

ANNANGROVE RESERVE

ENVIRONMENTAL EDUCATION RESOURCE



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Biodiversity and resilience.

The Hills local area has a great deal of existing biodiversity:

- Approx. 1000 native plant species
- Approx. 300 native fauna species
- Over 25,000 hectares of vegetation cover
- 13 ecological communities 9 of which are threatened
- Over 20 threatened plant species & 2 endangered plant populations
- And approx. 40 threatened fauna species


However, as these figures show, while there is great diversity some of our flora and fauna are listed as threatened species. These threatened species are under pressure from urban expansion and this pressure along with other factors has an impact on their future potential.

The Hills Shire Council manages approximately 1300 hectares of bushland and over 170 different reserves. These Reserves exist for the protection of native flora and fauna and to provide recreation activities such as bushwalking, picnics and environmental education. They range in size from Excelsior Reserve, Baulkham Hills at 71 hectares, to Annie Prior Reserve, Glenhaven which is less than one hectare.

The reserves include a variety of landscapes such as tall eucalypt forests, colourful sandstone heath and shady rainforest gullies. These reserves contain a great diversity of plants, animals and ecological communities, with the smaller urban reserves providing important habitat for flora and fauna and links to the larger reserves. The larger reserves such as Fred Caterson Reserve, which covers a large area, can be home to mammals such as Sugar Gliders, Bandicoots, Echidnas and a great diversity of birds, bats, reptiles and insects.

The larger a bush reserve the better the chance it has with coping with problems. The shape of the reserve also has an influence on its resilience or ability to cope with stress. A large and wide shape reserve copes better than a narrow and thin shaped reserve. A square or circular shape is the better than a narrow rectangle.

Activity: Read the issues faced by the Fred Caterson Reserve. Can you guess why shape and size matters to the animals and plants that inhabit the Fred Caterson Reserve.



Why does the bush need help?

Fred Caterson Reserve contains one of the Shire's largest sporting complexes, and recently became part of a busy suburban area. The bush will need some help to survive and adapt to these changes.

- 1 It is an island surrounded by suburbia**
Fred Caterson Reserve Bushland used to be part of a vast natural landscape stretching right across the continent. Even after most of the bush on surrounding flat land was cleared for farms, it remained part of a bush corridor extending north to the Hawkesbury and the vast natural areas of the Blue Mountains and Hunter Valley. Now it is almost surrounded by houses and roads, and linked to other bush patches only by narrow corridors.
- 2 It is full of holes like a Swiss cheese**
Patches of bush have been replaced by roads, fields, carparks and buildings. None of the bush is far away from disturbances associated with sports fields, gardens, roads and tracks.
- 3 There are many new environments where weeds thrive and bush plants struggle**
 - the edges, where the bush joins roads and houses.
 - disturbed soil and imported fill, e.g. sports field edges, areas that were dug up when sewers were installed.
 - stormwater drains—most bush plants can't live in the moist, nutrient-enriched soil around drain outlets, but many exotics flourish, creating "weed plumes"
 - sediment deposits in the creek
- 4 Weeds are in the reserve and nearby, ready to expand their territory**
There are hardy grasses, shrubs, vines and trees from all over the world that are capable of dominating parts of the reserve e.g. Small-leaved Privet, bamboo, honeysuckle, African Love Grass, and Balloon Vine.
- 5 Fire cycles have changed**
Regular fires (perhaps every 7 to 20 years) are part of the natural cycle in the Fred Caterson Reserve. If fire is excluded, or is too frequent, the bush will change.
- 6 People damage it**
Sometimes for fun people ride bikes through the bush, build bike jumps and cubbies, tag trees with spray paint, smash rocks, chop down trees. But it damages the bush. There is very little publicly owned bush in the local area, so we can't afford to wreck it.
Some reserve neighbours dump rubbish in the bush—particularly lawn clippings and other garden waste. This kills native plants, creates fire hazards and starts weed infestations. Others, often with good intentions have used parts of the reserve like a backyard—but mowing, planting and tidying damages the bush.
- 7 We are creating a new climate**
Fred Caterson Reserve, along with all the world's natural areas, is now on the threshold of a new threat. Unless the impact of climate change is reduced by a rapid reduction in worldwide fossil fuel use, the weather patterns, rainfall and temperature range that local plants and animals have adapted to, will change.

List of the 9 Threatened Communities in the Hills Shire

Two of the listed communities are found in Annangrove Reserve.

Threatened Ecological Communities

SHALE & SHALE/SANDSTONE SOILS

- Blue Gum High Forest (CEC State & Fed)
- Cumberland Plain Woodland (CEC State & Fed)
- Sydney Turpentine Ironbark Forest (EEC State, CEC Fed)
- Shale Sandstone Transition Forest (EEC State & Fed)
- Western Sydney Dry Rainforest (EEC State)

Threatened Ecological communities

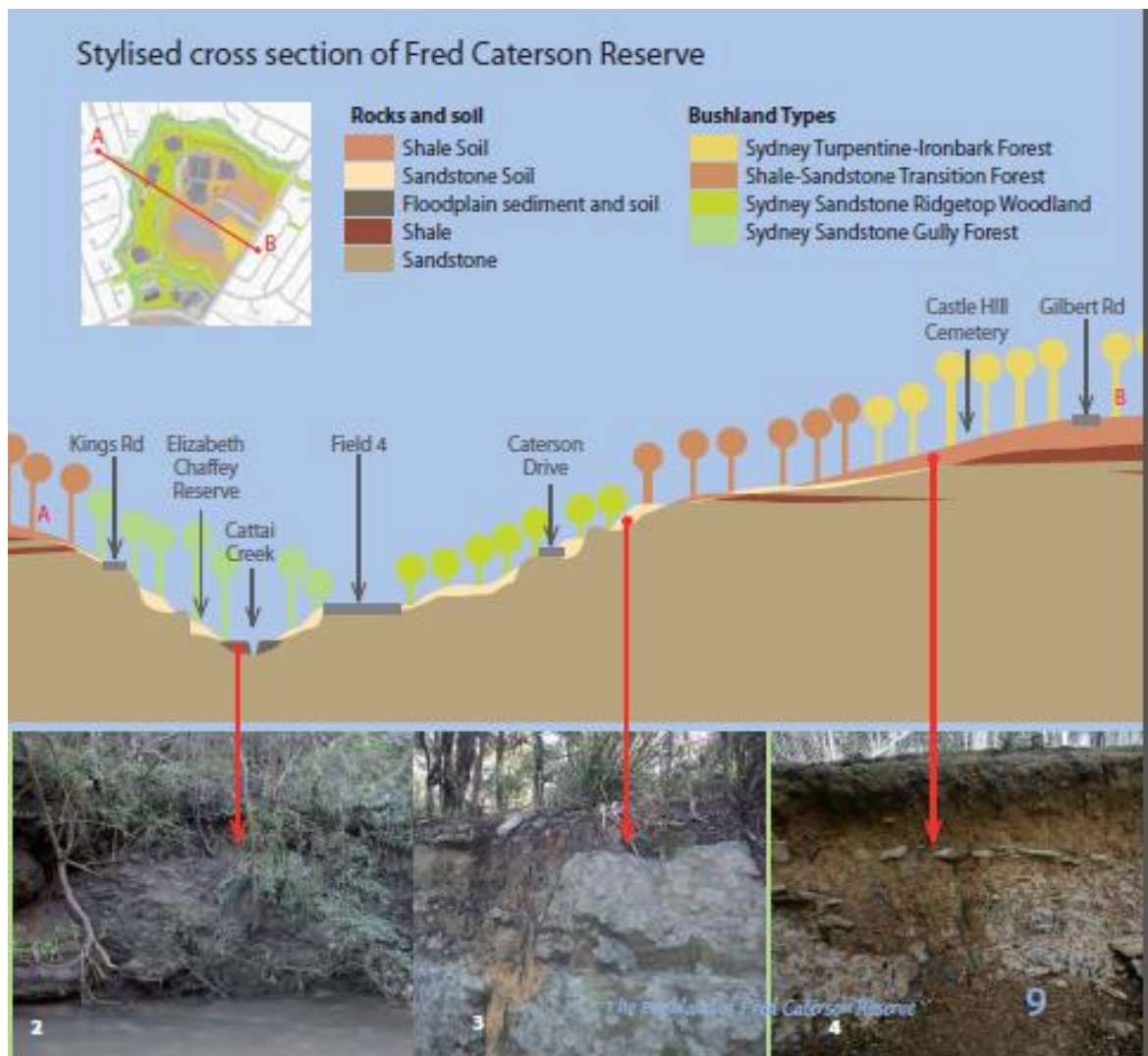
ALLUVIAL/WETLAND SOILS

- River-flat Eucalypt Forest (EEC State)
- Swamp Sclerophyll Forest on coastal floodplains (EEC State)
- Freshwater Wetlands on coastal floodplains (EEC State)
- Maroota Sands Swamp Forest (EEC State)

Description of Annangrove Reserve

Annangrove Reserve is a small bushland reserve located on the northern side of Annangrove Rd in the suburb of Annangrove. The reserve extends from the ridge top down a north facing slope into the gully area of Blue Gum Creek. The underlying geology is of one of predominately shale on the ridge top and sandstone on the slope and gully areas. This is reflected in the changing vegetation communities as you progress down the slope. The slope has a northerly aspect and a gradual grade or decline until you reach a steep drop into the gully at the base of the slope (see topographic map).

