

DAVIDSON STREET GRASSLAND

**- A REPORT ON THE FLORA, FAUNA,
DEVELOPMENT OPTIONS AND
MANAGEMENT**

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SUMMARY

Survey and analysis of data was carried out on the Davidson Street site during December 1993-January 1994. A total of 192 vascular plant species were recorded for the site. Of these 107 are considered to be indigenous and 85 as introduced. Three plant species are of State significance, nine of regional significance. Three vegetation communities are described one is listed under the Flora and Fauna Guarantee Act and is of State significance. The faunal assemblage comprises thirty-two species of terrestrial vertebrates 21 bird (6 introduced), 4 mammal (4 introduced), 3 reptile and 4 amphibian species. One species (Little Whip Snake) is of Regional significance. Habitat significance is rated at Regional. Overall, the site is rated as being of STATE significance given rare and endangered status of Plains Grassland vegetation and the high quality of remnant vegetation..

A range of threatening processes is listed, mostly human induced, including; habitat alteration, predation, weed invasion, rubbish dumping, physical disturbance and soil erosion. Vegetation quality is mapped.

Three development options are listed with advantages and disadvantages. Option one being no development, Options 2 and 3 limited development. Complete development of the site is not considered as an option due to high biological value. Maps of development options 2 and 3 are located in the body of the report adjacent to option descriptions.

General recommendations are made under the broad categories of re-zoning, development/construction and management of Flora and Fauna. Specific recommendation are summarised and appended.

Complete lists of All vascular plant species and vertebrate animals are listed. Quadrat information is appended as are references used in the report.

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INTRODUCTION

The Davidson's Street reservation is a small 13.5 hectare remnant grassland situated in the City of Preston (Melways Reference Map 8 B11 & B12). The reservation is bounded by Mahoney's Rd in the north, Bartrop St in the south, and in the east and west by the rear fences of residential houses on Dawson/Bray St and Loxton Ave respectively. Davidson's St heading east to west dissects the site into two units. The Merri Creek is closely situated to the reservation to the west. Soils are of basaltic origin. Kangaroo Grass (*Themeda triandra*) in association with other native grasses and herbs dominates the majority of the site, however the north-west border of the site is dominated by exotic pasture grasses. This report evaluates the significance of the site in its regional context based upon pre-existing data about the site and surrounding sites and the results from a Flora and Fauna survey carried out by the authors on the site.

1.0 VEGETATION

1.1 DATA COLLECTION

Two primary types of data collection were used to quantify and qualify the vegetation of the site. To determine the vegetation communities of the site several floristic quadrats were placed in visually assessed homogeneous vegetation. The purpose of this exercise was to clearly determine the vegetation communities being dealt with particularly in reference to significance of the vegetation communities and responsibility for management under the Flora and Fauna Guarantee Act 1988 and the State Conservation Strategy (Government of Victoria 1987, P 27).

Sampling sites consisted of 10 x 10m square quadrats placed in uniform vegetation. All vascular plant species in each quadrat were recorded and assigned a visually assessed cover/abundance value similar to that used in Gullan (1978) as listed below:

- + cover < 5% few individuals
- 1 cover < 5% any no. of individuals
- 2 cover 5-25% any no. of individuals
- 3 cover 25-50% any no. of individuals
- 4 cover 50-75% any no. of individuals
- 5 cover 75-100% any no. of individuals

Various notes were taken on other features of ecological interest at the quadrat that would have influence on the determination of the vegetation community of the site eg. soil, structure of the vegetation etc. and on the general quality of the vegetation eg. level of disturbance, weed invasion etc. A complete list of the vascular plant species and their respective cover abundances can be found in appendix 2. Quadrat locations are marked on Map 1.

1.2 PLANT TAXONOMY

Nomenclature throughout this report follow Ross (1993) with amendments provided by the National Herbarium (Melbourne).

In some instances the plants collected proved difficult to determine precisely to species level and the taxonomy of some other individual taxa is still unclear. These species are listed below:

Lepidosperma curtisii - The plants located on the site accord best with the descriptions for this species. The culms are shorter than the leaves, mostly half the length of the leaves, and the hypogeous bristles have long ciliate tips.

Dianella aff. *longifolia* (Nutfield)- Much confusion in regard to the exact taxonomy of the *Dianella longifolia* complex still exists. Work is presently being carried out on this well known taxon to determine its relationship with other taxa. For several years it has been known under the name *Dianella* aff. *longifolia* (Nutfield). It is under this name that its significance is determined

Amphibromus nervosus - the taxon on the site is most conveniently placed under the name *Amphibromus nervosus* although it differs from the general description and other plants known by this name. Notably it is a much shorter plant to 60cm with a more open inflorescence, fewer and larger spikelets. This taxon is widespread in the Greater Melbourne area and the name *Amphibromus nervosus* is widely applied to it at this time.

Galium sp.- Vegetative material of this plant only was found. It did not accord with any of the known locally native species. Flowering and fruiting material will be needed to determine the exact identification of this taxon.

1.3 LIMITATIONS AND QUALIFICATIONS

The timing of the survey in mid to late December is the ideal time for identification of many of the species that occur on the site although some of the autumn, winter and spring flowering geophyte species may have been easily overlooked. This is particularly the case with species in the genera *Drosera*, *Wurmbea* and many of the *Orchidaceae*. Further investigations at other times of the year may well turn up species within these groups. Similar grasslands in the vicinity of the Davidson Street site contain species in these groups and there are oral reports of *Drosera* and *Wurmbea* from the study area, but despite purposeful investigation these were not located.

2.0 CRITERIA FOR DETERMINATION OF BOTANICAL SIGNIFICANCE

2.1 Significance of plant species

Significance of individual plant species can be determined at several different levels according to the degree of resolution needed. For this report significance is determined at the state and regional level.

Plants of state significance were determined using the Department of Conservation and Environment publication *Rare or Threatened Plants in Victoria* (Gullan et al. 1990). This text clearly outlines criteria for inclusion of individual species as rare or threatened. The various categories of endangerment are listed below.

X - Presumed extinct in Australia: species that have either not been found in recent years despite thorough searching, or have not been collected for at least 50 years and were known only from now intensively settled areas.

x - Presumed extinct in Victoria: no post-1950 records from Victoria, in spite of field searches specifically for the plant; or intensive field searches (since 1950) at all known sites have failed to record the plant. The plant's status elsewhere in Australia is not considered in this category.

E - Endangered in Australia: at serious risk of disappearing from the wild state within one or two decades if present land use and other causes continue.

e - Endangered in Victoria: rare and at risk of disappearing from the wild state if present land use and other causes continue. The plants status elsewhere in Australia is not considered in this category.

V - Vulnerable in Australia: not presently Endangered but at risk of disappearing from the wild over a longer period (20 - 50 years) through continued depletion; or which largely occur on sites likely to experience changes in land use that would threaten the survival of the species in the wild.

v - Vulnerable in Victoria: rare, not presently endangered but likely to become so soon due to continued depletion; or occurring mainly on sites likely to experience changes in land-use which would threaten the survival of the plant in the wild; or taxa whose total populations are so low that recovery from a local

natural disturbance such as drought, landslip, or fire is doubtful. A plant's status elsewhere in Australia is not considered in this category.

R - Rare in Australia: rare but overall not currently considered Endangered or Vulnerable. Such species may be represented by a relatively large population in a very restricted area or by smaller populations spread over a wider range, or some intermediate combination of distribution pattern.

r - Rare in Victoria, but not considered otherwise threatened (their status elsewhere in Australia not being considered). This category does not necessarily imply that the plants are substantially threatened, but merely that there are relatively few known stands.

K - Poorly Known in Australia: suspected, but not definitely known, to belong to any of categories X,E,V, or R. Field distribution information is inadequate. Applies only to plants considered rare or threatened throughout Australia.

d - Not rare in Victoria in the wild state, but considered threatened: "regeneration is problematic or less than necessary to replace losses, and the populations are continuing to decrease, This category is used for those plants that may occur over their former range but are markedly less common and continuing to decline, and also for those plants whose range is now substantially reduced with satisfactory regeneration only in a very small proportion of that range.

Determination of the regional significance of individual plant species is far less clear cut than for species of state significance. Past works in this area have been based on various sized regional areas that may or may not have covered several biogeographic or floristic regions. For the purposes of this report regional significance is based on the Vegetation Survey and Sites of Botanical Significance in the Melbourne Metropolitan Area (Cheal et al. in prep). This report uses the Melbourne and

Metropolitan Planning Scheme Area of the Board of Works (now Melbourne Water) as the basis for it's region. Regional significance in the above report is determined statistically, based on the individual species occurring in less than 1% of the overall database for the region. Some species are sufficiently uncommon that they do not appear in the regional database (which is based on floristic quadrat data). These are included as regionally significant.

All indigenous plant species are considered of at least local significance due to past clearing and alienation of habitat.

2.2 Significance of plant communities

The determination of significance of plant communities within the study area is based on Frood and Calder (1987), Cheal et al. (in prep) and DCE (1990). A fuller description of the Criteria for determination of significance can be found in these publications.

Criteria for the selection of a site for inclusion as a site of significance is best summed up by Cheal et al. (in prep) as:

- (1) The presence of rare or threatened species, sub-species or varieties. Rare or threatened species in and Australian context are those of Briggs and Leigh (1988) and are, in a state context, those of Gullan, Cheal and Walsh (1990).
- (2) The presence of rare or threatened vegetation communities or sub-communities.
- (3) The degree of disturbance resulting from European settlement and development. The weediness of a site was found to be a very good indicator of the degree of disturbance and a useful measure of the site's "ecological distance" from pre-European conditions.
- (4) The vegetation heterogeneity of the site. Sites that supported a range of vegetation communities were considered to be

of greater significance than sites of comparable size but only supporting a single vegetation community.

(5) The long-term viability of the site. Site area was an important component of 'viability' but this also included a consideration of site 'integrity' (i.e. the presence of inholdings and the site border vs. site area comparison) and the difficulty with which desirable management practices could be implemented.

Significance ratings of National, State, Regional and Local significance can be assigned using the above reference and Remnant Native Grasslands and Grassy Woodlands of the Melbourne Area (DCE 1990). A brief summary of the various levels of ratings is extracted from DCE (1990):

National

Appropriate if the particular occurrence of an attribute contributes substantially to the presence of that attribute in Australia.

State

Appropriate if the particular occurrence of an attribute contributes substantially to the presence of that attribute in Victoria but not necessarily in Australia.

The western and northern borders of Victoria artificially divide natural regions and this may mean that some features are rare in Victoria but less so elsewhere in Australia. However the legislative responsibilities of the Victorian Government end at the border, so that although the status outside Victoria may be known, the security of an attribute in an adjacent State cannot be assumed.

