlenbeckia adpressa	CP 328
CHENOPODIACEAE	
Enchylaena lanata	KK 388, CP 302
Halosarcia pergranulata	KK 326, CP 295, 306
Maireana carnosa	KK 373
Maireana georgei	CP 293
AMARANTHACEAE	
Ptilotus declinatus	CP 229
Ptilotus polystachyus	KK 318
Ptilotus spathulatus	KK 383
Ptilotus stirlingii	KK 364
Ptilotus sp.	KK 359
Ptilotus sp.	CP 363
AIZOACEAE	
* Mesembryanthemum nodiflorum	CP 209, KK 358
CARYOPHYLLACEAE	
* Spergularia rubra	CP 219, 305
LAURACEAE	
Cassytha aurea var. hirta	CP 278
Cassytha glabella	CP 197
Cassytha ?pubescens	CP 277
Cassytha sp.	CP 257
DROSERACEAE	
Drosera leucoblasta	CP 320
Drosera parvula	CP 325

PITTOSPORACEAE		
	Billardiera sp.	CP 214
MIMOSACEAE		
	Acacia drewiana ssp. minor	CP 354
	Acacia erinacea	CP 291, KK 353
	Acacia filifolia	CP 189
	Acacia multispicata	KK 377
	Acacia resinosa	CP 210, 312, 235
	Acacia saligna	CP 225
PAPILIONACEAE		
	Chorizema aciculare	KK 316
	Daviesia euphorbioides	-
	Daviesia pachyphylla	KK 356
	Gastrolobium calycinum	CP 208
	Gastrolobium glaucum	CP 194
	Gastrolobium hamulosum	-
	Gastrolobium spinosum	KK 323
	Gompholobium asperulum	CP 193
	Gompholobium tomentosum	CP 269
	Jacksonia lehmannii	KK 314
	Jacksonia ?sericea	CP 188, 244
	Jacksonia spinosa	KK 372
*	Trifolium arvense	CP 232
POLYGALACEAE		
	Comesperma calymega	KK 367
	Comesperma volubile	CP 211
CELASTRACEAE		
	Psammomoya choretroides	CP 196
STACKHOUSIACEAE		
	Stackhousia huegelii	KK 332, CP 315
	Stackhousia scoparia	CP 343
	Tripterococcus brunonis	CP 246

SAPINDACEAE	
Dodonaea viscosa	KK 328
RHAMNACEAE	
Cryptandra pomaderroides	CP 255
MALVACEAE	
Alyogyne hakeifolia	KK 384
STERCULIACEAE	
Keraudrenia integrifolia	CP 250
Lysiosepalum rugosum	CP 252
DILLENIACEAE	
Hibbertia acerosa	CP 275
Hibbertia glomerata	CP 238
Hibbertia huegelii	CP 260
Hibbertia rostellata	CP 341
Hibbertia rupicola	CP 185
Hibbertia sp.	CP 313
Hibbertia sp.	CP 266
THYMELAEACEAE	
Pimelea brevistyla	CP 334
Pimelea imbricata	CP 187
MYRTACEAE	
Baeckea crispiflora	CP 179, 284, 311, 319
Beaufortia bracteosa	KK 302
Beaufortia elegans	CP 268
Calothamnus quadrifidus	CP 182
Calytrix angulata	CP 183, 309
Calytrix sapphirina	KK 340
Calytrix sp.	CP 327
Chamelaucium drummondii ssp. drummondii	CP 258
Darwinia purpurea	KK 355
Eremaea pauciflora	CP 264
Eucalyptus erythronema var. marginata	CP 294, 333

Eucalyptus pyriformis	CP 243
Eucalyptus aff. rigidula	CP 224
Eucalyptus celastroides ssp. virella	CP 292
Eucalyptus semivestita (ms)	CP 249
Leptospermum oligandrum	KK 307
Melaleuca acuminata ssp. websteri	KK 352
Melaleuca conothamnoides	CP 215
Melaleuca aff. cordata	CP 181
Melaleuca coronicarpa ssp. coronicarpa (ms)	CP 228
Melaleuca laxiflora	KK 349, CP 256
Melaleuca pentagona	CP 192, KK 379
Melaleuca radula	CP 227
Melaleuca scabra	CP 272, 286, 314
Melaleuca scabra var. tuberculata	KK 378
Melaleuca uncinata	CP 213, KK 337
Melaleuca sp.	CP 285
Micromyrtus racemosa	KK 357, CP 332
Scholtzia drummondii	KK 308
Thryptomene ?prolifera	CP 287
Verticordia acerosa ssp. preissii	CP 191
Verticordia eriocephala	KK 339
Verticordia pritzelii	KK 303, 341, 348
Verticordia sp.	KK 345
Verticordia sp.	CP 357

HALORAGACEAE

Glischrocaryon aureum	KK 311

EPACRIDACEAE

Astroloma serratifolium	CP 184, 321
Leucopogon tamminensis var. tamminensis	CP 259

PRIMULACEAE

*	Anagallis arvensis var. caerulea	KK 334

LOGANIACEAE

Logania flaviflora	CP 323, KK 347

GENTIANACEAE		
*	Centaurium sp	CP 289
CONVOLVULACEAE		
	Wilsonia humilis	CP 336
LAMIACEAE		
	Hemiandra coccinea	CP 263
	Hemigenia westringioides	KK 346, CP 339
	Hemigenia sp.	CP 296
	Microcorys obovata	CP 338
	Microcorys sp.	CP 282
SOLANACEAE		
*	Solanum hystrix	KK 371
PLANTAGINACEAE		
*	Plantago coronopus ssp. commutata	KK 382
RUBIACEAE		
	Opercularia vaginata	CP 180
LOBELIACEAE		
	Isotoma hypocrateriformis	CP 218, 230
	Lobelia rarifolia	CP 216
GOODENIACEAE		
	Brunonia australis	CP 326
	?Dampiera helmsii	CP 279
	Dampiera lavandulacea	CP 271
	Dampiera spicigera	CP 262
	Dampiera teres	CP 322, KK 329
	Dampiera wellsiana	CP 248
	Dampiera sp.	CP 346
	Goodenia caerulea	CP 185, 241, KK 365
	Lechenaultia biloba	CP 261
	Scaevola arenaria	CP 212

Verreauxia reinwardtii	CP 281
STYLIDIACEAE	
Levenhookia stipitata	CP 236
Stylidium bulbiferum	CP 217, 288, 307
Stylidium calcaratum	CP 361
Stylidium leptophyllum	CP 283
Stylidium macrocarpum	CP 274, 351
Stylidium sp.	CP 233
Stylidium sp.	CP 321
Stylidium sp.	CP 335
Stylidium sp.	CP 356
ASTERACEAE	
Blennospora drummondii	CP 299
Brachycome bellidioides	CP 298
Erymophyllum ramosum	KK 387
Gnephosis tenuissima	CP 226
Hyalosperma cotula	CP 237
Pogonolepis stricta	CP 220
Waitzia acuminata	CP 195
Waitzia paniculata	CP 240

APPENDIX 5 - SPECIES LIST FOR VEGETATION ASSOCIATIONS FOUND ON WATER RESERVE NO. 16416 AND REMNANT BUSHLAND ON RESERVE NO. 18672

Ws *Eucalyptus salmonophloia* (salmon gum) Woodland

Acacia acuminata
Acacia aestivalvis
Acacia erinacea
Acacia ligustrina
Acacia orbifolia
Arthropodium capillipes
Borya sphaerocephala
Cephalipterum drummondii
Crassula colorata
Dianella revoluta
Dodonaea inaequifolia
* Ehrharta calycina
Enchylaena lanata
Eremophila lehmanniana
Erymophyllum tenellum
Eucalyptus celastroides
Eucalyptus loxophleba
Eucalyptus salmonophloia
Gastrolobium parviflorum
Hyalosperma glutinosum
Maireana carnosa
Melaleuca acuminata
Melaleuca adnata
Melaleuca coronicarpa
Melaleuca uncinata
Melaleuca undulata
Olearia ?revoluta
Opercularia vaginata
Podolepis lessonii
Rhagodia drummondii
Rhagodia preissii
Santalum acuminatum
Scaevola spinescens
Stackhousia monogyna
Templetonia sulcata
Trachymene cyanopetala
Trachymene ornata

* Introduced species

Wsg *Eucalyptus salmonophloia/Eucalyptus salubris* Woodland

Acacia acuminata
Acacia dura
Acacoa erinacea
Acacia jacksonii
Acacia ligustrina
Acacia orbifolia
Amyema sp.
Astroloma serratifolium
* Bromus diandrus
Chamaescilla corymbosa
Chleilanthus austrotenuifolia
Chthonocephalus pseudevax
Daucus glochidiatus
Dodonaea pinifolia
Enchylaena lanata
Eremophila decipiens
Eucalyptus arachnaea
Eucalyptus celastroides
Eucalyptus loxophleba
Eucalyptus myriadena
Eucalyptus pluricaulis
Eucalyptus salmonophloia
Eucalyptus salubris
Eucalyptus semivestita
Eucalyptus sheathiana
Fumaria muralis
Grevillea huegelii
Helichrysum lindleyi
Helipterum manglesii
Hyalosperma glutinosum
Melaleuca acuminata
Melaleuca adnata
Melaleuca coronicarpa
Melaleuca ctenoides
Melaleuca undulata
Olearia muelleri
Podolepis lessonii
Podotheca gnaphalioides
Rhagodia drummondii
Rhagodia preissii
Santalum acuminatum
Senecio glomeratus
Stylidium periscelianthum
Templetonia sulcata
Thysanotus patersonii
Trachymene cyanopetala
Trachymene ornata
Wilsonia humilis

* Introduced species

Ww *Eucalyptus wandoo* Woodland

Acacia acuminata
Acacia fragilis
* Aira cupaniana
Allocasuarina campestris
* Anagallis arvensis
Angianthus tomentosus
Astroloma serratifolium
Baeckea ?crispiflora
Blennospora drummondii
Borya sphaerocephala
Caladenia flava
Caladenia roei
Calothamnus sp. 3459
Cyanicula gemmata
Dianella revoluta
Diplolaena microcephala
Ecdeiocolea monostachya
Eucalyptus loxophleba
Eucalyptus wandoo
Helipterum verecundum
Hibbertia rupicola
Lepidosperma sp.
Loxocarya aspera
Melaleuca uncinata
* Mesembryanthemum nodiflorum
Muehlenbeckia adpressa
* Parentucellia latifolia
* Petrorhagia velutina
Podolepis canescens
Podolepis lessonii
Podotheca angustifolia
Santalum acuminatum
Scholtzia drummondii
Trachymene cyanopetala
* Ursinia anthemoides
Waitzia acuminata
Waitzia citrina

* Introduced species

Wl *Eucalyptus loxoplheba* (York gum) Woodland

Acacia acuminata
Acacia ?chrysella
Acacia jacksonioides
Acacia lasiocarpa var. bracteolata
Acacia leptospermoides
Acacia ligustrina
Acacia orbifolia
Allocasuarina campestris
Astroloma serratifolium
* Avena sativa
Borya sphaerocephala
* Briza maxima
Caladenia roei
Chamaescilla corymbosa
Comesperma integerrimum
Crassula colorata
Dampiera lavandulacea
Dianella revoluta
Dodonaea pinifolia
Dodonaea viscosa
Enchylaena lanata
Erodium cygnorum
Erymophyllum tenellum
Eucalyptus arachnaea
Eucalyptus erythronema
Eucalyptus loxophleba
Eucalyptus salmonophloia
Gnephosis tenuissima
Grevillea petrophiloides
Helichrysum lindleyi
Helipterum manglesii
Helipterum splendidum
Helipterum verecundum
Hyalosperma glutinosum
Lepidosperma ?letophyllum
Melaleuca adnata
Melaleuca lateriflora
Melaleuca radula
Melaleuca uncinata
Melaleuca undulata
Mitrasacme paradoxa
Podolepis lessonii
Ptilotus spathulatus
Rhagodia drummondii
Rhagodia preissii
* Romulea rosea
Spartochloa scirpoidea
Templetonia sulcata
Thysanotus dichotomus
Trachymene cyanopetala
Trachymene ornata
Waitzia acuminata
Waitzia aurea

* Introduced species

Wla *Eucalyptus loxophleba* Woodland over *Acacia acuminata*

Acacia acuminata
Acacia erinacea
Acacia ?multispicata
* Aira cupaniana
Allocasuarina campestris
Allocasuarina huegeliana
* Anagallis arvensis
* Arctotheca calendula
Arthropodium capillipes
Astroloma serratifolium
* Avena sp.
Borya sphaerocephala
* Briza maxima
* Bromus diandrus
Chamaescilla corymbosa
Chleianthes austrotenuifolia
Conostylis prolifera
Cyanicula gemmata
Dampiera oligophylla
Daucus glochidiatus
Dianella revoluta
Drosera ?glanduligera
Erodium cygnorum
Erymophyllum tenellum
Eucalyptus loxophleba
Eucalyptus salmonophloia
Glischrocaryon aureum
Grevillea paniculata
Hakea preissii
Helichrysum lindleyi
Helipterum manglesii
Hibbertia rupicola
Lepidosperma ?letophyllum
Loxocarya aspera
Melaleuca ?radula
Neurachne alopecuroidea
Opercularia vaginata
* Oxalis sp.
Podolepis canescens
Podolepis capillaris
Podolepis lessonii
Ptilotus spathulatus
Ptilotus stirlingii
Rhagodia drummondii
Rhagodia preissii
Santalum acuminatum
Scaevola tortuosa
Stackhousia monogyna
Thelymitra antennifera
Trachymene cyanopetala
Trachymene ornata
Tribonanthes longipetala
* Ursinia anthemoides
Waitzia acuminata
Waitzia aurea

