Appendix No. 11

Ecological Report (2007) and Supplementary Advice (March 2010)

HUNTER ECO

Lanox Pty Ltd & KMSJ Pty Ltd
Locked Bag 9
Ashfield NSW 1800

Attention Harlan Hall

19 March 2010

Dear Harlan

370 Old Northern Road Castle Hill, proposed reserve

I have been requested to assess the appropriateness of the reserve set aside as part of the proposed subdivision of the subject property and also to describe the trees that would be removed from within the property.

In 2007 I prepared a report that assessed the conservation value of the small area on the subject site containing Blue Gums. The outcome of that analysis was that this area was most likely a remnant of *Sydney Blue Gum High Forest* which is listed as an endangered ecological community in the NSW *Threatened Species Conservation Act 1995*.

I inspected the subject site and the reserve area on 15 March 2010. The area under the Blue Gums was considerably overgrown since 2007, primarily by Lantana and Acacia. The proposed reserve takes in the entire extent of the Blue Gum vegetation community with the addition of a corridor along the southern boundary. The access and turning area can be constructed within the existing disturbance area and so not impact on the remnant Blue Gum habitat.

A row of trees is located in the centre of the proposed development area and these will need to be removed; the neat row indicates that these trees have been planted there. There were 3 native species: Tallowwood (*Eucalyptus microcorys*), Grey Ironbark (*Eucalyptus siderophloia*) and Silvertop Ash (*Eucalyptus sieberi*), the last of which is not endemic to the immediate area. None of these trees contained any potential fauna habitat hollows. Any other trees to be removed from around the old buildings were exotic species.

Images are attached showing the reserve plan outline and site photographs taken on 15 March 2010.

Yours Faithfully
HUNTER ECO

Colin Driscoll

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Environmental Biologist
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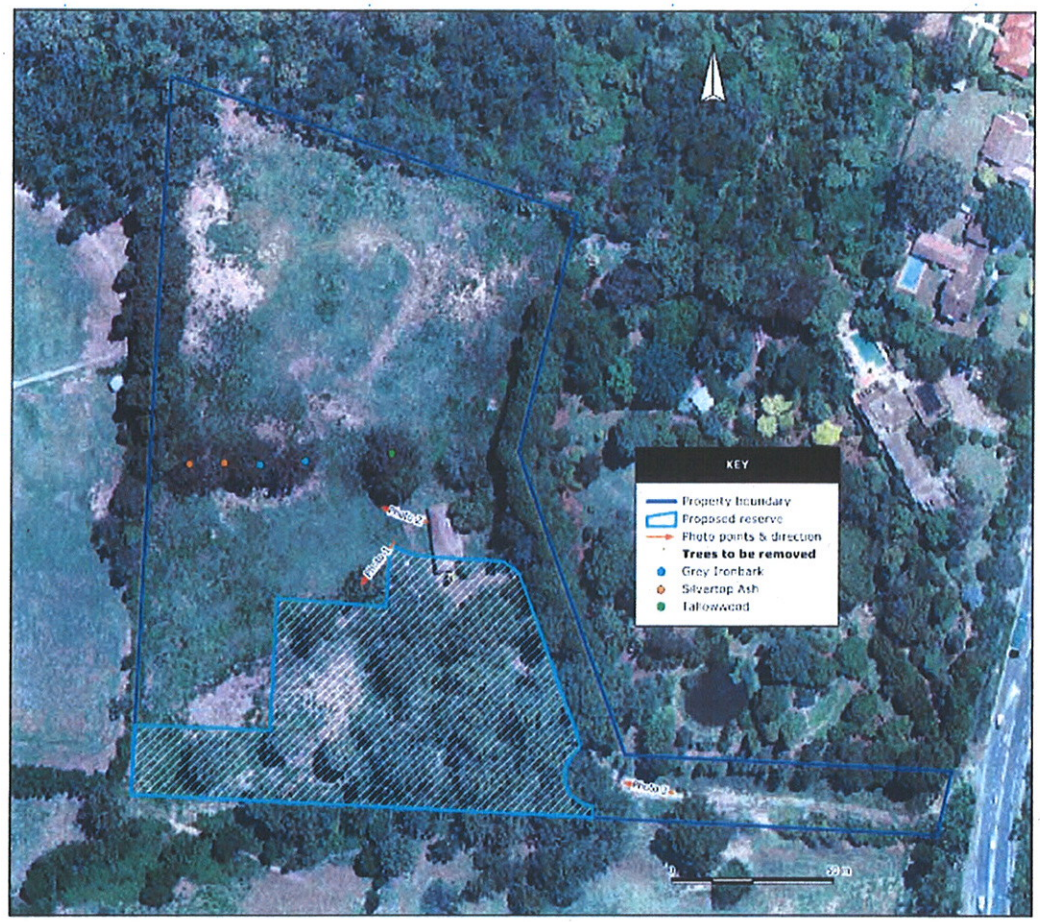

A plan view showing the proposed reserve, native trees to be removed, photo points and direction for the following photographs.

