SCHOOL BUSHLAND

PILOT SURVEY

by

Katherine Candy

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INTRODUCTION

Bushland can be defined as "land on which there is vegetation which is either a remainder of the natural vegetation of the land, or, if altered, is still representative of the structure and floristics of the natural vegetation, and provides the necessary habitat for native fauna" (Urban Bushland Policy, 1993; p.6).

The urban bushland of Western Australia has 'outstanding national heritage values,' which include nature conservation, scientific, intrinsic, social, economic, recreational, aesthetic and educational (Urban Bushland Council, 1995; p.4). In spite of this however, urban bushland in Perth and regional towns face many problems, and loss of bushland can result from urban development, lack of awareness of its value and state-wide management, degradation due to weeds, fire, dieback, feral animals and inappropriate land-use. This loss of bushland can be linked to both man-made and natural stresses. The former include clearing (since European settlement), vandalism, prescribed burning and recreation, while the latter include drought, seasonal variations in climate, fire and flooding. The increasing loss of bushland has many important implications including removal of protection from valuable topsoil ruining the aesthetics of many areas and also reducing wildlife habitats (Candy, 1998; Ministry of Education, 1989; Urban Bushland Council, 1995).

Although many problems such as weeds, rubbish dumping, fire and erosion are caused directly or indirectly by humans, they can also learn to manage and promote these very valuable areas of bushland. This is likely to prove most effective if commenced at an early age within the schools. In many cases bushland on schools sites being the only remaining remnants of the 'pre-European habitats', represent the only 'natural' habitats in urban areas. It is therefore very important to protect and manage any bushland which has been retained on school sites, so that it will continue to survive and regenerate, as a valuable resource for both educational and scientific purposes. It has been previously recommended that total planning and recognition of bushland as an educational resource will 'add diversity to urban areas.' Education can be seen to play a key role in promoting the ecological values of urban bushland. The retention of bushland on school sites will therefore provide many benefits including passive recreation and educational resources (Ministry of Education, 1989; Urban Bush Strategy, 1995).

The aim of this project was to set up a pilot survey to:

1) Establish a standard set of survey/assessment techniques to document bushland in schools from across the south-west of Western Australia.
2) Assess and document the following using the standard recording procedures:
   - the presence of bushland in schools in selected local government areas,
   - the area and condition of school bushland,
   - the use of the bushland resource in the school program.

CLIMATE, LANDFORMS & SOILS OF THE STUDY AREA

The Mediterranean climate of southwestern Australia is characterised by hot dry summers and cool wet winters. The amount of rainfall received varies, and tends to decrease from the Darling Scarp inland, resulting in a variation in vegetation reflecting conditions such as moisture availability. The shires located in the Perth metropolitan area can be classified as dry Mediterranean (5-6 dry months), while the Albany Shire can be classified as moderate Mediterranean (3-4 dry months) (Beard, 1981; Candy, 1998).

The geomorphology of Western Australia has been strongly influenced by climate in addition to tectonic and lithological controls. The geological framework of the state is largely comprised of the Yilgarn, Pilbara and Kimberley blocks, which controlled much of its geomorphological evolution (Wyrwoll, 1992).

Perth Area

The Yilgarn Block one of the oldest landforms in the world, is comprised largely of granite and gneissic rocks with its western margin defined by the Darling Fault, and the Perth Basin located further to the west. This basin is of more recent origin and it has undergone a series of changes such as the rising and lowering of sea levels, ultimately resulting in the production of the Swan Coastal Plain (Candy, 1998; McConnell *et al.*, 1993; Seddon, 1972).

The Swan Coastal Plain is approximately 30 km wide and stretches from just north of the Moore River extending south to Bunbury. This Plain is bounded to the east by the Darling and Gingin Scarps and to the west by the Indian Ocean. The eastern side consists of clay plains alternating with sandy stretches, while the western side is comprised of a series of sand ridges. The Swan Coastal Plain has been regionalised into five geomorphic units; these include the Foothills, Pinjarra Plain, Quindalup, Spearwood and Bassendean Dunes (DEP, 1998; McArthur & Bettenay, 1960; Pilgrim, 1979; Rippey & Rowland, 1995).

The Quindalup Dune System runs along the coast of the Swan Coastal Plain, varying in width up to 10 km, and is composed of loose sand consisting of sea shell fragments and quartz grains. Tamala limestone and Becher Sand can also be found within this dune system. This system also varies topographically from a low relief to steep aeolian highlands, and contains many landforms, such as parabolic dunes or blowouts (Rippey & Rowland, 1995; Semeniuk *et al.*, 1989).

The Spearwood Dune System lies inland of the Quindalup Dunes and the soils are yellow-brown in colour, less leached than the Bassendean Dunes, and consist of slightly calcareous aeolian sand remnants due to the leaching of the underlying limestone (Candy, 1998; Davidson, 1995).

The Bassendean Dunes are the oldest, most easterly and most extensive, consisting of low vegetated hills of quartz sand occurring in a 15 km wide belt, interspersed with many interdunal lakes and swamps. The soils are extremely leached, and podzolized white quartz sand with accumulations of iron and organic matter in the B horizon are present (Beard, 1981; Candy, 1998; Pilgrim, 1979).

The Pinjarra Plain lies on the east of the Swan Coastal Plain and rises gently to the east to meet the Foothills. The alluvial soils are primarily clays and silts and the plain is seasonally inundated (DEP, 1998).

The Gingin and Darling Scarps rise sharply from the coastal plain to the continental plateau and represent the eastern edge of a marine denudation plain formed in Late Tertiary or Quaternary time. The Darling Scarp extends from Muchea to Donnybrook, and geologically marks the change between the ancient granitic rocks of the Yilgarn Block to the east, and the more recent sedimentary deposits to the west (Pilgrim, 1979).

Albany Area

Albany and the surrounding region consisting of the Albany unit, is defined by Beard as the 'Albany Slopes'. This area is found to consist of a plain which rises gradually from the coast and levels off further inland. It rises from 69m above sea-level at the Albany airport to Mt Barker at 254m. Beyond this point the plain is gently undulating, however above the plain rise many isolated granite bosses and the imposing peaks of the Stirling Range. Below the plain, entrenched valleys of the numerous short rivers draining to the south coast are found, and on the coastal margin of the plain, sand dunes have been built up and have confined many swamps and sea inlets on their land-ward side (Beard, 1981).

Along the coast the granite bosses are fairly small but very abundant. They have been exposed by dissection of the country and seldom exceed 200m in height. Two of these Mt Clarence and Mt Melville dominate the town of Albany, rising to bare smooth rounded domes of rock. Much of the coastline is dominated by granite bosses forming headlands with embayments in lower country between them. The further inland the higher and larger the outcrops become, for example the Porongurup Range 670m (Beard, 1981).

On the higher plateau, level neutral yellow mottled soils containing ironstone gravels are found, which become more acid on the slopes towards the coast. On the lower slopes and swampy plains, sandy neutral soils predominate with leached sands. In the Porongurup Range and other granite bosses, there are shallow loamy soils, with red earths in pockets and in these areas Karri is present (Beard, 1981).

VEGETATION

Vegetation is 'an integral part of the landscape in which it occurs' (Havel, 1979, p.134) and is shaped by the landscape, climate, topography and soil conditions at that locality. Therefore in terms of understanding vegetation, physiography, landforms and soils are important and have been used by Speck (1958) and Beard (1959a) to classify the vegetation systems. It has been found that the vegetation types are a good guide to the soils, for example *Banksia* spp., *Eucalyptus marginata* (Jarrah) and *Allocasuarina fraseriana* (She-oak) woodlands indicate 'less fertile soils' (siliceous sands), while *Eucalyptus wandoo* and *Eucalyptus calophylla* (Marri) (to a lesser extent) indicate more fertile soils (lateritic podzolic soils and soloths). It is noted that in general Western Australian soils are extremely poor as a result of extensive weathering and leaching periods, and low phosphorus levels (Beard, 1981; Havel, 1979).

The relationship between vegetation and environment has also been demonstrated by Diels (1906; cited in Havel, 1979; p.127); for example, an association of She-oak with sandy soils, Marri with moist and relatively fertile soils, *Banksia littoralis* and *Melaleuca preissiana* with swamps, and *Banksia attenuata* and *B.menziesii* with sands. Wandoo, however, has been associated with heavy textured soils underlain by clay, which alternate between being dry in summer and wet in winter. Smaller genera such as *Petrophile* and *Isopogon* have been associated with dry gravels, while *Agonis, Boronia*, and *Astartea* are associated with swamps (Candy 1998; Havel, 1979).

In the Spearwood and Bassendean Dune Systems of the coastal plain, the two main determinants of the vegetation patterns are the degree of leaching and availability of moisture, while on the plateau, the main factor influencing the vegetation is topography. The main vegetation types found in each system include Jarrah/Banksia woodland (Spearwood) Jarrah/Casuarina/Banksia woodland (Bassendean) and Jarrah/Marri forest (Darling) (Beard, 1981; DEP, 1998).

The Pinjarra Plain has very little of its original vegetation left, as a result of its fertile soils suited to agriculture. On the better drained soils the original cover was Marri woodland with some Wandoo, Jarrah (on higher ground) and Flooded Gum (*Eucalyptus rudis*) in the wetter parts. The swampy sections however supported low woodland or forest of *Melaleuca rhaphiophylla*, thickets of *Melaleuca preissiana* or sedgeland. The Foothills are characterised by forest of Jarrah and Marri mixed with Wandoo on heavier gravelly soils and *Casuarina fraseriana* on the sandier soils. The streams within this system support a fringing woodland of *Melaleuca preissiana* and Flooded Gum (Beard, 1981).

The vegetation of the Albany region is varied and includes Jarrah forest on duricrusted plateau and on loam soils of valleys, and Marri-Wandoo woodlands on drier laterite-free soils. (The understoreys are similar to Karri Forest Subregion).

The Jarrah forest is the most characteristic formation within the region followed by Marri and Wandoo woodlands. Jarrah is found in pure strands on laterite, but it is joined by Marri where there is more 'superficial' soil. On shallow poorly drained soils Jarrah declines to form low forest and woodland, which become common in the south and south east of the region between the drainage of the Blackwood River and south coast rivers, and on the plain between Mt Barker and Albany. These poorer areas are usually a mosaic of Jarrah forest with poor trees and lower stands with thinner and more crowded stems, and more *Casuarina fraseriana. Casuarina fraseriana* also becomes more common on bleached (deep white) sands, (mixes with *Eucalyptus staeri* where this overlies laterite) and can become a pure stand on deep sand (Beard, 1990).

SURVEY PROCEDURES

Establishing the Study Sites

In order to set up the pilot survey three local government areas were selected for survey - Albany, Kwinana and Serpentine/Jarrahdale. These three areas were selected to encompass the range of urban development densities in the south-west.

To identify the schools in each municipality it was firstly necessary to contact the Education Districts. To determine whether the schools had any remaining bushland the Panairama CD (Perth & Environs 1997) was viewed and then each school site was visited. A survey sheet was designed to record the main vegetation types, assess the condition of the bush and disturbances, as well as the schools' use, management and attitude towards the bushland (Appendix A).

Education Districts

The Education District Offices (Cannington, Fremantle, Albany and Office of Non Government Education) provided all the necessary contact details such as the School Principal, Address, Phone and Fax Numbers (Appendix B).

Survey Sheet

The design of the survey sheet involved modification both before and after use, and it was designed to incorporate various details including date, recorders, school name, location, map reference and site map. Included as well was the overall plant community, including major species found, its condition, and any disturbances which may or may not have impacted upon the bushland. The condition of the bush was assessed according to Keighery's (1994) scale defined in Appendix A. Disturbances recorded included weed presence and cover, rubbish presence and type, signs of fire and years since fire, presence of tracks and animal impact. A completed example of the sheets used is found in Appendix A.

The individual layers and percentage cover of the plant community were recorded for each school, using Keighery's (1994) vegetation structure and cover sheet, however a full vegetation description using the 'Structural Classification table' (adapted from Muir and Aplin) was not considered necessary in this pilot survey.

School Bushland Assessment

The area and condition of bushland and disturbances at each school site was recorded using the assessment scale on the survey sheet, and interviews were conducted with the school principal or another staff member to document school usage, management and future use. A guiding schedule of questions was prepared for use at each school, however some of these were found to be not applicable at certain sites (Appendix A).

Municipalities and Schools Surveyed

Schools within a total of three localities were surveyed including two within the Perth Metropolitan area and one in the country. The two metropolitan municipalities chosen were Kwinana and Serpentine/Jarrahdale, while that chosen in the country was Albany. Within the Kwinana, Serpentine/Jarrahdale, and Albany municipalities a total of nine, seven and thirteen schools were found respectively.

Town of Kwinana

The nine schools in this municipality included seven government and two private schools. The seven government schools were Calista Primary, Hope Valley Primary, Kwinana Senior High, Leda Primary, Medina Primary, North Parmelia Primary and Orelia Primary. The two private schools were El Shaddai College and St Vincent's. Of these nine schools, only five had any bushland, and these consequently were surveyed, and the Principal or staff member interviewed.

Shire of Serpentine/Jarrahdale

The seven schools found within this municipality included only one private school, Byford John Calvin, while the government schools included Byford Primary, Jarrahdale Primary, Marri Grove Primary, Mundijong Primary, Serpentine Primary. A seventh government school Oakford no longer exists. As a total of only three schools in this municipality were deemed to have any bushland, these three were all that were surveyed.

Shire of Albany

Of the thirteen schools in and around the town of Albany, seven were government and six were private. The government schools included Albany Primary, Albany Senior High, Flinders Park Primary, Mount Lockyer Primary, North Albany Senior High, Spencer Park Primary and Yakamia Primary. The six private schools included Albany SDA, Bethel Christian, Great Southern Grammar, John Calvin, Parklands and St Josephs College. A total of five schools were surveyed in this municipality, as these were the only ones deemed to have any bushland.

Limitations & Constraints

The limitations and constraints on this survey included the time of the year the surveys were required to be conducted. The bushland surveys were carried out in January, February and March, when the majority of species are not flowering and therefore species identification was more difficult. One other difficulty was estimating the area of the bushland on the ground and so the aerial photographs (printed from the Panairama CD's – Perth & Environs 1998 and Great Southern 1996-98) were used, and the areas were then converted into hectares.

On completion of the pilot survey modification of the survey sheet was found to be necessary, substituting an updated version of Keighery's vegetation structure and cover recording sheet with less height classes, more details of rubbish dumping and tracks, and deletion or alteration of some survey questions.

RESULTS

Standard Survey Procedures

The standard survey procedures used in each municipality included contacting the District Education Offices, viewing the aerial photos, contacting the schools, interviewing School Principals and examination of school bushland sites.

Description School Bushland Identified

The area and condition of bushland varied from school to school and different localities. The types of bushland found also varied and included Jarrah/Marri forest, Jarrah/Banksia woodland and Jarrah/*Allocasuarina*/Banksia woodland (Appendix B). Overall 61% (8/13), of the schools were interested in retaining the bush, while 15% (2/3) were semi interested and 5 (38%) said they would not clear the bushland if the school needed to expand.

Town of Kwinana

A total of five schools were surveyed in this municipality and 60% (3) were interested in retaining the bush, while one (20%) was semi interested. The schools which had the largest amount of bushland were North Parmelia Primary, Kwinana Senior High, and Orelia Primary, while Calista and Medina had the least (Table 1). The condition of the bushland also varied from good (4) to degraded (5) (Table 1).

Table 1: School Bushland in Town of Kwinana.

SCHOOL	TYPE	BUSHLAND	AREA (ha)	CONDITION
Calista Primary	Government	Yes	0.40	Good-Completely Degraded
El Shaddai College	Private	Yes	N/A	N/A
Hope Valley Primary	Government	Nil	N/A	N/A
Kwinana Senior High	Government	Yes	4.12	Good-Degraded
LedaPrimary	Government	Nil	N/A	N/A
Medina Primary	Government	Yes	0.35	Degraded-Completely Degraded
North Parmelia Primary	Government	Yes	5.04	Good-Degraded
Orelia Primary	Government	Yes	2.76	Good-Degraded
St Vincents	Private	Nil	N/A	N/A

School Name: North Parmelia Primary

Address: Durrant Ave, PARMELIA 6167

Phone Number: (08) 9419 1489

Area of Bushland: This school has the largest area of bushland (5.04 ha) within the Kwinana Municipality. The bushland is located around the school and oval and is irregular in shape.

