1.7 Certification

As the principal author, I, Matthew Doherty make the following certification:

- The results presented in the report are, in the opinion of the principal author and certifier, a true and accurate account of the species recorded, or considered likely to occur within the site;

- All research workers have complied with relevant laws and codes relating to the conduct of flora and fauna research, including the *Animal Research Act 1995, National Parks and Wildlife Act 1974* and the *Australian Code of Practice for the Care and Use of Animals for Scientific Purposes*.

Signature of Principal Author and Certifier:

Matthew Doherty
Environmental & GIS Manager
RPS Harper Somers O'Sullivan
October 2008

2 METHODS

The DGEAR's stipulate assessment should have due regard to DECC's Threatened Species Assessment Guidelines. These guidelines refer the user to consult the Threatened Biodiversity Survey and Assessment Guidelines – Working Draft (DECC 2004) and any relevant recovery plans and threat abatement plans for ecological assessment. To this end these documents have formed the core basis for the adopted ecological assessment methodology over the site.

For the purposes of continuity and to best represent a holistic survey approach, the regional guidelines considered as part of the combined survey design and efforts are as follows:

- The Flora and Fauna Survey Guidelines, Lower Hunter Central Coast Region (Murray et al 2002);
- The Flora and Fauna Survey Guidelines of the Lake Macquarie Local Government Area (July 2001); and
- Wyong Ground Orchid Survey Wyong Shire (Gunninah Environmental Consultants, 2003).

The methodology employed to survey the proposed Conservation Estates does not strictly comply with DECC Biodiversity Survey Guidelines. However, the vegetation mapping was to provide baseline knowledge pertaining to the broad scale distribution of ecological communities throughout these proposed conservation areas. This mapping has been based upon both aerial photograph interpretation and ground truthing. The ground truthing involved random meanders and driving over the site for approximately 6 days. The survey effort then consisted of detailed quadrats to sample the vegetation and provide data for non-parametric statistical analysis (PATN). This data was used within cluster analysis to assist in the delineation of the vegetation communities.

The fauna assessments consisted of mainly habitat assessment and opportunistic surveys throughout the Conservation Estate. No trapping was undertaken within the Conservation Estate. Targeted Swift Parrot surveys were undertaken with the Conservation Estates. This survey effort was performed due to the strategic location of this portion for a native corridor which links Hexham Swamp to the proposed Conservation Estates to the west of Tank Paddock.

2.1 Preliminary (Desktop) Assessments

Preliminary assessments drew on a number of information sources including previous preliminary reporting and information held on government databases and archives. It must be noted here that the EcoBiological (2006) mapping was groundtruthed whilst performing the current survey. RPS HSO generally concurred with the majority of the mapping performed by EcoBiological, however some minor changes have been made which on groundtruthing were considered to differ from that of the previous mapping. This mapping was then used in the final vegetation mapping for this project.

Data gathered during preliminary assessments was used to assist in identifying distributions, suitable habitats and known records of threatened species so that field

investigations could more efficiently focus survey effort. The preliminary assessment utilised a number of other additional information sources, including:

- Vegetation Assessment Report, Harper Somers O'Sullivan (2005);
- Phase One Ecological Constraints Investigations RPS HSO (2007);
- Aerial Photograph Interpretation (API) and literature reviews to determine the broad categorisation of vegetation within the site;
- Review of fauna and flora records contained in the DECC Wildlife Atlas (Accessed April 2008);
- Literature reviews;
- LHCCREMS – Vegetation Survey, Classification and Mapping. (NPWS 2000, House 2003);
- Hunter Bird Observers Club (HBOC) records;
- Birdata (web version of Birds Australia's New Atlas of Australian Birds);
- A review of GIS data including aerial photography, topographic maps, SEPP 14 Wetland Mapping, Soil Landscapes, Acid Sulphate Soil Potential;
- DECC database of Threatened Species, Populations and Ecological Communities (website);
- DEWHA *EPBC Act 1999* Protected Matters Search; and
- Collective knowledge gained from extensive work in the area.

2.2 Flora Assessment

2.2.1 Flora Stratification Units

Stratification of the site was undertaken based on interpretation of Phase 1 base data, API and previous field inspections along with consideration of biophysical, vegetation structure, soil type and floristic boundaries. The DECC Flora Survey Guidelines were consulted to determine survey requirements for large sites. These guidelines suggest that area should be initially stratified on biophysical attributes (e.g. soil, geology) followed by vegetation structure (e.g. Woodland, Forest, Shrubland) and then floristics i.e. species. Within the Northern Proposed Conservation Estates, five vegetation structures of Subtropical Rainforest, Dry Open Forest, Coastal Wet Sclerophyll Forest, cleared/weeds and Freshwater Wetlands exist. While groundtruthing was ongoing, amendments were made and thus some stratification units were dismissed as not occurring within the site and some new units were identified. Amendments to the survey effort were based on the area of the vegetation communities and thus when new vegetation communities were delineated extra survey effort in the form of extended random meanders to determine the edge of vegetation communities were conducted.

2.2.2 Preliminary Vegetation Mapping

A variety of field survey techniques were employed over the course of fieldwork for this assessment to target the full suite of flora species and fauna guilds across the site. Nomenclature and classification of delineated vegetation communities followed the LHCCREMS Vegetation Community Mapping (NPWS 2000: House 2003) wherever those communities were commensurate with those encompassed by LHCCREMS mapping.

Vegetation Mapping

Flora surveys and vegetation mapping carried out on the site has been undertaken as follows:

- API to map the community(s) extent into definable map units;
- Confirmation of the community type(s) present (dominant species) via the undertaking of detailed flora surveys and identification;
- Review of previous preliminary environmental studies conducted by HSO (2005) and RPS HSO (2007);
- Review of the Lower Hunter and Central Coast Regional Environmental Management Strategy (LHCCREMS) Vegetation Mapping (NPWS 2000: House 2003) for the site and surrounding areas;
- The conservation status of the derived vegetation communities was considered in light of the findings of the LHCCREMS Vegetation Mapping (2003);
- Vehicle reconnaissance was carried out over most of the area on all the unformed tracks within the Conservation Estates. Notes on the distribution of the vegetation community assemblages were taken during these general traverses.
- Flora surveys were carried out the majority of the site, with an emphasis on potentially significant species. Over 100 flora quadrats 20m X 20m and five 100m Transects (Figure 2-1) were performed in the Conservation Estate. The general flora survey involved Random Meanders in line with methodology termed as the “Random Meander Technique” by Cropper (1993). Over 29 km of random meanders were undertaken on foot (Figure 2-2).
- Map the type and general extent of the community(s) present into definable map units where appropriate;
- Assessment of the potential for the derived vegetation communities to constitute EEC’s as listed within the *TSC Act (1995*) and the *EPBC Act (1999)* was also undertaken. The floristic composition, geomorphological characters and geographic distribution were considered when determining whether an EEC was present; and
- Vegetation mapping was mapped utilising a combination of the PATN Analysis, API and groundtruthing.

2.2.3 Plant Identification

During this survey when a plant could not be identified accurately within the field, a voucher sample was collected, together with notes on habitat, form and height, labelled and identified according to nomenclature in Harden (1992 – 2002). Opportunistic sightings of taxa were also collected if they were not found in any of the sampled sites. At a minimum, all dominant species were identified in all stratums to ensure that an informed delineation resulted. All flora species recorded are documented in Appendix B.

Voucher specimens were forwarded to Royal Botanical Gardens, Sydney, for verification of potential threatened flora species considered as difficult to separate from common flora species.

2.2.4 Data Recording

Site location and any threatened species were recorded in eastings and northings using Map Grid of Australia (GDA 94) Zone 56 co-ordinated system on a Trimble GEO XH GPS, which has sub-metre accuracy following post-processing.

2.2.5 Landform and Geophysical Information

Topographic information was collected along with measurements of altitude, slope and aspect. Slope was determined from a slope map, which was derived from 2 m contours for the entire site. Aspect was measured using a Sunto compass with reference to magnetic north. Information on geology, soils, fire and other disturbances were collected on NPWS survey data sheets. Site location was recorded in eastings and northings using Map Grid of Australia Zone 56 (GDA 94) co-ordinated system on a Trimble GEO XH GPS, which has sub-metre accuracy following post-processing.

2.2.6 Floristic Structure Information

Vegetation structure was determined based on Specht *et al,* (1995) by estimation of the height and PFC within each stratum present. Individual taxon data for each quadrat/transect was recorded using the NPWS species data forms. Species abundances were recorded utilising a modified Braun-Blanquet (1982) cover abundance six ranking scale as follows:

Cover Code	Projected Canopy Cover
1	<5% and uncommon
2	<5% and common
3	6-20%
4	21-50%
5	51-75%
6	76-100%

2.2.7 Significant Flora Survey

A list of potentially occurring significant flora species from the locality (10km radius) was compiled, which included, threatened species (Endangered or Vulnerable) and

EEC listed under the *TSC Act (1995)*, those species listed on the *EPBC Act (1999),* ROTAP listed flora species (Briggs and Leigh 1996), as well as any other species deemed to be of local importance.

No targeted searches were undertaken of threatened flora species within the proposed Conservation Estates. However, when threatened species were found, the extent of the population within the vicinity was mapped using a Trimble Geo XH GPS system.

2.2.8 Groundwater Dependent Ecosystems

Groundwater Dependent Ecosystems (GDE's) is a broad definition covering all ecosystems which are dependent upon groundwater either permanently or occasionally to survive (DLWC, 2002). Identification of GDE's depends upon the location of the vegetation communities in relation to groundwater. GDE's are typically the vegetation communities which are located in drainage depression, swamps and creeklines, where groundwater comes up to the surface. An assessment of whether GDE's occur within the Conservation Estates has been made within this EIR.

The NSW State Groundwater Dependent Ecosystem Policy (DLWC 2002) and Groundwater Dependent Ecosystems Assessment, Registration and Scheduling of High Priority (DWE 2006) were consulted to determine if any GDE's are present within the Conservation Estates and to classify them according to these policies.

There are differing types of Groundwater Systems (DLWC, 2002) these include:-

1. Deep Alluvial Groundwater Systems;
2. Shallow Alluvial Groundwater Systems;
3. Fractured Rock Groundwater Systems;
4. Coastal Sand Bed Groundwater Systems; and
5. Sedimentary Rock Groundwater Systems.

Three of these types of groundwater systems have the potential to occur in the Hunter region and these include Shallow Alluvial, Coastal Sand Bed and Sedimentary Rock Groundwater Systems. The most likely system to occur within the Conservation Estates would be Shallow Alluvial Groundwater System and thus soil mapping is important in assessing the potential for the presence of groundwater aquifers. Therefore, the soil mapping of Newcastle (Matthei, 1995) was consulted to determine the boundaries of alluvial soil mapping within the Conservation Estates.

2.2.9 Data Analysis

Vegetation data was collected from a total of 107 quadrats within the entire Northern Lands. A total of six quadrats were located within Black Hill Development Estate and 39 of these quadrats were located within the Link Road, Minmi Development Estate. The remaining 62 quadrats were sampled within the Conservation Estates at Tank Paddock and Stockrington. Agglomerative cluster analysis of the vegetation data collected was performed using the PATN Statistical Analysis Package Ver. 3.11 (Belbin 2006), to assist in the delineation of the vegetation communities across the Northern Lands. This statistical program has been used in previous large vegetation surveys in the region (Bell 2002, Bell 2004, Hill 2003, NPWS 2000 & Peake 2006).

Cluster analysis groups objects that are similar to one another. In the case of vegetation community analysis this statistical tool groups communities based on their similarity of plant species recorded.

Cluster analysis groups objects (in this case survey sites) together by way of an assessment of the association between data pairs. PATN provides several association measures which are applicable to different types of data. For the data collected within the Northern Lands, data both the Bray Curtis and Kulzcynski association measures were explored on the data with the default PATN settings. Belbin (2003) suggests that the Bray Curtis association measure is most appropriate where matches between higher values are more significant than matches between lower values and this would suggest that this measure is the most appropriate for abundance data. An unweighted pair-group arithmetic averaging (UPGMA) clustering strategy was applied to both association matrices with a default beta value of -0.1.

Dendrograms were produced using both association measures, with the Bray Curtis analysis giving clearer delineation of the vegetation communities present. Thus this methodology was employed for the dendrograms and further analysis of vegetation delineation. Exotics species were removed from the analysis to refine the delineations and give a clear idea of the native vegetation communities present. A two-step analysis was then performed upon the data using the species as variables and the quadrats as objects, to detect noisy and outlier variables (as recommended by Belbin 2008, Marine Community Example). Box Whisker were also produced which are plots which graphically display of the ability of a specific variable to discriminate between groups, this analysis also gives a Kruskal-Wallis statistic for each variable (this statistic is a non-parametric version of the f-ratio (Belbin, 2006, PATN ver. 3.11 help)). A two way table was produced and this table assisted in the analysis of which species were dominant in the different variants of the vegetation communities produced.

The data was transposed and using the quadrats as variables and the species as objects, the Two-step analysis was performed and noisy quadrats with a low KW statistic (<0.1) were also removed from the analysis. Three quadrats were identified as noisy and were removed from the analyses, these quadrats were placed in highly disturbed areas in which little natives were present and were not representative of the vegetation. Two were in the Alluival Tall Moist Forest and had severe weed infestations, with the remaining quadrat was located in Coastal Foothills Spotted Gum Ironbark Forest which had been recently subjected to a severe fire. Removal of these quadrats and species did not alter the analysis significantly; however' it did help to clearly delineate the vegetation communities.

The number of groups which is to be determined from the Dendrogram can be based on the point at which a levelling of scree plot of dissimilarity and number of fusion points occur. At this levelling point many clusters are formed at essentially the same linkage distance. Thus row fusion points were exported from PATN and plotted to assist in determining the cut off point for delineation of the vegetation communities.

The Freshwater Wetland Complex was not included within the data as it is clearly distinct from the dry sclerophyll and wet sclerophyll forests that occur elsewhere within the site. Moreover, quadrats are difficult to perform within this type of vegetation community. In addition, quadrats were not performed within the Weeds and cleared areas or the Dams vegetation communities. Sampling was undertaken by opportunistic survey and random meanders for these vegetation communities.

WARNING

No part of this plan should be used for critical design dimensions. Confirmation of critical positions should be obtained from Harper Somers O'Sullivan Pty Ltd.

Note that this Vegetation Community Map depicts clearly defined boundaries between vegetation communities that are the product of individual interpretation and are not distinguished by clearly defined boundaries 'on the ground'.

Therefore, this map should only be treated as an indication of approximate peripheries between delineated vegetation communities.

Caution should therefore be exercised when using this data for purposes requiring high levels of accuracy. Furthermore, no account for intergrading areas between delineated vegetation communities has been made.

Legend

- Conservation Estate
- Development Estate
- Quadrat Locations
- Cleared Areas/Tracks (No LHCCREMS Equivalent)
- Dam (No LHCCREMS Equivalent)
- MU 12 - Hunter Valley Moist Forest
- MU 15 - Coastal Foothills Spotted Gum - Ironbark Forest
- MU 17 - Lower Hunter Spotted Gum Ironbark Forest
- MU 19 - Hunter Lowland Redgum Forest
- MU 1a - Subtropical Rainforest
- MU 30 - Coastal Plains Smooth-barked Apple Woodland
- MU 37 - Swamp Mahogany - Paperbark Forest
- MU 40 - Swamp Oak - Rushland Forest
- MU 46 - Freshwater Wetland Complex
- MU 5 - Alluvial Tall Moist Forest
- Weeds/Disturbed Vegetation (No LHCCREMS Equivalent)

Q - 84, Q - 53, Q - 95, Q - 92, Q - 91, Q - 88, Q - 89, Q - 96, Q - 97, Q - 87, Q - 93, Q - 90, Q - 62, Q - 86, Q - 94, Q - 56, Q - 61, Q - 83, Q - 85, Q - 57, Q - 63, Q - 98, Q - 106, Q - 105, Q - 102, Q - 103, Q - 79, Q - 59, Q - 60, Q - 54, Q - 48, Q - 101, Q - 80, Q - 81, Q - 100, Q - 104, Q - 55, Q - 64, Q - 65, Q - 99, Q - 78, Q - 68, Q - 77, Q - 72, Q - 74, Q - 70, Q - 71, Q - 75, Q - 69, Q - 66, Q - 67, Q - 76, Q - 52, T24, Q26, Q27, Q29, Q28, Q19, Q31, Q - 47, Q18, Q32, Q37, Q34, Q33, Q35, T30, Q9, Q17, Q6, T5, T4, Q8

0 0.75 1.5km

TITLE: Figure 2-1 Flora Quadrat Survey Locations
Northern Conservation Estate

CLIENT: Coal & Allied Operations Pty Ltd

SCALE: 1: 28500 at A3 Size **DRAWN:** S. Bishop **APPROVED:** M.Doherty

DATUM: MGA Zone 56 (GDA 94) **DATE:** 3/11/2008

LAYOUT REF:J:\JOBS\24k\24530 Hunter Valley\Drafting\Ecology\Northern Lands\ALL WORKSPACES\REPORTS\Stockrington Tank Paddock\24530-2 FIGURE 2-1 Flora Quadrat survey locations A3 A3

CONTOUR INTERVAL: N/A

JOB REF: 24530-2

HARPER SOMERS O'SULLIVAN

PLANNING SURVEYING ECOLOGY

241 DENISON STREET BROADMEADOW PO BOX 428 HAMILTON NSW 2303
T: 02 4961 6500 F: 02 4961 6794 E: survey@hso.com.au W:www.hso.com.au ABN 11 093 343 858

WARNING

No part of this plan should be used for critical design dimensions. Confirmation of critical positions should be obtained from Harper Somers O'Sullivan Pty Ltd.

LEGEND

- Development Boundary
- Coservation Estate Boundary
- Random Meander (Total 45km)

0 1 2km

TITLE: Figure 2-2 Random Meander Survey Locations Northern Conservation Estates

CLIENT: Coal & Allied Operations Pty

SCALE: 1: 30000 at A3 Size **DRAWN:** S Corry **APPROVED:** S. Bishop

DATUM: MGA Zone 56 (GDA 94) **DATE:** 16/7/2008

LAYOUT REF: J:\JOBS\24k\24530 Hunter Valley\Drafting\Ecology\Northern Lands\ALL WORKSPACES\REPORTS\Stockrington Tank Paddock24530-2 Fig 2-2 Flora Random Meander Locations 160708.wor

CONTOUR INTERVAL: N/A

JOB REF: 24530-2

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2.3 Fauna Assessment

The fauna survey methodology initially consisted of the production of an Expected Fauna Species List for the area (Appendix C) and an assessment of the potential use of the site by threatened fauna species (as listed under the *TSC Act 1995* and *EPBC Act 1999*) identified from the vicinity of the site. This was achieved by undertaking literature and database reviews followed by confirmation through habitat assessment and the known movements, distribution and habitat requirements of threatened fauna species recorded from the wider locality. Additional species observed were also noted on the list. Furthermore, those species not occurring within fauna record databases, but for which potential habitat exists within the site have been assessed.

Diurnal Birds

Incidental bird observations were made and bird habitat assessments were undertaken across the entire site during the delineation of vegetation communities and targeted threatened flora searches. Particular note was taken of habitat quality based on structural complexity, community age cohort and evidence of successional growth patterns. Habitat quality attributes were used to inform assessment of site suitability for those potential avifauna species that were not detected due to seasonal movements, cryptic or secretive habits or general scarcity.

Habitat assessment included targeted searches for habitat attributes used by threatened species listed as having potential to occur within the site, including the seasonally occurring Swift Parrot and Regent Honeyeater. Targeted searches for Glossy Black Cockatoo were undertaken, including searches for chewed (*Allocasuarina*) cones indicative of past feeding by this species.

For diurnal surveys, emphasis was placed on peak activity periods, i.e. dawn and dusk, to maximise the chances of species encountered. Birds were identified by direct observation, by recognition of calls or distinctive features such as nests, feathers etc. Furthermore, whenever other survey work was conducted, during both diurnal and nocturnal day periods, opportunistic observations of those bird species encountered were recorded.

Nocturnal Birds

Incidental forest owl searches were conducted and habitat assessment was undertaken across the entire site during the delineation of vegetation communities and targeted threatened flora searches. Particular note was taken of habitat quality based on structural complexity, community age cohort and evidence of successional growth patterns. Other targeted habitat attributes included mature trees containing hollows, which may represent nesting opportunities for forest owl prey species or breeding opportunities for forest owls. Understorey strata densities were also assessed for their potential to represent potential habitat for terrestrial mammals, which are the favoured prey guild of some forest owl species.

Targeted Swift Parrot Surveys

Swift Parrot surveys were undertaken within proposed Conservation Estates and Development Estates over two days during July 2008. The survey period coincided with known Swift Parrot movements into south-eastern Australia. Surveys

encompassed two different methodologies to ensure adequate coverage of potential Swift Parrot habitat was made, and included:

- Targeting of small discrete vegetation community areas containing potential foraging species, such as occur in riparian zones; and

- Driving through more widespread foraging habitat to locate indicators (foraging aggregations of honeyeaters / lorikeets or the presence of blossom) that specific areas may have the potential to attract Swift Parrots during the current season.

As survey effort was limited to one part of the potential Swift Parrot season, habitat evaluation was also undertaken to determine where the most favourable areas of potential Swift Parrot habitat might occur across the C&A Lands.

Arboreal and Terrestrial Mammals

Incidental observations and habitat assessments for arboreal and terrestrial mammal species were undertaken across the entire proposed Conservation Estates during ecological surveys. Key habitat attributes targeted during ecological surveys, were structural complexity of vegetation communities, incidence of hollow-bearing trees, presence of blossom-producing trees and shrubs and levels of understorey forest debris.

The potential presence of Koala was assessed through the identification of potential Koala food trees, followed by inspection for signs of Koala usage. Trees were inspected for the presence of Koalas, characteristic scratch and claw marks on the trunk and scats around the base of each tree.

Opportunistic sightings of potential secondary indications (scratches, scats, diggings, tracks etc.) of resident fauna were sought. Such indicators included:

- Distinctive scats left by mammals. Any scats unable to be positively identified in the field were collected for further analysis, and scats of predator species containing fur / bones were sent for analysis if appropriate;

- Scratch marks made by various types of arboreal animals;

- Scats consistent with Koalas; and

- Feeding scars on *Eucalyptus* trees made by Gliders.

Any other incidental observations of fauna were recorded during all phases of fieldwork.

Microchiropteran Bats

Habitat assessment of the entire site was conducted during vegetation surveys to assess the suitability of proposed Conservation Estates to contain habitat for Microchiropteran bat species. Targeted habitat attributes included the incidence of caves and man-made structures, which may be suitable roosting habitat for cave-dwelling species, hollow-bearing trees, pools, dams, watercourses and structural

complexity of onsite vegetation communities as an indication of niche diversity and foraging opportunities.

Megachiropteran Bats

Habitat for these species, specifically the Grey-headed Flying Fox, was assessed by the incidence of blossom-producing and fruit-bearing tree species. Opportunistic searches were also conducted for roosting camps within the site's gullies.

Herpetofauna

Opportunistic Herptofauna (frog and reptile) searches were carried out and habitat assessments were conducted during vegetation surveys across the site. Habitat attributes targeted during habitat assessment, included ephemeral watercourses, pools, dams, poorly draining hillsides and wetland habitats for amphibian species and understorey forest debris levels, rocky outcrops, understorey complexity and densities were noted with regard to potential reptile habitat.

2.4 Habitat Assessment

An assessment of the relative value of the habitat present on the Conservation Estate was carried out. This assessment focused primarily on the identification of specific habitat types and resources on the site favoured by known threatened species from the region.

Key features assessed for flora habitat included vegetation type and stratification, soil type, depth and drainage, landform pattern, aspect and past disturbance including fire regime. Habitat key features assessed for fauna type at each survey point included hollow bearing tree density, feed tree density, diversity and density of Proteaceae species, Eucalypt diversity, vegetation strata number and density of dead wood debris across the ground as outlined in

Table 2.1 below. The assessment also considered the potential value of the site (and surrounds) for all major guilds of native flora and fauna.

Table 2.1 Ecological / Environmental Attributes Collected within Flora Survey Points

Feature	Variables	Value
Hollow Bearing Tree Density	Low Density Moderate Density High Density	Determine the density and distribution of denning and roosting habitat for native fauna species across the site.
Eucalypt diversity	Low Density Moderate Density High Density	Determine the diversity of Eucalypt feeding opportunities for native fauna species across the site.
Allocasuarina sp.	Low Density Moderate Density High Density	Determine the density and distribution of this habitat resource across the site, particularly as a forage plant species for Glossy Black-Cockatoo.
Proteaceae sp.	Low Density Moderate Density High Density	Determine the density and diversity of Proteaceae species across the site, as an indicator of winter foraging resources for threatened arboreal mammals, such as the Squirrel Glider and potentially the Pygmy Possum.
Structural Diversity	Low (1 layer) Moderate (2 layers) High (3+ layers)	A measure of habitat quality across the site, particularly as an indicator of microhabitat diversity and niche opportunity for bird species, potential threatened terrestrial mammals and the prey species of forest owls.
Fallen Timber	Low (few or none) Moderate (scattered) High (intact)	A measure of habitat quality across the site, particularly as an indicator of microhabitat diversity and niche opportunity for bird species, potential threatened terrestrial mammals and the prey species of forest owls.

The assessment was also based on the specific habitat requirements of each threatened fauna species in regards to home range, feeding, roosting, breeding, movement patterns and corridor requirements. Consideration was given to contributing factors including topography, soil, light and hydrology for threatened flora and assemblages.

2.5 Survey Dates, Type and Prevailing Conditions

The following Table 2-2 depicts the dates, survey type and prevailing weather during the ecological investigations conducted during the survey period.

Table 2-2: Survey Dates, Types & Prevailing Weather

DATE	SURVEY TYPE	WEATHER					
				Sun		Moon	
		Temperature ^{0}C	Rain (24 hrs to 9:00am)	Rise	Set	Rise	Set
Vegetation Surveys							
26/06/08	Vegetation community identification and classification	11 - 15	0 mm	6:56	16:55	-----	11:19
27/06/08		5 - 18	0mm	6:44	16:44	-----	11:48
30/06/08		5 - 22	0mm	6:56	16:57	3:39	13:19
01/07/08		12 - 20	0mm	6:56	16:57	4:47	14:39
02/07/08		11 - 18	0mm	6:56	16:58	5:58	15:45
03/07/08		6 - 18	0mm	6:56	16:58	7:01	16:57
04/07/08		5 - 17	0mm	6:56	16:58	7:54	18:11
07/07/08		7 - 20	0mm	6:56	17:00	9:44	21:34
08/07/08		10 - 18	0mm	6:56	17:00	10:13	22:35
09/07/08	Flora Quadrats	5 - 14	3.6mm	6:55	17:01	10:39	23:34
10/07/08		8 - 15	0mm	6:55	17:01	11:06	-----
11/07/08		7 - 15	0mm	6:55	17:02	11:34	00:32
16/07/08		5 -19	0mm	6:53	17:05	14:59	5:15
17/07/08		4 - 18	0.2mm	6:53	17:05	15:55	6:03
18/07/08		5 - 20	0mm	6:52	17:06	16:55	6:46
Fauna Surveys							
Incidental fauna surveys/ habitat assessment were conducted during vegetation surveys as listed above.							
16/07/08	Swift Parrot Surveys	12 – 18	0mm	6:53	17:05	14:59	5:15
17/07/08		20 – 33	0.2mm	6:53	17:05	15:55	6:03

Source:
Australian Government – Geoscience Australia [http://www.ga.gov.au/geodesy/astro/.jsp]
National Rainfall and Temperature Map Archives [http://www.bom.gov.au/silo/products/ClimMaps.shtml]

2.6 Limitations

Limitations associated with the EIR are presented herewith. The limitations have been taken into account throughout this assessment specifically in relation to threatened species assessments, results and conclusions.

In these instances, a precautionary approach has been adopted; as such 'assumed presence' of known and expected threatened species, populations and ecological communities has been made where relevant to ensure a holistic inventory.

Seasonality

Timing limitations are always encountered during ecological assessment surveys due to the seasonal variations across the broad spectrum of flora and fauna species to be studied. Preliminary surveys were carried out during March, targeted searches for threatened flora and fauna were undertaken during September, November and January. As such there was less survey work undertaken during times when certain migratory bird or bat species would have a higher probability for presence on the site and when some reptile and amphibian species might exhibit greater activity.

Most notably, several threatened flora species, particularly cryptic orchids, should be surveyed within their respective flowering periods. Several of the threatened orchids, which have potential habitat, could not be comprehensively surveyed to provide information on whether they occur within the site. Therefore, these threatened orchids cannot be discounted as occurring within the site.

The flowering and fruiting plant species that attract some nomadic or migratory threatened species, often fruit or flower in cycles spanning a number of years. Furthermore, these resources might only be accessed in some areas during years when resources more accessible to threatened species fail. As a consequence threatened species may be absent from some areas where potential habitat exists for extended periods and this might be the case for the above-mentioned species. Again, this has been taken into account in the habitat assessment phase, although ongoing surveys, conducted during a range of seasonal periods, are designed to elucidate any potential significance the C&A lands might represent for seasonal species.

In addition, the seasonality of the surveys also places limits on the number of flora species identified in the site as the optimum time to survey would be throughout Spring and Summer when the majority of flora species flower.

Data Availability & Accuracy

The collated threatened flora and fauna species records provided by the NPWS for the region are known to vary in accuracy and reliability. Traditionally this is due to the reliability of information provided to the NPWS for collation and/or the need to protect specific threatened species locations. For the purposes of this assessment this information has been considered to have an accuracy of ± 1km.