* Introduced species

Wa *Acacia acuminata* Woodland

Acacia acuminata
Acacia restiacea
Acacia saligna
* Arctotheca calendula
* Aira cupaniana
Allocasuarina campestris
Astroloma serratifolium
* Avena species
Borya sphaerocephala
* Briza maxima
Burchardia umbellata
Calytrix depressa
Chamaescilla spiralis
Chleianthes austrotenuifolia
Chorizema genistoides
Cyanicula gemmata
Dianella revoluta
Drosera macrantha
Drosera subhirtella
Erymophyllum tenellum
Glischrocaryon ?aureum
Grevillea paniculata
Hakea lissocarpha
Helichrysum lindleyi
Hibbertia rupicola
Hypocalymma angustifolium
Lepidosperma sp.
Loxocarya aspera
Melaleuca radula
Mirbelia ramulosa
Podolepis canescens
Podolepis lessonii
Santalum spicatum
Solanum oldfieldii
Stylidium calcaratum
Stypandra glauca
Trachymene cyanopetala
Trachymene ornata
Tribonanthes longipetala
* Ursinia anthemoides
Verticordia chrysanthella
Waitzia acuminata
Waitzia aurea

Mm Mallee over *Melaleuca uncinata*

Acacia bidentata
Acacia ericksonii
Acacia jacksonioides
Acacia leptospermoides
Acacia orbifolia
Allocasuarina campestris
Astroloma serratifolium
Billardiera erubescens
Bossiaea eriocarpa
Callitris canescens
Cassytha melantha
Cryptandra leucophracta
Cyanicula gemmata
Daviesia sp. 2956
Diuris aff. corymbosa
Dodonaea bursariifolia
Dodonaea pinifolia
Dodonaea viscosa
Drosera macrophylla
Drosera macrantha
Eucalyptus arachnaea
Eucalyptus erythronema
Eucalyptus flocktoniae
Eucalyptus hypoclamydea
Eucalyptus pluricaulis ssp. pluricaulis
Eucalyptus rigidula
Eucalyptus semivestita
Eucalyptus sheathiana
Eucalyptus subangusta
Gastrolobium parviflorum
Grevillea hakeoides ssp. stenophylla
Grevillea paniculata
Hakea ?coriacea
Hakea meisneriana
Helichrysum lindleyi
Helipterum manglesii
Hibbertia rostellata
Hypocalymma angustifolium
Lepidosperma ?letophyllum
Leptospermum erubescens
Leucopogon gracillimus
Lysiosepalum rugosum
Melaleuca acuminata
Melaleuca adnata
Melaleuca coronicarpa
Melaleuca ctenoides
Melaleuca laxiflora
Melaleuca scabra
Melaleuca spicigera
Melaleuca uncinata
Microcorys obovata
Olax benthamiana
Persoonia scabrella
Phebalium ambiguum
Phebalium filifolium
Phebalium tuberculosum
Pimelea leucantha
Podolepis capillaris
Podolepis lessonii
Santalum acuminatum
Stylidium crassifolium
Stylidium leptophyllum
Thryptomene racemulosa
Trachymene cyanopetala
Waitzia acuminata

* Introduced species

Mc Mallee over *Melaleuca coronicarpa*

Acacia ?bidentata
Acacia ?fragilis
Acacia orbifolia
Acacia sulcata var. platyphylla
Allocasuarina acutivalvis
Astroloma serratifolium
Baeckea ?preissiana
Callitris canescens
Comesperma volubile
Diuris aff. corymbosa
Dodonaea bursariifolia
Dodonaea aff. microzyga
Dodonaea pinifolia
Dodonaea viscosa
Drosera macrophylla
Drosera subhirtella
Eucalyptus celastroides
Eucalyptus eremophila
Eucalyptus erythronema
Eucalyptus pluricaulis ssp. pluricaulis
Eucalyptus semivestita
Eucalyptus ?subangusta
Gastrolobium parviflorum
Gastrolobium spinosum
Hibbertia rostellata
Hypocalymma angustifolium
Melaleuca adnata
Melaleuca coronicarpa
Melaleuca ctenoides
Melaleuca pentagona
Melaleuca sclerophylla
Melaleuca uncinata
Melaleuca undulata
Phebalium filifolium
Phebalium tuberculosum

Me Mallee over *Melaleuca*

Acacia sulcata var. platyphylla
Allocasuarina acutivalvis
Astroloma serratifolium
Callitris canescens
Dodonaea bursariifolia
Dodonaea pinifolia
Eucalyptus arachnaea
Eucalyptus pluricaulis
Eucalyptus semivestita
Eucalyptus sheathiana
Eucalyptus subangusta
Gastrolobium parviflorum
Melaleuca acuminata
Melaleuca adnata
Melaleuca coronicarpa
Melaleuca uncinata
Melaleuca undulata

Kdt *Dryandra/Petrophile shuttleworthiana* Thicket

Acacia drewiana ssp. minor
Acacia jacksonioides
Acacia restiacea
Acacia semicircinalis
Actinostrobus arenarius
Allocasuarina acutivalvis
Allocasuarina campestris
Allocasuarina drummondiana
Astroloma serratifolium
Beaufortia bracteosa
Beaufortia interstans
Caladenia flava
Calytrix leschenaultii
Chamelaucium drummondii
Chorizema aciculare
Comesperma drummondii
Conostylis androstemma
Cryptandra leucophracta
Cyanostegia angustifolia
Dampiera lindleyi
Dampiera oligophylla
Daviesia aff. daphnoides
Daviesia nudiflora
Drosera macrophylla
Dryandra comosa
Dryandra purdieana
Eucalyptus ?hypoclamydea
Eucalyptus pyriformis
Eucalyptus semivestita
Eucalyptus subangusta
Exocarpos sparteus
Gastrolobium calycinum
Gastrolobium glaucum
Gastrolobium spinosum
Glischrocaryon aureum
Goodenia pinifolia
Grevillea armigera
Grevillea eryngioides
Grevillea petrophiloides
Hakea ?circumalata
Hakea gilbertii
Hakea meisneriana
Hakea scoparia
Hemigenia viscida
Hibbertia acerosa
Hibbertia exasperata
Hibbertia huegelii
Isopogon divergens
Isopogon scabriusculus
Loxocarya aspera
Lysinema ciliatum
Melaleuca aff. cordata
Melaleuca conothamnoides
Melaleuca holosericea
Melaleuca platycalyx
Melaleuca pungens
Melaleuca scabra
Melaleuca sclerophylla
Melaleuca uncinata
Microcorys obovata
Mirbelia dilatata
Nemcia obovata
Opercularia vaginata
Persoonia quinquenervis
Petrophile media
Petrophile shuttleworthiana
Phebalium filifolium
Platysace ?maxwellii
Santalum acuminatum
Scholtzia drummondii
Stylidium coroniforme
Stylidium repens
Synaphea sp.
Verticordia chrysantha

Kdh *Dryandra* Low Heath

Acacia jacksonioides
Acacia leptospermoides
Acacia semicircinalis
Actinostrobus arenarius
Allocasuarina acutivalvis
Allocasuarina campestris
Baeckea ?preissiana
Baeckea sp. 9
Beaufortia interstans
Calytrix leschenaultii
Chamelaucium drummondii
Conostylis androstemma
Cryptandra leucophracta
Dampiera oligophylla
Daviesia aff. daphnoides
Drosera macrophylla
Drosera subhirtella
Dryandra purdieana
Eucalyptus flocktoniae
Eucalyptus pyriformis
Eucalyptus ?rigidula
Exocarpos sparteus
Glischrocaryon aureum
Grevillea armigera
Grevillea integrifolia ssp. shuttleworthiana
Grevillea petrophiloides
Guichenotia micrantha
Hakea ?circumalata
Hakea cygna
Hakea gilbertii
Hakea platysperma
Hakea scoparia
Hibbertia exasperata
Hibbertia huegelii
Isopogon scabriusculus
Lasiopetalum molle
Lysinema ciliatum
Melaleuca aff. cordata
Melaleuca conothamnoides
Melaleuca holosericea
Melaleuca pungens
Melaleuca scabra
Olax benthamiana
Petrophile media
Petrophile shuttleworthiana
Santalum acuminatum
Scholtzia drummondii
Stylidium ?nungarinense
Stylidium repens
Synaphea species
Thryptomene racemulosa
Verticordia chrysantha
Verticordia eriocephala
Verticordia picta

Kh Scrub Heath

Acacia drewiana ssp. minor
Acacia multispicata
Acacia nigripilosa ssp. nigripilosa
Acacia phaeocalyx
Acacia semicircinalis
Actinostrobus arenarius
Allocasuarina campestris
Allocasuarina humilis
Anigozanthos humilis
Baeckea ?preissiana
Beaufortia elegans
Beaufortia interstans
Boronia coerulescens
Bossiaea eriocarpa
Calothamnus quadrifidus
Calothamnus sanguineus
Calytrix violacea
Cassytha ?pubescens
Chamelaucium drummondii
Chorizema aciculare
Comesperma drummondii
Conospermum stoechadis
Conostylis setigera
Crassula colorata
Cryptandra pungens
Dampiera oligophylla ssp. juncea
Daviesia aff. daphnoides
Daviesia hakeoides
Daviesia nudiflora
Drosera macrophylla
Dryandra purdieana
Eremaea pauciflora
Eucalyptus eudesmioides
Eucalyptus pyriformis
Eucalyptus rigidula
Exocarpos sparteus
Gompholobium obcordatum
Grevillea armigera
Grevillea ?tridentifera
Grevillea uncinulata
Hakea cygna ssp. cygna
Hakea erecta
Hakea gilbertii
Hakea incrassata
Hakea lissocarpha
Hakea trifurcata
Hibbertia exasperata
Hibbertia huegelii
Hibbertia hypericoides
Isopogon divergens
Isopogon dubius
Isopogon scabriusculus
Jacksonia fasciculata
Leptospermum erubescens
Leucopogon conostephioides
Loxocarya myrioclada
Loxocarya parthenica
Lysinema ciliatum
Melaleuca aff. cordata
Melaleuca conothamnoides
Melaleuca pungens
Melaleuca scabra
Mirbelia floribunda
Olax benthamiana
Persoonia ?coriacea
Petrophile ericifolia
Petrophile media
Petrophile shuttleworthiana
Santalum acuminatum
Stylidium repens
Synaphea constricta
Thysanotus patersonii
* Ursinia anthemoides
Verticordia chrysantha
Verticordia eriocephala
Verticordia picta

Kt *Allocasuarina campestris* Thicket

Acacia ericksonii
Acacia fragilis
Acacia lasiocalyx
Acacia lasiocarpa var. bracteolata
Acacia restiacea
Acacia sulcata var. platyphylla
Allocasuarina campestris
Allocasuarina microstachya
Angianthus tomentosus
Arthropodium capillipes
Astroloma serratifolium
Baeckea ?crispiflora
Baeckea ?preissiana
Borya sphaerocephala
Bossiaea eriocarpa
Burchardia umbellata
Caladenia flava
Callitris canescens
Calothamnus quadrifidus
Calytrix depressa
Calytrix leschenaultii
Chamaescilla corymbosa
Chamaescilla spiralis
Chleianthus austrotenuifolia
Comesperma volubile
Conostylis androstemma
Conostylis prolifera
Cryptandra leucophracta
Cyanicula gemmata
Dampiera lavandulacea
Dampiera oligophylla ssp. juncea
Darwinia purpurea
Daviesia hakeoides
Dianella revoluta
Diuris aff. corymbosa
Dodonaea divaricata
Drosera glanduligera
Drosera macrophylla
Drosera spilos
Drosera subhirtella
Ecdeiocolea monostachya
Elythranthera brunonis
Eremophila lehmanniana
Eucalyptus ?hypoclamydea
Eucalyptus loxophleba
Eucalyptus pyriformis
Gompholobium obcordatum
Grevillea acerosa
Grevillea integrifolia ssp. shuttleworthiana
Grevillea tridentifera
Haemodorum sp.
Hakea incrassata
Hakea meisneriana
Hakea scoparia
Halgania sp.
Helichrysum lindleyi
Helipterum manglesii
Helipterum splendidum
Hemigenia sericea
Hibbertia exasperata
Hibbertia glomerosa
Hibbertia huegelii
Hibbertia rostellata
Hyalosperma cotula
Hypocalymma angustifolium
Isotoma hypocrateriformis
Lepidosperma ?letophyllum
Leptospermum erubescens
Leucopogon gracillimus
Leucopogon ?planifolius
Loxocarya aspera
Lysinema ciliatum

Melaleuca adnata
Melaleuca conothamnoides
Melaleuca platycalyx
Melaleuca radula
Melaleuca scabra
Melaleuca uncinata
Mesomelaena preissii
Microcorys obovata
Mirbelia spinosa
Opercularia vaginata
Petrophile media
Petrophile seminuda
Phebalium tuberculosum
Podolepis canescens
Podolepis lessonii
Psammomoya choretroides
Santalum acuminatum
Scholtzia drummondii
Spartochloa scirpoidea
Stylidium breviscapum
Stylidium calcaratum
Stylidium neglectum
Thelymitra antennifera
Thysanotus ?patersonii
Trachymene ornata
* Ursinia anthemoides
Verticordia acerosa ssp. preissii
Verticordia brachypoda
Verticordia chrysantha
Verticordia picta
Waitzia acuminata
Waitzia aurea