Vegetation type: Jarrah/Banksia/*Allocasuarina* woodland.

Condition: 4 to 5: Good to Degraded condition.

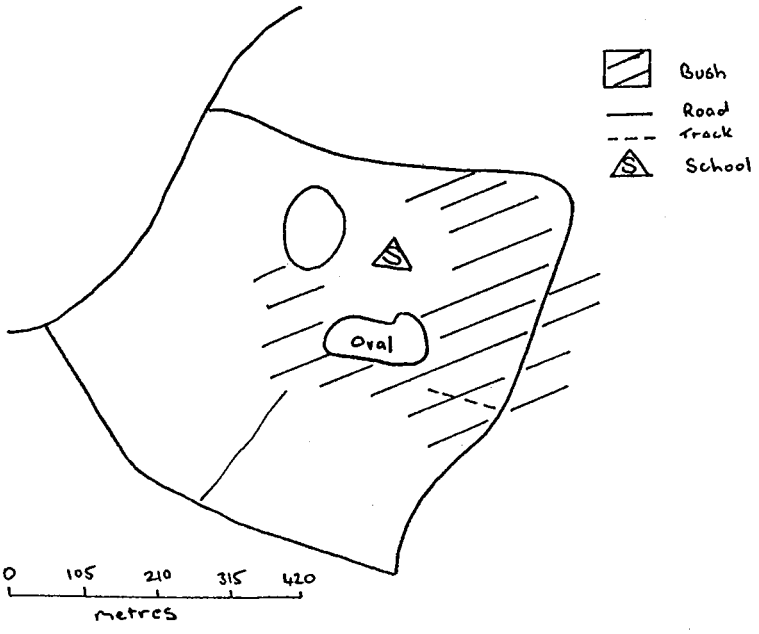
Disturbance: The major disturbances included weeds, fire and rubbish dumping. The major weed species present were veldt grass (*Ehrharta calycina)* and gladiolus (*Gladiolus caryophyllaceus*), while the majority of the rubbish dumped was food wrappers and drink containers.

Use of Bushland: Two teachers have taken students out into the bush for nature lessons, and once a year the whole school participates in Clean-up Australia day.

Management of Bushland: The local fire brigade burns the bush approximately every year.

Bushland Retention/Management: It was evident from the interview that the School Principal and two other teachers were interested in the bushland. The Principal has been approached by the Green Team (organised by Environmental Branch Kwinana Town Council) and hopes to start propagation, as well as worm farming. Although he doesn't intend to expand the school, some of the bushland which is owned by Homeswest may go, as it has been set aside for the rail link. The school has also suffered from some vandalism, however this has not deterred them from preserving the bush.

Site Sketch:



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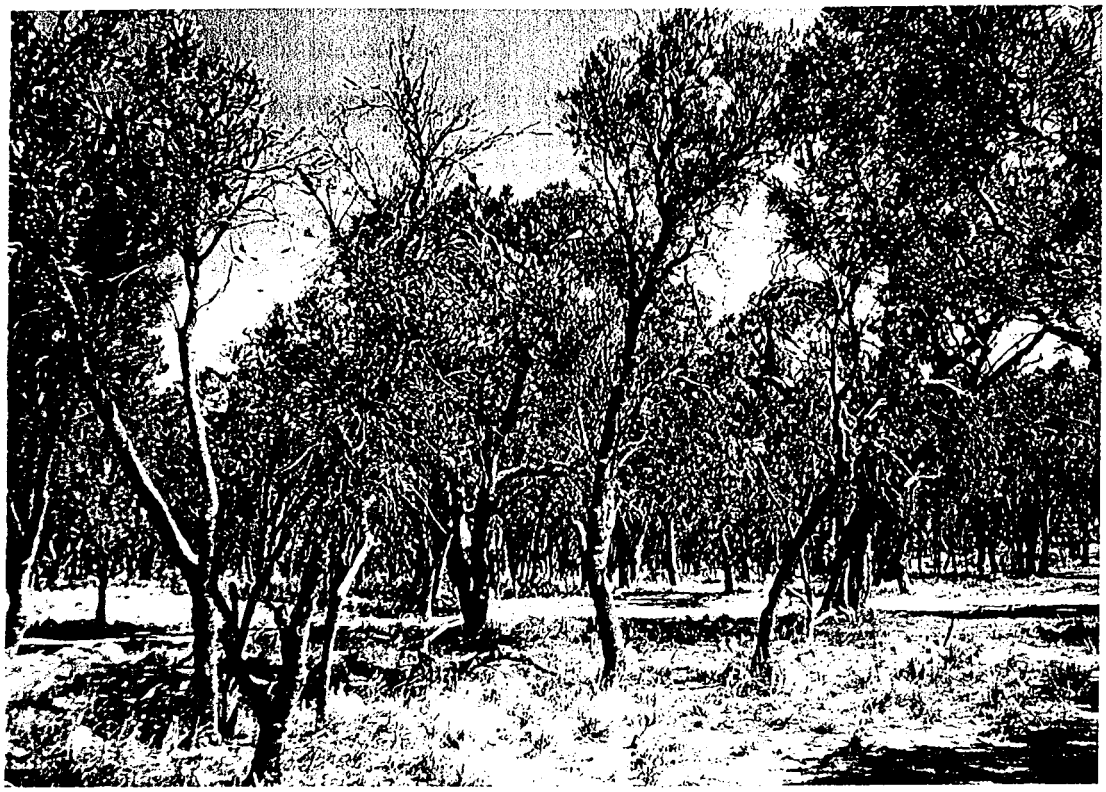


PLATE 1: The bushland surrounding North Parmelia is characterised by Jarrah, Banksia and *Allocasuarina* trees.

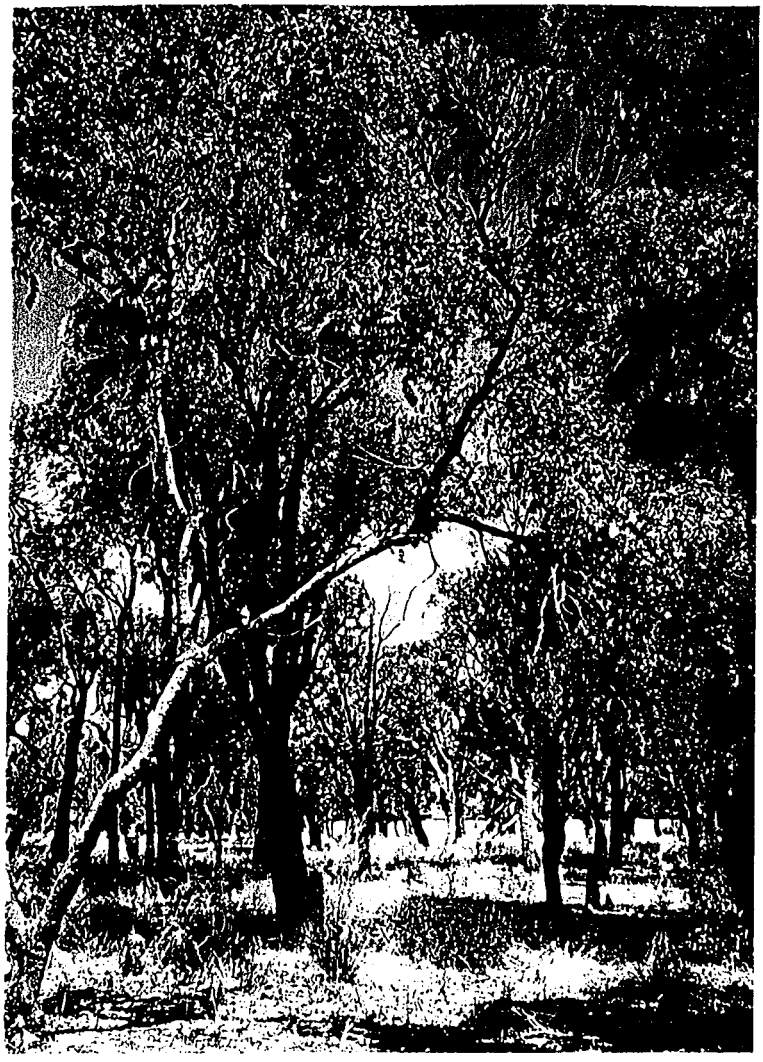


PLATE 2: The understorey is characterised by *Jacksonia*, *Xanthorrhoeas* and veldt grass.

School Name: Kwinana Senior High

Address: Gilmore Ave, KWINANA 6167

Phone Number: (08) 9419 2666

Area of Bushland: The bushland around this school is approximately 4.12 ha and one section (belt) between Kwinana Senior High and Orelia Primary is jointly owned. The bushland borders the school ovals.

Vegetation type: Jarrah/Banksia woodland to open woodland.

Condition: 4 to 5: Good to Degraded condition.

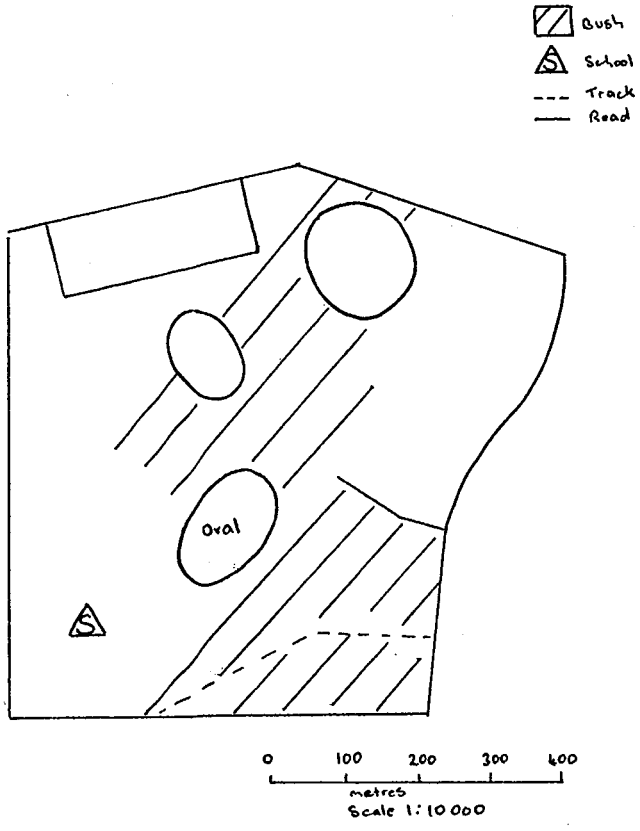
Disturbance: A fire has recently been through and as a result many weed species such as veldt grass are present in large proportions and there is little understorey. The other major disturbances included rubbish dumping (such as food wrappers and drink containers) and multiple sand tracks.

Use of Bushland: The bushland around this school is used for cross-country, access to Orelia oval for hockey training and cooking classes.

Management of Bushland: N/A

Bushland Retention/Management: One staff member who is a member of the Green Team showed an interest in the bushland. There was also an interest from this staff member and one other to name plaque the vegetation.

Site Sketch:



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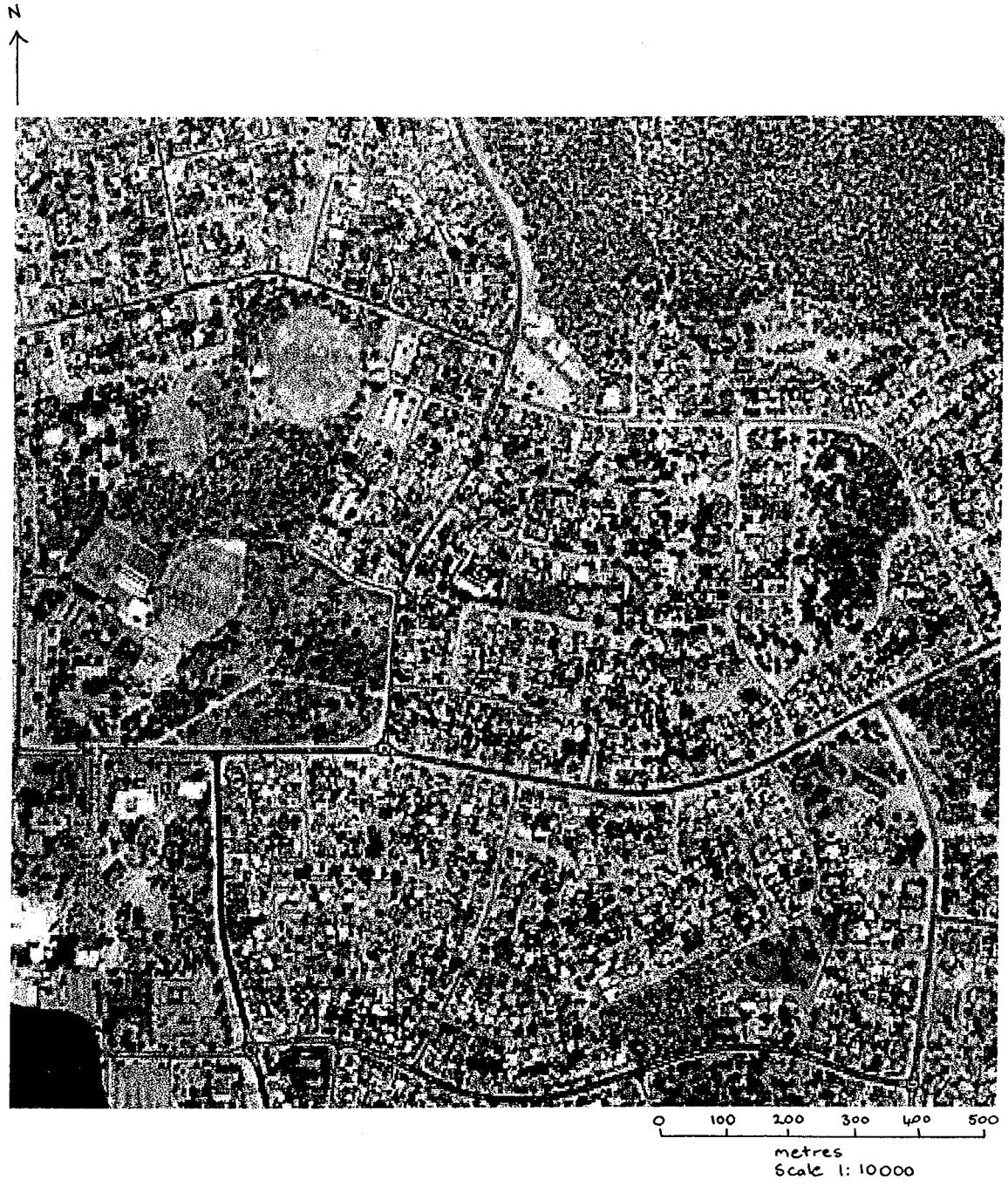


PLATE 3: The bushland surrounding Kwinana is characterised by Jarrah, Banksia and a few Tuart trees.

PLATE 4: The understorey is characterised by *Jacksonia*, *Xanthorrhoeas* and veldt grass.

School Name: Orelia Primary

Address: Bolton Way, ORELIA 6167

Phone Number: (08) 9419 1293

Area of Bushland: The bushland around this school is also common to Kwinana Senior High, with a belt between the two schools being jointly owned. The bushland area around Orelia is approximately 2.76ha in size.

Vegetation type: Jarrah/Banksia woodland to open woodland.

Condition: 4 to 5: Good to Degraded condition.

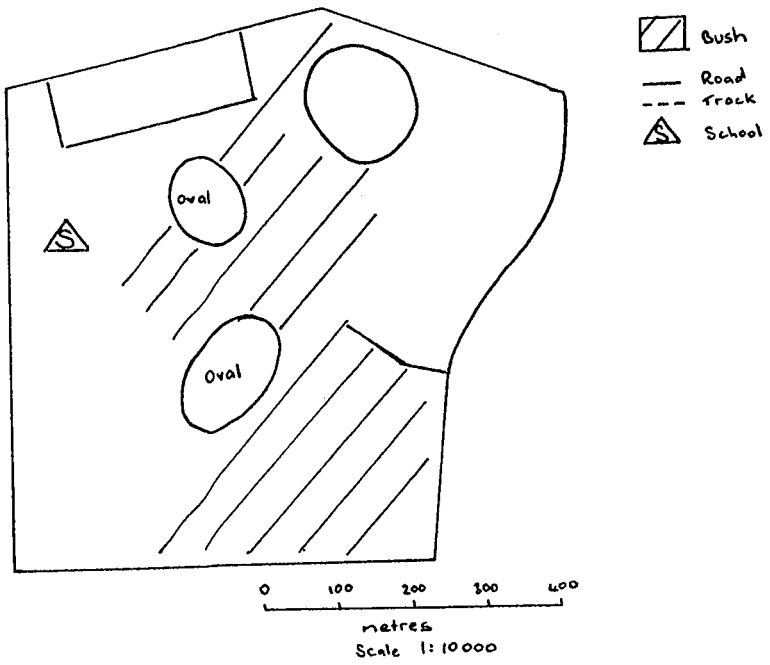
Disturbance: The bush around both schools has been frequently vandalised and set on fire.