Photo 1 The western edge of the reserve

Photo 2 The line of trees to be removed

Photo 3 The location of the turning area at the bottom of the main access ramp

370 Old Northern Road Castle Hill

Classification of a portion of vegetation dominated by *Eucalyptus saligna* (Sydney Blue Gum)

A report prepared for Lanox Pty Ltd and KMSJ Pty Ltd
by Colin Driscoll, Hunter Eco

HUNTER ECO

370 Old Northern Road Castle Hill.
Classification of a portion of vegetation dominated by *Eucalyptus saligna* (Sydney Blue Gum).

For Lanox Pty Ltd & KMSJ Pty Ltd

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370 Old Northern Road Castle Hill. Classification of a portion of vegetation dominated by *Eucalyptus saligna* (Sydney Blue Gum).

1. Background

The owners of the property Lot 2, DP 135804, 370 Old Northern Road Castle Hill (Figures 1 & 2) have a current development consent from Baulkham Hills Shire Council (BHSC) to provide access into the property from Old Northern Road. However the approved access stops short of providing complete access to the property. The point at which the approved access stops is at the edge of a patch of vegetation dominated by *Eucalyptus saligna* (Sydney Blue Gum) which is deemed by BHSC to be Blue Gum High Forest (BGHF) listed in Part 3 of Schedule 1 of the NSW *Threatened Species Conservation Act 1995* as a Critically Endangered Ecological Community (EEC). The patch of vegetation containing Blue Gums has an area of approximately 0.5 hectares.

The purpose of this report is to describe the Sydney Blue Gum dominated vegetation on the subject site and to determine whether it can reasonably be classified as an EEC.

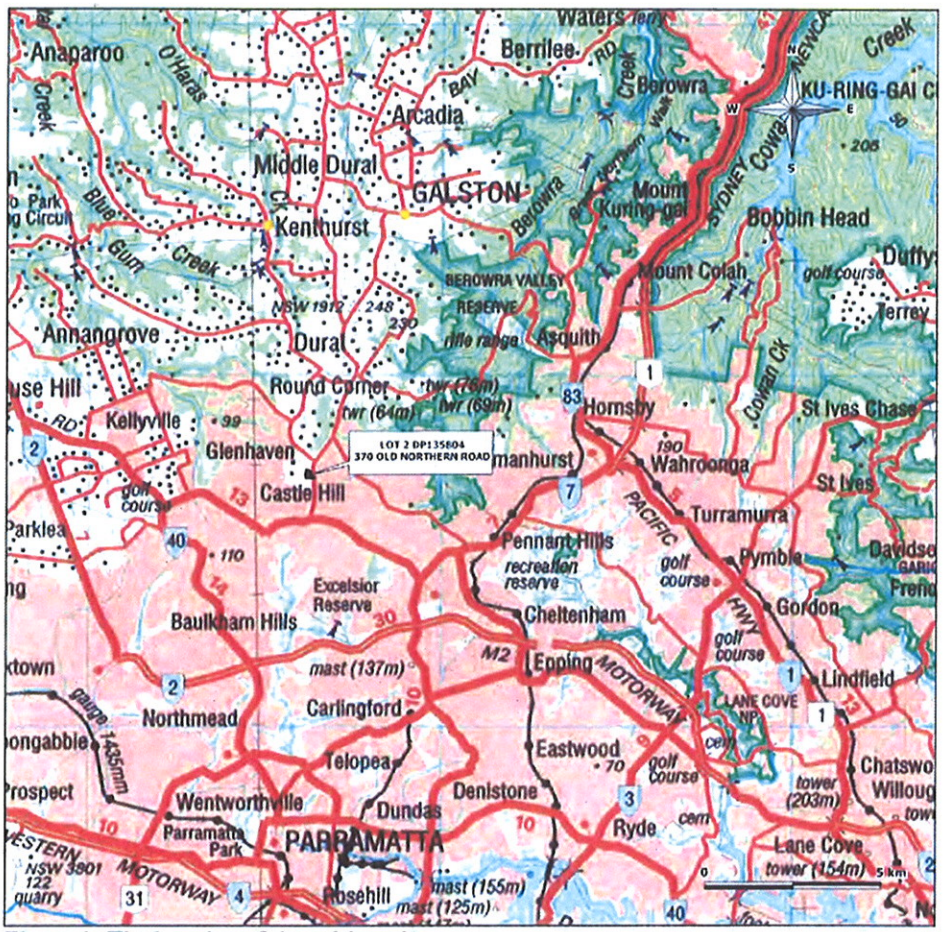

Figure 1: The location of the subject site.