Ka *Allocasuarina campestris/Calothamnus aspera* Thicket

Acacia lasiocalyx
Acacia ulicina
Allocasuarina campestris
Astroloma serratifolium
Calothamnus aspera
Chamaescilla corymbosa
Chleianthes austrotenuifolia
Diuris sp.
Dodonaea ?divaricata
Drosera macrophylla
Hakea scoparia
Melaleuca radula
Spartochloa scirpoidea

Kg *Allocasuarina campestris/Hakea meisneriana* Thicket

Acacia sulcata var. platyphylla
Allocasuarina campestris
Beaufortia bracteosa
Conostylis androstemma
Cryptandra leucophracta
Darwinia purpurea
Dryandra purdieana
Ecdeiocolea monostachya
Gastrolobium calycinus
Haemodorum sp.
Hakea circumalata
Hakea incrassata
Hakea meisneriana
Hakea scoparia
Hemigenia westringioides
Hibbertia exasperata
Melaleuca conothamnoides
Melaleuca aff. cordata
Melaleuca scabra
Petrophile media
Petrophile seminuda
Petrophile shuttleworthiana

Ky2 *Allocasuarina campestris/Hakea erecta* Heath

(unburnt)

Acacia filifolia
Actinostrobus arenarius
Allocasuarina campestris
Astroloma serratifolium
Baeckea ?preissiana
Boronia coerulescens
Comesperma scoparium
Conospermum brownii
Conospermum stoechadis
Conostylis wonganensis
Cryptandra glabriflora
Dampiera oligophylla
Darwinia purpurea
Daviesia nudiflora
Drosera ?spilos
Dryandra purdieana
Elythranthera brunonis
Grevillea didymobotrya
Grevillea eriostachya
Hakea circumalata
Hakea erecta
Hakea platysperma
Hibbertia exasperata
Isopogon scabriusculus
Jacksonia macrocalyx
Lechenaultia biloba
Melaleuca conothamnoides
Melaleuca aff. cordata
Melaleuca platycalyx
Mesomelaena preissii
Mirbelia spinosa
Opercularia vaginata
Patersonia sp.
Petrophile ericifolia
Psammomoya choretroides
Santalum acuminatum
Stylidium repens
Thysanotus patersonii
Trachymene cyanopetala
Trachymene ornata
Verticordia chrysantha
Verticordia eriocephala
Verticordia picta

Ky1 *Allocasuarina campestris/Hakea erecta* Heath

(burnt)

Acacia acuminata
Acacia filifolia
Acacia latipes
Acacia leptospermoides
Acacia multispicata
Acacia restiacea
Actinostrobus arenarius
Allocasuarina campestris
Allocasuarina microstachya
Andersonia lehmanniana
Baeckea ?crispiflora
Baeckea aff. preissiana
Beaufortia bracteosa
Beaufortia interstans
Boronia coerulescens
Borya sphaerocephala
Burchardia umbellata
Calothamnus quadrifidus
Calytrix gracilis
Calytrix leschenaultii
Chamelaucium drummondii
Chorizema aciculare
Conospermum stoechadis
Conostylis setigera
Conostylis wonganensis
Cryptandra glabriflora
Cryptandra spinescens
Dampiera lavandulacea
Dampiera oligophylla
Darwinia purpurea
Daviesia nudiflora
Dianella revoluta
Drosera spilos
Drosera subhirtella
Dryandra fraseri
Dryandra purdieana
Ecdeiocolea monostachya
Elythranthera brunonis
Glischrocaryon aureum
Grevillea armigera
Grevillea didymobotrya
Grevillea eryngioides
Grevillea ?teretifolia
Grevillea uncinulata
Hakea circumalata
Hakea cygna
Hakea erecta
Hakea incrassata
Hakea platysperma
Hakea scoparia
Hibbertia drummondii
Isopogon scabriusculus
Jacksonia fasciculata
Laxmannia grandiflora
Lepidosperma sp.
Leucopogon hamulosum
Leucopogon ?planifolius
Melaleuca conothamnoides
Melaleuca aff. cordata
Melaleuca platycalyx
Mesomelaena preissii
Mirbelia spinosa
Opercularia vaginata
Persoonia ?striata
Petrophile ericifolia
Petrophile media
Petrophile seminuda
Petrophile shuttleworthiana
Pimelea brevifolia
Psammomoya choretroides

Scholtzia drummondii
Stylidium repens
Stypandra glauca
Synaphea sp.
Thysanotus patersonii
Trachymene cyanopetala
Trachymene ornata
Verticordia chrysantha
Verticordia eriocephala
Verticordia picta

Kv *Allocasuarina acutivalvis* Thicket

Allocasuarina acutivalvis
Allocasuarina campestris
Astroloma serratifolium
Cryptandra leucophracta
Cyanicula gemmata
Dianella revoluta
Dodonaea ?divaricata
Drosera spilos
Drosera subhirtella
Elythranthera brunonis
Grevillea didymobotrya
Grevillea petrophiloides
Hakea incrassata
Hakea scoparia
Hibbertia exasperata
Hibbertia rostellata
Hypocalymma angustifolium
Isopogon scabriusculus
Leucopogon sp.
Melaleuca conothamnoides
Melaleuca coronicarpa
Melaleuca uncinata
Psammomoya choretroides
Thryptomene racemulosa
Verticordia chrysantha
Waitzia acuminata
Waitzia paniculata

Km *Melaleuca uncinata* Thicket

Acacia ericksonii
Acacia sp. 3458
Allocasuarina acutivalvis
Allocasuarina campestris
* Avena sp
Baeckea ?preissiana
Borya sphaerocephala
* Briza maxima
* Bromus diandrus
Callitris canescens
Calytrix depressa
Comesperma volubile
Cotula coronopifolia
Dampiera lavandulacea
Dodonaea ?divaricata
Dodonaea viscosa
Ecdeiocolea monostachya
Enchylaena lanata
Eucalyptus ?eremophila
Gastrolobium parviflorum
Glischrocaryon ?aureum
Hakea coriacea
Hakea scoparia
Halosarcia ?lepidosperma
Halosarcia ?pergranulata
Helichrysum lindleyi
Hibbertia rostellata
Hypocalymma angustifolium
Isotoma hypocrateriformis
Lepidosperma sp.
Leptospermum erubescens
* Lolium rigidum
Loxocarya aspera
Melaleuca acuminata
Melaleuca adnata
Melaleuca coronicarpa
Melaleuca ctenoides
Melaleuca hamulosa
Melaleuca lateriflora
Melaleuca laxiflora
Melaleuca platycalyx
Melaleuca scabra
Melaleuca spicigera
Melaleuca uncinata
Melaleuca undulata ssp. undulata
* Mesembryanthemum nodiflorum
Petrophile shuttleworthiana
Podolepis lessonii
Rhagodia drummondii
Santalum acuminatum
Spartochloa scirpoidea
Stylidium ?repens
Stypandra glauca
* Ursinia anthemoides
Waitzia acuminata

Kc *Melaleuca scabra* Heath

Acacia fragilis
Acacia leptospermoides
Acacia semicircinalis
Acacia sulcata var. platyphylla
Actinostrobus arenarius
Allocasuarina acutivalvis
Allocasuarina campestris
Baeckea ?preissiana
Beaufortia bracteosa
Beaufortia interstans
Caladenia flava
Callitris canescens
Comesperma volubile
Conostylis androstemma
Cryptandra glabriflora
Cryptandra leucophracta
Dampiera oligophylla
Dodonaea ?divaricata
Drosera glanduligera
Drosera macrophylla
Drosera subhirtella
Dryandra purdieana
Eucalyptus hypoclamydea
Eucalyptus pyriformis
Exocarpos sparteus
Gastrolobium calycinum
Goodenia pinifolia
Grevillea paniculata
Hakea coriacea
Hakea gilbertii
Hakea meisneriana
Hakea scoparia
Hemigenia westringioides
Hibbertia exasperata
Hypocalymma angustifolium
Isopogon scabriusculus
Kunzea limnicola
Lepidosperma ?letophyllum
Melaleuca conothamnoides
Melaleuca coronicarpa
Melaleuca holosericea
Melaleuca platycalyx
Melaleuca scabra
Melaleuca sclerophylla
Melaleuca uncinata
Micromyrtus racemosa
Persoonia striata
Petrophile media
Petrophile seminuda
Petrophile shuttleworthiana
Phebalium tuberculosum
Pimelea sulphurea
Platysace ?maxwellii
Psammomoya choretroides
Santalum acuminatum
Scholtzia drummondii
Stylidium breviscapum
Stylidium nungarinense
Stylidium petiolare
Thomasia molle
Thryptomene racemulosa
Thysanotus patersonii
Verticordia chrysantha

Kl *Melaleuca sclerophylla* Heath

Acacia lasiocarpa var. bracteolata
Acacia pulchella ssp. goadbyi
Andersonia sp.
Beaufortia bracteosa
Calytrix sp.
Chamaescilla corymbosa
Comesperma volubile
Dampiera lindleyi
Dodonaea ?pinifolia
Drosera glanduligera
Dryandra purdieana
Elythranthera brunonis
Gastrolobium calycinus
Glischrocaryon ?aureum
Grevillea tridentifera
Hakea erinacea
Hakea marginata
Hakea scoparia
Hibbertia exasperata
Isopogon scabriusculus
Kunzea limnicola
Lysinema ciliatum
Melaleuca coronicarpa
Melaleuca scabra
Melaleuca sclerophylla
Melaleuca uncinata
Nemcia obovata
Petrophile media
Petrophile seminuda
Santalum acuminatum
Stylidium nungarinense
Stylidium ?repens
Verticordia chrysantha
Verticordia ?picta

Ke *Eremaea* Heath

Acacia acuaria
Acacia phaeocalyx
Acacia restiacea
Actinostrobus arenarius
Adenanthos drummondii
Allocasuarina campestris
Allocasuarina humilis
Allocasuarina microstachya
Anigozanthos humilis
Baeckea ?crispiflora
Beaufortia elegans
Borya sphaerocephala
* Briza maxima
Brunonia australis
Burchardia umbellata
Caladenia flava
Calothamnus quadrifidus
Calothamnus sanguineus
Calytrix violacea
Chamaescilla spiralis
Chorizema aciculare
Comesperma scoparium
Conospermum stoechadis
Conostylis setigera
Conostylis villosa
Dampiera lavandulacea
Dampiera oligophylla
Dampiera spicigera
Daviesia nudiflora
Dicrastylis velutina
Drosera subhirtella
Dryandra fraseri
Ecdeiocolea monostachya
Elythranthera brunonis
Eremaea pauciflora
Eucalyptus pyriformis
Glischrocaryon ?aureum
Grevillea armigera
Grevillea eriostachya
Grevillea ?integrifolia ssp. biformis
Grevillea tridentifera
Grevillea uncinulata
Hakea erecta
Hakea incrassata
Hakea lissocarpha
Hakea trifurcata
Halgania sp.
Hibbertia acerosa
Isopogon divergens
Jacksonia fasciculata
Jacksonia macrocalyx
Lechenaultia biloba
Leptospermum erubescens
Leucopogon conostephioides
Loxocarya myrioclada
Loxocarya parthenica
Lysinema ciliatum
Melaleuca aff. cordata
Melaleuca scabra
Opercularia vaginata
Petrophile ericifolia
Petrophile media
Petrophile seminuda
Petrophile shuttleworthiana
Petrophile striata
Pileanthus peduncularis
Platysace ?maxwellii
Podolepis canescens
Santalum spicatum
Scholtzia drummondii
Stylidium repens
Synaphea sp.