Use of Bushland: The children at Orelia Primary do not use the bush anymore, except for cross-country once a year and occasionally for nature walks.

Management of Bushland: N/A

Bushland Retention/Management: The bushland is seen as dangerous due to dumped syringes, loiterers, motorbikes/trailbikes, public thoroughfare and snakes. As a result the interest in the bushland has decreased and now there is an emphasis on information technology. The bushland around the school may be used for a middle school one day, however there is no money for it and there probably will not be any in the future. Selling a few blocks has also been contemplated however it was pointed out that they would not be worth much, as there is an oversupply of land in the area. It was suggested that some community sheds ie Little Athletics may be built instead, but these would mainly be on developed sections and not on the bushland.

Site Sketch:



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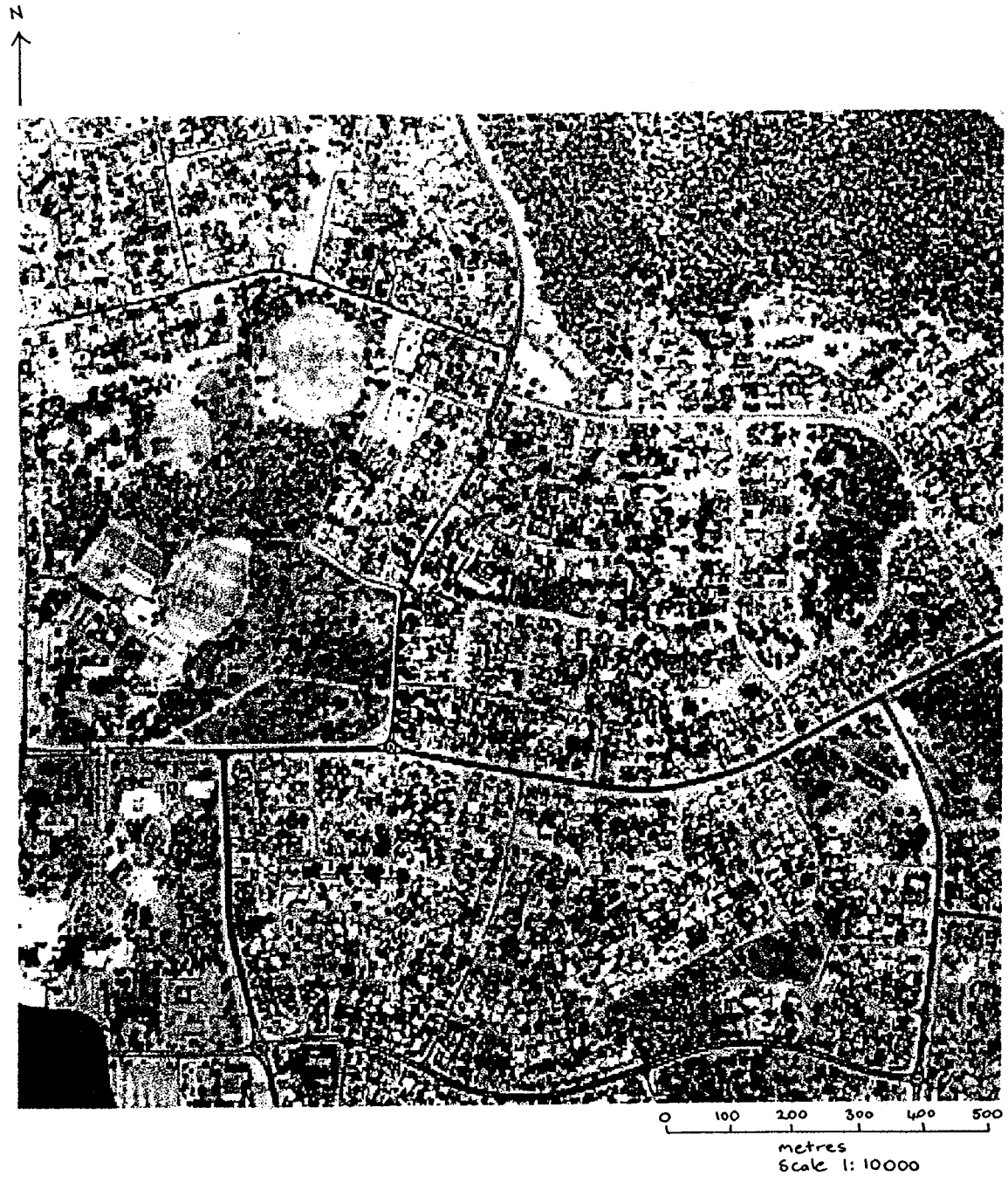


PLATE 5: The bushland surrounding Orelia Primary has recently been burnt and is characterised by many Banksia trees.

PLATE 6: Another view of the bushland surrounding the schools' oval.

School Name: Calista Primary

Address: Chilcott St, CALISTA 6167

Phone Number: (08) 9419 2355

Area of Bushland: The majority of the bushland around the school is located around the oval and overall is approximately 0.4 ha in size. There are however two other significant areas which are classified as parkland and not bushland.

Vegetation type: Jarrah/Banksia woodland.

Condition: 4 to 6: Good to Completely Degraded condition.

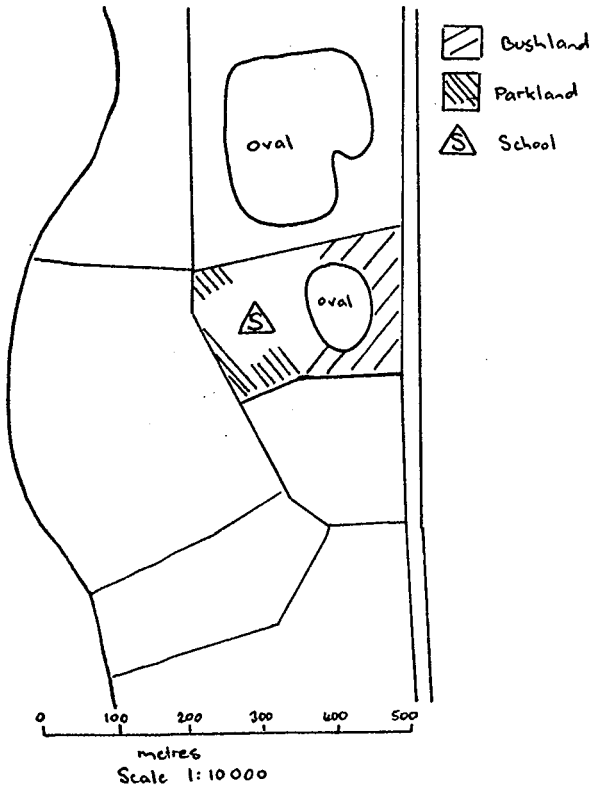
Disturbance: The major disturbances include weeds such as veldt grass, fire (within a year), rubbish dumping (glass, food wrappers, garden) and timber cutting.

Use of Bushland: One of the parkland areas is used for some class experiments. The children have also been taken to The Spectacles wetlands and the local drain to conduct water monitoring tests by one teacher and a CALM representative.

Management of Bushland: Reticulation and tree limbs lopped in one area.

Bushland Retention/Management: The bushland will be kept.

Site Sketch:



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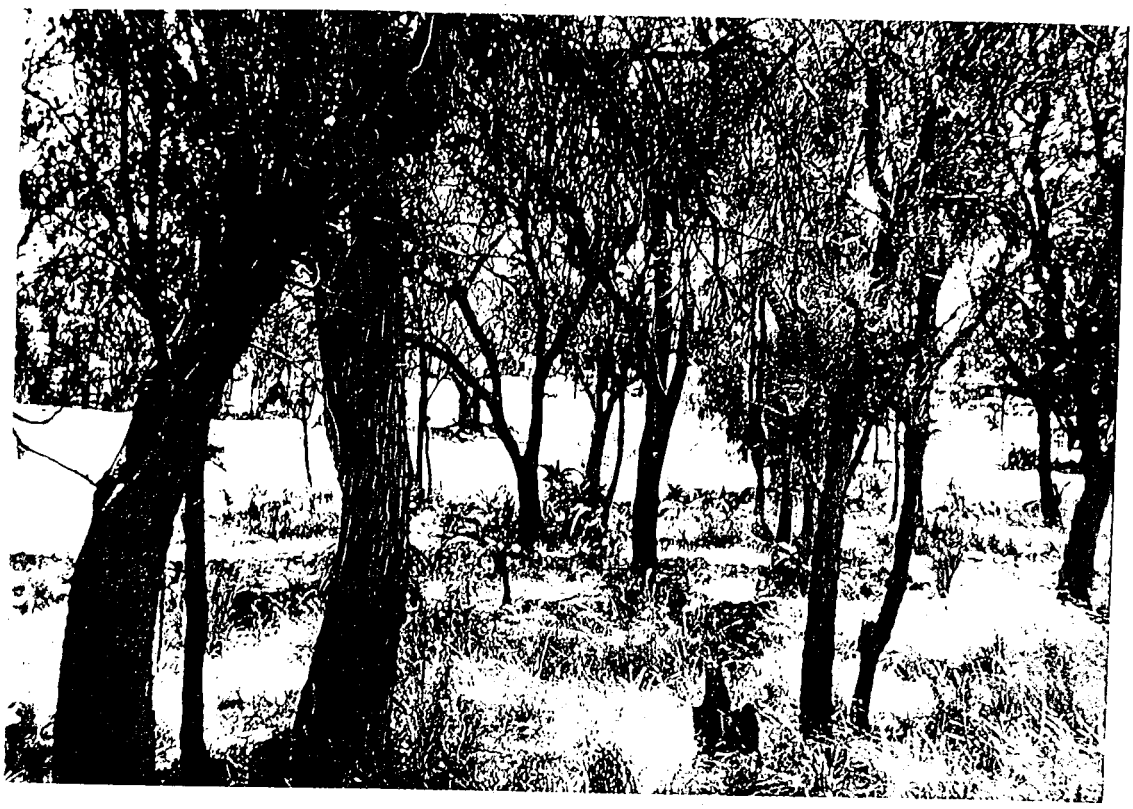

PLATE 7: The bushland bordering the oval at Calista is characterised by Jarrah and Banksia trees.

PLATE 8: A Parkland area showing a nice stand of Marri trees with a grass understorey which is reticulated.

School Name: Medina Primary

Address: Medina Ave, MEDINA 6167

Phone Number: (08) 9419 2633

Area of Bushland: There is little bushland left around this school and is approximately 0.35 ha in size.

Vegetation type: Jarrah/Banksia open woodland

Condition: 5 to 6: Degraded to Completely Degraded condition.

Disturbance: The major disturbances include fire, rubbish dumping (glass and clippings), weeds (veldt grass), sand tracks, timber cutting and soil removal.

Use of Bushland: The bushland is used for cross-country and archaeological classes.

Management of Bushland: The bush is burnt every two years by the local fire brigade.

Bushland Retention/Management: The bushland will never be used in the near future as the school has already shrunk from being the District High School before Kwinana Senior High was built.

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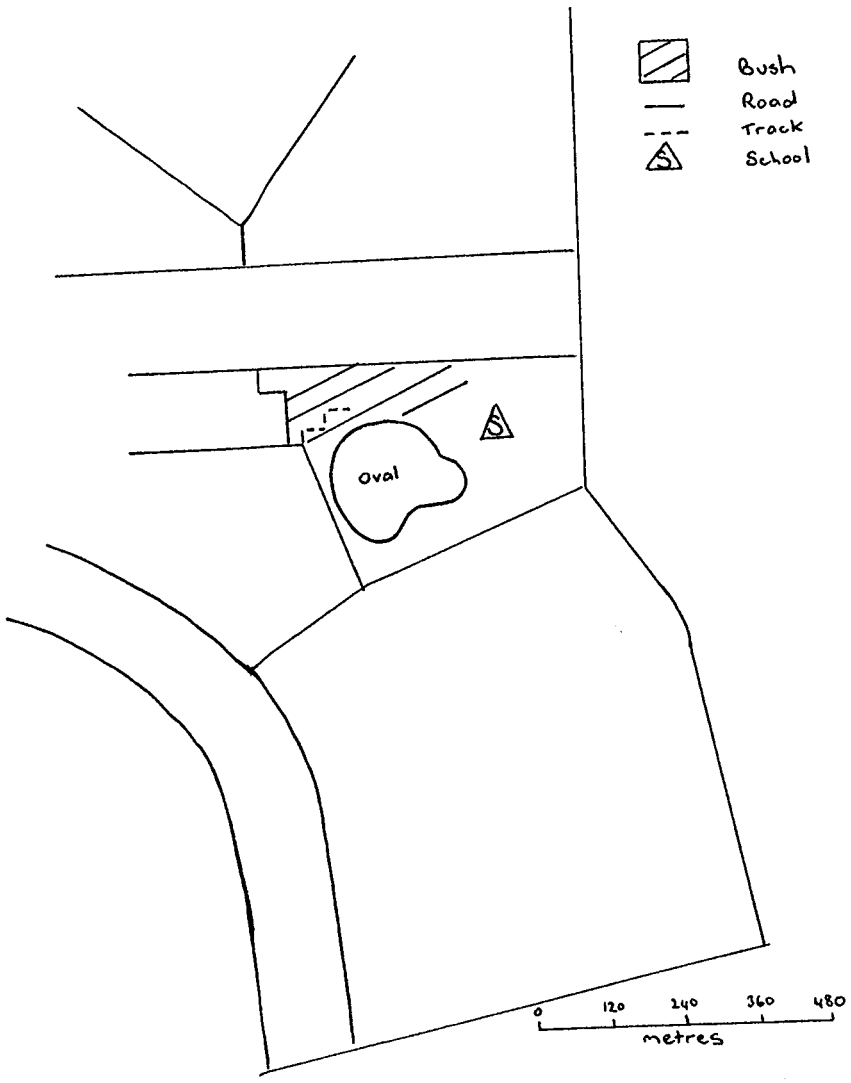

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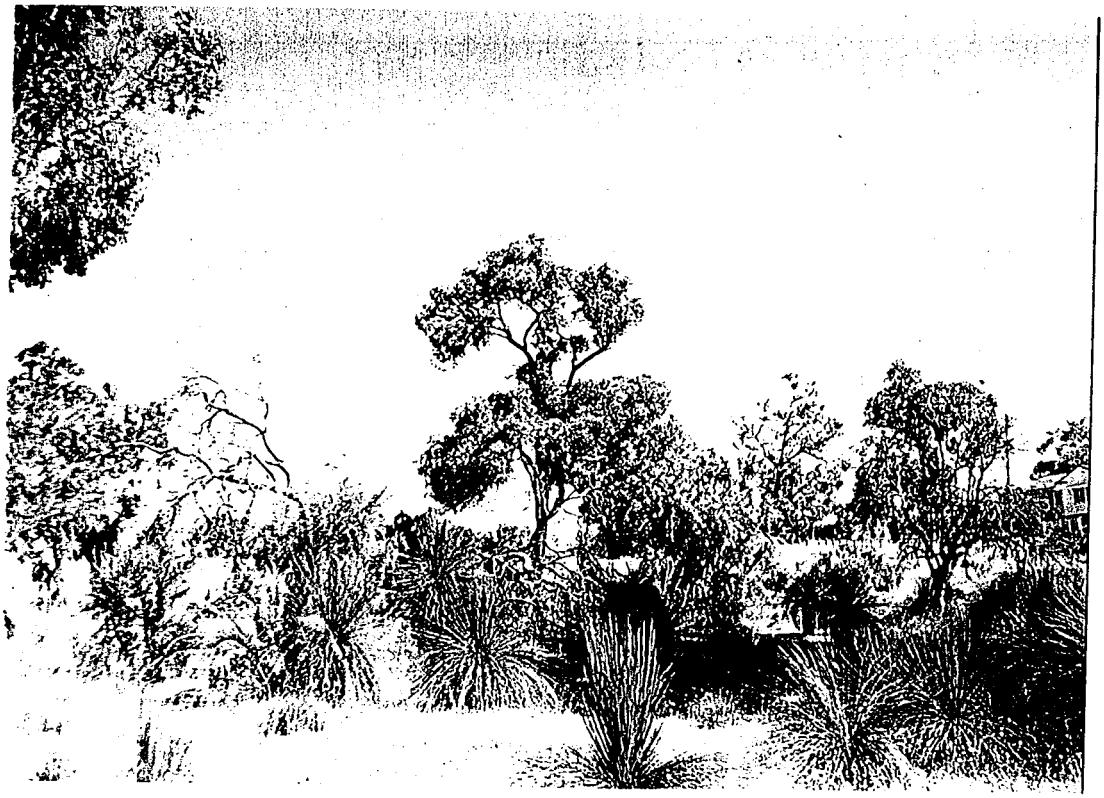


PLATE 9: The small bushland area at Medina has lots of *Xanthorrhoeas* and *Jacksonias*.

