

3 SURVEY RESULTS

3.1 Flora results

A total of one hundred and ninety nine (199) species of plants were observed within the subject site. Landscaping or planted species around the existing dwellings were not counted or listed in Table 3.1.

Six (6) vegetation communities were identified within the subject site through aerial photographic interpretation and ground truthing. These included;

- Pasture with Scattered Trees
- Grey Gum/Ironbark Open Forest (EEC – Shale Sandstone Transition Forest)
- Grey Gum/Ironbark/Peppermint Gully Forest
- Riparian Scrub
- Planted Vegetation
- Aquatic Dam

Descriptions of the above communities are within Section 4.

The plants observed within the vegetation communities of the subject site are listed in the Table 3.1 below.

Table 3.1 - Flora observations for the subject site

Family	Scientific Name	Common Name
TREES		
Mimosaceae	<i>Acacia decurrens</i>	Black Wattle
Mimosaceae	<i>Acacia melanoxylon</i>	Blackwood
Mimosaceae	<i>Acacia parvipinnula</i>	Silver-stemmed Wattle
Aceraceae	<i>Acer</i> sp. (cultivar)*	Maple
Casuarinaceae	<i>Allocasuarina littoralis</i>	Black She-oak
Casuarinaceae	<i>Allocasuarina torulosa</i>	Forest Oak
Myrtaceae	<i>Angophora bakeri</i>	Narrow-leaved Apple
Myrtaceae	<i>Angophora floribunda</i>	Rough-barked Apple
Myrtaceae	<i>Backhousia myrtifolia</i>	Grey Myrtle
Cupressaceae	<i>Callitris rhomboidea</i>	Port Jackson Cypress
Lauraceae	<i>Cinnamomum camphora</i> *	Camphor Laurel
Myrtaceae	<i>Corymbia gummifera</i>	Red Bloodwood
Eleocarpaceae	<i>Elaeocarpus reticulatus</i>	Blueberry Ash
Myrtaceae	<i>Eucalyptus beyeriana</i>	-
Myrtaceae	<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark
Myrtaceae	<i>Eucalyptus eugenioides</i>	Thin-leaved Stringybark

Table 3.1 - Flora observations for the subject site

Family	Scientific Name	Common Name
Myrtaceae	<i>Eucalyptus fibrosa</i>	Broad Leaved Ironbark
Myrtaceae	<i>Eucalyptus parramattensis</i> ssp. <i>parramattensis</i>	Parramatta Red Gum
Myrtaceae	<i>Eucalyptus piperita</i>	Sydney Peppermint
Myrtaceae	<i>Eucalyptus punctata</i>	Grey Gum
Myrtaceae	<i>Eucalyptus sclerophylla</i>	Scribbly Gum
Myrtaceae	<i>Eucalyptus sideroxylon</i>	Red Ironbark
Myrtaceae	<i>Eucalyptus sparsifolia</i>	Narrow-leaved Stringybark
Santalaceae	<i>Exocarpos cupressiformis</i>	Native Cherry
Moraceae	<i>Ficus rubiginosa</i>	Port Jackson Fig
Bignoniaceae	<i>Jacaranda mimosifolia</i> *	Jacaranda
Myrtaceae	<i>Melaleuca linariifolia</i>	Snow in Summer
Myrsinaceae	<i>Myrsine variabilis</i>	Muttonwood
Oleaceae	<i>Notelaea longifolia</i>	Mock Olive
Oleaceae	<i>Olea europaea</i> subsp. <i>cuspidata</i> *	Common Olive
Rosaceae	<i>Photinia X fraseri</i> *	Photinia
Pinaceae	<i>Pinus</i> sp.* (Cultivar)	-
Pittosporaceae	<i>Pittosporum undulatum</i>	Sweet Pittosporum
Anacardiaceae	<i>Schinus molle</i> var. <i>areira</i> *	Pepper Tree
Myrtaceae	<i>Tristania neriifolia</i>	Water Gum
SHRUBS		
Mimosaceae	<i>Acacia brownii</i>	-
Mimosaceae	<i>Acacia linifolia</i>	Flax Wattle
Mimosaceae	<i>Acacia longifolia</i> var. <i>longifolia</i>	Sydney Golden Wattle
Mimosaceae	<i>Acacia suaveolens</i>	Sweet Scented Wattle
Mimosaceae	<i>Acacia terminalis</i>	Sunshine Wattle
Araliaceae	<i>Astrotricha latifolia</i>	Broad-leaf Star-hair
Myrtaceae	<i>Baeckea brevifolia</i>	-
Proteaceae	<i>Banksia spinulosa</i>	Hairpin Banksia
Rutaceae	<i>Boronia ledifolia</i>	Sydney Boronia
Pittosporaceae	<i>Bursaria spinosa</i> var. <i>spinosa</i>	Blackthorn
Cunoniaceae	<i>Ceratopetalum gummiiferum</i>	Christmas Bush
Rutaceae	<i>Correa reflexa</i>	Native Fuschia
Goodeniaceae	<i>Dampiera purpurea</i>	Purple Dampiera
Fabaceae	<i>Daviesia ulicifolia</i>	Gorse Bitter Pea
Fabaceae	<i>Dillwynia retorta</i>	Eggs and Bacon
Rutaceae	<i>Eriostemon australasius</i>	Pink Wax Flower
Apocynaceae	<i>Gomphocarpus fruticosus</i> *	Narrow Leaf Cotton Bush
Fabaceae	<i>Gompholobium latifolium</i>	Broad-leaf Wedge-pea
Fabaceae	<i>Gompholobium minus</i>	Dwarf Wedge-pea
Proteaceae	<i>Hakea salicifolia</i>	Willow Hakea
Proteaceae	<i>Hakea sericea</i>	Needlebush
Fabaceae	<i>Indigofera australis</i>	Native Indigo