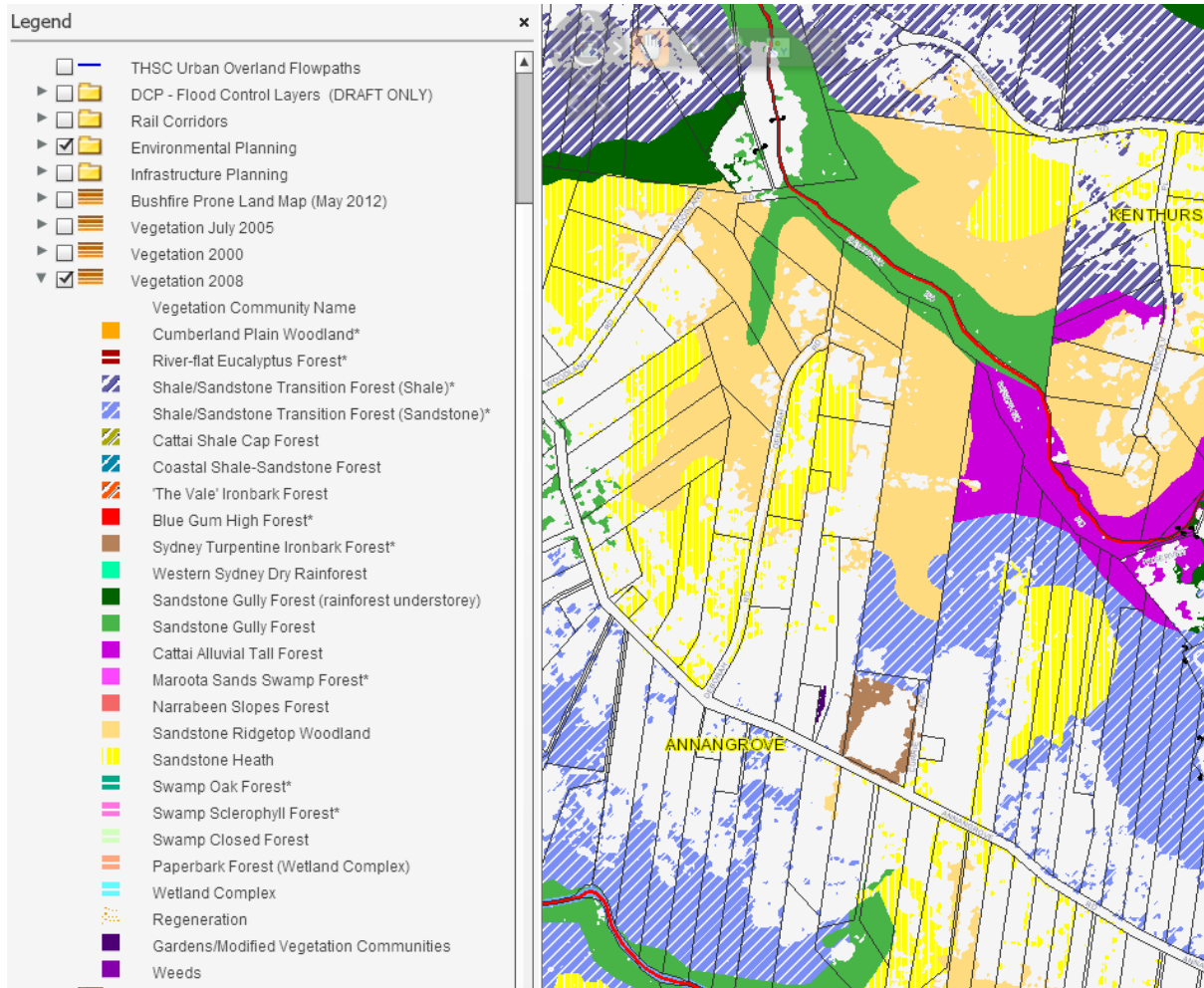
The following diagram illustrates a cross section for a similar reserve showing both the underlying rocks and soil and the corresponding vegetation cover of forest and woodland communities.



Annangrove Reserve contains 5 different vegetation communities, two of which are listed as threatened vegetation communities. Four of the 5 vegetation communities are in a good to reasonable condition.

THE VEGETATION COMMUNITIES OF ANNANGROVE RESERVE:

1. SYDNEY TURPINTINE IRONBARK FOREST
2. SHALE /SANDSTONE TRANSITION FOREST
3. SANDSTONE RIDGETOP WOODLAND
4. SANDSTONE HEATH
5. SANDSTONE GULLY FOREST



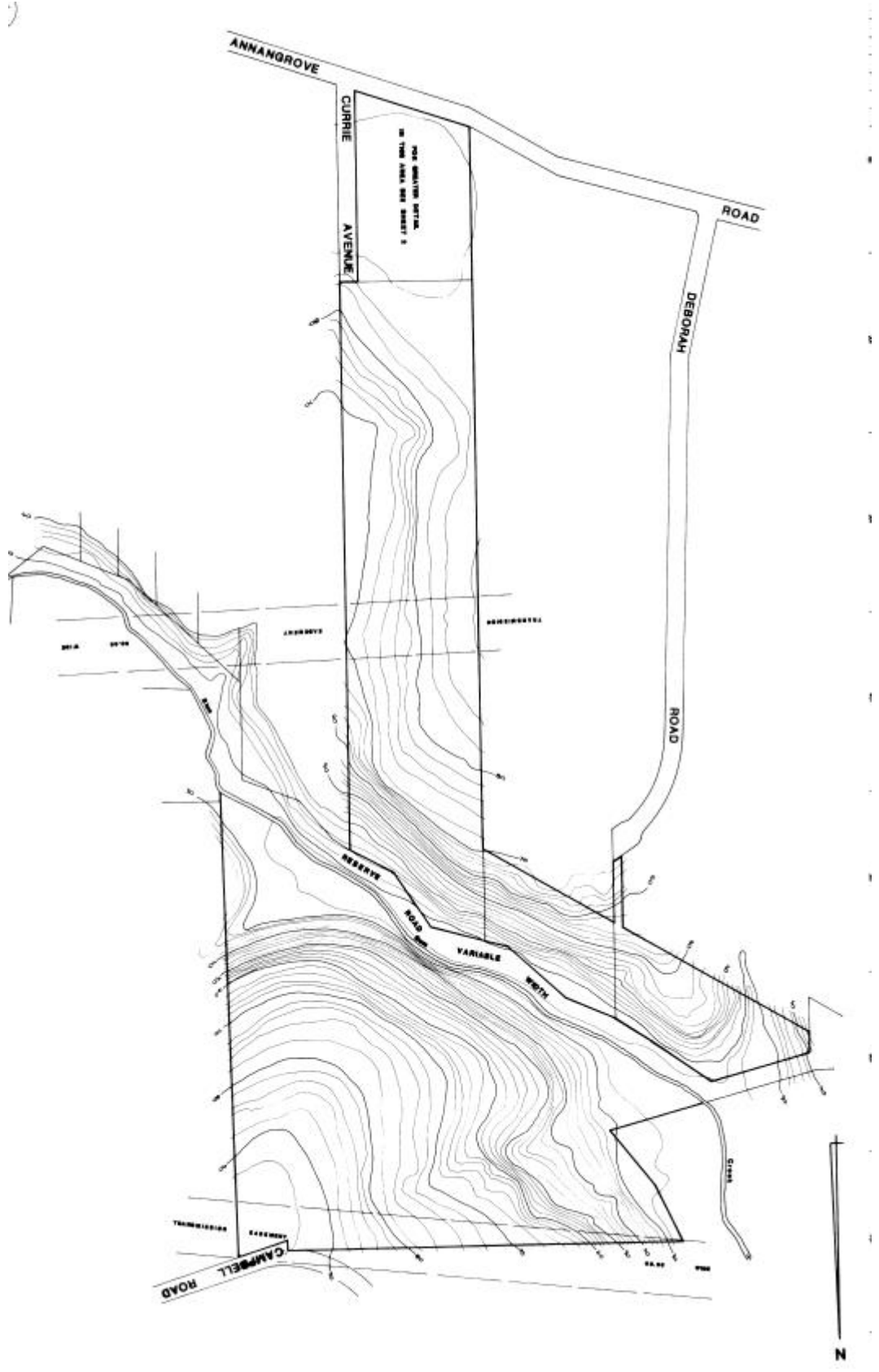
The Annangrove Reserve has a long rectangular shape and is subject to 'edge effects' or negative impacts along its boundaries. This fragmented reserve is mainly surrounded by cleared paddocks and large housing blocks. There is a sporting field, tennis court facility and 2 large halls occupying the southern end of the site and a proposed recreation facility on the western boundary of Annangrove Park. There are some minor walking tracks through the reserve and though these are not heavily used.

The reserve has some positive habitat features. These include

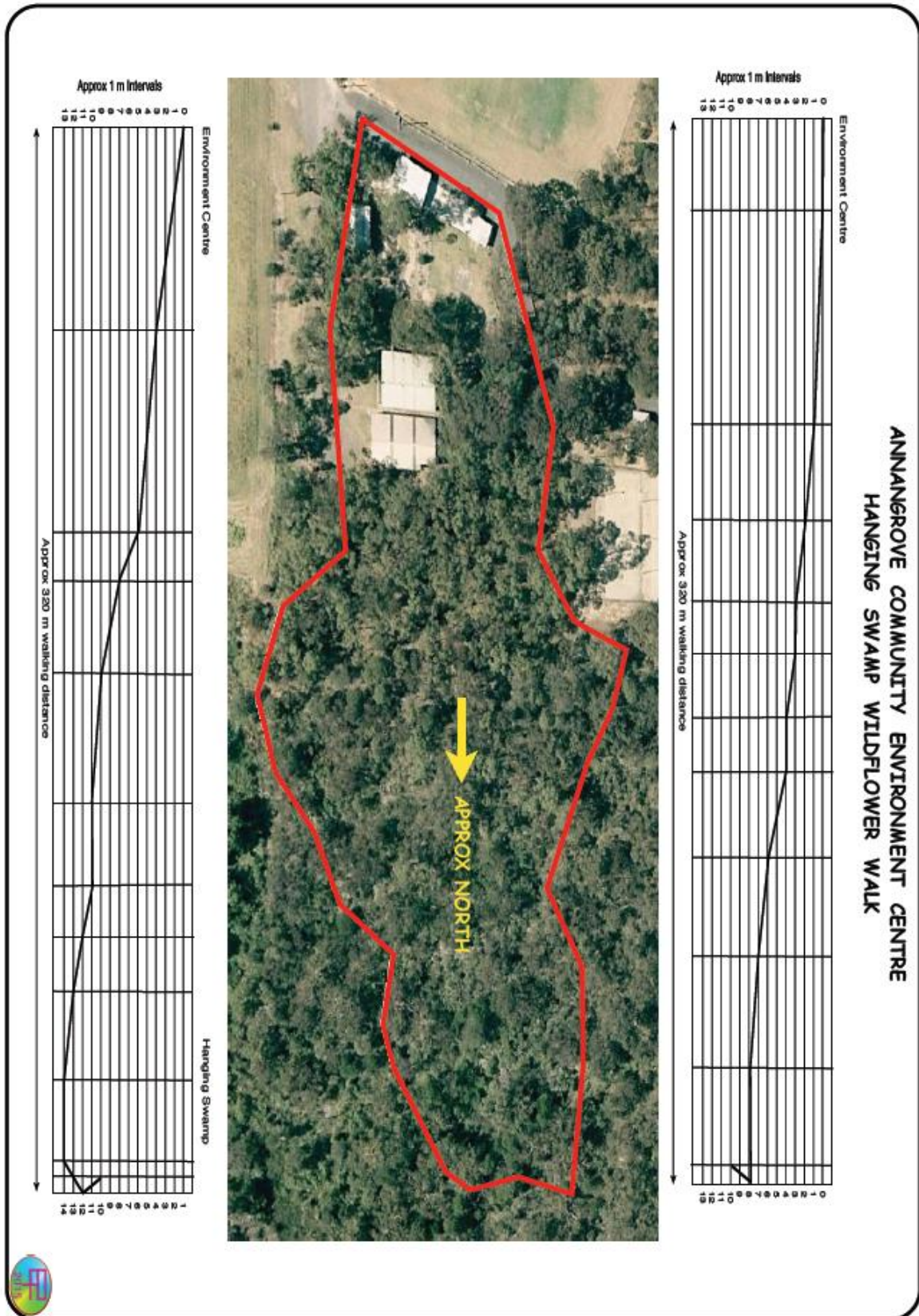
- a diverse range of vegetation communities
- a number of old and dead trees
- a wildlife corridor or link to other patches of bushland
- access to a fairly permanent water supply (Blue Gum Creek)
- good gully access (east to west movement for wildlife)
- increasing size and shape as you move down the slope
- limited access to reserve via walking tracks

There is a range of management issues involved in conserving this reserve and these issues vary for each vegetation community. The issues that are inherent in protecting this or any bushland reserve range from drainage issues to illegal dumping. The management issues show a locational or spatial pattern. For example, when mapping the distribution of weeds - the distribution or spread of the weeds is often along an edge near houses; or along creeks (a lot of seeds of weeds are spread by water as well as other methods or vectors).