Shire of Serpentine/Jarrahdale

Within this municipality a total of three schools were surveyed, with 66.7% (2) interested in retaining the bush. There was little bush within this area, however Mundijong Primary had the largest amount and the condition of bushland ranged from excellent (2) to completely degraded (6) (Table 2).

Table 2: School Bushland in Shire of Serpentine/Jarrahdale

SCHOOL	TYPE	BUSHLAND	AREA (ha)	CONDITION
Byford John Calvin	Private	Nil	N/A	N/A
Byford Primary	Government	Nil	N/A	N/A
Jarrahdale Primary	Government	Yes	0.12	Good-Degraded
Marri Grove Primary	Government	Nil	N/A	N/A
Mundijong Primary	Government	Yes	0.27	Excellent-Good
Oakford Primary	Government	Nil	N/A	N/A
Serpentine Primary	Government	Yes (Little)	0.06	Completely Degraded

School Name: Mundijong Primary

Address: Livesey St MUNDIJONG 6202

Phone Number: (08) 9525 5118

Area of Bushland: There are two small areas of bushland totalling 0.27 ha, one of which has been roped off with pine bollards and is oval in shape and the other is bounded by a fence and is rectangular in shape.

Vegetation type: Jarrah/*Allocasuarina*/Banksia open woodland.

Condition: 2 to 4: Excellent to Good condition.

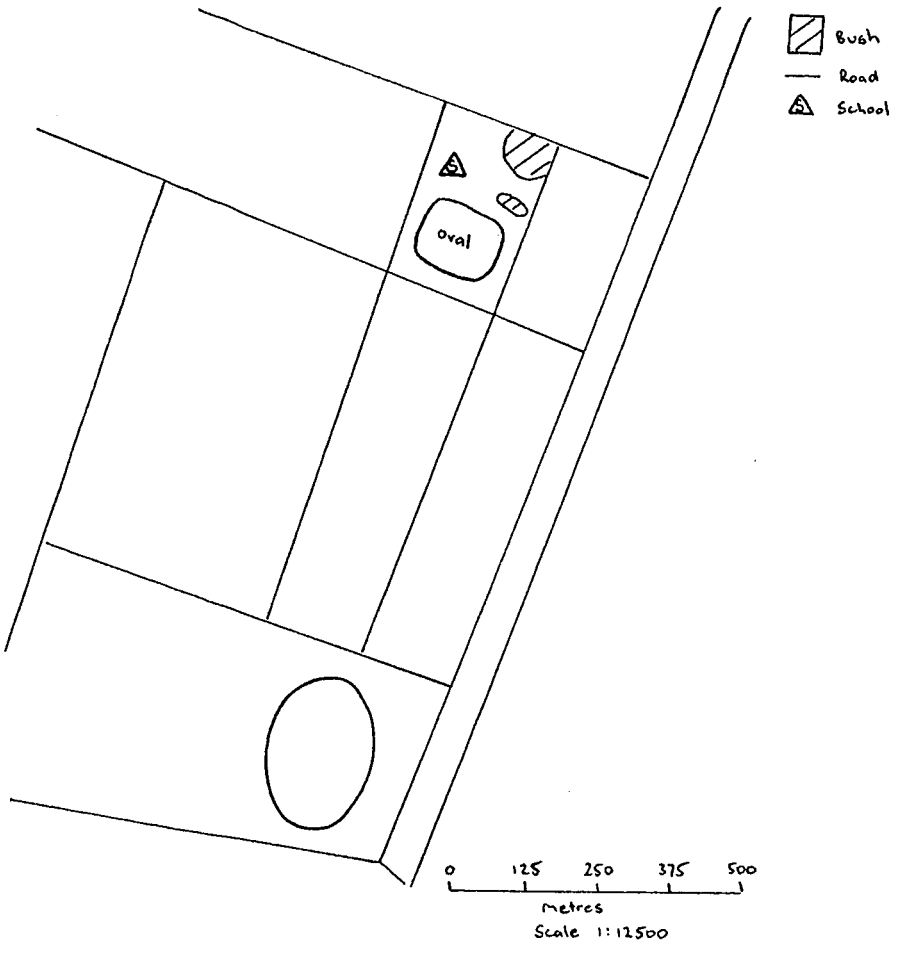
Disturbance: The major disturbances included weeds such as veldt grass, blowfly grass (*Briza maxima*) and woody pear (*Xylomelum occidentale*). There has been little to no rubbish dumping along the road edge as the P&C has put up a fence.

Use of Bushland: The area has been set aside as a nature strip.

Management of Bushland: One area has been roped off with pine bollards and rope.

Bushland Retention/Management: They are interested in placing name plaques on the native vegetation in the roped off area. This area is to be kept and has been made into a nature strip. The children are not allowed to play in the bush because of dangers such as glass and snakes.

Site Sketch:



Aerial Photo:

PLATE 10: The bushland area that has been protected by pine bollards and rope.

PLATE 11: Another small area of bushland that borders the road is characterised by Banksia and *Allocasuarina* trees.

School Name: Jarrahdale Primary

Address: Wanliss St JARRAHDALE 6203

Phone Number: (08) 9525 5157

Area of Bushland: Most of the bushland surrounding Jarrahdale Primary is CALM land and as a result little belongs to the school itself. This small area situated behind the school is approximately 0.12 ha in size and is rectangular.

Vegetation type: Marri/Banksia woodland.

Condition: 4 to 5: Good to Degraded condition.

Disturbance: The major disturbances include fire, weeds, timber cutting, and rubbish such as broken glass and tiles. Little rubbish however has been dumped since a rubbish dump was established on the other side of town and CALM cleaned up the area about 18 months ago.

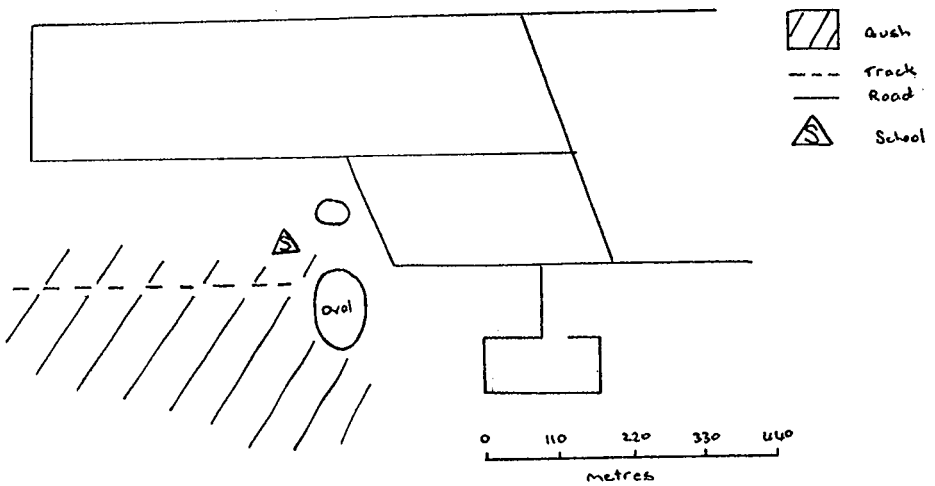
Use of Bushland: The bushland is used for cross-country where the children run around the back of the school, through the bush and around the oval. The children are not allowed behind the school without the teachers, and so the teachers often take them there.

Management of Bushland: The local fire brigade burns the bush behind the school every year to prevent a fire hazard, and the leaves are often raked up. A mixture of non-native trees and shrubs have been planted around the school, which have been donated by Alcoa and the local municipality.

Bushland Retention/Management:

Jarrahdale Primary is interested in retaining the bush, and has been involved in a number of offsite projects. For example they have been involved in Ribbons of Blue where the water quality at Whitebridge creek is monitored and trees and shrubs have been planted at Langford. Once a year they are also involved with the Boardwalk at Blue rocks (Albany Hwy 7km out, Acacia Rd).

Site Sketch:



Aerial Photo:

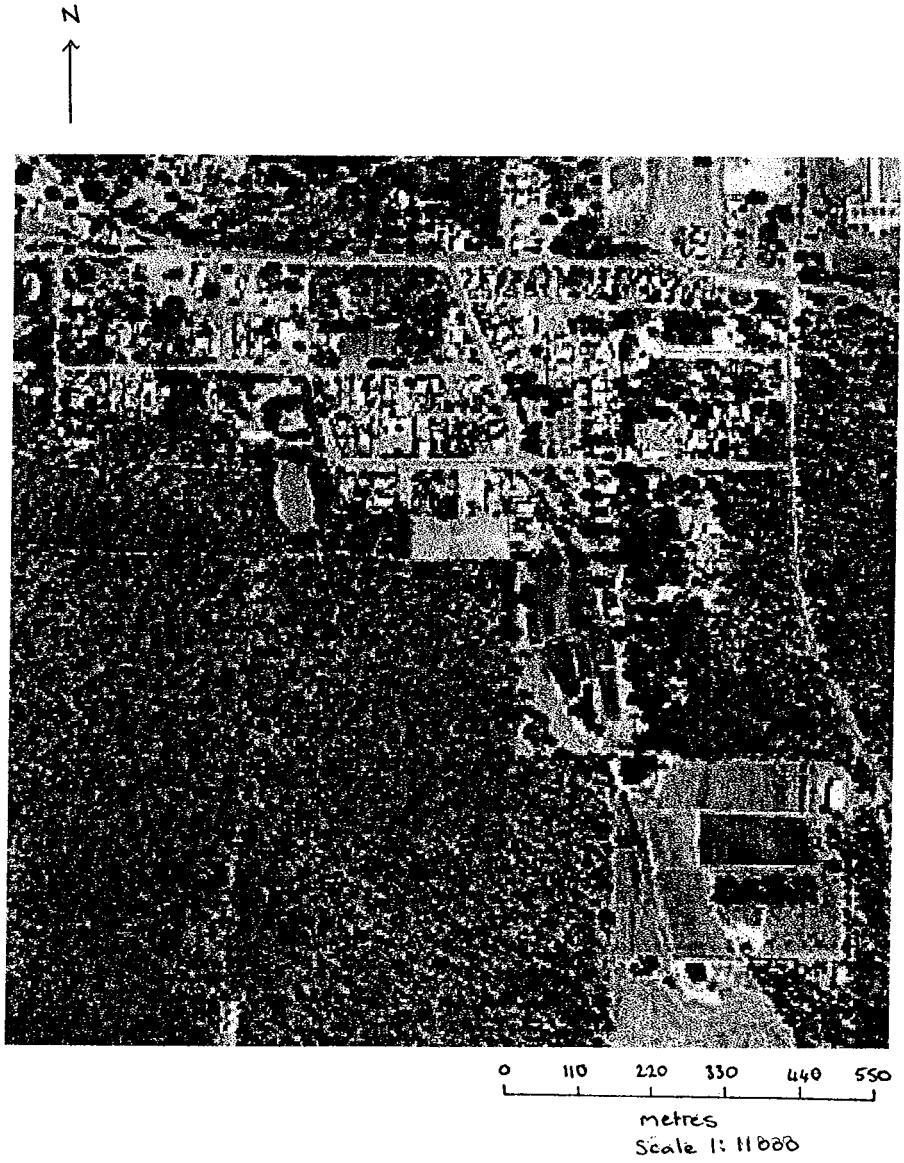


PLATE 12: A section of the bush behind the school is characterised by Banksias and *Xanthorrhoeas.*

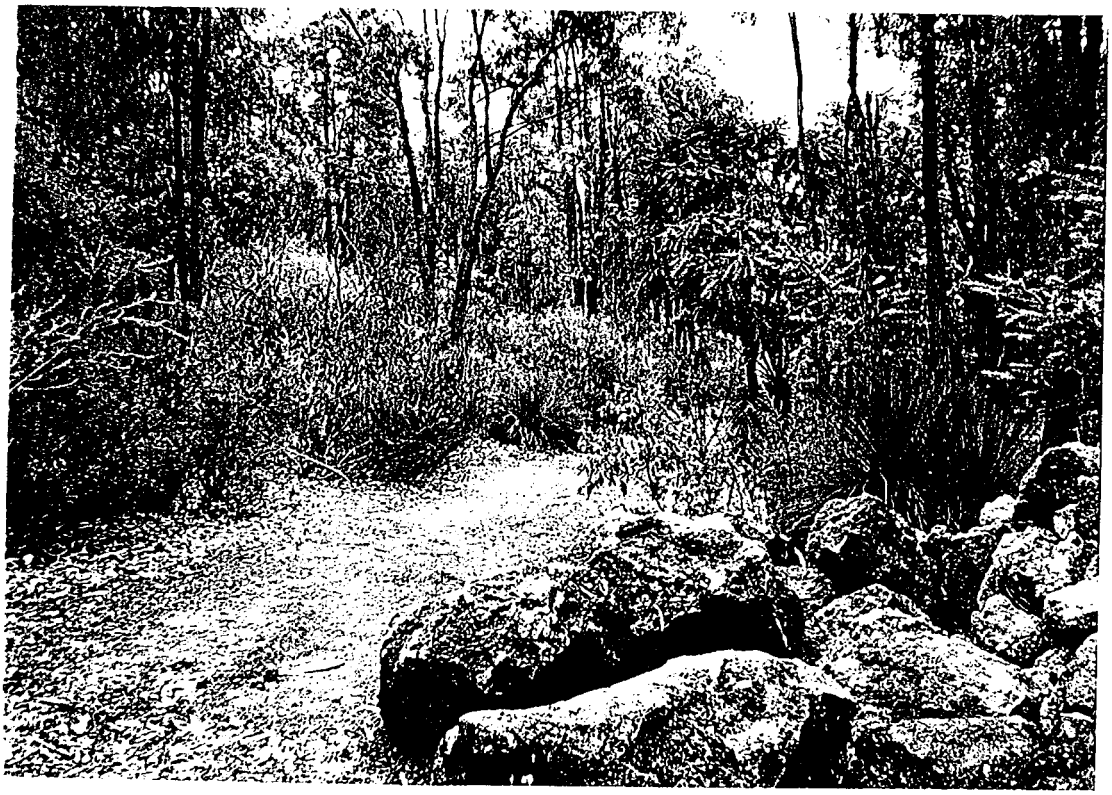


PLATE 13: The track that divides the bushland behind the school from the State forest.

School Name: Serpentine Primary

Address: Lefroy St SERPENTINE 6205

Phone Number: (08) 9525 2257

Area of Bushland: There is little to no remnant bushland left around this school and one small remaining area is approximately 0.06 ha in size. There is however a nice stand of Marri trees (*Eucalyptus calophylla)* which are surrounded by blue metal gravel carpark.

Vegetation type: Marri very open woodland.

Condition: 6: Completely degraded condition.