Table 3.1 - Flora observations for the subject site

Family	Scientific Name	Common Name
Myrtaceae	<i>Kunzea ambigua</i>	Tick Bush
Verbenaceae	<i>Lantana camara</i> *	Lantana
Myrtaceae	<i>Leptospermum trinervium</i>	Flaky-barked Tea-tree
Oleaceae	<i>Ligustrum lucidum</i> *	Large-leaved Privet
Oleaceae	<i>Ligustrum sinense</i> *	Small-leaved Privet
Proteaceae	<i>Lomatia myricoides</i>	River Lomatia
Solanaceae	<i>Lycium ferocissimum</i> *	African Boxthorn
Celastraceae	<i>Maytenus silvestris</i>	-
Myrtaceae	<i>Melaleuca armillaris</i>	Bracelet Honey Myrtle
Fabaceae	<i>Mirbelia rubiifolia</i>	-
Ochnaceae	<i>Ochna serrulata</i> *	Mickey Mouse Plant
Rubiaceae	<i>Opercularia aspera</i>	Common Stinkweed
Asteraceae	<i>Ozothamnus diosmifolius</i>	Ball Everlasting
Proteaceae	<i>Persoonia bargoensis</i> ^{TS}	-
Proteaceae	<i>Persoonia linearis</i>	Narrow-leaved Geebung
Proteaceae	<i>Persoonia pinifolia</i>	Pine-leaved Geebung
Euphorbiaceae	<i>Phyllanthus hirtellus</i>	Thyme Spurge
Phytolaccaceae	<i>Phytolacca octandra</i> *	Inkweed
Fabaceae	<i>Podolobium ilicifolium</i>	Prickly Shaggy Pea
Rhamnaceae	<i>Pomaderris ferruginea</i>	-
Rhamnaceae	<i>Pomaderris intermedia</i>	-
Rhamnaceae	<i>Pomaderris lanigera</i>	Woolly Pomaderris
Lamiaceae	<i>Prostanthera rhombea</i>	-
Rosaceae	<i>Rubus anglocandicans</i> *	Blackberry
Rosaceae	<i>Rubus parvifolius</i>	Native Raspberry
GROUNDCOVERS & WATER PLANTS		
Polygonaceae	<i>Acetosa saggitata</i> *	Turkey Rhubarb
Orchidaceae	<i>Acianthus fornicatus</i>	Pixie Caps
Asteraceae	<i>Actinotus helianthi</i>	Flannel Flower
Adiantaceae	<i>Adiantum aethiopicum</i>	Common Maidenhair
Liliaceae	<i>Agapanthus praecox</i> *	Agapanthus
Asteraceae	<i>Ageratina riparia</i> *	Mist Flower
Poaceae	<i>Aira</i> sp.*	-
Primulaceae	<i>Anagallis arvensis</i> *	Scarlet Pimpernel
Poaceae	<i>Andropogon virginicus</i> *	Whisky Grass
Poaceae	<i>Anisopogon avenaceus</i>	Oat Speargrass
Poaceae	<i>Aristida ramosa</i>	Wire Grass
Poaceae	<i>Aristida vagans</i>	Three-awn Speargrass
Epacridaceae	<i>Astroloma humifusum</i>	Cranberry Heath
Poaceae	<i>Austrodanthonia fulva</i>	Wallaby Grass
Poaceae	<i>Austrostipa pubescens</i>	Tall Speargrass
Asteraceae	<i>Bidens pilosa</i> *	Cobbler's Pegs
Blechnaceae	<i>Blechnum cartilagineum</i>	Gristle Fern
Poaceae	<i>Bothriochloa biloba</i>	Red Grass, Lobed Blue