Topographic map (note orientation of direction North)



Cross-section of Annangrove Reserve



Aerial views of Annangrove Reserve

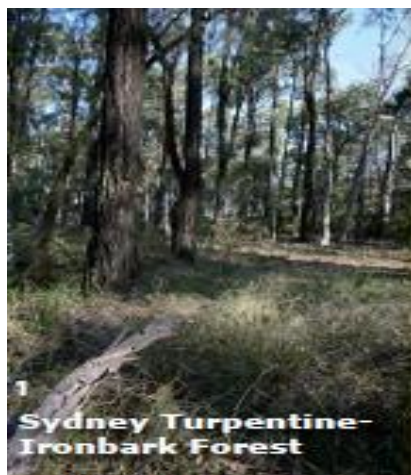


Aerial view showing links to other green corridors
Aerial view of limited walking tracks in upper reserve area



Native plant communities

The character of the Australian bush changes depending on the soil, position in the landscape, climate, and fire history. Particular groups of plants tend to occur together and are known as plant communities. Ecologists and botanists have developed a standard way of defining types and someone used to the Sydney bush can recognise them. There are 5 distinct communities in Annangrove Reserve, and some variation within them. They don't have precise boundaries but grade into one another. Annangrove Reserve is unusual because it still has remnants of the bush that grew on Sydney's shale soils. These communities are now very rare, and this is recognised under state and federal legislation: Sydney Turpentine-Ironbark Forest and Shale-Sandstone Transition Forest were declared endangered ecological communities in 1998.



1
Sydney Turpentine-Ironbark Forest

1 In higher areas on flat or gently sloping shale country

Status: endangered

Trees Red Mahogany *Eucalyptus resinifera*, Grey Gum *Eucalyptus punctata*, Forest Oak *Allocasuarina torulosa*, Turpentine *Syncarpia glomulifera*, Native Cherry *Exocarpus cupressiformis*.

Shrubs Bearded Heath *Leucopogon juniperinus*, Blackthorn *Bursaria spinosa*, Breynia *Breynia oblongifolia*.

Climbers Happy Wanderer *Hardenbergia violacea*, Running Postman *Kennedia rubicunda*.

Ground layer Often thick with many grasses and lilies e.g. Kangaroo Grass *Themeda australis*, Wallaby Grass *Austrodanthonia tenuior*, Wiry Panic grass *Panicum simile*, Pratia *Pratia purpurascens*, Flax-lily *Dianella revoluta*, Sword-



2
Shale-sandstone Transition Forest

Downslope of the Ironbark forest where sandstone and shale soils mix **Status: endangered** Plants from sandy and clay soils grow together. Includes many significant plants e.g. the endangered Downy Wattle *Acacia pubescens*, and Purple Heath *Epacris purpurascens*

2 On soils with more shale

Trees 20–30m e.g. Broad-leaved Ironbark *Eucalyptus fibrosa*, Grey Gum *E. punctata*, Stringybark *E. eugenoides*, Red Bloodwood *E. gummifera*.

Shrubs Bearded Heath *Leucopogon juniperinus*. More clay species e.g. Downy Wattle *Acacia pubescens*, Paper Daisy *Cassinia aculeata*, Bush Pea *Pultenaea scabra*, Sickle Wattle *Acacia falcata*.

Ground layer Often thick swards e.g. Kangaroo Grass *Themeda australis*, Sword-sedge *Lepidosperma laterale*, Wallaby Grass *Danthonia* spp.

3 On soils with more sandstone

Trees 20–30m e.g. Scribbly Gum *Eucalyptus schlerophylla*, Grey Gum *Eucalyptus punctata* More Red Bloodwood *Corymbia gummifera*, and Sydney Red Gum *Angophora costata*.

Shrubs Many sandstone species e.g. Green Spider Flower *Grevillea mucronulata*, Hairpin Banksia *Banksia spinulosa*, Large leaved Geebung *Persoonia levis*.

Ground layer Often thick swards e.g. Kangaroo grass *Themeda australis*, Sword-sedge *Lepidosperma laterale*. More Spear Grass *Stipa pubescens* and *Lomandra longifolia*.

Sydney Turpentine Ironbark Forest

Map 30: Sydney Turpentine-ironbark Forest



- Only 0.5% of the original area remains in small patches within urban or rural areas
- Castle Hill & shale capped ridges - Ellerman Park, Annangrove, Dural
- 10% in formal reserves

Fauna of the Shale Forests



- Map shows survey sites for Councils 'silent night' micro bat monitoring program
- 40 properties surveyed and 17 micro-bat species detected. Seven of which are listed threatened species.



SYDNEY TURPINTINE IRONBARK FOREST (STIF)

Distribution

The STIF vegetation community is found contained in the thin strip of vegetation cover on the western edge of Annangrove Park. It does not extend (in a northerly direction) much beyond the car park and the tennis courts at the rear of the oval. This is due to the underlying geology and land clearing that has occurred in the past. The underlying shale layer capping does not spread much beyond the ridgeline. The distribution of this community has also become limited due to past historical landuses that occurred in the area (such as logging and clearing for farming). The shale areas provided the better soils for farming and a number of orchards and nurseries occurred along Annangrove Road which follows the line of the ridge top. (The road followed the ridge top for ease of transport as well). This small but critical strip has been maintained and managed along the western side of Annangrove Park.

Description

STIF is a relatively tall open forest type, normally associated with fairly fertile soils. The dominant canopy (tree) species are Narrow leaf Ironbark (*Eucalyptus cerebra*), Broadleaf Ironbark (*Eucalyptus fibrosa*) and normally Turpentine trees (*Syncarpia glomulifera*). On the boundary with the next vegetation community you can find some other tall trees like Stringybark, Scaly Barks and Angophoras.

There is only some sparse understorey species such as young wattles, *Pittosporum undulatum* (very invasive species) and *Allocasaurina*. This lack of understorey is mainly the result of an altered fire regime that has resulted in the reduction in the occurrence of fire and the past mowing of the site. There is an active bushcare program now in operation to protect and promote the rejuvenation of the site. See the signage along the edge of the site.

There are mainly grasses as ground cover. There are present some exotic grasses (introduced weed species) like African Love Grass (*Eragrostis curvula*) which is a very invasive grass.

Classification

STIF is classified as an endangered STIF community at the State level and critically endangered at the national level. Only 0.5 % of the original areas remain and these are located in small, fragmented and highly modified remnants like the area found alongside Annangrove Park.

Main key management issues

- Interface issues due to urban expansion (closeness and high impact of activities)
- Recreational landuse – oval expansion and water management
- Only small remnant community of a few hectares within this reserve
- Fragmented and isolated patch remains; subject to further degradation
- Long and narrow site (high edge effect) providing a poor habitat rating
- Lack of community awareness esp. understanding of classification and bushcare efforts

Strategies

- Identification of critical habitat and the enforcement of Legislation
- Better mapping of sites - use of on-ground surveying and satellite images
- Bushcare – employing suitable bush regeneration techniques
- Community Engagement – better education and awareness of critical veg communities
- Greater co-ordination between levels of government

THREATENED SPECIES ASSOCIATED WITH SHALE COMMUNITIES

FLORA

- *Pimelea spicata* (now likely extinct in the Hills)
- *Epacris purpurascens* var. *purpurascens* (V)
- *Persoonia hirsuta* (E)
- *Pimelea curviflora* var. *curviflora* (V)
- *Acacia pubescens* (V)
- *Dillwynia tenuifolia* (endangered population)



Persoonia hirsuta

FAUNA

- Glossy Black Cockatoo
- Grey-headed Flying Fox
- Cumberland Land Snail
- Eastern Pygmy Possum
- Gang Gang Cockatoo
- Yellow-bellied Glider



Empty shells of
Cumberland Land Snail



Yellow-bellied Glider

MICRO-BATS

Councils 'silent night' micro bat monitoring program surveyed 40 properties and 17 species were detected, seven of which are listed as threatened species. They comprise a large part of the mammal diversity within the Shire and are important for biological control of pest insects, pollination of plants and seed dispersal.

MICRO-BAT HABITAT

- Trees – under bark, in crevices, small hollows
- Caves – Sandstone caves & overhangs, man-made structures eg stormwater pipes, road culverts, old buildings, disused mines

FAST MICRO-BAT FACTS

- They are mammals & they nourish their young with milk
- They love to eat pest insects e.g. lawn grub moths, weevils, beetle, midges, flying termites, mosquitoes – biological control
- Important for pollinating and dispersing the seeds of plants



Shale Sandstone Transition Forest

Threatened Species



Vulnerable

Epacris purpurascens

- Shrub to 1.5 m high with small pointed heath-like leaves & white/pink tubular flowers in autumn to spring
- Prefers poorly drained sites
- Killed by fire

Gang Gang Cockatoo

- Grey bird to 37 cm long, males with red head & crest (females grey)
- Moves to lower altitudes in winter including urban areas
- Favours larger trees for nests & roosting



Shale Sandstone Transition Forest

Threatened Species



Vulnerable

Eastern Pygmy Possum

- Tiny climber with tail that can curl around & grip
- Feed on insects, nectar & pollen, mostly warmer months
- Found in small hollows, old bird nests, holes in ground etc.
- Night survey with traps & spot light

Yellow-bellied Glider

- Large, active & vocal glider to 30 cm long & tail 45 cm long
- Gliding membrane from wrist to ankle for movement
- Feed on plants (e.g. nectar, sap) & insects
- Leave v-shaped scar on food trees when extract sap
- Live in family groups in hollows of large trees
- Survey at night (spot-light) as nocturnal

Vulnerable

Potential impacts



- Edge effects between bushland & development
- Reduce genetic diversity & resilience
- Loss of fauna habitat e.g. bat roost site under bridge culvert
- Disturbance to nesting threatened birds

What can go wrong?

Interface between residential areas and threatened communities are subject to many threats



Council reserves

- Bike Jumps
- Clearing & damage
- Soil dumping
- Garden clippings
- Plantings
- ❖ Highly restricted community
- ❖ Only a few ha within local reserves

SHALE SANDSTONE TRANSITION FOREST (SSTF)

Distribution

SSTF occurs immediately north of the STIF. It starts near the tennis court and extends from the ridge top down the slope for a distance of approximately 50 metres. The SSTF is primarily associated with the underlying geological transition from the Hawkesbury Shale to the Hawkesbury Sandstone. This vegetation community is termed an Eco tone (ecological transition zone) as it tends to contain elements of both of the adjoining vegetation communities.

Description

The areas closest to the shale exhibit a vegetation cover with a more open forest to woodland structure, whilst the areas further down the slope become a woodland to a low open woodland or are covered by dense scrub.

The dominant canopy species are Stringybark (*Eucalyptus sparifolia*) Red bloodwoods (*Corymbia gummifera*) Scaly Bark (*Eucalyptus squamosa*) and Angophora (*A. Bayerei*) She-oaks (*Allocasuarina littoralis*), Broadleaf geebung (*Persoonia levis*) or Narrowleaf geebung *Persoonia linearis* are all found in the highly variable understorey. There are some grassy areas Small population of endangered herb (*Pimelia curviflora*) occurs below the scout hall and the vulnerable groundcover *Darwinia biflora* is present in large numbers. Orchid plants flower at the right time of the year.