Figure 2: The subject site in a local context

2. Previous vegetation studies

Several vegetation studies which cover an area that includes the subject site have been reported: Benson & Howell (1990); Benson & Howell (1994); NPWS (2002); and, Tozer (2003). Baulkham Hills Shire Council also have a map of the vegetation of the shire.

A recent investigation of the subject site (Fanning 2005) provides general information about the vegetation and floristic content but does not list the flora species according to the vegetation communities present or provide any abundance information. Another recent report (UTM 2005) is an arborist report of the condition of the Blue Gums that are located in the proposed access disturbance area.

2.1. Vegetation mapping

There are two available vegetation maps of the area in and around the subject site. Figure 3 shows the BHSC map overlaid with the extent of vegetation as derived from the 2005 aerial photograph. While no key was provided on the BHSC paper document, they have confirmed that the red area represents BGHF.

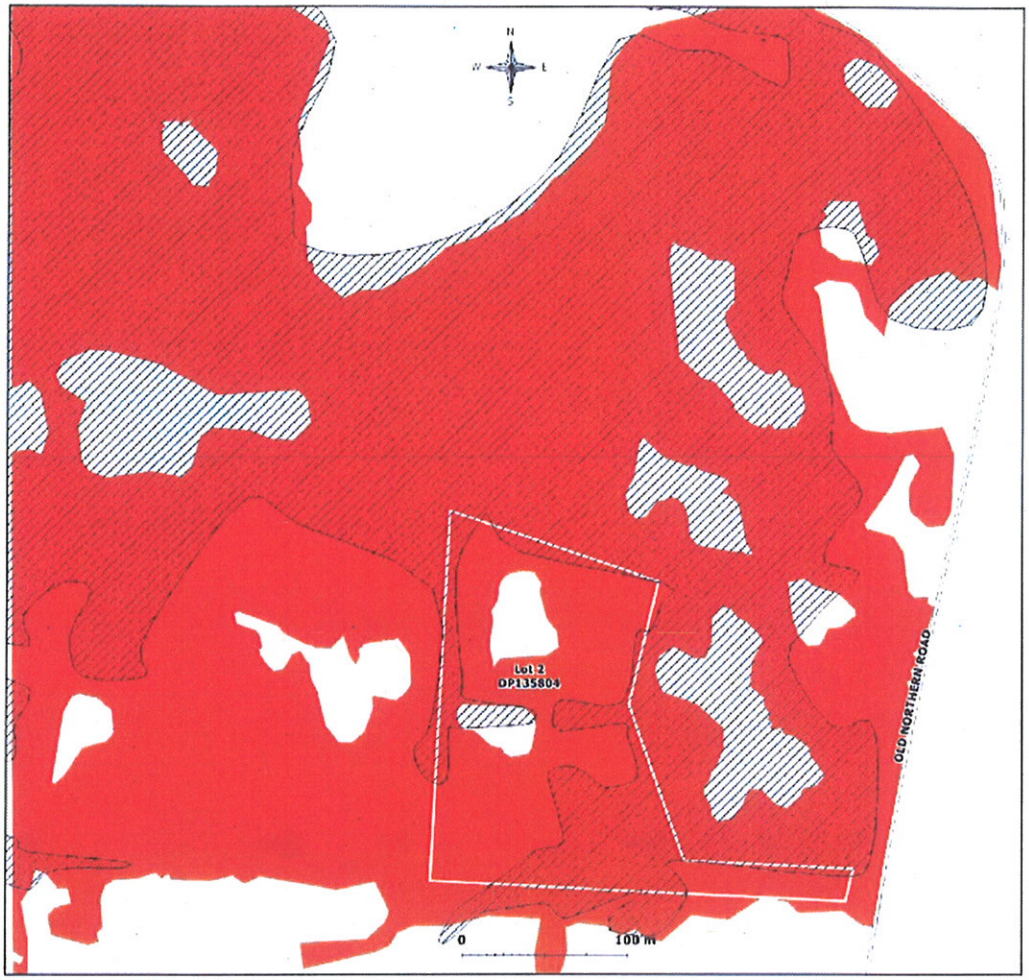

Figure 3: BHSC vegetation map.