Threatened flora and fauna records within the region were predominantly sourced from the DECC Atlas of Wildlife Database and a DEWHA Protected Matters Search. Other sources such as Birdata and HBOC were also utilised. Similar limitations are known to exist with regards to these data sources and their accuracy.

Note: Data recorded by RPS HSO during the survey period, has been undertaken with a Trimble GeoXH GPS unit, which is capable of sub-metre accuracy following post processing.

Access

The survey was limited by access and size of the Conservation Estate; in some areas the topography or density of flora (i.e. *Lantana camara* tangles) restricted access to some parts of the Conservation Estate. Furthermore, due to recent weather events notably the June (2007) long weekend storm, many of the tracks have been severely degraded or blocked off by fallen timber.

Fauna

Fauna survey effort varied according to the standards set within the DECC Biodiversity Survey Guidelines due to the following reasons:

- Seasonal constraints as outlined above.

- Diurnal Birds - Habitat assessment and previous records and reporting were used to determine the probability of site use. Bird sensus surveys outlined in the aforementioned methods in combination with opportunistic surveys conducted during other fieldwork were considered as representing a wider and more thorough coverage of the site than short periods over limited transects. Survey coverage was determined by stratification units designed to represent other fauna guilds and flora surveys. Survey of seasonally occurring threatened species, including Swift Parrot and Regent Honeyeater was limited to two days. However, the site was assessed for its potential to support these species by the presence / absence of winter-flowering *Eucalyptus* species and known habitat preferences elsewhere in the region.

-
- Habitat assessment was utilised where survey effort was less than recommended for particular fauna guilds such as arboreal mammals and nocturnal birds.

Despite the apparent deficiencies, suitable coverage of the site is considered to have been accomplished, particularly as potential occurrences of likely species is assumed (precautionary approach) in light of habitat assessment, previous local records, seasonality deficiencies, the known movements of locally occurring threatened species and the combined authors local knowledge and experience.

3 Results

3.1 Flora

A total of 516 flora species were identified during the survey period over the Conservation Estates within the quadrats, transects and random meander surveys. A complete list of the flora species identified is provided in Appendix B of this report.

3.1.1 Vegetation Community Delineation

Vegetation communities have been delineated via the methods outlined within Section 3. Following the initial field surveys and mapping, subsequent statistical analysis was employed to qualify and test the results.

A scree plot, Figure 3-1 shows the dissimilarity against groups in which it shows the point of inflection at 0.70 dissimilarity level. Therefore 15 groups have been recognised by the non-parametric statistical analysis (PATN Ver. 3.11, Belbin 2006). However, the data levels off at 0.72 dissimilarity showing 9 groups. These nine groups are supported by ground truthing with nine vegetation communities being delineated.

Figure 3-2 includes the Dendrogram produced by the PATN program (Ver. 3.11, Belbin 2006), which indicates the floristic relationships between the vegetation communities. A combination of statistical analysis and groundtruthing has delineated nine vegetation communities within both the Conservation Estates and the Development Estates. Extensive survey effort of over 100 quadrats was used within the statistical analyses. A clear delineation is shown between the dry sclerophyll and wet sclerophyll forests within the northern lands. However, several variants of these vegetation communities were delineated at a lower level of dissimilarity and are shown in the Dendrogram of the site (Figure 3-2). When taking into consideration the variants there are 15 which correspond to the scree plot. Therefore as a result of groundtruthing and statistical analysis 9 vegetation communities have been delineated within the Northern Lands (this includes both the Conservation Lands and the development estates of Link Road and Black Hill), with some communities containing several variants. These variants are described within the description of the individual communities. It must be noted that the variants are not defined vegetation communities in their own right but floristic variation does occur throughout the community. These have not been mapped due to the time constraints imposed on this project and in any case are not necessary as they do not assist the assessment of conservation significance of any of these communities to any further significant degree.

The PATN analysis did not delineate between two the community of Swamp Oak Rushland Forest or Swamp Mahogany Paperbark Forest and this is due to low sampling in these communities (1 quadrat each) as these communities occurred in Tank Paddock in small areas (<1ha).

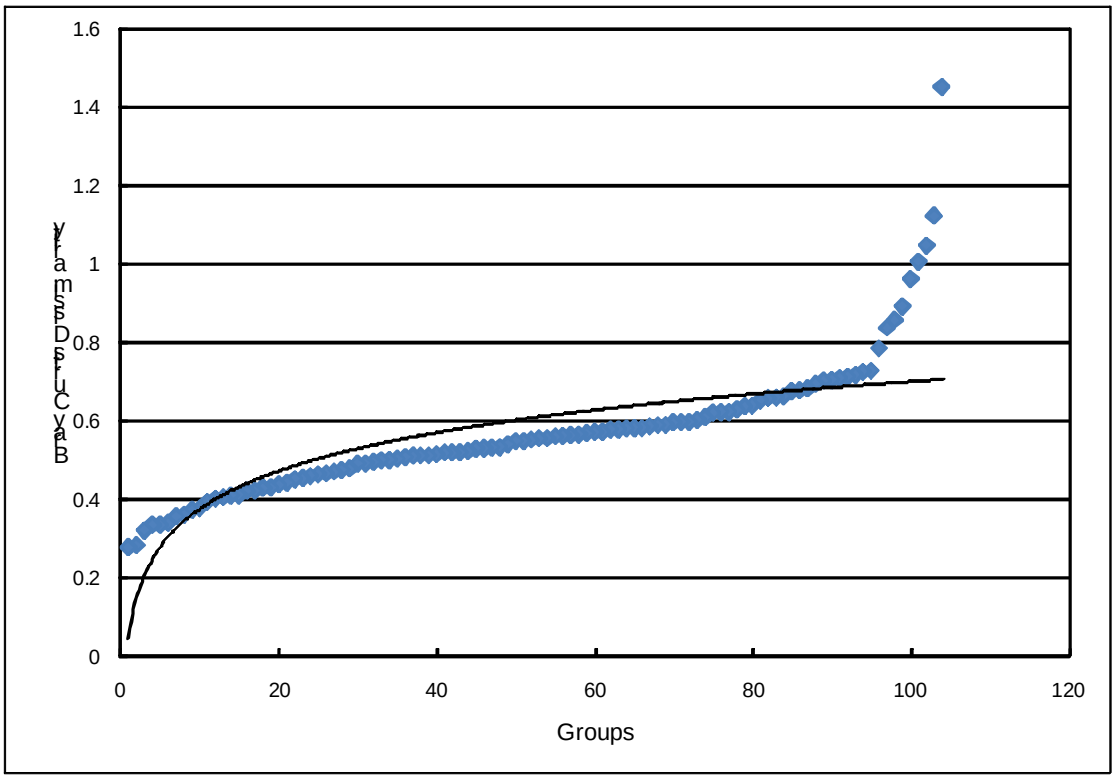

Figure 3-1 Scree Plot of Bray Curtis Association Measure results

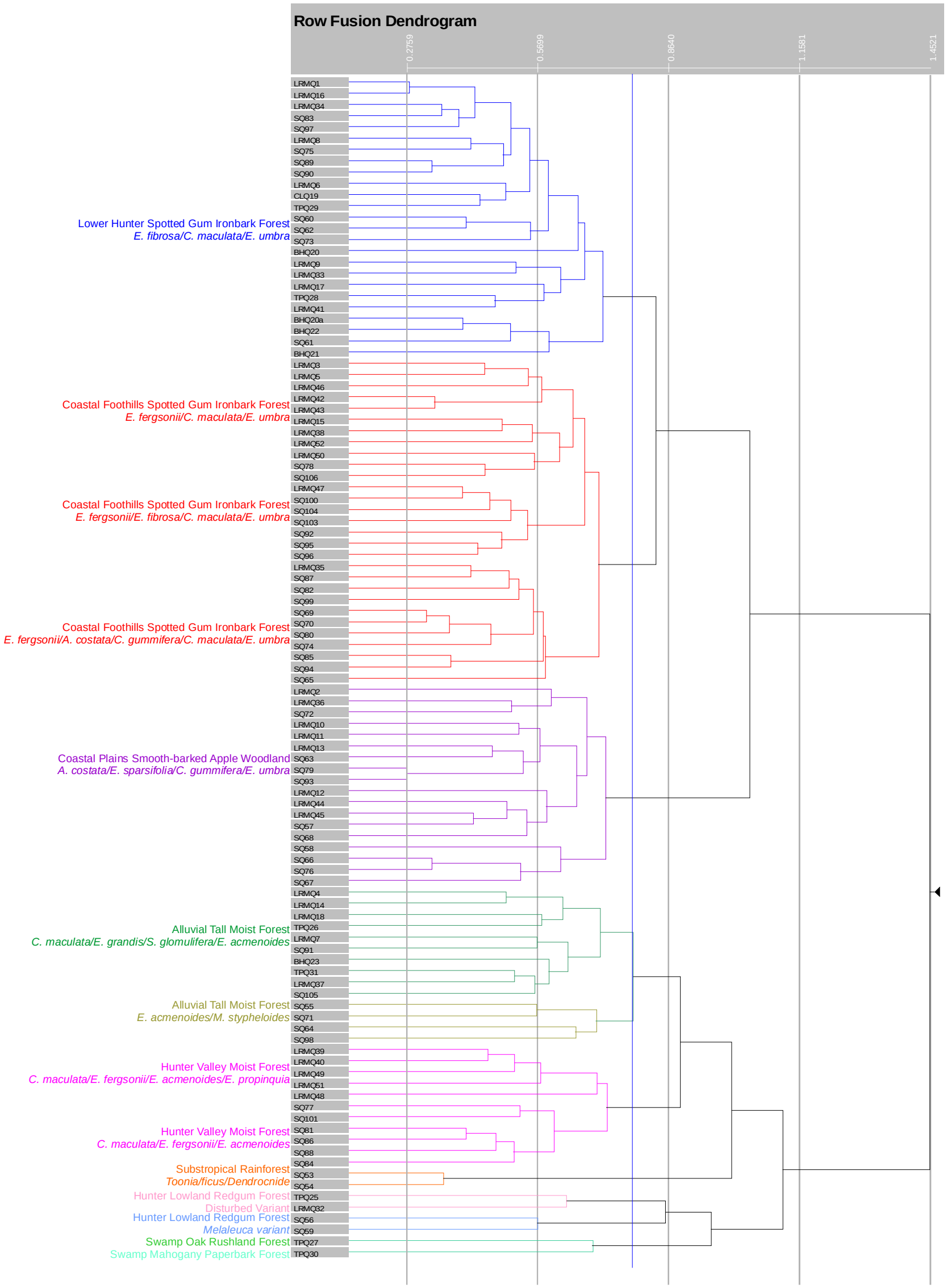

Figure 3-2 Dendrogram showing vegetation communities and dissimilarity association for the Northern Estates

3.1.2 Description of Vegetation Communities

A description of each community and classification into the adopted regional vegetation classification, being Lower Hunter and Central Coast Regional Biodiversity Strategy (NPWS 2000; House 2003) has occurred. However the vegetation types have not always conformed to these descriptions. The descriptions below describe the vegetation communities and, where relevant, deviations from LHCCREMS classifications. The following 12 vegetation communities were delineated within Northern Conversation Estates as shown in Figure 3-2 and listed below: EEC's are identified by bold text. Table 3-1 summarises total approximate vegetation community areas and status. Photographs of each vegetation community can be found in Appendix E.

1. Coastal Foothills Spotted Gum - Ironbark Forest (CFSGIF);
2. Coastal Plains Smooth-barked Apple Woodland (CPSBAW);
3. **Lower Hunter Spotted Gum Ironbark Forest (LHSGIF) (EEC – Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin Bioregion);**
4. Hunter Valley Moist Forest (HVMF);
5. Alluvial Tall Moist Forest (ATMF);
6. **Subtropical Rainforest (SR) (EEC – Lowland Rainforest of the NSW North Coast and Sydney Basin Bioregion);**
7. **Hunter Lowland Redgum Forest (HLRF) (EEC – Hunter Lowland Redgum Forest in the Sydney Basin and the North Coast Bioregion);**
8. **Swamp Oak Rushland Forest (SORF) (EEC – Swamp Oak Floodplain Forest on Coastal Floodplains);**
9. **Swamp Mahogany – Paperbark Forest (SMPF) (EEC – Swamp Sclerophyll Forest on Coastal Floodplains);**
10. **Freshwater Wetland Complex (EEC – Freshwater Wetlands on Coastal Floodplains);**
11. Weeds and Cleared Areas; and
12. Dam.

Table 3-1: Vegetation Community Areas

Vegetation Community	1. TSC Act 2. EPBC Act 3. Other	Area in Conservation Estate
Alluvial Tall Moist Forest		174.48
Coastal Foothills Spotted Gum-Ironbark Forest		1,209.13
Coastal Plains Smooth-Barked Apple Woodland		260.15
Dam		0.52
Freshwater Wetland Complex	**1. EEC - Freshwater Wetlands**	11.90
Hunter Lowland Redgum Forest	**1. EEC - HLRF**	19.84
Hunter Valley Moist Forest		139.42
Lower Hunter Spotted Gum Ironbark Forest	**1. EEC - LHSGIF**	408.16
Sub-tropical Rainforest	**1.EEC - Lowland Rainforest**	21.52
Swamp Mahogany – Paperbark Forest	**1. EEC - SSF**	0.23
Swamp Oak Rushland Forest	**1. EEC - SOFF**	0.58
Weeds And Cleared Areas		241.64

WARNING

No part of this plan should be used for critical design dimensions. Confirmation of critical positions should be obtained from Harper Somers O'Sullivan Pty Ltd.

Caution should therefore be exercised when usingthis data for purposes requiring high levels of accuracy. Furthermore, no account for intergrading areas between delineated vegetation communities has been made.

LEGEND

- Development Lands
- Link Road - Minmi Development Estate
- Cleared Areas/Tracks (No LHCCREMS Equivalent)
- Dam (No LHCCREMS Equivalent)
- MU 12 - Hunter Valley Moist Forest
- MU 15 - Coastal Foothills Spotted Gum - Ironbark Forest
- MU 17 - Lower Hunter Spotted Gum Ironbark Forest
- MU 19 - Hunter Lowland Redgum Forest
- MU 1a - Subtropical Rainforest
- MU 30 - Coastal Plains Smooth-barked Apple Woodland
- MU 37 - Swamp Mahogany - Paperbark Forest
- MU 40 - Swamp Oak - Rushland Forest
- MU 46 - Freshwater Wetland Complex
- MU 5 - Alluvial Tall Moist Forest
- Weeds/Disturbed Vegetation (No LHCCREMS Equivalent)

Creek

Surveyors

George Booth Drive

Bluegum Creek

Bluegum Creek

Sydney Newcastle Freeway

Newcastle Link Road

0.75 1.5km

TITLE: Figure 3-3 Vegetation Map
Northern Conservation Estates

CLIENT: Coal & Allied Operations Pty Ltd

PLANNING SURVEYING ECOLOGY

HARPER SOMERS O'SULLIVAN

SCALE: 1: 28000 at A3 Size **DRAWN:** D. Landenberger **APPROVED:** M.Doherty

DATUM: MGA Zone 56 (GDA 94) **DATE:** 3/11/2008

LAYOUT REF:J:\JOBS\24k\24530 Hunter Valley\Drafting\Ecology\Northern Lands\ALL WORKSPACES\REPORTS\Stockrington Tank Paddock\24530-2 FIGURE 3-3 Consv Est Vegetation map A-A3

CONTOUR INTERVAL: N/A

JOB REF: 24530-2

241 DENISON STREET BROADMEADOW PO BOX 428 HAMILTON NSW 2303
T: 02 4961 6500 F: 02 4961 6794 E: survey@hso.com.au W:www.hso.com.au ABN 11 093 343 858

1 Coastal Foothills Spotted Gum Ironbark Forest

This community occupies the majority of the Conservation Estates and covers approximately 1,209 ha. This vegetation community is commensurate with MU 15 Coastal Foothills Spotted Gum – Ironbark Forest as described by LHCCREMS (NPWS 2000; House 2003). This community is associated with the steep or south facing slopes across the site and was generally evident between LHSGIF and HVMF. This community is extremely variable throughout the Conservation Estates with the moister slopes having *Angophora costata, Corymbia gummifera* and *Eucalyptus acmenoides* as a co-dominant within the canopy layer. The ridgetops had these species missing and were dominated by *Corymbia maculata, Eucalyptus fergusonii* subsp. *dorsiventralis* and *Eucalyptus umbra* subsp. *umbra* as the dominant canopy species. The ROTAP species *Eucalyptus fergusonii* subsp. *dorsiventralis* was the dominant canopy species through the vegetation community.

The cluster analysis has delineated three variants at a dissimilarity level of 0.6, and this has mostly been attributed to the presence of *Angophora costata* and *Corymbia gummifera* in the more sheltered aspects of the site. The more exposed sites on northerly facing aspects and ridgetops mostly had these two species absent. The exception to this rule is where the community adjoined Coastal Plains Smooth-barked Apple Woodland or Lower Hunter Spotted Gum Ironbark Forest and ecotones have species common to both communities within them. Further detailed description of the three variants is provided below.

E. fergusonii/C. maculata/E. umbra
This was the dominant of the three variants and commonly occurring on the ridgetops and south facing slopes with the conservation lands. The majority of this variant occurs within the Link Road Minmi development estate, with only two quadrats sampled within the Conservation Estate. These three canopy species were joined by co-dominants of *E. acmenoides* and *E punctata.* The understorey consisted of *Acacia floribunda* and occasionally *Indigofera australis.* The groundlayer was consisted of *Themeda australis, Entolasia stricta, Imperata cylindrica* and *Lomandra longifolia.*

E. fergusonii/A. costata/C. gummifera/C. maculata/E. umbra
At the base of the slopes where CFSGIF is ecotoning with HVMF it is not uncommon to have a mixture of canopy species from the two communities. *Doryanthes excelsa* (Gymea Lilly) was noted to be an informative species for this community on this site given that it only occurred within CFSGIF and along the fringes of CPSBAW. The mid storey in this variant consisted of more moist species including *Rhodamnia rubescens* (Brush Turpentine), *Gymnostachys anceps* (Settlers Flax), *Rapanea variabilis* (Muttonwood) and *Smilax australis.* This variant was dominated by *Acacia fimbriata* in the south eastern portion of the conservation estate.

E. fergusonii/E. fibrosa/C. maculata/E. umbra
It was observed that where CFSGIFwas occupying a north facing slope or on level areas, the mid and lower storeys are dominated more by dry species and almost appeared to resemble LHSGIF. The canopy is still dominated by *E fergusonii* subsp. *dorsiventralis, C. maculata, E umbra* subsp. *umbra* and *E punctata,* however *E. fibrosa* were also recorded within this variant. The mid storey consisted of *Daviesia ulicifolia, Pultenea villosa* and *Macrozamia reducta* with *Joycea pallida* replacing *Themeda australis* as the dominant ground cover.

Upper Stratum – 15 m to 22 m with a PFC of 20% to 50%, the dominant species being *Corymbia maculata* (Spotted Gum), *Eucalyptus fergusonii* subsp. *dorsiventralis, Eucalyptus propinqua* (Small-fruited Grey Gum)*, Angophora costata* (Smooth-barked Apple), *Corymbia gummifera* (Red Bloodwood), *Eucalyptus acmenoides* (White Mahogany) and *Eucalyptus umbra* subsp. *umbra* (Broad-leaved Mahogany).

Mid Stratum 1 – 3 m to 10 m with a PFC of 10% to 20%, the dominant species being *Allocasuarina torulosa* (Forest She-oak) and juvenile *Eucalyptus* sp.

Mid Stratum 2 – 1.5 m to 3 m with a PFC of 30% to 40%, the dominant species being *Daviesia ulicifolia* (Eggs and Bacon), *Acacia fimbriata* (Fringed Wattle), *Acacia floribunda, Pultenaea daphnoides, Leptospermum polygalifolium* (Lemon-scented Tea-tree), and *Persoonia linearis* (Narrow-leaved Geebung).

Lower Stratum – 0.3 m to 1.5 m with a PFC of 40% to 80%, the dominant species being *Doryanthes excelsa* (Gymea Lilly), *Poa affinis, Oplismenus imbecillus* (Basket Grass), *Dichondra repens* (Kidney Weed), *Gonocarpus tetragynus* (Raspwort), *Lomandra longifolia* (Mat Grass), *Goodenia heterophylla* var. *heterophylla* (Variable-leaved Goodenia)*, Joycea pallidea* (Silver-Top Wallaby Grass), *Imperata cylindrica* var. *major* (Blady Grass)*, Themeda australis* (Kangaroo Grass), *Entolasia stricta* (Wiry Panic) and *Hardenbergia violacea* (Native Sarsaparilla).

2 Coastal Plains Smooth-barked Apple Woodland

This vegetation community occupies several patches throughout the Conservation Estates. This vegetation community encompasses 260 ha and occurs on the slopes and on the ridgetop in the north-eastern portion of the Conservation Estates. It is commensurate with MU 30 Coastal Plains Smooth-barked Apple Woodland as described by LHCCREMS (NPWS 2000; House 2003). The threatened flora species *Tetratheca juncea* and *Grevillea parviflora* subsp. *parviflora* were recorded within this community. The community varies throughout its range. The ridgetop section where *Callistemon linearifolius* was observed was on an ecotone with CFSGIF and had some elements of this community present. The portion in the south western area had a co-dominant understorey of *Angophora bakeri* as the soil had a high sand content. The presence of *A. bakeri* and *Grevillea parviflora* subsp. *parviflora* within this section of CPSBAW may indicate that this area is a variation of this community.

The cluster anlaysis delineated two variants of this community which varied in canopy layer, on variant had *Eucalyptus sparsifolia* as the dominant and this variant occurred mainly on the ridgetop within the two larger patches within the conservation estates. The second variant which contained *Eucalyptus capitellata* as the dominant stringybark occurred within the sections in the eastern portion of the conseration lands and within the Link Road Minmi development estate.

Variant: Dry Exposed

A dry variant of this community was identified where this community occurs on the ridgetops in the southern portions of the Conservation Estates. The ironbark *Eucalyptus fibrosa* was present and *Banksia spinulosa* var. *collina* was generally absent. This variant was not separated by the cluster analysis but this is mainly attributed to small sample size of three quadrats (Q12, Q36, Q44, Q45) and three of these quadrats being clustered closely together. EcoBiological (2006) also identified this *Eucalyptus fibrosa* variant. Further sampling of this community is required to give a clear description of this variant.

Upper Stratum – 15 m to 20 m with a PFC of 30 to 50%, the dominant species being *Angophora costata* (Smooth-barked Apple), *Corymbia gummifera* (Red Bloodwood), *Eucalyptus capitellata* (Brown Stringybark), *Eucalyptus sparsifolia* (Narrow-leaved Stringybark) and *Eucalyptus fibrosa* (Broad-leaved Ironbark).

Mid Stratum 1 – 4 m to 10 m with a PFC of 10% to 40%, the dominant species being *Allocasuarina torulosa* (Forest She-oak) and juvenile *Eucalyptus sp*.

Mid Stratum 2 – 2 m to 3 m with a PFC of 40% to 50%, the dominant species being *Banksia spinulosa* var. *collina* (Hair-pin Banksia), *Epacris pulchella, Leptospermum polygalifolium* (Lemon-scented Tea-tree) and *Dillwynia retorta* (Eggs and Bacon).

Lower Stratum – 0.5 to 1m with a PFC of 60% to 90%, the dominant species being *Phyllanthus hirtellus* (Thyme Spurge)*, Hibbertia aspera* subsp. *aspera, Lomandra obliqua* (Fish Bones), *Xanthorrhoea latifolia* subsp. *latifolia* (Forest Grass Tree), *Themeda australis* (Kangaroo Grass), *Imperata cylindrica* var*. major* (Blady Grass), *Entolasia stricta* (Wiry Panic) and *Joycea pallida* (Silver-top Wallaby Grass).

3 Lower Hunter Spotted Gum Ironbark Forest (EEC)

This community occupies the western portion of the site and covers approximately 408 ha. This vegetation community is commensurate with MU 17 Lower Hunter Spotted Gum – Ironbark Forest (LHSGIF) as described by LHCCREMS (NPWS 2000; House 2003). This community varied, some areas containing a dense shrub layer of *Melaleuca nodosa* and other areas a dense understorey of *Daviesia ulicifolia*. The remaining areas of the site have a grassy understorey dominated by *Joycea pallidea, Themeda australis, Entolasia stricta* and *Imperata cylindrica.* This variant was also illustrated within the cluster analysis where this community varied with no clear variants delineating out at lower dissimilarity levels.

This community differs from the CFSGIF community in that the dominant ironbark is *Eucalyptus fibrosa* and the understorey has dominants of *Melaleuca nodosa, Daviesia ulicifolia* and *Bursaria spinosa. Eucalyptus crebra* has replaced *Eucalyptus fibrosa* as the dominant ironbark along a strip of this community on the western side of the site. The scientific determination for LHSGIF describes this vegetation community as occurring principally on Permian geology with some occurrences on Triassic Narrabeen Group. The site occurs on Permian Geology of Newcastle and Tomago Coal Measures. The dominant species which are described within the scientific determination are present within this community. This vegetation community occurred on exposed ridgetops and slopes which were mostly north facing. The community is disjunct and occurs in small localised patches throughout the eastern portion of the Conservation Estates. The occurrence within the western portion of the Conservation Estates is large and is generally intact as the lands are relatively flat. In places this vegetation community was difficult to delineate and in some areas scattered individuals of *Angophora costata* occurred and the stringybark *Eucalyptus globoidea* was a co-dominant in the canopy layer.

Upper Stratum – 18 m to 20 m with a PFC of 30% to 40%, the dominant species being *Corymbia maculata* (Spotted Gum), *Eucalyptus fibrosa* (Broad-leaved Ironbark), *Eucalyptus punctata* (Grey Gum), and *Eucalyptus umbra* subsp. *umbra* (Broad-leaved Mahogany).

Mid Stratum 1 – 5 m to 13 m with a PFC of 20% to 40%, the dominant species being juvenile Eucalypts and *Melaleuca nodosa* (Ball Honeymyrtle).

Mid Stratum 2 – 1.5 m to 3 m with a PFC of 20% to 70%, the dominant species being *Melaleuca nodosa* (Honeymyrtle), *Acacia ulicifolia* (Prickly Moses), *Acacia fimbriata* (Fringed Wattle), *Pultenaea villosa, Daviesia ulicifolia* (Gorse Bitter Pea), *Bursaria spinosa* (Blackthorn) and *Persoonia linearis* (Narrow-leaved Geebung).

Lower Stratum – 0.5 m to 2 m with a PFC of 60% to 80%, the dominant species being *Lomandra filiformis* subsp. *coriacea, Lomandra multiflora* subsp. *multiflora, Cymbopogon refractus* (Barbed-wire Grass), *Austrodanthonia tenuior* (Wallaby Grass), *Joycea pallidea* (Silver-top Wallaby Grass), *Imperata cylindrica* var. *major* (Blady Grass)*, Themeda australis* (Kangaroo Grass), *Eustrephus latifolius* (Wombat Berry), *Entolasia stricta* (Wiry Panic) and *Aristida vagans* (Three-awned Spear Grass).

4 Hunter Valley Moist Forest

This vegetation community occurs within slopes above creeklines particularly on southern aspects, or where moisture retention occurs. This vegetation community covers approximately 139 ha and is commensurate with MU 12 Hunter Valley Moist Forest (HVMF) as described by LHCCREMS (NPWS 2000; House 2003). This community occurs on sheltered gullies and south facing slopes below steep sandstone outcrops. Often this community develops in the head drainage lines at a slightly elevated level. It has a high diversity of natives and was at times difficult to delineate from the ATMF. It was considered that ATMF generally occurred in the well developed drainage line on alluvial soils. This produced a greater diversity within *Melaleucas,* particularly the dominance of *Melaleuca styphelioides* and certain Eucalypts such as *Eucalyptus salinga, Eucalyptus grandis, Eucalyptus siderophloia* and mature *Syncarpia glomulifera* trees*.* HVMF had a dominant canopy cover of *Eucalyptus fergusonii* subsp. *dorsiventralis, Corymbia maculata* and *Eucalyptus acmenoides,* with *Syncarpia glomulifera* and *Melaleuca styphelioides* being present as a shrub species only. This community generally occurred on the upper south facing slopes and in gullies where moisture is retained and it generally adjoined ATMF. This community is most likely an ecotone between ATMF and CFSGIF in sheltered steep gullies as it contains species from both of these communities.

The cluster analysis delineated two variants at a dissimilarity level of approximately 0.72. These two variants are described below:

C. maculata/E. fergusonii/E. acmenoides/E. propinquia Variant

This variant occurred within both the Conservation and the Development Estate, *Eucalyptus propinquia* was a dominant canopy tree, The understorey was had dryer species present such as *Pteridium esculentum* (Bracken Fern) and

C. maculata/E. fergusonii/E. acmenoides Variant

This variant was similar to the previous one with *E. propinquia* absent from the canopy cover. In addition the understorey had a dominance of wetter species such as *Gymnostachys anceps, Rhodamnea rubescens,* and *Oplismenus aemulus*. Whilst these two variants were similar the dominance in the understorey varied within the community.

Both of these variants occur within the Stockrington Conservation Estates.

Upper Stratum – 15 to 20 m with a Projected Foliage Cover (PFC) of 30% to 60%, the dominant species being *Corymbia maculata* (Spotted Gum), *Eucalyptus*

fergusonii subsp. *dorsiventralis, Eucalyptus punctata* (Grey Gum) and *Eucalyptus acmenoides* (White Mahogany).