Regional

Appropriate if the particular occurrence of an attribute contributes substantially to the presence of that attribute in the Greater Melbourne Area, but not necessarily in the state. The Greater Melbourne Area is that used by the SGAP Maroondah Study

Group and can be found in The Flora of Melbourne (SGAP Maroondah Inc. (1991)).

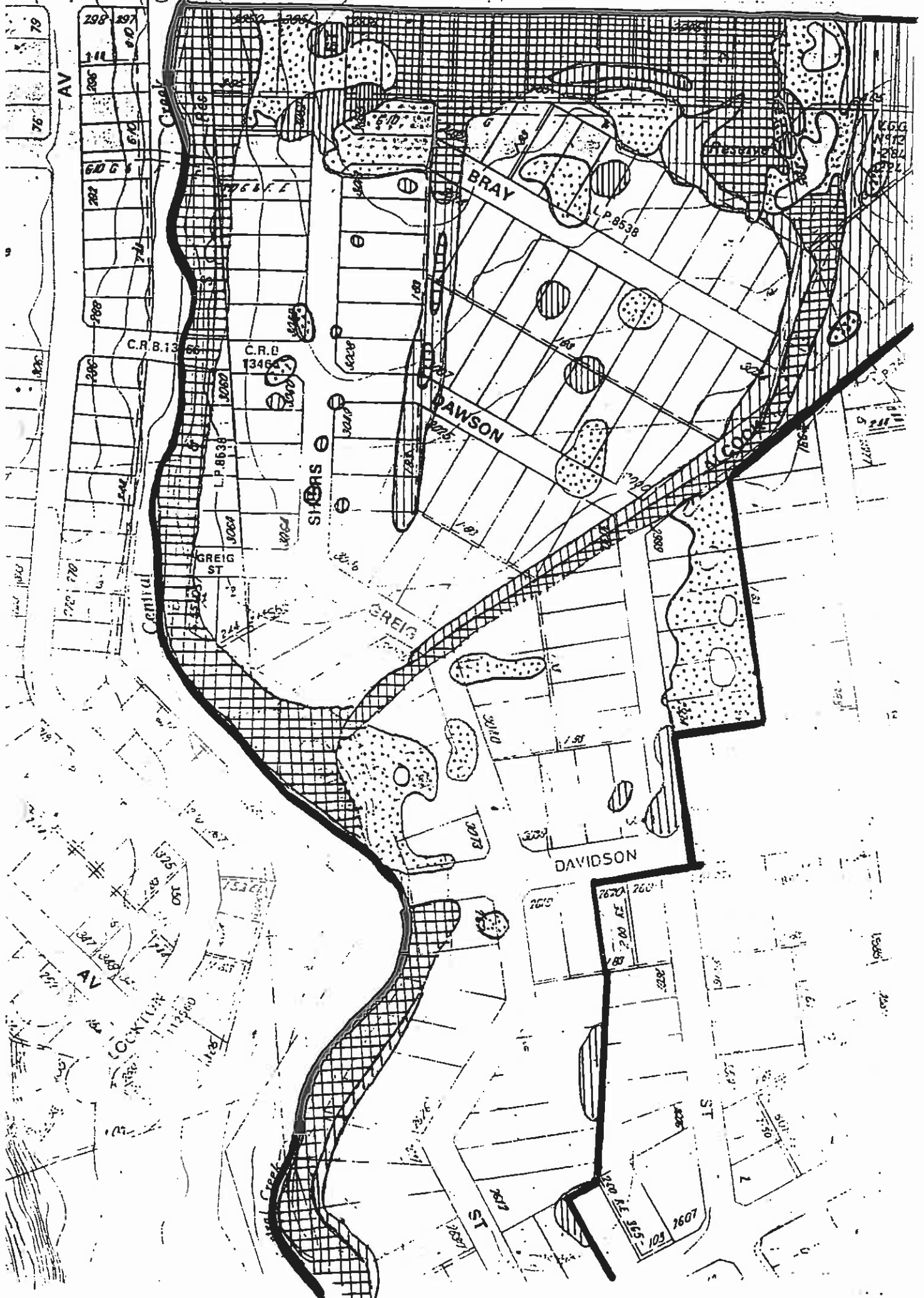
Local

Appropriate if the particular occurrence of an attribute contributes substantially to the presence of that attribute in the local area but not necessarily in the region.

2.3 QUALITY ASSESSMENT

Quality of the vegetation was assessed using a standard four level scale as outlined below:

Red (crosshatched)	Severely disturbed vegetation with little or no remnant indigenous vegetation
Yellow (vertical lines)	less than 50% indigenous vegetation sever to moderate disturbance
Blue (dots)	50-75% indigenous vegetation
Green (blank)	substantially intact with little or no invasion of exotic species and little or no disturbance.



3.0 RESULTS

3.1 VASCULAR PLANT SPECIES

A total of 192 vascular plant species were recorded for the site. Of these 107 are considered to be indigenous and 85 as introduced.

SIGNIFICANT SPECIES

All indigenous species on the site are considered to be of local significance. This is due to the general depletion of indigenous vegetation in Victoria and especially Grassland vegetation and its component species.

A total of nine species are considered to be of regional significance due to general rarity, depletion of original populations, lack of recruitment of seedlings or scarcity of habitat. These are listed below:

Caesia calliantha
Carex tereticaulis
Dianella aff longifolia (Nutfield)
Lomandra nana
Poa rodwayi
Rumex dumosus
Stipa aristiglumis
Stipa curticomma
Thelymitra megacalyptra

Three species are considered to be of state significance. Two of these are listed by Gullan et al, (1990) these being *Callitriche brachycarpa* and *Tripogon lolliiformis*. The third *Lepidosperma curtisii* was not recognised in Victoria at the time of the publication of Gullan et al. (1990) but is considered by some authors as being of state significance (Carr 1993).

3.2 VEGETATION COMMUNITIES

Two vegetation communities were determined for the study area and one unclassified vegetation assemblage, these being:

Plains Grassland

Grassy Wetland

unclassified riparian vegetation

Quadrat data from the site was compared with records of the Department of Conservation and Natural Resources. This comparison placed the quadrat data well within the descriptions of the two communities listed above (State of Victoria 1990). Plains grassland has been given various names by different authors and can be found under the epithets of Themeda Grassland, Kangaroo Grass Grassland and Basalt Plains Grassland.

3.3 SIGNIFICANCE OF VEGETATION COMMUNITIES AND THE SITE AS A WHOLE

Plains Grassland historically covered approximately one fifth of the state. Grassland vegetation occupied most of the Western Basalt Plains in a area roughly between Melbourne and the South Australian border. Due to a variety of reasons including grazing and clearing, less than 1% of the original Plains Grasslands Remain (McDougall 1989). Much of the remaining Plains Grassland has been effected by human influence with little or no pristine Plains Grassland left. What does remain of the remnant Plains Grassland is being destroyed by further clearing and alienation with some authors estimating that up to 10% of what remains being lost annually (Lunt 1993). As a consequence of this destruction, Plains Grassland was listed under the Flora and Fauna Guarantee Act and an action Statement prepared. The action statement prepared (Remnant Native Grasslands and Grassy Woodlands of the Melbourne Area, an action plan for conservation based on Biological values) reinforces the statements made in the State Conservation Strategy (1987, p.33) that states:

As a general rule, those sites significant at the state level or above will be preserved for nature conservation purposes and sites of regional or local significance will be protected wherever possible.

The points forwarded above puts the vegetation community of Plains Grassland as a whole as being of State significance, this being recognised generally by the Government of Victoria through the listing process under the Flora and Fauna Guarantee Act (1987).__

The site is listed in The State of Victoria (1990) as be of Regional significance and possibly of State significance with the priviso that further survey is required for confirmation. This survey and study adds considerably to the knowledge of the site, therefore fulfilling, in the opinions and determinations of the authors, the criteria for classification of the site as being of

State Significance. For state rating see classification system above. The criteria which are fulfilled by the individual taxa, vegetation communities and the site as a whole are:

1 Ecological integrity and viability

Criterion 1a: Importance in demonstrating existing ecological processes or natural systems.

Criterion 1b: Importance in maintaining existing ecological processes or natural systems at a regional, state or national level

The grasslands of the study area are a basically intact remnant of the original grasslands of the area containing a large number and wide range of indigenous species.

2 Richness and Diversity

Criterion 2: Importance in exhibiting unusual richness or diversity of indigenous flora and or fauna.

Compares favourably with previously classified Plains grassland sites considered of State significance and surpassing several in species diversity and number of significant species.

3 Rarity

Criterion 3: Importance for rare or threatened flora, fauna, vegetation types, faunal assemblages or other natural biotic phenomena.

Contains three species classified as being of State significance and 9 species of regional significance. Contains a large remnant of Plains Grassland that is classified, as a plant community, as being of State significance.

4 Representative of type

Criterion 4: Importance in demonstrating the principal characteristics of the range of indigenous vegetation types and faunal assemblages.

Clearly fulfils this criterion as being a representative example of substantially intact Plains Grassland Community.

4.0 FAUNA

4.1 Nomenclature

Nomenclature for mammal, bird, reptile and amphibian names, follows the Atlas of Victorian Wildlife (1993).

4.2 Limitations

Time constraints prevented bat trapping, small mammal trapping and pitfall trapping for small mammals, reptiles and amphibians. Results from fauna surveys over short periods and within one season should be interpreted with the proviso, that they may fail to detect rare, migrating, transient or cryptic species, such as the Striped Legless Lizard, *Delmar impar*. The length of the survey has a direct bearing on the number of species recorded. The common species are readily recorded, whereas the less common or rarer and cryptic species often require observations over a longer period to be detected. Similarly, transient species may not be detected during a relatively short survey period, even when the survey site is an integral part of the species habitat or range, or forms an important corridor for movement for breeding or dispersal of young.

4.2 LITERATURE

Previous records from the Atlas of Victorian Wildlife (1993) report a faunal assemblage of 65 native terrestrial vertebrates, comprising 49 bird, 1 mammal, 12 reptile and 3 amphibian species within the two minute block (N37 41, S37 43, W144 58, E145 00) incorporating the study site, however within the one minute block (N37 41, S37 42, W144 58, E144 59) covering the study area only 8 native bird, 5 reptile and 3 amphibian species are recorded. Habitat along the Merri Creek to the north and south of the study area has been assessed by McMahon and Schulz (1993) and Beardsell (in prep). Three units assessed by these studies are close in proximity to the Davidson St. site and provide information to assess the Davidson St. site in its regional context. These are the Barry Rd Gorge unit, the Cooper St unit and the Merri Creek unit between Mahoney's Rd downstream to Murray Rd.