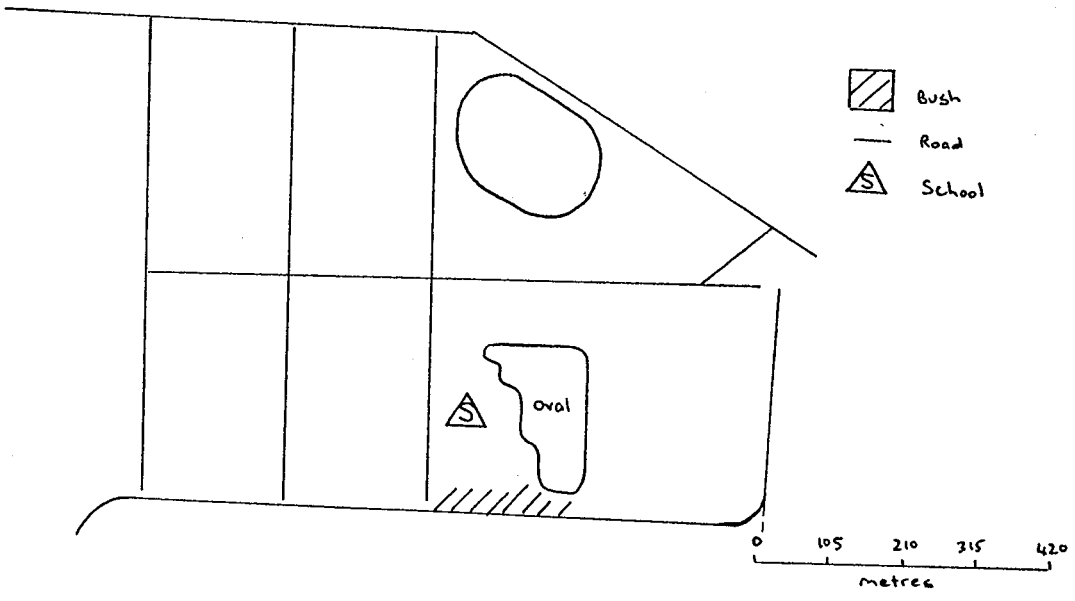
Disturbance: The major disturbances include clearing, weeds, fire, rubbish dumping and enrichment plantings.

Use of Bushland: N/A

Management of Bushland: Nil.

Bushland Retention/Management: Not interested.

Site Sketch:



Aerial Photo:

PLATE 14: The small bushland area is characterised by some remnant Marri trees with little understorey.

PLATE 15: A stand of remnant Marri trees above the carpark.

Shire of Albany

Out of the five schools surveyed 80% (4) were interested in retaining the bush and Albany Senior High had the largest amount of bushland (Table 3). The condition of school bushland ranged from excellent (2) to completely degraded (6) (Table 3).

Table 3: School Bushland in Shire of Albany.

SCHOOL	TYPE	BUSHLAND	AREA (ha)	CONDITION
Albany Primary	Government	Nil - few trees	N/A	N/A
Albany SDA	Private	Some	N/A	N/A
Albany Senior High	Government	Yes	6.13	Excellent-Very Good
Bethel Christian	Private	Nil - few trees	N/A	N/A
Flinders Park Primary	Government	Yes	1.75	Very Good-Degraded
Great Southern Grammar	Private	Nil - few trees	N/A	N/A
John Calvin	Private	Nil - few trees	N/A	N/A
Mount Lockyer	Government	Nil	N/A	N/A
North Albany Senior High	Government	Yes	0.31	Good-Degraded
Parklands	Private	Nil - few trees	N/A	N/A
Spencer Park Primary	Government	Nil - few trees	N/A	N/A
St Josephs College	Private	Yes	0.75	Very Good-Degraded
Yakamia Primary	Government	Yes (Little)	0.31	Degraded-Completely Degraded

School Name: Albany Senior High

Address: Burt St, ALBANY 6330

Phone Number: (08) 9841 2411

Area of Bushland: There are two bushland areas – natural bush and pine plantation. The approximate area of the natural bush is 6.125 ha.

Vegetation type: Jarrah/Marri/*Allocasuarina*

Condition: 2 to 3: Excellent to Very Good condition.

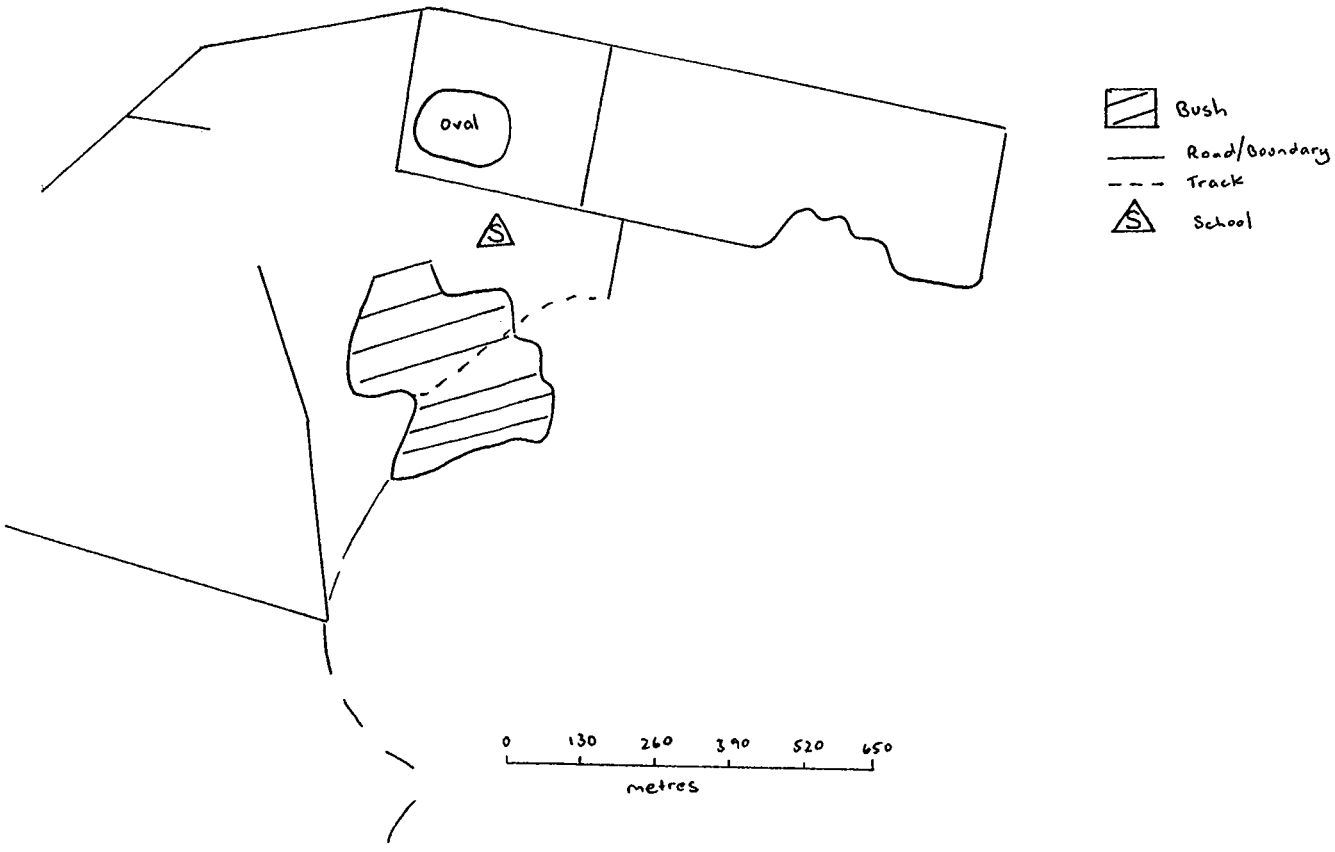
Disturbance: The major disturbances include fire, rubbish dumping (chip packet, glass, cardboard, washing machine), sand tracks, timber cutting and pine plantation.

Use of Bushland: The bushland is used for biology classes and cross-country.

Management of Bushland: The Fire Brigade burns it every year and they have a clean up day once a year.

Bushland Retention/Management: The school has no intention to develop the natural bushland area, however the Education Department would like to put a Primary School & District office in the pine plantation area.

Site Sketch:



Aerial Photo:

PLATE 16: An example of the tracks that exist in the bushland behind Albany High.

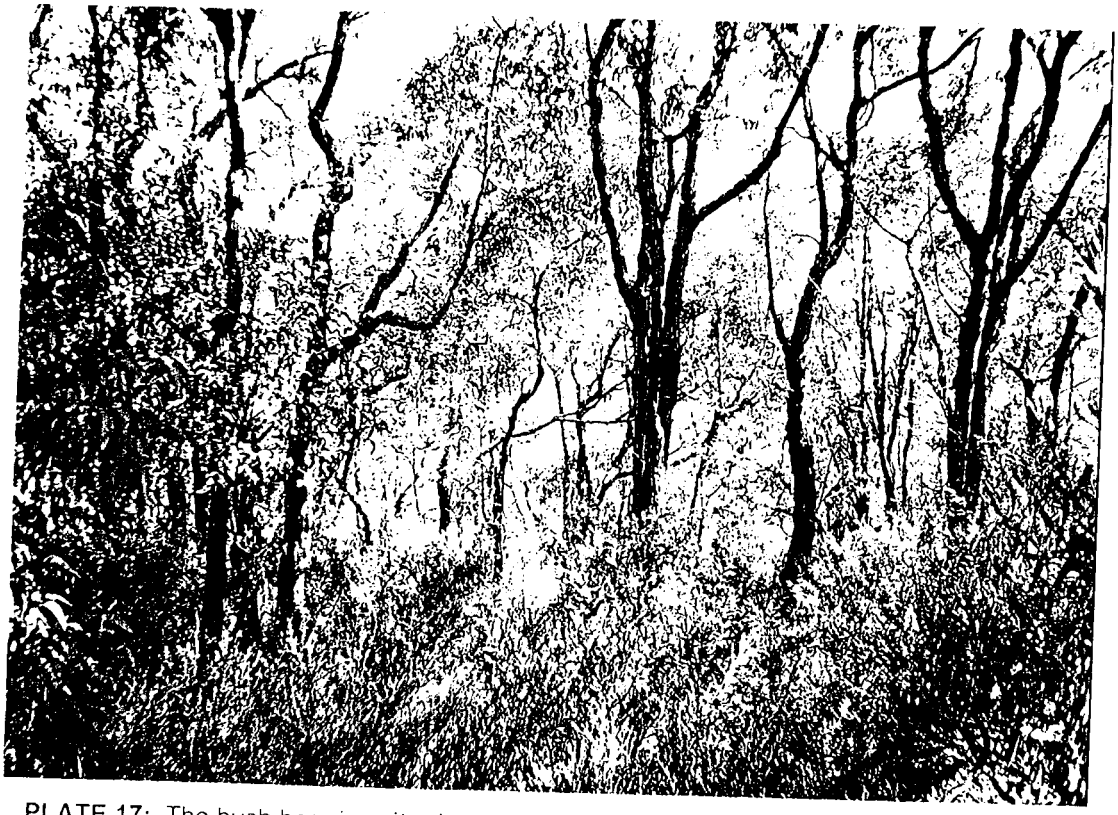


PLATE 17: The bush here is quite dense and is characterised by Jarrah trees.

School Name: Flinders Park Primary

Address: Yatana Rd, ALBANY 6330

Phone Number: (08) 9844 7200

Area of Bushland: The bushland surrounding the school and oval is approximately 1.75 ha. There is also a lot of bush on private land behind the back fence, however a road has been gazetted to go through that bushland.

Vegetation type: Banksia/*Allocasuarina*/*Eucalyptus* woodland.

Condition: 3 to 5: Very Good to Degraded condition.

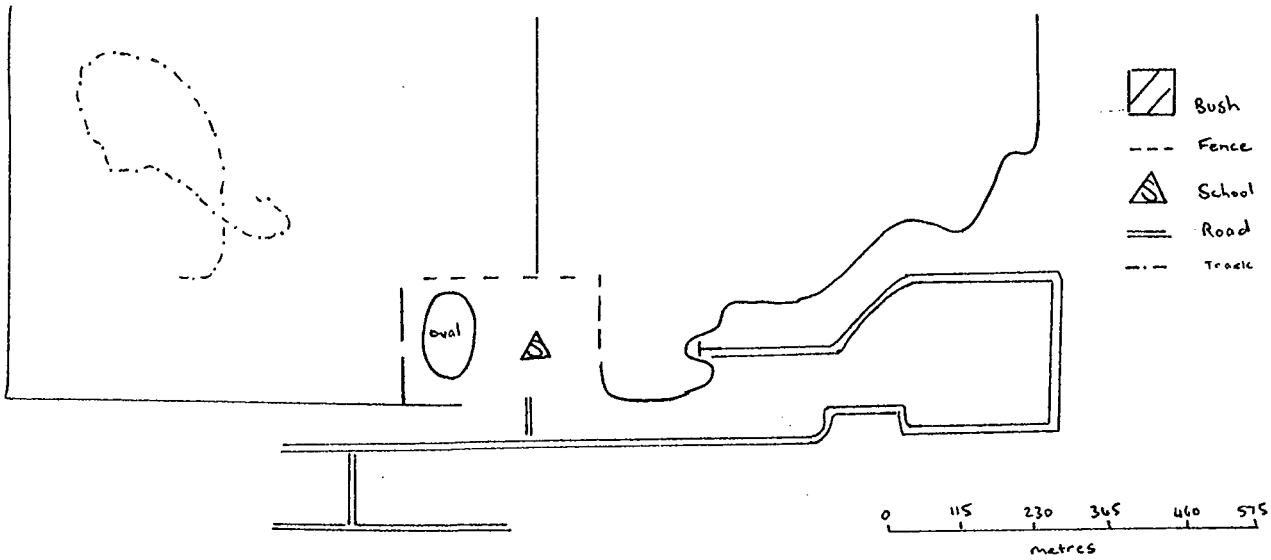
Disturbance: The disturbances include animal impact (kangaroos, rabbits), weeds (Pelargonium, Dandelions (*Taraxacum*), and Blowfly grass (*Briza*)), rubbish dumping (milk cartons, tyres), sand tracks, timber cutting and soil dumping.

Use of Bushland: The children play in the bushland areas where there are lots of she-oaks (*Allocasuarinas*) and little undergrowth. They are also taken on nature walks by some of the teachers.

Management of Bushland: The gardener goes through the bush and does a 'scrub and clean up', and checks for rubbish.

Bushland Retention/Management: If new buildings were required the school would generally want to build buildings where there is no bush. There is however a proposed driveway through some of the bushland, however it will have little impact (ie a few trees will be lost).

Site Sketch:



Aerial Photo:

N

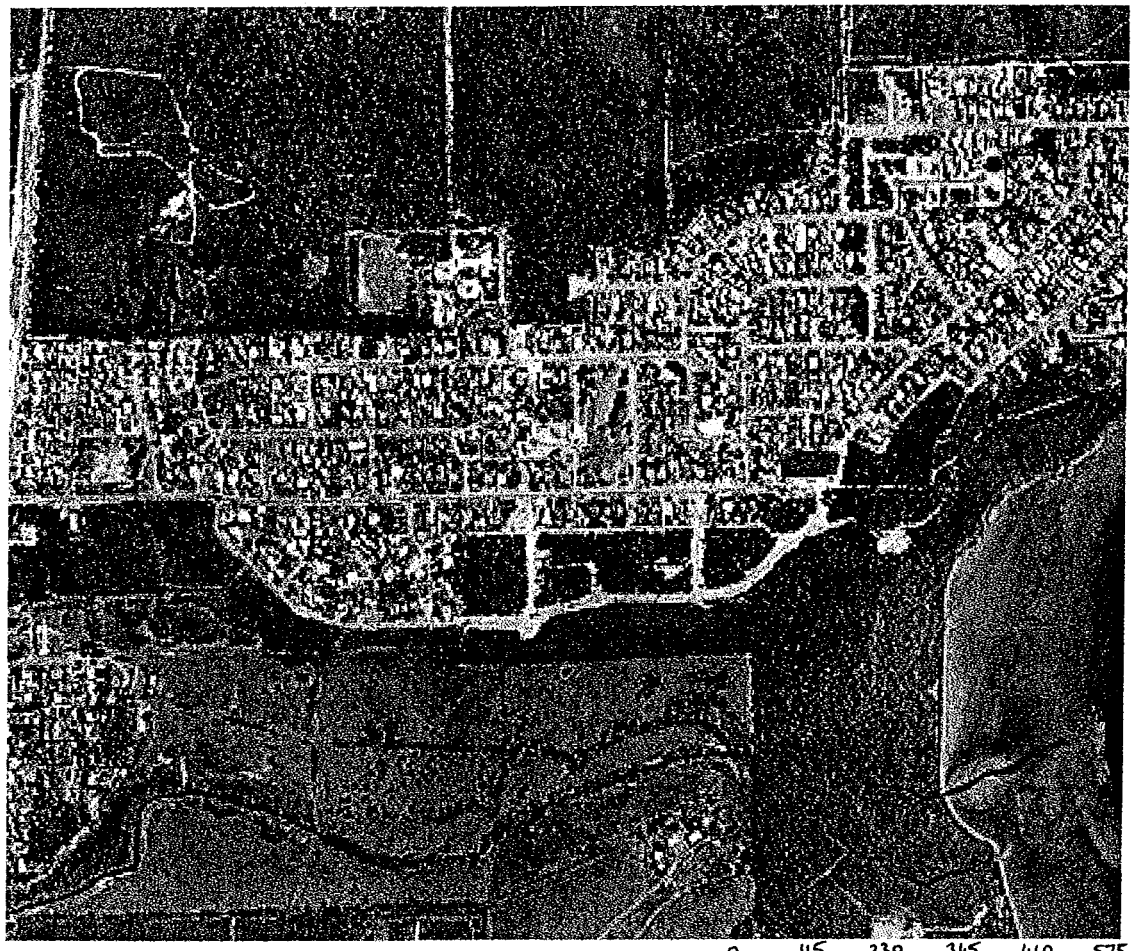


PLATE 18: The bush that borders the school oval is characterised by *Allocasuarina* and *Eucalyptus* trees.