Table 3.1 - Flora observations for the subject site

Family	Scientific Name	Common Name
		Grass
Poaceae	<i>Briza maxima</i> *	Quaking Grass
Brassicaceae	<i>Capsella bursa-pastoris</i> *	Shepherds purse
Cyperaceae	<i>Carex appressa</i>	Tall Sedge
Sinopteridaceae	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	Poison Rock Fern
Poaceae	<i>Chloris gayana</i> *	Rhodes Grass
Asteraceae	<i>Cirsium vulgare</i> *	Spear Thistle
Asteraceae	<i>Conyza sumatrensis</i> *	Fleabane
Cyperaceae	<i>Cyathochaeta diandra</i>	-
Poaceae	<i>Cymbopogon refractus</i>	Barbwire Grass
Poaceae	<i>Cynodon dactylon</i> *	Common Couch
Cyperaceae	<i>Cyperus eragrostis</i> *	Umbrella Sedge
Solanaceae	<i>Datura stramonium</i> *	Common Thornapple
Apiaceae	<i>Daucus glochidiatus</i>	Native Carrot
Phormiaceae	<i>Dianella caerulea</i>	Flax Lily
Phormiaceae	<i>Dianella longifolia</i>	-
Phormiaceae	<i>Dianella revoluta</i> var. <i>revoluta</i>	Spreading Flax Lily
Poaceae	<i>Dichelachne micrantha</i>	Short-hair Plume Grass
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed
Blechnaceae	<i>Doodia aspera</i>	Rasp Fern
Poaceae	<i>Echinopogon caespitosus</i> var. <i>caespitosus</i>	Tufted Hedgehog Grass
Poaceae	<i>Ehrharta erecta</i> *	Panic Veldtgrass
Chenopodiaceae	<i>Einadia hastata</i>	Berry Saltbush
Poaceae	<i>Entolasia marginata</i>	Bordered Panic
Poaceae	<i>Entolasia stricta</i>	Wiry Panic
Poaceae	<i>Eragrostis brownii</i>	Brown's Lovegrass
Poaceae	<i>Eragrostis leptostachya</i>	Paddock Lovegrass
Euphorbiaceae	<i>Euphorbia peplus</i> *	Spurge
Goodeniaceae	<i>Goodenia hederacea</i> subsp. <i>hederacea</i>	Ivy-leaved Goodenia
Dilleniaceae	<i>Hibbertia aspera</i>	Rough Guinea Flower
Dilleniaceae	<i>Hibbertia empetrifolia</i> subsp. <i>uncinata</i>	-
Dilleniaceae	<i>Hibbertia obtusifolia</i>	Grey Guinea Flower
Asteraceae	<i>Hypochaeris radicata</i> *	Flatweed
Poaceae	<i>Imperata cylindrica</i> var. <i>major</i>	Blady Grass
Anthericaceae	<i>Laxmannia gracilis</i>	Slender Wire Lily
Brassicaceae	<i>Lepidium africanum</i> *	Common Peppercross
Cyperaceae	<i>Lepidosperma concavum</i>	-
Cyperaceae	<i>Lepidosperma laterale</i>	Variable Sword-sedge
Cyperaceae	<i>Lepidosperma longitudinale</i>	Pithy Sword Sedge
Restionaceae	<i>Lepyrodia scariosa</i>	Scale Rush
Lindsaeaceae	<i>Lindsaea linearis</i>	Screw Fern
Lomandraceae	<i>Lomandra confertifolia</i>	-
Lomandraceae	<i>Lomandra filiformis</i>	Wattle Mat-rush
Lomandraceae	<i>Lomandra longifolia</i>	Spiky-headed Mat-rush

Table 3.1 - Flora observations for the subject site

Family	Scientific Name	Common Name
Lomandraceae	<i>Lomandra obliqua</i>	Twisted Mat-rush
Poaceae	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Rice Grass
Poaceae	<i>Oplismenus imbecillis</i>	-
Cactaceae	<i>Opuntia stricta</i> *	Prickly Pear
Oxalidaceae	<i>Oxalis corniculata</i> *	Yellow Wood Sorrel
Oxalidaceae	<i>Oxalis perrenans</i>	-
Oxalidaceae	<i>Oxalis pes-caprae</i> *	Soursob
Poaceae	<i>Panicum simile</i>	Two Colour Panic
Poaceae	<i>Paspalum dilatatum</i> *	Paspalum
Poaceae	<i>Pennisetum clandestinum</i> *	Kikuyu
Thymelaeaceae	<i>Pimelea linifolia</i> subsp. <i>linifolia</i>	Slender Rice Flower
Plantaginaceae	<i>Plantago lanceolata</i> *	Ribwort
Rubiaceae	<i>Pomax umbellata</i>	Pomax
Lobeliaceae	<i>Pratia purpurascens</i>	Whiteroot
Dennstaedtiaceae	<i>Pteridium esculentum</i>	Bracken
Pteridaceae	<i>Pteris tremula</i>	Tender Brake
Polygonaceae	<i>Rumex crispus</i> *	Curled Dock
Asteraceae	<i>Senecio linearifolius</i>	Fireweed
Asteraceae	<i>Senecio madagascariensis</i> *	Fireweed
Malvaceae	<i>Sida rhombifolia</i> *	Paddy's Lucerne
Solanaceae	<i>Solanum nigrum</i> *	Black Nightshade
Solanaceae	<i>Solanum prinophyllum</i>	Forest Nightshade
Solanaceae	<i>Solanum pseudocapsicum</i> *	-
Solanaceae	<i>Solanum pungetium</i>	Eastern Nightshade
Solanaceae	<i>Solanum radicans</i> *	-
Asteraceae	<i>Soliva sessilis</i> *	Jojo
Asteraceae	<i>Sonchus oleraceus</i> *	Common Sow-thistle
Caryophyllaceae	<i>Stellaria media</i> *	Common Chickweed
Liliaceae	<i>Stypandra glauca</i>	Nodding Blue Lily
Asteraceae	<i>Tagetes minuta</i> *	Stinking Roger
Asteraceae	<i>Taraxacum officinale</i> *	Dandelion
Poaceae	<i>Themeda australis</i>	Kangaroo Grass
Commelinaceae	<i>Tradescantia albiflora</i> *	Wandering Jew
Fabaceae	<i>Trifolium repens</i> *	White Clover
Typhaceae	<i>Typha australis</i>	Cumbungi
Verbenaceae	<i>Verbena bonariensis</i> *	Purpletop
Plantaginaceae	<i>Veronica persica</i> *	Creeping Speedwell
Plantaginaceae	<i>Veronica plebeia</i>	Creeping Speedwell
Xanthorrhoeaceae	<i>Xanthorrhoea media</i>	-
Xanthorrhoeaceae	<i>Xanthorrhoea minor</i> subsp. <i>minor</i>	-
VINES		
Asparagaceae	<i>Asparagus asparagoides</i> *	Bridal Creeper
Pittosporaceae	<i>Billardiera scandens</i> var. <i>scandens</i>	Apple Dumplings
Lauraceae	<i>Cassytha glabella</i> forma <i>glabella</i>	Slender Devil's Twine