The Barry Road Gorge unit situated 1 km north of the Davidson St. site on the east side of Merri Creek is approximately 130 ha in size containing plains grassy woodland, River Red Gum/Gilgai plains, riparian woodland, riparian scrub, escarpment shrubland and plains grassland habitats. The faunal assemblage consists of 67 species of native terrestrial vertebrate, comprising 44 bird, 2 mammal, 15 reptile and 6 frog species and is rated regionally significant (Beardsell in prep). The following regionally significant species have been recorded from this unit; Little Eagle, Calamanthus, Brown Songlark, Fat-tailed Dunnart, Marbled Gecko, Cunningham's Skink, Red-bellied Black Snake, Lowland Copperhead and Little Whip Snake (Beardsell in prep).

The Cooper Street unit situated 1.5 km north of the Davidson St. site on the west side of Merri Creek between Barry Road and Cooper Street is approximately 74 ha in size. The site contains plains grassy woodland, riparian woodland, escarpment shrubland, stony knoll grassland, plains grassland and grassy wetland/amphibious herbfield habitats. The area supports 88 species of native terrestrial vertebrate comprising 67 bird, 2 mammal, and 6 frog species and is rated state significant (Beardsell in prep). Two threatened species in Victoria the

Swift Parrot and Striped Legless Lizard and nine regionally threatened species, the Banded Lapwing, Spotted Harrier, Whistling Kite, Rufous Songlark, Common Long-necked Tortoise, Red-bellied Black Snake, Lowland Copperhead, Little Whip Snake and Bibron's Toadlet have been recorded in this unit (Beardsell in prep).

Adjacent to the Davidson St. site and downstream from Mahoney's Road to Murray Road along the Merri Creek, forty-four terrestrial vertebrates have been recorded (McMahon and Schulz 1993). The regionally significant Rufous Night Heron, Hardhead, Short-necked Tortoise, and Marbled Gecko have been recorded in this unit (McMahon and Schulz 1993).

4.3 METHODOLOGY

The study site was surveyed on the 22nd, 23rd 24th and 31th of December, 1993. The area was initially inspected on 17th December, 1993.

Birds

Birds were surveyed by direct observation, from calls and from incidental signs such as nests and regurgitated pellets.

Mammals

Mammals were surveyed by direct observation, active searching, by rock turning and by incidental signs such as scats, burrows, tracks and runways. Arboreal mammals were not surveyed due to the lack of suitable habitat in the study area.

Reptiles and Amphibians

Reptiles and amphibians were surveyed by active searching involving direct observations of reptiles, rock and litter turning and by identifying the characteristic mating calls of frogs

4.4 RESULTS

Thirty-two species of terrestrial vertebrates were recorded within the Davidson Street grassland. The faunal assemblage comprises 21 bird (6 introduced), 4 mammal (4 introduced), 3 reptile and 4 amphibian species. The results are presented in Table 1.

TABLE 1. Fauna Species recorded during the Davidson's St Survey (22/12-31/12/93)
 (* =Introduced species, O =Species observed, I =Species detected by indirect evidence)

Species		Record Type
Australian Pelican	<i>Pelecanus conspicillatus</i>	O
Pacific Black Duck	<i>Anas superciliosa</i>	O
White-faced Heron	<i>Ardea novaehollandiae</i>	O
Australian Hobby	<i>Falco longipennis</i>	I
Brown Falcon	<i>Falco berigora</i>	I
Australian Kestrel	<i>Falco cenchroides</i>	O
Silver Gull	<i>Larus novaehollandiae</i>	O
*Feral Pidgeon	<i>Columba livia</i>	O
*Common Skylark	<i>Alauda arvensis</i>	O
Welcome Swallow	<i>Hirundo neoxena</i>	O
Richard's Pipit	<i>Anthus novaeseelandiae</i>	O
*Common Blackbird	<i>Turdus merula</i>	O
Grey Shrike-thrush	<i>Colluricincla harmonica</i>	O
Little Grassbird	<i>Megalurus gramineus</i>	O
Golden-headed Cisticola	<i>Cisticola exilis</i>	O
White-plumed Honeyeater	<i>Lichenostomus penicillatus</i>	O
*House Sparrow	<i>Passer domesticus</i>	O
*Common Starling	<i>Sturnus vulgaris</i>	O
*Common Myna	<i>Acridotheres tristis</i>	O
Australian Magpie Lark	<i>Grallina cyanoleuca</i>	O
Australian Raven	<i>Corvus coronoides</i>	O
*House Mouse	<i>Mus musculus</i>	I
*Cat	<i>Felis catis</i>	O
*Dog	<i>Canis familiaris</i>	O
*Rabbit	<i>Oryctolagus cuniculus</i>	I
Garden Skink	<i>Lampropholis guichenoti</i>	O
Eastern Brown Snake	<i>Pseudongia textilis</i>	O
Little Whip Snake	<i>Uroechis flagellum</i>	O
Common Froglet	<i>Ranidella signifera</i>	O
Southern Bullfrog	<i>Limnodynastes dumerilii</i>	I
Striped Marsh Frog	<i>Limnodynastes peronii</i>	I
Growling Grass Frog	<i>Litoria raniformis</i>	I

4.5 CRITERIA FOR DETERMINING SIGNIFICANCE OF FAUNA AND SITE

Species Significance

The basis for determining the significance rating of a site is the fauna recorded from that site. The following criteria, based on the criteria of the International Union for the Conservation of Nature (IUCN), have been applied to determine the significance of faunal species.

LOCAL

all indigenous fauna is considered significant at a local level, because of the overall decline in the fauna since European settlement, and the continued incremental loss of habitat and reduction in range due to development.

REGIONAL a species is considered to be significant at a regional level if it has a disjunct distribution, it has an unusual ecological occurrence, or extraordinary concentrations such as colonial nesting, roosting or feeding sites, or if it is substantially depleted or restricted in the region.

STATE a species is considered significant at a state level if it is listed by Baker-Gabb (1991) as vulnerable, rare or insufficiently known, or if it is listed under the Flora and Fauna Guarantee Act (1988) in Victoria.

NATIONAL a species is considered significant at a national level if it is listed as endangered in Australia by CONCOM (1991), or if it is listed as endangered in Victoria by Baker-Gabb (1991).

Site Significance

The criteria for determining the significance rating of sites is generally based on the criteria established by Schulz & Webster (1992) and Beardsell et al. (in prep.) for the sites of

significance studies in the greater Melbourne area (GMA). These criteria have been modified because of the limiting factors associated with most small scale fauna surveys and environmental impact assessment studies. In the vast majority of cases, study areas are frequently small, fauna surveys are usually brief and seldom allow repeat observations over time, surveying over seasons to enable recording of breeding and seasonal migrants, and they may fail to record rare, transient or cryptic species.

LOCAL a site is designated as being of local significance if:

- it supports indigenous species not classified by Baker-Gabb (1991) as threatened in Victoria;
- it has moderate to high potential for serving as a habitat link between two sites of Regional significance or as a link to urban areas, to enable native species to disperse into such areas;
- it has moderate potential for rehabilitation and management for the public appreciation of faunal values.

REGIONAL a site is designated as being of regional significance if:

- it supports species classified as 'Notable Wildlife in Victoria' (Government Gazette);
- it supports species that are classified as uncommon and restricted in the region;
- it contains a disjunct population, unusual ecological occurrence or extraordinary concentration in a regional context of a naturally restricted (eg. colonial nesting, roosting or feeding) or substantially depleted or restricted species or subspecies in the region.
- it supports a high level of species diversity in the region. The number of species required to fulfil this criteria will vary depending on the size, scope and season of the survey. Schulz & Webster (1992) and Beardsell et al. (in prep.) worked on 2' latitude by 2' longitude blocks with a six year survey period. Their diversity criteria require 50 to 110 bird species, 7 to 21 native mammal species or 8 to 24 species of frogs and reptiles;
- it contains a partial habitat link between two sites of state significance or a regional and state site, or a primary habitat link between two sites of regional significance or between a site of state significance and large urban areas.

STATE a site is designated as being of state significance if:

- it contains a species listed under the Flora and Fauna Guarantee Act (1988);

- it contains species listed by Baker-Gabb (1991) as Endangered that visit the site sporadically, and are not recorded breeding at the site;
 - it contains species listed by Baker-Gabb (1991) as Vulnerable. For birds this only includes records of breeding or a single sighting of a large population or repeated sightings of individuals in natural habitat;
 - it contains species listed by Baker-Gabb (1991) as Rare or Insufficiently Known, or four or more species of international migratory waders, or a roosting colony of cave-dwelling bats or more than 1000 waterfowl.
- it supports a high level of species diversity. Schulz & Webster (1992) and Beardsell et al. (in prep.) specified 110 to 150 species of native birds, or 25 or more species of native frogs and reptiles, or 22 or more species of native mammals for 2' latitude by 2' longitude blocks surveyed over six years. The number of species required to fulfil these criteria will depend on the size, season and scope of the survey, and a knowledge of the fauna of the region;
- it supports 5% or more of the Victorian population or an extraordinary concentration in a State context of a native mammal, reptile or frog species;
 - it contains an intact primary habitat link containing comparable habitat attributes to two connecting sites or series of sites of state or higher faunal significance;
 - it has high scientific significance (eg. forms a post-graduate study site, or it has biogeographical significance in the region).

NATIONAL a site is designated as being of national significance if:

- it contains a population of a species, subspecies or community listed as endangered in Australia by CONCOM (1991) or in Victoria by Baker-Gabb (1991), or a large population (exceeding 5% of the total known population) of a species or subspecies listed as Vulnerable in Australia by CONCOM (1991) or in Victoria By Baker-Gabb (1991).

4.6 SIGNIFICANCE

Fauna: The species recorded are not classified by Baker-Gabb (1991) as threatened in Victoria and are not listed under the Flora and Fauna Guarantee Act (1988). All native species present are considered to be of local significance, except the Little Whip Snake which is rated as regionally significant.

Site: Following the significance criteria, the study site is considered to be of Regional Significance.

4.7 ECOLOGICAL THREATS TO FAUNA

Isolation, disturbance and habitat deterioration - management implications

Residential and industrial development in the past has isolated the site from other nearby remnants associated with the Merri Creek and restricted faunal movement between these site and the Davidson St. site. A more recent sub-division adjacent to the south-west corner of the site has significantly reduced the habitat which links the Merri Creek with the survey site and has further restricted potential faunal movement. The isolating and fragmenting of the habitat within the site has most probably caused: a reduction in the diversity of species; a changed in the composition of the faunal assemblage; and effected ecological processes such as food chains, predator-prey interactions, plant-pollinator associations and dispersal. Furthermore isolation and fragmentation will increase the potential for, and compound the effects of, disturbance, habitat deterioration and provide greater opportunities for predation by introduced predators. Continued isolation and fragmentation of the site will most probably result in further loss of species diversity. It is recommended that access/connectivity between other remnant vegetation area be maintained and improved as these links/corridors themselves can act as habitat for a number of species (thereby increasing potentially available habitat) as well as providing a source of both plant and animal immigration/emigration.