Thysanotus ?patersonii
Trachymene ornata
* Ursinia anthemoides
Verticordia chrysantha
Verticordia densiflora
Verticordia eriocephala
Verticordia wonganensis
Waitzia aurea

Kb *Beaufortia* Heath

Acacia ?filifolia
Acacia ?fragilis
Actinostrobus arenarius
Allocasuarina campestris
Baeckea ?preissiana
Baeckea sp. "9"
Beaufortia interstans
Beaufortia squarrosa
Calytrix sapphirina
Conospermum stoechadis
Conostylis androstemma
Dryandra purdieana
Eucalyptus pyriformis
Glischrocaryon ?aureum
Grevillea armigera
Grevillea didymobotrya
Grevillea eriostachya
Grevillea eryngioides
Grevillea integrifolia ssp. shuttleworthiana
Grevillea paniculata
Hakea cygna
Hakea erecta
Hibbertia huegelii
Isopogon scabriusculus
Jacksonia sp.
Melaleuca conothamnoides
Melaleuca aff. cordata
Petrophile ericifolia
Petrophile media
Petrophile seminuda
Platysace ?maxwellii
Verticordia chrysantha
Verticordia eriocephala
Verticordia monadelpha
Verticordia venusta

Ks Sedges/Heath

Acacia filifolia
Acacia jacksonioides
Acacia ligustrina
Actinostrobus arenarius
Allocasuarina campestris
Allocasuarina microstachya
* Arctotheca calendula
Astroloma serratifolium
Baeckea ?crispiflora
Baeckea aff. crispiflora A.
Baeckea ?preissiana
Beaufortia bracteosa
Boronia coerulescens
Borya sphaerocephala
Burchardia umbellata
Calothamnus quadrifidus
Calytrix ?leschenaultii
Chamaescilla corymbosa
Chamaescilla spiralis
Chorizema aciculare
Comesperma scoparium
Conospermum incurvum
Conospermum stoechadis
Conostylis wonganensis
Cryptandra glabriflora
Cryptandra pungens
Cyanicula amplexans
Cyanicula gemmata
Dampiera lavandulacea
Dampiera lindleyi
Dampiera oligophylla
Darwinia purpurea
Daviesia hakeoides
Daviesia nudiflora
Diuris ?setacea
Dodonaea divaricata
Drosera macrantha
Drosera spilos
Drosera subhirtella
Dryandra purdieana
Ecdeiocolea monostachya
Elythranthera brunonis
Eucalyptus pyriformis
Exocarpos sparteus
Gastrolobium calycinum
Gastrolobium glaucum
Gastrolobium hamulosum
Glischrocaryon aureum
Grevillea armigera
Grevillea didymobotry ssp. didymobotrya
Grevillea eriostachya
Grevillea eryngioides
Grevillea teretifolia
Grevillea uncinulata
Hakea erecta
Hakea incrassata
Hakea lissocarpha
Hakea meisneriana
Hakea platysperma
Hakea scoparia
Halgania sp. 3466
Hemigenia westringioides
Hibbertia exasperata
Isopogon scabriusculus
Jacksonia sp.
Laxmannia grandiflora
Lepidosperma ?letophyllum
Leucopogon hamulosum
Lysinema ciliatum
Melaleuca conothamnoides
Melaleuca aff. cordata
Melaleuca holosericea

Melaleuca scabra
Melaleuca sclerophylla
Mesomelaena preissii
Mirbelia spinosa
Petrophile ericifolia
Petrophile media
Petrophile seminuda
Platysace ?maxwellii
Podotheca angustifolia
Prasophyllum cyphochilum
Psammomoya choretroides
* Raphanus raphanistrum
Santalum acuminatum
Spartochloa scirpoidea
Stylidium breviscapum
Stylidium repens
Stypandra glauca
Synaphea sp.
Thelymitra campanulata
Thryptomene racemulosa
Thysanotus patersonii
Trachymene cyanopetala
Trachymene ornata
* Ursinia anthemoides
Verticordia acerosa ssp. preissii
Verticordia brachypoda
Verticordia chrysantha
Verticordia eriocephala
Verticordia picta

Kn *Nytsia floribunda* Heath

Acacia acuminata
Acacia filifolia
Acacia lasiocarpa
Allocasuarina campestris
Allocasuarina humilis
Allocasuarina microstachya
Astroloma serratifolium
Baeckea aff. crispiflora A.
Beaufortia bracteosa
Boronia coerulescens
Borya sphaerocephala
Burchardia umbellata
Calothamnus quadrifidus
Calothamnus sanguineus
Calytrix depressa
Chamaescilla corymbosa
Chamaescilla spiralis
Chorizema aciculare
Conostylis wonganensis (edge)
Cryptandra pungens
Dampiera lavandulacea
Dampiera oligophylla
Daviesia ?hakeoides
Daviesia nudiflora
Dodonaea divaricata
Ecdeiocolea monostachya
Elythranthera brunonis
Gastrolobium glaucum
Glischrocaryon ?aureum
Goodenia trichophylla
Grevillea uncinulata
Hakea incrassata
Hakea trifurcata
Hibbertia ?enervia
Hyalosperma cotula
Jacksonia sp.
Lepidobolus chaetocephalus
Leptospermum oligandrum
Leucopogon hamulosum
Melaleuca aff. cordata
Melaleuca scabra
Mesomelaena preissii
Microcorys ericifolia
Mirbelia spinosa
Nemcia obovata
Neurachne alopecuroidea
Nuytsia floribunda
Persoonia quinquenervis
Petrophile seminuda
Podolepis canescens
Podotheca angustifolia
Podotheca gnaphalioides
Psammomoya choretroides
Ptilotus polystachyus
Stylidium leptophyllum
Stylidium repens
Stypandra glauca
Thysanotus patersonii
Trachymene ornata
* Ursinia anthemoides
Verticordia acerosa
Verticordia brachypoda
Verticordia chrysantha
Verticordia densiflora
Verticordia huegelii
Verticordia picta
Waitzia acuminata
Waitzia paniculata

Ku *Borya* Herbs/Sedges

Acacia acuminata
Acacia ericksonii
Acacia latipes
Acacia ?pulchella
Acacia restiacea
Allocasuarina campestris
Allocasuarina microstachya
Astroloma serratifolium
Baeckea ?preissiana
Borya sphaerocephala
* Briza maxima
Burchardia umbellata
Caladenia roei
Chorizema aciculare
Chorizema genistoides
Cryptandra pungens
Cyanicula gemmata
Dampiera oligophylla
Dianella revoluta
Diuris laxiflora
Drosera subhirtella
Ecdeiocolea monostachya
Glischrocaryon ?aureum
Hakea incrassata
Helipterum manglesii
Hibbertia exasperata
Lepidobolus ?chaetocephalus
Loxocarya aspera
Melaleuca uncinata
Mesomelaena preissii
Nemcia obovata
Opercularia vaginata
Podolepis lessonii
Prasophyllum cyphochilum
Psammomoya choretroides
Santalum spicatum
Stylidium neglectum
Stylidium periscelianthum
Stypandra glauca
Trachymene cyanopetala
Trachymene ornata
Verticordia acerosa ssp. preissii

G Granite

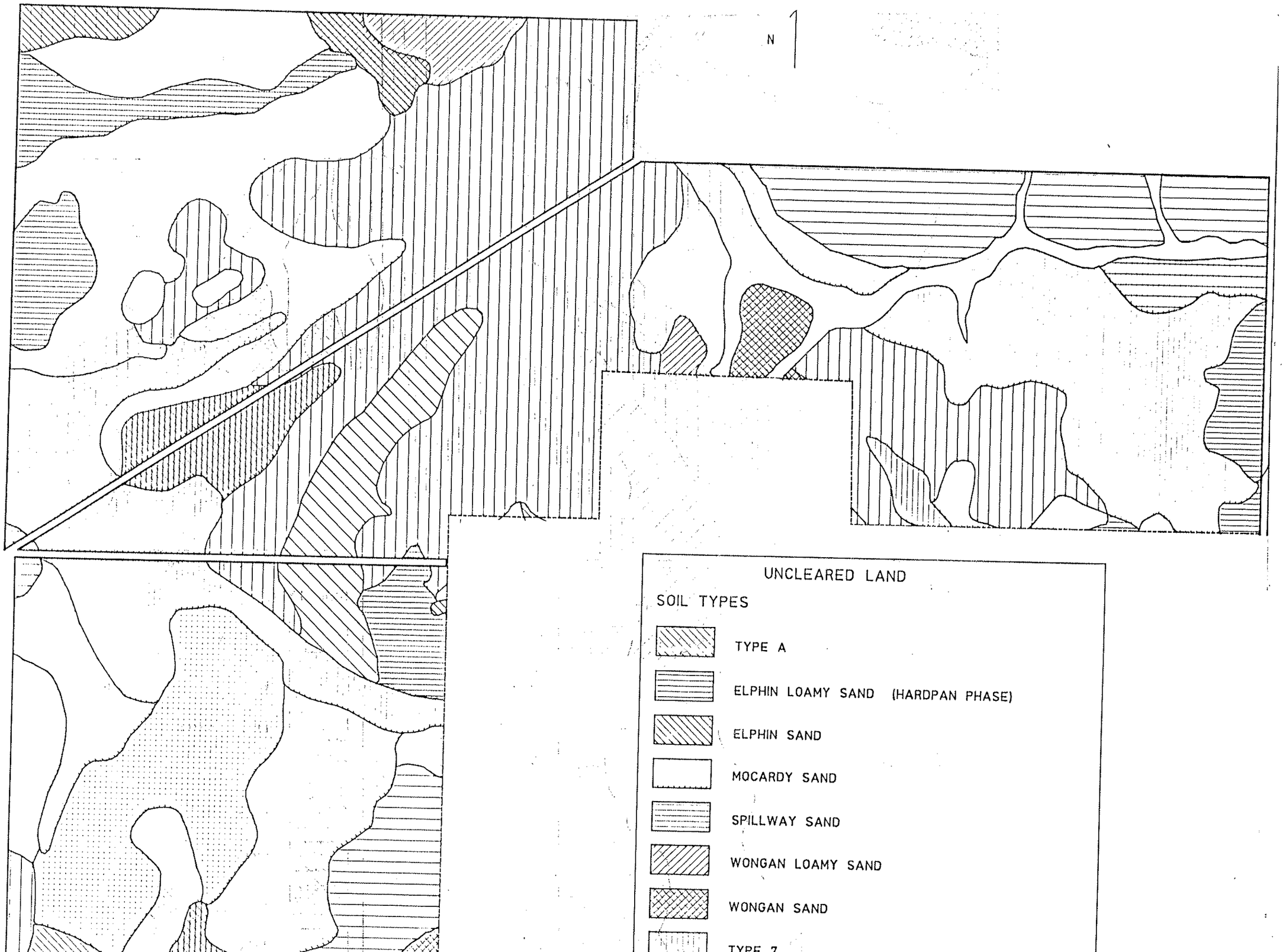
Acacia acuminata
Acacia lasiocalyx
* Aira cupaniana
Allocasuarina campestris
Allocasuarina huegeliana
Alyogyne hakeifolia
Arthropodium capillipes
Astroloma serratifolium
* Avena sativa
Baeckea sp. 2776
Blennospora drummondii
Borya laciniata
Borya sphaerocephala
* Briza maxima
Bulbine semibarbata
Caladenia dimidia
Caladenia microchila
Caladenia roei
Calandrinia sp.
Calothamnus quadrifidus
Calothamnus sp. 2774
Calytrix depressa
Chamaescilla corymbosa
Chleianthes austrotenuifolia
Cyanicula gemmata
Dianella revoluta
Diplolaena microcephala
Diuris aff. corymbosa
Diuris picta
Dodonaea viscosa ssp. angustissima
Drosera glanduligera
Drosera macrantha
Drosera subhirtella
Ecdeiocolea monostachya
Elythranthera brunonis
* Erhartia calycinus
Eucalyptus loxophleba
Glischrocaryon ?aureum
Guichenotia micrantha
Hakea petiolaris
Hakea scoparia
Helichrysum lindleyi
Helipterum manglesii
Hibbertia glomerosa
Hibbertia rostellata
Hibbertia rupicola
Isotoma hypocrateriformis
Kunzea pulchella
Lepidosperma ?letophyllum
Leptospermum erubescens
Leptospermum oligandrum
Loxocarya aspera
Melaleuca fulgens
Melaleuca platycalyx
Melaleuca radula
Melaleuca uncinata
Millotia myosotidifolia
* Parentucellia latifolia
* Pentaschistis airoides
Pimelea imbricata var. piligera
Podolepis lessonii
Podotheca gnaphalioides
Prasophyllum ringens
Santalum acuminatum
Spartochloa scirpoidea
Stackhousia monogyna
Stylidium breviscapum
Stylidium ?calcaratum
Stylidium neglectum
Stylidium nungarinense
Stypandra glauca

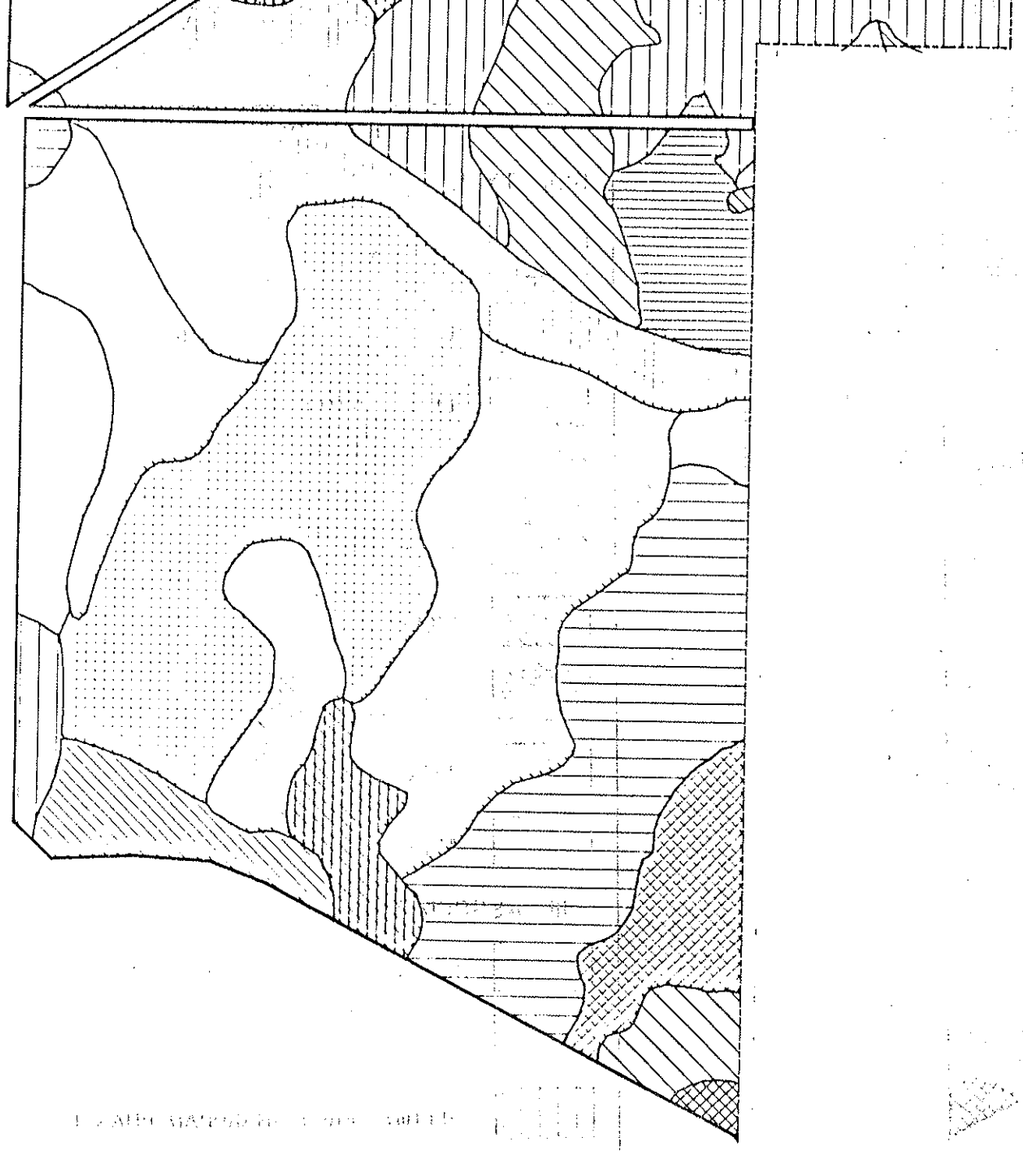
Thelymitra antennifera
Thryptomene australis
Thysanotus dichotomus
Thysanotus ?patersonii
Tribonanthes longipetala
Verticordia chrysanthella
* Wahlenbergia capensis
Waitzia acuminata

Samphire

Allocasuarina campestris
Halosarcia lepidosperma
Melaleuca uncinata
Rhagodia drummondii
Scaevola helmsii

FIGURE 2. **Soil Map of the area covered by remnant vegetation on Reserve No. 18672 (Experimental Farm)**





SCALE 1 : 10,000

See original (CALM Merredin Office) for colour code.