Table 3.1 - Flora observations for the subject site

Family	Scientific Name	Common Name
Ranunculaceae	<i>Clematis glycinoides</i> var. <i>glycinoides</i>	Clematis
Asteraceae	<i>Delairea odorata</i> *	Cape Ivy
Fabaceae	<i>Desmodium rhytidophyllum</i>	-
Luzuriagaceae	<i>Eustrephus latifolius</i>	Wombat Berry
Luzuriagaceae	<i>Geitonoplesium cymosum</i>	Scrambling Lily
Fabaceae	<i>Glycine clandestina</i>	Twining Glycine
Fabaceae	<i>Glycine tabacina</i>	Twining Glycine
Fabaceae	<i>Hardenbergia violacea</i>	False Sarsparilla
Caprifoliaceae	<i>Lonicera japonica</i> *	Japanese Honeysuckle
Bignoniaceae	<i>Pandorea pandorana</i>	Wonga Vine
Apocynaceae	<i>Parsonsia straminea</i>	Common Silkpod
Menispermaceae	<i>Stephania japonica</i> var. <i>discolor</i>	Snake Vine
EPIPHYTES		
Loranthaceae	<i>Amyema gaudichaudii</i>	Mistletoe
<i>Species name</i> ^{TS} = Threatened Species * = Introduced Species		

3.2 Fauna results

A fauna species list is not available as the assessment has been desktop based.

Incidental sightings of the Glossy Black-Cockatoo (*Calyptorhynchus lathami*) have been made on the edge of the bushland near the eastern boundary – vulnerable listed species under the TSC Act (1995) and Cattle Egret (*Ardea ibis*) – migratory bird species in one of the northern paddocks.

4 ECOLOGICAL CONSTRAINTS ASSESSMENT

4.1 Previous surveys reviewed

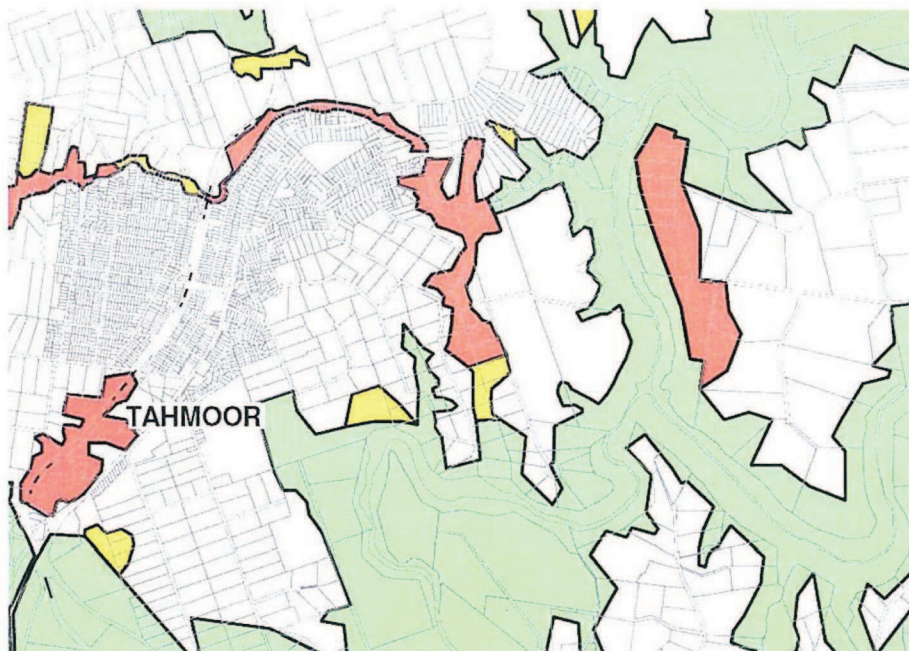
4.1.1 *Cumberland Plain Vegetation Mapping (NPWS 2002) and Tozer (2003)*