The close proximity and high density of residential development surrounding the site has resulted in a high level of disturbance at the site. The size of the site provides little buffer to any site disturbance. Clearing of surface rocks in the past associated with establishing the Golf Driving Range (D.Duggan per.comm.) over much of the site has deteriorated much of the habitat for reptiles. Rubbish dumping is evident along the northern boundary next to Mahoney's Rd. Use of fire, to reduce fuel loads along the north-west border, occurred in December 1993 and incidental evidence suggest that this practice has occurred

in the past. Disturbances of these types provide opportunity for weed infestation. Weed infestation, if not controlled, can proliferate and lead to species loss via habitat alteration. Infestation is evident particularly along the north-west border where the latter two events are most prevalent. Slashing, for fire protection purposes, using a tractor mower during the summer period has also been a regular disturbance on the site.. This activity should be minimised as grass inflorescence's provide valuable habitat for butterflies and many of the grassland birds such as the Little Grassbird and the Golden-headed Cisticola. Continual habitat disturbance and deterioration will result in a further loss of species diversity at the site. Faunal preservation on the site is ultimately dependent on disturbance minimisation.

Controlled Fire

If fire, either for fuel reduction or weed management purposes is a proposed management practice, then burns should be well planned and take into account ecological factors such as the frequency, size of the area burnt, season and intensity. Proposed fires should be planned so that sufficient, unburnt, adjacent refugia is available for faunal species. If possible burning in the ephemeral grassy wetlands and the exotic pasture grass infested north-west border where surface rocks are still present should be avoided to maintain the habitat values of these areas for amphibians and reptiles. If logistically feasible proposed burns should be limited to less than one hectare in size and burnt in a mosaic pattern on at least a five year rotation (Beardsell in prep).

Predation

Introduced predators, such as cats, dogs and foxes have the potential to severely impact on ground dwelling fauna (eg. small mammals, skinks, lizards, frogs and ground frequenting birds), particular in relatively small confined areas. Domestic cats and dogs were observed at the site on all days visited by the authors. The domestic cats were roaming and/or hunting on each of these occasions. Foxes were not seen on the site or any

indirect evidence to suggest their presence, however it is most probable that foxes are utilising the site for feeding purposes. The impact of introduced predators is often most evident in area already stressed by disturbance and isolation. The low numbers observed of each species recorded at the site may be a reflection of the introduced predators present.

Site Viability

The Davidson St. site has potential for the long term maintenance of populations of species listed (see Table 1). The combination of size, isolation, past and current disturbance and predation by introduced predators has most likely reduced the species diversity and abundance at the site. Viability of the site will depend on whether management adequately addresses these issues.

5.0 DEVELOPMENT OPTIONS

A number of well established criteria have been identified and discussed in the early part of this report and must be considered in determining development options and potential of the site.

1. Critically endangered status and high conservation significance of native grassland vegetation in both a National and State context.

2. Clear responsibility to protect remaining remnant grassland areas as outlined within the State Conservation Strategy, State Flora and Fauna Guarantee and Native Grassland Strategy.

It is within this context therefore that given the relatively intact and high quality status of the study area development potential is limited. In determining potential development options for the site the following management objectives have been identified:

- need for major restructure of proposed subdivision to restrict development to disturbed areas and ensure appropriate balance between conservation and development potential, recognizing the need for maximum protection of high quality remnants.

- Ensure effective management of conservation areas and that development does not compromise existing values or future management.

- ensure protection of landscape, recreation, land values etc associated with native grassland areas and enhance open space linkage along Central Creek - Merri Creek.

To assist in determining development potential of the site, quality assessment of vegetation conservation values has been undertaken. The adjoining map clearly delineates high quality, poor quality and severely degraded areas.

Of the 146 allotments present within the study area 22 comprise severely disturbed poor quality vegetation. These are generally confined to Mahoney's Road frontage, proposed recreation reserve and other associated allotments located in the NE corner of the site. Despite degraded quality of vegetation in the NW corner, development potential of this site is limited by high faunal habitat values as indicated in fauna survey. This is due to the presence of rocks and other materials associated with development of former Golf Driving range which has provided critical habitat for native reptile species including Little Whip Snake (regionally significant occurrence). Acknowledgment of fauna values is critical to ensuring balanced approach to conservation and development opportunities of the area.

OPTION 1

Protect whole of site including degraded allotments which could be managed as fire buffer areas and active recreation areas.

Advantages

Would manage total area of land available by increasing viability of remnants and restrict degradation processes (see report by Faithfull., T. and Lord, R. 1992). Protection of the whole site would maximises opportunities for the establishment of education and tourist development. Degraded areas could be used for the establishment of visitor facilities, car parking, indigenous plant nursery and display/interpretive gardens.

Disadvantages

Would prevent any subdivision and sale of area for development.

OPTION 2

Retain bulk of the site and allow for limited subdivision of Mahoneys Road frontage and restructure of subdivision to allow development of proposed public reserve.

Advantages/disadvantages

As per Option 1 but would allow for limited development.

May adversely impact on remnant vegetation through creation of an edge effect associated with development of allotments and need to provide an effective fire management buffer zone adjacent to grassland reserve.



OPTION 3

As per Option 2 but would allow for limited development of areas east of Dawson street and lot 2603. This would allow for continuation of Dawson Street into Davidson St. and link to proposed Alcock Ct..

Will require restructuring of proposed Dawson Street alignment and adjacent residential allotments to protect high quality vegetation present along shallow drainage line that contains significant species eg. *Lepidosperma curtisii*.

Advantages

Would allow clear delineation between the grassland reserve and residential development ie. the roadway would be used to provide a management buffer zone and maintenance access point along the eastern edge of the reserve.

- increases land available for development
- maintains linear corridor linking open-space areas north and south of Davidson St.

Disadvantages

Potentially compromises the integrity of the grassland through the alteration of the general drainage patterns and impact on existing remnant vegetation associated with road construction and development.

- Construction and development would require stringent conditions and active supervision to ensure protection of remnant vegetation in particular drainage swales comprising significant vegetation.
- Reduces diversity of the vegetation present through loss of only recorded site for *Leptorhynchos squamatus* in the local area.



AREA TO, BE DEVELOPED

6.0 GENERAL RECOMMENDATION

General recommendations have been listed under the following sub-headings: re-zoning, development/construction and management

6.1 Re-zoning

Existing residential subdivision was created prior to ecological assessment of the site. Subsequent assessment has delineated areas ranging from very high to low quality in the conservation sense.

To ensure appropriate balance between conservation and development of the site while maximizing conservation and development potentials restructuring of the subdivision proposal in reference to road access network and residential allotments is required.

- Review of the status of the proposed recreation reserve. As presently configured the recreation reserve is poor quality with regard to the remnant indigenous vegetation and is generally highly disturbed. It would be preferable to allow this area to be altered to residential status and a piece of higher quality and more significant vegetation to be selected to maximise conservation potential.

- Restructuring of the subdivision must maintain the linear nature of the reserve and effective management buffers to protect overall integrity of the grassland.

6.2 DEVELOPMENT/CONSTRUCTION

Subject to restructuring of the subdivision, stringent guidelines and close supervision of road construction work and building will be critical to practical conservation of reserved areas. It is highly recommended therefore that construction of a boundary fence along the northern and eastern edges of the grassland reserve be undertaken prior to start of construction work and that work crews be adequately briefed as to their purpose. This will prevent any deliberate or accidental access onto the reserve and minimize potential damage caused by construction equipment

and/or dumping or stockpiling of materials on grassland vegetation.

- There is also a need to preserve surface drainage patterns to protect the integrity of the reserved grassland vegetation. Presence of several grassland species would appear to be closely linked to surface drainage patterns of the site. Occurrence of ephemeral (ie. seasonal) wetland areas and associated species is a clear indication of the finely balanced ecology and dynamics of grassland species and plant communities.

6.3 MANAGEMENT GUIDELINES

Remnant grassland vegetation and associated wildlife habitat must be managed in a sensitive and positive manner. Disturbance impacts such as rubbish dumping and vehicular access have generally resulted in rapid degradation of grassland areas through encouraging opportunist weed species. A number of weed species which have potential to seriously threaten and/or replace native grassland vegetation is no management is undertaken (eg *Phalaris*, *Nassella* spp., *Stipa* spp., Fennel etc.). Prevention of these impacts and active intensive management of the vegetation is critical to control weed invasion, stabilize and conserve the site.

- The management regime must therefore aim to set the following long-term objectives

1. Maintain the site as a viable grassland reserve for conservation of flora and fauna species in situ.
2. Maintain the genetic diversity and populations of rare or threatened species.
3. Provide a source of plant material for use in restoration and revegetation works, education and promotional activities.
4. Provide opportunities for public education and passive recreation related to native grasslands.

6.4 MANAGEMENT ISSUES

PROTECTION OF LIFE AND PROPERTY FROM FIRE

It is generally recognised that there is a potential risk of a fire event causing damage to adjoining properties.

Fire risk is closely related to proximity of buildings to the site and fuel loadings (amount of fine fuel biomass). Fuel loading is highly variable and dependant on species and growth stage. A number of exotic grasses eg. *Phalaris* are notable for producing high fuel loads due to their life cycle which dictates that they "die off" and dry out by early summer. Because of the past disturbance history of the site, these exotic grasses tend to be concentrated along the edges closest to the houses and the creek and pose a very high fire hazard.

In contrast many native grassland species are summer growing perennials. It is generally not until late summer/early autumn when flower heads mature (cure and dry) when they produce flammable dry matter. *Themeda triandra*, the predominant indigenous grass of the site is readily "controlled" by burning at low intensity prior to the main fire season to maintain a green sward during the period of high fire risk over summer.

1. Fire Breaks

Mowed fire breaks have been established between the rear of the houses and the reserve on the east boundary and along the western boundary of the reserve adjacent to Central Creek.

It is recommended that these fire breaks are maintained. Ideally, they should be no wider than 10-15m to minimise encroachment into native grassland areas. Subject to seasonal conditions, mowing is best carried out in September and late November/December to prevent seed set.

Mowing of the reserve proper.

Mowing of the reserve has the potential to cause serious degradation to conservation values due to:

- introduction and spread of weed seed from contaminated machinery.