Mid Stratum 1 – 10 m to 15 m with a PFC of 10% to 30%, the dominant species being *Allocasuarina torulosa* (Forest She-oak) and juvenile Eucalypts.

Mid Stratum 2 – 2 m to 8 m with a PFC of 30% to 60%, the dominant species being *Backhousia myrtifolia* (Grey Myrtle), *Synoum glandulosum* (Scentless Rosewood), *Clerodendrum tomentosum* (Hairy Clerodendrum), *Syncarpia glomulifera* (Turpentine), *Rapanea variabilis* (Muttonwood), *Rhodamnia rubescens* (Brush Turpentine), *Acacia irrorata* (Green Wattle) and *Glochidion ferdinandi* var. *ferdinandi* (Cheese Tree).

Lower Stratum – 0.3 to 1.0m with a PFC of 50% to 80%, the dominant species being *Entolasia stricta* (Wiry Panic), *Imperata cylindrica* var. *major* (Blady Grass), *Lomandra longifolia* (Spiny Mat-rush), *Themeda australis* (Kangaroo Grass), *Pteridium esculentum* (Bracken Fern), *Adiantum aethiopicum* (Common Maidenhair), *Doodia apsera* (Rasp Fern), *Oplismenus aemulus* (Basket Grass), *Plectranthus parviflorus, Lantana camara, Gymnostachys anceps* (Settlers Flax), *Rubus mollucans* var trilobus (Molucca Bramble), *Cayratia clematidea* (Native Grape), *Desmodium varians, Geranium homeanum* (Native Geranium) and *Oplismenus imbecillis* (Basket Grass).

5 Alluvial Tall Moist Forest

This vegetation community occurs within the creeklines within the Conservation Estates, these creeklines include Blue Gum Creek, Long Gully and Minmi Creek. Whilst weed infestations are present there are a number of natives still present throughout this vegetation community. This vegetation community covers approximately 174 ha and is commensurate with MU 5 Alluvial Tall Moist as described by LHCCREMS (NPWS 2000; House 2003). This community is very similar to HVMF across the site. It was noted that in the ATMF within the site, tall thick stands of *Melaleuca styphelioides* often dominated the upper-mid stratum with species including *Eucalyptus salinga* and *Eucalyptus grandis* as the dominant canopy species. Whilst *Melaleuca styphelioides* occasionally occurred in HVMF it was not nearly as dense and not as tall as the stands in ATMF. The dominant tree cover varied throughout this vegetation community. The well defined creeklines were dominated by *Eucalyptus salinga* and *Eucalyptus grandis.* The north eastern portion adjoining Stockrington in Minmi Creek was co-dominated by *Eucalyptus grandis* whilst Blue Gum Creek is dominated by *Eucalyptus salinga.* The remaining portions of the vegetation community were similar with the exception that the former species was not present.

The cluster analysis has separated this community into two variants which are described below:

C. maculata/S. glomulifera/E. acmenoides (Broad-leaf understorey) variant

This variant occurred in the wider drainage lines where more broad-leaf species were present due to a more closed canopy cover. An example of this variant occurred along a small section of Blue Gum Creek to the south east of the quarry, the ATMF was bordering on Subtropical Rainforest without the high density canopy cover. The upper stratum included *Toona ciliata* (Red Cedar), *Alphitonia excelsa* (Red Ash) and *Eucalyptus salinga* (Blue Gum). Small *Dendroscnide excelsa* (Giant Stinging Tree), *Cryptocarya microneura* and *Commersonia fraserii* dominate the mid storey with a

sparse understorey. Whilst this occurred it was not delineated as rainforest as the canopy was not closed and contained a co-dominance of *Melaleuca styphelioides* in the sub canopy layer in addition to the rainforest species. Whilst these species did not occur within all the areas of this variant, the floristic composition generally contained more diversity of broad-leaf species than the variant below.

***Melaleuca styphelioides/Eucalyptus acmenoides* variant**

In this variant the shrub *Melaleuca styphelioides* was the dominant sub canopy layer whilst *Eucalyptus acmenoides* always occurred within this variant. However the other canopy species varied. The broad-leaf species were absent from this variant as the canopy cover was more open. In some areas this was due to *Lantana camara* infestation and others it was where the drainage line narrowed allowing for drying along the banks of the drainage lines.

Upper Stratum – 20 to 25 m with a Projected Foliage Cover (PFC) of 30% to 60%, the dominant species being *Eucalyptus grandis* (Flooded Gum), *Eucalyptus salinga* (Sydney Blue Gum), *Eucalyptus paniculata* (Grey Ironbark), *Eucalyptus siderophloia* (Northern Grey Ironbark), *Syncarpia glomulifera* (Turpentine), *Cryptocarya microneura* (Murrogun), *Corymbia maculata* (Spotted Gum) and *Eucalyptus acmenoides* (White Mahogany).

Mid Stratum 1 – 10 m to 20 m with a PFC of 10% to 20%, the dominant species being, *Melaleuca styphelioides* (Prickly-leaved Melaleuca), *Commersonia fraseri* (Brush Kurrajong) and *Syncarpia glomulifera* (Turpentine).

Mid Stratum 2 – 2 m to 8 m with a PFC of 30% to 80%, the dominant species being, *Backhousia myrtifolia* (Grey Myrtle), *Clerodendrum tomentosum* (Hairy Clerodendrum), *Cassine australis* (Red Olive Plum), *Hibiscus heterophyllus* (Native Rosella), *Glochidion ferdinandi* var. *ferdinandi* (Cheese Tree) and *Lantana camara* (Lantana).

Lower Stratum – 0.3 to 1.5m with a PFC of 30% to 40%, the dominant species being *Carex appressa*, *Adiantum aethiopicum* (Common Maidenhair), *Adiantum formosum* (Giant Maidenhair), *Dianella caerulea* var *producta* (Blue-flax Lilly), *Doodia apsera* (Rasp Fern), *Lomandra longifolia* (Spiky-headed Mat-rush), *Oplismenus imbecillus* (Basket Grass), *Smilax australis* (Native Raspberry), *Stephania japonica* var. *discolor* (Snake Vine), *Sarcopetalum harveyanum* (Pearl Vine), and *Cissus antarctica* (Native Grape).

6 Subtropical Rainforest (EEC – Lowland Rainforest)

This rainforest covers approximately 22 ha and occurs in the deep gullies of Long Gully and another one to the west of Long Gully. This community is commensurate with MU 1a Coastal Warm Temperate – Sub Tropical Rainforest as described by LHCCREMS (NPWS 2000; House 2003). EcoBiological (2006) have previously analysed this community in detail and concluded that this community is best described as Subtropical Rainforest and was closely related to *Ficus* spp. – *Dysoxylum fraserianum – Toonia – Dendrocnide* sub alliance 15 of Floyd (1990). The results of this survey concur with the EcoBiological (2006) due to the dominance of *Toonia ciliata*, *Dendrocnide excelsa, Dendrocnide photinophylla* and *Ficus* species which were identified within this community. EcoBiological (2006) have also studied in detail the difference between the two possible Endangered Ecological Communities of Lowland Rainforest on Floodplains of the NSW North Coast Bioregion and Lowland Rainforest of the NSW North Coast and Sydney Basin

Bioregion which could relate to Subtropical Rainforest. EcoBiological found that 65% of the 108 plant taxa listed for Lowland Rainforest EEC occurred on site whilst only 42% occurred within the Lowland Rainforest on Floodplain EEC. Thus it is considered that this community is considered to be Lowland Rainforest of the NSW North Coast and Sydney Basin Bioregion.

This vegetation community is currently under threat from severe incursions of *Lantana camara*. This species has taken hold at the base of the drainage lines and heavily infested on the bottom slopes, particularly where tributaries run into the main creekline.

<u>*Upper Stratum*</u> – 18 to 25 m with a Projected Foliage Cover (PFC) of 60% to 80%, the dominant species being *Dendrocnide excelsa* (Giant Stinging Tree), *Alphitonia excelsa* (Red Ash), *Toonia ciliata* (Red Cedar), *Dendrocnide photinophylla* (Shiny-leaved Stinging), *Baloghia inophylla* (Brush Bloodwood), *Ficus watkinsoniana* (Strangler Fig), *Neolitsea dealbata* (White Bollygum), *Cryptocarya microneura* (Murrogum) and *Euroschinus falcata* (Ribbonwood)

<u>*Mid Stratum 1*</u> – 10 m to 16 m with a PFC of 10% to 20%, the dominant species being, *Diploglottis australis* (Native Tamarind), *Claoxylon australis* (Brittlewood), *Eupomatia laurina* (Bolwarra), *Commersonia fraseri* (Brush Kurrajong), *Guioa semiglauca* and *Diospyros australis* (Black Plum).

<u>*Mid Stratum 2*</u> – 2 m to 8 m with a PFC of 30% to 80%, the dominant species being, *Streblus brunonianus* (Whalebone Tree), *Acmena smithii* (Lilly Pilly), *Clerodendrum tomentosum* (Hairy Clerodendrum), *Cassine australis* (Red Olive Plum), *Alphitonia excelsa* (Red Ash), *Alectryon subcinereus* (Native Quince), *Hibiscus heterophyllus* (Native Rosella), *Glochidion ferdinandi* var. *ferdinandi* (Cheese Tree) and *Lantana camara* (Lantana).

<u>*Lower Stratum*</u> – 0.3 to 1.5m with a PFC of 10% to 30%, the dominant species being *Carex appressa*, *Adiantum aethiopicum* (Common Maidenhair), *Adiantum formosum* (Giant Maidenhair), *Adiantum hispidulum* (Rough Maidenhair)*, Pellaea falcata* (Sickle Fern)*, Doodia apsera* (Rasp Fern), *Dendrobium gracilicaule, Gymnostachys anceps* (Settlers Flax), *Lomandra longifolia* (Spiky-headed Mat-rush), *Pyrrosia rupestris* (Rock Felt Fern), *Oplismenus imbecillus* (Basket Grass).

<u>*Vines*</u> - *Cissus antarctica* (Native Grape)*, Arthropteris tenella* (Jointed Fern), *Stephania japonica* var. *discolor* (Snake Vine), *Capparis arborea* (Brush Caper Berry)*, Tetrastigma nitens* (Three-leaved Water Vine)*, Dioscorea transversa* (Native Yam), *Geitonoplesium cymosum* (Scrambling Lily), *Ripogonum album* (White Supplejack)*, Morinda jasminoides, Smilax australis* (Native Raspberry), *Parsonsia straminea* (Monkey Rope) and *Cissus antarctica* (Native Grape).

7 Hunter Lowland Redgum Forest (EEC)

This vegetation community occurs in two small areas on the western side of the conservation area and in small patches of Tank Paddock. This vegetation encompasses approximately 20 ha. The largest portion of this community follows a north-south drainage flat on the western side of the Conservation Estates and is depicted by a dominance of large *Eucalyptus tereticornis* (Forest Red Gum) in the upper stratum.

The cluster analysis has delineated this community into two variants and it is considered that they are one community. The reason for this is the quadrats which

were surveyed at Tank Paddock and the Link Road Minmi Development Estate are highly degraded with mostly the canopy cover which is representative of this community remaining. The remaining areas in which the quadrats were performed (within the western portion of the Conservation Estate) had an understorey of *Melaleuca decora* and *Melaleuca lineariifolia*.

Upper Stratum – 15 to 20 m with a Projected Foliage Cover (PFC) of 20% to 40%, the dominant species being *Eucalyptus tereticornis* (Forest Red Gum), *Eucalyptus punctata* (Grey Gum), *Corymbia maculata* and *Eucalyptus fibrosa* (Red Ironbark)

Mid Stratum 1 – 5 to 8 m with a Projected Foliage Cover (PFC) of 30% to 40%, the dominant species being *Melaleuca lineariifolia* (Snow in Summer), *Casuarina glauca* (Swamp Oak), and *Melaleuca decora*

Mid Stratum 2 – 1 to 2 m with a Projected Foliage Cover (PFC) of 20% to 40%, the dominant species being *Dodonea triquetra* (Hop Bush), *Acacia longifolia* (Sydney Golden Wattle) and *Leucopogon juniperinus* (Prickly Beard-heath).

Lower Stratum – 0 to 0.5 m with a Projected Foliage Cover (PFC) of 40% to 50%, the dominant species being *Lomandra longifolia* (Mat-Rush), *Cymbopogon refractus* (Barbed Wire Grass), *Entolasia stricta* (Panic Grass), *Themeda australis* (Kangaroo Grass) and *Digitaria parviflora* (Finger Grass).

8 Swamp Oak Rushland Forest (EEC – Swamp Oak Floodplain Forest on Coastal Floodplains)

This vegetation community occurs in two small areas within the low lying areas adjoining Hexham Swamp within Tank Paddock. This vegetation community encompasses approximately 0.58 ha and is commensurate MU 40 Swamp Oak Rushland Forest as described by LHCCREMS (NPWS 2000; House 2003). This community had a high incursion of *Lantana camara* and it was difficult to gain access.

The cluster analysis grouped this vegetation community with Swamp Mahogany Paperbark Forest due to a similar floristic composition within the groundlayer. However the SORF is highly disturbed due to incursions of *Lantana camara* and was difficult did not contain a large diversity of natives. This community also adjoined the Freshwater Wetland Complex and had some wetland species on its fringes. For the purposes of this project these two communities have been delineated separately on the basis of the canopy layer.

Upper Stratum – to 10 m with a PFC of 10% to 20%, the dominant species is *Casuarina glauca* (Swamp Oak).

Mid Stratum – to 3 m with a PFC of 60% to 80%, the dominant species being, *Lantana camara* (Lantana) around the fringes of the community.

Lower Stratum – to 1 m with a PFC of 30% to 40%, the dominant species being *Carex appressa, Juncus usitatus*, *Cynodon dactylon* (Common Couch), *Isolepis nodosa* (Nodding Sedge) and *Typha orientalis* (Typha).

9 Swamp Mahogany – Paperbark Forest (EEC – Swamp Sclerophyll Forest on Coastal Floodplains);

This vegetation community in a small area in the northern portion of Tank Paddock, and is linked to a swamp which is located on the adjoining property. This vegetation community encompasses 0.23 ha. This vegetation community is commensurate with MU 37 Swamp Mahogany – Paperbark Forest as described by LHCCREMS (NPWS 2000; House 2003). It fringes a swamp that occurs offsite and flows into Pambalong Swamp to the north west of the site. Further discussion on the cluster analysis results of this vegetation community are outlined above in the Swamp Oak Rushland Forest description.

Upper Stratum – to 20 m with a Projected Foliage Cover (PFC) of 40% to 60%, the dominant species being *Eucalyptus robusta* (Swamp Mahogany) and *Melaleuca quinquinervia* (Broad-leafed Paperbark).

Mid Stratum 1 – 4 m to 8 m with a PFC of 10% to 20%, the dominant species being *Melaleuca linearifolia* (Snow-in Summer) and *Melaleuca ericifolia* (Swamp Paperbark).

Mid Stratum 2 – 3 m to 5 m with a PFC of 30% to 90%, the dominant species being *Lantana camara* (Lantana), *Chrysanthemoides monilifera* subsp*. rotundata* (Bitou Bush) and *Pittosporum undulatum* (Sweet Pittosporum).

Lower Stratum – to 1.5 m with a PFC of 10% to 50%, the dominant species being *Juncus mollis, Cynodon dactylon* (Couch Grass), *Imperata cylindrica* var *major* (Blady Grass), *Ranunculus inundatus* (River Buttercup), *Carex appressa* (Tall Sedge), *Oplimenus aemulus* (Basket Grass) and *Smilax glyciphylla* (Native Sarsaparilla).

10 Freshwater Wetland Complex (EEC – Freshwater Wetlands on Coastal Floodplains);

This vegetation community occurs as two areas in the north east of Tank Paddock. These areas are connected to and drain into Hexham Swamp. This community is floristically diverse and provides habitat for a range of native flora and fauna. This vegetation community covers approximately 12 ha and is commensurate with MU 46 Freshwater Wetland Complex as described by LHCCREMS (NPWS 2000; House 2003).

Upper Stratum – to 10 m with a Projected Foliage Cover (PFC) of 10% to 20%, the dominant species being *Eucalyptus robusta* (Swamp Mahogany), *Melaleuca styphelioides* (Prickly-leaved Melaleuca) and *Melaleuca ericifolia* (Swamp Paperbark).

Mid Stratum – to 3m with a PFC of 30% to 40%, the dominant species being *Melaleuca lineariifolia* (Snow in Summer) around the edges.

Lower Stratum – to 1.5m with a PFC of 20% to 30%, the dominant species being *Gahnia clarkei* (Tall Saw Sedge)*, Ranunculus inundatus* (River Buttercup), *Adiantum aethiopicum* (Common Maidenhair), *Blechnum cartilagineum, Persicaria strigosa*, *Persicaria hydropiper* (Water Pepper), *Hydrocotyle peduncularis, Dichondra repens* (Kidney Weed) and *Paspalium distichum* (Water Couch).

Emergents – *Baumea articulata* (Jointed Twig-Rush), *Typha orientalis* (Bull Rush) *Juncus continuus* and *Philydrum lanuginosum* (Woolly Frogmouth).

Aquatics – *Azolla pinnata* (Ferny Azolla) and *Alisma plantago-aquatica* (Water Plantain).

11 Weeds and Cleared Areas

This vegetation community occurs within the central area of the site and exists as a quarry. Smaller areas on the eastern and western side of the site are the result of clearing for the mining operations. The remaining areas are either unformed tracks or electricity easements. This community encompasses approximately 242 ha and is not commensurate with any vegetation communities that have been described by LHCCREMS (NPWS 2000; House 2003). These areas are highly disturbed and have high weed incursions. The canopy cover of this community generally exists as scattered examples of Eucalypt trees which are outlined below.

Upper Stratum – 15 to 18 m with a Projected Foliage Cover (PFC) of 5% to10%, the dominant species being *Eucalyptus punctata* (Grey Gum), *Eucalyptus propinqua* (Small-fruited Grey Gum), *Melaleuca styphelioides* (Prickly-leaved Melaleuca), *Corymbia maculata* (Spotted Gum), *Erythrina* x *sykesii* (Coral Tree) and *Eucalyptus acmenoides* (White Mahogany).

Mid Stratum – 1.5 m to 3 m with PFC of 20 to 50%, the dominant species being *Acacia longifolia* var. *longifolia* (Sydney Golden Wattle), *Kunzea ambugia* (Tick Bush), *Acacia falcata* (Sickle Wattle), *Lantana camara* (Lantana), *Cinnamomum camphora* (Camphor Laurel) and *Grevillea robusta* (Silky Oak).

Lower Stratum – 0.3 m to 1 m with a PFC of 80% to 90%, the dominant species being *Pennisetum clandestinum* (Kikuyu), *Pteridium esculentum* (Bracken Fern), *Cynodon dactylon* (Common Couch), *Verbena bonariensis* (Purple Top), *Ageratina adenophorum,* (Crofton Weed), *Eragrostis curvula* (African Lovegrass), *Physalis peruviana* (Cape Gooseberry), *Senecio madagascariensis* (Fireweed), *Paspalum dilatum* (Paspalum), *Richardia brasiliensis* (White Eye), *Andropogon virginicus* (Whisky Grass), *Hypochaeris radicata* (Flatweed), *Plantago lanceolata* (Ribwort), *Bidens pilosa* (Farmer's Friends), *Trifolium repens* (White Clover) and *Sida rhombifolia* (Paddy's Lucerne).

12 Dams

This vegetation community occurs as constructed dams within the cleared areas of the site, with the large dams in the north east of the site having been utilised as water reservoirs for the mining operations. This community encompasses approximately 0.52 ha and is not commensurate with any vegetation communities that have been described by LHCCREMS (NWPS 2000; House 2003). The terrestrial vegetation described below is the vegetation which occurs within the immediate surrounds of the dam. The edges of the dams have high weed infestations particularly of pasture weeds and *Lantana camara.* The emergent vegetation fringes the shallow areas of the dam and are dominated by *Typha orientalis.*

Upper Stratum – 15 m to 18 m with a PFC of 5%, the dominant species being dominant species being *Eucalyptus punctata* (Grey Gum), *Eucalyptus propinqua (Small*-fruited Grey Gum), *Eucalyptus paniculata* (Grey Ironbark), *Syncarpia glomulifera* (Turpentine), *Eucalyptus acmenoides* (White Mahogany) and *Cinnamomum camphora* (Camphor Laurel).

Mid Stratum –2 m to 4 m with a PFC of 20% to 40%, the dominant species being *Acacia longifolia* var. *longifolia* (Sydney Golden Wattle), *Acacia suaveolens, Pittosporum undulatum* (Sweet Pittosporum), *Alphitonia excelsa* (Red Ash), *Lantana camara* (Lantana), *Senna pendula* var. *glabrata* (Winter Senna) and *Glochidion ferdinandi var. ferdinandi* (Cheese Tree).

Lower Stratum – 0.5 m to 1 m with a PFC of 60% to 80%, the dominant species being *Pennisetum clandestinum* (Kikuyu), *Carex appressa, Andropogon virginicus* (Whisky Grass), *Hypochaeris radicata* (Flatweed), *Cynodon dactylon (Common Couch), Verbena bonariensis* (Purple Top), *Richardia brasiliensis* (White Eye), *Andropogon virginicus (Whisky Grass), Hypochaeris radicata* (Flatweed) and *Plantago lanceolata* (Ribwort).

Emergents – 0.5 m to 1 m with a PFC of 10% to 20%, the dominant species being *Baumea articulata* (Jointed Twig-Rush), *Typha orientalis* (Typha), *Phragmites australis* (Native Rush), *Persicaria decipiens* (Spotted Knotweed), *Juncus subsecundus* (Finger Rush) and *Juncus usitatus* (Common Rush).

3.1.3 Conservation Status of Vegetation Communities

Six EEC's that are listed under the *TSC Act 1995* occur within six delineated vegetation communities extant on the Northern Lands Conservation Estates. These six communities are listed below:

- The vegetation community delineated as Lower Hunter Spotted Gum Ironbark Forest is commensurate with 'Lower Hunter Spotted Gum – Ironbark Forest in the Sydney Basin Bioregion';

- The vegetation community delineated as Hunter Lowland Redgum Forest is commensurate with 'Hunter Lowland Redgum Forest in the Sydney Basin and NSW North Coast Bioregions';

- The vegetation community delineated as Swamp Oak Rushland Forest is commensurate with 'Swamp Oak Floodplain Forest in the NSW North Coast, Sydney Basin and South East Corner Bioregions';

- The vegetation community delineated as Subtropical Rainforest is commensurate with 'Lowland Rainforest of the NSW North Coast and Sydney Basin Bioregion';

- The vegetation community delineated as Swamp Mahogany - Paperbark Forest is commensurate with 'Swamp Sclerophyll Forest on Coastal Floodplains in the NSW North Coast, Sydney Basin and South East Corner Bioregions'; and

- Freshwater Wetland Complex is commensurate with 'Freshwater Wetlands on Coastal Floodplains in the NSW North Coast, Sydney Basin and South East corner Bioregions'.

3.1.4 Regionally Significant Vegetation Communities within Lake Macquarie LGA

Newcastle City Council does not at present have any flora and fauna guidelines so the guidelines for Lake Macquarie Council were used to identify any regionally significant vegetation communities in the area.

The following vegetation communities, which occur within the site, are considered to be regionally significant by Lake Macquarie Flora and Fauna Guidelines within the Lake Macquarie LGA and Lower Hunter and Central Coast Regional Biodiversity Strategy (Payne 1998) (EEC's in bold):

- Alluvial Tall Moist Forest;
- Coastal Foothills Spotted Gum – Ironbark Forest;
- **Hunter Lowland Redgum Forest (EEC – Hunter Lowland Redgum Forest on Coastal Floodplains);**
- **Freshwater Wetland Complex (EEC – Freshwater Wetlands on Coastal Floodplains);**
- **Swamp Mahogany - Paperbark Forest (Swamp Sclerophyll Forest on Coastal Floodplains - listed as EEC); and**
- **Swamp Oak Rushland Forest (Swamp Oak Floodplain Forest - listed as EEC); and**

- **Subtropical Rainforest - (EEC Lowland Rainforest in the Sydney Basin Bioregion).**

3.1.5 Regionally Significant Flora Species

Two ROTAP listed species (Briggs and Leigh, 1996) were identified within the Northern Lands Conservation Site. These are as follows:-

- *Callistemon shiressii* 3RC-, this species occurred within the Alluvial Tall Moist Forest and the Coastal Foothills Spotted Gum Ironbark Forest (Figure 3-4 shows location of this species);
- *Eucalyptus fergusonii* subsp. *dorsiventralis* 2RC-. This species occurred throughout both the Hunter Valley Moist Forest and the Coastal Foothills Spotted Gum Ironbark vegetation communities throughout the Conservation Estates. As previously discussed in Section 4.1.5 this species fruits varied and may have hybridised with *Eucalyptus paniculata* in some areas of the site.

In addition, Lake Macquarie Flora and Fauna Guidelines (2001) contain a list of regionally significant flora species and nine of these were identified within the site, and are listed as follows:

- *Callistemon shiressii;*
- *Eucalyptus fergusonii* ssp*. dorsiventralis;*
- *Eucalyptus grandis;*
- *Eucalyptus robusta;*
- *Ficus fraseri;*
- *Ficus watkinsiana;*
- *Muehlenbeckia gracillima;*
- *Ottelia ovalifolia;* and
- *Syzygium paniculatum.*

The Part 3A Environment Assessment for the Abel Underground Mine Project (EcoBiological 2006) lists several species which have range extensions and are rare which were detected during surveys within the Subtropical Rainforest Vegetation Community. This survey was more extensive than the current survey and included quadrat and statistical analyses on the vegetation communities. These are as follows:-

- *Christella hispidula* (Rare in NSW);
- *Capparis arborea* (Range Extension);
- *Drypetes australasica* (Range Extension);
- *Ficus watkinsoniana* (Range Extension);
- *Mallotus philippensis* (Range Extension);
- *Randia benthamiana* (Range Extension);
- *Mischocarpus australis* (Range Extension);
- *Rhysotoechia bifolioata* (Range Extension);
- *Alangium villosum subsp. polyosmoides* (Range Limit);
- *Daphnandra sp. A* (Range Limit);
- *Dendrocnide photinophylla* (Range Limit); and
- *Embelia australiana* (Range Limit).

3.1.6 Desktop Assessment - Threatened Flora Search Results

The results of this search indicated numerous threatened flora species have been previously recorded within the locality and/ or have potential habitat within the site. The following nine species have been recorded within 10 km (DECC Atlas of NSW Wildlife Data 2008) of the site (Refer to Figure 3-4):

- *Acacia bynoeana* (Bynoe's Wattle)*;*
- *Angophora inopina* (Charmhaven Apple)*;*
- *Callistemon linearifolius* (Netted Bottle Brush);
- *Eucalyptus parramattensis* subsp. *decadens;*
- *Grevillea parviflora ssp parviflora* (Little-flower Grevillea);
- *Rutidosis heterogama* (Heath Wrinklewort);
- *Syzygium paniculatum* (Magenta Lilly Pilly);
- *Tetratheca juncea* (Black-eyed Susan); and
- *Zanichellia palustris.*

In addition, to the above threatened flora species recorded on the DECC Atlas of NSW Wildlife Data, it was considered the following species have potential habitat and or have been recorded within the vicinity of the site and should be considered within this assessment:

- *Arthropteris palisotii;*
- *Caladenia tessellata* (Thick Lip Spider Orchid);
- *Cynanchum elegans;*
- *Dendrobium melaleucaphilum* (Spider Orchid);
- *Diuris praecox* (Rough Double Tail);
- *Eucalyptus glaucina;* and
- *Melaleuca biconvexa* (Biconvex Paperbark).

WARNING
No part of this plan should be used for critica design dimensions. Confirmation of critical positions should be obtained from Harper Somers O' Sullivan Pty Ltd.