An extensive vegetation mapping survey of the Cumberland Plain area of Western Sydney has been undertaken which has shown vegetation to be;

- Upper Georges River Sandstone Woodland
- Shale Sandstone Transition Forest (High sandstone influence) (EEC - SSTF)
- Western Sydney Gully Forest
- Riparian Scrub
- Cleared

4.1.2 *Wollondilly Shire Council Website*

Under the LEP 2009, Council have rated the vegetation significance from Class 1 to Class 5 in increasing order of importance. Insert 2 showing the subject site near the centre and the surrounds out to approximately 3km shows most vegetation to the north-south and east of the subject site to be of the highest value (in green) whilst the vegetation in the north-west and that the immediate west outside of the site as red and yellow (Class 4 and 3 vegetation respectively).



Insert 2 – Vegetation classification mapping and importance from Council's website (LEP 2009).

4.2 Flora species

A total of one hundred and ninety nine (199) flora species were observed within the subject site during the survey. All species recorded on site are listed in Table 3.1.

One (1) specimen was sent to the Royal Botanic Gardens for confirmation, returning the result for the threatened species *Persoonia bargoensis*. This specimen was on the edge of a forested area approximately 10m from the edge of a gully to Myrtle Creek adjacent to the northern boundary.

4.3 Vegetation communities

Six (6) vegetation communities were identified within the subject site through aerial photographic interpretation and ground truthing. These included;

- Pasture with Scattered Trees
- Grey Gum/Ironbark Open Forest (EEC – Shale Sandstone Transition Forest)
- Grey Gum/Ironbark/Peppermint Gully Forest
- Riparian Scrub
- Planted Vegetation
- Aquatic Dam

Pasture with Scattered Trees

This vegetation community resembles what would have been *Shale Sandstone Transition Forest* for most parts of the site however there are only remnant trees, typically less than 2 trees per hectare. The midstorey is absent and the ground layer is comprised of both exotic and native grasses and herbs but there is a much higher proportion of exotic species due to grazing and trampling by cattle. Most of the scattered trees are *Eucalyptus punctata* (Grey Gum) or an Ironbark species such as *Eucalyptus fibrosa* (Broad leaved Ironbark), *Eucalyptus crebra* (Narrow-leaved Ironbark) or *Eucalyptus beyeriana*.



Photo 1 – An example of the pasture with scattered trees vegetation within one of the northern paddocks.

The understorey consists of several pasture grasses with some weeds and native herbs and there is little to no regeneration of new Eucalypt saplings. The understorey vegetation is regularly maintained by slashing and grazing.

Grey Gum/Ironbark Open Forest (EEC – Shale Sandstone Transition Forest)

This vegetation community occurs essentially around the flatter portions of the subject site on the edge of fringing vegetation. The soil and geology properties of the flatter areas support the EEC – Shale Sandstone Transition Forest. The steeper gully areas are sandstone derived and do not support this EEC.

There were three (3) small notable remnant patches of this community within the paddocks (as denoted on Figure 1) however all were less than 0.25ha therefore under the biometric assessment can be removed.

Canopy:

The main canopy species found were *Eucalyptus punctata* (Grey Gum) and *Eucalyptus fibrosa* (Broad leaved Ironbark) to a height of 20-30m and a projected foliage cover of approximately 15%. Other Ironbark species such as *Eucalyptus crebra* (Narrow-leaved Ironbark) and *Eucalyptus beyeriana* were present at a lower percentage.

Midstorey:

Common species include *Angophora bakeri* (Narrow-leaved Apple), *Allocasuarina littoralis* (Black She-oak), *Notelaea longifolia* (Mock Olive), *Kunzea ambigua* (Tick Bush), *Persoonia linearis* (Narrow-leaved Geebung), *Bursaria spinosa* (Native Blackthorn) and *Exocarpos cupressiformis* (Native Cherry). There are two (2) layers present as *Angophora bakeri* and *Allocasuarina littoralis* form a sub-canopy to a height of approximately 10-16m and the remaining species are usually around 1-4m tall. The estimated projected foliage cover is estimated at approximately 15-20%.



Photo 2 – Part of the EEC close to the north-eastern boundary.

Understorey:

Common species include *Entolasia stricta* (Wiry Panic), *Microlaena stipoides* (Weeping Rice Grass), *Echinopogon caespitosus* (Tufted Hedgehog Grass), *Panicum simile* (Two Colour Panic), *Solanum prinophyllum* (Forest Nightshade), *Pratia purpurascens* (Whiteroot), *Glycine clandestina* (Twining Glycine), *Lepidosperma laterale* (Variable Sword-sedge), *Pomax umbellata* (Pomax) and *Lomandra filiformis* (Wattle Mat-rush). The height is below 1m tall and the projected foliage cover is highly variable from 40-70%. It may be higher in instances where there are exotic grasses on the edges of the community.