- smothering of native vegetation caused by windrows of slashed material. These often provide active sites for colonization by weed species eg. *Anthoxanthum odoratum* (Sweet Vernal Grass). Being smothered under slash, other than in windrows, can kill some species or inhibit their regeneration, especially inter-tussock herbs.
- Associated soil disturbance and weed invasion caused by mowing in the wetter months.
- Prevention of flowering and seed set of indigenous species when mowing is carried out in late Spring and early summer. Active disturbance of this type may severely compromise native species by preventing regeneration leading to local extinctions on site. On the other hand, mowing of severely weed invaded sections of the reserve may be used as an effective tool in the prevention of further seeding of weed species.

Other than as an ecological tool as in the instances above mowing should therefore be avoided if possible. If deemed essential, it is best restricted to late January. Slash is best removed using either a grass catcher, raked by hand or burnt off. This is essential to prevent smothering of native vegetation and reduce fire risk associated with dry slash the ground. Careful consideration must be given both to cutting height (minimum 150-200mm) and to the type of machinery used for mowing to minimize wight and associated soil disturbance eg. use of Front Deck mowers as opposed to a Tracter/slasher.

Management burning

Burning may be carried out to both reduce fuel loading and associated fire risk as well as to stimulate regeneration of indigenous herbs and grasses. It is likely that fire played a critical role in the regeneration and distribution of many basalt flora and fauna species.

It is essential therefore that burning is undertaken within sound ecological guidelines, giving due consideration to the ecological requirements of native plant and fauna species in particular.

This implies the following:

A mosaic approach is adopted in developing a burning regime for the reserve whereby no more than 1-2ha sized patches are burnt at any given time. This also applies to frequency and timing of burns. This is important to preserve a range of habitats for native fauna etc.

Burnt sites are actively monitored to document changes in floristic composition to better understand and improve knowledge of fire ecology. This will also allow identification of appropriate burning regimes ie. intensity and frequency of fire required to maintain ecological integrity of the site.

That resources are committed to ensure follow-up management of the reserve to control weeds that will inevitably regenerate after burning. Burning is a particularly effective strategy for control and management of various weed species.

Rubbish dumping

Rubbish dumping is an ongoing management problem in all urban reserves. The effects on the environment are many and varied including weed invasion, increased fire risk and direct destruction of vegetation. Rubbish dumping has secondary effects on the reserve as well, reducing amenity, lowering the public perception of the reserve and ultimately the devaluation of the importance of remnant vegetation. Control measures that would reduce the rubbish dumping include:

Clearly defining the use of the reserve ie. for conservation and public education and the intentions of management. This could include signposting, fencing, leafletting, and forming of a "Friends" Group.

Regular rubbish removal and generally keeping the public view of the reserve clean.

Soil Disturbance

Next to rubbish dumping, soil disturbance is equally as common and arguably more detrimental in the long term to native grassland vegetation. The basaltic soils and the vegetation that occurs on the site are particularly sensitive to soil disturbance, particularly rutting of the soil when it is wet or moist and scalping of the soil by tractor slashers. These sites are prone to weed invasion as evidenced on areas adjacent to the main drain running through the centre of the site where weed infestations are clearly linked to past mowing. At present the main forms of soil disturbance are caused by maintenance vehicles and illegal use of trail-bikes and off-road vehicles.

Several solutions to this problem include:

exclusion of vehicular access to the site with the possible exception of maintenance vehicles in which case access should be limited. This could be achieved through fencing of the site and effective communication to operators and staff involved in works on or near the site.

Avoiding maintenance vehicular access to areas of the site when soils are moist and likely to be rutted by tires.

Managing weed invasions

Of the various disturbance processes which threaten the continued survival of remnant native grassland communities, invasion by environmental weeds is considered to pose the most serious long-term threat.

Active management of weed invasion is therefore of critical importance. This can be achieved by:

- Minimizing soil disturbance.

- Prioritize management of weeds present giving highest priority to invasive species such as *Nassella* spp., introduced *Stipa* spp., *Phalaris* spp., *Rosa rubiginosa*, *Rubus discolor*, *Paspalum dilatatum*, *Foeniculum vulgare*, and *Cynara cardunculus*.
- Ensuring primary focus of management is initially given to containing further spread and invasion of these species, working towards their eventual eradication from the site.
- Preventing further introduction of weeds to the reserve via mowing machinery or management activities.
- Preventing the dumping of garden rubbish.
- Promoting active management of disturbed areas using revegetation techniques (ie. overseeding or planting) to encourage healthy competition of indigenous species thereby minimizing re-invasion of exotic species.

MAINTAINING AND ENHANCING SPECIES DIVERSITY PRESENT ON SITE

Given the critically endangered status of native grassland vegetation within Victoria, all grassland remnants such as the study area are of vital importance in providing refuge for native flora and fauna.

The study area assumes even greater importance within this context due to the comparatively intact status of the vegetation and presence of several species of State significance.

Management must therefore aim to preserve the vegetation communities and ensure a balance of individual species and fauna habitats. Special focus will need to be given to management and conservation of herbaceous plant species. This will be dependant to some extent on management of associated native grass species such as *Themeda triandra* which itself is prone to out-compete other indigenous herbs unless burnt seasonally and regularly eg. 3-5 years (depending on vegetation community and species composition).

In addition to the sites intrinsic conservation values, it also provides an opportunity to re-introduce associated native plant species (and fauna to a lesser degree) which were formerly present and are now restricted or locally extinct. The site could also be used to establish viable populations of rare and endangered species, thereby increasing their chances of survival.

Management practices required to maintain and enhance species diversity include:

- Active management to control weeds especially highly invasive species.
- Establishment of an appropriate burning regime to remove excess *Themeda* growth followed by spot spraying of weed regeneration.
- Enrichment of existing vegetation through the introduction of planted tube-stock or direct seeding.
- Revegetation of disturbed areas following weed control/rubbish removal using either tube-stock or direct seeding techniques.
- Access control to minimize destruction of indigenous vegetation caused by soil disturbance or rubbish dumping on site.

UTILISING THE SEED RESOURCE

The use of remnant vegetation as a source for seed is becoming increasingly important as more and more sites are lost to other land uses. Faithful and Lord (1992) more than adequately sum up the importance of remnants for this purpose:

"The native grassland species present of the site represent a rare resource for collection of seed for revegetation projects. The opportunity should be utilized to collect this seed, however it is important that seed collection does not jeopardise the survival of species at the site through over-collection. Seed

collection should follow the guidelines published in the Flora of Melbourne (1990)."

- That the reserve be managed in a manner that allows for the use of the seed resource available without compromise of other values.

ENHANCING LANDSCAPE VALUES

It is important to recognise that the current status and landscape appearance of the site has been substantially modified from its original condition prior to European settlement.

As a consequence little remains of the various species of trees and shrubs which would have occurred along the fringes of Central Creek and scattered throughout the grassy plains. Dominant tree species would have included River Red Gum and Blackwood. This latter species is still present although its growth has been severely restricted due to regular mowing of the site.

Re-establishment of trees and shrubs could be undertaken on disturbed areas scattered throughout the reserve so as not to compromise areas of high quality grassland vegetation. Planting densities of trees and shrubs would need to mimic the original natural state.

In addition to improving landscape values through the re-establishment of trees and shrubs, other improvements can be made by removing overhead power-lines which bisect the site.

- Major ~~revegetation~~ revegetation works could also be undertaken along Central Creek to restore wetland function and associated fringing vegetation. These works would allow treatment of urban runoff and improve water quality.

IMPROVING PUBLIC IMAGE OF THE RESERVE

Despite the critically endangered status of native grassland vegetation, general public awareness of these factors is extremely poor, unlike other high profile conservation issues such as Rainforests.

A major effort is therefore required to increase community awareness of grassland conservation. Promoting the special values and importance of the reserve will be important to gaining the support of local residents.

Most residents are presently unaware of the status and importance of the area, and generally regard it as no more than waste land. These problems are compounded by the fact that:

- many of the residents are of non-english speaking background. Multilingual information will therefore need to be provided.
- No regular management of the reserve has been undertaken resulting in a build-up of dumped rubbish etc.

The public image of the site can be improved by:

- Preparing leaflets and other interpretative information in local community languages to promote and highlight the special qualities of the reserve.
- Regular consultation with local community to inform them of management issues and to seek their support eg. control burning, vehicular access, rubbish dumping.
- This could take the form of site information days with interpreters present to improve level of communication between various language groups and parties.
- Encourage the establishment of a local friends group to assist in management of the reserve and provide a "local Neighbourhood

watch" function with regard to vandalism and other disturbing processes. .

- Signposting the site as a reserve.

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APPENDIX 1

REGIONAL FAUNA LIST

Status (Atlas of Victorian Wildlife 1993)

End	Endangered
Vul	Vulnerable
R/R	Rare and Restricted
R/C	Restricted Colonial
R.Sig	Regionally Significant (McMahon and Schulz 1993)
*	Introduced Species

Localities

A	=Davidson's St (current survey)
B	=Davidson's St (1 min Block)
C	=Davidson's St (2 min Block)
D	=Barry Rd Gorge Unit
E	=Coopers St Unit
F	=Merri Ck (Mahoney's Rd to Murray Rd)

Record Type

O	=Observed
I	=Indirect Evidence
L	=Literature

Status	Species		LOCALITIES					
			A	B	C	D	E	F
	Australasian Grebe	<i>Tachybaptus novaehollandiae</i>			L		L	
	Great Cormorant	<i>Phalacrocorax carbo</i>			L		L	L
	Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>			L			
	Little Pied Cormorant	<i>Phalacrocorax melanoleucos</i>			L	L	L	
R/C	Australian Pelican	<i>Pelecanus conspicillatus</i>	O		L			
	Black Swan	<i>Cygnus atratus</i>			L			
	Straw-necked Ibis	<i>Threskiornis spinicollis</i>				L	L	
	Pacific Black Duck	<i>Anas superciliosa</i>	O		L	L	L	L
	Chestnut Teal	<i>Anas castanea</i>			L		L	
*	Mallard	<i>Anas platyrhynchos</i>			L			
	Pink-eared Duck	<i>Malacorhynchus membranaceus</i>			L			
R.Sig	Hardhead	<i>Aythya australis</i>			L			L
	White-faced Heron	<i>Ardea novaehollandiae</i>	O		L	L	L	L
	Pacific Heron	<i>Ardea pacifica</i>			L		L	
	Cattle Egret	<i>Ardeola ibis</i>					L	
R/C	Great Egret	<i>Egretta alba</i>			L	L		
R/C	Rufous Night Heron	<i>Nycticorax caledonicus</i>			L			L
R.Sig	Little Eagle	<i>Hieraaetus morphnoides</i>				L	L	
R.Sig	Spotted Harrier	<i>Circus assimilis</i>				L	L	
R.Sig	Marsh Harrier	<i>Circus aeruginosus</i>				L	L	
	Black-shouldered Kite	<i>Elanus notatus</i>		L	L	L	L	L
R.Sig	Whistling Kite	<i>Haliastur sphenurus</i>				L	L	
	Brown Goshawk	<i>Accipiter fasciatus</i>				L	L	L
	Australian Hobby	<i>Falco longipennis</i>	O		L	L	L	L
	Brown Falcon	<i>Falco berigora</i>	O			L	L	L
	Australian Kestrel	<i>Falco cenchroides</i>	O		L	L	L	
	Silver Gull	<i>Larus novaehollandiae</i>	O		L	L	L	L
	Stubble Quail	<i>Coturnix novaezelandiae</i>		L	L	L	L	
R.Sig	Buff-banded Rail	<i>Rallus phillippensis</i>				L		
R.Sig	Spotless Crake	<i>Porsana tabuensis</i>				L		
	Dusky Moorhen	<i>Gallinula tenebrosa</i>			L	L	L	L
	Purple Swamphen	<i>Porphyrio porphyrio</i>			L			
	Eurasian Coot	<i>Fulica atra</i>			L			
R.Sig	Latham's Snipe	<i>Gallinago hardwickii</i>					L	