UNCLEARED LAND

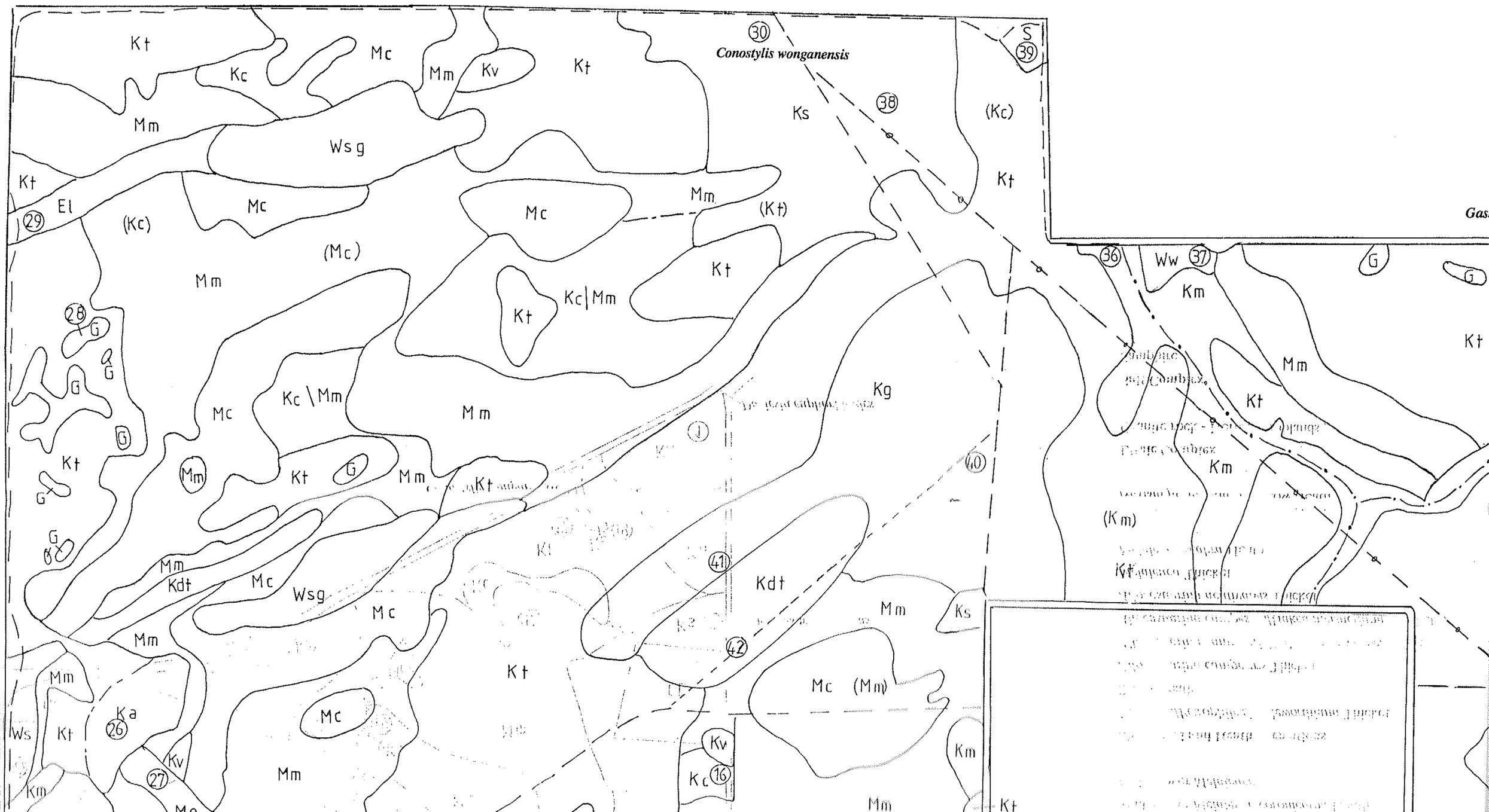
SOIL TYPES

- TYPE A
- ELPHIN LOAMY SAND (HARDPAN PHASE)
- ELPHIN SAND
- MOCARDY SAND
- SPILLWAY SAND
- WONGAN LOAMY SAND
- WONGAN SAND
- TYPE 7
- TYPE 10

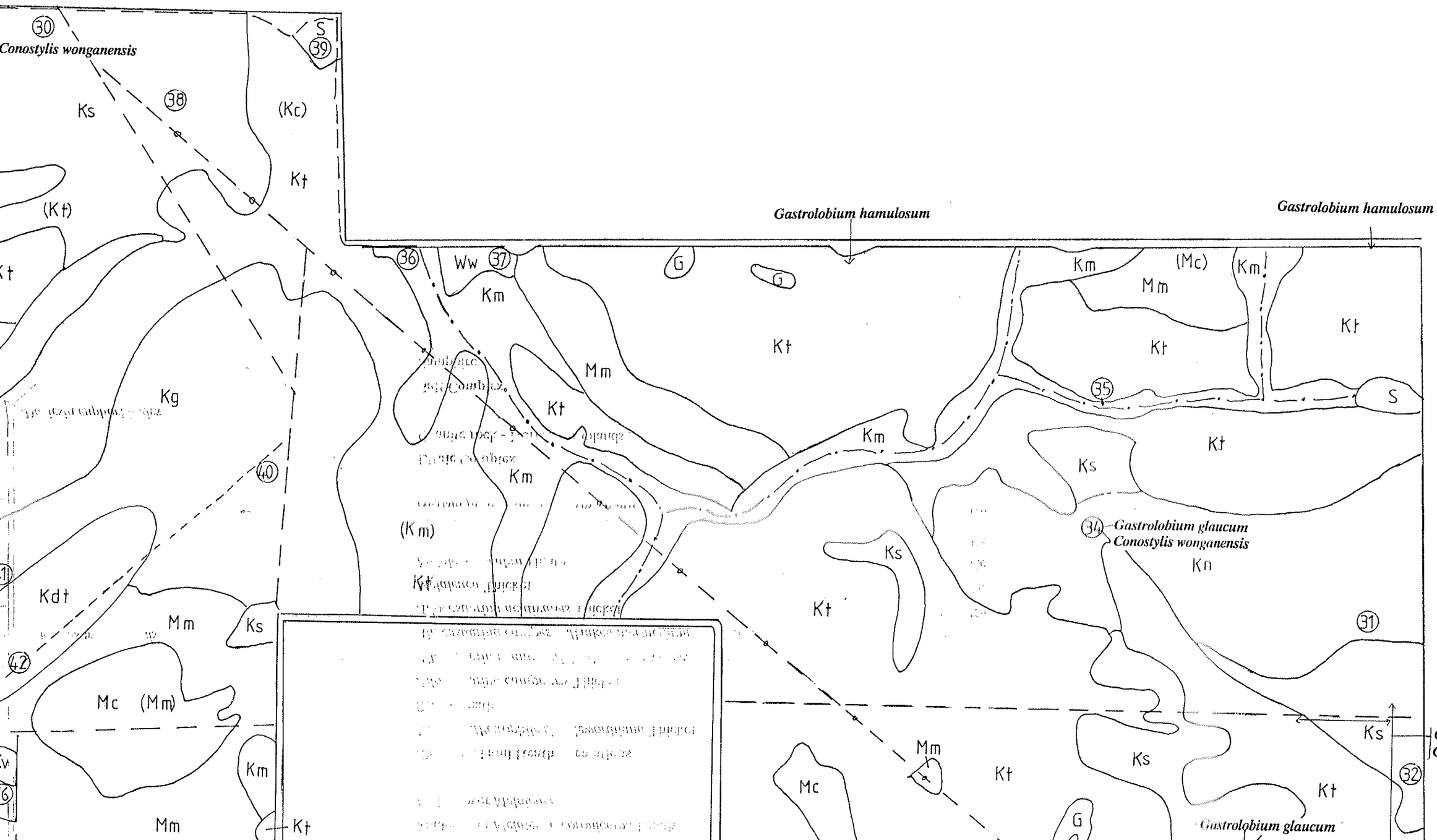
SOIL ASSOCIATION

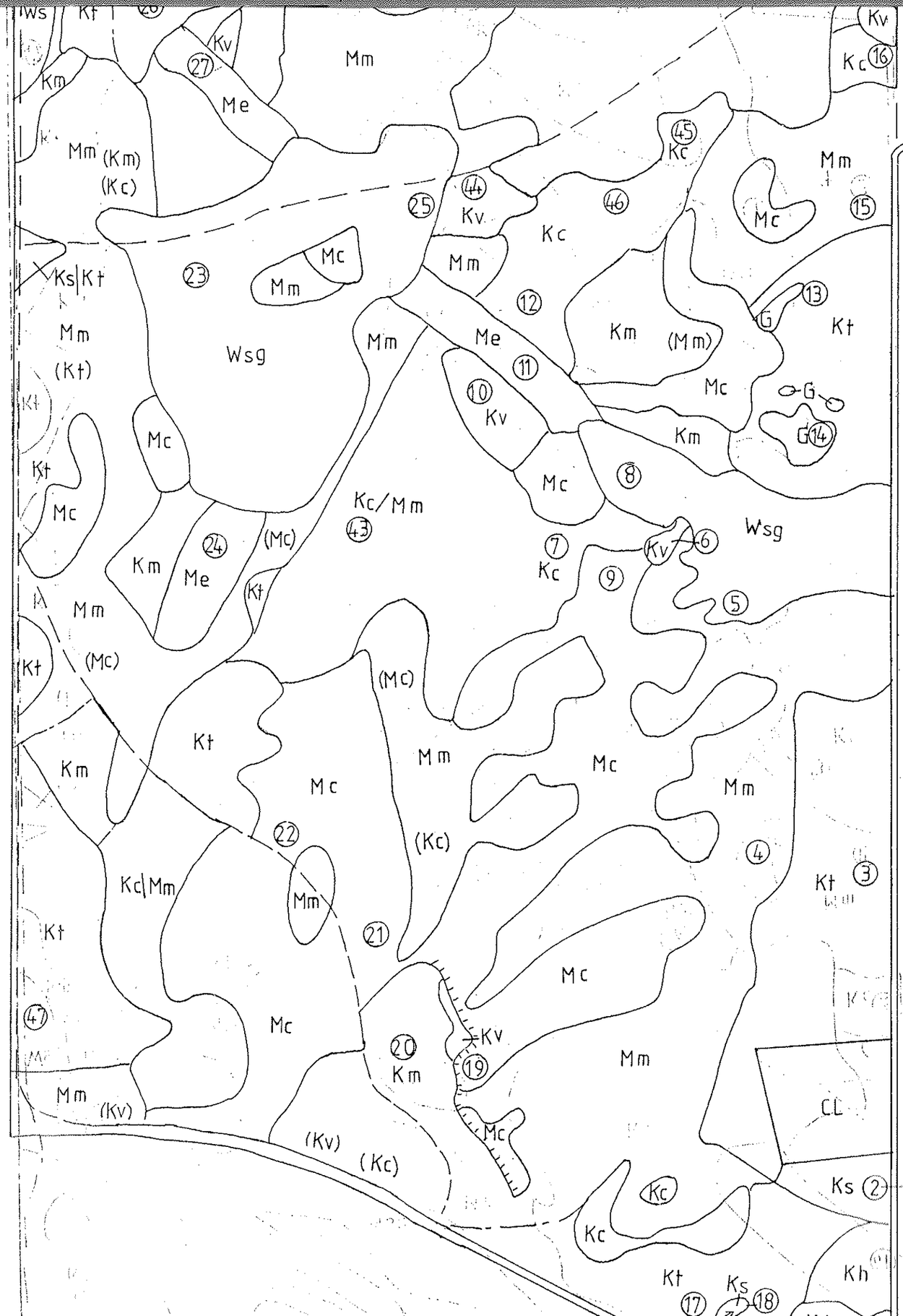
- SHALLOW DUPLEX SOILS (UNDIFFERENTIATED)
- ELPHIN SERIES
- ELPHIN SERIES (HARDPAN PHASE)
- ELPHIN SERIES AND TYPE A
- ELPHIN SERIES AND MOCARDY SANDS
- MOCARDY SAND AND TYPE 8
- YALING SERIES
- YALING GRAVELLY LOAM AND ELPHIN SERIES (HARDPAN PHASE)
- YALING GRAVELLY LOAM AND ELPHIN LOAMY SAND
- TYPE 7B (NON ALKALINE)
- TYPE 7 AND TYPE 8