PLATE 19: A stand of *Allocasuarina* trees is used as a playground by the school children.

School Name: St Josephs College

Address: Martin Road, Spencer Park 6330

Phone Number: (08) 9841 4755

Area of Bushland: The bushland area is approximately 0.75 ha and rectangular in shape.

Vegetation type: Jarrah/*Allocasuarina*/*Nutysia* woodland

Condition: 3 to 5: Very Good to Degraded condition.

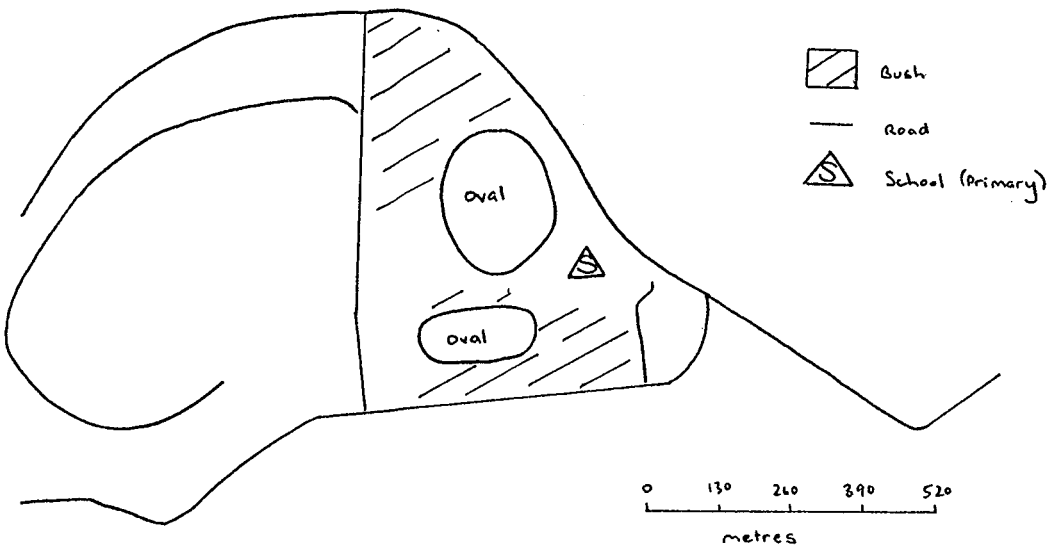
Disturbance: The disturbances here included rabbits, soil dumping, sand trails and rubbish dumping (chip packet, oil drum and plastics). There were very few weeds however some Blowfly grass (*Briza maxima*) was found in this area.

Use of Bushland: The children use the She-oak (*Allocasuarina*) area as a playground. They collect the she-oak nuts (to barter with) and sticks to make cubbies. The teachers however worry that it results in erosion, as they remove the needles etc off the ground. The children are also not allowed to play in the bushland area because of 'stranger danger'.

Management of Bushland: N/A

Bushland Retention/Management: In the immediate future there are no plans to the remove bush which is owned by school.

Site Sketch:



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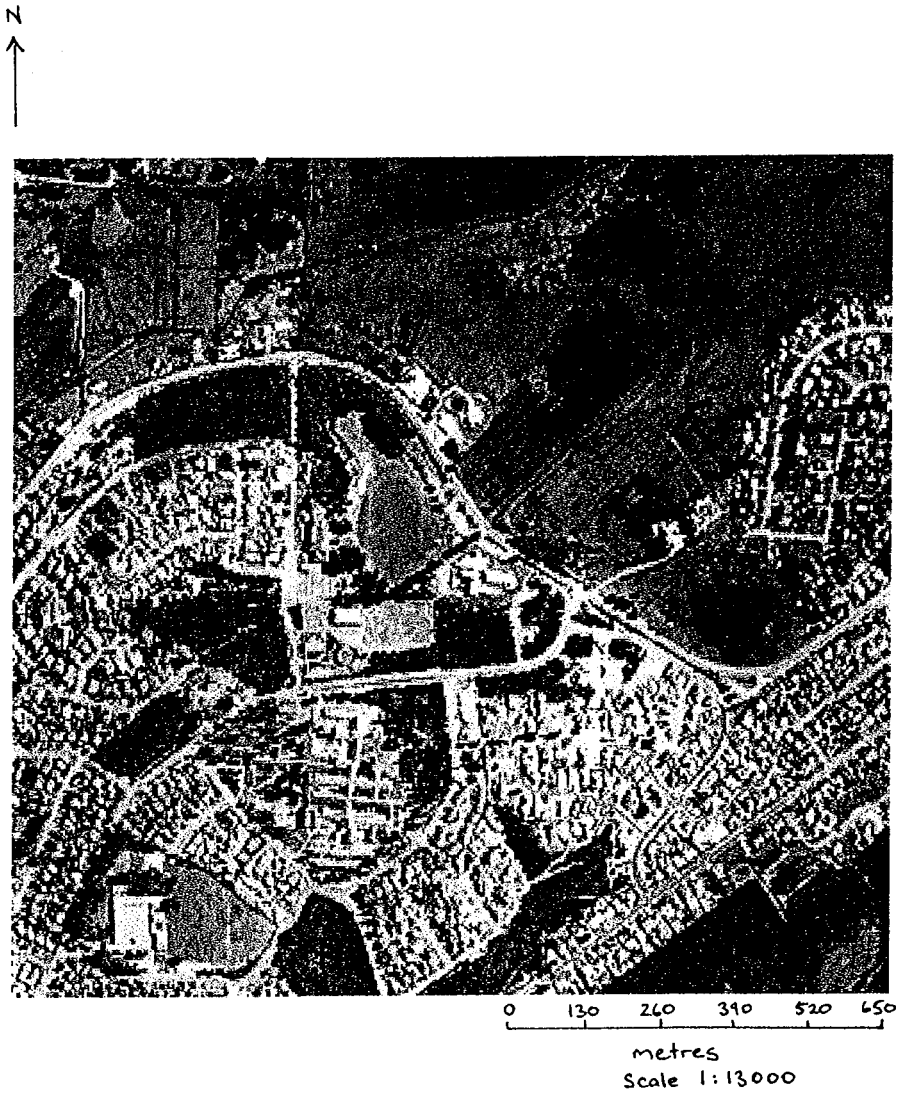


PLATE 20: The view of the bushland from the school oval.

PLATE 21: The bush at St Joseph's is characterised by *Allocasuarina* and *Nutysia* trees.

School Name: North Albany Senior High

Address: Anson Rd, ALBANY 6330

Phone Number: (08) 9841 6611

Area of Bushland: The small square piece of bushland in the front corner of the school is approximately 0.3125 ha.

Vegetation type: Jarrah/*Allocasuarina* woodland to open woodland.

Condition: 4 to 5: Good to Degraded condition.

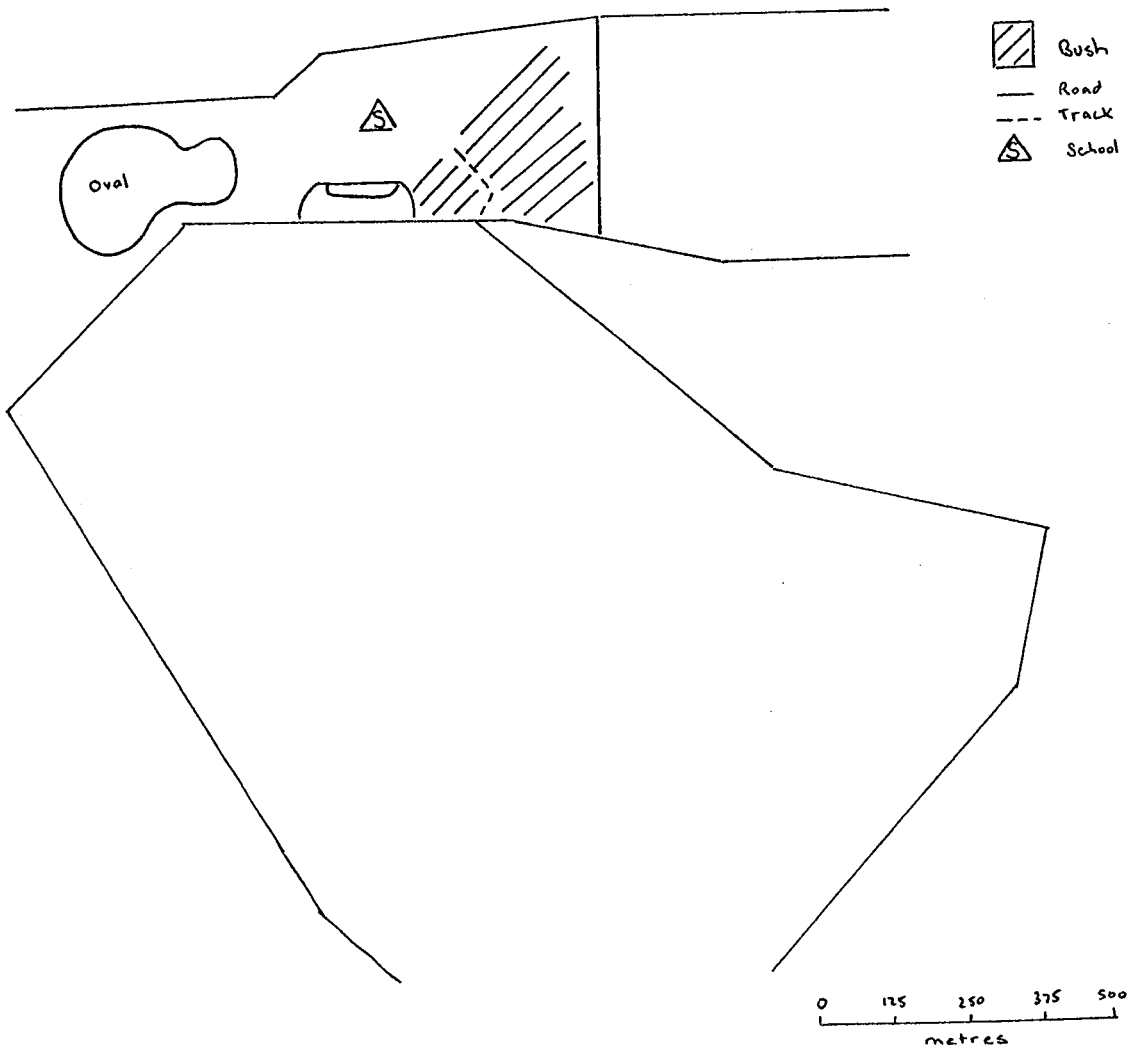
Disturbance: The major disturbances include weeds (such as Pelargonium, *Briza*, *Avena*, and Acacia), fire, rubbish dumping (plastic spoons, bricks, paper), tracks and timber cutting.

Use of Bushland: N/A

Management of Bushland: N/A

Bushland Retention/Management: Not interested.

Site Sketch:



Aerial Photo:

PLATE 22: A small section of bush at the front entrance of the school includes *Allocasuarina* trees.

School Name: Yakamia Primary

Address: Beaufort Rd ALBANY 6330

Phone Number: (08) 9841 7533

Area of Bushland: There is a narrow piece of bushland running alongside the creek which totals approximately 0.3125 ha. There are also vacant bushland lots on the other side of the creek which are owned by the Town Council, and act as an excellent buffer between the school and houses.

Vegetation type: Fringing vegetation – Paperbarks, Swamp bottlebrush (*Beaufortia decussata).*

Condition: 5 to 6: Degraded to Completely Degraded condition.

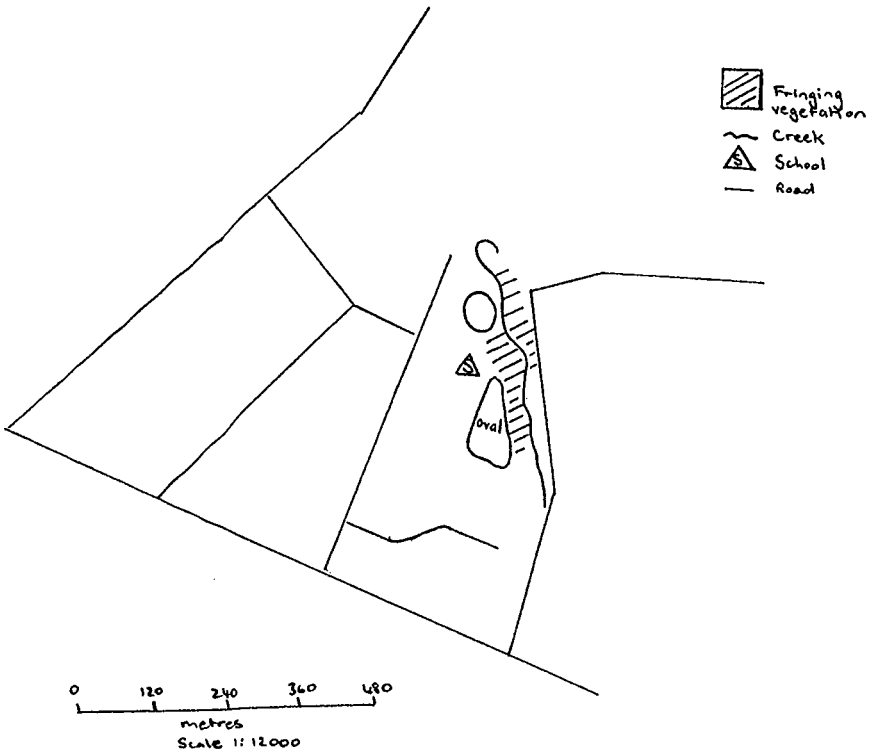
Disturbance: The major disturbances include weeds such as blackberry, talareena, and watsonia, and its original use as a dairy farm.

Use of Bushland: The children are involved in environmental activities such as planting and weeding along the creek.

Management of Bushland: The school has been planting and weeding along Yakamia Creek. A few controlled trials have been set up to control talareena and watsonia and these controlled trials have avoided using poison, by concentrating on mulch newspaper and straw matting instead. This has been a student program.