			A	B	C	D	E	F
	Masked Lapwing	<i>Vanellus miles</i>			L	L	L	L
	Banded Lapwing	<i>Vanellus tricolor</i>					L	
	Sacred Ibis	<i>Threskiornis aethiopicus</i>			L	L	L	L
*	Feral Pidgeon	<i>Columba livia</i>	O		L	L	L	L
*	Spotted Turtle Dove	<i>Streptopelia chinensis</i>			L	L	L	L
	Galah	<i>Cacatua roseicapilla</i>			L	L	L	L
	Long-billed Corella	<i>Cacatua tenuirostris</i>				L	L	
	Musk Lorikeet	<i>Glossopsitta concinna</i>					L	
	Purple-crowned Lorikeet	<i>Glossopsitta porphyrocephala</i>					L	
	Swift Parrot	<i>Lathamus discolor</i>					L	
	Eastern Rosella	<i>Platycerus eximius</i>			L		L	
	Red-rumped Parrot	<i>Psephotus haematonotus</i>			L	L	L	
	Horsefield's Bronze-Cuckoo	<i>Chrysococcyx basalis</i>				L	L	L
	Southern Boobook	<i>Ninox novaeseelandiae</i>					L	
	Barn Owl	<i>Tyto alba</i>				L	L	
	Tawny Frogmouth	<i>Podargus strigoides</i>					L	
	Australian Owlet-nightjar	<i>Aegotheles cristatus</i>					L	
	White-throated Needletail	<i>Hirundapus caudacutus</i>			L	L	L	L
	Fork-tailed Swift	<i>Apus pacificus</i>				L	L	
	Laughing Kookaburra	<i>Dacelo novaeguineae</i>			L			
	Sacred Kingfisher	<i>Halcyon sancta</i>					L	
	Singing Bushlark	<i>Mirafra javanica</i>				L	L	
*	Common Skylark	<i>Alauda arvensis</i>	O	L	L	L	L	L
	Welcome Swallow	<i>Hirundo neoxena</i>	O		L	L	L	L
	Tree Martin	<i>Cecropis nigricans</i>				L	L	
	Richard's Pipit	<i>Anthus novaeseelandiae</i>	O	L	L	L	L	
	Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>			L	L	L	L
	White-winged Triller	<i>Lalage sueurii</i>			L			
*	Common Blackbird	<i>Turdus merula</i>	O	L	L	L	L	L
	Song Thrush	<i>Turdus philomelos</i>						L
	Flame Robin	<i>Petroica phoenicea</i>				L	L	
	Golden Whistler	<i>Pachycephala pectoralis</i>				L	L	
	Grey Shrike-thrush	<i>Colluricincla harmonica</i>	O			L	L	
	Grey Fantail	<i>Rhipidura fuliginosa</i>				L	L	
	Willie Wagtail	<i>Rhipidura leucophrys</i>			L	L	L	L
	Clamorous Reed Warbler	<i>Acrocephalus stentoreus</i>		L	L	L	L	L
	Little Grassbird	<i>Megalurus gramineus</i>	O			L	L	
	Golden-headed Cisticola	<i>Cisticola exilis</i>	O	L	L	L	L	
R. Sig	Rufous Songlark	<i>Cinclorhamphus mathewsi</i>					L	
	Brown Songlark	<i>Cinclorhamphus cruralis</i>				L	L	
	Superb Fairy-wren	<i>Malurus cyaneus</i>		L	L	L	L	L
	White-browed Scrub-wren	<i>Sericornis frontalis</i>				L	L	L
	Calamanthus	<i>Sericornis fuliginosus</i>				L	L	
	Yellow-rumped Thornbill	<i>Acanthiza chrysorrhoa</i>			L	L	L	L
	Yellow Thornbill	<i>Acanthiza nana</i>				L	L	
	Red Wattlebird	<i>Anthochaera carunculata</i>			L	L	L	L
	Little Wattlebird	<i>Anthochaera chrysoptera</i>			L			
	Noisy Miner	<i>Manorina melanocephala</i>			L			
	White-plumed Honeyeater	<i>Lichenostomus penicillatus</i>	O	L	L	L	L	L
	White-fronted Chat	<i>Ephthianura albifrons</i>				L	L	
	Mistletoebird	<i>Dicaeum hirundinaceum</i>			L	L	L	L
	Striated Pardalote	<i>Pardalotus striatus</i>			L	L	L	L

			A	B	C	D	E	F
	Silvereye	<i>Zosterops lateralis</i>			L	L	L	L
*	European Goldfinch	<i>Carduelis carduelis</i>			L	L	L	L
*	European Greenfinch	<i>Carduelis chloris</i>			L	L	L	L
*	House Sparrow	<i>Passer domesticus</i>	O	L	L	L	L	L
*	Tree Sparrow	<i>Passer montanus</i>						L
	Red-browed Firetail	<i>Emblema temporalis</i>				L	L	L
*	Common Starling	<i>Sturnus vulgaris</i>	O	L	L	L	L	L
*	Common Myna	<i>Acridotheres tristis</i>	O	L	L	L	L	L
	Dusky Woodswallow	<i>Artamus cyanoleuca</i>					L	
	Australian Magpie Lark	<i>Grallina cyanoleuca</i>	O		L	L	L	L
	Grey Butcherbird	<i>Cracticus torquatus</i>					L	
	Australian Magpie	<i>Gymnorhina tibicen</i>			L	L	L	L
	Australian Raven	<i>Corvus coronoides</i>	O		L		L	
	Little Raven	<i>Corvus mellori</i>		L	L	L	L	L
	Fat-tailed Dunnart	<i>Sminthopsis crassicaudata</i>				L	L	
	Common Brushtail Possum	<i>Trichosurus vulpecula</i>			L			
	Eastern Grey Kangaroo	<i>Macropus giganteus</i>					L	
	White-striped Mastiff-bat	<i>Tadarida australis</i>				L	L	L
	Water Rat	<i>Hydromys chrysogaster</i>				L	L	L
*	House Mouse	<i>Mus musculus</i>	I	L	L	L	L	L
*	Black Rat	<i>Rattus rattus</i>			L	L		
*	Fox	<i>Vulpes vulpes</i>		L	L	L	L	L
*	Cat	<i>Felis catis</i>	O			L	L	
*	Brown Hare	<i>Lepus capensis</i>				L	L	
*	Rabbit	<i>Oryctolagus cuniculus</i>	I			L	L	L
R.Sig	Short-necked Tortoise	<i>Emydura macquarii</i>				L	L	L
	Common long-necked Tortoise	<i>Chelodion longicollis</i>				L	L	
R.Sig	Marbled Gecko	<i>Phyllodactylus marmoratus</i>			L	L	L	L
Vul	Striped Legless Lizard	<i>Delmar impar</i>					L	
	Large-striped Skink	<i>Ctenotus robustus</i>				L	L	
	Cunningham's Skink	<i>Egernia cunninghami</i>				L	L	
	White's Skink	<i>Egernia whittii</i>			L			
	Garden Skink	<i>Lampropholis guichenoti</i>	O	L	L	L		L
	Weasel Skink	<i>Lampropholis mustelina</i>			L			
	Bougainville's Skink	<i>Lerista bougainvillii</i>			L			
	Eastern Three-lined Skink	<i>Leiopisma duperreyi</i>			L	L	L	
	Grass Skink FORM A	<i>Leiopisma entrecasteauxii A</i>		L	L	L	L	L
	Southern Water Skink CTF	<i>Sphenomorphus tympanum</i>			L	L	L	L
	Common Blue-tongued Lizard	<i>Tiliqua scincoides</i>			L	L	L	L
R.Sig	Lowland Copperhead	<i>Austrelaps superbus</i>				L	L	
	Tiger Snake	<i>Notechis scutatus</i>		L	L	L	L	L
R.Sig	Red-bellied Black Snake	<i>Pseudechis porphyriacus</i>		L	L	L	L	
	Eastern Brown Snake	<i>Pseudongia textilis</i>	O			L	L	L
	Little Whip Snake	<i>Unechis flagellum</i>	O	L	L	L	L	
	Common Froglet	<i>Ranidella signifera</i>	O	L	L	L	L	
	Southern Bullfrog	<i>Limnodynastes dumerilii</i>	I			L	L	
	Striped Marsh Frog	<i>Limnodynastes peronii</i>	I			L	L	
	Spotted Marsh Frog SCR	<i>Limnodynastes tasmaniensis SCR</i>		L	L	L	L	
	Common Spadefoot Toad	<i>Neobatrachus sudelli</i>				L	L	

			A	B	C	D	E	F
R.Sig	Brown Toadlet	<i>Pseudophryne hilhroni</i>					I.	
	Growling Grass Frog	<i>Litoria raniformis</i>	I	L	L	L	L	
	Southern Brown Tree Frog	<i>Litoria ewingii</i>				L	L	L
Vul	Macquarie Perch	<i>Macquaria australasica</i>			L			

APPENDIX 2 TOTAL LIST OF VASCULAR PLANT SPECIES RECORDED FOR THE DAVIDSON STREET SITE, DECEMBER 1993.

* denotes an introduced species.