The vegetation mapping from NPWS (2002) provides several data layers. Figure 4 shows the extant vegetation map (modelled) for the area containing the subject site; again overlaid with the extent of vegetation as derived from the 2005 aerial photograph.

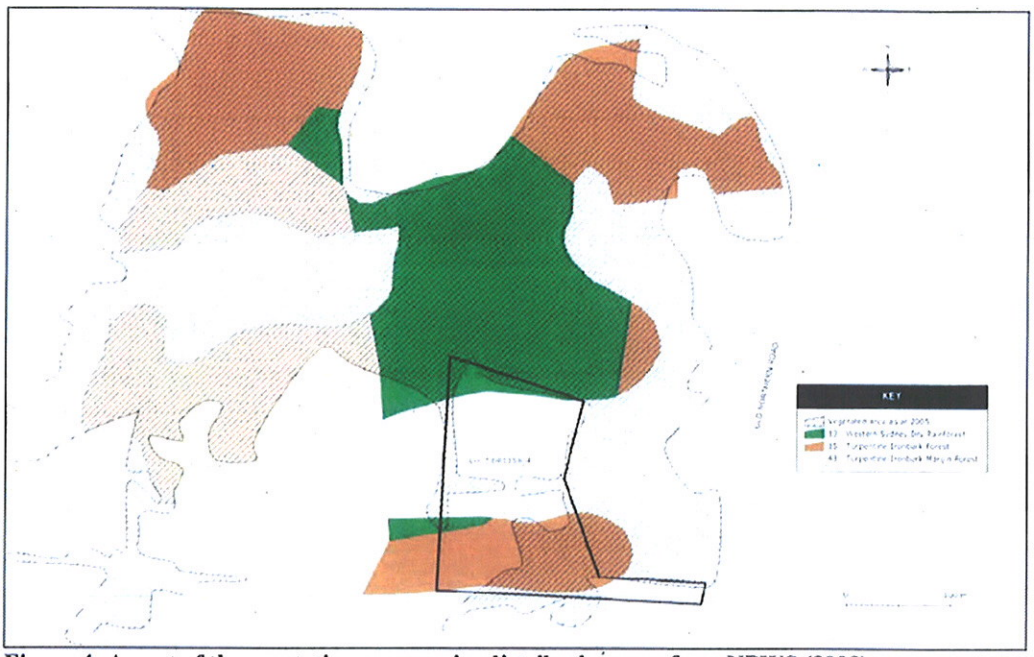

Figure 4: A part of the vegetation community distribution map from NPWS (2002)

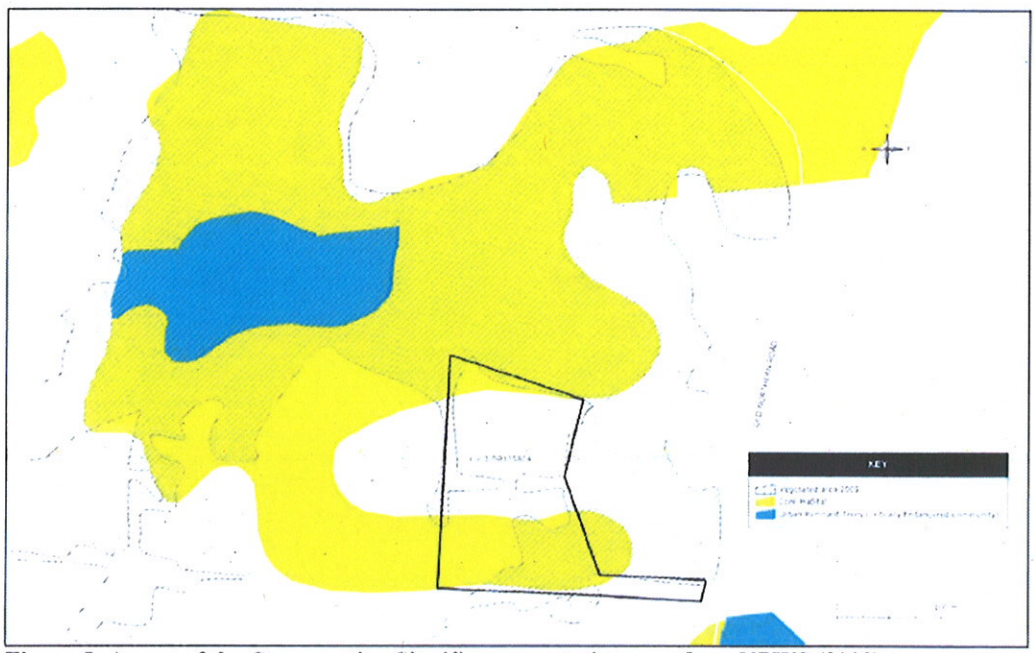

Figure 5: A part of the Conservation Significant vegetation map from NPWS (2002)