Classification

SSTF is listed as an endangered community at the state and national level. In NSW it is estimated that less than 16% of the pre-European coverage of this community remains.

Key Management Issues

- Small extent of the community that remains
- Problems with increased drainage off sealed roads
- Seepage problems from the septic toilet sewerage system
- Degradation of the existing Casuarina stand and loss of feed trees for Glossy Black Cockatoos
- Problem of littering and small scale dumping of rubbish and household waste
- Small section of weed infestation at the end of Currie Ave (privet and blackberry)

Strategies

- Revegetate casuarina stand and restrict access
- Mitigate drainage problems with excess water and nutrients entering site
- Bushcare

SANDSTONE RIDGETOP WOODLAND

Distribution

This woodland community occurs predominately on the middle to lower part of the slope. The underlying geology is now dominated by sandstone. There is an area of exposed rock platforms that form a rock shelf and these support a wet heath community. The vegetation community changes again when the topography steepens with a sharp drop into a deep gully. It is in this area that the Sandstone gully forest appears.

Classification

Not listed as endangered and common in the shire as not heavily settled.



4 Sydney Sandstone Ridgetop Woodland 5 6

On the mid-slopes, e.g. around Caterson Drive Status: uncommon The Scribbly Gum *Eucalyptus schlerophylla*, Narrow-leaved Apple *Angophora bakeri* Woodland is particularly unusual: known from only a few scattered remnants in the upper Cattal and close by along Toongabbie Creek Soils are generally shallow and sandy with some deeper pockets and clay rich patches. Shrub layer is thick and ground layer medium to dense

4 On shallow rocky soils.

Trees 10-15m e.g. Scribbly Gum *Eucalyptus schlerophylla*, Narrow-leaved Apple *Angophora bakeri*, Cattal Mahogany *Eucalyptus catta*.

Shrubs Narrow-leaved Geebung *Persoonia linearis*, Hairy Geebung *Persoonia hirsuta*, *Grevillea mucronulata*, Bushy Needlebush *Hakea serecia*, Hairpin Banksia *Banksia spinulosa*, Everlasting *Ozothamnus diosmifolius*, Tick Bush, *Kunzea ambigua*, Five Corners *Styphelia laeta*, Rice Flower *Pimelia linifolia*, Purple Heath *Epacris purpurascens*.

Groundlayer *Dianella prunina*, *Lomandra Lomandra longifolia*,

5 On lower slopes and pockets of deeper soil

Trees 15–20m e.g. Scribbly Gum *Eucalyptus schlerophylla*, Sydney Red Gum *Angophora costata*.

Shrubs Bridal Daisy Bush *Olearia microphlla*, Bush Pea *Pultneaea villosa*, Narrow-leaved Geebung *Persoonia linearis*, Hairy Geebung *Persoonia hirsuta*, *Grevillea mucronulata*, Bushy needlebush *Hakea serecia*, Hairpin Banksia *Banksia spinulosa*, Rice flower *Pimelia linifolia*.

Groundlayer *Lomandra Lomandra longifolia*, Weeping Meadow Grass *Microlaena stipoides*.

6 Swampy low open woodland. In wet patches—often with groundwater discharge

Trees 4–10m e.g. Scribbly Gum *Eucalyptus schlerophylla*, Narrow-leaved Apple *Angophora bakeri*.

Shrubs Narrow-leaved Bottlebrush *Callistemon linearis*, Hairpin Banksia *Banksia spinulosa*, Purple Heath *Epacris purpurascens*, Tick Bush *Kunzea ambigua*.

Groundlayer *Lepidosperma laterale*, Scale Rush *Lepyrodia scariosa*.

Description

Sandstone ridgetop woodland is structurally variable. The shrub density varies according to the frequency of fire. In this site the absence of fire has resulted in the presence of a large amount of woody debris and the occurrence of semi-senescent scrub like *Banksia ericifolia* and *Leptospermum* (tea tree) species. There are few trees and these are short and scattered. The main species are Red Bloodwood (*Corymbia gummifera*) and Narrow leaved Stringybark (*Eucalyptus sparsifolia*).

A diverse array of shrub species is present. Common understorey species include *Acacia linifolia*, *Dillwynia retorta*, Paperbarks, Drumsticks and thin leaved Geebung (*Persoonia linearis*). There are a number of larger old man banksias and smaller *Banksia ericifolia*. The ground stratum or cover is also quite diverse and features a diverse range of wildflowers when in season; such species include *Dionellas* and *Cyathochaeta diandra*.

Key Management Issues

- Illegal dumping
- Clearing under power lines by energy supply companies
- Changes to asset protection zones under the new 10/40 rule
- Presence of feral animals such as rabbits, foxes and wild deer
- Maintain key habitat features like bush rock, old trees, dead trees etc.

Strategies

- Enforcement (RID) Regional Illegal Dumping squad
- Baiting program for foxes and rabbits
- Consultation with other government agencies
- Sustainable management of key bush features

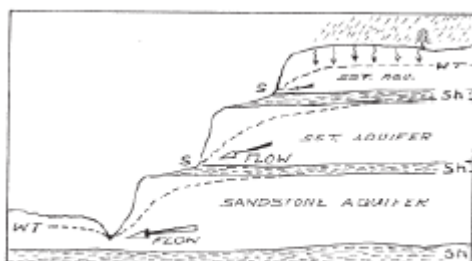
SANDSTONE HEATH

Distribution

This community has very limited distribution. It is restricted to areas where the soil is extremely shallow and has locally impeded drainage caused by the presence of a large, generally flat sandstone shelf or ledge. This forces water to pool or collect here forming a geographical feature often referred to as a hanging swamp. This swamp or wet heath area is only found in a limited area on the eastern side of the reserve but is a more common in adjoining properties.

Description

The vegetation comprises a form of sedge land or wet tussocky grass, dominated by *Leptocarpus tenax* and *Lepidosperma* spp. intermixed with wet heath on the fringes of the typical sandstone flora. This situation is rare in this area due to geological and rainfall constraints.



Schematic portrayal of sandstone (SST) aquifers, shale (Sh) aquicludes, the water table and the springs (S).

Classification

This community is naturally very limited in extent in general in the Hills Shire and is of local to regional conservation significance.

Management Issues

- Similar to surrounding Sandstone woodland in which it occurs
- Increased runoff and erosion problems removing thin covering of organic material and lichens
- Walking tracks impacting on the thin crust of soil

Strategies

- See Sandstone woodland
- Minimise excess runoff
- Minimise use of walking track

SANDSTONE GULLY FOREST

Distribution

This community occurs in the deeper gully area of the reserve. The gully is the drainage line for one of the tributaries of Blue Gum Creek. The gully is surrounded by steep side and the community is found within these boundaries. The taller forest occurs here because of the occurrence of deeper soils and less exposure to drying winds.



On lower slopes and gully floors and around the creeks **Status: generally common—although the closed forest sub-community is unusual** Soils vary from shallow in rocky area to quite deep in the gully floors, conditions are generally moister than in woodland areas and trees are taller

7 On drier areas shallower soils

Trees 25–30m e.g. Blackbutt *Eucalyptus pilularis*, Sydney Peppermint *E. piperita*, Scribbly Gum *E. sclerophylla*, Red Mahogany *E. resinifera*, Sydney Red Gum *Angophora costata*.

Shrubs Sparse to medium e.g. Hairpin Banksia *Banksia spinulosa*, Bushy Needlebush *Hakea sericea*, Everlasting *Ozothamnus diosmifolius*, Sydney Golden Wattle *Acacia longifolia*.

Groundlayer Many grasses and herbs e.g. *Lomandra longifolia*, Weeping Meadow Grass *Microlaena stipoides*, Oat Spear Grass *Anisopogon avenaceus*, Pixie Orchid *Acianthus formicatus*.

8 On south facing gullies, or lower slopes with deeper soils

Trees 25–30m e.g. Blackbutt *Eucalyptus pilularis*, Sydney Red Gum *Angophora costata*, *Eucalyptus resinifera*, Christmas Bush *Ceratopetalum gummiferum*

Shrubs usually dense e.g. Graceful Bush-pea *Pultenaea flexilis*, Lemon-scented Tea-tree *Leptospermum polygalifolium*. Often invaded by privet and honeysuckle.

Groundlayer Many ferns and sedges e.g. *Lomandra longifolia*, Bog Rush *Schoenus melanostachys*, Saw Sedge *Gahnia sieberana*, Maidenhair *Adiantum aethiopicum*, Pixie Orchid *Acianthus formicatus*.

Climbers Old Man's Beard *Clematis aristata*, Wombat Berry *Eustrephus latifolius*.

9 Closed forest. On deep, moist soils of the gully floor. One small patch on the northern side of Castle Hill Creek

Trees Dense sub-canopy of White Cherry *Schizomeria ovata* and Christmas Bush *Ceratopetalum gummiferum* underneath taller Sydney Red Gum *Angophora costata*.

Groundlayer Soft Bracken *Calochlaena dubia*, Gristle Fern *Blechnum cartilagenium*. Invaded by the weed Trad *Tradescantia fulminenses*.

Climbers Old Man's Beard *Clematis aristata*.

Description

The trees that dominate the gully are quite tall and have an obvious canopy cover due to the close spacing of the trees. This is a good example of a tall closed forest community. The canopy is dominated by *Eucalyptus piperita*, and *Corymbia gummifera*, specimens which can exceed 20m in height. *E. punctata* and *Angophora bakeri* species can also be found.

The Understorey is diverse and contains species normally associated with sandstone rock outcrops and benches like *Acacia linifolia*, *Dillwynia retorta*, *Hakeas*, *She oaks*, *Geebung*s and *Pittosporum*.

Classification

Sydney sandstone Gully Forest is well conserved because it generally occurs on steep and relatively infertile slopes, which are unsuited for cropping or even rough grazing.

Key Management issues

Weed invasion along creek lines

Feral pests

Strategies

Noxious weed control by agencies like HRCC

Feral pest control by THSC and LLS

Sydney Sandstone Gully Forest

TREES

Angophora costata (Smooth-barked Apple)
Corymbia gummifera (Red Bloodwood)
Eucalyptus globoidea (White Stringybark)
Eucalyptus haemastoma (Broad-leaved Scribbly Gum)
Eucalyptus piperita (Sydney Peppermint)
Eucalyptus punctata (Grey Gum)



SHRUBS

Acacia spp (Wattle)
Allocasuarina littoralis (Black She-oak)
Banksia spinulosa var *spinulosa* (Hairpin Banksia)
Cassinia uncinata (Sticky Cassinia)
Gompholobium grandiflorum (Large Wedge Pea)
Grevillea spp (Spider flower)
Hakea dactyloides (Finger Hakea)
Lambertia formosa (Mountain Devil)
Leptospermum polygalifolium ssp *polygalifolium*
Ozothamnus diosmifolius (White Dogwood)
Persoonia spp. (Geebung)
Pittosporum undulatum (Sweet Pittosporum)



GROUNDCOVERS

Aristida vagans (Threeawn Speargrass)
Juncus spp (Rush)
Lomandra spp. (Mat-rush)
Microlaena stipoides (Weeping Meadow Grass)
Fomax umbellata
Pratia purpurascens (Whiteroot)
Pteridium esculentum (Bracken)
Rytidosperma tenuius (Wallaby Grass)
Xanthorrhoea spp (Grass Tree)



KEY THREATENED PLANTS TO LOOK FOR:

TREE

Eucalyptus camfieldii
Eucalyptus sp. Cattai



SHRUB

Acacia bynoeana
Acacia gordonii
Callistemon linearifolius
Darwinia biflora
Darwinia peduncularis
Grevillea parviflora ssp. *supplicans*
Hibbertia superans
Melaleuca deanei
Olearia cordata
Persoonia hirsuta
Pimelea curviflora var. *curviflora*
Zienia involucreata

GROUNDCOVER

Tetraloche glandulosa

Vegetation species list and threatened species with potential to occur on-site from Hayes 2013

Key habitat features:

A mature eucalypt woodland with hollows, a dense shrub layer, leaf litter, exposed sandstone boulders, small crevices and rock overhangs.