FIGURE 6: VEGETATION OF REMNANT BUSHLAND ON EXPERIM



REMNANT BUSHLAND ON EXPERIMENTAL FARM NO. 18672





Legend:

- roads and major
- tracks
- foot tracks
- power lines
- vegetation boun
- approximate veg
- drainage line
- escarpment
- 23 — site number
- CL — cleared land
- railway line

VEGETATION ASSOCIATIONS OF THE REMNANT BUS

FARM No. 18672

Woodland Formations

Eucalyptus salmonophloia (salmon gum)/*Eucalyptus salubris* (

Eucalyptus wandoo (white gum) Low Woodland

Eucalyptus loxophleba (York gum) Low Forest

Mallee Formations

Mallee over *Melaleuca uncinata* (broombush) Thicket

Mallee over *Melaleuca coronicarpa* Heath

Mallee over *Melaleuca*

Shrubland and Heath Formations

Dryandra/Petrophile shuttleworthiana Thicket

Scrub Heath

Allocasuarina campestris Thicket

Allocasuarina campestris/Calothamnus aspera Thicket

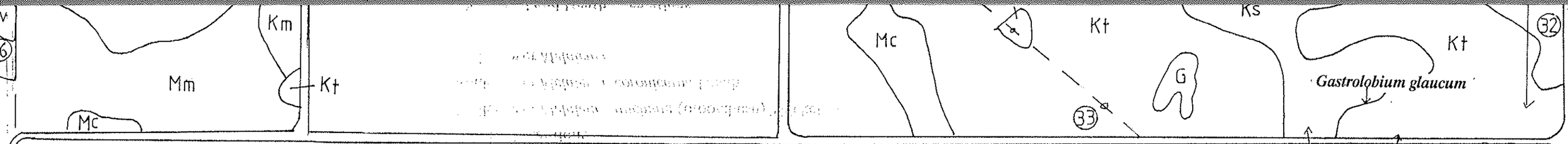
Allocasuarina campestris/Hakea meisneriana Thicket

Allocasuarina acutivalvis Thicket

Melaleuca Thicket

Melaleuca scabra Heath

Sedges/Heath



Legend:

- roads and major tracks
- tracks
- foot tracks
- power lines
- vegetation boundary
- approximate vegetation boundary
- drainage line
- escarpment
- 23 — site number
- CL — cleared land
- railway line

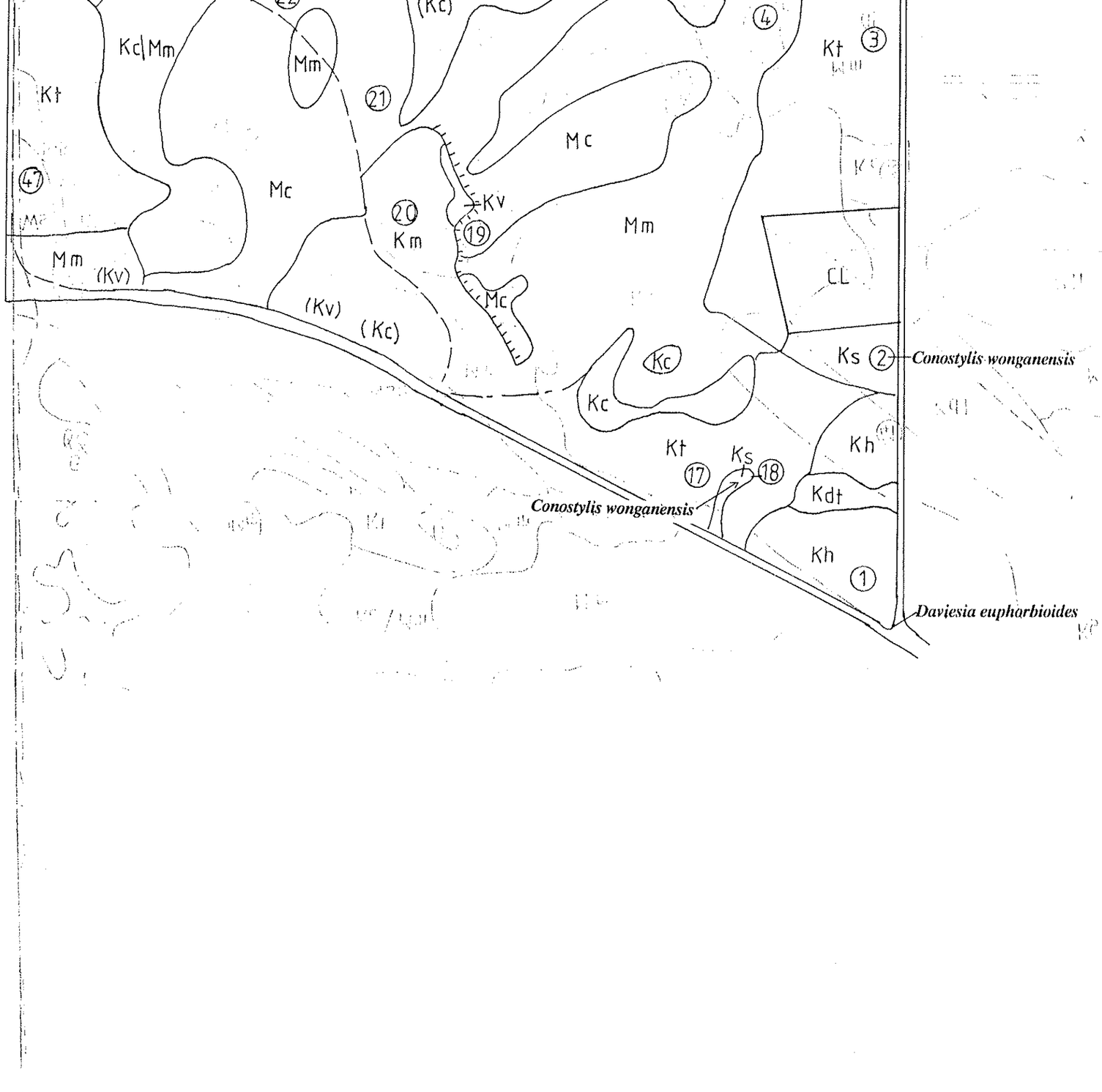
N

SCALE 1:6000

VEGETATION ASSOCIATIONS OF THE REMNANT BUSHLAND ON EXPERIMENTAL FARM No. 18672

	Map Unit
Woodland Formations	
Eucalyptus salmonophloia (salmon gum)/*Eucalyptus salubris* (gimlet) Woodland	Wsg
Eucalyptus wandoo (white gum) Low Woodland	Ww
Eucalyptus loxophleba (York gum) Low Forest	Wl
Mallee Formations	
Mallee over *Melaleuca uncinata* (broombush) Thicket	Mm
Mallee over *Melaleuca coronicarpa* Heath	Mc
Mallee over *Melaleuca*	Mc
Shrubland and Heath Formations	
Dryandra/Petrophile shuttleworthiana Thicket	Kdt
Scrub Heath	Kh
Allocasuarina campestris Thicket	Kt
Allocasuarina campestris/Calothamnus aspera Thicket	Ka
Allocasuarina campestris/Hakea meisneriana Thicket	Kg
Allocasuarina acutivalvis Thicket	Kv
Melaleuca Thicket	Km
Melaleuca scabra Heath	Ks
Sedges/Heath	Ks

Conostylis wonganensis



Eucalyptus loxophleba (York gum) Low Forest

Mallee Formations

Mallee over *Melaleuca uncinata* (broombush) Thicket

Mallee over *Melaleuca coronicarpa* Heath

Mallee over *Melaleuca*

Shrubland and Heath Formations

Dryandra/Petrophile shuttleworthiana Thicket

Scrub Heath

Allocasuarina campestris Thicket

Allocasuarina campestris/Calothamnus aspera Thicket

Allocasuarina campestris/Hakea meisneriana Thicket

Allocasuarina acutivalvis Thicket

Melaleuca Thicket

Melaleuca scabra Heath

Sedges/Heath

Nuytsia floribunda over Low Heath

Lithic Complex

Granite rock - Herbs, Shrublands

Salt Complex

Samphire

Eucalyptus loxophleba (York gum) Low Forest	Wl
Mallee Formations	
Mallee over *Melaleuca uncinata* (broombush) Thicket	Mm
Mallee over *Melaleuca coronicarpa* Heath	Mc
Mallee over *Melaleuca*	Mc
Shrubland and Heath Formations	
Dryandra/Petrophile shuttleworthiana Thicket	Kdt
Scrub Heath	Kh
Allocasuarina campestris Thicket	Kt
Allocasuarina campestris/Calothamnus aspera Thicket	Ka
Allocasuarina campestris/Hakea meisneriana Thicket	Kg
Allocasuarina acutivalvis Thicket	Kv
Melaleuca Thicket	Km
Melaleuca scabra Heath	Kc
Sedges/Heath	Ks
Nuytsia floribunda over Low Heath	Kn
Lithic Complex	
Granite rock - Herbs, Shrublands	G
Salt Complex	
Samphire	S