Bushland Retention/Management: The school is interested in restoring the natural vegetation along the creek, and have been encouraged by the Agriculture Department and the local Land Care Education Officer. They have also been involved in other nominated sites such as along the higher Yakamia creek (above School)

Site Sketch:



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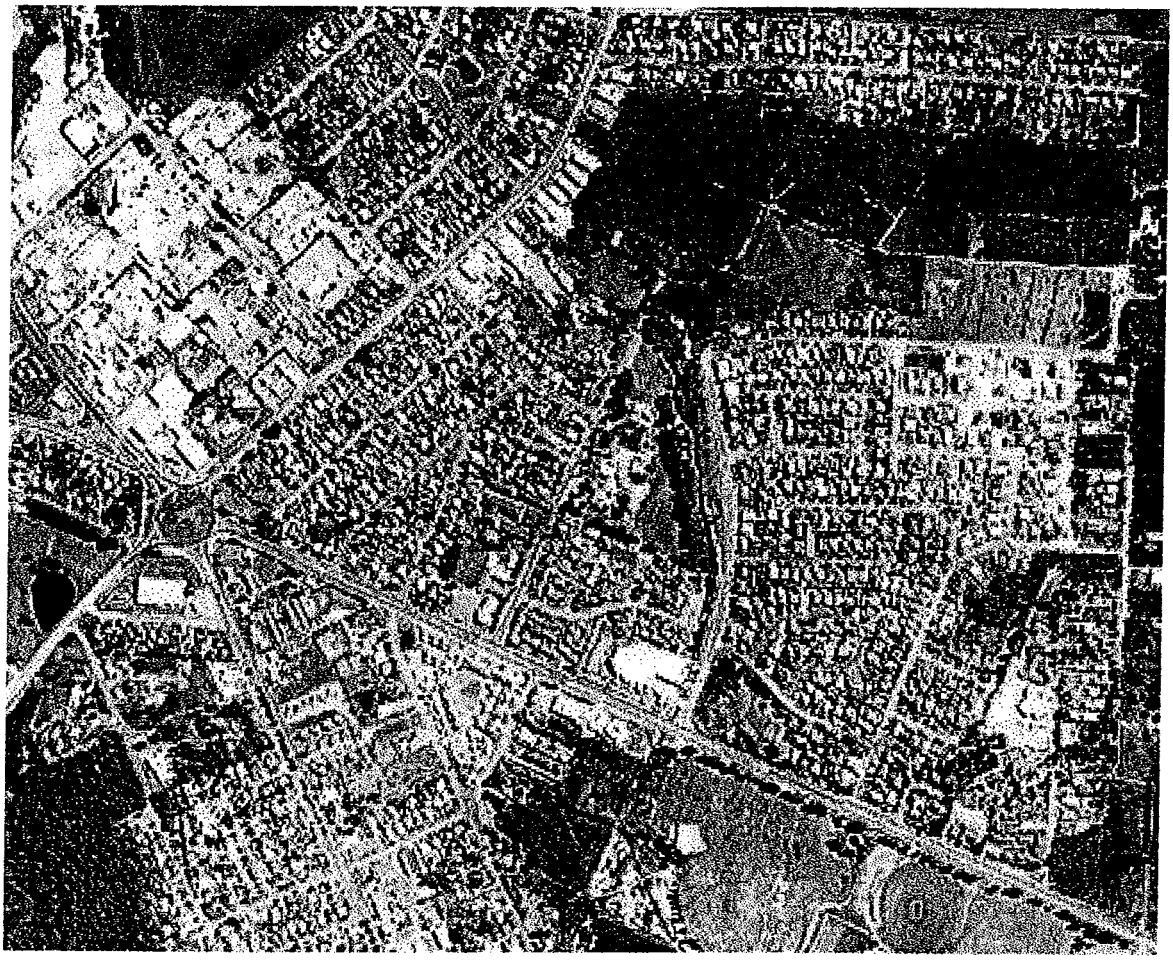

PLATE 23: The creek at Yakamia has been degraded and has lots of weeds, however a few remnant paperbarks (*Melaleuca preissiana*) are present.

IMPLICATIONS

The initial survey procedures used revealed some shortcomings including time of year, classification details and applicability of some questions. An updated version was then prepared for future use in other school bushland sites. The time required for each survey varied from school to school. However the recommended allocated time would be at least ½ to 1 full day for each, depending upon the amount of bushland and the interest of the school.

It was evident from the pilot survey that the area, condition of school bushland, and school attitude in the three municipalities Albany, Kwinana and Serpentine/Jarrahdale varied from school to school.

On the whole it was found that in many of the schools in which interviews were conducted there was an interest in retaining the natural bushland, especially when the Principal was interested. There was also a general consensus that the bushland found on the school sites was to be kept and future development on the bushland minimised, however it was pointed out in some cases that the Education Department may have different plans.

In many cases the bushland was used for nature activities or fitness (cross-country). However the children were often not allowed to go into the bush by themselves because of dangers such as snakes, loiterers or dumped syringes. As well there were other concerns expressed such as the risk of vandals and bushfires. Out of the 13 schools surveyed at least 4 schools called in the local fire brigade to control burn, while another 2 in Kwinana were often burnt by vandals.

It was evident from the survey results that the individual school bushland management practices varied from shire to shire, and often schools were found to have a combination of good and bad practices. A common failing encountered when some schools had decided to revegetate was that a number of them planted exotics instead of native species.

Of all the schools Mundijong Primary provided an example of a school which has effectively set aside a small area of natural vegetation. Although the area is small, it is quite diverse and trampling of the vegetation and other disturbances is minimised by pine bollards and rope around its perimeter. It is also hoped to name plaque the individual species and use the area as an educational resource.

Other schools such as North Parmelia Primary, Kwinana Senior High, Orelia Primary and Albany Senior High have large areas of natural bush which are highly diverse, however they are affected by frequent fires which can have detrimental effects on the bush. For example weed species such as *Ehrharta calycina* (veldt grass) proliferate after fire and out compete native species. The small area of bush behind Jarrahdale Primary is also subject to fires every year, while the bush in and around Kwinana Senior High and Orelia Primary is also subject to thoroughfare from Orelia to the shops. As a result trampling of the vegetation is common and many tracks exist, which ultimately leads to degradation.

A number of schools are affected by rubbish dumping, however Orelia Primary, North Parmelia Primary and Albany Senior High have a Clean-up day where the children wear gloves and participate in the rubbish collection.

Overall this survey suggests that the following management practices contribute to preservation of the bushland:

- collecting rubbish
- removal of weeds
- limiting fires
- rehabilitating the bush with native species
- limiting and marking tracks
- roping or fencing off bushland along its perimeter,
- educating the schools and community about the importance of the bushland and the need for continued management,
- the importance of gaining support from the school principal.

In many cases while individuals have good intentions, they do not know the best strategies to use, and guidance and direction is needed. Therefore it is necessary to educate both the schools and the community about appropriate ways of preserving school bushland, as well as the importance of doing so.

CONCLUSION

This pilot survey provides a framework by means of which remnant bushland surrounding schools throughout the south-west of Western Australia can be assessed and documented. This will enable the establishment of an inventory of the remaining examples of the 'natural' habitat prior to European settlement which may not be in existence elsewhere, and which are a valuable educational and scientific resource.

The shortcomings revealed during this pilot survey included the time of year it was conducted, when many plant species were not in flower, and the applicability of some survey questions from school to school and differing localities.

Overall the best management strategy to retain school bushland in a near natural state would be to combine all the good practices of the individual schools. This includes collecting rubbish, weeding, limiting fires, rehabilitating the bush with native species, limiting and marking tracks, and roping or fencing off bushland along its perimeter. As well it is important to continue educating the schools and community about the importance of the bushland and the need for sound management practices. Without adequate management and education these small remaining bushland areas will be subject to increasing disturbance and degradation which will ultimately result in the loss of flora and fauna species, its habitat potential and its 'inherent value' as part of our natural landscape.

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APPENDIX A

APPENDIX :

Wildflower Society
of WESTERN AUSTRALIA (Inc.)

SCHOOL BUSHLAND SURVEY SHEET

DATE: 9/3/99

RECORDERS: Kate Candy

SCHOOL NAME: North Parmelia Primary

CONTACTS: Paul Woodley (Principal)

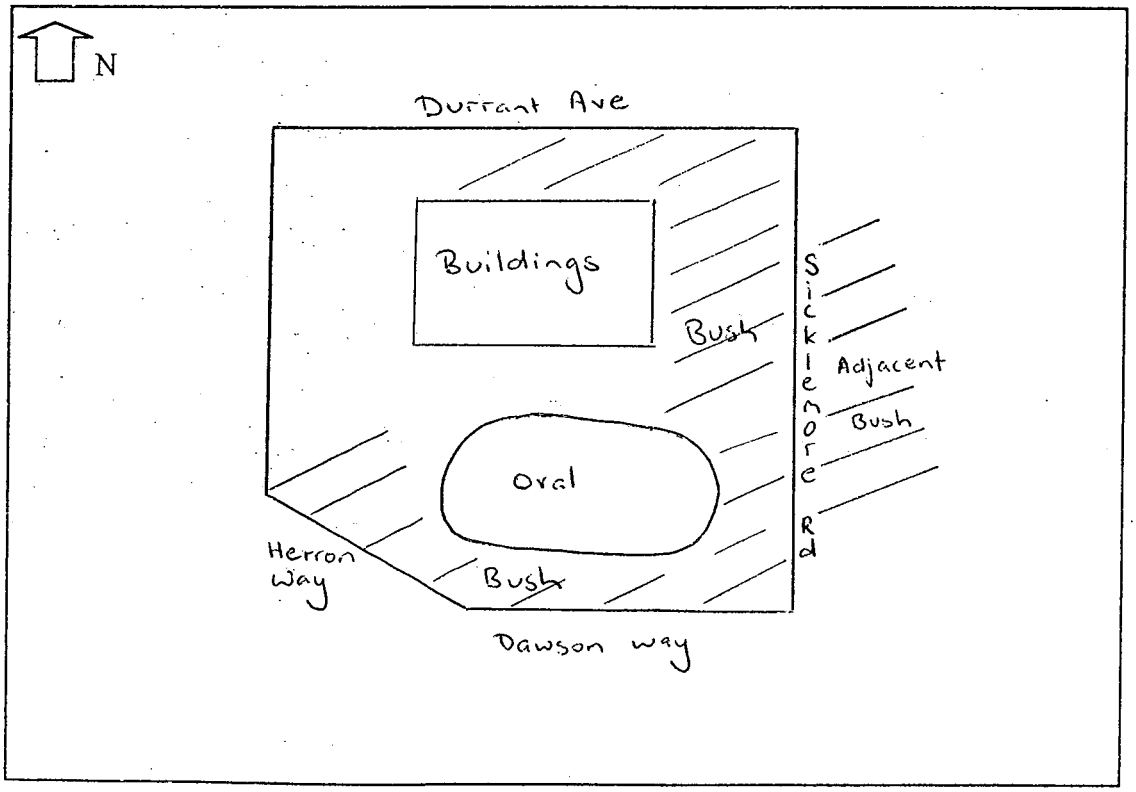
LOCATION: Durrant Ave Parmelia

MAP REFERENCE: Map 428 GR B10

BUSHLAND (Presence/Absence): ✓

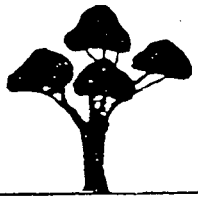
ADJACENT BUSHLAND: Yes

SCHOOL PLAN:



PO BOX 64 NEDLANDS, WA 6909. TELEPHONE: (08) 9386 8790. FACSIMILE: (08) 9386 8929

PLANT COMMUNITY: Jarrah / Banksia / Allocasuarina Woodland

	TREES			MALLEES	
	over 30m	15 - 30m	5 - 15m under 5m	over 8m	under 8m
LIFE FORM					
COVER CLASS (%)	2 - 10	2 - 10	30 - 70		2 - 10
DOMINANT SPECIES	Eucalyptus marginata (Jarrah)	A. fraseriana Jarrah	Acacia saligna A. fraseriana		Melaleuca

	SHRUBS				SHRUBS
	over 2m	2m - 1.5m	1.5 - 1m	1 -0.5m	under 0.5m
LIFE FORM					
COVER CLASS (%)	2 - 10	2 - 10	2 - 10	2 - 10	10 - 30
DOMINANT SPECIES	Jacksonia furcellata	Stirlingia latifolia	J. furcellata Macrozamia riedlei	Hypocalymma r. Oxylobium	Xanthorrhoea gracili Scaevola caescen Petrophile

	GRASSES	HERBS	SEDGES over 0.5m	under 0.5m
LIFE FORM				
COVER CLASS (%)	30 - 70	2 - 10	2 - 10	2 - 10
DOMINANT SPECIES	Ehrharta calycina	Borchardia umbellata Corynotheca micrantha	Mesomelaena stygia Lepidosperma	Lasiocarya flexuos

Source: Keighery 1994

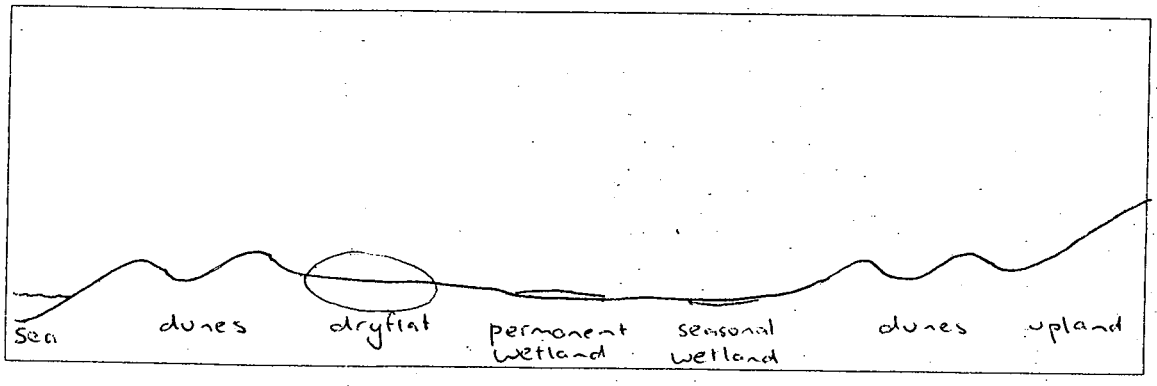
COMMON/SIGNIFICANT SPECIES:

	NATIVES	WEEDS
TREES	Eucalyptus marginata	Woody Pear (Xylomelum occidentale)
	Allocasuarina fraseriana	
	Jacksonia furcellata Banksia attenuata	
SHRUBS	Adenanthos cygnorum	
	Gompholobium tomentosum	
	Oxylobium capitatum	
HERBS	Dampiera linearis	Pelargonium capitatum
	Conostylis	Dandelions (Taraxacum officinale)
	Asteriolona	
SEDGES	Mesomelaena stygia	
	Lepidosperma	
GRASSES		Briza maxima & minor
		Veldt (Ehrharta calycina)

CONDITION:

		NOTES: Borderline
PRISTINE		
EXCELLENT		
VERY GOOD	✓	
GOOD		
DEGRADED		

TOPOGRAPHIC POSITION:



SOIL TYPE: Sandy

SOIL COLOUR: white - grey

LITTER LAYER: ✓ 30-70% needles, eucalypt leaves

GENERAL DISTURBANCE:

a) Major ☑ Ehrharta prevalent
b) Minor ☐
c) Nil ☐

OVERALL CONDITION (1(Pristine)- 6 (Completely Degraded)):.....

4-5

VEGETATION CONDITION SCALE: Keighery 1994

PRISTINE (1)	Pristine or nearly so. no obvious signs of disturbance
EXCELLENT (2)	Vegetation structure intact, disturbance affecting individual species and weeds are non aggressive species
VERY GOOD (3)	Vegetation structure altered, obvious signs of multiple disturbance (ie repeated fires, weeds, dieback, logging, grazing)
GOOD (4)	Vegetation structure significantly altered by very obvious signs of multiple disturbance. Retains basic vegetation structure or ability to regenerate it.
DEGRADED (5)	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example disturbance to vegetation structure caused by very frequent fires, presence of aggressive weeds, partial clearing, dieback and grazing.
COMPLETELY DEGRADED (6)	The structure of the vegetation structure is no longer intact, and the area is completely or almost completely without native species. These areas often described as parkland cleared with flora comprising weed or crop species with isolated native trees or shrubs.

DISTURBANCES

WEEDS:

a) Presence ☑
b) Cover %
- 0 - 10 ☐
- 10 - 25 ☐
- 25 - 50 ☑
- 50 - 75 ☐
- >75 ☐

TYPES:

- a) Veldt grass ☑
- b) Watsonia ☐
- c) Gladiolus ☑
- d) African love grass ☐
- e) Woody weeds ☐
- f) Other weeds ☑ Pigface (Carpobrotus)

ANIMAL IMPACT:

- a) Kangaroos ☐
- b) Rabbits ☑
- c) Horses ☐
- d) Dogs ☑ – People walking them
- e) Cats ☐
- f) Other ☑ Snakes, racehorse goanna

ANIMAL GRAZING:

- a) Stock eg cattle, horses, sheep ☐
- b) Feral or native mammals eg kangaroos, rabbits, cats ☐

SIGNS OF FIRE (eg burnt trunks, charcoal, ash): Charcoal, burnt trunks

YEARS SINCE LAST FIRE:

- a) less than 1 year
- b) 1-2 years
- c) 2-5 years
- d) 5 + years
- e) unknown

The local fire brigade burn the bush surrounding the school every year

SIGNS OF DISEASE:

- a) Dieback ☐
- b) Other ☑ Some dead Banksias & Jarrah

RUBBISH DUMPING:

- a) Household ☑
- b) Garden ☐
- c) Other ☐

Lots Fastfood wrappers, Glass, Drink carton Plastic, metal, Tyre, Aluminium can Shoe, Beer bottles, Swing base.