LEGEND

- Development Estate
- Conservation Estates

THREATENED FLORA SPECIES

- *Acacia bynoeana*
- *Angophora inopina*
- *Callistemon linearifolius*
- *Eucalyptus parramattensis subsp. decadens*
- *Grevillea parviflora subsp. parviflora*
- *Rutidosis heterogama*
- *Syzygium paniculatum*
- *Tetratheca juncea*
- *Zannichellia palustris*

0 2 4km

TITLE: Figure 3-4 NPWS Atlas Flora Records Northern Conservation Estate

CLIENT: Coal & Allied Operations Pty Ltd

PLANNING SURVEYING ECOLOGY

HARPER SOMERS O'SULLIVAN

SCALE: 1: 95000 at A3 Size **DRAWN:** D. Landenberger **APPROVED:** M. Doherty

DATUM: MGA Zone 56 (GDA 94) **DATE:** 10/3/2008

LAYOUT REF: J:\JOBS\24k\24530 Hunter Valley\Drafting\Ecology\Northern Lands\ALL WORKSPACES \REPORTS\Stockrington Tank Paddock\24530-2 Figure 3-4 NPWS Atlas Flora Recordsnth conser A-A3.wor

CONTOUR INTERVAL: N/A

JOB REF: 24530-2

241 DENISON STREET BROADMEADOW PO BOX 428 HAMILTON NSW 2303
T: 02 4961 6500 F: 02 4961 6794 E: survey@hso.com.au W:www.hso.com.au ABN 11 093 343 858

Threatened Flora Species with potential to occur

The following 14 threatened flora species have potential habitat within the Northern Conservation Estates:

- *Acacia bynoeana* – Sub-optimal habitat within disturbed areas under the electricity easements. However this species preferred habitat is open woodland on sandy soils. This species closest record is within the Lake Macquarie SCA to the south west of the site;
- *Arthropteris palisotii* – An epiphytic fern, this species was located within the Subtropical Rainforest by Ecobiological (2006) in the north of the Stockrington Conservation Estates within the Subtropical Rainforest;
- *Caladenia tessellata* – Potential habitat within the dry sclerophyll forests within the Conservation Estates;
- *Callistemon linearifolius* – A small shrub, a large population of this species was located within the Lower Hunter Spotted Gum Ironbark Forest in the north western portion of the Conservation Estates. The remaining areas of LHSGIF contains potential habitat for this species;
- *Cynanchum elegans* – vine found in Rainforest habitats. Potential habitat within the ecotone between the riparian zones and the subtropical rainforest within the Conservation Estate;
- *Dendrobium melaleucaphilum* – Epiphytic orchid mostly found on *Melaleuca styphelioides*, habitat within the Alluvial Tall Moist Forest, Subtropical Rainforest and Hunter Valley Moist Forest within the Conservation Estates;
- *Diuris praecox* – cryptic orchid with potential habitat within the Hunter Valley Moist Forest, Coastal Foothills Spotted Gum Ironbark Forest, Coastal Plains Smooth-barked Apple Woodland, Lower Hunter Spotted Gum Ironbark vegetation community within the Conservation Estates;
- *Eucalyptus glaucina* – a tree, with potential habitat within the Hunter Lowland Redgum Forest vegetation community within the Conservation Estates;
- *Grevillea parviflora* subsp. *parviflora* – a shrub, a large population was located within the Lower Hunter Spotted Gum Ironbark Forest and potential habitat exists within the remaining sections of this vegetation community;
- *Melaleuca biconvexa* – Shrub to small tree found in low-lying swamping areas, marginal habitat within the wet sclerophyll vegetation communities within the Conservation Estates;
- *Rutidosis heterogama* – A small shrub, a large population of this species has been located within Lower Hunter Spotted Gum Ironbark Forest in the western portion of the Conservation Estates. Potential habitat occurs within the Lower Hunter Spotted Gum Ironbark Forest vegetation community within the Conservation Estates;
- *Syzygium paniculatum* – Shrub to small tree found in rainforests or riparian vegetation, potential habitat within riparian zones and the Subtropical Rainforest within the Conservation Estates; One specimen of this species was located in a disturbed area adjoining Alluvial Tall Moist Forest at Stockrington;
- *Tetratheca juncea* – Shrub found within dry sclerophyll forests and woodlands, potential habitat within this Conservation Estates occurs within the Coastal Plains Smooth-barked Apple Woodland. Over 300 plant clumps were located within the western portions of the Conservation Estates; and
- *Zanichellia palustris* – an aquatic species which has sub-optimal habitat within the Freshwater Wetland Complex vegetation community.

3.1.7 Threatened Flora Species

Seven threatened flora species, being *Arthropteris palisotii, Callistemon linearifolius, Eucalyptus nicholii, Grevillea parviflora* subsp*. parviflora, Rutidosis heterogama, Syzygium paniculatum* and *Tetratheca juncea* were located within the Conservation Estates. *Arthropteris palisotii* was recorded by EcoBiological (2006). Two species being *Eucalyptus nicholii* and *Syzygium paniculatum,* may be not be naturally occurring within the Conservation Estates.

Arthropteris palisotii

This species was recorded by EcoBiological (2006) when surveying the Subtropical Rainforest for the proposed Abel Underground Mine Operations (Refer to Figure 3-4). This species was tentatively identified within that report. This species is considered to be significant as sightings are extremely rare.

Eucalyptus nicholii

Four individuals of this species were recorded within the Conservation Estates (Refer to Figure 3-4). This species distribution has been recorded on shallow infertile soils such as slate, shales, granite and porphyrite from Niangala to Glen Innes on the northern tableland of NSW. As the distribution of this species is not naturally occurring in the Hunter Region it is most probable that this species has been introduced from land fill as it was recorded on a road edge.

Callistemon linearifolius

At least 355 individuals of this species were located within the Lower Hunter Spotted Gum Ironbark Forest within the Conservation Estates (Refer to Figure 3-4). The counts of this species involved counting above ground stems, therefore the total genetically distinct individuals which may be present could be below this amount. This species is scattered throughout the main ridgetop within the north western portion of the Conservation Estates. Targeted surveys to gauge the extent of the population have not been completed and it is expected that the population may be considerably larger than what has been reported here. A voucher specimen was sent to the Royal Botanical Gardens in Sydney and has been confirmed to be *Callistemon linearifolius* (Refer to Appendix D).

Grevillea parviflora subsp. parviflora

At least 105 individuals of this species have been located to the west of George Booth Drive (Refer to Figure 3-4). Above ground stems of this species were counted and as this species is clonal the genetic number of individual plants may be smaller. Targeted surveys to gauge the extent of the population have not been completed and it is expected that the population may be considerably larger than what has been reported here. This species was recorded within the Coastal Plains Smooth-barked Apple Woodland.

Rutidosis heterogama

It is estimated that over 1000-1500 individual plants were recorded during field visits and the actual extant population is expected to be far greater (Refer to Figure 3-4). It should be noted that this species appeared to be more common within disturbed areas such as along track sides, near railway verges and amongst dumped refuse. There was also a large population within a power easement just outside of the Conservation Estates on the western slopes of the Sugarloaf Range. This species was recorded predominately within the Lower Hunter Spotted Gum Ironbark vegetation community.

Syzygium paniculatum

One plant was found within the Conservation Estates (Refer to Figure 3-4), examination of the fruit of this plant found it to be 3 locular which is a distinguishing feature of this plant from other similar species (ie *Acmena smithii)*. This plant was growing in an area of high disturbance, adjoining Alluvial Tall Moist Forest and may have been brought in from another Conservation Estates in land fill. The plant is located near Blue Gum creek and it is possible, however, that it has come from upstream in Alluvial Tall Moist Forest or Subtropical Rainforest or may have been transported to its position in a disturbed area by natural means (ie seed dispersal by birds). Whichever is the case it is considered that this species is significant as it is growing in suitable habitat (albeit disturbed). A search of this area was performed with no further specimens located within the vicinity.

Tetratheca juncea

Approximately 352 *Tetratheca juncea* plant clumps were located during field visits in 2005, late 2007 and 2008 (Refer to Figure 3-4). The population is estimated to be considerably larger as the majority of the surveys were performed outside of the flowering period for this species. It is estimated that 256 ha of habitat within the Conservation Estates, remains to be surveyed. Thus, it is considered that this population will be significantly larger than what has been recorded during the vegetation surveys.

Other Cryptic orchids

No threatened cryptic orchids were located during the targeted surveys within the Conservation Estates. The main common orchids that have been identified within the Conservation Estates, include *Acianthus* sp*., Caladenia* sp*., Calochilus* sp*., Cymbidium* sp*., Dendrobium* sp*., Dipodium* sp*., Microtis* sp*., Pterostylis* sp*.* and *Thelymitra* sp*.*

WARNING

No part of this plan should be used for critical design dimensions. Confirmation of critical positions should be obtained from Harper Somers O'Sullivan Pty Ltd.

LEGEND

- Link Road - Minmi Development Estate
- Conservation Estates

THREATENED FLORA SPECIES

- *Arthropteris palisotii (Ecobiological Record 2006)*
- *Callistemon linearifolius*
- *Area of Callistemon linearifolius*
- *Eucalyptus nicholii*
- *Grevillea parviflora subsp. parviflora*
- *Rutidosis heterogama*
- *Tetratheca juncea*
- *Syzygium paniculatum*

ROTAP SPECIES

- *Callistemon shiressii (RPSHSO 2007)*
- *Callistemon shiressii (Ecobiological Record 2006)*

STOCKRINGTON
SEAHAMPTON
MINMI
Mount Sugarloaf
Surveyors Creek
George Booth Drive
Bluegum Creek
Sydney Newcastle Freeway
Newcastle Link Road
0 1 2km

TITLE: Figure 3-5 Threatened and Rare Flora Species Northern Conservation Estates

CLIENT: Coal & Allied Pty Ltd

SCALE: 1: 28000 at A3 Size **DRAWN:** D. Landenberger **APPROVED:** M Doherty

DATUM: MGA Zone 56 (GDA 94) **DATE:** 3/11/2008

LAYOUT REF: J:\JOBS\24\24530 Hunter Valley\Drafting\Ecology\Northern Lands\ALL WORKSPACES\REPORTS\Stockrington Tank Paddock\24530-2 FIGURE 3-4 Consv EstThreatened Flora species A-A3.wor

CONTOUR INTERVAL: N/A

JOB REF: 24530-2

HARPER SOMERS O'SULLIVAN

PLANNING SURVEYING ECOLOGY

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3.1.8 Groundwater Dependent Ecosystems

GDE's is a broad definition covering all ecosystems which are dependent upon groundwater either permanently or occasionally to survive (DLWC, 2002). Several of the vegetation communities on the Conservation Estates have been identified as GDE's, and these include Freshwater Wetland Complex, Swamp Mahogany Paperbark Forest, Swamp Oak Rushland Forest, HVMF, HLRF and ATMF (Refer to Figure 3-5). Identification of GDE's depends upon the location of the vegetation communities in relation to groundwater. GDE's are typically the communities which are located in drainage depression, swamps and creeklines, where groundwater comes up to the surface.

Matthei (1995) has mapped the several soil landscapes within the Conservation Estates and these include Cockle Creek (alluvial), Wyong (alluvial), Stockrington (coalluvial), Cedar Hill (coalluvial), Sugarloaf (coalluvial), Killingworth (erosional), Bolwarra Heights (erosional) Beresfield (residual), Hamilton (Residual), Rivermead (Residual), Awaba (associated) and Bobs Farm (estuarine). The erosional soils of Killingworth are mapped at the higher elevations and are likely to be comprised of clay soil overlying weathered rock. The soil landscapes of Beresfield, Rivermead and Hamilton have been mapped in the northern portion of the Conservation Estates at the high elevations adjoining Hexham Swamp. These soil landscapes are similar to Killingworth in that residual clay loams occur over weathered rock. Similarly the Stockrington, Cedar Hill and Sugarloaf coalluvial would occur over weathered rock.

However, lower lying areas at Tank Paddock in the Conservation Estates are likely to have regular inundation due to the close proximity to Hexham Swamp where the groundwater table is often on the surface. Hexham Swamp is part of the floodplain of the Hunter River. The estuarine soils of Bobs Farm are subject to waterlogging and have permanently high watertables, this soil landscape is mapped in the Tank Paddock in the north eastern portion of the Conservation Estates Estate and adjoining Hexham Swamp. The alluvial soil landscapes of Cockle Creek and Wyong within Surveyors Creek (west) and Blue Gum Creek (east) are likely to contain unconfined alluvial aquifers.

Six vegetation communities within the Conservation Estates are classified as GDE's and these include, Freshwater Wetland Complex, Swamp Mahogany Paperbark Forest, Swamp Oak Rushland Forest, HVMF, HLRF and ATMF. These vegetation communities occur on the estuarine soils of Bob's Farm and the alluvial soils of Cockle Creek and Wyong. The remaining vegetation communities are not likely to be dependent upon groundwater and are most likely to be a result of surface runoff rather than groundwater dependence.

GDE's have been classified into several different types according to DLWC (2006). These classes take into consideration aquifer, ecological and geomorphic types. The aquifers present would be unconsolidated alluvial aquifers classed as A1 with Hypogean habitat. Table 3-2 below outlines the GDE types, classes and sub-classes as per DLWC (2006) which occur within the Conservation Estates.

Table 3.2GDE's Types and Classes for Conservation Estates

Vegetation Community at Conservation Estate	GDE TYPE	Class	Description of Class	Habitat
Alluvial Tall Moist Forest (northern occurrences)	Riparian & Terrestrial Vegetation (T)	T1	Riparian Vegetation Community	Terrestrial
Hunter Valley Moist Forest	Riparian & Terrestrial Vegetation (T)	T1	Riparian Vegetation Community	Terrestrial
Hunter Lowland Redgum Forest	Riparian & Terrestrial Vegetation (T)	T1	Riparian Vegetation Community	Terrestrial
Swamp Oak Rushland Forest	Riparian & Terrestrial Vegetation (T)	T1	Riparian Vegetation Community	Terrestrial
Swamp Mahogany Paperbark Forest	Riparian & Terrestrial Vegetation (T)	T1`	Riparian Vegetation Community	Terrestrial
Freshwater Wetland Complex	Wetlands (W)	W2	Coastal Floodplain Freshwater Forested Wetland	Epigean

WARNING

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Caution should therefore be exercised when usingthis data for purposes requiring high levels of accuracy. Furthermore, no account for intergrading areas between delineated vegetation communities has been made.

LEGEND

- Conservation Lands
- Link Road - Minmi Development Estate

SOIL LANDSCAPES (MATTHEI 1995)

- Bobs Farm Estuarine Soils
- Cockle Creek Alluival Soils
- Wyong Alluival Soils

GROUNDWATER DEPENDENT ECOSYSTEMS

- MU 12 - Hunter Valley Moist Forest
- MU 19 - Hunter Lowland Redgum Forest
- MU 37 - Swamp Mahogany - Paperbark Forest
- MU 40 - Swamp Oak - Rushland Forest
- MU 46 - Freshwater Wetland Complex
- MU 5 - Alluvial Tall Moist Forest

Surveyors Creek
Surveyors Creek
Bluegum Creek
Bluegum Creek
George Booth Drive
Swamp Mahogany - Paperbark Forest
Swamp Oak - Rushland Forest
Freeway
Newcastle
Sydney
Newcastle Link Road
0
0.75
1.5km

TITLE: Figure 3-6 Groundwater Dependent Ecosystems Northern Conservation Lands

CLIENT: Coal & Allied Operations Pty Ltd

SCALE: 1: 28000 at A3 Size **DRAWN:** D. Landenberger **APPROVED:** M.Doherty

DATUM: MGA Zone 56 (GDA 94) **DATE:** 21/10/2008

LAYOUT REF:J:\JOBS\24k\24530 Hunter Valley\Drafting\Ecology\Northern Lands\ALL WORKSPACES\REPORTS\Stockrington Tank Paddock\24530-2 FIGURE 3-4 Consv Est GDEs A-A3

CONTOUR INTERVAL: N/A

JOB REF: 24530-2

PLANNING SURVEYING ECOLOGY

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241 DENISON STREET BROADMEADOW PO BOX 428 HAMILTON NSW 2303
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3.2 Fauna

Of 58 threatened fauna species previously recorded within 10km (DECC Atlas of NSW Wildlife Data 2007) of the Conservation Estates. A total of 13 of these species are highly unlikely to occur within the Stockrington and Tank Paddock Conservation Estates due to the absence of suitable habitat. Of the remaining 45 species (listed below), four were recorded during fauna surveys (indicated by an asterisk '*') or previous surveys (Atlas of NSW Wildlife data 2008) (indicated by a double asterisk '**'). Assessment of habitat potential within Conservation Estates found that a further 24 species have a moderate or greater opportunity of occurring within the Conservation Estates (indicated by a triple asterisk '***'). Refer to Figure 3-7.

Litoria aurea	Green and Golden Bell Frog***
Litoria brevipalmata	Green-thighed Frog***
Varanus rosenbergi	Heath Monitor
Ephippiorhynchus asiaticus	Black-necked Stork***
Botaurus poiciloptilus	Australasian Bittern***
Ixobrychus flavicollis	Black Bittern***
Oxyura australis	Blue-billed Duck
Anseranas semipalmata	Magpie Goose***
Stictonetta naevosa	Freckled Duck***
Irediparra gallinaceae	Comb-crested Jacana***
Rostratula australis	Australian Painted Snipe***
Lophoictinia isura	Square-tailed Kite***
Callocephalon fimbriatum	Gang-Gang Cockatoo* **
Calyptorhynchus lathami	Glossy Black-Cockatoo
Melanodryas cucullata	Hooded Robin
Stagonopleura guttata	Diamond Firetail
Pomatostomus temporalis	Grey-crowned Babbler
Chthonicola sagittatus	Speckled Warbler**
Climacteris picumnus	Brown Treecreeper* **
Melithreptus gularis	Black-chinned Honeyeater* **
Anthochaera phrygia	Regent Honeyeater***
Lathamus discolor	Swift Parrot***
Neophema pulchella	Turquoise Parrot
Ninox connivens	Barking Owl
Ninox strenua	Powerful Owl* **
Tyto novaehollandiae	Masked Owl**
Tyto tenebricosa	Sooty Owl***
Ptilinopus magnificus	Wompoo Fruit-Dove**
Ptilinopus regina	Rose-crowned Fruit-Dove***
Ptilinopus superbus	Superb Fruit-Dove
Dasyurus maculatus	Spotted-tailed Quoll***
Phascogale tapoatafa	Brush-tailed Phascogale
Petaurus australis	Yellow-bellied Glider**
Petaurus norfolcensis	Squirrel Glider**
Phascolarctos cinereus	Koala* ***
Pteropus poliocephalus	Grey-headed Flying-fox**
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat***
Miniopterus australis	Little Bentwing-bat**
Mormopterus norfolkensis	Eastern Freetail-bat***
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat***
Falsistrellus tasmaniensis	Eastern False Pipistrelle***

Chalinolobus dwyeri	Large-eared Pied Bat***
Myotis adversus	Large-footed Myotis***
Scoteanax rueppellii	Greater Broad-nosed Bat***
Vespadelus troughtoni	Eastern Cave Bat***

In addition to the above threatened species a further thirteen threatened wetland, estuarine and inland fauna species have been recorded within a 10 km perimeter buffer of the Conservation Estates. These species have appeared in wider locality searches as consequence of the Conservation Estate's proximity to estuarine and wetland habitats and rare local records of inland species. These species have not been included within the above 10 km threatened species list, as Conservation Estates are unlikely to represent refuge areas for these species on at least an intermittent basis.

Charadrius leschenaultia	Greater Sand-plover
Calidris tenuirostris	Great Knot
Chelodina mydas	Green Turtle
Charadrius mongolus	Lesser Sand-plover
Pterodroma leucoptera	Gould's Petrel
Pterodroma solandri	Providence Petrel
Sterna albifrons	Little Tern
Haematopus longirostris	Pied Oystercatcher
Pandion cristatus	Osprey
Hamirostra melanosternon	Black-breasted Buzzard
Limicola falcinellus	Broad-billed Sandpiper
Limosa limosa	Black-tailed Godwit
Xenus cinerius	Terek Sandpiper

The results of opportunistic surveys for potential fauna are presented below.

3.2.1 Terrestrial Mammals

Few terrestrial mammals were noted during opportunistic fauna surveys within the Conservation Estates apart from a single *Antechinus stuartii* individual and both Swamp and Red-necked Wallabies. Common Wombat scats were noted within Stockrington Conservation Estate. Due to the lack of formal surveys for small terrestrial mammals habitat assessment was utilised to determine the potential for Conservation Estates to support populations of small to medium terrestrial mammals.

3.2.2 Arboreal Mammals

No formal surveys were conducted for arboreal mammals, although habitat assessment and secondary indications suggest that the Stockrington Conservation Estate is likely to support healthy populations of arboreal mammals. The existence of large tracts of unbroken forest interspersed by wet gullies containing understorey structural complexity strongly suggests that the Conservation Estates would support healthy populations of common arboreal mammals, such as *Pseudocheirus peregrinus* (Common Ringtail Possum) and *Trichosurus vulpecula* (Common Brush-tailed Possum). Concentrations of glider feeding scars in some areas of the Conservation Estates suggest that the Conservation Estates also supports glider species in at least some areas of the Conservation Estates. Feeding scars occurring on *Corymbia gummifera* (Red Bloodwood) in Coastal Foothills Spotted Gum Ironbark Forest and Coastal Plains Smooth-barked Apple Woodland within Stockrington lands

were consistent with those made by *Petaurus breviceps* (Sugar Glider) or *P. norfolcensis* (Squirrel Glider). The similarity of these species makes it difficult to distinguish between the feeding marks with sufficient confidence to identify the originator of observed marks. Elsewhere, within Stockrington Lands, larger feeding marks, on *Eucalyptus punctata* (Grey Gum), occurring adjacent to riparian communities suggest the presence of *Petaurus australis* (Yellow-bellied Glider), although the presence of this species cannot be confidently confirmed on this evidence alone due to the lack of the characteristic "vee" feeding marks that this species usually makes. The occurrence of local records (Atlas of NSW Wildlife data 2008) further suggests the presence of *P. australis.*

On habitat assessment alone the Stockrington lands are considered as being of sufficient quality in extent, maturity and complexity to support all three petaurids noted above and indeed *Petauroides volans* (Greater Glider) and *Acrobates pygmaeus* (Feathertail Glider). Due to such evidence, the precautionary principle should apply and the presence of all locally occurring glider species should be assumed within Stockrington Conservation Estate. The condition of habitat occurring within Tank Paddock Conservation Estate suggests that the site would support *T. vulpecula*, *P. peregrinus*, *P. breviceps* and *A. pygmaeus*, although the Conservation Estates contains sufficient habitat to support *P. norfolcensis* and potentially *P. australis* within ATMF and adjacent communities. Certainly the observed presence of a roosting *Ninox strenua* (Powerful Owl) suggests that the Conservation Estates supports a healthy arboreal mammal population. *P. norfolcensis* and *P. australis* are listed as Vulnerable under the *TSC Act 1995*.

The presence of almost pure stands of *E. punctata* (Grey Gum) in some areas of the Stockrington Estates suggests that the Conservation Estates potentially represents a part of the range of a sparse population of *Phascolarctos cinereus* (Koala) occurring in the forests to the south of the Hunter River. Thus while performing flora surveys a koala scat was located within a dense stand of *Eucalyptus propinqua* (Small-fruited Grey Gum) trees in the Northern portion of the conservation estate (Refer to Figure 3-7). The Stockrington lands are likely to represent part of a green corridor linking the Watagan forests to denser Koala populations occurring to the north of the Hunter River. That such a corridor is used by Koalas is evidenced by the presence of a single individual in forest adjacent to the Wallsend – Newcastle Link Road in 2007 where no recent Koala records previously existed and a single koala scat in the conservation estate.

3.2.3 Bats

Due to the lack of formal surveys for bats habitat assessment was utilised to determine the potential for Conservation Estates to support populations of bats. The Stockrington and Tank Paddock Conservation Estates contain a variety of habitat opportunities for both Microchiropteran and Megachiropteran bat species.

Foraging habitat for flying-foxes such as the Grey-headed Flying-fox (*Pteropus poliocephalus*) and Little Red Flying-fox (*Pteropus scapulatus*) exists within flowering canopy trees across the Conservation Estates. Due to the large size of these estates it is likely that foraging opportunities exist year round. Potential roosting habitat for flying-foxes exist in gully forests within the Conservation Estates, although, no roosts were found during surveys or are known to occur.

A range of foraging and roosting habitats exist within the Conservation Estates for insectivorous Microchiropteran bats. Clutter tolerant species such as Long-eared Bats (*Nyctophilus gouldii* and *N. geoffroyi*.) are likely to utilise the low to mid stratum

of forested areas. Whilst forest edges and forest canopy would provide foraging habitats for species more suited to fast flight in more open habitats such as Freetail Bats (*Mormopterus* sp.), White Striped Freetail Bat (*Tadarida australis*) and Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*). Other forest bats such as *Vespedelus* sp. and Bentwing Bats (*Miniopterus* sp.) are likely to make use of tracks through forests and woodland habitats,

Roosting habitat for hollow-dwelling bat species including the threatened East Coast Freetail Bat (*Mormopterus norfolkensis*) and Greater Broad-nosed Bat (*Scoteanax rueppelli*) exist within hollow-bearing trees within the Conservation Estates. Potential roosting habitat within old mine shafts and rocky outcrops exists within the Conservation Estates exists for cave roosting species such as the threatened Little Bentwing Bat (*Miniopterus australis*) and Eastern Bentwing Bat (*Miniopterus schriebersii*).

3.2.4 Avifauna

Many terrestrial avifauna groups are represented within the Conservation Estates, due to the diversity of habitats represented across the Stockrington and Tank Paddock lands. Both sites contain dry open sclerophyllous communities although these habitats exhibit greater diversity and extent within the Stockrington section. These dry sclerophyll communities contain most expected common species, apart from those species that were not present during surveys due to their migratory habits. The higher than average quality of dry forest habitats within Stockrington lands is evidenced by the presence of two regionally significant species (Bell & Murray 2001), being *Hylacola pyrrhopygia* (Chestnut-rumped Heathwren) and *Falcunculus frontatus* (Crested Shrike-tit) and two threatened species, being *Melithreptus gularis gularis* (Black-chinned Honeyeater) and *Climacteris picumnus* (Brown Treecreeper).

The Crested Shrike-tit is sparsely present in mesic and riparian communities and where these habitats interface with dry communities. The full status of the Chestnut-rumped Heathwren is not currently known within the Conservation Estates, but if the dry sclerophyll habitat it was recorded in along George Booth Drive is an indicator of its presence elsewhere in the vicinity, there are large areas of similar or better habitat for this species in the south-western portion of the Stockrington lands.

The Black-chinned Honeyeater and Brown Treecreeper are listed as Vulnerable under the *TSC Act 1995*. A single Brown Treecreeper was observed at the confluence of Lower Hunter Spotted Gum Ironbark Forest and Hunter Lowland Redgum Forest along George Booth Drive. This species is normally recorded further west, but the presence of *E. fibrosa* (Broad-leaved Ironbark) communities mixing with riparian habitat in these forests appears to be a factor in the area's ability to support this species. Likewise, the presence of Black-chinned Honeyeaters in the same vicinity is likely an association with *E. fibrosa* and increased understorey complexity offered by adjacent riparian habitat. These observations represent some of the most easterly records for these species in the Hunter Valley and as such represent observations at the limits of the range for both of these species.

Broad riparian communities in this vicinity have been noted to support a high diversity of honeyeater species, which suggests that other threatened species such as *Anthochaera phrygia* (Regent Honeyeater) and *Lathamus discolor* (Swift Parrot) may utilise these habitats on a seasonal basis when local blossom events occur. The Swift Parrot and Regent Honeyeater are listed as Endangered under the *TSC Act 1995*.

Callocephalon fimbriatum (Gang-Gang Cockatoo) was recorded on three occasions in the southwest section of Stockrington lands and although small numbers were observed on two occasions, 22 individuals were recorded on a third occasion suggesting that the area may be important for this species on a seasonal basis for foraging purposes. The Gang-Gang Cockatoo is listed as Vulnerable under the *TSC Act 1995*.

Both the Stockrington and Tank Paddock lands contain areas ATMF, although these habitats are more extensive within Stockrington lands and it also contains areas of Subtropical Rainforest and HVMF. A locally rare species, *Monarcha trivirgatus* (Spectacled Monarch), was observed in ATMF at Tank Paddock and *Ninox strenua* (Powerful Owl) was also observed roosting in the same vicinity. Extensive avian surveys have not been conducted within mesic vegetation communities in the Stockrington lands, but these habitats are relatively well developed and are therefore expected to provide habitat opportunities for wet forest bird species. Scats were found within rainforest in Long Gully that are considered to belong to *Alectura lathami* (Australian Brush-turkey), which is some indication of the potential for the rainforest there to support wet forest bird species.

3.2.5 Nocturnal Birds

Observations of nocturnal avian species were limited to incidental observations of individual birds during vegetation surveys. *Podargus strigoides* (Tawny Frogmouth) was observed on a number of occasions within Stockrington lands, although this common dry forest species and the equally common *Aegotheles cristata* (Australian Owlet-nightjar) are expected to be widespread across Conservation Estates. *Ninox strenua* (Powerful Owl) was observed roosting within ATMF at Tank Paddock, but there is also abundant suitable habitat for this species across all Conservation Estates. The Powerful Owl is listed as Vulnerable under the *TSC Act 1995*.

3.2.6 Swift Parrot and Regent Honeyeater Target Survey Results

The widespread occurrence of *Corymbia maculata* (Spotted Gum) across large areas of both proposed Development and Conservation Estates suggests that these lands have the potential to attract Swift Parrots during those seasons when Spotted Gum is an important winter flowering species within the central to lower Hunter Valley. Additionally, the occurrence of riparian forests containing *Eucalyptus tereticornis* (Forest Redgum) which were observed to have a high avian diversity, in conjunction with ridgetop areas of *Corymbia maculata* (Spotted Gum) are considered to be potential habitat for Regent Honeyeater. Investigation of forests containing Spotted Gum during 2008 surveys found that there were only occasional Spotted Gums flowering, which were attracting small widespread parties of Noisy Friarbirds. Within the Developments Estates no Lorikeet species were observed while small numbers of Little Lorikeets were observed to be feeding on Spotted Gum within the Conservation Estates. Extensive ATMF habitats within the Conservation Estates were attracting Little Lorikeets, although no lorikeets were observed within the Development Estates in this habitat. Red Gum communities in the southwest of the Conservation Estates contained a diversity of honeyeater species, although some species were found to use adjacent Spotted Gum / Ironbark assemblages and appeared to benefit from the greater structural richness brought about by the interface between these communities. Forest Red Gum blossom was found to be in relatively short supply and as a consequence there were few nectivorous species attracted to the limited blossom. No Swift Parrots or Regent Honeyeaters were

observed within either the Conservation or Development Estates during the 2008 surveys.