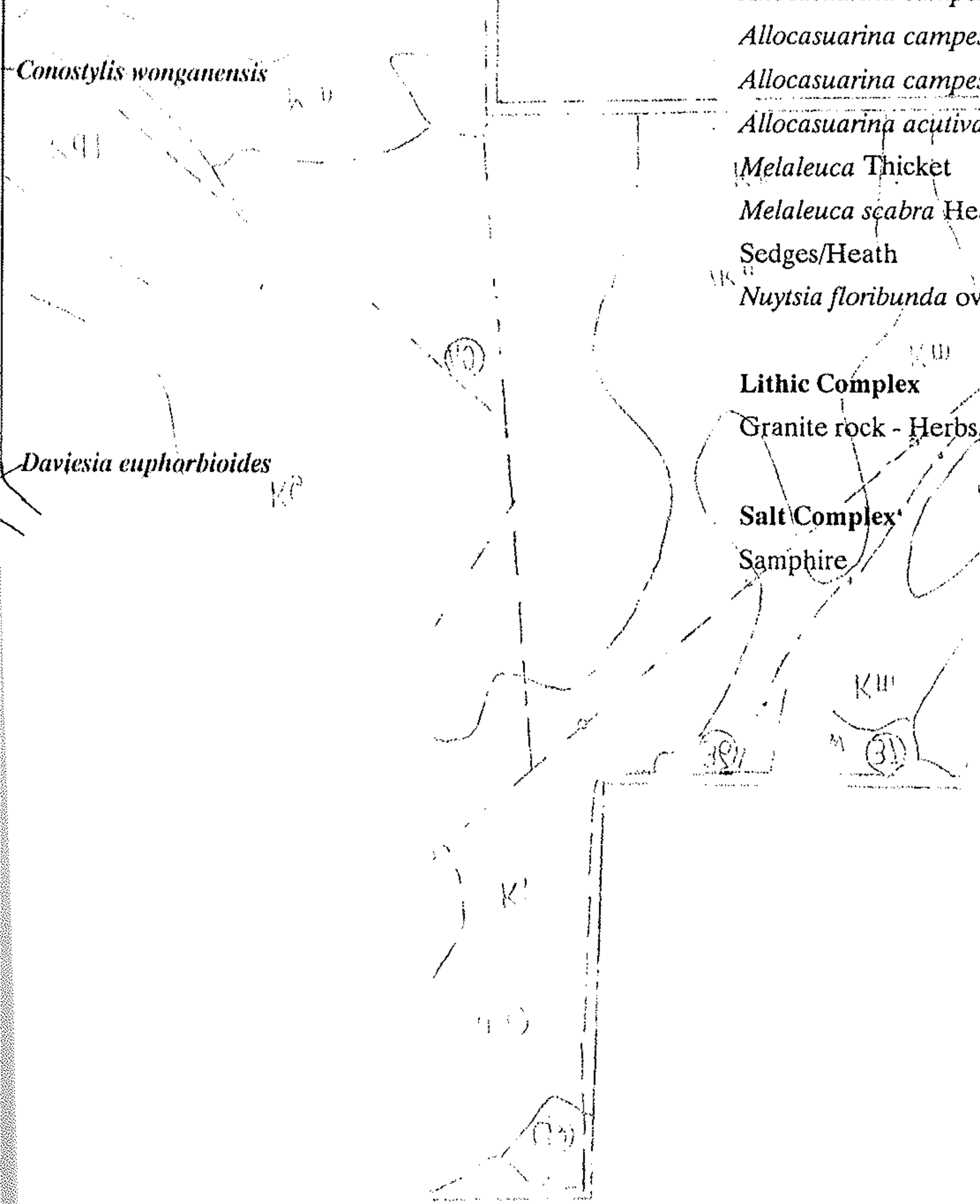
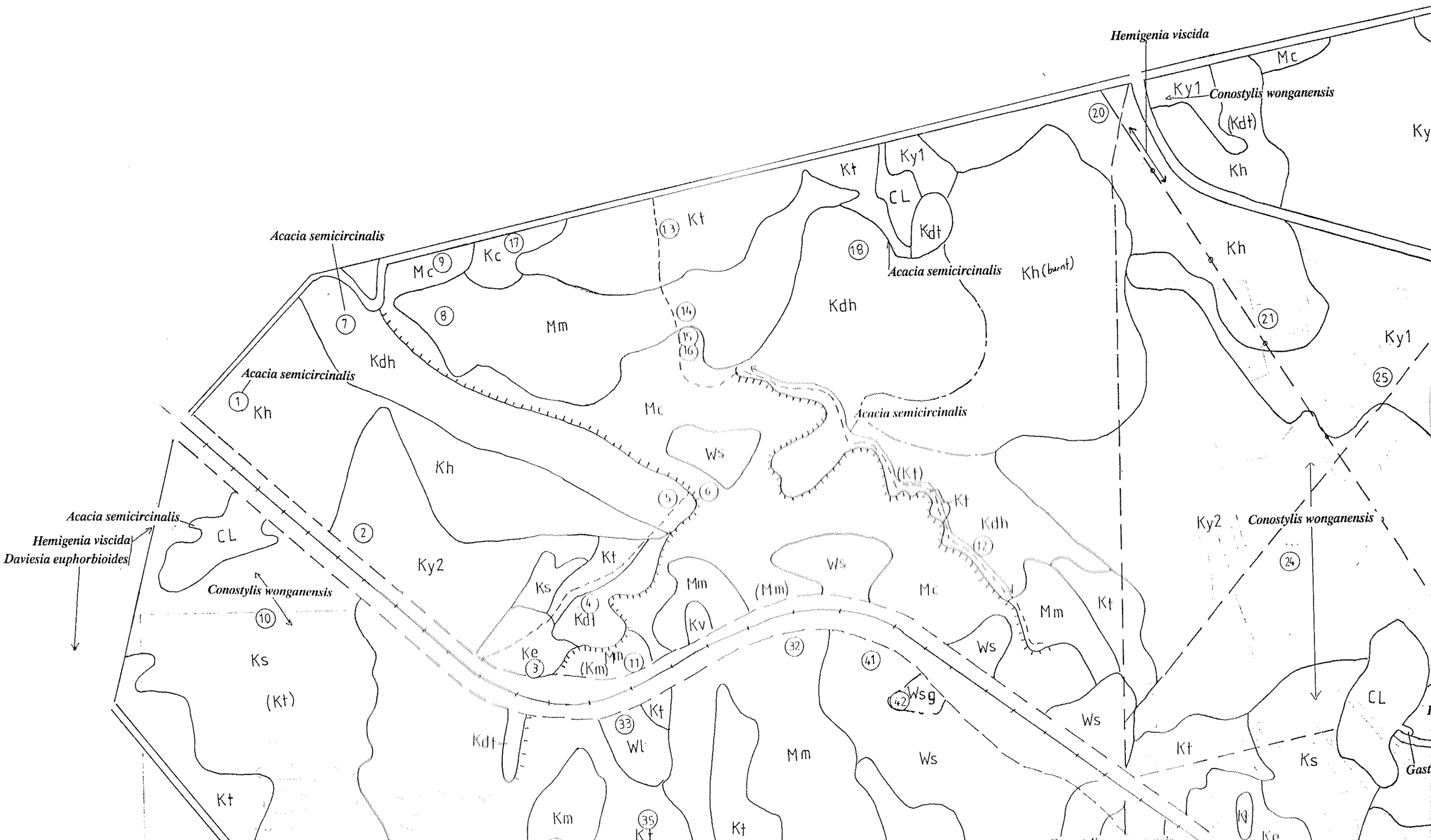
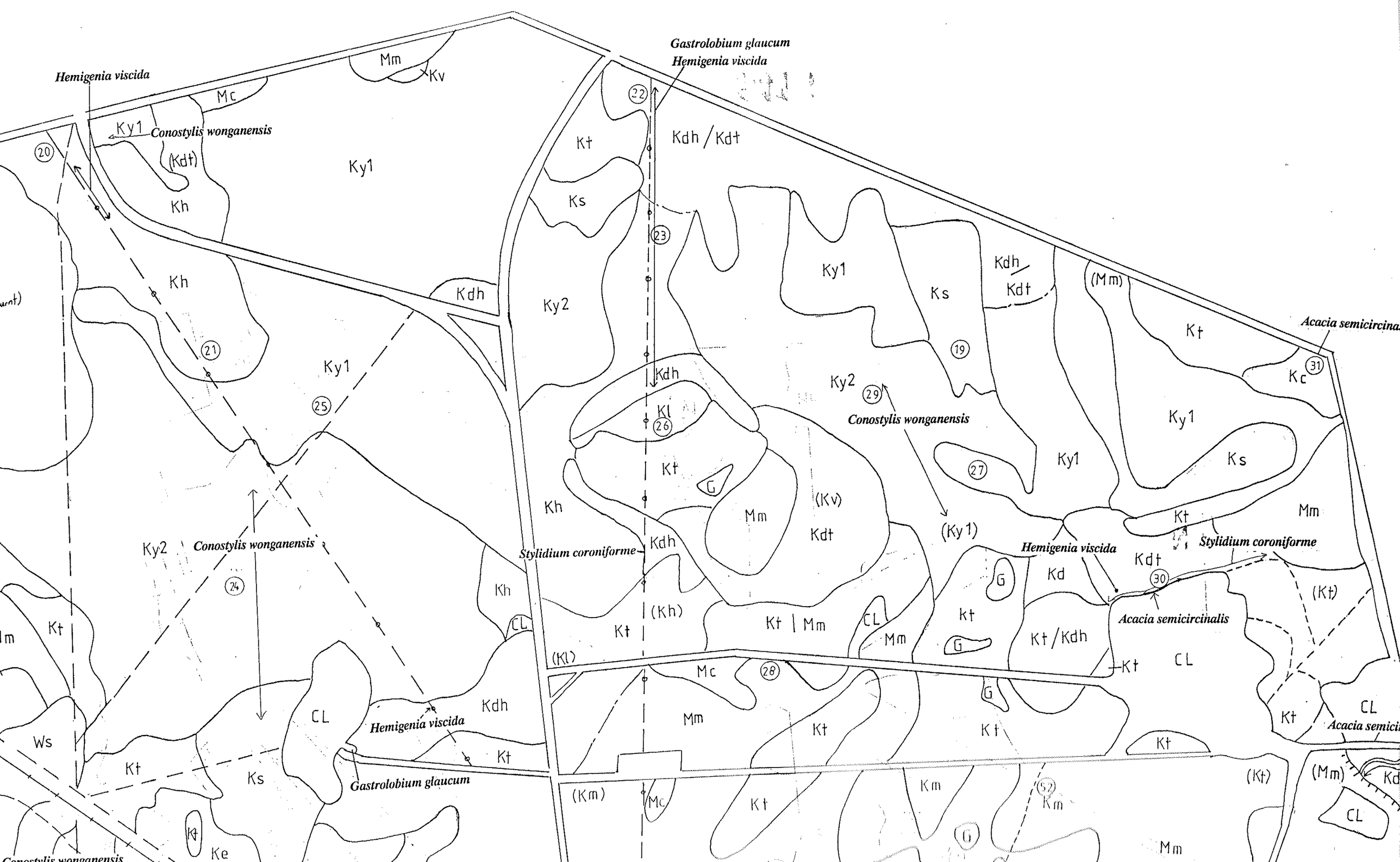
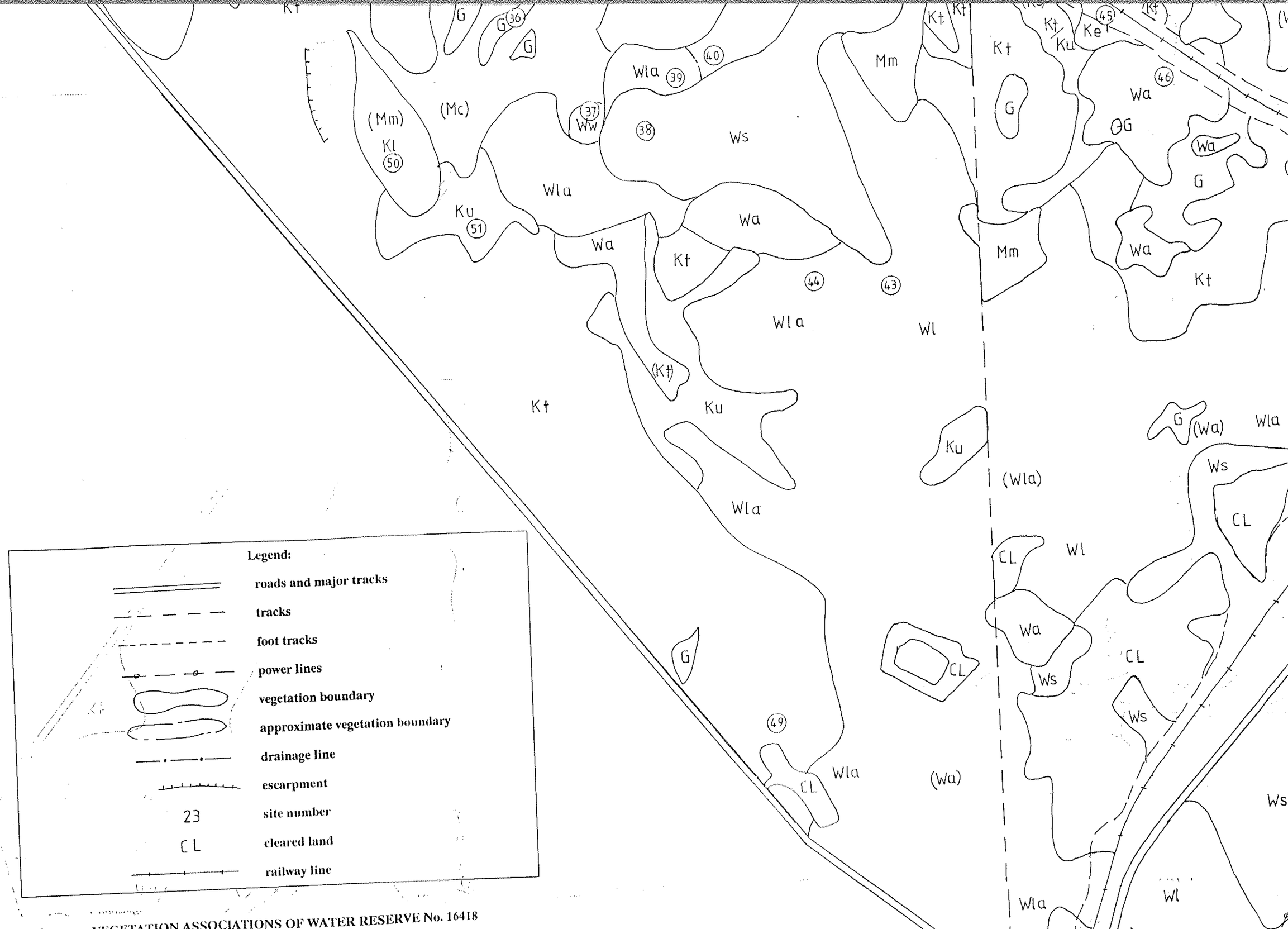