KEY THREATENED ANIMALS TO LOOK FOR:

BIRDS

Gang Gang Cockatoo (*Callocephalon fimbriatum*)
Glossy Black Cockatoo (*Calyptorhynchus lathamii*)
Speckled Warbler (*Chthonicola sagittata*)
Varied Sittella (*Daphoenositta chrysoptera*)
Little Lorikeet (*Glossopsitta pusilla*)
Little Eagle (*Hieraaetus morphnoides*)
Swift Parrot (*Lathamus discolor*)
Barking Owl (*Ninox connivens*)
Powerful Owl (*Ninox strenua*)
Scarlet Robin (*Petroica boodang*)
Flame Robin (*Petroica phoenicea*)
Masked Owl (*Tyto novaehollandiae*)



MAMMALS

Spotted-tailed Quoll (*Dasyurus maculatus*)
Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)
Little Bent-wing Bat (*Miniopterus australis*)
Eastern Bent-wing Bat (*Miniopterus schreibersii oceanensis*)
Eastern Freetail Bat (*Mormopterus norfolkensis*)
Squirrel Glider (*Petaurus norfolcensis*)
Koala (*Phascolarctos cinereus*)
Grey-headed Flying-fox (*Pteropus poliocephalus*)
Yellow-bellied Sheath-tail Bat (*Saccolaimus flaviventris*)
Greater Broad-nosed Bat (*Scoteanax rueppellii*)



AMPHIBIANS

Giant Burrowing Frog (*Heleioporus australiacus*)
Red-crowned Toadlet (*Pseudophryne australis*)



REPTILES

Rosenberg's Goanna (*Varanus rosenbergi*)

Threatened species with potential to occur on-site from Hayes 2013



The importance of fieldwork for the management of natural resources.

A presentation by Gerard Nolan.

Basic fieldwork provides data about:

- The species (flora and fauna) are found at a site (What)
- The distribution pattern of the species identified (Where)
- The number of species identified (How many)
- The types/classification of the vegetation community
- The habitat features that are present on the site

Fieldwork undertaken by council (How) includes:

- Collecting flora and fauna specimens
- Collecting traces of fauna specimens
- Surveying for a variety of fauna species
- Undertaking long term trapping or surveying
- Undertaking night time surveys

GIS support work to supplement this fieldwork includes:

- Satellite imaging
- Aerial photography
- Infra-red and other sensory data
- Topographic surveying

Outcome: Production of vegetation maps of the surveyed vegetation communities and site maps of the surveyed fauna

Field work is important in that the data that you collect can provide critical information for management planning, for instance:

- The possible threats to the site, for example the impact of weeds or feral animals;
- Past changes to the site, for example altered fire regimes or the addition of fill;
- Historical development of the site in terms of past landuse, for example increased nutrient levels in the soil or surrounding creeks;
- The possible strategies required to manage the site, for example providing guidelines for the conservation of species in new development areas or providing baiting programs for pests.

Management strategies mainly fall into one of the following areas or categories:

- Legislation
- Enforcement (policing)
- Economic policies
- Community engagement and Education

The importance of Annangrove Reserve.

An article on Annangrove Reserve by Leslie Waite.

We are fortunate in Annangrove Reserve to have a very diverse range of plants and plant communities, some of which have great value because of their rarity. This diversity is here at Annangrove Reserve because of a specific set of conditions which allow us to observe the natural progression of plant communities on a shale-capped, sandstone slope:

- Rich shale soil on the ridge top, (Ironbark Woodland)
- Gently sloping land where the shale soils mix with the underlying sandstone (Shale-Sandstone Transition Forest)
- Steeper slope where the sandstone soils are poor and thin (Sandstone Woodland)
- Rugged and steep, sheltered area at the bottom of the slope (Sandstone Gully Forest)
- In addition there is a patch of sandstone heath on shallow sandstone soils and a boggy sedge land on a poorly drained sandstone shelf.

These ecological communities are important because of their limited distribution and occurrence.

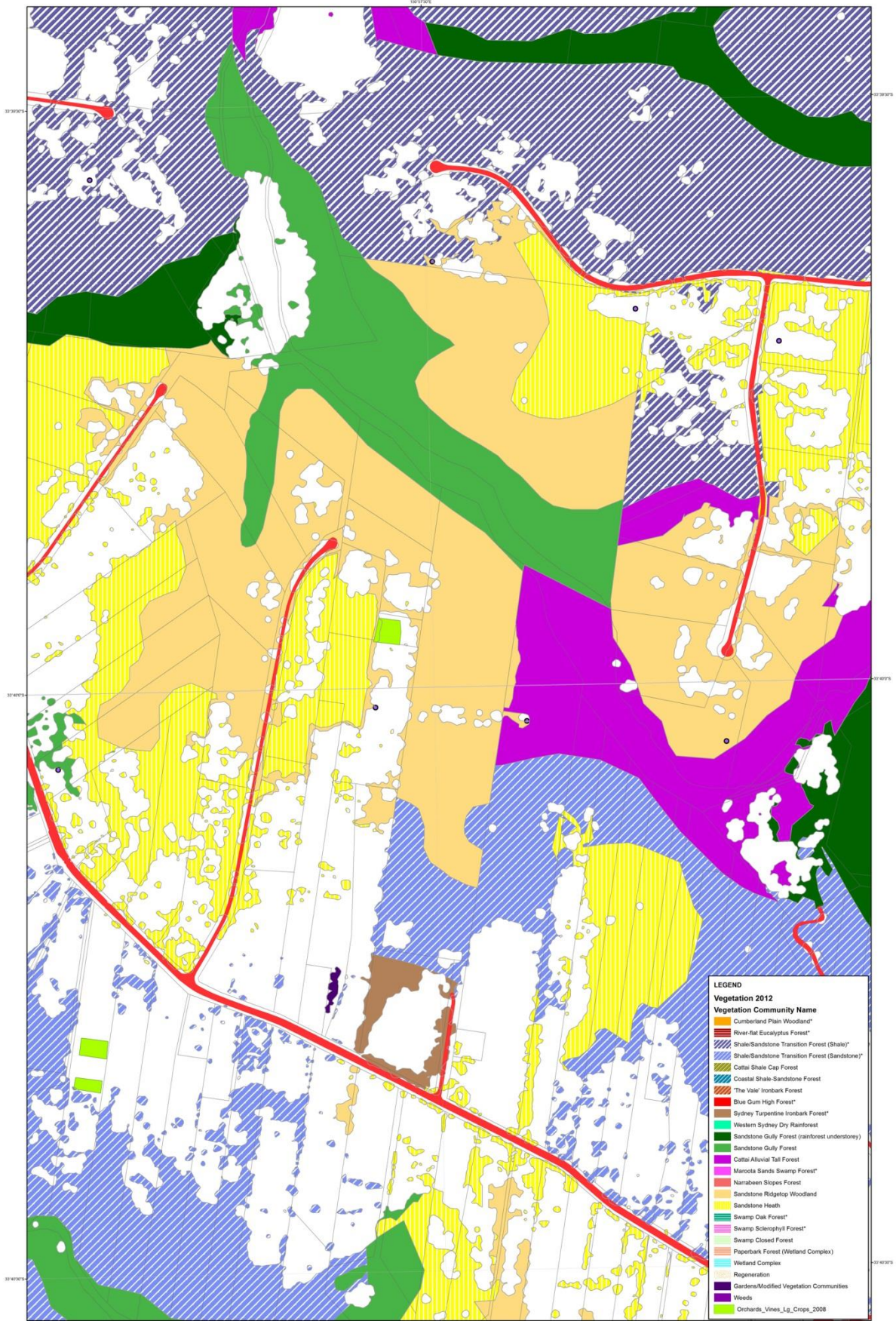
The Definition of an Ecological Community

"A diverse yet recognisable association of plants that occupy a specific geographic area where the relationship and interaction between species is of interest.

"An inter-related and inter-dependent assemblage of vegetation that has structural and species diversity and forms a recognisable association".

Because Annangrove Reserve is a unique and ecologically important area the council staff and local volunteers are working towards:

1. **Documenting the plants and plant communities** by conducting a 'Significant Plant Species' and 'Native Plant Species and Plant Communities' surveys of the Park
2. **Protecting what we have left** by holding a Community Bushcare morning on the second Sunday of every month. Contact Elaine – Community Volunteer (9679 1536) or Fresa -Council Officer, for registration and information (9843 0555)
3. **Educating the community** about this area of natural and unique beauty by
 - a. Holding a variety of workshops - e.g. bush photography, bushwalks concentrating on plant id and ecology
 - b. Producing handouts and information sheets on various aspects of our bushland
 - c. Publishing a booklet "Seasonal Wildflower Identification for Annangrove Park"



- LEGEND**
- Vegetation 2012**
- Vegetation Community Name**
- Cumberland Plain Woodland*
 - River-flat Eucalyptus Forest*
 - Shale/Sandstone Transition Forest (Shale)*
 - Shale/Sandstone Transition Forest (Sandstone)*
 - Cattai Shale Cap Forest
 - Coastal Shale-Sandstone Forest
 - The Vale/ Ironbark Forest
 - Blue Gum High Forest*
 - Sydney Turpentine Ironbark Forest*
 - Western Sydney Dry Rainforest
 - Sandstone Gully Forest (rainforest understorey)
 - Sandstone Gully Forest
 - Cattai Alluvial Tall Forest
 - Maroola Sands Swamp Forest*
 - Narrabeen Slopes Forest
 - Sandstone Ridgtop Woodland
 - Sandstone Heath
 - Swamp Oak Forest*
 - Swamp Sclerophyll Forest*
 - Swamp Closed Forest
 - Paperbark Forest (Wetland Complex)
 - Wetland Complex
 - Regeneration
 - Gardens/Modified Vegetation Communities
 - Weeds
 - Orchards_Vines_Lg_Crops_2008