Figure 5 from NPWS (2002) shows the areas determined to be of conservation significance. Core habitat areas are: "Areas that constitute the backbone of a viable conservation network across the landscape (core areas), or areas where the endangered ecological communities are at imminent risk of extinction."

Urban Remnant Trees are: "Areas of critically endangered ecological communities which remain as remnant trees in an urban landscape." The use of the term 'critically endangered' in this context should be taken as a general rather than a legal assessment of the status of these communities; *Critically Endangered* was not available as a listing criterion until the gazettal of the *Threatened Species Conservation Amendment (Listing Criteria) Regulation 2005* in October 2005.

From the above it can be seen that the BHSC vegetation map does not accurately reflect either the extent or possible type of vegetation that is likely to occur in and around the subject site. The NPWS data provides more detail as to the possible vegetation types in the area but does not accurately describe the extent of vegetation in the locality of the subject site.

The NPWS (2002) vegetation map is derived from a model as described in Tozer (2003) rather than from any comprehensive ground assessment. At any location, detailed quantitative data should always be used to assess the validity of the model. The various communities described in the modelled distribution are determined through a vegetation classification process again detailed in Tozer (2003). This process aggregates quantitative vegetation data, taken from 0.04ha sample plots from across the study area, into groupings that have more in common with each other than with those from other groups. These groupings then form the basis for a detailed description of a distinct vegetation community.

The NPWS (2002) vegetation model (Figure 4) shows the subject site as containing the EEC Sydney Turpentine-Ironbark Forest (STIF) which can also have an overstorey dominated by Blue Gums (Tozer 2003). This assessment will consider both this and BGHF as possibilities for the site.

3. The Blue Gum vegetation on the subject site

3.1. Assessment of the state and condition

For this investigation, a quantitative assessment of the Blue Gum vegetation was collected from a .04m^2 (20m x 20m) plot (Figures 6 & 7). The small size of the Blue Gum stand (.04m^2 is close to 10% of the area occupied by the Blue Gums) meant that only one plot could be placed in a representative area that was not too close to an edge of the stand. Data collected was a complete list of all vascular plant species present with each species being scored for cover/abundance (CA) using the modified 7-point Braun-Blanquet scale (Poore 1955) (Box).

1 = rare, few individuals present, cover < 5%;
2 = uncommon & cover < 5%;
3 = common & cover < 5%;
4 = (very abundant & cover < 5%) or (5% < cover < 20%);
5 = (20% < cover <50%);
6 = (50% < cover <75%);
7 = (75% < cover < 100%).

In determining the location for the sample plot the entire area under the Blue Gums was searched to determine whether there were any patches where the floristic content and structure contained a particularly good representation of native species; none was found.