FERNS AND FERN ALLIES

ADIANTACEAE

Cheilanthes sieberi	Narrow Rock Fern
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MONOCOTYLEDONS

ALISMATACEAE

Alisma plantago-aquatica	Water Plantain
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CYPERACEAE

Bolboschoenus caldwellii	Sea Club-sedge
Carex breviculmis	Short-stem Sedge
Carex inversa	Common Sedge
Carex tereticaulis	Rush Sedge
*Cyperus eragrostis	Drain Flat-sedge
Eleocharis acuta	Common Spike-sedge
Eleocharis pusilla	Small Spike-sedge
Eleocharis sphacelata	Tall Spike-sedge
*Isolepis hystrix	Awned Club-sedge
Lepidosperma curtisii	Sword-sedge
Schoenoplectus validus	River Club-sedge
Schoenus apogon	Common Bog-sedge

IRIDACEAE

*Romulea rosea	Common Onion-grass
*Sisyrinchium iridifolium	Striped Rush-leaf

JUNCACEAE

Juncus anabilis	Hollow Rush
*Juncus articulatus	Jointed Rush
Juncus bufonius	Toad Rush
*Juncus capitatus	Dwarf Rush

<i>Juncus flavidus</i>	Yellow Rush
<i>Juncus holoschoenus</i>	Joint-leaf Rush
<i>Juncus pauciflorus</i>	Loose-flower Rush
<i>Juncus subsecundus</i>	Finger Rush

JUNCAGINACEAE

<i>Triglochin striata</i> <i>www</i>	Streaked Arrow-grass
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LILIACEAE

* <i>Allium vineale</i>	Crow Garlic
<i>Arthropodium strictum</i>	Chocolate-lily
<i>Burchardia umbellata</i>	Milkmaids
<i>Caesia calliantha</i>	Blue Grass-lily
<i>Dianella</i> sp. aff. <i>longifolia</i> (Nuttfield) <i>amoena</i>	Flax-lily
<i>Dianella revoluta</i>	Black-anther Flax-lily
<i>Tricoryne elatior</i>	Yellow Rush-lily

ORCHIDACEAE

<i>Microtis unifolia</i>	Common Onion-orchid
<i>Thelymitra megacalyptra</i>	Scented Sun-orchid
<i>Thelymitra pauciflora</i>	Common Sun-orchid

POACEAE

<i>Agrostis aemula</i>	Blown-grass
<i>Agrostis avenacea</i>	Common Blown-grass
✓ <i>Agrostis avenacea</i> var. <i>perennis</i>	Common Blown-grass
* <i>Agrostis capillaris</i>	Brown-top Bent
* <i>Aira caryophyllea</i>	Silvery Hair-grass
<i>Amphibromus archeri</i>	Pointed Swamp Wallaby-grass
<i>Amphibromus nervosus</i>	Veined Swamp Wallaby-grass
* <i>Anthoxanthum odoratum</i>	Sweet Vernal-grass
* <i>Avena barbata</i>	Bearded Oat
<i>Bothriochloa macra</i>	Red-leg Grass
* <i>Briza maxima</i>	Large Quaking-grass
* <i>Briza minor</i>	Lesser Quaking-grass
* <i>Bromus diandrus</i>	Great Brome
* <i>Bromus hordeaceus</i>	Soft Brome
* <i>Bromus madritensis</i>	Compact Brome

*Cortaderia selloana	Pampas Grass
*Dactylis glomerata	Cocksfoot
<i>Austro</i> Danthonia caespitosa	Common Wallaby-grass
<i>Austro</i> Danthonia duttoniana	Brown-back Wallaby-grass
<i>Austro</i> Danthonia laevis	Smooth Wallaby-grass
<i>Austro</i> Danthonia linkii	Leafy Wallaby-grass
<i>A</i> Danthonia penicillata	Slender Wallaby-grass
<i>A</i> Danthonia pilosa	Velvet Wallaby-grass
<i>A</i> Danthonia racemosa	Branched Wallaby-grass
<i>A</i> Danthonia tenuior	Long-leaf Wallaby-grass
Dichelachne crinita	Long-hair Plume-grass
Elymus scabrus <i>Scaber</i>	Common Wheat-grass
*Festuca arundinacea	Tall Fescue
*Gaudinia fragilis	Fragile Oat
Hemarthria uncinata	Mat Grass
*Holcus lanatus	Yorkshire Fog
*Lolium perenne	Perennial Rye-grass
*Lolium rigidum	Wimmera Rye-grass
Microlaena stipoides	Weeping Grass
*Nassella leucotricha	Pale Needle-grass
*Nassella neesiana	Chilean Needle-grass
*Nassella trichotoma	Serrated Tussock
Panicum effusum	Hairy Panic
*Paspalum dilatatum	Paspalum
*Paspalum distichum	Water Couch
*Pennisetum clandestinum	Kikuyu
Pentapogon quadrifidus	Five-awned Spear-grass
*Phalaris aquatica	Toowoomba Canary-grass
*Piptatherum miliaceum	Rice Millet
Poa labillardieri	Common Tussock-grass
Poa morrisii	Soft Tussock-grass
Poa rodwayi	Tasmanian Tussock-grass
Poa sieberiana	Grey Tussock-grass
*Polypogon monspeliensis	Annual Beard-grass
*Sporobolus indicus <i>aficanus</i>	Indian Rat-tail Grass
<i>A</i> Stipa aristiglumis	Plump Spear-grass
<i>A</i> Stipa bigeniculata	Kneed Spear-grass
<i>A</i> Stipa curtica	Short-crown Spear-grass

A. Stipa scabra subsp. scabra

Themeda triandra

**Tribolium acutiflorum*

Tripsacum daniellii

**Vulpia bromoides*

Rough Spear-grass

Kangaroo Grass

Plagiocloa

Rye Beetle-grass

Squirrel-tail Fescue

TYPHACEAE

Typha domingensis

Cumbungi

XANTHORRHOACEAE

Lomandra filiformis

Wattle Mat-lily

Lomandra nana

Dwarf Mat-lily

DICOTYLEDONS

APIACEAE

Eryngium yuccifolium

Blue Devil

Eryngium yuccifolium

Prickfoot

**Foeniculum vulgare*

Fennel

ASTERACEAE

**Arctotheca calendula*

Cape Weed

**Aster subulatus*

Aster-weed

**Calendula officinalis*

Garden Marigold

Calocephalus lacteus

Milky Beauty-heads

**Cichorium intybus*

Chicory

**Cotula coronopifolia*

Water Buttons

**Cynara cardunculus*

Spanish Artichoke

Gnaphalium gymnocephalum *Eucalyptus collina* Creeping Cudweed

**Gnaphalium purpureum* *Gnaphalium purpureum* Purple Cudweed

**Hypochoeris radicata*

Cat's Ear

**Leontodon taraxacoides*

Hairy Hawkbit

Leptorhynchus squamatus

Scaly Buttons

Leptorhynchus tenuifolius

Wiry Buttons

**Picris echioides* *Helminthotheca echioides* Ox-tongue

Senecio quadridentatus

Cotton Fireweed

**Silybum marianum*

Variegated Thistle

Solenogyne dominii	Solenogyne
*Sonchus oleraceus	Milk Thistle
*Tragopogon porrifolius	Salsify

BORAGINACEAE

*Echium plantagineum	Paterson's Curse
*Plagiobothrys canescens	Valley Popcorn Flower

BRASSICACEAE

*Rapistrum rugosum	Giant Mustard
*Rorippa nasturtium-aquaticum	Two-row Bitter-cress

CALLITRICHACEAE

Callitriche brachycarpa	Short Water Starwort
*Callitriche stagnalis	Water Starwort

CAMPANULACEAE

Lobelia pratioides	Poison Lobelia
Wahlenbergia gracilentia	Annual Bluebell
Wahlenbergia luteola	Yellowish Bluebell

CARYOPHYLLACEAE

*Cerastium glomeratum	Common Mouse-ear Chickweed
*Silene gallica	French Catchfly

CLUSIACEAE

Hypericum gramineum	Small St. John's Wort
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CONVOLVULACEAE

Convolvulus erubescens	Pink Bindweed
Convolvulus remotus	Grassy Bindweed
Dichondra repens	Kidney-weed

CRASSULACEAE

Crassula sieberiana ssp. tetramera	Sieber Crassula
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CUSCUTACEAE

*Cuscuta epithymum	Common Dodder
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EUPHORBIACEAE

*Euphorbia lathyris	Caper Spurge
*Euphorbia peplus	Petty Spurge

FABACEAE

Bossiaea prostrata	Creeping Bossiaea
*Cytisus palmensis <i>Chamaecytisus palmensis</i>	Tree Lucerne
*Lotus corniculatus	Bird's-foot Trefoil
*Trifolium angustifolium	Narrow-leaf Clover
*Trifolium campestre	Hop Clover
*Trifolium dubium	Suckling Clover
*Trifolium repens	White Clover
*Trifolium striatum	Knotted Clover
*Ulex europaeus	Furze
*Vicia sativa	Common Vetch

GENTIANACEAE

*Centaurium erythraea	Common Centaury
*Centaurium tenuiflorum	Centaury
*Cicendia quadrangularis	Square Cicendia

GERANIACEAE

Geranium potentilloides	Cinquefoil
Geranium retrorsum	Grassland Crane's-bill

HALORAGACEAE

Gonocarpus tetragynus	Common Raspwort
Haloragis aspera	Rough Raspwort
Haloragis heterophylla	Varied Raspwort

LINACEAE

*Linum trigynum	French Flax
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LORANTHACEAE

Muellerina eucalyptoides	Creeping Mistletoe
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LYTHRACEAE

Lythrum hyssopifolia

Small Loosestrife

MALVACEAE

*Modiola caroliniana

Carolina Mallow

MIMOSACEAE

*Acacia longifolia var longifolia

Sallow Wattle

Acacia nearnsii

Black Wattle

Acacia melanoxylon

Blackwood

MYRTACEAE

Eucalyptus camaldulensis

River Red Gum

Kunzea ericoides

Burgan

ONAGRACEAE

*Epilobium ciliatum

Glandular Willow-herb

Epilobium hirtigerum

Hairy Willow-herb

OXALIDACEAE

Oxalis exilis

Shady Wood-sorrel

Oxalis radicata

Wood-sorrel

PITTOSPORACEAE

Bursaria spinosa subsp. ?