Photo 3 – Small remnant patch where Quadrat 1 was undertaken (looking south)

Grey Gum/Ironbark/Peppermint Gully Forest

This vegetation community exists within the gully lines around the subject site where the sandstone is the major influence and slopes are greater than 5 degrees (usually much more).

Canopy:

The three main overstorey species include *Eucalyptus punctata* (Grey Gum), *Eucalyptus fibrosa* (Broad leaved Ironbark) and *Eucalyptus piperita* (Sydney Peppermint) to a height of 18-25m and a projected foliage cover of 15-25%. *Corymbia gummifera* (Red Bloodwood) is moderately common also.

Midstorey:

Common species include *Angophora bakeri* (Narrow-leaved Apple), *Allocasuarina littoralis* (Black She-oak), *Kunzea ambigua* (Tick Bush), *Persoonia linearis* (Narrow-leaved Geebung), *Leptospermum trinervium* (Flaky-barked Tea-tree) and *Ceratopetalum gummiferum* (Christmas Bush). There are two (2) layers present as *Angophora bakeri* and *Allocasuarina littoralis* form a sub-canopy to a height of approximately 10-16m and the remaining species are usually around 1-4m tall. The estimated projected foliage cover is estimated at approximately 15-30%.

Understorey:

Common species include *Entolasia stricta* (Wiry Panic), *Aristida ramosa* (Wire Grass), *Echinopogon caespitosus* (Tufted Hedgehog Grass), *Microlaena stipoides* (Weeping Rice Grass), *Correa reflexa* (Native Fuschia), *Pimelea linifolia* (Slender Rice Flower), *Astroloma humifusum* (Cranberry Heath), *Eriostemon australasius* (Pink Wax Flower), *Dampiera purpurea* (Purple Dampiera), *Ozothamnus diosmifolius* (Ball Everlasting), *Lomandra confertifolia*, *Lomandra obliqua* (Twisted Mat-rush), *Lepidosperma laterale* (Variable Sword-sedge), *Lomandra filiformis* (Wattle Mat-rush) and *Xanthorrhoea media*.



Photo 4 – Gully Forest on the eastern side of the subject site near Quadrat 12.

Riparian Scrub

This vegetation community is quite limited to the base of the gully or ephemeral drainage line where there is moderate amounts of rock outcropping and a narrow deposit of damp soil. This vegetation type is limited to Myrtle Creek and one of the southern tributaries off Bargo River within the subject site. More of this community exists in some of the finer tributaries off the Nepean River but just east of the subject site in the northern portion, for example quadrat 14.

Canopy:

The canopy may be intermittently covered by Eucalypt, Corymbia or Angophora species where the Riparian Scrub is narrow however the main species are *Tristania neriifolia* (Water Gum), *Backhousia myrtifolia* (Grey Myrtle) and *Melaleuca linariifolia* (Snow in Summer). The projected foliage cover varies depending upon aspect and protection between approximately 30-55% and a height of 10-18m.

Midstorey:

The midstorey sparse to moderate containing younger canopy species as well as *Myrsine variabilis* (Muttonwood), *Notelaea longifolia* (Mock Olive) and *Pomaderris ferruginea* to a height range of 1.5-4m and a projected foliage cover of 10-30%.



Photo 5 – Riparian scrub adjacent to quadrat 14.

Understorey:

Common species include *Oplismenus imbecilis*, *Microlaena stipoides* (Weeping Rice Grass), *Lomandra longifolia* (Spiky-headed Mat-rush), *Blechnum cartilagineum* (Gristle Fern), *Cassytha glabella* (Slender Devil's Twine), *Adiantum aethiopicum* (Common Maidenhair), *Correa reflexa* (Native Fuschia), *Entolasia stricta* (Wiry Panic), *Dianella caerulea* (Flax Lily), *Lepidosperma laterale* (Variable Sword-sedge) and *Dichondra repens* (Kidney Weed). The projected foliage cover is again highly variable and may be dependent upon aspect and light conditions; varying from 30-75%.

There may be some exotic vegetation down the riparian line including mostly annual species to 5% coverage in narrow areas or up to 60% in where the riparian scrub is wider in the vicinity of quadrat 2. This area contained a number of invasive species such as *Ageratina riparia* (Mist Flower), *Tradescantia albiflora* (Wandering Jew), *Lonicera japonica* (Japanese Honeysuckle), *Delairea odorata* (Cape Ivy) and *Ligustrum sinense* (Small leaved Privet).

Planted Vegetation

There were a few lines of planted trees and shrubs in the central areas of the subject site either around fence lines or along existing internal roads. Trees and shrubs were mostly non local species. Examples include Photinia, Pine, Callitris, *Melaleuca armilaris* and Eucalypts. These areas were not surveyed to any great extent and they are generally adjacent to cleared area of mostly low habitat value.



Photo 6 – Planted Eucalyptus along an internal road.



Photo 7 - Planted pine trees along some fence lines in the southern portion of the subject site.

Aquatic Dams

Very little survey was done in these areas as there was little to no vegetation present within or along the fringes of the dams.