Although no Swift Parrots or Regent Honeyeaters were observed within the C&A lands during the 2008 survey these results are not considered to be a faithful indication of the capacity of these lands to support the Swift Parrot or Regent Honeyeaters. Overall the Conservation Estates exhibit greater habitat opportunities for these species, due to the greater extent of widespread habitat, predominantly Spotted Gum-Ironbark assemblages, ATMF, and the inclusion of riparian Forest Red Gum communities, which are likely to represent focal habitat points for these species during seasons when they occur within the locality. The absence of both of these species from the Conservation Estates during the winter of 2008 is consistent with the paucity of coastal and Lower Hunter records for both of these species during the 2008 season. There have been few Swift Parrot records within the region compared with previous years and no Regent Honeyeaters during the 2008 winter period. Evaluation of potential habitats within Conservation Estates suggests that there is a good probability that both of these species would use the Conservation Estates during favourable years within the region. However, the same assumptions are not considered to apply to the Development Estates, due to the smaller amounts of suitable habitat, lack of Forest Red Gum habitats and the somewhat isolated and to some extent fragmented nature of these lands in comparison with the extent of the Conservation Estates and their continuity to large significant forest areas in the regional context.

3.2.7 Herptofauna

A limited number of herpetofauna were observed during opportunistic surveys owing largely to the generally cool conditions when vegetation surveys were conducted and, in the case of frogs at least, the lack of surveys during nocturnal hours. However, common reptile species, such as *Pseudechis porphyriacus* (Red-bellied Black Snake), *Lampropholis delicata* (Grass Skink), *Varanus varius* (Lace Monitor), *Amphibolurus muricatus* (Jacky Lizard) and the frog species *Litoria latopalmata* (Broad-palmed Frog) and *Pseudophryne coriacea* (Red-backed Toadlet) were observed during surveys. A discussion on the potential for Conservation Estates to represent potential habitat for locally occurring herpetiles is contained in Section 4.3.

WARNING
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LEGEND

- Development Estate
- Conservation Lands
- Australasian Bittern
- Barking Owl
- Black-chinned Honeyeater (eastern subspecies)
- Brown Treecreeper
- Brush-tailed Phascogale
- Diamond Firetail
- Eastern Bentwing-bat
- Eastern Cave Bat
- Eastern False Pipistrelle
- Eastern Freetail-bat
- Gang-gang Cockatoo
- Glossy Black-Cockatoo
- Greater Broad-nosed Bat
- Green and Golden Bell Frog
- Green-thighed Frog
- Grey-crowned Babbler (eastern subspecies)
- Grey-headed Flying-fox
- Hooded Robin
- Hooded Robin (south-eastern form)
- Koala
- Large-eared Pied Bat
- Large-footed Myotis
- Little Bentwing-bat
- Magpie Goose
- Masked Owl
- Powerful Owl
- Regent Honeyeater
- Rose-crowned Fruit-Dove
- Sooty Owl
- Speckled Warbler
- Spotted-tailed Quoll
- Square-tailed Kite
- Squirrel Glider
- Superb Fruit-Dove
- Swift Parrot
- Turquoise Parrot
- Wompoo Fruit-Dove
- Yellow-bellied Glider
- Yellow-bellied Sheathtail-bat

0 2 4km

TITLE: Figure 3-7 NPWS Atlas Fauna Records
Northern Conservation Estate

CLIENT: Coal & Allied Operations Pty Ltd

SCALE: 1: 95000 at A3 Size
DRAWN: A.Saddington
APPROVED: M. Doherty
DATUM: MGA Zone 56 (GDA 94)
DATE: 30/07/2008
LAYOUT REF: J:\JOBS\24k\24530 Hunter Valley\Drafting\Ecology\Northern Lands\ALL WORKSPACES \REPORTS\MinmiLinkRdReport\24530-2 Figure 4-6 NPWS Atlas Fauna Records A-3
CONTOUR INTERVAL: N/A
JOB REF: 24530-2

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LEGEND

- Conservation Estates
- Development Estates
- Koala Scat Location
- Powerful Owl Roosting Site
- Gang-gang Cockatoo
- Brown Treecreeper
- Black-chinned Honeyeater

Development Estate Threatened Species Records

- Greyheaded Flyingfox
- Little Bentwing Bat
- Powerful Owl
- Squirrel Glider

EcoBiological 2006

- Powerful Owl
- Sooty Owl

TITLE: Figure 3-8 Threatened Fauna Concervation Northern Estate

CLIENT: Coal & Allied Operations

SCALE: 1: 30000 at A3 Size **DRAWN:** S. Bishop **APPROVED:** M. Doherty

DATUM: MGA Zone 56 (GDA 94) **DATE:** 10/10/2008

LAYOUT REF: J:\JOBS\24k\24530 Hunter Valley\Draft ..., ology\Northern Lands\ALL WORKSPACES\REPORTS\Stockrington Tank Paddock\24530-2 FIGURE 3-5 Consv EstThreatened Fauna species A-A3.wor

CONTOUR INTERVAL: N/A

JOB REF: 24530-2

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3.3 Habitat Survey

3.3.1 Flora Habitat

The vegetation communities present throughout the Conservation Estates at Stockrington and Tank Paddock offer a number of suitable habitat types for a relatively diverse representation of native flora communities and species occurring in the Lower Hunter Region. A number of geomorphological factors contribute to those vegetation communities present within these lands. These factors include the geology, soils, elevation and rainfall patterns, and are further diversified by topological context in relation to slope, aspect and substrate permeability. The geomorphological influences underlying these Conservation Estates provide suitable conditions for ten native vegetation communities, being:-

- Coastal Foothills Spotted Gum - Ironbark Forest (CFSGIF);
- Coastal Plains Smooth-barked Apple Woodland (CPSBAW);
- **Lower Hunter Spotted Gum Ironbark Forest (LHSGIF);**
- Hunter Valley Moist Forest (HVMF);
- Alluvial Tall Moist Forest (ATMF);
- **Subtropical Rainforest (STRF);**
- **Hunter Lowland Redgum Forest (HLRF);**
- **Swamp Oak Rushland Forest (SORF);**
- **Swamp Mahogany-Paperbark Forest (SMPF)** and
- **Freshwater Wetland Complex**.

A number of vegetation communities within the Conservation Estates are of significance due to their listing as Endangered Ecological Communities (EEC) under the *TSC Act 1995*, including LHSGIF, STRF (EEC – Lowland Rainforest of the NSW North Coast and Sydney Basin Bioregion), HLRF, SORF (EEC – Swamp Oak Floodplain Forest on Coastal Floodplains), SMPF (EEC – Swamp Sclerophyll Forest on Coastal Floodplains) and Freshwater Wetland Complex (EEC – Freshwater Wetlands on Coastal Floodplains). Apart from those species already afforded protection under the *TSC Act 1995*, ATMF, CFSGIF, HVMF and CPSBAW are recognised in the *Lower Hunter and Central Coast Regional biodiversity Strategy* (Payne 1998) as vegetation communities of Regional Significance due to either their riparian and/or *Eucalyptus salinga*, *Corymbia maculata* or *Angophora costata* associations.

Apart from these naturally occurring vegetation communities there are areas within the Conservation Estates that have been cleared to facilitate energy and transport infrastructure and road works material quarrying and associated maintenance and accessibility requirements. These cleared areas are characterised by disturbed substrates and high levels of light, which provide opportunities for exotic weeds and colonists from adjacent native vegetation communities.

A number of threatened flora species are known to occur regionally within vegetation communities occurring within Conservation Estates at Stockrington and Tank Paddock which are listed in Table 3-3 below. There are a number of ROTAP listed flora that have the potential to occur within Conservation Estates at Stockrington and Tank Paddock, which are listed in Table 3-4 below.

The condition of the vegetation communities varies across the Conservation Estates with some areas exhibiting degradation with proximity to tracks, infrastructure

easements and lands cleared for previous land-use practices. The edges of ATMF and HVMF offer opportunities for mesic vegetation, including serious introduced weeds like *Lantana camara* (Lantana). Other than those opportunities for weeds occurring within cleared easements, vegetation community disturbances within the Conservation Estates are by and large limited to edge effects associated with access tracks and small occasional incidences of rubbish dumping.

Table 3-2: Potential Threatened Flora Habitat

Threatened Species / Community	MU15 CFSGIF	MU 30 CPSBAW	MU 17 LHSGIF	MU 12 HVMF	MU5 ATMF	STRF	MU 19 HLRF	MU 40 SORF	MU 37 SMPF	MU 46 FWC
Acacia bynoeana		+								
Angophora inopina	+	+								
Arthropteris palisotii						+				
Caladenia tessellata		+								
Callistemon linearifolius	+	+	+							
Cryptostylis hunteriana		+								
Cynanchum elegans				+		+				
Dendrobium melaleucaphilum					+	+				
Diuris praecox		+	+							
Eucalyptus glaucina			+				+			
Grevillea parviflora ssp. *parviflora*	+	+	+							
Melaleuca biconvexa	+			+	+				+	
Rutidosis heterogama			+							
Syzygium paniculatum				+	+					
Tetratheca juncea	+	+								
Zanichellia palustris										+

Table 3-3: Potential ROTAP Species Habitat

ROTAP Species / Community	MU15 CFSGIF	MU 30 CPSBAW	MU 17 LHSGIF	MU 12 HVMF	MU5 ATMF	STRF	MU 19 HLRF	MU 40 SORF	MU 37 SMPF	MU 46 FWC
Callistemon shiressii				+	+					
Eucalyptus fergusonii ssp. *fergusonii*	+		+							
Grevillea montana	+		+							
Macrozamia flexuosa	+	+	+							

3.3.2 Fauna Habitat

Fauna potentially occurring within the Conservation Estates varies with respect to vegetation quality, density and community form. The Conservation Estates represents vegetation communities encompassing both wet and dry sclerophyll vegetation associations as well as rainforest community associations. The variation in vegetation within the Conservation Estates provides habitat for a diversity of common fauna species and opportunities for a moderate – high number of threatened fauna species.

Eucalypt and other dominant trees flowering times have potential to supply nectar and foraging opportunities for a diversity of species throughout the majority of the year. Dominant tree species and flowering period are contained in Table 3-5 below.

Table 3-4: Dominant Tree Species and Flowering Period

Threatened Flora Species	TSC listed	EPBC listed	Habitats (But not confined to) Map units REMS	Potential Threatened Fauna Species that May be attracted by Blossom	Flowering Period (Best time to Survey) in Months of the Year											
					J	F	M	A	M	J	J	A	S	O	N	D
Angophora costata	NA	NA	15 & 17	Micro bats (insects), gliders.	■	■								■	■	■
Corymbia maculata	NA	NA	12, 15 & 17	Micro bats (insects), Flying Foxes, Gliders, Regent Honeyeater, Swift Parrot	▒				■	■	■	■	■	▒	▒	▒
Eucalyptus acmenoides	NA	NA	5 & 12	Micro bats (insects), Flying Foxes, Gliders	■										■	■
Eucalyptus fergusonii subsp. *dorsiventralis**	NA	NA	12 & 17	Micro bats (insects), Flying Foxes, Gliders, Regent Honeyeater, Swift Parrot		▒	■	■	▒	▒						
Eucalyptus fibrosa	NA	NA	17	Micro bats (insects), Flying Foxes, Gliders, Regent Honeyeater, Swift Parrot			■	■	■	■	■	■	▒	▒	▒	
Eucalyptus globoidea	NA	NA	17	Micro bats (insects), Flying Foxes, Gliders, Regent Honeyeater, Swift Parrot				■	■	■						
Eucalyptus grandis	NA	NA	5	Micro bats (insects), Flying Foxes, Gliders, Regent Honeyeater, Swift Parrot				■	■	■	■	■				
Eucalyptus paniculata	NA	NA	5	Micro bats (insects), Flying Foxes, Gliders, Regent Honeyeater, Swift Parrot	■				■	■	■	■	■	■	■	■
Eucalyptus propinqua	NA	NA	5, 12 & 15	Micro bats (insects), Flying Foxes, Gliders	■	■	■									
Eucalyptus punctata	NA	NA	5, 12 & 15	Micro bats (insects), Flying Foxes, Gliders, Regent Honeyeater	■	■	■	■								■
Eucalyptus robusta	NA	NA	37	Micro bats (insects), Flying Foxes, Gliders, Regent Honeyeater, Swift Parrot					■	■	■					
Eucalyptus tereticornis	NA	NA	18	Micro bats (insects), Flying Foxes, Gliders, Regent Honeyeater, Swift Parrot				■	■	■	■	■	■	■		

Dark shading represents core flowering times for canopy trees as reported in the literature and light shading represents those times when flowering has been noted by RPS HSO ecologists outside these core flowering periods.

Note: The cleared areas occurring within the Conservation Estates are considered to be insignificant in terms of providing habitat for native fauna species aside from

providing foraging habitat along the ecotone between cleared and forested areas (such as for hunting bats).

Terrestrial Mammals

The Open Forest communities within the Conservation Estates provide suitable habitat for a number of common terrestrial mammals, including small marsupials, rodents and the Echidna. Within dry forest communities understorey complexity is variable with the most suitable opportunities for terrestrial mammals occurring where understorey densities are highest and forest debris is present. Densities of understorey vegetation within the Conservation Estates vary from moderate to moderately high. General understorey density variations within the Conservation Estates largely follow a pattern of more open understoreys on dry or north facing ridges and slopes and higher densities on south facing and lower slopes where dry communities merge with riparian and wet forest communities in the gullies and flats. Open forest habitats offer grazing opportunities for herbivorous fauna, such as Macropods and Wombats.

ATMF within the Conservation Estates has a complex understorey of ground cover species, vine thickets and in some area stands of *Lantana camara* (Lantana). The density of understorey vegetation provides habitat opportunities for terrestrial mammals including marsupial and rodent species guilds. These wet forest habitats offer foraging niches for bandicoots and shelter for wallabies where they may retire during daylight hours from more open grazing habitats.

In addition to ATMF and Dry open forest habitats within the Conservation Estates, major gullies within the site, particularly in the head of Long Gully, Blue Gum Creek and its western tributaries and to a lesser extent the headwaters of Buttai Creek, contain stands (some sizeable) of rainforest. The extent and relative isolation of rainforest stands and associated sclerophyllous forests within the Conservation Estates (particularly Stockrington lands) offer potential habitat opportunities for more secretive terrestrial fauna such as *Dasyurus maculatus* (Spotted-tailed Quoll).

Habitat within these Conservation Estates for terrestrial mammals (particularly Stockrington) are of considerably greater quality than those occurring within Development Estate lands at Black Hill and Minmi-Link Road. This is due to a number of factors not the least of which is the large and continuous stand of vegetation these lands represent and the broad continuous linkages they possess to more southerly areas of the Sugarloaf Range and as a consequence the Watagans further to the south. Moreover, forest habitats within the Conservation Estates exhibit a greater variation in canopy tree age cohort with greater densities of hollow-bearing trees occurring within these habitats. On the whole, understorey strata exhibit greater densities and complexity than those within the above mentioned Development Estates, which is likely to promote greater population densities and diversity in terrestrial mammal populations.

Arboreal Mammals

There are large areas of dry forest within the proposed Conservation Estates that exhibit a diversity of age cohort within canopy tree species, suggesting that these areas of the Conservation Estates have not been cleared in the recent past. Consequently large areas of these lands are covered in forests containing trees of sufficient maturity to develop hollows, which provide shelter and nesting opportunities for arboreal mammals. The large, mature and continuous nature of much of the forested lands within the Stockrington Conservation Estate are able to provide a

continuous succession of foraging opportunities throughout the year for glider and possum species. The quality of onsite forest habitats suggests that they support good populations of arboreal mammals. Open forest habitats over much of the Tank Paddock lands are of relatively low maturity, which suggests that they have limited capacity to contain hollow-bearing trees, but these habitat attributes occur more reliably within wet sclerophyll forest communities occurring along the gullies traversing the southern portion of the site and traversing the site from the northeast to the southwest.

Open and cleared areas containing a low diversity and density of Eucalypt species hold limited habitat for arboreal species.

Bats

The wooded and adjacent open areas within the Conservation Estates provide extensive insectivorous foraging habitat for Microchiropteran bat species. The mix of dominant tree species occurring within the Conservation Estates has the potential to provide a continuous supply of nectar throughout the year, thus attracting insect populations for a range of microchiropteran bats that have been recorded within the locality. Furthermore, there are substantial areas of both wet and dry forest communities offering a wide diversity of hunting niche for the majority of Microchiropteran species that have been recorded within the Lower Hunter Valley. There are low to high incidences of hollow-bearing trees within the Conservation Estates forests, offering a range of hollow sizes and including the smaller hollows favoured by hollow-dwelling Microchiropteran bats. The Conservation Estates is continuous with forests spilling off the Sugarloaf Range to the south, and represents a significant area of unbroken core habitat for locally occurring bat populations. There are caves occurring along the rocky watercourse of Blue Gum Creek, which may provide roosting opportunities for cave-dwelling Microchiropteran bats and known roosting opportunities for Microchiropteran bat species occur within the Sugarloaf Range to the south.

Canopy trees within the Conservation Estates offer blossom foraging opportunities for Grey-headed Flying-foxes and rainforest trees occurring in the gullies provide seasonal fruit resources for this species. Flying-foxes travel widely to access foraging resources and the continuity of onsite habitats with those in adjacent ranges represents a significant contribution to core habitat for local populations of flying-foxes. Although no roosting camps of flying-foxes were observed within proposed Conservation Estates during ecological surveys, there are a number of significant gullies within Stockrington lands that appear to offer potential locations for flying-fox roosting camps.

Frogs

Stockrington Conservation Estates encompass the headwaters of Buttai and Surveyors Creeks in the west and the western tributaries of Blue Gum Creek in the east including Long Gully. These creek heads represent relatively steep and relatively small catchments offering largely ephemeral water flows, although there are flat areas where more permanent pools persist. The wet nature of these gullies would make them highly suitable Conservation Estates for frog species including potential habitat for locally occurring threatened frog species. There are few wetland habitats within these catchments although there are a number of dams that have been colonised by wetland vegetation, which would provide microhabitat opportunities for common frog species. The Blue Gum Creek valley cuts through the eastern portion of the Conservation Estates and is characterised by rocky channel

beds which may provide habitat for wet forest frog species, including those that prefer rocky creekline habitats such as *Mixophyes* species. The Tank Paddock Conservation Estate occurs on the south western fringe of the Hexham floodplain with areas of wetland habitat entering the Conservation Estates where mesic forested drainage lines interface with floodplain habitats. Floodplain habitats and lower mesic drainage lines are likely to provide a diversity of habitat niches for common frog species.

Reptiles

Habitat within the Conservation Estates has potential for representing significant shelter and foraging opportunities for a diversity of reptile species. This can be attributed to the complexity of understorey strata and the high incidence of forest debris in the ground cover layer.

Semi to permanent wetlands and dams are likely to provide year round habitat, where ephemeral ponds are associated with creeklines and drainage lines within the Conservation Estates there are intermittent foraging opportunities for common snake and turtle species. Wooded areas are likely to represent habitat for common lizard and snake species. The extent and diversity of forest habitats within the Conservation Estates suggest that they may provide suitable habitat for regional threatened reptile species, such as the Pale-headed Snake and Stephen's Banded Snake.

Avifauna

The wooded areas provide suitable foraging resources (e.g. Invertebrate habitat and blossom), nesting and roosting opportunities for a variety of sedentary and migratory birds. Hollow-bearing trees occurring across the Conservation Estates may provide nesting habitat for hollow dependant birds such as Forest Owls, Treecreepers, Parrots, Pardalotes, Kingfishers and Woodswallows.

Dry sclerophyllous forests within the Conservation Estates are continuous within the extensive forests and woodlands of the Sugarloaf Range to the south. The resulting continuity of forest represents extensive habitats for those species requiring large home range areas to persist. Furthermore, large continuous forest areas provide unhindered regional corridors for nomadic birds such as nectivorous species as they respond to local blossoming events.

Although understorey habitat varies in density across the Conservation Estates, there are large areas of dry forest characterised by well-developed understorey strata and these habitats provide abundant opportunities for small avian species for both foraging, shelter and nesting purposes.

The regular juxtaposition of both dry and mesic or riparian forest types within the Conservation Estates increases the niche potential for both wet and dry forest bird groups due to the ecotonal areas created by overlapping adjacent vegetation communities. The hilly nature of the Conservation Estates has created a relatively wide range of micro-habitats for vegetation communities, due to the interplay of slope, aspect, soil type and thus wind / sun, exposure / shelter and moisture retention. This has resulted in a mosaic of habitat opportunities for a wide range of locally occurring birds including threatened and regionally significant species.

The diversity of vegetation communities across the Conservation Estates ensures a diverse mosaic of canopy species offering blossom resources throughout the year.

The presence of Ironbarks in some communities, particularly in the southwest along George Booth Drive, appear to be important to the persistence of threatened species such as the Brown Treecreeper and Black-chinned Honeyeater.

Riparian habitats in the southwest provide dense understorey strata and blossom producing species in the canopy, which attracts a diversity of honeyeater species, offering intermittent foraging opportunities for threatened nectivorous species such as the Regent Honeyeater and Swift Parrot. The quality of this mosaic of habitats provide opportunities for regionally significant species such as Chestnut-rumped Heathwren and Crested Shrike-tit. Mid-storey resources and canopy fruits provide foraging opportunities for threatened cockatoo species, including the Gang-Gang Cockatoo and Glossy Black Cockatoo.

Subtropical Rainforest patches are sufficiently developed to attract nomadic fruit-doves including threatened species that intermittently occur locally.

3.4 Habitat Mapping

Habitat condition mapping (Figure 3-9) has been undertaken based on the results of field assessment coupled with the results of floristic investigations and RPS HSO Ecology staff combined observations and experience. To optimise the habitat mapping for display and analysis, habitat quality has been divided into the five categories outlined below, based on the habitat assessment elements discussed previously in Table 2-1. The habitat assessment elements are; hollow-bearing tree density, Eucalypt diversity, Allocasuarina species density, Proteaceae species density, structural diversity and fallen timber density. Refer to Table 3-5 below for total areas of habitat category.

Note: The habitat quality has been delineated with reference to but does not follow the delineated vegetation community boundaries.

High – Quality habitat with native flora showing no significant disturbance with old growth elements, intact understorey and year round foraging opportunities preferable to significant and threatened fauna species that includes forest owls, arboreal mammals, avifauna (includes EEC with no weed incursion and areas perceived to have regionally unique floristic representations or fauna habitat).

Above average – Quality habitat with native flora showing little to no disturbance with moderate level of key elements. These areas are likely to be utilised by native fauna species, including threatened species, as part of a larger home range (includes EEC with minor weed incursion).

Average quality – Habitat with dominant native community with low – moderate disturbance levels within elements, and includes areas of recent fire disturbance where understorey diversity is low with long term natural regeneration likely (also includes EEC with moderate weed incursion).

Below average – Habitat representing a native vegetation community with high weed incursion and other disturbances and low level of foraging opportunities (includes EEC with severe weed incursions and disused tracks with signs of native regeneration).

Low – Cleared land dominated by exotic flora species and representing preferred habitat for exotic fauna species (includes highly disturbed and frequently used tracks).

Table 3-5: Habitat in Conservation Estates

Habitat	Area in Conservation Estates (ha)	
	Stockrington	Tank Paddock
1 – High	397	89
2 – Above Ave	1679	8
3 – Average	142	0
4 – Below Ave	2.8	0
5 – Low	129	61
TOTALS	**2349.8**	**158**

WARNING
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LEGEND

Developmnent Estate
Conservation Estate

HABITAT CATEGORY

1 - High
2 - Above Average
3 - Average
4 - Below Average
5 - Low

0 1 2km

TITLE: Figure 3-9 Habitat Condition Conservation Estates

CLIENT: Coal & Allied Operations Pty Ltd

PLANNING SURVEYING ECOLOGY

HARPER SOMERS O'SULLIVAN

SCALE: 1: 32000 at A3 Size **DRAWN:A.Saddington** **APPROVED: D. Landenberger**

DATUM: MGA Zone 56 (GDA 94) **DATE:** 25/3/2008

LAYOUT REF:J:\JOBS\24k\24530 Hunter Valley\Drafting\Ecology\Northern Lands\ALL WORKSPACES\REPORTS\Stockrington Tank24530 FIGURE 3-6habitatconditionmappingA-3 Pa

CONTOUR INTERVAL: N/A

JOB REF: 24530-2

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3.5 Identification of Threatened Species, Populations & Ecological Communities

Those threatened flora and fauna species (listed under the *TSC Act* and the *EPBC Act*) that have been gazetted / recorded from within the region of the Conservation Estates have been considered within Ecological Inventory Report. EEC's and Endangered Populations known from the broader area have also been identified. Each species / community / population is considered for its potential to occur within the Conservation Estate. This Ecological Inventory Report deals with each species / community / population separately and identifies the ecological parameters of significance associated with the overall proposal.

'Species' or **'EEC / Population'** – Lists each threatened species / EEC / population known from the vicinity of the Conservation Estates. The status of each threatened species under the *TSC Act* and *EPBC Act* is also provided.

'Habitat Description and Known Populations' or **'Habitat Description and Known Stands / Populations'** – Provides a brief account of the species / community / population and the preferred habitat attributes required for the existence / survival of each species / community / population.

'Chance of Occurrence within Conservation Estates'– Assesses the likelihood of each species / community / population to occur within the site in terms of the aforementioned habitat description and taking into account local habitat preferences, results of recent field investigations, data gained from various sources and previously gained knowledge via fieldwork undertaken within other ecological assessments in the locality.

Table 3-6 Threatened Species Assessment

Species	Habitat Description and Known Populations	Chance of Occurrence within Conservation Estate
Plants		
Acacia bynoeana Bynoe's Wattle (E, V*)	Small, prostrate shrub found in low heath and open woodland, generally on loamy clays and sand. Occurs from the Lower Hunter south to the Southern Highlands. Within the Hunter Sub-bioregion it has been found in several locations within the Cessnock LGA where it has been found growing in Kurri Sand Swamp Woodland (KSSW). Has also been recently recorded as isolated populations within Yellow Bloodwood Woodland and Blue-leaved Stringybark Woodland near Ellalong. Locally, it is known to occur with Coastal Plains Scribbly Gum Woodland.	**Low** The survey did not record this species within the proposed development area. Habitat within the Development Estate can be considered sub-optimal at best, as this species prefers woodland habitats Thus it is unlikely that this species will occur due to the lack of suitable habitat..
Arthropteris palisotii Lesser Creeping Fern (E)	Occurs in North-eastern NSW and also in Queensland. The Lesser Creeping Fern grows on trees. Its creeping stem is branched and wiry and covered with dark scales. Spores are borne on the underside of the leaflets in circular clumps. Occurs in rainforest, mainly on tree trunks.	**High** EcoBiological (2006) recorded this species within the Subtroprical Rainforest vegetation community within the Stockrington Conservation Estates.
Angophora inopina Charmhaven Apple (V, V*)	Small to medium tree found in shallow sandy soils in open woodland, swamp woodland and wet heath. The main occurrences of this species are in the Wyong and Lake Macquarie LGA's (from Charmhaven to Wyee and Morisset, and north to near Toronto), with disjunct populations also in Port Stephens LGA (south of Karuah).	**Low** This species was not detected during any of the surveys and the Conservation Estate lacks potential habitat for this species. Therefore it is highly unlikely for this species to occur within the Conservation Estates.
Callistemon linearifolius (V)	Shrub that grows in dry sclerophyll forest on the coast and adjacent ranges. Significant populations recently found within the Lower Hunter, including Werakata National Park. Re-sprouting/juvenile specimens difficult to distinguish from other *Callistemon* species such as *C. rigidus* or *C. linearis* without the aid of flowering parts. Locally this species has been recorded where dry forest habitats interface with salt tolerant vegetation communities, such as Swamp Oak Rushland Forest and Riparian Melaleuca forest.	**High** A large population of at least 355 specimens were located within the Lower Hunter Spotted Gum Ironbark Forest in the north of the Stockrington Conservation Estates. In addition 408.2 ha of potential habitat for this species occurs within the Conservation Estates.
Caladenia tessallata Tessellated Spider Orchid (E, V*)	A small terrestrial orchid, which regrows its single leaf on an annual basis. It is known to occur in grassy woodland and locally it has potential to occur within Coastal Plains Scribbly Gum Woodland. It has been recorded within Munmorah State Recreation Area to the south of the Development Estate.	**Moderate** Potential habitats for *Caladenia tessellata* include dry sclerophyll forests such as Lower Hunter Spotted Gum-Ironbark Forest, Coastal Plains Smooth-barked Apple Woodland, Coastal Foothills Spotted Gum-Ironbark Forest and Hunter Valley Moist Forest (approximately 2016.9ha). However, some of the vegetation communities contain sub-optimal micro-habitat and other factors such as aspect and topography would also influence the suitability of habitat for this cryptic orchids. Due to the cryptic nature of this species, it is relatively difficult to locate in the field and as such its presence within the Development Estate cannot be discounted.
Cryptostylis hunteriana Leafless Tongue Orchid (V, V*)	A cryptic Saprophytic orchid species that flowers between December and February. Distribution limits N-Gibraltar Range S- south of Eden. Grows in a variety of habitats from tall open forests to swamp heath on sandy soils	**Moderate** The preferred habitat for this species is Coastal Plains Scribbly Gum Woodland, however this species has been recorded within Coastal Plains Smooth Barked Apple Forest at Freemans Waterhole (Bell, 2004), which is present within the Conservation Estate. This species generally occurs with other species of the same genus such as *Cryptostylis subulata* and *Cryptostylis erecta.* Neither of these species were recorded within the Conservation Estates. Thus the habitat present within the Conservation Estate is considered to be sub-optimal. However due to the cryptic nature of this species , it is relatively difficult to locate in the field and as such its presence cannot be discounted.