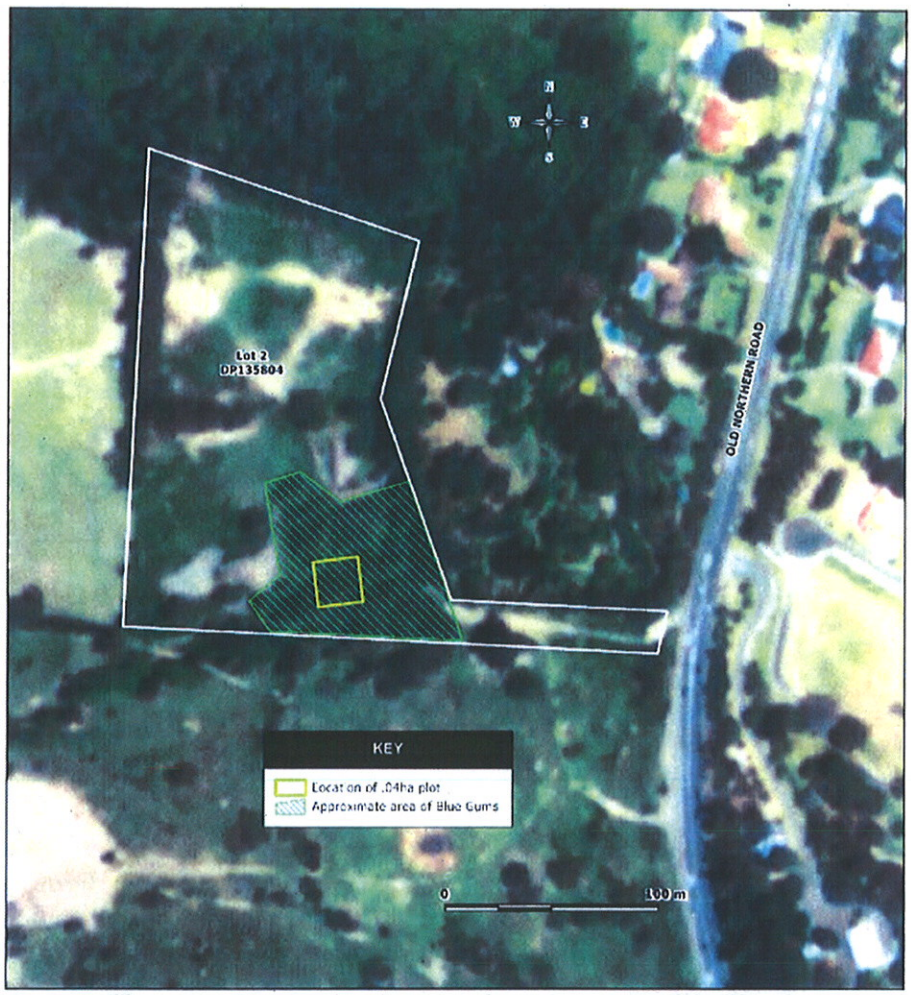

Figure 6: The subject site showing the approximate boundary of the Blue Gum vegetation and the location of the .04ha floristic plot.

Figure 7: The floristic plot taped and showing the condition of the vegetation.

4. Results

Table 1 shows the results from the 0.04ha plot in which 36 plant species were identified, 20 (56%) of which were weed species and 16 were native species.

Table 1 : Species and cover abundance data from a 0.04ha plot.

Scientific Name	Family Name	CA
Centella asiatica	**Apiaceae**	4
*Araujia sericiflora**	**Asclepiadaceae**	2
*Asparagus asparagoides**	**Asparagaceae**	1
*Cirsium vulgare**	**Asteraceae**	2
*Conyza bonariensis**	**Asteraceae**	6
Ozothamnus diosmifolius	**Asteraceae**	1
*Senecio madagascariensis**	**Asteraceae**	1
*Sigesbeckia orientalis subsp. orientalis***	**Asteraceae**	5
Pandorea pandorana subsp. pandorana	**Bignoniaceae**	1
Doodia aspera	**Blechnaceae**	1
Wahlenbergia communis	**Campanulaceae**	1
Einadia hastata	**Chenopodiaceae**	5
Commelina cyanea	**Commelinaceae**	4
Desmodium brachypodum	**Fabaceae (Faboideae)**	1
Glycine clandestina	**Fabaceae (Faboideae)**	2
Acacia parramattensis	**Fabaceae (Mimosoideae)**	1
*Malva neglecta**	**Malvaceae**	1
*Sida rhombifolia**	**Malvaceae**	4
Melia azedarach	**Meliaceae**	1
Eucalyptus saligna	**Myrtaceae**	7
*Ochna serrulata**	**Ochnaceae**	2
*Ligustrum lucidum**	**Oleaceae**	4
*Ligustrum sinense**	**Oleaceae**	4
*Olea europaea**	**Oleaceae**	1
Oxalis perennans	**Oxalidaceae**	2
*Passiflora edulis**	**Passifloraceae**	1
*Ehrharta erecta**	**Poaceae**	6
*Paspalum dilatatum**	**Poaceae**	1
Veronica plebeia	**Scrophulariaceae**	1
*Solanum mauritianum**	**Solanaceae**	2
*Solanum nigrum**	**Solanaceae**	1
*Solanum pseudocapsicum**	**Solanaceae**	2
Clerodendrum tomentosum	**Verbenaceae**	1
*Lantana camara**	**Verbenaceae**	6
*Verbena bonariensis**	**Verbenaceae**	3
Cayratia clematidea	**Vitaceae**	2

*introduced weed species, **native weed species.