One large dam occurs adjacent to the western boundary that has a small amount of Typha growing in the north-eastern corner, approximately 20m² only. There is a small dam of approximately 20x20m in the south-eastern portion of the subject site with no aquatic vegetation and there is also a small dam immediately adjacent to the eastern subject site boundary (near quadrat 11) which again has little to no fringing vegetation.



Photo 8 – Eastern end of the largest dam.



Photo 9 – Dam in the south-eastern portion of the subject site.

4.4 Threatened flora legislation

Botanical survey was undertaken over four (4) days during July 2010. One (1) threatened flora species *Persoonia bargoensis* was observed.

One (1) endangered ecological community, *Shale Sandstone Transition Forest* was observed within the subject site. The location of this EEC is shown on Figure 1. It has been described as Grey Gum/Ironbark Open Forest in section 4.3.

4.4.1 State legislative matters

TSC Act (1995) – A search of the Atlas of NSW Wildlife (DECCW 2010) database indicated that thirteen (13) species have been recorded within a 10 km radius of the subject site. Those species are listed in Table 4.1.

Of those thirteen (13) threatened flora species, six (6) have the potential to occur within the subject site. Those species are *Darwinia penduncularis*, *Epacris purpurascens* var. *purpurascens*, *Persoonia bargoensis*, *Persoonia glaucescens*, *Persoonia hirsuta* and *Pomaderris brunnea*.

- *Persoonia bargoensis* has a high likelihood of occurrence within the subject site. One specimen found near the northern perimeter of the subject site was sent to the Royal Botanic Gardens for confirmation, returning a positive result. In the Atlas of NSW Wildlife (DECCW 2010) database, there is one (1) record of this species within the subject site as marked on Figure 1. A record was made in 2005 although the accuracy of this record is to the nearest 1000m, thus possibly not within the subject site. The area surrounding the 2005 finding is presently grazed, has no midstorey and the understorey is predominately pasture grasses and annuals. It is highly doubtful that the specimen existed in said location.

4.4.2 Endangered populations

There are no known endangered flora populations within the Wollondilly LGA.

4.4.3 National legislative matters

A review of the schedules of the *EPBC Act* (1999) indicated the potential for seventeen (17) threatened flora species to occur within a 10km radius of the site (Table 4.1).

Of those seventeen (17) threatened flora species, four (4) have the potential to occur within the subject site. Those species are *Persoonia bargoensis*, *Persoonia glaucescens*, *Persoonia hirsuta* and *Pomaderris brunnea*.

Shale Sandstone Transition Forest is listed as a matter of national environmental significance. A development proposal that has significant potential to alter the size, habitat potential or composition of this vegetation community, will require a referral to DEWHA.

4.5 Endangered ecological communities

One (1) endangered ecological community was located onsite, namely;

- *Shale Sandstone Transition Forest*

The areas occupied by these communities are shown on Figure 1.

Desktop comparisons of the quadrat data to *Tozer* (2003) for the vegetation communities mapped on the Cumberland Plain Mapping Project and to that of the Scientific Committee's Final Determinations show that those quadrats undertaken on the flatter portions of land had a much higher congruence to that of the EEC Shale Sandstone Transition Forest.

Quadrats undertaken on sloped land heading into the gully (i.e. near the top of the slope) had a moderate congruence to the EEC but also a moderate to high similarity to that described as either Upper Georges River Sandstone Woodland or Western Sydney Gully Forest.

The lower portions of the slopes which were surveyed or those in the centre of an ephemeral creek line within a gully showed a moderate resemblance to that described in *Tozer* as Riparian Scrub. There is essentially no Angophora, Corymbia and Eucalypt layer as this is replaced by small trees such as Grey Myrtle and Water Gum.

4.6 Threatened flora species habitat assessment

Table 4.1 below provides an assessment of threatened flora species habitat likely to occur within the subject site.

Table 4.1 – Threatened flora habitat assessment

Scientific name	Growth form and habitat requirements	Conservation status	Comments	TSC Act	EPBC Act
<i>Acacia bynoeana</i> EPBC	Erect or spreading shrub to 0.3 m high growing in heath and dry sclerophyll open forest on sandy soils. Often associated with disturbed areas such as roadsides. Distribution limits N-Newcastle S-Berrima.	Blue Mountains NP, Royal NP, Castlereagh NR, Agnes Banks NR, Lake Macquarie SRA, Dharawal NR, Marramarra NP, Parr SRA	Nearest record is 12km away. No suitable habitat present.	E1	V
<i>Acacia flocktoniae</i> EPBC	Erect or spreading shrub, 2-3m tall. Phyllodes 4-10cm long and 3-5mm wide. Flowers usually June – August. Grows in dry sclerophyll forest on sandstone. Distribution limits N – Mt Wilson, S – Picton.	Blue Mountains NP	No records within 10km. No suitable habitat present.	V	V
<i>Apatophyllum constable</i> EPBC	A small shrub up to 40cm tall that grows in dry sclerophyll forest on slopes with a north to north-westerly aspect usually near cliffs. It flowers from August to December. Most populations are restricted to Wollemi National Park near the town of Glen Davis. The species has been removed from the TSA Act since 2007.	Wollemi NP	No records within 10km. No suitable habitat present.	-	E
<i>Caladenia tessellata</i> EPBC	Terrestrial orchid. Clay-loam or sandy soils. Distribution limits N-Swansea S-south of Eden.	Munmorah SRA, Popran NP, Wyrabalong NP	No records within 10km. No suitable habitat present.	E1	V
<i>Cryptostylis hunteriana</i> EPBC	Saprophytic orchid. Grows in swamp heath on sandy soils. Distribution limits N-Gibraltar Range S-south of Eden.	Gibraltar Range NP, Ku-ring-gai Chase NP, Ben Boyd NP	No records within 10km. No suitable habitat present.	V	V