Species	Habitat Description and Known Populations	Chance of Occurrence within Conservation Estate
Cynanchum elegans White-flowered Wax Plant (E, E*)	Occurs scattered along the NSW Northern Coast south to Wollongong usually in dry, littoral or subtropical rainforest and occasionally Melaleuca scrub or woodland. A climbing or twining plant species that flowers from August to May with peak flowering in November. One record within the Atlas of NSW Wildlife data occurs within the Lower Hunter Region and Central Coast at Green Point to the north of Belmont.	**Low - Moderate** Potential habitat within the subtropical rainforest vegetation communities within the Stockrington conservation estate. Thus it is considered the chance of occurrence to be moderate.
Dendrobium melaleucaphilum Spider Orchid (E)	Epiphytic orchid growing mostly growing on *Melaleuca styphelioides*, but occasionally on rainforest trees or rocks. Extends from south of the Blue Mountains to Queensland. Preferred habitat is coastal swamp forests.	**Low – Moderate** Although the favoured host plant for this orchid, *Melaleuca styphelioides*, was recorded within the Conservation Estates during flora surveys, there are no known records for this orchid species in the Newcastle area. The majority of the habitat of Alluvial Tall Moist occurs within the drainage lines of both the Tank Paddock and Stockrington Conservation Estates. Nevertheless, due to the occurrence of potential habitat its presence within the Conservation Estates cannot be totally discounted.
Diuris praecox Newcastle Doubletail (V, V*)	Found predominantly in coastal Eucalypt forests on hilltops or slopes. This species has been recorded at a number of dry forest locations to the southeast of Lake Macquarie.	**Moderate** There is opportunity for this species to occur within open forest habitats within the Conservation Estates. However, this species was not identified during the flora surveys, however targeted surveys were not undertaken within the Conservation Estate. Potential habitats for *Diuris praecox* include dry sclerophyll forests such as Lower Hunter Spotted Gum-Ironbark Forest, Coastal Plains Smooth-barked Apple Woodland, Coastal Foothills Spotted Gum-Ironbark Forest and Hunter Valley Moist Forest (approximately 2016.9ha). Due to the cryptic nature of this species, it is relatively difficult to locate in the field and as such its presence within the Conservation Estates cannot be discounted.
Eucalyptus camfieldii Camfield's Stringybark (V, V*)	Tree or mallee to 10m high, but often less. Rare and localised, in coastal shrub heath on sandy soils on sandstone, often restricted drainage. Records from the Hunter Sub-bioregion are largely in near-coastal areas from the Port Stephens LGA to the Central Coast. An isolated stand of trees consistent with this species has been recorded near Kurri Kurri (K. Hill pers. comm.). A local record to the east of the site is reported in the Atlas of NSW Wildlife data.	**Low** The Conservation Estates lack potential habitat (sandy soils and shrub heath) suitable for this species. Therefore it is considered highly unlikely for this species to occur.
Eucalyptus glaucina Slaty Red Gum (V, V*)	Red Gum species that grows in grassy woodland on deep, fertile and moist soils. Recorded within Hunter Lowland Redgum Forest and Central Hunter Ironbark Spotted Gum Grey Box Forest communities in the lower Central Hunter. Interbreeding known to occur between this species and *E. tereticornis*.	**Moderate** Potential habiat for this species occurs within the Hunter Lowland Redgum Forest which occurs in the both the Tank Paddock and Stockrington Conservation Estates. No individuals of this species were recorded during the flora surveys, however no targeted surveys were undertaken within the Conservation Estates. Thus it is considered that this species has a moderate chance of occurrence within the Hunter Lowland Redgum Forest habitats within the Conservation Estates.
Eucalyptus parramattensis ssp. decadens Drooping Red Gum (V, V*)	Red Gum species that grows in dry sclerophyll woodland on sandy soils, often in low damp sites. Locally, this species occurs almost exclusively in association with Kurri Sand Swamp Woodland and Tomago Sand Swamp Woodland and ecotonal areas, but a small disjunct stand of stunted individuals have been recently recorded within coastal heath in the Lake Macquarie LGA (RPS HSO pers. obs.).	**Low** The Conservation Estates lack potential habitat (dry sclerophyll woodland on sandy soils) suitable for this species. Therefore it is considered highly unlikely for this species to occur.

Species	Habitat Description and Known Populations	Chance of Occurrence within Conservation Estate
Grevillea parviflora subsp. *parviflora* Small Flowered Grevillea (V, V*)	Occurs in light, clayey soils in woodlands and open forests. Most plants appear capable of suckering from a rootstock. Relatively widespread within the Cessnock LGA where it has been recorded in LHSGIF. Occurs within Werakata National Park. Much confusion surrounds the taxonomy of this species and other similar *Grevillea* taxa (S. Bell *pers. comm.*), and a NPWS-funded study of the species is currently in progress.	**High** Approximately 105 individuals of this species were located within the Coastal Plains Smooth-barked Apple Woodland within the western portion of the Stockrington Conservation Estates. In addition there is 1897.3ha of habitat in the form of Coastal Plains Smooth-barked Apple and Lower Hunter Spotted Gum Ironbark Forest present within the Conservation Estates.
Melaleuca biconvexa Biconvex Paperbark (V, V*)	A shrub to small tree, which grows in poorly drained areas from Jervis Bay to Port Macquarie. Records in the Hunter Region are confined to western Lake Macquarie (Atlas of NSW Wildlife data).	**Low - Moderate** The majority of records of this species occur to the west of Lake Macquarie and the Central Coast, with some scattered records also occurring at Wallsend and Cardiff. Whilst potential habitat exists in the Alluvial Tall Moist Forest vegetation community within the Conservation Estates, the species was not recorded during flora surveys. Thus it is considered unlikely for this species to occur due to lack of local records.
Microtis angusii Angus's Onion Orchid (E, E*)	Record from the Terry Hill's district of Sydney. Occurs upon disturbed soil horizons that were originally ridgetop lateritic soils supporting a distinctive open to low open forest community, Duffy's Forest Vegetation Community, which is listed as an EEC. Suspected occurrences in the southern Lake Macquarie hinterland are derived from a tentative record by Bell (1998) in the Lake Macquarie State Recreation area, which occurs to the south of Gwandalan.	**Low - Moderate** The presence of records within the central coast area and the occurrence of habitat, as described from other locations where this species has been recorded, suggests that this species may have sub-optimal habitat within both the Conservation Estates.
Rulingia prostrata Dwarf Kerrawang (E, E*)	A prostrate shrub forming mats greater than 1m in width and occurring within heath, dry sclerophyll and coastal sands around Tomago.	**Low** The survey did not record this species within the proposed Conservation Estates. The Conservation Estates lacks potential habitat (coastal sands) suitable for this species.
Rutidosis heterogama Heath Wrinklewort (V, V*)	Small Asteraceous herb occurring in the Hunter Region growing in disturbed areas and adjacent parcels of bushland within the Cessnock LGA. This species is also noted as occurring within coastal heathland habitats between Wyong and Evans Head on sandy substrates or moist areas within open forest.	**High** It is estimated that over 1000-1500 individual plants were recorded during field visits and the actual extant population is expected to be far greater as targeted surveys were not undertaken. Potential habitat exists within the Lower Hunter Spotted Gum Ironbark forest community (136.8ha) within the Conservation Estate.
Syzygium paniculatum Magenta Lilly Pilly (V, V*)	A shrub to small tree found in sub-tropical and littoral rainforest on sandy soils or sheltered gullies mostly near water courses. Distribution between Bulahdelah and Jervis Bay. Hunter Region records confined to the Lake Macquarie hinterland (Atlas of NSW Wildlife data).	**High** One individual of this species was detected within a disturbed section of Blue Gum Creek in the south east of the Stockrington Conservation Estate. In addition there is habitat present in the form of Subtropical Rainforest and Alluvial Tall Moist Forest.
Tetratheca juncea Black-eyed Susan (V, V*)	Occurs in a variety of forested and heathy habitats. Locally found in Open Forests and Woodlands with dense, undisturbed understorey, often in association with *Angophora costata* / *Corymbia gummifera* on slopes with south-easterly aspects. A number of records exist from the local area including several records from the proposed Conservation Estates within the Tank Paddock Development Estate (Atlas of NSW Wildlife data).	**High** Approximately 352 *Tetratheca juncea* plant clumps were located during field visits in 2005, late 2007 and 2008 (Refer to Figure 3-4). The population is estimated to be considerably larger as the majority of the surveys were performed outside of the flowering period for this species. It is estimated that 256 ha of habitat within the Conservation Estates, remains to be surveyed. Thus, it is considered that this population will be significantly larger than what has been recorded during the vegetation surveys.

Species	Habitat Description and Known Populations	Chance of Occurrence within Conservation Estate
Zannichellia palustris (E)	A submerged monoecious weakly rhizomatous aquatic annual or perennial plant. Within Australia it is known only from the Murray River estuary in South Australia and the Lower Hunter region in NSW. This species occurs in fresh to brackish, still to slow moving waters. *Z. palustris* has been collected from Ironbark Creek (Shortland), Black Creek (Cessnock), Kooragang Island and from near Belmont. None of the known sites of this species are formally protected and none are managed in any way for the conservation of the species. This species is ROTAP-coded 3R+, indicating that the species occurs overseas.	**Moderate** The survey did not record this species within the Conservation Estate. However, potential habitat of 11.9ha does occur within the Freshwater Wetland Complex within Tank Paddock Conservation Estate
Herpetofauna		
Litoria aurea Green and Golden Bell Frog (E, V*)	Inhabits swamps, lagoons, streams and ponds as well as dams, drains and storm water basins. Thought to be displaced from more established sites by other frog species, thus explaining its existence on disturbed sites. Previously widespread within the Sydney Basin Bio-region, but now sparsely distributed within the Lower Hunter and Central Coast areas.	**Moderate** Although there is habitat occurring around dams and along lower watercourses within the site, this species only persists in the region within sites exhibiting a saline influence and the population has contracted to a number of select locations in the region. However, Tank Paddock Conservation Estates which occurs adjacent to Hexham Swamp offers suitable habitat for the species.
Litoria brevipalmata Green-thighed Tree Frog (V)	Occurs in isolated localities from the NSW Central coast to south-east Queensland. They occur in a range of habitats from rainforest and moist Eucalypt forest to dry eucalypt forest and heath. Breeding occurs following heavy rainfall events in late spring and summer, with frogs congregating around large, temporary pools where males generally only call for one or two nights. This species has been recorded from only one location in the Hunter River catchment, being along creekline habitat within the HEZ study area (Harper Somers O'Sullivan 2004a). Populations of this species are also known to exist regionally within the Watagan National Park (Ehmann, 1997) and Cooranbong (Atlas of NSW Wildlife data).	**Moderate** Riparian and wetland habitats within the site are commensurate with potential habitat for this species and its presence within the site cannot be discounted.
Varanus rosenbergi Heath Monitor (V)	Inhabits a range of habitats, including coastal heaths, woodland and sclerophyll forests. It shelters in self-made burrows or in hollow logs and rock crevices and is known to be semi-arboreal. Its range extends from southern Western Australia through South Australia. The Victorian and NSW populations are isolated from these western populations and from each other. Within NSW, populations are known from the Canberra region north to Wondabyne.	**Low** The survey did not record this species within the proposed conservation estate. Unlikely to occur due to its more southerly occurrence.
Avifauna		
Ixobrychus flavicollis Black Bittern (V)	Solitary species, living near water (estuarine to brackish) in mangroves and other trees which need to form only a narrow fringe of cover. A riparian species that occasionally ventures into the open within estuarine habitats. Sedentary resident along Dora and Stockton Creeks in western Lake Macquarie, but is likely to occur in any brackish to estuarine forested coastal creeks in the lower NSW coast.	**Moderate** Tank Paddock Conservation Estate contains potential wetland habitat for this species.

Species	Habitat Description and Known Populations	Chance of Occurrence within Conservation Estate
Botaurus poiciloptilus Australian Bittern (V)	The Australasian Bittern is confined to Australia and New Zealand. Within Australia this species occurs in the southeast and southwest with the occasional vagrant in the northwest of Australia. It favours permanent fresh-waters dominated by sedges, rushes, reeds or cutting grasses (e.g. Phragmites, Scirpus, Eleocharis, Juncus, Typha, Baumea and Gahnia). Feeds on insects, small fish, eels, frogs and other aquatic life, sometimes in ricefields. It is partly nocturnal in habits, and, keeping as it does to the depths of reedy swamps, is seldom seen during the day. There is an anecdotal record for this species within the proposed Conservation Estates of Tank Paddock.	**Moderate** Tank Paddock Conservation Estate contains potential wetland habitat for this species.
Ephippiorhynchus asiaticus Black-necked Stork (E)	Inhabits swamps associated with river systems and large permanent pools but sometimes appears on the coast or in estuaries. It has also been recorded on farm dams and sewage treatment ponds. Within the Hunter Region it occurs spasmodically on freshwater or estuarine wetlands.	**Moderate** Tank Paddock Conservation Estate contains potential wetland habitat for this species.
Lophoictinia isura Square-tailed Kite (V)	Inhabits open forests and woodlands, particularly those on fertile soils with abundant passerines. They may also range in nearby open habitats but not into extensive treeless regions. This species is notably absent from alpine regions and small isolated remnant woodlands in large open areas. Records exist from the Cessnock and Maitland LGA's and there are records for this species from Cooranbong in the southwest of the Lake Macquarie LGA (Atlas of NSW Wildlife data; HBOC records). Records for this species within the Lower Hunter are generally limited to Autumn.	**Low – Moderate** Due to the generalist habitat requirements of this species, it could potentially occur within the site on a seasonal basis. Records in the Hunter Sub-bioregion are generally sparse and it would be difficult to locate during targeted surveys.
Callocephalon fimbriatum Gang-gang Cockatoo (V)	Occurs in forests and woodlands where it forages on the seed capsules of Eucalypts. Sedentary, seasonally nomadic or part-migratory, this species shows a general trend to leave highland habitats in winter for more lowland districts. Requires large Eucalypt tree hollows for nesting. Records exist from the Watagan Mountains and adjacent lowlands and foot hills (Atlas of NSW Wildlife data).	**High** The species was recorded in three locations within the Stockrington Conservation Estates during surveys.
Calyptorhynchus lathami Glossy Black-Cockatoo (V)	Occurs in forests and woodlands where it forages predominantly on *Allocasuarina* cones. Requires large Eucalypt tree hollows for nesting. Records within the Hunter Sub-bioregion predominantly from relatively undisturbed forested areas on the ranges such as the Watagan Forests, with isolated records from the valley floor remnants.	**Moderate** This species was not recorded within the site during fauna surveys; however, the known feed tree *Allocasuarina littoralis* occurs widely within the site. Therefore, this species may use habitat within the development estate on at least an intermittent basis.
Melanodryas cucullata subsp. *cucullata* Hooded Robin (V)	Ranges from about Mundubbera, Qld, to the Spencer Gulf, SA, intergrading with other subspecies through the northern Murray-Darling Basin (Garnett *et al*, 2000). They occupy drier Eucalypt forest, woodland and scrub as well as grasses and low shrubs. The species is a quiet, shy and largely sedentary bird, most often observed in pairs or small groups. The size of territories throughout Australia has been estimated to be between 5 to 50 hectares. Established pairs keep to their territory year round, banding into family groups only briefly after breeding. (Schodde and Tidemann, 1986).	**Low** This species was not recorded within the site during fauna surveys. Although a record for this species occurs within the Link Road Minmi Development Estate nearby (Atlas of NSW Wildlife data), habitat within the Conservation Estates is not considered suitable for this species and occurs outside its current distribution within the Hunter Valley. Therefore, chance of occurrence is considered low.

Species	Habitat Description and Known Populations	Chance of Occurrence within Conservation Estate
Stagonopleura guttata Diamond Firetail (V)	Small Finch occupying open woodlands / forests and associated habitats with grassy understorey. Generally found west of the Divide or in drier semi-coastal areas such as the upper Hunter Valley. Appears unable to persist in remnants less than 200ha. Local records for this species are rare, but it has been recorded in the Cessnock LGA during sustained dry periods.	**Low** This species was not recorded within the Conservation Estate during fauna surveys. Despite occurrences within the Lower Hunter Region (Atlas of NSW Wildlife data) this species occurs sparsely across the western to central Hunter, and as such it is unlikely to occur in the Lower Hunter on more than a rare occasion.
Pomatostomus temporalis temporalis Grey-crowned Babbler (V)	Ranges from SA to Cape York Peninsula, Qld, generally in areas receiving an average annual rainfall between 250 and 1000 mm. The Grey-crowned Babbler inhabits open Eucalypt woodlands with a grassy groundcover and sparse, tall shrub layer. Also be observed along streams in cleared areas and grassy road verges (Morcombe, 2000). Forages mainly on insects and spiders in leaf litter and soil, but also venturing into vegetation. Within the Lower Hunter Valley, this species is known from Werakata National Park (University of Newcastle 2001). It has been recorded in Wollemi, Goulburn River and Yengo National Parks (Atlas of NSW Wildlife 2005; authors pers. obs.).	**Low** This species was not recorded within the site during fauna surveys and there are no records for this species within the locality of the site. The site is dominated by eucalypt forests and lacks this species' preferred open woodland habitat. Therefore, the chance of occurrence is considered low.
Chthonicola sagittatus Speckled Warbler (V)	Occurs in South-Eastern Australia, from South-West Victoria through eastern New South Wales to Central Queensland, mostly on the western slopes and tablelands of the Great Dividing Range, and in the drier areas of coast. Lives in a wide range of Eucalypt dominated vegetation that has a grassy and shrubby understorey often on rocky ridges or gullies (Garnett *et al*, 2000). Within the Lower Hunter Valley, this species is known from Werakata National Park, the HEZ, Elderslie and North Rothbury (Harper Somers O'Sullivan 2004). Records also exist from Wollemi, Goulburn River, Dharug and Yengo National Parks (Atlas of NSW Wildlife 2005).	**Low - Moderate** This species was not recorded within the site during fauna surveys. Habitat within the site is considered sub-optimal for this species and Lower Hunter records for this species do not occur further east than the Sugarloaf Range. However, records occur at the western extremity of lands to be retained for conservation purposes at Stockrington (Atlas of NSW Wildlife data).
Climacteris picumnus subsp. *victoriae* Brown Treecreeper (V)	Occurs through central NSW on the western side of the Great Dividing Range and sparsely scattered to the east of the Range in drier areas such as the Cumberland Plain of Western Sydney, and in parts of the Hunter, Clarence, Richmond and Snowy River valleys. Frequents drier forests and woodlands, particularly open woodland lacking a dense understorey, but also grasslands where there are sufficient logs, stumps and dead trees nearby. Within the Lower Hunter Valley, this species is known from Werakata National Park, Rothbury, the HEZ and Ellalong (Atlas of NSW Wildlife 2005).	**High** This species was recorded within the west of the Stockrington Conservation Estates during surveys. Although this species is known to occur within Lower Hunter Spotted Gum Ironbark Forest in the Cessnock LGA, birds east of the Sugarloaf population are rare. Other records also occur at the western extremity of lands to be retained for conservation purposes at Stockrington (Atlas of NSW Wildlife data).
Melithreptus gularis gularis Black-chinned Honeyeater (V)	Occurs in eastern Australia, along the inland slopes of the Great Dividing Range, extending to the coast between Sydney and Newcastle, NSW, and north to Rockhampton, Qld. Occupies dry Eucalypt woodland within an annual rainfall range between 400-700 mm, particularly within associations containing Ironbark and Box species (Garnett *et al*, 2000). Within the Lower Hunter Valley, this species is known from Werakata National Park the HEZ and Ellalong lagoon (Harper Somers O'Sullivan 2004). Additionally, substantial and regular records of this species were noted from the Spotted Gum / Ironbark associations in the Cessnock / Kurri Kurri area during 2005 (HSO Ecologists pers. obs.).	**High** This species was recorded within the west of the Stockrington Conservation Estates during surveys. Although this species is known to occur within Lower Hunter Spotted Gum Ironbark Forest in the Cessnock LGA, birds east of the Sugarloaf population are rare. Other records also occur at the south-western extremity of lands to be retained for conservation purposes at Stockrington (Atlas of NSW Wildlife data)

Species	Habitat Description and Known Populations	Chance of Occurrence within Conservation Estate
Anthochaera phrygia Regent Honeyeater (E, E*)	Nomadic Honeyeater that disperses to non-breeding areas, including the coast, in winter, where flowering trees are sought. Within the Lake Macquarie LGA this species is generally associated with *Eucalyptus robusta* (Swamp Mahogany). Local occurrences are during winter months when this species flowers, although their stronghold is west of the great divide and it appears that movements to the coast only occur when foraging resources fail in the west and, to some extent, the Central to Lower Hunter Valley.	**Moderate** This species was not recorded within the Conservation Estate during surveys. Due to its high mobility and the presence of both *Corymbia maculata* on ridges and *Eucalyptus tereticornis* in some gullies which were found to contain a high diversity of avifauna speciesthe likelihood of this species using the Conservation Estates on an intermittent basis cannot be discounted.
Lathamus discolor Swift Parrot (E, E*)	On the mainland this species frequents Eucalypt forests and woodlands with large trees having high nectar production during winter. Mainland winter foraging sites often vary from year to year. Nests only in Tasmania. When recorded within the Lake Macquarie LGA this species is often associated with winter flowering eucalypt species such as *E. robusta* and *E. tereticornis* (Author pers. obs.), but they are known to forego nectar resources for lerps, which occur on a variety of eucalypt species. Locally this species has been recorded on Point Wollstonecraft and Nord's Wharf to the west (Atlas of NSW Wildlife data).	**Moderate** This species was not recorded within the Conservation Estate during targeted survey. Due to the occurrence of records within the wider locality of the Conservation Estate, its high mobility and the presence of a wide variety of canopy tree species representing a potential food source, the likelihood of this species using the Conservation Estates on an intermittent basis cannot be discounted.
Neophema discolor Turquoise Parrot (V)	Turquoise Parrot is typically recorded west of the Great Divide on the tablelands and western slopes, extending to the coastal districts through the dry forest corridor of the Hunter Valley (Crome & Shields, 1992). The species occurs in eucalypts woodlands and open forests, with a ground cover of grasses and low understorey of shrubs (NPWS, 2002). This species forages primarily on the seeds of shrubs, grasses and herbs, both native and introduced, and the spore cases of mosses. Breeding pairs nest in small hollow branches of Eucalypts.	**Low** This species was not recorded within the site during fauna survey. Within the Hunter Region this species occurs sparsely across the western to central Hunter, and as such it is unlikely to occur east of the Sugarloaf Range.
Ninox connivens Barking Owl (V)	Occurs in forests, woodlands, and savannah and riverine woodland although more open country is favoured for foraging and large hollow-bearing eucalypts for breeding. The Barking Owl is widespread within New South Wales, with records from coastal areas along with the slopes, plains, tablelands, and far western plains. Hollands (1991) regards the habitat of this species as open country with a choice of large trees for roosting and nesting. Prey species taken includes arrange of mammals and birds, as well as invertebrates (Readers Digest 1982). Usually occupies permanent territories, generally greater than 100 ha.	**Low** Not recorded during owl call back and nocturnal spotlighting surveys. A number of widely scattered records for this species occur within the Lower Hunter, both to the east and to the west of the site, and as such the chance of its occurrence on a rare occasion cannot be discounted. However, the possibility that the site is part of the home range of individuals or pairs is considered unlikely.
Ninox strenua Powerful Owl (V)	Occurs in sclerophyll forests and woodlands where suitable prey species occur (being predominantly arboreal mammals). Requires large hollows, usually in Eucalypt trees, for nesting. Roosts in dense vegetation within such areas. Records from the Hunter Sub-bioregion are fairly widespread (HBOC records; HSO ecologists pers. obs.).	**High** A roosting bird was recorded within the Tank Paddock Conservation Estate during associated fauna surveys, records and suitable habitat also exists within the Stockrington Conservation Estate.
Tyto novaehollandiae Masked Owl (V)	Found in a range of habitats, locally within sclerophyll forests and woodlands where appropriate / preferred prey species occur (being predominantly terrestrial mammals). Requires large Eucalypt hollows for nesting and prefers to roost in these hollows as well. Records from the Hunter Sub-bioregion are fairly widespread within the sub-coastal districts and often of road kill birds (HBOC records; RPS HSO ecologists pers. obs.).	**Moderate - High** There are anecdotal records of sightings within the proposed Conservation Estates of Tank Paddock (Green Corridor Coalition) and suitable habitat exists within both the Stockrington and Tank Paddock Conservation Estates. Hollows of sufficient size to represent potential breeding sites for this species were noted during habitat assessment within the Conservation Estates.

Species	Habitat Description and Known Populations	Chance of Occurrence within Conservation Estate
Tyto tenebricosa *Sooty* Owl (V)	Occurs in wet Eucalypt forest and rainforest with tall emergent trees, often in easterly facing gullies. Within these areas this species hunts for a range of mainly mammalian prey at all levels of the forest strata. Roosts in tree hollow or dense canopy vegetation. Also nests in large Eucalypt tree hollows. Most Hunter records exist from the Watagan mountains (Atlas of NSW Wildlife data), but this species has also been observed to the southwest of Awaba (RPS HSO ecologist pers. obs.).	**Moderate - High** The Stockrington Conservation Estates contain wet sclerophyll and rainforest habitat that is suitable for the species and the species has been recorded previously (EcoBiological 2006).
Ptilinopus magnificus Wompoo Fruit Dove (V)	Ranges from Cape York (Qld.) along the coast and ranges south to the Hunter River (NSW.), with the southern end of the range decreasing having once extended to Nowra. This Fruit-Dove is a frugivorous rainforest specialist inhabiting the canopy of sub-tropical, warm-temperate and depauperate rainforests. Occasionally it will stray to fruiting trees outside of rainforest areas. Breeding occurs between July and December and is linked to the fruiting cycles of favoured feed trees including figs, laurels, myrtles and native tamarind. This species prefers relatively undisturbed to completely undisturbed rainforest	**Moderate** Potential habitat for this species exists within Subtropical Rainforest within the Stockrington Conservation Estates and records exist within the western portion (Atlas of NSW data). However, it was not recorded during surveys.
Ptilinopus regina Rose-crowned Fruit Dove (V)	Ranges through Eastern Australia, from Cape York south to the vicinity of Port Stephens. Occasionally it extends into Victoria. The Rose-crowned Fruit Dove generally lives in rainforest, though it also frequents brushes of coastal districts as well as forests and mangroves. It usually feeds on figs or other fruit and berry-bearing trees.	**Moderate** Potential habitat for this species exists within Subtropical Rainforest within the Stockrington Conservation Estates. However, it was not recorded during surveys.
Ptilinopus superbus Superb Fruit Dove (V)	Occurs from north-eastern rainforest, forest and mangroves north of Cardwell, Qld; becoming uncommon nomads or non-breeding migrants further south to the Hunter River, with rare sightings recorded south to Tasmania. It is mainly a rainforest inhabitant but will feed in adjacent mangroves or Eucalypt forest, venturing into coastal brushes also at various times of the year. It usually feeds on figs or other fruit and berry-bearing trees.	**Low - Moderate** Highly marginal potential habitat for this species exists within Subtropical Rainforest within the Stockrington Conservation Estates. However, it was not recorded during surveys.
Mammals		
Dasyurus maculatus Spotted-tailed Quoll (V, V*)	Found sparsely across a relatively wide variety of habitats from coastal heathland to rainforest habitats. This species creates a den in fallen hollow logs or among rocky outcrops. Generally, it does not occur in otherwise suitable habitats that are in close proximity to urban development. Local records for this species only occur with a level of regularity within large tracts of undisturbed forest as occurs in ranges surrounding the region.	**Moderate** Potential habitat for this species exists within the Stockrington Conservation Estates
Phascogale tapoatafa Brush-tailed Phascogale (V)	Inhabits dry open forest and woodlands, often in areas with sparse groundcover. It is one of the most arboreal Dasyurids and mainly hunts invertebrates, although some vertebrate prey is taken on occasion. Utilises small tree hollows for nesting and refuge sites.	**Low** Whilst habitat within the site is considered to be marginally suitable for this species previous records of this species are limited to areas north of the Hunter river (Atlas of NSW Wildlife data). Therefore, the chance of occurrence is considered to be low.