THE HILLS
 Sydneys Garden Shire
 THE HILLS SHIRE COUNCIL

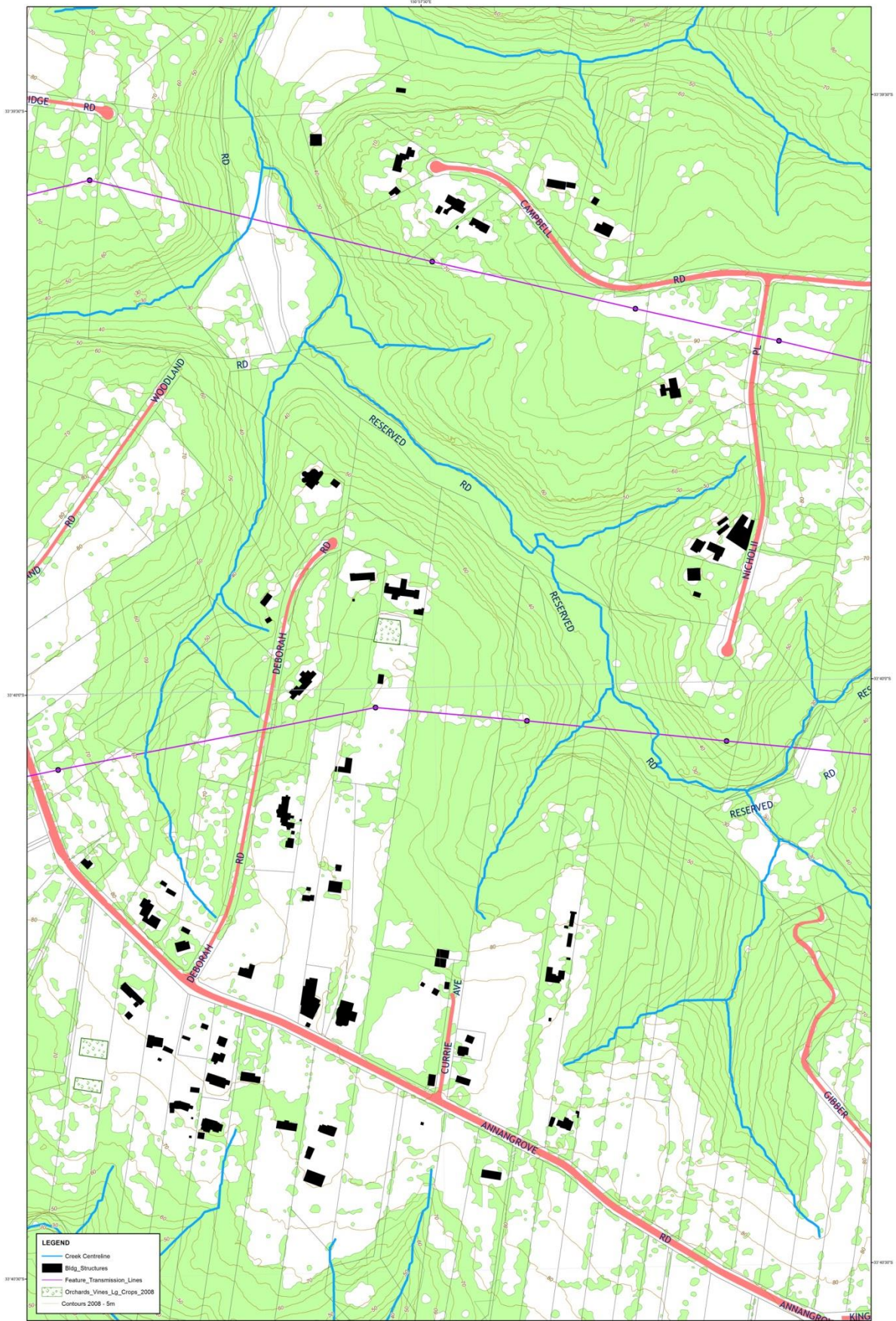
ANNANGROVE PARK
 SCALE : 1 : 2,500



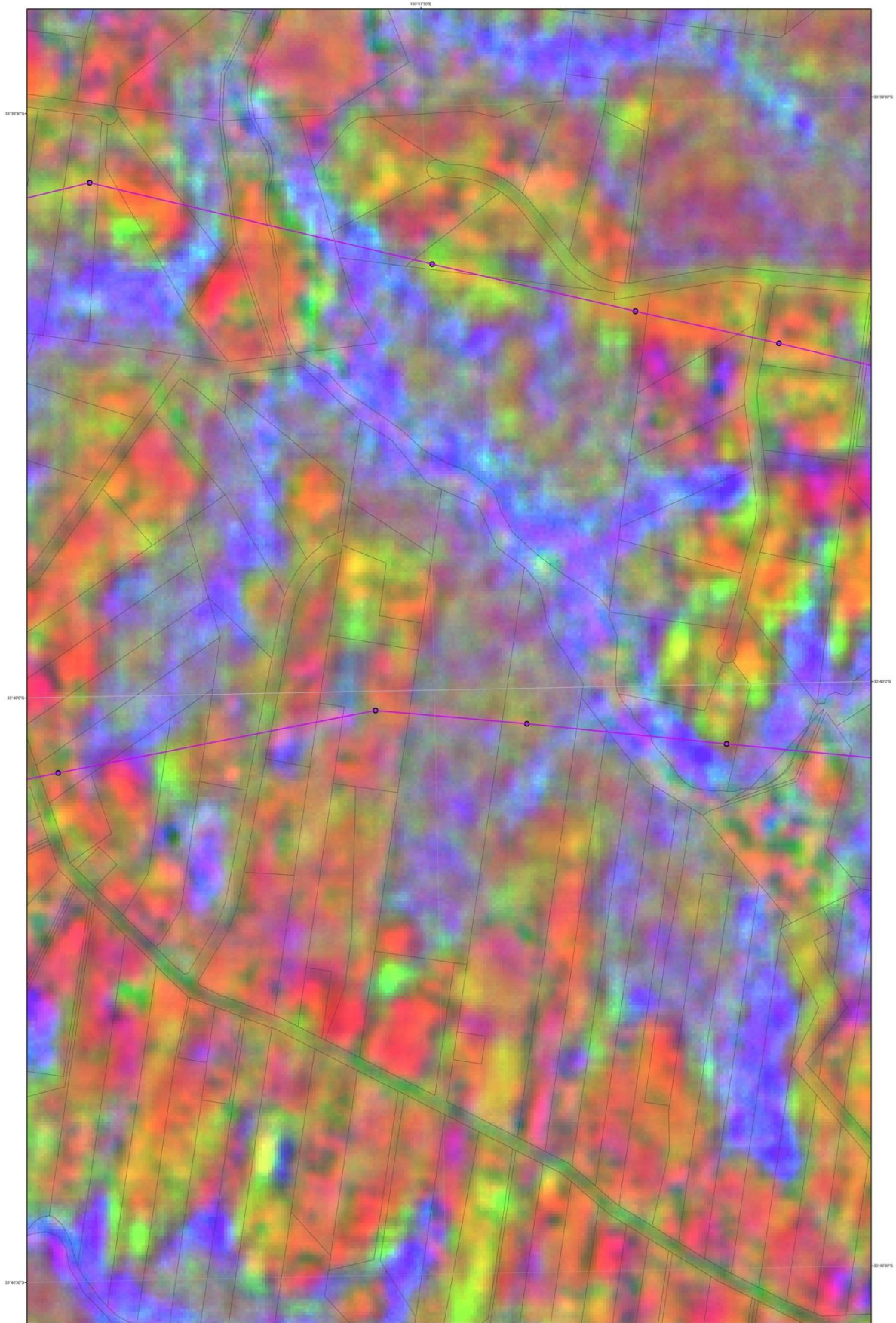
2012 VEGETATION

PROJECTION: GDA / MGA 94 Zone 56
 LAT: LONG: 30" increments









THE HILLS
 Sydney's Garden Shire
 THE HILLS SHIRE COUNCIL

ANNANGROVE PARK

SWIR GEOLGY & SOILS

SCALE : 1:2,500

RED = PCA 1 SWIR 1550 - 2450nm
 GREEN = SWIR ALQH RATIO
 BLUE = SWIR CLAY RATIO

NOTES
 The SWIR (Short Wave Infra Red) Channels displayed here cover the 1550 - 2450 Nanometre range. Resolution has been resampled to 5 metres GSD. All Imagery has been derived from Satellites.
 PROJECTION: GDA / MGA 94 Zone 56
 LAT LONG 30" Increments



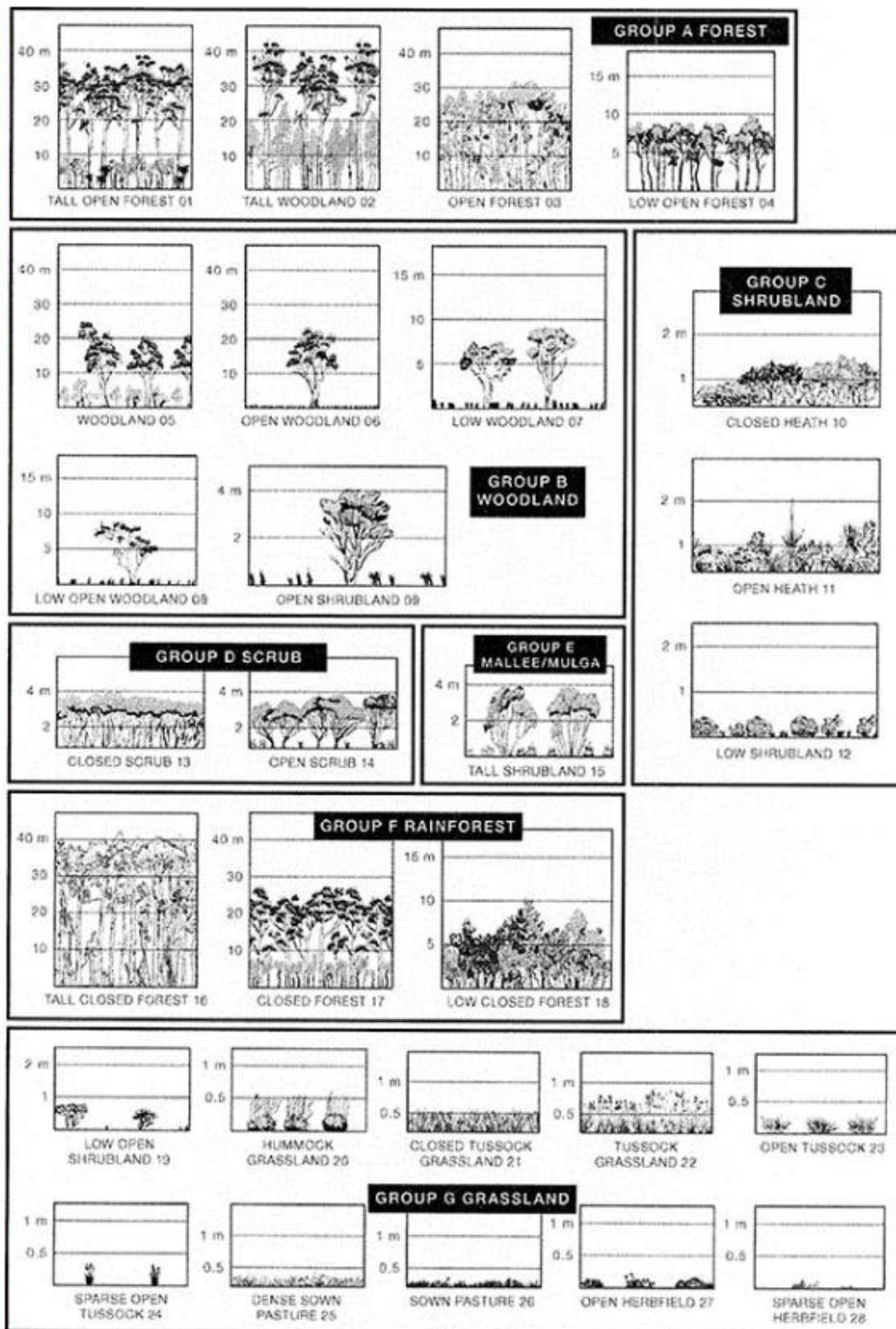
Table 1: Structural Classification of Vegetation