Table 4.1 – Threatened flora habitat assessment

Scientific name	Growth form and habitat requirements	Conservation status	Comments	TSC Act	EPBC Act
<i>Cynanchum elegans</i> DECCW EPBC	Climber or twiner to 1 m. Grows in rainforest gullies, scrub & scree slopes. Distribution limits N-Gloucester S-Wollongong.	Camel's Hump NR, Woko NP, Booti Booti NP, Oxley Wild Rivers NP, Goulburn River NP, Glenrock SRA, Kooragang Island NR, Camels Hump NR, New England NP, Sea Acres NR, Wollemi NR Darawank NR Khappingaht NR	Nearest record is 5km away. No suitable habitat present.	E1	E
<i>Darwinia peduncularis</i> DECCW	Divaricate shrub to 1.5 m high. Grows in dry sclerophyll forest on sandstone hillsides and ridges. Distribution limits N-Glen Davis S-Hornsby.	Blue Mountains NP, Wollemi NP, Marramorra NP, Berowra Valley RP	Nearest record is 2.5km away. Potential habitat present on the slope to the Nepean and Bargo Rivers. Not observed.	V	-
<i>Epacris purpurascens</i> var. <i>purpurascens</i> DECCW	Erect shrub to 1.5m high growing in sclerophyll forest and scrub and near creeks and swamps on Sandstone. Distribution limits N-Gosford S-Blue Mountains.	Ku-ring-gai Chase NP Muogamarra NR Brisbane Water NP Berowra Valley RP Bents Basin SRA	Nearest record is 0.5km away. Potential habitat present in the gully vegetation adjacent to ephemeral creek lines. Not observed.	V	-
<i>Grevillea parviflora</i> subsp. <i>parviflora</i> DECCW EPBC	Open to erect shrub to 1 metre. Grows in woodland on light clayey soils. Distribution limits N-Cessnock S-Appin.	Werakata NP	Nearest record is 1km away. Given the areas of possible habitat are now pastures, no suitable habitat is present.	V	V
<i>Lepidium hyssopifolium</i> EPBC	Perennial herb to 50cm tall. Occurs in a variety of habitats including woodland with a grassy understorey and grassland. Cryptic natured. Disjunct populations in the areas of Bathurst, Bungendore, Crookwell and Armidale.	Bolwarrah FLR	No records within 10km. Unlikely to be present given lack of records within 50km.	E1	E

Table 4.1 – Threatened flora habitat assessment

Scientific name	Growth form and habitat requirements	Conservation status	Comments	TSC Act	EPBC Act
<i>Leucopogon exolasius</i> DECCW	Erect shrub to 2 metres high. Rocky hillsides and creek banks in Sydney Sandstone Gully Forest. Confined to Woronora and Georges Rivers and Stokes Creek.	Heathcote NP	Nearest record is 6.5km away. Only 2 records within 10km. The species has a small distribution geographically in which the subject site appears to be a long way from, however given the presence of nearby records and the presence of Sandstone Gully Forest, suboptimal habitat available.	V	V
<i>Melaleuca deanei</i> DECCW EPBC	Shrub to 3 m high. Grows in heath on sandstone. Distribution limits N-Gosford S-Nowra.	Berowra Valley Regional Park, Brisbane Water NP, Ku-ring-gai Chase NP, Garigal NP, Lane Cove NP, Royal NP, Heathcote NP	Nearest record is 5.5km away. No suitable habitat present.	V	V
<i>Persicaria elatior</i> DECCW	Erect herb to 90cm tall. Leaves up to 11cm long and 30mm wide. Grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance. Known from Moruya SF, Upper Avon River catchment, Bermagui, Picton Lakes, Raymond Terrace and Grafton area.	Moruya SF Cherry Tree SF Gibberagee SF	Nearest record is 4km away, made in 1949. No other records within 10km. No potential habitat present as all pooling water areas likely to potential habitat are man-made.	V	V
<i>Persoonia acerosa</i> EPBC	Erect to spreading shrub. Grows in heath or dry sclerophyll forest on sandstone. Distribution limits N-Bilpin S-Hill Top.	Blue Mountains NP	No records within 10km. No suitable habitat present.	V	V
<i>Persoonia bargoensis</i> DECCW EPBC	Erect shrub to 1m high. Grows in woodland to Dry sclerophyll forest, on sandstone and laterite. Restricted to the Bargo area.	Unknown	Nearest record occurs on site however the record says accuracy to 1000m. One specimen found.	E1	V