Species	Habitat Description and Known Populations	Chance of Occurrence within Conservation Estate
Petaurus australis Yellow-bellied Glider (V)	Usually associated with tall, mature wet Eucalypt forest. Also known from tall dry open forest and mature woodland. The diverse diet of this species is primarily made up of Eucalypt nectar, sap, honey dew, manna and invertebrates found under decorticating bark and pollen. Tree hollows for nest sites are essential, as are suitable food trees in close proximity. Most records in the Lower Hunter Region occur in the Watagan Mountains and other areas exhibiting significant stands of forest (Atlas of NSW Wildlife data).	**Moderate** Atlas of NSW Wildlife records occur within proposed Conservation Estates west of Stockrington. However, no evidence of occupation was observed during site inspections.
Petaurus norfolcensis Squirrel Glider (V)	Occurs in Eucalypt forests and woodlands where it feeds on sap exudates and blossoms. In these areas tree hollows are utilised for nesting sites. Also requires winter foraging resources when the availability of normal food resources may be limited, such as winter-flowering shrub and small tree species. Widely distributed across the lower Hunter Sub-bioregion, few records from the Upper Hunter (Atlas of NSW Wildlife data).	**Moderate** Suitable foraging and denning habitat exists within the Conservation Estates for this species.
Phascolarctos cinereus Koala (V)	Occurs in forests and woodlands where it requires suitable feed trees (particularly *Eucalyptus* spp.) and habitat linkages. Will occasionally cross open areas, although it becomes more vulnerable to predator attack and road mortality during these excursions. Records from the Hunter Sub-bioregion are generally scarce, with a small number of records from Cessnock, Singleton and Muswellbrook LGA's. Within the Greater Hunter Region it is largely confined to the Port Stephens area, the Lake Macquarie hinterland and the Watagan Mountains (Atlas of NSW Wildlife data).	**High** A Koala scat was recorded within the Stockrington Conservation Estate during surveys and confirmed via scat analysis (Barbara Triggs). Scattered local records exist and it is considered likely that the species occurs at either very low densities or individuals are moving through the area.
Pteropus poliocephalus Grey-headed Flying-fox (V, V*)	Forages over a large area for nectar / fruits etc. Seasonally roosts in communal base camps situated within wet sclerophyll forests or rainforest. Frequently observed to forage in flowering Eucalypts. May occur anywhere within the Hunter Sub-bioregion where food or roosting resources are available.	**Moderate - High** Due to the presence of foraging habitat within flowering canopy species across the Conservation Estates and the high mobility of the species, it is considered highly likely that the species would regularly utilise the site. Furthermore, potential roosting camp habitat occurs within a number of the gullies within the Stockrington Conservation Estates.
Miniopterus schreibersii subsp. *oceanensis* Eastern Bentwing-Bat (V)	This species utilises a range of habitats for foraging, including rainforest, wet and dry sclerophyll forests, woodlands and open grasslands. Requires caves or similar structures for roosting habitat. Widely distributed across the Hunter Sub-bioregion, particularly in sub-coastal districts (Atlas of NSW Wildlife data). A number of records for this species occur within the vicinity of the site.	**High** The species was recorded within proposed Conservation Estates at Stockrington, which also contains potential cave roosting habitat in disused rail tunnels and rocky outcrops.
Miniopterus australis Little Bentwing-bat (V)	Prefers to forage in well-vegetated areas, such as within wet and dry sclerophyll forests and rainforests. Requires caves or similar structures for roosting habitat. Largely confined to more coastal areas in the Hunter region. A number of records for this species occur within the local area (Atlas of NSW Wildlife data).	**High** The species was recorded within proposed Conservation Estates at Stockrington, which also contains potential cave roosting habitat in disused rail tunnels and rocky outcrops.

Species	Habitat Description and Known Populations	Chance of Occurrence within Conservation Estate
Mormopterus norfolkensis Eastern Freetail-bat (V)	This species forages predominantly in dry forests and woodlands east of the divide. It roosts in tree hollows, under bark and within man-made structures. Found within a scattered distribution across the Lower Hunter Region. Locally it occurs within the Lake Macquarie hinterland (Atlas of NSW Wildlife data).	**Moderate** Due to the high mobility of this species the presence of potential foraging and roosting habitat within the Conservation Estate, it is likely that this species occurs within the site on at least an intermittent basis. Hollow-bearing trees within the Conservation Estates represent potential roosting habitats for the species.
Saccolaimus flaviventris Yellow-bellied Sheathtail-bat (V)	Occurs in a range of habitats from rainforest to arid shrubland, roosts in tree-hollows. Near coastal records occur to the south in the Wyong and Gosford LGAs (Atlas of NSW Wildlife data).	**Moderate** Due to the high mobility of this species the presence of potential foraging and roosting habitat within the Conservation Estate, it is likely that this species occurs within the site on at least an intermittent basis. Hollow-bearing trees within the Conservation Estates represent potential roosting habitats for the species.
Falsistrellus tasmaniensis Eastern False Pipistrelle (V)	This species is found in a variety of forest types such as open forests, woodlands and wetter sclerophyll forests (usually with trees >20m). This species roosts in tree hollows. Few records occur within the Hunter Sub-bioregion.	**Moderate** Due to the high mobility of this species the presence of potential foraging and roosting habitat within the Conservation Estate, it is likely that this species occurs within the site on at least an intermittent basis. Hollow-bearing trees within the Conservation Estates represent potential roosting habitats for the species.
Chalinolobus dwyeri Large-eared Pied Bat (V)	This species forages in tall open forests, including dry forests and the edges of rainforest. It roosts in mine shafts and similar structures. Hunter Region records for this species are largely confined to the Watagan Mountains (Atlas of NSW Wildlife data).	**Moderate** Due to the high mobility of this species the presence of potential foraging and roosting habitat within the Conservation Estate, it is likely that this species occurs within the site on at least an intermittent basis. Hollow-bearing trees within the Conservation Estates represent potential roosting habitats for the species.
Myotis adversus Large-footed Myotis (V)	Usually found near bodies of water, including estuaries, lakes, reservoirs, rivers and large streams, often in close proximity to their roost site. Roosts in colonies of between a dozen and several hundred individuals in caves, mines and disused railway tunnels (Atlas of NSW Wildlife data).	**Moderate** Suitable open water foraging habitats for this species exist within large dams and wide areas of Blue Gum Creek within Stockrington Conservation Estates and wetland habitats of Tank Paddock for this species. Furthermore, suitable roosting habitat for the species exists within disused railway tunnels and rocky outcrops within the Stockrington Conservation Estates.
Scoteanax rueppellii Greater Broad-nosed Bat (V)	Forages in moister gullies and wet sclerophyll forests as well as in lightly wooded areas and open spaces / ecotones. This species roosts in tree hollows and is relatively widespread within the Lower Hunter Region (Atlas of NSW Wildlife data).	**Moderate** Due to the high mobility of this species the presence of potential foraging and roosting habitat within the Conservation Estate, it is likely that this species occurs within the site on at least an intermittent basis. Hollow-bearing trees within the Conservation Estates represent potential roosting habitats for the species.

Species	Habitat Description and Known Populations	Chance of Occurrence within Conservation Estate
Vespadelus troughtoni Eastern Cave Bat (V)	A cave dweller, known from wet sclerophyll forest and tropical woodlands from the coast and Dividing Range to the drier forests of the semi-arid zone. It has been found roosting in small groups in sandstone overhangs, in mine tunnels and occasionally in buildings. In all situations, the roost sites are frequently in reasonably well-lit areas. The distribution of this species is largely to the north of the Hunter (Strahan 1995), with one record at Windermere Park in south-western Lake Macquarie (Atlas of NSW Wildlife data).	**Moderate** Due to the high mobility of this species and the presence of potential foraging habitat within the Conservation Estate, it is likely that this species occurs within the site on at least an intermittent basis. Potential cave roosting habitat exists in disused rail tunnels and rocky outcrops within the Stockrington Conservation Estates
Endangered Ecological Communities		
Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bio-regions	Associated with periodic or semi-permanent inundation by freshwater, although there may be minor saline influence in some wetlands. They typically occur on silts, muds or humic loams in depressions, flats, drainage lines, backswamps, lagoons and lakes associated with coastal floodplains. Wetlands or parts of wetlands that lack standing water most of the time are usually dominated by dense grassland or sedgeland vegetation, often forming a turf less than 0.5 metre tall and dominated by amphibious plants including *Paspalum distichum*, *Leersia hexandra* and *Carex appressa*. Wetlands or parts of wetlands subject to regular inundation and drying may include large emergent sedges over 1 metre tall, such as *Baumea articulata, Eleocharis equisetina* and *Lepironia articulata*. Correlates with LHCCREMS Map Unit (MU) 46 – 'Freshwater Wetland Complex'.	**High** The geomorphological characteristics and the flora species composition of this vegetation community were found to occur within several wetland communities within Tank Paddock Conservation Estates.
Lower Hunter Redgum Forest in the Sydney Basin and NSW Coast Bioregions	Fund on gentle slopes arising from depressions and drainage flats on Permian sediments of the Hunter Valley floor in the Sydney Basin and NSW North Coast Bioregions. Recorded from the local government areas of Maitland, Cessnock and Port Stephens (in the Sydney Basin Bioregion) and Muswellbrook and Singleton (in the NSW North Coast Bioregion) but may occur elsewhere in these bioregions. Common canopy tree species are *Eucalyptus tereticornis* (Forest Red Gum) and *E. punctata* (Grey Gum). Other frequently occurring canopy species are *Angophora costata*, *Corymbia maculata*, *E. crebra* and *E. moluccana*. The mid-storey is open and characterised by sparse shrubs such as *Breynia oblongifolia*, *Leucopogon juniperinus*, *Daviesia ulicifolia* and *Jacksonia scoparia*. The ground cover typically comprises grasses and herbs. Correlates with LCCREMS Map Unit (MU) 19 'Hunter Lowland Redgum Forest'.	**High** The geomorphological characteristics and the species composition of this vegetation community were found to occur within both the Stockrington and Tank Paddock Conservation Estates.
Lower Hunter Spotted Gum - Ironbark Forest in the Sydney Basin Bioregion.	This community is dominated by *Corymbia maculata* (Spotted Gum) and *Eucalyptus fibrosa* (Broad-leaved Ironbark) with occasional occurrences of *E. punctata* (Grey Gum) and *E. crebra* (Grey Ironbark). Several distinctions have been noted within the LHCCREMS community profiles between this community and other Spotted Gum / Ironbark associations, often characterised by the dominant canopy composition, range, soil type and topography (NPWS 2000). Within the Lower Hunter, the peak of distribution occurs within the forested areas between Beresfield and Cessnock. On the basis of revised vegetation mapping conducted in 2002, a total of 32,366ha of LHSGIF has been mapped within the LHCCREMS study area boundary. Correlates with LCCREMS Map Unit (MU) 17.	**High** The geomorphological characteristics and the species composition of this vegetation community were found to occur over within the Conservation Estates. This EEC was the dominant vegetation community in both the Tank Paddock and Stockrington Conservation Estates.

Species	Habitat Description and Known Populations	Chance of Occurrence within Conservation Estate
Lowland Rainforest of the NSW North Coast and Sydney Bioregion	Lowland Rainforest, in a relatively undisturbed state, has a closed canopy, characterised by a high diversity of trees whose leaves may be mesophyllous and encompass a wide variety of shapes and sizes. Typically, the trees form three major strata: Emergents, canopy and sub-canopy which, combined with variations in crown shapes and sizes results in an irregular canopy appearance. The trees are taxonomically diverse at the genus and family levels, and some may have buttressed roots. A range of plant growth forms are present in Lowland Rainforest, including palms, vines and vascular epiphytes. In disturbed stands of this community the canopy cover may be broken, or the canopy may be smothered by exotic vines. The Hawkesbury River notionally marks the southern limit of Lowland Rainforest in the NSW North Coast and Sydney Basin bioregions.	**High** The geomorphological characteristics and the species composition of this vegetation community were found to occur within deeply incised gullies within the northern portion of the Stockrington Conservation Estates.
Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bio-regions	This community is associated with periodically inundated flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains, typically occurring on grey-black clay-loams and sandy loams. Usually occurring below 20 m altitude.	**High** The geomorphological characteristics and the species composition of this vegetation community were found to occur in a small area within the Tank Paddock Conservation Estates.
Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bio-regions	The community is associated with humic clay or sandy loams on waterlogged or episodically flooded alluvial flats and drainage lines within coastal floodplains. It is generally characterised by an open to dense canopy of Eucalypts and / or Paperbarks. Canopy heights generally vary from 8m to 25m depending on species composition. In the Hunter Region the canopy often contains *Eucalyptus robusta* and / or *Melaleuca quinquinervia* although other species, such as *Casuarina glauca*, *Eucalyptus resinifera* subsp. *hemilampra* and *Livistona australis* may be present.	**High** The geomorphological characteristics and the species composition of this vegetation community were found to occur in a small area within the Tank Paddock Conservation Estates.

Notes: (V) = Vulnerable Species listed under the *Threatened Species Conservation Act 1995*.
(E) = Endangered Species listed under the *Threatened Species Conservation Act 1995*.
(V*) = Vulnerable Species listed under the *Commonwealth EPBC Act 1999*.
(E*) = Endangered Species listed under the *Commonwealth EPBC Act 1999*.
(M*) = Migratory Species listed under the *Commonwealth EPBC Act 1999*

4 Discussion

The Lower Hunter Region's vegetation is of bio-geographic significance as it supports a transition between the northern and southern plant and animal assemblages. This north-south link is not evident elsewhere in the Hunter Valley. The Region also forms an east-west migratory pathway and a drought refuge for inland species.

The preservation of large vegetated areas that are linked to other similar areas has been recognised as fundamentally important to achieving long term regional biodiversity outcomes in the Lower Hunter region. The two most valued of these areas in the Lower Hunter contain large land areas owned and controlled by C&A. The firstly, is the green corridor that links the Watagans and Yengo National Parks with the coastal plains of the Tomago Sandbeds, Stockton Bight and Port Stephens and secondly, the Wallarah Peninsula lands provide a regionally significant break between urban areas, and contain areas of high biodiversity, scenic amenity and heritage value.

The C&A lands to be dedicated form both large vegetated areas in their own right, and complete linkage of identified regional corridors in key areas.

In addition to their important strategic location in a wider landscape context, the Conservation Estates contain valuable biodiversity resources. They contain and will conserve a range of important vegetation communities, including six Endangered Ecological Communities (EEC) and other vegetation types that have been depleted in the region. These EEC's are listed below:-

- Freshwater Wetlands on Coastal Floodplains;
- Swamp Sclerophyll Forests on Coastal Floodplains;
- Swamp Oak Floodplain Forest on Coastal Floodplains;
- Lowland Rainforest;
- Hunter Lowland Redgum Forest; and
- Lower Hunter Spotted Gum Ironbark Forest.

Several threatened plant species have been recorded within the Conservation Estates, including the following

- *Arthropteris palisotii* (Recorded by EcoBiological 2006)*;*
- *Callistemon linearifolius;*
- *Eucalyptus nicholii;*
- *Grevillea parviflora* subsp. *parviflora*;
- *Rutidosis heterogama;*
- *Syzygium paniculatum;*
- *Tetratheca juncea* (Black-eyed Susan).

Two of the threatened flora species recorded in the Conservation Estates are considered to be planted specimens and not naturally occurring, being *Eucalyptus nicholii* and *Syzygium paniculatum*, although *S. paniculatum* may have been transported to its position in a disturbed area by natural means.

In addition to the abovementioned threatened species two rare (ROTAP) species *Callistemon shiressii* and *Eucalyptus fergusonii* subsp. *dorsiventralis* were also identified within the Conservation Estates.

A wide diversity of threatened fauna species have been recorded within the varied habitats of the conservation estate and these are as follows:-

- Powerful Owl (EcoBiological 2006);
- Sooty Owl (EcoBiological 2006);
- Koala;
- Gang Gang Cockatoo
- Brown Treecreeper
- Black-chinned Honeyeater

The diverse nature of both the landform settings, varying from coastal ranges forests, rainforests and woodlands to wetlands, provides a diverse array of habitats and resources for native fauna. The Conservation Estates are known to contain important populations of numerous threatened fauna species, including birds, mammals and herpetofauna. The conservation of these lands will provide secure regional biodiversity gene pools, and also through linkages facilitate valuable genetic material exchange and other key processes associated with sustainable ecological population dynamics.

In summary, the C&A conservation dedications provide outcomes that contribute to meeting the Environmental Protection goals outlined in the Sustainability Criteria contained within the Lower Hunter Regional Strategy. Such includes:

- Outcomes consistent with the Draft Lower Hunter Regional Conservation Plan;
- Maintains/improves areas of regionally significant biodiversity;
- Maintains environmental areas for air & water quality; and
- Protects areas of Aboriginal cultural heritage value and historical heritage value.

These outcomes:

- Conserve in perpetuity key strategic parcels of land that complete long sought after regional biodiversity conservation corridors and buffer areas;
- Provide large intact areas of conserved habitat that will function as regional biodiversity gene pools;
- Protect an important array of vegetation communities, flora and fauna species, and natural landscape assets, including threatened species and EEC's; and
- Contribute significantly to the successful implementation of the Lower Hunter Regional Conservation Plan.

5 Conclusion

This ecological inventory of the Stockrington and Tank Paddock Conservation Estates has been undertaken to support the Link Road Minmi and Black Hill Development Estates as part of the proposal for C&A surplus Northern Estates. The Stockrington and Tank Paddock Conservation Estates are an integral part of the Watagan to Stockton Corridor which will achieve regional conservation outcomes. Furthermore, suitable actions are proposed to minimise potentially deleterious permanent and ongoing impacts to the conservation lands.

The field and desktop studies have recorded the following parameters of ecological significance within the Conservation Estates:

- native vegetation commensurate with those listed as EEC's;
- threatened flora species recorded within and adjacent to the proposed development;
- threatened fauna species recorded within and adjacent to the proposed development;
- habitat for threatened flora and fauna species known from within and adjacent to the proposed development; and
- other areas containing native vegetation with varying degrees of modification / degradation.

The large areas of Conservation Estates at Stockrington and Tank Paddock that will be set aside as part of the development provide excellent ecological outcomes across the site. The Stockrington Conservation Estates will contribute a large portion of land to conservation in perpetuity, which will in essence formalise the Watagan to Stockton Corridor. The importance of the conservation of Tank Paddock as part of the Conservation Estates will result maintaining a vegetation corridor from Hexham Swamp and the Hunter Estuary to the Watagan Mountains and the Sugarloaf Range. This large tract of native vegetation will provide habitat for a wide variety of native flora and fauna.

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APPENDIX A Memorandum of Understanding

THE MINISTER FOR THE ENVIRONMENT

and

THE MINISTER FOR PLANNING

and

THE MINISTER FOR LANDS

and

COAL AND ALLIED INDUSTRIES LTD

MEMORANDUM OF UNDERSTANDING

I V KNIGHT
Crown Solicitor
60-70 Elizabeth Street
SYDNEY NSW 2000

200600938 D2006/178441

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MEMORANDUM OF UNDERSTANDING

THIS MOU is made on _____ of _____ 2006.

Between

1. **THE MINISTER FOR THE ENVIRONMENT** of Level 36, Governor Macquarie Tower, 1 Farrer Place, Sydney in the State of New South Wales; and

2. **THE MINISTER FOR PLANNING** of Level 34, Governor Macquarie Tower, 1 Farrer Place, Sydney in the State of New South Wales

3. **THE MINISTER FOR LANDS** of Level 34, Governor Macquarie Tower, 1 Farrer Place, Sydney in the State of New South Wales

(together, the "Government"); and

4. **COAL AND ALLIED INDUSTRIES LTD** (the "Landholder").

Background

A. The New South Wales Government intends to implement an Environmental Land Offset Scheme for the Lower Hunter region to complement and support the Lower Hunter Regional Strategy and the Lower Hunter Regional Conservation Plan.

B. The Environmental Land Offset Scheme aims to:

(i) increase public ownership of certain land in the Lower Hunter region for dedication as a conservation reserve; and

(ii) recognise the development potential of certain other land in the Lower Hunter region.

C. The purpose of this MOU is to set out the parties' intentions with respect to the implementation of the Environmental Land Offset Scheme, insofar as it concerns the Landholder.

1. Definitions and interpretation

1.1 In this MOU, unless the context otherwise requires:

"**Conservation reserve**" means any land intended to be reserved or dedicated under the NPW ***Act*** and includes references to a national park, nature reserve, state conservation area or regional park, as those terms are defined under that Act

"Development potential of Schedule 1 land" means the development potential specified in Schedule 1 for each parcel of Schedule 1 land (either hectares or dwellings or both).

"Dwelling" has the same meaning as in the *Standard Instrument —Principal Local Environmental Plan.*

"Environmental Land Offset Scheme" insofar as it concerns the Landholder means the Environmental Land Offset Scheme described in clause 3 of this MOU.

"EP&A Act" means the *Environmental Planning and Assessment Act 1979,* as amended from time to time.

"Lower Hunter Regional Conservation Plan" means the Lower Hunter Regional Conservation plan released by the NSW Department of Environment and Conservation, published on that Department's website and as amended from time to time.

"Lower Hunter Regional Strategy" means the Lower Hunter Regional Strategy released by the NSW Department of Planning, published on that Department's website and as amended from time to time.

"Map" means the maps titled *"Northern Area –Aerial',* and *"Southern Area – Aerial'* as prepared by UrbisJHD and *"Catherine Hill Bay – Middle Camp Urban Area"* as prepared by Allen Jack + Cottier, *"Plan of Hunter Valley Operations & Warkworth Mt Thorley Roads"* and *"Plan of MTP Roads"* prepared by Coal and Allied Land and Property Department that are incorporated into this MOU by reference.

"MOU" means this Memorandum of Understanding which includes the Schedules and maps that are incorporated into this MOU by reference

"NPW Act" means the *National Parks and Wildlife Act 1974* as amended from time to time.

"Rezoning" means the mechanism of changing the landuse zone for a parcel of land contained in a environmental planning instrument (as defined by the EP&A Act), noting that this change in landuse zone may be effected by the gazettal of a State Environmental Planning Policy or a local environmental plan.

"Schedule 1 land" means the land identified in Schedule 1

"Schedule 2 land" means the parcels of land owned by the Landholder and identified in Schedule 2, or part thereof.

"**TSC Act**" means the ***Threatened Species Conservation Act 1995*** as amended from time to time.

"**Transferred Schedule 2 land**" means Schedule 2 land, or part thereof, transferred to the Minister for the Environment in accordance with clause 3.2.

2. Implementation

2.1 The parties are committed to using their best endeavours to implement this MOU.

2.2 The parties acknowledge and agree that:

2.2.1 this MOU is intended to express the parties' objectives and firm intentions with regard to those matters with which it deals, but is not intended to create enforceable or binding legal obligations between them;

2.2.2 nothing in this MOU shall be taken to fetter the discretion of the Minister for Planning in exercising functions under the *EP&A Act* or the Minister for the Environment in exercising functions under the NPW Act or the TSC Act or the discretion of the Landholder in negotiating a commercial acceptable outcome; and

2.2.3 nothing in this MOU is intended to constitute a representation, warranty or guarantee by or on behalf of the Government, the Minister for Planning or the Minister for the Environment or the Landholder.

2.3 All parties acknowledge and agree that they have not relied or acted or forborne from acting in any way as a result of any statement made by any of the parties in this MOU or in discussions leading up to this MOU.

3. The Environmental Land Offset Scheme

3.1 The Parties have agreed that the Schedule 1 Land has the Development Potential as identified by Schedule 1 and a Rezoning application will be submitted to the Minister for Planning.

3.2 The Minister for Planning intends to use reasonable endeavours to allow the Landholder to achieve the development potential of Schedule 1 land by either:

3.2.1 Rezoning the land through an amendment to State Environmental Planning Policy 2005 (Major Projects) and approval of any concept plan submitted under Part 3A of the EP&A Act ; and/or

3.2.2 Facilitating the rezoning of the land through the gazettal of a Local Environmental Plan prepared by the relevant local government authority and made by the Minister for Planning and approval of any concept plan submitted under Part 3A of the EP&A Act; and/or

3.2.3 Any other means that achieves the development potential of Schedule 1 Lands;

in accordance with, the Lower Hunter Regional Conservation Plan and subject to the requirements of the *EP&A **Act.***

3.3 The Landholder intends to transfer ownership of Schedule 2 land to the Minister for the Environment upon the rezoning of Schedule 1 land and approval to the concept plan(s) being obtained on reasonably acceptable terms.

3.4 The Minister for the Environment intends to ensure Transferred Schedule 2 land is dedicated as part of the national park estate or as a conservation reserve.

3.5 The Landholder intends not to undertake any action or activity, pending transfer of Schedule 2 land or rezoning of Schedule 1 land that will have detrimental effect on the conservation or Aboriginal heritage values of Schedule 2 lands except where the Landholder is

3.5.1 directed to undertake such an action or activity by another Government agency or instrumentality (such as the Rural Fire Service), or

3.5.2 is otherwise required by law to undertake such an action or activity, or

3.5.3 continuing any existing use (including those approved to commence) action or activity

3.6 Notwithstanding clause 3.5 the Landholder, in the context of discussions with the Roads & Traffic Authority on its proposed compensatory habitat requirements for 299 hectares of Stockrington land for a Proposed Highway Link between the F3 and Branxton, intends to continue to negotiate the sale of 24.3 hectares of land to Newcastle Coal Company Pty Limited for the purposes of surface mining facilities on the following basis:

3.6.1 that the Landholder's negotiations with Newcastle Coal Company Pty Limited are to specify that an alternative area of land shall be transferred by Newcastle Coal to the Minister for the Environment that is at least 24.3 hectares in size,

3.6.2 the land to be transferred by Newcastle Coal is to meet the obligations for compensatory habitat identified in conditions 48, 49 and 50 of the Approval granted by the Minister for Planning under section 115B(2) of the EP&A Act in relation to the *Proposed Highway Link Between the F3 and Branxton* dated November 2001, and

3.6.3 the Minister for the Environment agreement to the transfer of land by Newcastle Coal Company Pty Limited.

3.7 The Minister for Lands intends to use his best endeavours to enable the Landholder, to acquire title to the Crown Roads for mining purposes as described in the maps titled *"Plan of Hunter Valley Operations and Warkwotth Mt Thorley Roads"* and *"Plan of MTP Roads"* adjacent or within the existing or proposed coal mine developments known as Hunter Valley Operations, Warkworth Mt Thorley and Mount Pleasant, subject to an agreed value being negotiated which recognises the land to be transferred by the Landholder to the Minister for the Environment as identified in Schedule 2.

4. Agreement

4.1 Notwithstanding clause 3, the details of the Environmental Land Offset Scheme described in clause 3 are the subject of ongoing negotiation by the parties, which they propose will form part of a legally enforceable agreement to be entered into by them.

4.2 All parties are to use their best endeavours to enter into such an agreement referred to in clause 4.1 as soon as possible noting a target date of three months for this to occur.

4.3 The parties acknowledge that the proposed agreement referred to in clause 4.1 will include a schedule of commitments that set out the sequencing and staging of Schedule 1 land and the dedication for conservation of Schedule 2 lands.

4.4 The parties acknowledge that:

4.4.1 If there is any reduction in Schedule 2 Land to be transferred then a proportional reduction will result for the development potential of Schedule 1 Land. This clause will apply separately to the Northern and Southern Coal & Allied lands.

4.4.2 If the development potential of Schedule 1 Land in relation to the number of dwellings or lots to be achieved is reduced then a proportional reduction will occur in the amount of Schedule 2 Land to be transferred to the Minister for the Environment. This clause will apply separately to the Northern and Southern Coal & Allied lands

5. Term

5.1 This MOU starts on the date it is signed by both parties and continues until the parties enter into an agreement of the type referred to in clause **4,** or 1 year, whichever is the later.

This Memorandum of Understanding is signed on 17 October **2006.**

The Honourable Bob Debus MP
The Minister for the Environment

The Honourable Frank Sartor MP
The Minister for Planning

The Honourable Tony Kelly MLC
The Minister for Lands

Doug Ritchie, Managing Director Coal & Allied for and on behalf of
[The Landholder]

SCHEDULE 1 – POTENTIAL DEVELOPMENT LANDS

This Schedule forms part of the MOU.

Schedule 1 Land

Property description	Map reference	Development potential
	Southern Lands – Catherine Hill Bay – nominated as 'blue land' on the Map prepared by Urbis JHD	• Residential development covering up to **50** hectares to achieve **300** dwellings • Residential development to be in accordance with the development footprint on the map titled "Catherine Hill Bay – Middle Camp Urban Area" as prepared by Allen Jack + **Cottier**
	Southern Lands – Nords Wharf – nominated as 'blue land' on the Map prepared by Urbis JHD	Residential development covering up to **9** hectares to achieve **90** dwellings
	Southern Lands – Gwandalan – nominated as 'blue land' on the Map prepared by Urbis JHD	Residential development covering up to **80** hectares to achieve **700** dwellings
	Northern Lands – Minmi and Newcastle Link Roads – nominated as 'blue lands' on the Map prepared by Urbis JHD	Residential development covering up to 526 hectares with a density of up to an average of **12** dwellings per hectare subject to detailed planning and constraints analysis
	Northern Lands – Black Hill – nominated as 'blue lands' on the Map prepared by Urbis JHD	Employment lands development covering up to **183** hectares

SCHEDULE 2 − ENVIRONMENTAL LANDS OFFSETS

This Schedule forms part of the MOU.