Given that the legal description of an EEC is contained in the determination by the NSW Scientific Committee, the first step is to compare the species from the plot data taken on the subject site with the list of species provided in the determination. Table 2 shows the list of native species that could be present in any sample from BGHF and STIF and highlights those species that were present in the sample plot.

Table 2: Species listed in the EEC determinations and their presence on the subject site.

Blue Gum High Forest 2007		**Sydney Turpentine-Ironbark Forest 1998**	
Acmena smithii	*Oplismenus aemulus*	*Acacia decurrens*	*Goodenia hederacea*
Adiantum aethiopicum	*Oplismenus imbecillis*	*Acacia falcata*	*Goodenia heterophylla*
Allocasuarina torulosa	***Oxalis perennans***	*Acacia implexa*	*Hardenbergia violacea*
Alphitonia excelsa	*Pandorea pandorana*	*Acacia longifolia*	*Imperata cylindrica*
Angophora costata	*Persoonia linearis*	*Acacia myrtifolia*	*Indigofera australis*
Angophora floribunda	*Pittosporum revolutum*	***Acacia parramattensis***	*Kennedia rubicunda*
Asplenium flabellifolium	*Pittosporum undulatum*	*Allocasuarina torulosa*	*Kunzea ambigua*
Backhousia myrtifolia	*Platylobium formosum*	*Angophora costata*	*Lepidosperma laterale*
Blechnum cartilagineum	*Poa affinis*	*Angophora floribunda*	*Leucopogon juniperinus*
Breynia oblongifolia	*Polyscias sambucifolia subsp. A*	*Aristida vagans*	*Lomandra longifolia*
Calochlaena dubia	*Pratia purpurascens*	*Billardiera scandens*	*Melaleuca decora*
Carex maculata	*Pseuderanthemum variabile*	*Breynia oblongifolia*	*Microlaena stipoides*
Cissus hypoglauca	*Pteridium esculentum*	*Bursaria spinosa*	*Notelaea longifolia*
Clematis aristata	*Rapanea variabilis*	***Centella asiatica***	*Oplismenus aemulus*
Clerodendrum tomentosum	*Smilax australis*	*Cheilanthes sieberi*	*Oxalis exilis*
Dianella caerulea	*Smilax glyciphylla*	*Clematis aristata*	***Ozothamnus diosmifolius***
Doodia aspera	*Tylophora barbata*	*Clematis glycinoides*	*Pandorea pandorana*
Elaeocarpus reticulatus	*Viola hederacea*	***Clerodendrum tomentosum***	*Panicum simile*
Entolasia marginata		***Commelina cyanea***	*Pittosporum revolutum*
Entolasia stricta		*Corymbia gummifera*	*Pittosporum undulatum*
Eucalyptus globoidea		*Daviesia ulicifolia*	*Poa affinis*
Eucalyptus paniculata		*Dianella caerulea*	*Polyscias sambucifolia*
Eucalyptus pilularis		*Dichelachne rara*	*Pomax umbellata*
Eucalyptus saligna		*Dichondra repens*	*Poranthera microphylla*
Eustrephus latifolius		*Dodonaea triquetra*	*Pratia purpurascens*
Ficus coronata		*Echinopogon caespitosus*	*Pseuderanthemum variabile*
Glochidion ferdinandi var. ferdinandi		*Elaeocarpus reticulatus*	*Rapanea variabilis*
Glycine clandestina		*Entolasia marginata*	*Rubus parvifolius*
Hydrocotyle laxiflora		*Entolasia stricta*	*Smilax glyciphylla*
Leucopogon juniperinus		*Eucalyptus acmenoides*	*Stipa pubescens*
Lomandra longifolia		*Eucalyptus globoidea*	*Syncarpia glomulifera*
Marsdenia rostrata		*Eucalyptus paniculata*	*Themeda australis*
Maytenus silvestris		*Eucalyptus resinifera*	*Tylophora barbata*
Morinda jasminoides		*Exocarpos cupressiformis*	***Veronica plebeia***
Notelaea longifolia forma longifolia		***Glycine clandestina***	*Zieria smithii*
5 of 53 native species in common with plot data		**7 of 70 native species in common with plot data**	

Of the 53 native species listed in the BGHF determination only 5 were present in the .04ha sample plot. A more detailed analysis is possible using the data from Tozer (2003). The technical report for Map Unit 152, *Blue Gum High Forest* notes that a typical .04ha plot taken in BGHF would contain at least 34 native species, 17 of which would be positively diagnostic of BGHF. Tozer (2003) set out a procedure for the proper location of .04ha sample plots, the collection of data from those plots, and the analysis of that data in order to determine the most likely community that was being sampled. He states that *"the test can not proceed unless the test plot contains the minimum number of species specified for the Map Unit under consideration."*

The data from the .04ha plot taken on the subject site contained 16 native species so using the rules from Tozer (2003) it would not be possible to positively identify the community as BGHF.