TRACKS (Manmade):

a) Fire breaks
b) Walk Trails
c) Vehicle (Off road use)
d) Service corridor eg SEC, Water Authority, Main Roads

[ ]
[✓]
[ ]
[ ]

Sand tracks – people walking through bush

CLEARING (% of bushland area):

a) 50-100%
b) 25%
c) 0%
d) Other

[ ]
[ ]
[ ]
[✓]

0-10%

FENCING:

a) All
b) Partial
c) Nil
d) Other

[ ]
[✓]
[ ]
[ ]

Fencing present where joins houses

SELECTIVE SPECIES REMOVAL BY:

a) Timber cutting
b) Mowing
c) Wildflower picking
d) Other

[✓]
[ ]
[ ]
[ ]

ENRICHMENT PLANTINGS (ie species not found in community): .....

.....

SOIL:

a) Removal
b) Dumping

[✓]
[ ]

WATER REGIME CHANGES:

a) Salinity
b) Floods
c) Nutrient Influx
d) Drains
e) Watering

[ ]
[ ]
[ ]
[ ]
[ ]

NORTH PARMELIA PRIMARY SCHOOL

Date: Thursday 11th February

Principal: Paul Woodley

QUESTION: Does all the bushland around belong to the school? How much?

The bushland is owned by the school and Homeswest. The bushland owned by Homeswest contains many orchids. However this may go as intention to put in railway line before Johnson Rd which would probably lead to Homeswest developing it. This bushland area is used for nature walks.

QUESTION: Is the bushland around this school used by the children in any way? Is the bushland adjacent to the school used by the children? Or is it considered too dangerous? (If so for what reason)?

On Cleanup Australia Day all the children wear latex gloves and go through the bush.

The teachers take the children out for nature walks to teach them about the local flora ie nature activities.

QUESTION: Is the bushland managed in any way ie by fire, weed control?
N/R see Q5

QUESTION: Does the bushland attract rubbish dumping?

The bushland is a dumping ground.

QUESTION: Do you have any problems in the bushland such as vandals and/or fire?

Enormous vandalism, but still want to preserve it. It is also a fire hazard. As a result the local fire brigade burns it every year or so.

QUESTION: Is this school involved in any environmental activities or groups such as Ribbons of Blue?

Has been approached by GREEN TEAM (Lefkie Kailis) from Kwinana Senior High School, which dovetails with their Spectacles bush programme. Lefkie approached the school after three children designed a web page for a competition and won. The children were then sent on a conference where environmental issues were discussed among others. Note: Principal was only just talking to her yesterday. He also hopes to start propagation, as well as worm farming.
The local shire sponsors the GREEN TEAM & the programme involves 4 stages

1) identify natives
2) gather & collect seed
3) propagate
4) manage

Note: can't run a nursery – too many problems.

QUESTION: If this school needed to expand how would you use the bushland?

The Principal doesn't intend to expand the school ~ 570 children, but if do put demountables on peripheral without destroying bush.

Wildflower Society

of WESTERN AUSTRALIA (Inc.)

SCHOOL BUSHLAND SURVEY SHEET

DATE:

RECORDERS:**.....**

SCHOOL NAME:**.....**

CONTACTS:**.....**

LOCATION:**.....**

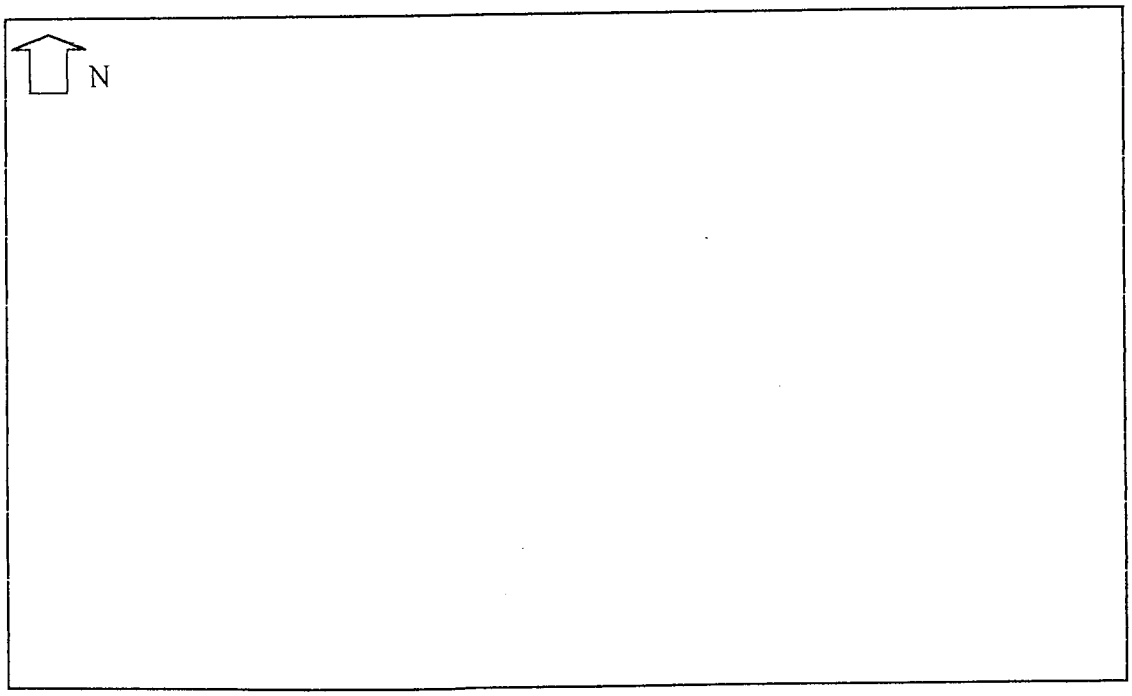
MAP REFERENCE:**.....**

AERIAL PHOTO REFERENCE:**.....**

BUSHLAND (Presence/Absence):**.....**

ADJACENT BUSHLAND:**.....**

SCHOOL PLAN:

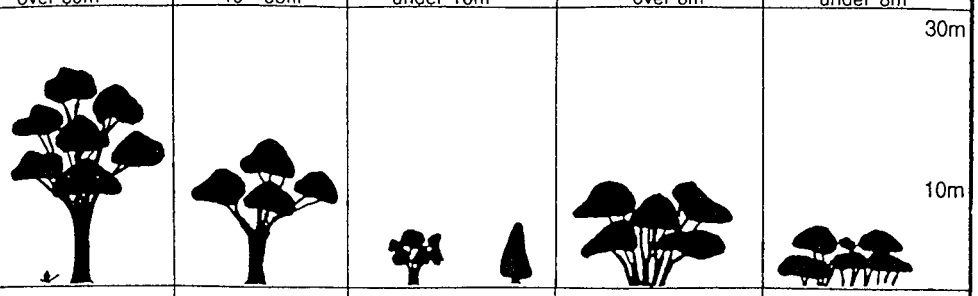


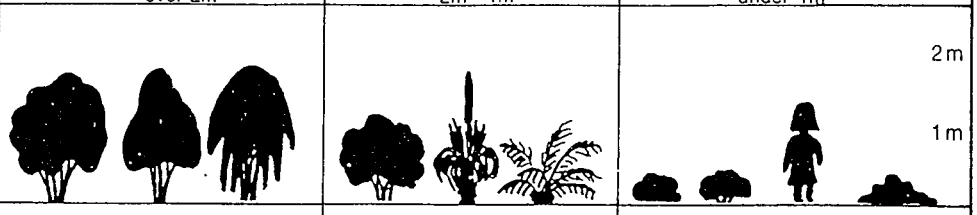
PO BOX 64, NEDLANDS, WA 6909. TELEPHONE: (08) 9383 7979. FACSIMILE: (08) 9383 9929

***PLANT COMMUNITY** (Duplicate as necessary for each community in bushland):*

.....

.....

	TREES			MALLEES	
	over 30m	10 - 30m	under 10m	over 8m	under 8m
LIFE FORM					
COVER CLASS (%)					
DOMINANT SPECIES					

	SHRUBS		SHRUBS
	over 2m	2m - 1m	under 1m
LIFE FORM			
COVER CLASS (%)			
DOMINANT SPECIES			

	GRASSES	HERBS	SEDGES	OTHER
LIFE FORM				
COVER CLASS (%)				
DOMINANT SPECIES				

COMMON/SIGNIFICANT SPECIES:

	NATIVES	WEEDS
TREES		
SHRUBS		
HERBS		
SEDGES		
GRASSES		

CONDITION:

PRISTINE		NOTES:
EXCELLENT		
VERY GOOD		
GOOD		
DEGRADED		

TOPOGRAPHIC POSITION:

SOIL TYPE:.....

SOIL COLOUR:.....

LITTER LAYER:.....

GENERAL DISTURBANCE:

a) Major ☐
b) Minor ☐
c) Nil ☐

OVERALL CONDITION (1(Pristine)- 6 (Completely Degraded)):.....

.....

VEGETATION CONDITION SCALE: Keighery 1994

PRISTINE (1)	Pristine or nearly so, no obvious signs of disturbance
EXCELLENT (2)	Vegetation structure intact, disturbance affecting individual species and weeds are non aggressive species
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DEGRADED (5)	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For eg. disturbance to vegetation structure caused by very frequent fires, presence of aggressive weeds, partial clearing, dieback and grazing.
COMPLETELY DEGRADED (6)	The structure of the vegetation structure is no longer intact, and the area is completely or almost completely without native species. These areas often described as parkland cleared with flora comprising weed or crop species with isolated native trees or shrubs.

DISTURBANCE FACTORS

WEEDS:

a) Presence ☐
b) Cover %
- 0 - 10 ☐
- 10 - 30 ☐
- 30 - 60 ☐
- >60 ☐

TYPES:

a) Veldt grass ☐
b) Watsonia ☐
c) Gladiolus ☐
d) African love grass ☐
e) Woody weeds ☐
f) Dandelions ☐
g) Other weeds ☐ .....

SIGNS OF FIRE
(eg burnt trunks, charcoal, ash):

.....

.....

FREQUENCY OF FIRE:

a) Very Frequent ☐
b) Less frequent ☐
c) unknown ☐

TRACKS (Manmade):

a) Fire breaks ☐
b) Walk Trails ☐
c) Vehicle (Off road use) ☐
d) Service corridor - ☐
SEC, Water Authority) ☐

Type:

a) Sand ☐
b) Concrete ☐
c) Woodchips ☐
d) Gravel ☐
e) Other ☐ .....

.....

SOIL:

a) Removal ☐
b) Dumping ☐

FENCING:

a) All ☐
b) Partial ☐
c) Nil ☐
d) Other ☐ .....

.....

CLEARING (% of bushland area):

a) 75% ☐
b) 50% ☐
c) 25% ☐
d) Other ☐ .....

.....

ENRICHMENT PLANTINGS
(ie species not found in community):

.....

.....

SELECTIVE SPECIES REMOVAL BY:

a) Timber cutting ☐
b) Mowing ☐
c) Digging up ☐
d) Other ☐ .....

.....

WATER REGIME CHANGES:

a) Drains ☐
b) Reticulation ☐
c) Salinity ☐

RUBBISH DUMPING:

a) Household ☐
- Food/Packaging ☐
- Furniture ☐
- Clothing ☐

b) Garden ☐
- Clippings ☐
- Play Equipment ☐

c) Bricks/Tiles ☐
d) Vehicle ☐
- Tyre ☐

e) Other ☐ .....

.....

SCHOOL INTEREST IN RETENTION/MANAGEMENT

QUESTION: Does all the bushland around the school belong to the school? How much?

.....

.....

QUESTION: Is the bushland around this school used by the children in any way? Is the bushland adjacent to the school used by the children? Or is it considered too dangerous? (If so for what reason)?

.....

.....

QUESTION: Is the bushland managed in any way ie by fire, weed control?

.....

.....

QUESTION: Does the bushland attract rubbish dumping?

.....

.....

QUESTION: Do you have any problems in the bushland such as vandals and/or fire?

.....

.....

QUESTION: Is this school involved in any environmental activities or groups such as Ribbons of Blue?

.....

.....

QUESTION: If this school needed to expand how would you use the bushland?

.....

.....

APPENDIX:

A GUIDE TO FILLING OUT BUSHLAND SURVEY SHEET

Recording Sheet 1

Date: It is important to record the date or dates of your visit to each school site.

Recorders: Record all the people involved, as these will vary from school to school.

School Name: Record the school's name.

Contacts: Record the names of people to contact and whether it is the principal or another staff member.

Location: Record the location of the school ie road, street and suburb

Map Reference: In the Metropolitan area refer to UBD 1998 Street Directory 40th Edition, while in country refer to The West Australian Travellers Atlas Edition 3. Record map number and grid reference of each school.

Aerial Photo Reference: Record the photo number, latitude/longitude coordinates and CD used.

Bushland: Record if any bushland is present on the school site.

Adjacent bushland: Record if there is any bushland adjacent to the school.

School Plan: Draw a sketch of the school grounds showing where the bushland is located, as well as the school buildings, car parks and playgrounds. Make sure the sketch is drawn in a northerly orientation. Also indicate the roads that run around the periphery of the school, as well as any fencing.

Recording Sheet 2

Plant Community: Give a general description of the major dominating species and indicate whether it is forest, open forest, woodland, open woodland etc.

Vegetation Structure and Cover: Record the heights and percentage cover of the dominant species in each layer ie Trees, Shrubs, Herbs/Grasses/Sedges. The layers should be selected from the pictorial representation. To record plant cover, a visual estimate of all the plants in each group is needed. This can be done by drawing an imaginary boundary around all the extremities of the plants and deciding which cover class (2-10%, 10-30%, 30-70%, over 70%) represents the individual or group of plants in a particular layer.

Common/Significant Species: Record the most common/significant native and weed species according to their life form ie Tree, Shrub, Herb, Sedge and Grass.

Condition: Give an indication of the vegetation condition by selecting a rating from the six condition ratings listed below (Keighery, 1994).

PRISTINE (1)	Pristine or nearly so, no obvious signs of disturbance
EXCELLENT (2)	Vegetation structure intact, disturbance affecting individual species and weeds are non aggressive species
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<u>Recording Sheet 3</u>

Topographic position: Indicate the position of the site ie whether it is wetland, dry flat according to the transect diagram. This diagram will need to be modified for different state locations.

Soil type: Describe the soil type according to whether it is sand, clay, sandy clay, loam etc

Soil colour: Record the colour of the soil ie yellow, brown, grey, red etc.

Litter Layer: Visually estimate the litter layer cover by placing into the same cover classes used to record vegetation cover (2-10%, 10-30%, 30-70%, over 70%). Also make notes on litter composition ie banksia leaves.

General Disturbance: Choose between major, minor and nil for the extent of disturbances in the bushland concerned.

Overall condition: Indicate the overall condition of the school site. Use the vegetation condition scale ratings from 1(pristine) to 6 (completely degraded) and describe as a range between the appropriate classes.

Recording Sheet 4

DISTURBANCES

Weeds: If weeds are present estimate the percentage cover according to the five classes given (0-10, 10-30, 30-60, >60). Record the types of weeds found and if not listed tick other and name.

Animals: Note if there are any animals or signs of animals by choosing the type of animal.

Fire: Record whether there are any signs of fire such as ash, charcoal, burnt tree trunks and estimate the frequency.

Disease: Note if they are any signs or dieback or other disease caused by insects etc.

Rubbish Dumping: Indicate the types of rubbish found and classify them according to whether they are household or garden or from another source.

Tracks: Indicate presence of any tracks such as fire breaks, walk trails, service corridor, vehicle (off road use) and give details ie sand tracks.

Clearing: Estimate how much of the bushland area has been cleared.

Fencing: Record if there is any fencing around the school and/or bush, and if so whether it is all fenced or only partially.

Selective Species Removal: Note if there has been any timber cutting, mowing, wildflower picking.

Enrichment Plantings: Record if there have been any non native species planted ie those that are not normally found in that community.

Soil: Note if any soil has been removed or dumped.

Water Regime Changes: Note if there are any signs of salinity, drains and reticulation.