Projective Foliage Cover of the Tallest Stratum					
Life form of tallest stratum	70-100%	50-70%	30-50%	10-30%	<10%
Trees >30m	Tall Closed Forest	Tall Forest	Tall Open Forest	Tall Woodland	(N/A)
Trees 10-30m	Closed Forest	Forest	Open Forest	Woodland	Open Woodland
Trees <10m	Low Closed Forest	Low Forest	Low Open Forest	Low Woodland	Low Open Woodland
Shrubs >2m	Closed Scrub	Scrub	Open Scrub	Tall Shrubland	Tall Open Shrubland
Shrubs (S) 0.25-2m	Closed Heathland	Heathland	Open Heathland	Shrubland	Open Shrubland
Shrubs (NS) 0.25-2m	(N/A)	(N/A)	Low Shrubland	Low Shrubland	Low Open Shrubland
Shrubs (S) <0.25m	(N/A)	(N/A)	(N/A)	Dwarf Open Heathland	Dwarf Open Heathland
Shrubs (NS) <0.25m	(N/A)	(N/A)	(N/A)	Dwarf Shrubland	Dwarf Open Shrubland
Hummock grasses	(N/A)	(N/A)	(N/A)	Hummock Grassland	Open Hummock Grassland
Tussock grasses	Closed Grassland	Grassland	Grassland	Open Grassland	Very Open Grassland
Sedges	Closed Sedgeland	Sedgeland	Sedgeland	Open Sedgeland	Very Open Sedgeland
Herbs (forbs)	Closed Herbland	Herbland	Herbland	Open Herbland	Very Open Herbland
Ferns	Closed Fernland	Fernland	Fernland	(N/A)	(N/A)

Table 1 gives a version of Specht's system of vegetation classification.

The Specht's system identifies about 50 categories of vegetation systems in Australia. With this system you can make a quick classification of a plant community into one of the following:

- forest (open forest)
- rainforest (closed forest)
- woodland
- scrub/shrubland/heathland
- grassland/sedgeland
- herbland



NOTE: Refer to Figures 2.4(A) to 2.4(G) for greater vegetation detail.

APPENDIX

THREATENED FLORA SPECIES KNOWN IN THE HILLS SHIRE

	SCIENTIFIC NAME	EPBC	TSC
1.	<i>Acacia bynoeana</i> (Byone's Wattle)	V	E
2.	<i>Acacia gordonii</i>	E	E
3.	<i>Acacia pubescens</i> (Downy Wattle)	V	V
4.	<i>Ancistrachne maidenii</i>		V
5.	<i>Asterolasia elegans</i>	E	E
6.	<i>Darwinia biflora</i>	V	V
7.	<i>Dillwynia tenuifolia</i>	V	V
8.	<i>Epacris purpurascens</i> var. <i>purpurascens</i>	V	V
9.	<i>Eucalyptus</i> sp. <i>Cattai</i>		E
10.	<i>Grevillea parviflora</i> subsp. <i>parviflora</i>		V
11.	<i>Grevillea parviflora</i> subsp. <i>Supplicans</i>		E
12.	<i>Hibbertia superans</i>		E
13.	<i>Kunzea rupestris</i>	V	V
14.	<i>Leucopogon fletcheri</i> subsp. <i>Fletcheri</i>		E
15.	<i>Melaleuca deanei</i> (Deane's Paperbark)	V	V
16.	<i>Micromyrtus blakelyi</i>	V	V
17.	<i>Olearia cordata</i>	V	V
18.	<i>Persoonia hirsuta</i> (Hairy Geebung)	E	E
19.	<i>Persoonia mollis</i> subsp. <i>maxima</i>	E	E
20.	<i>Pimelea curviflora</i> var. <i>curviflora</i>	V	V
21.	<i>Tetratheca glandulosa</i>	V	V
22.	<i>Zieria involucreta</i>	V	E

V - Vulnerable - at risk over a longer period (20-50 years) **

E - Endangered - at serious risk in the short term (one or two decades) **

** Species considered to be either Endangered or Vulnerable are classified as "Threatened".

THREATENED POPULATIONS KNOWN WITHIN THE HILLS SHIRE

	ENDANGERED POPULATION
1	<i>Dillwynia tenuifolia</i>
2	<i>Darwinia fascicularis</i> ssp. <i>Oligantha</i>

ENDANGERED ECOLOGICAL COMMUNITIES KNOWN WITHIN THE HILLS SHIRE

	ECOLOGICAL COMMUNITY
1	Blue Gum High Forest
2	Cumberland Plain Woodland
3	Sydney Turpentine-Ironbark Forest
4	Shale-Sandstone Transition Forest
5	Swamp Sclerophyll Forest on Coastal Floodplains
6	River-Flat Eucalypt Forest on Coastal Floodplains
7	Freshwater Wetlands on Coastal Floodplains
8	Sydney Freshwater Wetlands
9	Swamp Oak Floodplain Forest
10	Western Sydney Dry Rainforest
11	Maroota Sands Swamp Forest

APPENDIX I – THREATENED SPECIES IN THE HILLS SHIRE

THREATENED FAUNA SPECIES KNOWN IN THE HILLS SHIRE

	COMMON NAME	SCIENTIFIC NAME	EPBC	TSC
1.	Swift Parrot	<i>Lathamus discolor</i>	E	E
2.	Regent Honeyeater	<i>Xanthomyza phrygia</i>	E	E
3.	Eastern Pygmy Possum	<i>Cercartetus nanus</i>		E
4.	Cumberland Plain Land Snail	<i>Meridolum corneovirens</i>		E
5.	Spotted-tailed Quoll	<i>Dasyurus maculates</i>	E	V
6.	Giant Burrowing Frog	<i>Heleioporus australiacus</i>	V	V
7.	Superb Parrot	<i>Polytelis swainsonii</i>	V	V
8.	Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>	V	V
9.	Australasian Bittern	<i>Botaurus poiciloptilus</i>		V
10.	Barking Owl	<i>Ninox connivens</i>		V
11.	Black Bittern	<i>Ixobrychus flavicollis</i>		V
12.	Black-chinned Honeyeater (eastern subspecies)	<i>Melithreptus gularis gularis</i>		V
13.	Brown Treecreeper	<i>Climacteris picumnus</i>		V
14.	Comb-crested Jacana	<i>Irediparra gallinacea</i>		V
15.	Diamond Firetail	<i>Stagonopleura guttata</i>		V
16.	Eastern Bentwing-bat	<i>Miniopterus schreibersii oceane</i>		V
17.	Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>		V
18.	Eastern Freetail-bat	<i>Mormopterus norfolkensis</i>		V
19.	Freckled Duck	<i>Stictonetta naevosa</i>		V
20.	Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>		V
21.	Glossy Black-Cockatoo	<i>Calyptorhynchus lathami</i>		V
22.	Greater Broad-nosed Bat	<i>Scoteanax rueppellii</i>		V
23.	Hooded Robin	<i>Melanodryas cucullata</i>		V
24.	Koala	<i>Phascolarctos cinereus</i>	V	V
25.	Large-footed Myotis	<i>Myotis adersus</i>		V
26.	Little Eagle	<i>Hieraaetus morphnoides</i>		V
27.	Little Lorikeet	<i>Glossopsitta pusilla</i>		V
28.	Masked Owl	<i>Tyto novaehollandiae</i>		V
29.	Osprey	<i>Pandion haliaetus</i>		V
30.	Pink Robin	<i>Petroica rodinogaster</i>		V
31.	Powerful Owl	<i>Ninox strenua</i>		V
32.	Red-crowned Toadlet	<i>Pseudophryne australis</i>		V
33.	Scarlet Robin	<i>Petroica boodang</i>		V
34.	Sooty Owl	<i>Tyto tenebricosa</i>		V
35.	Speckled Warbler	<i>Pyrrholaemus sagittatus</i>		V
36.	Square-tailed Kite	<i>Lophoictinia isura</i>		V
37.	Squirrel Glider	<i>Petaurus norfolcensis</i>		V
38.	Turquoise Parrot	<i>Neophema pulchella</i>		V
39.	Varied Sittella	<i>Daphoenositta chrysoptera</i>		V
40.	Wompoo Fruit-Dove	<i>Ptilinopus magnificus</i>		V
41.	Yellow-bellied Glider	<i>Petaurus australis</i>		V
42.	Yellow-bellied Sheath-tail-bat	<i>Saccolaimus flaviventris</i>		V

History of Annangrove Park and Surrounding Area

General information about Annangrove

The suburb of Annangrove was named after Annangrove House, the home of Edward Johnston. Edward was the grandson of Major George Johnston who led the soldiers against the convict rebels in the Battle of Vinegar Hill in 1804. The house was named after the Scottish town of Annan, where Major Johnston was born. Edward Johnston bought land in the district in 1893 and by 1896 both the post office and the school had taken the name Annangrove after Johnston's house. By 1915 Annangrove was the established name for the district.

The original Annangrove House was situated close to the Community Environment Centre and Annangrove Park. It was burnt down in the great bushfire which swept through the district in 1939.

Annangrove and the surrounding area is mostly sited on Hawkesbury sandstone with ridges divided by deep gullies. Originally the area was heavily wooded and timber cutting was the first industry established here. However, because of the slightly sandy loamy soil, it was found that the district was well suited to the growing of citrus fruits, and this later became the main industry of Annangrove.

The history of settlement

The original inhabitants of the area were Aboriginal people who belonged to the Darug tribe. Although they were nomadic, the Aboriginal people often used caves above permanent water supplies as a home base. Charcoal drawings, shellfish middens, animal bones and stone flakes have been found in caves throughout the Hills Shire.

The earliest Europeans who came to Annangrove were timber loggers in search of ironbark, red and white mahogany, and turpentine wood. The first permanent settlers received land grants in the area from the 1820s. In 1823 James O'Hara (born in the colony of convict parents), was granted a parcel of land, as were Michael Cantwell (a convict who came to the colony in 1810 under a life sentence and was emancipated by Governor Macquarie) and Thomas Sanders (born in the colony in 1799). These early settlers cleared the land and grew maize and wheat, while sheep were raised for meat and wool.

During the 1820s bushrangers also roamed the district. The most infamous of these outlaws was 'Bold' Jack Donohue who was 'the last of the convict outlaws', and the inspiration for the Australian version of the song The Wild Colonial Boy. Donohue's gang robbed in the 'Robin Hood' style, taking from the rich settlers and then selling their stolen goods to the poor settlers in the district. The bushrangers were often helped by settlers and were allowed to use blacksmithing equipment on the farms to shoe their horses.