Another listed endangered ecological community in the Cumberland Plain that can be characterised by a dominant *Eucalyptus saligna* overstorey is Sydney Turpentine Ironbark Forest (STIF). This community was listed by the Scientific Committee as endangered in 1998. Strictly, STIF as described in the Scientific Committee determination, does not contain *Eucalyptus saligna* however all determinations state that the list of species provided is not intended to be comprehensive. Classification of STIF as a community having *Eucalyptus saligna* as a significant overstorey component distinct from BGHF was supported by the work of Tozer (2003), being described as Map Unit 15, Turpentine Ironbark Forest. As shown earlier in this report the modelling in NPWS (2002) suggested that the vegetation on the subject site would most likely be *Turpentine Ironbark Forest* or *Turpentine Ironbark Margin Forest* (Map Unit 43).

The Blue Gum dominated vegetation on the subject site should also be assessed against STIF and the Turpentine Ironbark Forest/Margin Forest of Tozer (2003). Table 2 shows the list of native species from the Scientific Committee determination that could be present in any sample from STIF. Of 70 possible native species only 7 were present in the .04ha plot data from the subject site.

The technical report (Tozer 2003) for Map Unit 15, *Turpentine Ironbark Forest* notes that a typical .04ha plot would contain at least 33 native species, 18 of which would be positively diagnostic of Map Unit 15. The technical report for Map Unit 43, *Turpentine Ironbark Margin Forest* notes that a typical .04ha plot would contain at least 38 native species, 11 of which would be positively diagnostic of Map Unit 43. Furthermore, for *Turpentine Ironbark Margin Forest, Eucalyptus saligna* is noted as being an 'uninformative' species.

The data from the .04ha plot taken on the subject site contained 16 native species so using the rules from Tozer (2003) it would not be possible to positively identify the community as either Map Unit 15 or Map Unit 43 or the endangered STIF.

5. Discussion

There are two issues for consideration: does the floristic content and structure of the patch of vegetation on the subject site meet the requirements for identification as an EEC?; and if not, what vegetation community remnant does the floristic content describe?

5.1. Can the vegetation be defined as an EEC?

The Threatened Species Conservation Act 1995 (s4(1)) defines an ecological community as "an assemblage of species occupying a particular area." Vegetation communities are made up several strata of plants, commonly the ground, shrub, and overstorey layers. Often a taller layer referred to as emergents is also present. The 'assemblage of species' implies that there would be good representation from all of the structural layers, even in disturbed communities, in order for a community to be classified as such.

This principle was supported by Preston JC in *Motorplex (Australia) Pty Limited v Port Stephens Council [2007] NSWLEC 74* where he said in 119 "...the proper classification of the vegetation on the control sites must involve consideration of the whole description of the MU42 community, and not just the canopy label. The full narrative description, the vegetation structure and the full list of diagnostic plant species all need to be considered...."

Plot data collected from the subject site contained only 16 native species of which 5 species out of a possible 56 were listed in the determination for BGHF and 7 species out of a possible 70 were listed in the determination for STIF. Even allowing for the fact that the diagnostic species lists provided in the determination can cover a wide geographic range where not all species will be represented at all locations, these numbers are atypical for either community. Rather, along with the high numbers of weed species present, these numbers indicate a degraded remnant of a community.

Further analysis was available from the detailed community data reported in Tozer (2003). The statistical significance limits of that data were that for a positive identification of BGHF to be made, a sample plot should contain a minimum of 34 native species. For a positive identification of STIF to be made a sample plot should contain a minimum of 37 native species. The sample plot from the subject site contained only 16 native species (less than half that required for either community) which meant that positive identification could not be made.

For both BGHF and STIF the subject site is situated in:

- The correct geology, being Ashfield Shale of the Wianamatta Group;
- The correct elevation, being approximately 160m AHD;
- The correct rainfall, being around 1000mm per year;
- An area where other instances of either community have been modelled to occur (Figure 8).

Despite these factors, the native floristic content and structure is not diverse enough to positively identify the vegetation as being either of the possible EEC's. The modelling by Tozer (2003) suggests that the area would most likely have supported STIF rather than BGHF.