Sweet Bursaria

PLANTAGINACEAE

*Plantago coronopus

Buck's-horn Plantain

*Plantago lanceolata

Ribwort

Plantago gaudichaudii

Native Plantain

POLYGONACEAE

*Acetosella vulgaris

Sheep Sorrel

*Rumex conglomeratus

Clustered Dock

*Rumex crispus

Curled Dock

Rumex dumosus

Wiry Dock

RANUNCULACEAE

*Ranunculus muricatus

Sharp Buttercup

ROSACEAE

Acaena agnipila	Hairy Sheep's Burr
Acaena echinata	Sheep's Burr
Acaena ovina	Australian Sheep's Burr
*Rosa rubiginosa	Sweet Briar
*Rubus discolor	*Rubus sp. aff. cuneatus Blackberry

RUBIACEAE

Asperula conferta	Common Woodruff
Asperula scoparia	Prickly Woodruff
*Galium aparine	Cleavers
Galium sp.	Bedstraw

SALICACEAE

*Salix X rubens	Willow
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SCROPHULARIACEAE

Veronica gracilis	Slender Speedwell
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THYMELAEACEAE

Pimelea curviflora	Curved Rice-flower
Pimelea humilis	Common Rice-flower

VIOLACEAE

Hymenanthera dentata	Tree Violet
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Appendix 3 INDIVIDUAL QUADRATS RECORDED FOR THE DAVIDSON STREET SITE DECEMBER 1993.

QUADRAT D20035 35 SPECIES 140° 0' 0" 37° 0' 0" January 1994 100 m 10' GRID

106 1	<i>Acaena echinata</i>	146 1	<i>Elymus scabrus</i>
149 1	<i>Agrostis aenula</i>	151 +	<i>Agrostis avenacea</i>
153 +	* <i>Agrostis capillaris</i>	236 1	* <i>Anthoxanthum odoratum</i>
284 +	<i>Asperula scoparia</i>	495 +	* <i>Briza maxima</i>
496 +	* <i>Briza minor</i>	583 2	<i>Calocephalus lacteus</i>
642 +	<i>Carex inversa</i>	963 +	<i>Danthonia duttoniana</i>
967 +	<i>Danthonia laevis</i>	1033 +	<i>Dichelachne crinita</i>
1145 +	<i>Eleocharis pusilla</i>	1179 +	<i>Epilobium hirtigerum</i>
1579 1	<i>Haloragis aspera</i>	1692 1	* <i>Holcus lanatus</i>
1803 +	<i>Juncus amabilis</i>	1818 +	<i>Juncus flavidus</i>
1895 1	* <i>Leontodon taraxacoides</i>	2036 +	* <i>Lolium perenne</i>
2037 +	* <i>Lolium rigidum</i>	2092 +	<i>Lythrum hyssopifolia</i>
2476 1	* <i>Phalaris aquatica</i>	2511 +	* <i>Picris echioides</i>
2544 +	* <i>Plagiobothrys canescens</i>	2561 1	* <i>Plantago lanceolata</i>
2600 3	<i>Poa labillardieri</i>	2950 +	* <i>Rosa rubiginosa</i>
3039 +	<i>Schoenus apogon</i>	3266 1	<i>Stipa bigeniculata</i>
3387 1	<i>Themeda triandra</i>	3544 +	* <i>Vulpia bromoides</i>
3997 2	* <i>Nassella leucotricha</i>		

QUADRAT D20036 20 SPECIES 140° 0' 0" 37° 0' 0" January 1994 100 m 10' GRID

151 1	<i>Agrostis avenacea</i>	174 +	<i>Alisma plantago-aquatica</i>
208 2	<i>Amphibromus archeri</i>	297 +	* <i>Aster subulatus</i>
651 +	<i>Carex tereticaulis</i>	918 +	* <i>Cyperus eragrostis</i>
963 +	<i>Danthonia duttoniana</i>	1139 2	<i>Eleocharis acuta</i>
1692 +	* <i>Holcus lanatus</i>	1806 +	* <i>Juncus articulatus</i>
1818 1	<i>Juncus flavidus</i>	1821 +	<i>Juncus holoschoenus</i>
2092 +	<i>Lythrum hyssopifolia</i>	2430 2	* <i>Paspalum dilatatum</i>
2431 2	* <i>Paspalum distichum</i>	2640 +	* <i>Polypogon monspeliensis</i>
2969 +	* <i>Rumex conglomeratus</i>	2970 +	* <i>Rumex crispus</i>
3628 1	<i>Amphibromus nervosus</i>	4220 2	<i>Agrostis avenacea</i> var. <i>perennis</i>

QUADRAT D20037 35 SPECIES 140° 0' 0" 37° 0' 0" January 1994 100 m 10' GRID

106 +	<i>Acaena echinata</i>	107 +	<i>Acaena ovina</i>
151 1	<i>Agrostis avenacea</i>	153 +	* <i>Agrostis capillaris</i>
164 +	* <i>Aira caryophylla</i>	495 +	* <i>Briza maxima</i>

583 +	<i>Calocephalus lacteus</i>	702 1	* <i>Centaurium erythraea</i>
975 2	<i>Danthonia pilosa</i>	1033 1	<i>Dichelachne crinita</i>
1036 1	<i>Dichondra repens</i>	1239 2	<i>Eryngium ovium</i>
1466 1	<i>Gnaphalium gymnocephalum</i>	1470 +	* <i>Gnaphalium purpureum</i>
1584 1	<i>Haloragis heterophylla</i>	1748 1	* <i>Hypochoeris radicata</i>
1895 +	* <i>Leontodon taraxacoides</i>	1925 1	<i>Lepidosperma lineare</i>
2018 1	* <i>Linum trigynum</i>	2389 +	<i>Oxalis radicata</i>
2430 +	* <i>Paspalum dilatatum</i>	2553 1	* <i>Plantago coronopus</i>
2561 1	* <i>Plantago lanceolata</i>	3039 1	<i>Schoenus apogon</i>
3195 +	<i>Solenogyne dominii</i>	3265 +	<i>Stipa aristiglumis</i>
3266 +	<i>Stipa bigeniculata</i>	3290 2	<i>Stipa scabra</i>
3387 +	<i>Themeda triandra</i>	3421 +	<i>Tricoryne elatior</i>
3423 +	* <i>Trifolium angustifolium</i>	3506 +	<i>Veronica gracilis</i>
3544 +	* <i>Vulpia bromoides</i>	3555 +	<i>Wahlenbergia gracilentia</i>
3673 1	<i>Convolvulus remotus</i>		

QUADRAT D20038 33 SPECIES 140° 0' 0" 37° 0' 0" January 1994 100 m 10' GRID

149 +	<i>Agrostis aemula</i>	164 1	* <i>Aira caryophyllea</i>
284 +	<i>Asperula scoparia</i>	340 +	* <i>Avena barbata</i>
495 1	* <i>Briza maxima</i>	496 1	* <i>Briza minor</i>
702 1	* <i>Centaurium erythraea</i>	705 1	* <i>Centaurium tenuiflorum</i>
733 1	<i>Cheilanthes sieberi</i>	961 +	<i>Danthonia caespitosa</i>
1028 1	<i>Dianella longifolia</i>	1038 +	<i>Dichopogon strictus</i>
1239 1	<i>Eryngium ovium</i>	2404 +	<i>Panicum effusum</i>
2476 +	* <i>Phalaris aquatica</i>	2561 +	* <i>Plantago lanceolata</i>
2608 +	<i>Poa sieberiana</i>	2609 +	<i>Poa rodwayi</i>
2942 1	* <i>Romulea rosea</i>	2950 +	* <i>Rosa rubiginosa</i>
2966 +	* <i>Acetosella vulgaris</i>	2972 +	<i>Rumex dumosus</i>
3039 1	<i>Schoenus apogon</i>	3151 +	* <i>Silene gallica</i>
3266 +	<i>Stipa bigeniculata</i>	3270 1	<i>Stipa curticaoma</i>
3387 4	<i>Themeda triandra</i>	3421 1	<i>Tricoryne elatior</i>
3427 +	* <i>Trifolium dubium</i>	3544 1	* <i>Vulpia bromoides</i>
3673 +	<i>Convolvulus remotus</i>	4059 +	<i>Wahlenbergia luteola</i>
4337 +	<i>Crassula sieberiana</i> ssp. <i>tetramera</i>		

Appendix 4. SUMMARY OF MANAGEMENT RECOMMENDATIONS

PROTECTION OF CONSERVATION VALUES

Vegetation

- set the following long-term objectives:

1. Maintain the site as a viable grassland reserve for conservation of flora and fauna species in situ.
2. Maintain the genetic diversity and populations of rare or threatened species.
3. Maintain conservation values to provide a source of plant material for use in restoration and revegetation works, education and promotional activities.
4. Provide opportunities for public education and passive recreation related to native grasslands.

- Clearly define the use of the reserve.
- Commit resources to ensure follow-up management.
- That the reserve be managed in a manner that allows for the use of the seed resource available without compromise of other values.

Fauna

- Control predation by introduced predators
- Maintain and enhance habitat values.

Weed control

- Initiate active management of weed invasion:
 - Minimizing soil disturbance.
 - Prioritizing management of weeds present giving highest priority to invasive species.
 - Ensuring primary focus of management is initially given to containing further spread and invasion of these species.
 - Preventing further introduction of weeds to the reserve via mowing machinery or management activities.
 - Preventing the dumping of garden rubbish.
 - Promoting active management of disturbed areas using revegetation techniques to encourage healthy competition by indigenous species.

Fire control

- Maintain fire breaks.
- Mowing should be avoided. If unavoidable, slash is to be removed and Front Deck mowers used instead of Tractor/slathers.
- Burning must be carried out within sound ecological guidelines. The use of a mosaic approach being adopted in developing a burning regime.
- Burnt sites are to be actively monitored.

Access Control

- Regular rubbish removal and generally keeping the public view of the reserve clean.
- Exclude vehicular access to the site.
- Avoid maintenance vehicular access to areas of the site when soils are moist.

Landscape and amenity values

- Re-establish trees and shrubs on disturbed areas where deemed appropriate.
- Remove of overhead power-lines.
- Execute major revegetation works along Central Creek to restore function and associated vegetation allowing for treatment of urban runoff.

Education and interpretation

- Prepare leaflets and other interpretative information in local community languages to promote and highlight the special qualities of the reserve.
- Establish regular consultation with the local community to inform them of management issues and to seek their support eg. control burning, vehicular access, rubbish dumping.
- Carry out information days with interpreters present to improve level of communication between various language groups and parties.

- Encourage the establishment of a local friends group to assist in management of the reserve and provide a "local Neighbourhood watch" function with regard to vandalism and other disturbing processes.
- Signpost the site as a reserve.

Development options

- Restructure the subdivision proposal in reference to road access network and residential allotments
- Review the status of the proposed recreation reserve.
- Maintain the linear nature of the reserve and effective management buffers to protect overall integrity of the grassland.
- Establish and enforce stringent guidelines and close supervision of road construction work and building.
- Construct a boundary fence along the northern and eastern edges of the grassland reserve prior to start of construction work and brief work crews as to their purpose..
- Preserve surface drainage patterns.
- Prevent human induced impacts.