Whilst the early settlers grew a variety of crops, during the long wet period of the 1860s it was noticed that citrus trees on the more sandy soils were not affected by root rot and this encouraged the establishment of a large citrus industry in the area. The local citrus industry became so successful it was renowned for growing the best oranges and mandarins in Australia at the time. When citrus prices began to fall after World War I, the farmers of the district also began to raise chickens to supplement their income.

The changing face of Annangrove

Long-time residents of the area remember a time in the 1950s when 'swaggies' would come through the district. Swaggies or swagmen were itinerant workers who wandered from district to district. They did odd jobs such as picking crops or cutting wood in exchange for a meal, some sugar or tea. Some swaggies lived in caves or would sleep in

holes in large eucalyptus trees or even under bridges along Pitt Town Road. It was possible to track where the swaggies had been because when they didn't have shoes they would often cut pieces of car tyres and tie them around their feet to use as shoes. Their tracks could then be followed on the dirt roads of the area.

From the 1970s the district began to change as the subdivision of orchards commenced, and they and the poultry farms began to disappear. The district has slowly been transformed by the breakup of the old farm holdings and the establishment of new houses on acreage. Most of this development has occurred on the ridge tops and the gully areas have so far avoided the removal of the original vegetation. The more recent demand for rural properties close to the urban fringe has witnessed the establishment of very large and expensive houses with the more traditional weather-board, fibro houses and even the red brick houses of the seventies being knocked down.

Annangrove Park and the Community Environment Centre

Situated close to the Annangrove shops and the public school is Annangrove Park which has been for many decades the recreational and community centre of the suburb with its Langland's Oval, tennis courts, scout hall, a children's playground and the Girl Guide Hall. Currie Avenue which borders Annangrove Park and is the access road to the recreational facilities is named after Arthur Telfer Currie (1890 – 1969), who came to Annangrove in 1915 and married and settled down in the area. He was heavily involved in the sporting, cultural and social life of Annangrove.

The oval is surrounded by the remains of an old turpentine-ironbark forest and behind the oval is a large natural bushland reserve which supports a number of endangered plant species. The bushland has an extensive collection of flowering plants, which provide an attractive wildflower display in September. A number of plant species found within the bush reserve are classified as threatened. A narrow and informal track has been established to accommodate a bushwalk which allows the general public to experience and appreciate the local natural environment.

The original 1960s tennis club house was remodelled in the 1980s as a playgroup meeting area for young mothers and was used by the Annangrove community for pre-school age children and their families for over a decade.

In 1998 the building became a Community Centre with a Rural Community Development Officer appointed to act as an outreach worker for the local community. The centre provided information on community health and welfare programs, helped to establish sustainable farming practices and raised the awareness of environmental issues.

In 2006 a Community Environment Centre was officially opened in this building, along with a waterwise demonstration garden; later a community demonstration vegetable garden was added to assist in the workshop presentations available to the public. In 2010 an energy efficiency retrofit of the building included the installation of louvers, solar energy panels, solar hot water system, whirlybird fixtures, roof insulation and energy-efficient appliances.

Bibliography

A History of Kenthurst & Annangrove by Catherine Charlton, Nov 1981 (Library no.994.41 CHA)

The Beginnings of the Hills District, the Hills District Historical Society, 1987 (Library no. 994.41 BEG)



Name:

Date:

Class:

Plant Systems at Annangrove Pk Stage 4 Fieldwork

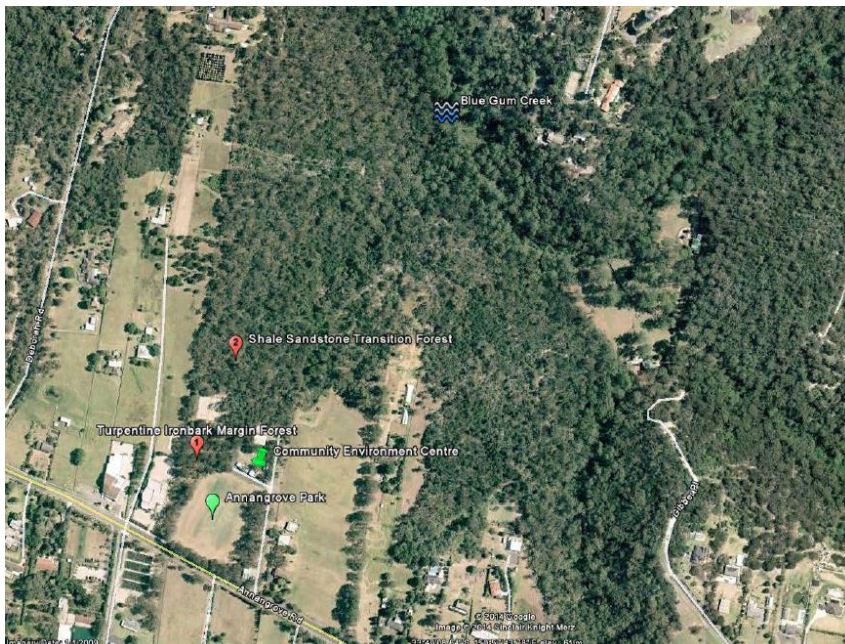
Timetable	
Arrive at Annangrove Park.	9.30am
Introduction and Overview	9.35am
Session 1	9.45am
Morning Tea	10.55am
Session 2	11.10am
Session 3	12.20pm
Lunch	1.30pm
Depart	2.00pm

Key Question:

What factors influence the different plant communities across landscapes?

Key Areas of Investigation

Making sense of the green – What types of plant communities live in Sydney?
The ecology of vegetation – what factors influence why communities survive in that location?



Site 1 -Features of Plant Communities

Turpentine Ironbark Margin Forest

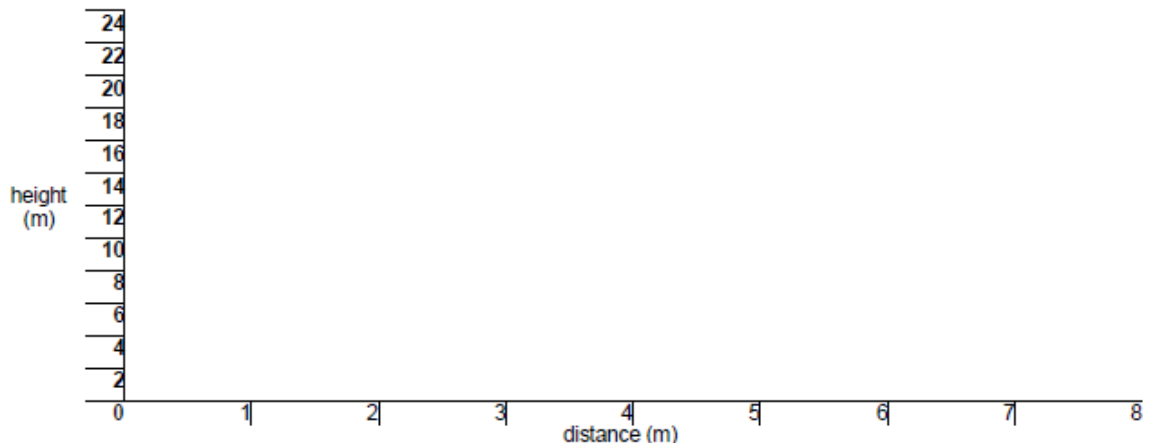
1. Record the dominant species in the studied environment

Trees (A woody plant over 5m tall usually with a single stem)	
Shrubs (A woody plant up to 8m, usually with many stems arising at or near the base)	
Herbs (A plant whose stem does not produce woody, persistent tissue)	

2. Record the main factors of the studied environment

Factors	Notes	Equipment	Result
Time	Record current time		
Forest Type	Record the major tree type		
Vegetation Form	eg. closed forest, open forest	Pictorial Key	
Landform	eg. creek, hill, valley, ocean		
Air Temperature	Record in °C	Digital Thermometer	
Humidity	Record in %	as above	
Soil Temperature	Record in °C	Probe Thermometer	
Aspect	Direction the land is sloping down	Compass	
Slope	Flat <10, Gentle 10-20, Medium 20-30, Steep >30	Clinometer	
Water	Dry, Moist or wet of the area		
Soil pH	Measures the acidity (<7) and alkalinity (>7)	pH Soil Kit	
Soil Colour	Rub some soil onto paper as a record of soil colour		

3. Profile Drawing of Vegetation Community



Human Impacts on a Vegetation Community

There are many ways in which a vegetation community can be disturbed and each disturbance can have a varying degree of impact.

Observe the vegetation community around you to complete the following checklist.

1. Has the soil been disturbed by;

	None (0)	minor (1)	major (2)
erosion (sheet, rill, gully)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
mining of soil, clay or sand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
dumping of rubbish/garden waste	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
bushrock collection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
access roads, paths or tracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. Has the vegetation been disturbed by;

	None (0)	minor (1)	major (2)
weed invasion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
logging	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
past clearing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
off road vehicle use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
nutrient/sewage seepage from adjacent farmland	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. Is the site;

	No (0)	Yes (2)
adjacent to an urban area	<input type="checkbox"/>	<input type="checkbox"/>
adjacent to recreational facilities	<input type="checkbox"/>	<input type="checkbox"/>
showing evidence of feral animals	<input type="checkbox"/>	<input type="checkbox"/>

Score:

Poor	=	21 - 30
Average	=	11 - 20
Good	=	0 - 10

Recorded score:

Observe as many alterations to the vegetation community at the study site.

Alteration	Environmental Impact

HABITAT ASSESSMENT

Habitat Element						Gully 1	Gully 2	Ridge 1	Ridge 2
TREES	Trees		1-3 large trees (1-6m) 1	More than 3 large trees 2					
	One or more trees native to Australia	2							
	A variety of 4 or more plant species	2							
	Healthy Tree Canopy / Plant Foliage	Healthy 2	Moderately Healthy 1	Defoliation Evident 0	Evidence of Dieback 0				
SHRUBS	Shrubs	None 0	Some 1	Many 2					
	Native Shrubs	None 0	Some 1	Most 2					
GROUND COVERS	Ground Cover	None 0	Some 1	Most 2					
	Native Grasses or Spreading Plants	2							
SHELTER	Hollows	Butt Hollows 1	Limb Hollows 1	Fallen Log Hollows 1					
	Rocks & Crevices	None 0	Some 1	Most 2					
	Leaf Litter	None 0	Some 1	Most 2					
	Loose Bark (attached or shed)	None 0	Some 1	Most 2					
	Logs & Fallen Branches	None 0	Some 1	Most 2					
WATER	Pond/Water	Yes 1	No 0						
FOOD	Plants with Fruits / Seeds	None 0	Some 1	Most 2					
HABITAT SPACE	Plants of Different Ages	None 0	Some 1	Most 2					
SURROUNDING LANDSCAPE	Joined or Located to Other Gardens / Bush by Gardens / Bush	Yes 1	No 0						
<p>A LOW SCORE WILL INDICATE THE ZONE IS POOR HABITAT This may be because it has been disturbed or requires additional habitat parameters to better support the amazing variety of living things.</p>					TOTAL SCORE				
					/ 33				