FIGURE 7: VEGETATION OF WATE



TATION OF WATER RESERVE NO. 16418



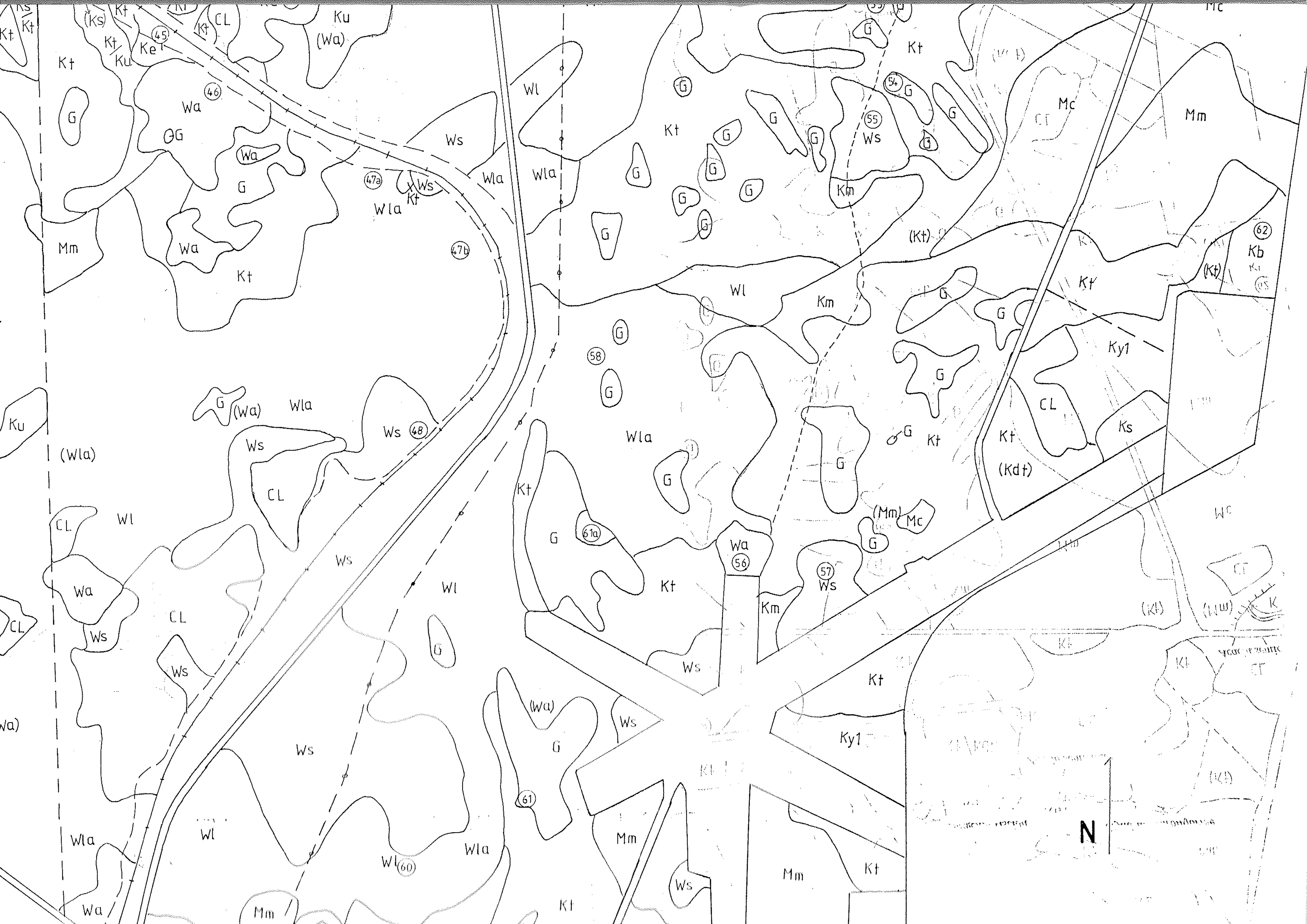


VEGETATION ASSOCIATIONS OF WATER RESERVE No. 16418

Woodland Formations

Eucalyptus salmonophloia (salmon gum) Woodland

Eucalyptus salmonophloia (salmon gum)/*Eucalyptus salubris* (gimlet) Woodland



Ks
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(Ks)
Kt
CL
Ku
(Wa)
45
Kt
Ku
Ke
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46
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G
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Kt
Mm
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Wl
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Wla
47a
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47b
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Mm
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Kb
(Kt)
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Wl
Km
G
G
Ky1
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58
G
G
(Wa)
Wla
Ku
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Ws
48
Ws
CL
Wla
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(Kdt)
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Kt
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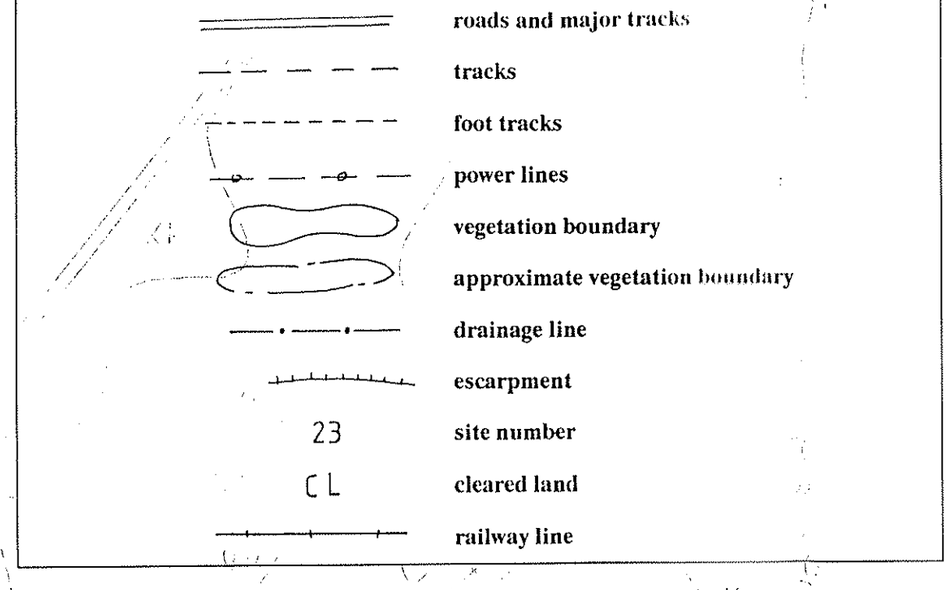
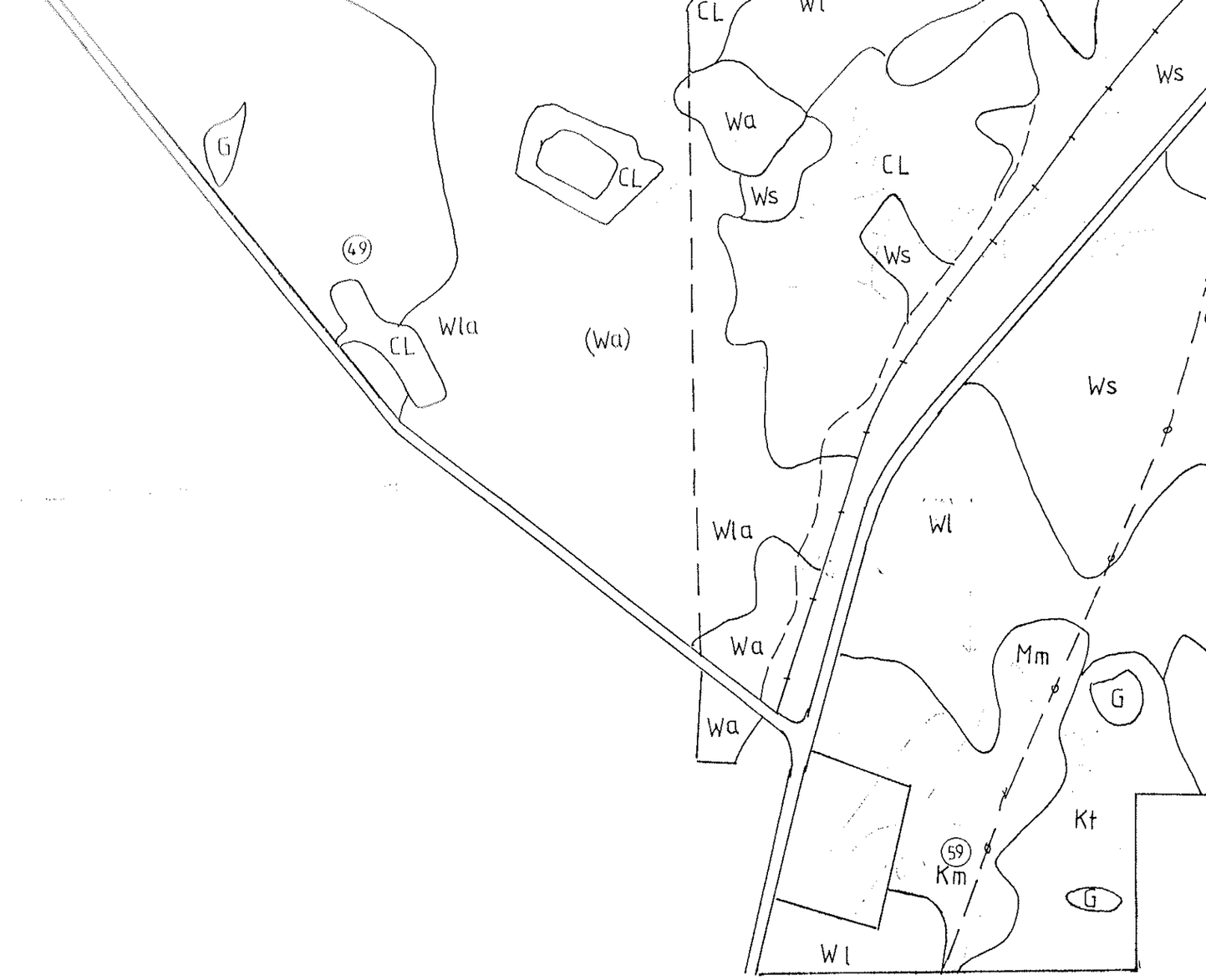




VEGETATION ASSOCIATIONS OF WATER RESERVE No. 16418

Woodland Formations

Eucalyptus salmonophloia (salmon gum) Woodland	Ws
Eucalyptus salmonophloia (salmon gum)/*Eucalyptus salubris* (gimlet) Woodland	Wsg
Eucalyptus wandoo (white gum) Low Woodland	Ww
Eucalyptus loxophleba (York gum) Low Forest	Wl
Eucalyptus loxophleba (York gum) Low Forest over *Acacia acuminata* (jam)	Wla
Acacia acuminata Low Forest	Wa

Mallee Formations

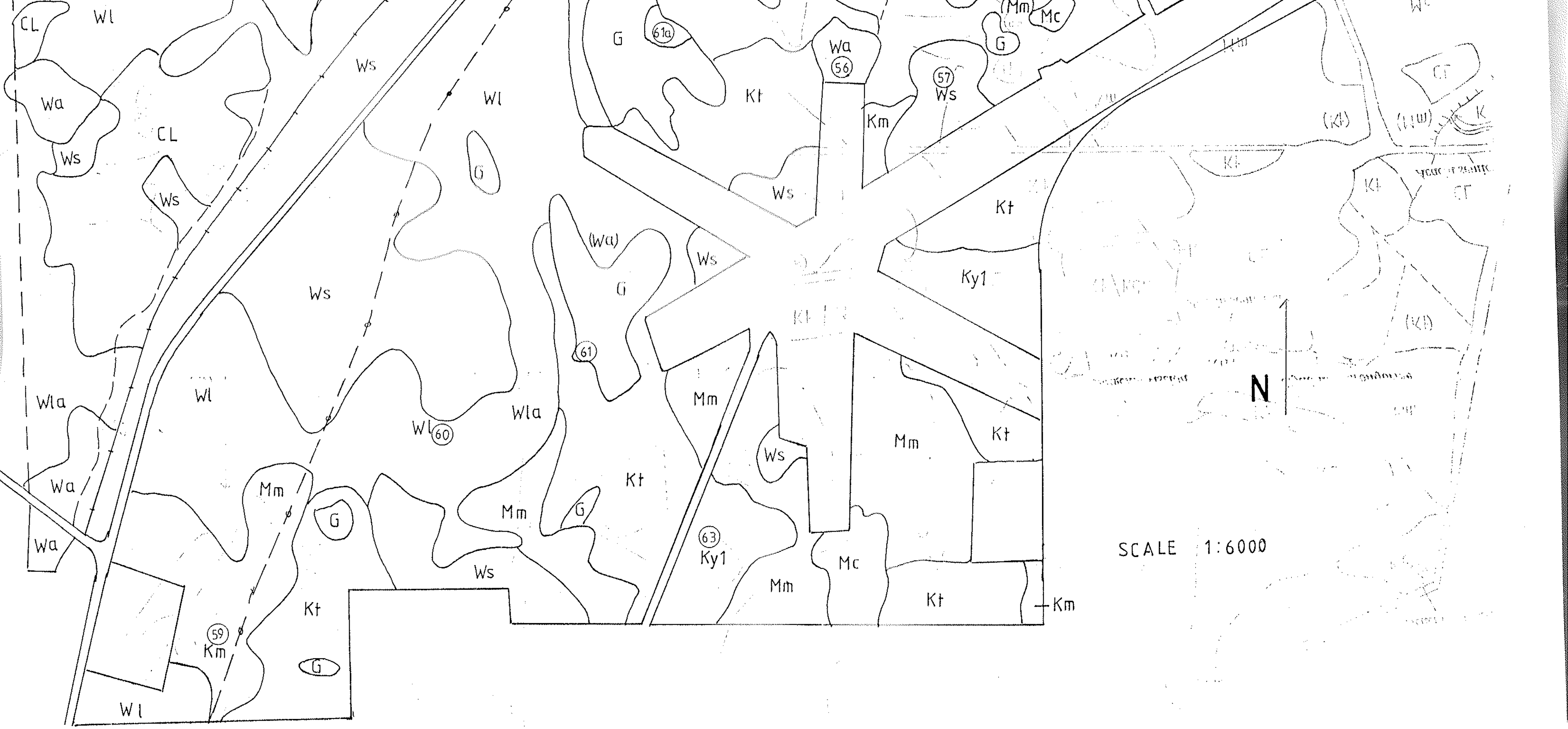
Mallee over *Melaleuca uncinata* (broombush) Thicket	Mm
Mallee over *Melaleuca coronicarpa* Heath	Mc

Shrubland and Heath Formations

Dryandra/Petrophile shuttleworthiana Thicket	Kdt
Dryandra Low Heath	Kdh
Scrub Heath	Kh
Allocasuarina campestris Thicket	Kt
Allocasuarina campestris/Hakea erecta Heath	Ky1
Allocasuarina campestris/Hakea erecta Heath (burnt)	Ky2
Melaleuca Thicket	Km
Melaleuca scabra Heath	Kc
Melaleuca sclerophylla Low Heath	Kl
Eremaea Heath	Ke
Beaufortia Heath	Kb
Sedges/Heath	Ks
Open Scrub over Herbs/Sedges	Ku

Lithic Complex

Granite, Herbs, Shrublands	G


CL
Wl
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Wla
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Mm
G
Mm
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Kt
63
Ky1
Mm
Mc
Kt
Km
Wa
Ws
Kt
59
Km
G
Wl
N
SCALE 1:6000