Schedule 2 Land

Property description	Map reference	Area
	Southern Lands − Catherine Hill Bay and Wallarah Peninsular − nominated as 'green lands'	657 hectares
	Southern Lands − Gwandalan and Cranagan Bay − nominated as 'green lands'	192 hectares
	Northern Lands − Stockrington − nominated as 'green lands'	2326 hectares
	Northern Lands − Tank Paddock − nominated as 'green lands'	147 hectares
		Total 3322 hectares

APPENDIX B Flora Species List

Table 1 Flora Species for the Conservation Estates

Class/Subclass	Family	Scientific Name	Common Name
Filicopsida	Adiantaceae	*Adiantum aethiopicum*	Common Maidenhair
		Adiantum diaphanum	Filmy Maidenhair
		Adiantum formosum	Giant Maidenhair
		Adiantum hispidulum	Rough Maidenhair
	Aspleniaceae	*Asplenium australasicum*	Birds Nest Fern
	Azollaceae	*Azolla pinnata*	Ferny Azolla
	Blechnaceae	*Blechnum cartilagineum*	Gristle Fern
		Blechnum indicum	-
		Blechnum nudum	-
		Doodia aspera	Rasp Fern
	Davalliaceae	***Arthropteris palisotii (E) (EcoBiological 2006)***	-
		Arthropteris tenella	Jointed Fern
		*Nephrolepis cordifolia**	Fish-bone Fern
	Dennstaedtiaceae	*Pteridium esculentum*	Bracken
	Dicksoniaceae	*Calochlaena dubia*	False Bracken
	Dryopteridaceae	*Lastreopsis acuminata*	Shiny Shield-fern
		Lastreopsis decomposita	Trim Shield Fern
	Lindsaeaceae	*Lindsaea linearis*	Screw Fern
		Lindsaea microphylla	Lacy Wedge-fern
	Polypodiaceae	*Dictymia brownii*	-
		Microsorum scandens	Fragrant Fern
	Sinopteridaceae	*Cheilanthes sieberi* subsp. *sieberi*	Poison Rock Fern
		Pellaea falcata	Sickle Fern
		Pellaea paradoxa	-
Coniferopsida	Pinaceae	*Pinus radiata**	Radiata or Monterey Pine
	Podocarpaceae	*Podocarpus elatus*	Plum Pine
Cycadopsida	Zamiaceae	*Macrozamia reducta*	Burrawang
Magnoliidae	Acanthaceae	*Brunoniella australis*	Blue Trumpet
		Pseuderanthemum variabile	Pastel Flower
		*Thunbergia alata**	Black-eyed Susan
	Alismataceae	*Alisma plantago-aquatica*	Water Plantain
	Anacardiaceae	*Euroschinus falcata* var. *falcata*	Ribbonwood
	Apiaceae	*Apium leptophyllum**	Slender Celery
		Centella asiatica	Swamp Pennywort
		*Ciclospermum leptophyllum**	Slender Celery
		*Foeniculum vulgare**	Fennel
		*Hydrocotyle bonariensis**	Kurnell Curse / Pennywort
		Hydrocotyle geraniifolia	Forest Pennywort
		Hydrocotyle laxiflora	Stinking Pennywort
		Hydrocotyle peduncularis	Pennywort

Class/Subclass	Family	Scientific Name	Common Name
Magnoliidae	Apiaceae	*Hydrocotyle tripartita*	Pennywort
		Trachymene incisa subsp. *incisa*	Native Parsnip
	Apocynaceae	*Melodinus australis*	-
		Parsonsia straminea	Common Silkpod
	Araliaceae	*Astrotricha latifolia*	Broad-leaf Star-hair
		Polyscias sambucifolia	Elderberry Panax
	Asclepiadaceae	*Marsdenia rostrata*	Common Milk Vine
		Marsdenia suaveolens	Scented Marsdenia
		Tylophora barbata	Bearded Tylophora
	Asteraceae	*Ageratina adenophorum**	Crofton Weed
		*Aster subulatus**	Wild Aster
		*Bidens pilosa**	Cobbler's Pegs
		Brachycome multifida var. *multifida*	Cut-leaved Daisy
		Carduus nutans subsp. n*utans*	Nodding Thistle
		Chrysanthemoides monilifera subsp. *rotundata**	Boneseed
		Chrysocephalum apiculatum	Common Everlasting
		*Cirsium vulgare**	Spear Thistle
		*Conyza bonariensis**	Flax-leaf Fleabane
		*Gnaphalium americanum**	Cudweed
		*Hypochaeris radicata**	Flatweed
		Lagenifera stipitata	-
		Olearia microphylla	
		Onopordum acanthium subsp. *acanthium*	Scotch Thistle
		Ozothamnus diosmifolius	Ball Everlasting
		***Rutidosis heterogama* (EV)**	**-**
		Senecio hispidulus var. *dissectus*	Fireweed
		Senecio linearifolius	Fireweed
		*Senecio madagascariensis**	Fireweed
		Sigesbeckia orientalis	Indian Weed
		*Soliva sessilis**	Jojo
		*Sonchus oleraceus**	Common Sow-thistle
		*Taraxacum officinale**	Dandelion
		Vernonia cinerea var. *cinerea*	-
		Vittadinia cuneata var. cuneata	Fuzzweed
	Balsaminaceae	*Impatiens walleriana**	Busy Lizzie
	Basellaceae	*Anredera cordifolia**	Madiera Vine
	Bignoniaceae	*Pandorea pandorana*	Wonga Vine
	Brassicaceae	*Raphanus raphanistrum**	Wild Radish
	Campanulaceae	*Wahlenbergia communis*	Tufted Bluebell
		Wahlenbergia gracilis	Australian Bluebell
	Capparaceae	*Capparis arborea*	Brush Caper Berry
	Carophyllaceae	*Cerastium glomeratum**	Mouse-ear Chickweed

Class/Subclass	Family	Scientific Name	Common Name
Magnoliidae	Caryophyllaceae	*Stellaria flaccida*	Forest Starwort
		*Stellaria media**	Common Chickweed
	Casuarinaceae	*Allocasuarina littoralis*	Black She-oak
		Allocasuarina torulosa	Forest Oak
		Casuarina glauca	Swamp Oak
	Celastraceae	*Cassine australis var. australis*	Red Olive Plum
		Maytenus silvestris	-
	Cesalpinioideae	*Senna pendula* var. *glabrata**	-
	Chenopodiaceae	*Einadia hastata*	Berry Saltbush
	Commelinaceae	*Commelina cyanea*	Scurvy Weed
		*Tradescantia fluminensis**	Wandering Jew
	Convolvulaceae	*Dichondra repens*	Kidney Weed
		*Ipomoea cairica**	Blue Morning Glory
		Polymeria calycina	Bindweed
	Cucurbitaceae	*Sicyos australis*	Star Cucumber
	Cunoniaceae	*Aphanopetalum resinosum*	Gum Vine
		Ceratopetalum apetalum	Coachwood
		Schizomeria ovata	Crab Apple
	Dilleniaceae	*Hibbertia aspera*	Rough Guinea Flower
		Hibbertia dentata	Twining Guinea Flower
		Hibbertia empetrifolia subsp. uncinata	-
		Hibbertia pedunculata	-
		Hibbertia scandens	Climbing Guinea-flower
	Droseraceae	*Drosera peltata*	Sundew
	Ebenaceae	*Diospyros australis*	Black Plum
	Eleocarpaceae	*Elaeocarpus reticulatus*	Blueberry Ash
	Epacridaceae	*Acrotriche divaricata*	Ground-berry
		Epacris pulchella	NSW Coral Heath
		Leucopogon juniperinus	Prickly Beard-heath
		Leucopogon lanceolatus	Lance-leaf Beard-heath
		Lissanthe strigosa subsp *strigosa*	Peach Heath
		Trochocarpa laurina	Tree Heath
	Escallionaceae	*Abrophyllum ornans*	Native Tamarind
	Euphorbiaceae	*Breynia oblongifolia*	Coffee Bush
		Claoxylon australe	Brittlewood
		Croton verreauxii	Native Cascarilla
		*Euphorbia peplus**	Spurge
		Glochidion ferdinandii	Cheese Tree
	Euphorbiaceae	*Omalanthus populifolius*	Bleeding Heart
		Phyllanthus gunnii	Spurge
		Phyllanthus hirtellus	Thyme Spurge
		Poranthera microphylla	

Class/Subclass	Family	Scientific Name	Common Name
Magnoliidae	Euphorbiaceae	*Eupomatia laurina*	Bolwarra
	Fabaceae	*Bossiaea prostrata*	-
		Daviesia squarrosa	-
		Daviesia ulicifolia	Gorse Bitter Pea
		Desmodium gunii	-
		Desmodium rhytidophyllum	-
		Desmodium varians	-
		Dillwynia retorta var. *retorta*	Eggs and Bacon
		*Erythrina X sykesii**	Coral Tree
		Glycine clandestina	Twining Glycine
		Glycine tabacina	Twining Glycine
		Gompholobium grandiflorum	Golden Glory Pea
		Gompholobium latifolium	Broad-leaf Wedge-pea
		Hardenbergia violacea	False Sarsparilla
		Hovea linearis	-
		Indigofera australis	Native Indigo
		Jacksonia scoparia	Dogwood
		Kennedia rubicunda	Dusky Coral Pea
		Millettia australis	Native Wisteria
		Mirbelia rubiifolia	-
		Podolobium ilicifolium	Prickly Shaggy Pea
		Podolobium scandens	Netted Shaggy Pea
		Pultenaea spinosa	
		Pultenaea cunninghamii	-
		Pultenaea daphnoides	Large-leaf Bush Pea
		Pultenaea paleacea var. *paleacea*	-
		Pultenaea retusa	-
		Pultenaea villosa	-
		*Trifolium arvense**	Haresfoot Clover
		*Trifolium dubium**	Yellow Suckling Clover
		*Trifolium repens**	White Clover
		Vicia sativa subsp. *sativa**	Common Vetch
	Flacourtiaceae	*Scolopia braunii*	Flintwood
	Gentianaceae	*Centaurium tenuiflorum*	-
	Geraniaceae	*Geranium homeanum*	Northern Cranesbill
	Goodeniaceae	*Goodenia hederacea* subsp. *hederacea*	Ivy-leaved Goodenia
		Goodenia heterophylla subsp. *heterophylla*	Variable Leaved Goodenia
	Goodeniaceae	*Goodenia ovata*	-
		Goodenia rotundifolia	-
	Goodeniaceae	*Scaevola ramosissima*	Purple Fan Flower
	Haloragaceae	*Gonocarpus tetragynus*	Raspwort
		*Myriophyllum aquaticum**	Brazilian Water Milfoil

Class/Subclass	Family	Scientific Name	Common Name
Magnoliidae	Lamiaceae	*Plectranthus parviflorus*	Cockspur Flower
		Prostanthera incisa	-
		Scutellaria mollis	Soft Skull Cap
		*Stachys arvensis**	Stagger Weed
	Lauraceae	*Cassytha glabella* forma *glabella*	Slender Devil's Twine
		Cassytha pubescens	Common Devil's Twine
		*Cinnamomum camphora**	Camphor Laurel
		Cryptocarya glaucescens	Jackwood
		Cryptocarya microneura	Murrogun
		Cryptocarya rigida	Rose Maple
		Neolitsea australiensis	Green Bolly Gum
	Lobeliaceae	*Pratia purpurascens*	Whiteroot
	Loranthaceae	*Dendrophthoe vitellina*	Mistletoe
		Muellerina eucalyptoides	Mistletoe
	Malvaceae	*Hibiscus heterophyllus*	Native Rosella
		Howittia trilocularis	Blue Howitta
		*Malva parviflora**	Small-flowered Mallow
		*Modiola caroliniana**	Red-flowered Mallow
		*Sida rhombifolia**	Paddy's Lucerne
	Meliaceae	*Melia azedarach* var. *australasica*	White Cedar
		Synoum glandulosum	Scentless Rosewood
		Toona ciliata	Red Cedar
	Menispermiaceae	*Sarcopetalum harveyanum*	Pearl Vine
		Stephania japonica var. *discolor*	Snake Vine
	Menyanthaceae	*Villarsia exaltata*	Yellow Marsh Flower
	Mimosaceae	*Acacia binervata*	Two-veined Hickory
		Acacia elongata	-
		Acacia falcata	Sickle Wattle
		Acacia fimbriata	Fringed Wattle
		Acacia floribunda	Sally Wattle
		Acacia implexa	Hickory
		Acacia irrorata subsp. *irrorata*	Green Wattle
		Acacia linifolia	Flax Wattle
		Acacia longifolia var. *longifolia*	Sydney Golden Wattle
		Acacia maidenii	Maiden's Wattle
		Acacia myrtifolia	Red Stem Wattle
		Acacia parramattensis	Sydney Green Wattle
	Mimosaceae	*Acacia suaveolens*	Sweet Scented Wattle
		Acacia terminalis subsp. augustifolia	Sunshine Wattle
		Acacia ulicifolia	Prickly Moses
		Pararchidendron pruinosum var. *pruinosum*	Snow Wood
	Monimiaceae	*Doryphora sassafras*	Sassafras

Class/Subclass	Family	Scientific Name	Common Name
Magnoliidae	Monimiaceae	*Wilkiea heugeliana*	Wilkiea
	Moraceae	*Ficus coronata*	Sandpaper Fig
		Ficus fraseri	-
		Ficus rubiginosa	Port Jackson Fig
		Ficus watkinsiana	Strangler Fig
		Maclura cochinchinensis	-
	Myoporaceae	*Eremophila debilis*	Winter Apple
	Myrsinaceae	*Embelia australiana*	Embelia
		Rapanea howittiana	Brush Muttonwood
		Rapanea variabilis	Muttonwood
	Myrtaceae	*Acmena smithii*	Lillypilly
		Angophora bakeri	Narrow-leaved Apple
		Angophora costata	Smooth-barked Apple
		Angophora floribunda	Rough-barked Apple
		Babingtonia similis	-
		Backhousia myrtifolia	Grey Myrtle
		Baloghia inophylla	Brush Bloodwood
		Callistemon citrinus	Crimson Bottlebrush
		***Callistemon linearifolius* (V)**	**Crimson Bottlebrush**
		Callistemon linearis	Narrow-leaved Bottlebrush
		Callistemon rigidus	Stiff Bottlebrush
		Callistemon salignus	Willow Bottlebrush
		***Callistemon shiressii* (R)**	-
		Corymbia gummifera	Red Bloodwood
		Corymbia maculata	Spotted Gum
		Eucalyptus acmenoides	White Mahogany
		Eucalyptus capitellata	Brown Stringybark
		Eucalyptus crebra	Narrow-leaved Ironbark
		***Eucalyptus fergusonii subsp. dorsiventralis* (R)**	-
		Eucalyptus fibrosa	Broad Leaved Ironbark
		Eucalyptus globoidea	White Stringybark
		Eucalyptus grandis	Flooded gum
		Eucalyptus moluccana	Grey Box
		***Eucalyptus nicholii* (EV)**	**Narrow-leaved Black Peppermint**
		Eucalyptus paniculata subsp. *paniculata*	Grey Ironbark
		Eucalyptus pilularis	Blackbutt
		Eucalyptus piperita subsp. *piperita*	Sydney Peppermint
		Eucalyptus propinqua var. *propinqua*	Small Fruited Grey Gum
		Eucalyptus punctata	Grey Gum
		Eucalyptus resinifera subsp. *resinifera*	Red Mahogany

Class/Subclass	Family	Scientific Name	Common Name
Magnoliidae	Myrtaceae	*Eucalyptus robusta*	Swamp Mahogany
		Eucalyptus saligna	Sydney Blue Gum
		Eucalyptus siderophloia	Northern Grey Ironbark
		Eucalyptus sparsifolia	Narrow-leaved Stringybark
		Eucalyptus tereticornis	Forest Red Gum
		Eucalyptus umbra subsp. *umbra*	Broad-leaved White Mahogany
		Kunzea ambigua	Tick Bush
		Leptospermum parvifolium	Small-leaved Tea-tree
		Leptospermum polygalifolium subsp. *polygalifolium*	Lemon Scented Tea-tree
		Leptospermum trinervium	Flaky-barked Tea-tree
		Melaleuca decora	-
		Melaleuca ericifolia	Swamp Paperbark
		Melaleuca lineariifolia	Snow in Summer
		Melaleuca nodosa	Ball Honey Myrtle
		Melaleuca quinquenervia	Broad-leaved Paperbark
		Melaleuca stypheloides	Prickly-leaved Tea Tree
		Neolitsea dealbata	White Bolly Gum
		Rhodamnia rubescens	Brush Turpentine
		Syncarpia glomulifera	Turpentine
		Syzygium australe	Brush Cherry
		***Syzygium paniculatum* (EV)**	**Magenta Lilly Pilly**
	Ochnaceae	*Ochna serrulata**	Mickey Mouse Plant
	Oleaceae	*Ligustrum sinense**	Small-leaved Privet
		Notelaea longifolia	Mock Olive
		Notelaea ovata	Mock Olive
		Notelaea venosa	Veined Mock Olive
	Onagraceae	*Ludwigia peploides* subsp. *montevidensis*	Water Primrose
	Oxalidaceae	*Oxalis corniculata**	Yellow Wood Sorrel
		*Oxalis latifolia**	Pink Fishtail
		Oxalis perennans	-
	Passifloraceae	*Passiflora herbertiana*	Native Passionfruit
	Philydraceae	*Philydrum lanuginosum*	Woolly Frogmouth
	Phytolaccaceae	*Phytolacca octandra**	Inkweed
	Piperaceae	*Piper novae-hollandiae*	Pepper Vine
	Pittosporaceae	*Billardiera scandens* var. *scandens*	Apple Dumplings
		Bursaria spinosa var. *spinosa*	Blackthorn
	Pittosporaceae	*Hymenosporum flavum*	Native Frangipani
		Pittosporum multiflorum	Orange Thorn
		Pittosporum revolutum	Yellow Pittosporum
		Pittosporum undulatum	Sweet Pittosporum
	Plantaginaceae	*Plantago debilis*	Slender Plantain

Class/Subclass	Family	Scientific Name	Common Name
Magnoliidae	Plantaginaceae	*Plantago lanceolata**	Ribwort
	Polygalaceae	*Comesperma sphaerocarpum*	-
		Muehlenbeckia gracillima	Slender Lignum
		Persicaria decipiens	Slender Knotweed
		Persicaria lapathifolia	Pale Knotweed
		Persicaria strigosa	-
		*Rumex crispus**	Curled Dock
	Polypodiaceae	*Platycerium bifurcatum* subsp. *bifurcatum*	Elkhorn
		Pyrrosia rupestris	Rock Felt Fern
	Primulaceae	*Anagallis arvensis var. caerulea**	Blue Pimpernel
		*Anagallis arvensis**	Scarlet Pimpernel
	Proteaceae	*Banksia spinulosa* var. *collina*	Hairpin Banksia
		***Grevillea parviflora* subsp. *parviflora* (EV)**	**-**
		Grevillea robusta	Silky Oak
		Hakea sericea	Needlebush
		Isopogon anemonifolius	Flat-leaved Drumsticks
		Lambertia formosa	Mountain Devil
		Persoonia levis	Broad-leaved Geebung
		Persoonia linearis	Narrow-leaved Geebung
	Pteridaceae	*Pteris umbrosa*	Jungle Brake
	Ranunculaceae	*Clematis aristata*	Old Man's Beard
		Ranunculus inundatus	River Buttercup
	Rhamnaceae	*Alphitonia excelsa*	Red Ash
	Rosaceae	*Prunus persica**	Peach Tree
		Rubus moluccanus var. trilobus	Broad-leaf Bramble
		Rubus parvifolius	Native Raspberry
		Rubus rosifolius	Forest Bramble
		*Rubus ulmifolius**	Blackberry
	Rubiaceae	*Galium binifolium*	-
		Galium proquinquum	Bedstraw
		Morinda jasminoides	-
		Opercularia aspera	Common Stinkweed
		Pomax umbellata	Pomax
		*Richardia brasiliensis**	White Eye
	Rutaceae	*Acronychia oblongifolia*	Common Acronychia
		Boronia polygalifolia	Milkwort Boronia
	Rutaceae	*Correa reflexa*	Native Fuschia
		Geijera salicifolia var. *latifolia*	Broad-leaved Brush Wilga
		Melicope micrococca	White Euodia
		Phebalium squamulosum subsp. *squamulosum*	-
		Zieria smithii	Sandfly Zieria

Class/Subclass	Family	Scientific Name	Common Name
Magnoliidae	Santalaceae	*Exocarpos cupressiformis*	Native Cherry
		Exocarpos strictus	Pale Ballart
		Alectryon subcinereus	Native Quince
		Diploglottis australis	Native Tamarind
		Dodonaea triquetra	Hop Bush
		Guioa semiglauca	Guioa
		Mischocarpus australis	Red Pear Fruit
	Sapotaceae	*Planchonella australis*	Black Apple
	Scrophulariaceae	*Gratiola latifolia*	-
		Veronica plebia	Creeping Speedwell
	Solanaceae	*Physalis peruviana**	Cape Gooseberry
		*Solanum mauritianum**	Wild Tobacco
		*Solanum nigrum**	Black Nightshade
		Solanum prinophyllum	Forest Nightshade
		Solanum pungetium	Eastern Nightshade
		Solanum stelligerum	Devil's Needles
	Sterculiaceae	*Brachychiton acerifolius*	Illawarra Flame Tree
		Brachychiton populneus	Kurrajong
		Commersonia fraseri	Brush Kurrajong
	Strelitzeaceae	*Streblus brunonianus*	Whalebone Tree
	Stylidiaceae	*Stylidium graminifolium*	Trigger Plant
	Thelypteridaceae	*Christella dentata*	-
	Thymelaeaceae	*Pimelea linifolia* subsp. *linifolia*	Slender Rice Flower
	Tremandraceae	***Tetratheca juncea* (EV)**	**Black-eyed Susan**
	Ulmaceae	*Trema tomentosa* var. *viridis*	Native Peach
	Urticaceae	*Dendrocnide excelsa*	Giant Stinging Tree
		Dendrocnide photinophylla	Shiny-leaved Stinging Tree
		Urtica incisa	Stinging Nettle
	Verbenaceae	*Clerodendrum tomentosum*	Hairy Clerodendrum
		*Lantana camara**	Lantana
		*Verbena bonariensis**	Purpletop
		*Verbena rigida**	Veined Verbena
	Violaceae	*Hybanthus monopetalus*	Slender Violet
		Hybanthus stellarioides	
		Viola betonicifolia	-
	Violaceae	*Viola hederacea*	Ivy-leaved Violet
	Vitaceae	*Cayratia clematidea*	Slender Grape
	Vitaceae	*Cissus antarctica*	Native Grape
		Cissus hypoglauca	Water Vine
		Tetrastigma nitens	Three-leaved Water Vine
	Winteraceae	*Tasmannia insipida*	-
Liliidae	Anthericaceae	*Arthropodium milleflorum*	Pale Vanilla Lily
		Arthropodium minus	Small Vanilla Lily

Class/Subclass	Family	Scientific Name	Common Name
Liliidae	Anthericaceae	*Caesia parviflora* var. *parviflora*	Pale Grass Lily
		Thysanotus tuberosus	Fringed Lily
		Tricoryne elatior	Yellow Rush Lily
	Araceae	*Gymnostachys anceps*	Settlers Flax
	Arecaceae	*Livistona australis*	Cabbage Tree Palm
	Asparagaceae	*Protasparagus aethiopicus**	Asparagus Fern
	Asteliaceae	*Cordyline stricta*	Narrow-leaf Palm Lily
	Cyperaceae	*Baumea articulata*	Jointed Twig-Rush
		Carex appressa	Tall Sedge
		Carex fascicularis	Tassel Sedge
		Carex inversa	Knob Sedge
		Carex longebrachiata	Bergalia Tussock
		*Cyperus brevifolius**	Mullumbimby Couch
		Cyperus difformis	Variable Flat-sedge
		*Cyperus eragrostis**	Umbrella Sedge
		Cyperus polystachyos	-
		Cyperus sphaeroideus	-
		Cyperus tetraphyllus	=
		Eleocharis sphacelata	Tall Spike-rush
		Fimbristylis dichotoma	Common Fringe-rush
		Gahnia aspera	Saw Sedge
		Gahnia clarkei	Tall Saw-sedge
		Gahnia melanocarpa	Black-fruit Saw-sedge
		Gahnia radula	-
		Gahnia sieberiana	Red-fruited Saw-sedge
		Isolepis nodosa	-
		Lepidosperma laterale	Variable Sword-sedge
		Ptilothrix deusta	-
		Schoenus brevifolius	Bog-rush
		Schoenus melanostachys	Black Bog Rush
	Dioscoreaceae	*Dioscorea transversa*	Native Yam
	Doryanthaceae	*Doryanthes excelsa*	Gymea Lily
	Hypoxidaceae	*Hypoxis hygrometrica*	Golden Star
	Iridaceae	*Libertia paniculata*	Branching Grass-flag
	Juncaceae	*Juncus acutus**	-
		*Juncus cognatus**	-
		Juncus mollis	-
	Juncaceae	*Juncus subsecundus*	Finger Rush
		Juncus usitatus	Common Rush
	Juncaginaceae	*Triglochin microtuberosum*	Water Ribbons
		Triglochin procerum	Water Ribbons
	Liliaceae	*Lilium formosanum**	Formosan Lily
	Lomandraceae	*Lomandra confertifolia* subsp.	-

Class/Subclass	Family	Scientific Name	Common Name
		rubiginosa	
Liliidae	Lomandraceae	*Lomandra confertifolia var. pallida*	-
		Lomandra cylindrica	-
		Lomandra filiformis subsp. *coriacea*	Wattle Mat-rush
		Lomandra filiformis subsp. *filiformis*	Wattle Mat-rush
		Lomandra glauca subsp. *glauca*	-
		Lomandra longifolia	Spiky-headed Mat-rush
		Lomandra multiflora	Many-flowered Mat-rush
		Lomandra obliqua	Twisted Mat-rush
	Luzuriagaceae	*Eustrephus latifolius*	Wombat Berry
		Geitonoplesium cymosum	Scrambling Lily
	Orchidaceae	*Acianthus fornicatus*	Pixie Caps
		Caladenia carnea	Pink Finger Orchid
		Caladenia catenata	White Finger Orchid
		Calochilus campestris	Copper Beard Orchid
		Calochilus robertsonii	Purplish Beard Orchid
		Cymbidium suave	Native Cymbidium
		Dendrobium gracilicaule	-
		Dipodium punctatum	Hyacinth Orchid
		Microtis parviflora	Slender Onion Orchid
		Pterostylis baptistii	King Greenhood
		Pterostylis curta	Blunt Greenhood
		Pterostylis longifolia	-
		Pterostylis nutans	Nodding Greenhood
		Pterostylis ophioglossa	Snake's Tongue Greenhood
		Pterostylis sp.	Greenhood
		Thelymitra purpurata	Sun Orchid
		Thelymitra sp.	Sun Orchid
	Phormiaceae	*Dianella caerulea* var. *producta*	Blue Flax Lily
		Dianella revoluta var. *revoluta*	Spreading Flax Lily
	Poaceae	*Andropogon virginicus**	Whisky Grass
		Aristida calycina	Wire Grass
		Aristida ramosa	Wire Grass
		Aristida vagans	Three-awn Speargrass
		Austrodanthonia linkii var. *fulva*	Wallaby Grass
		Austrodanthonia tenuior	Wallaby Grass
		Austrostipa pubescens	Tall Speargrass
		Austrostipa ramosissima	Stout Bamboo Grass
		*Avena fatua**	Wild Oats
		*Axonopus affinis**	Narrow-leaved Carpet Grass
		Bothriochloa decipiens	Redleg Grass
Liliidae	Poaceae	*Bothriochloa macra*	-

Class/Subclass	Family	Scientific Name	Common Name
		*Briza maxima**	Quaking Grass
		*Briza minor**	Shivery Grass
		*Briza subaristata**	-
		*Bromus molliformis**	Soft Brome
		*Chloris gayana**	Rhodes Grass
		*Cortaderia selloana**	Pampas Grass
		Cymbopogon refractus	Barbwire Grass
		Cynodon dactylon	Common Couch
		Deyeuxia quadriseta	Reed Bent Grass
		Dichelachne micrantha	Short-hair Plume Grass
		Digitaria parviflora	Small-flowered Finger Grass
		Echinopogon caespitosus var. *caespitosus*	Tufted Hedgehog Grass
		Echinopogon ovatus	Forest Hedgehog Grass
		*Ehrharta erecta**	Panic Veldtgrass
		Entolasia marginata	Bordered Panic
		Entolasia stricta	Wiry Panic
		Eragrostis benthamii	Bentham's Love Grass
		Eragrostis brownii	Brown's Lovegrass
		*Eragrostis curvula**	African Lovegrass
		Eragrostis tenuifolia	
		*Hyparrhenia hirta**	Coolatai Grass
		Imperata cylindrica var. *major*	Blady Grass
		Joycea pallida	Silvertop Wallaby grass
		Lachnagrostis aemulus	Blown Grass
		*Lolium perrenne**	Perennial Ryegrass
		*Melinus repens**	Red Natal Grass
		Microlaena stipoides var. *stipoides*	Weeping Rice Grass
		Oplismenus aemulus	Basket Grass
		Oplismenus imbecillis	-
		*Panicum maximum**	Guinea Grass
		Panicum simile	Two Colour Panic
		Paspalidium distans	-
		*Paspalum dilatatum**	Paspalum
		Paspalum distichum	Water Couch
		*Paspalum urvellei**	Vasey Grass
		*Pennisetum clandestinum**	Kikuyu
		Phragmites australis	Common Reed
		Poa affinis	-
		*Poa annua**	Winter Grass
		Poa labillardieri var. *labillardieri*	Tussock Grass
		*Setaria gracilis**	Slender Pigeon Grass
Liliidae	Poaceae	*Setaria pumila**	Pale Pigeon Grass

Class/Subclass	Family	Scientific Name	Common Name
		*Sporobolus africanus**	Parramatta Grass
		Sporobolus elongatus	Slender Rat's Tail Grass
		*Stenotaphrum secundatum**	Buffalo Grass
		Themeda australis	Kangaroo Grass
		*Vulpia myuros**	Rat's Tail Fescue
	Smilacaceae	*Ripogonum album*	White Supplejack
		Ripogonum fawcettianum	Small Supplejack
		Smilax australis	Lawyer Vine
		Smilax glyciphylla	Sarsaparilla
	Typhaceae	*Typha orientalis*	Cumbungi
	Xanthorrhoaceae	*Xanthorrhoea latifolia* subsp. *latifolia*	-
		Xanthorrhoea macronema	-
	Zingiberaceae	*Alpinia caerulea*	Native Ginger

Table 2 – Flora Quadrat Records for the Conservation Estates

Species Name	Q19	Q25	Q26	Q27	Q28	Q29	Q30	Q31	Q53	Q54	Q55	Q56	Q57	Q58	Q59	Q61	Q72	Q73	Q74	Q75	Q76	Q77	Q78	Q79	Q80	Q81
Abrophyllum ornans	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia binervata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia elongata	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	4	0	0	0	0	0	0	0	0	0	0
Acacia falcata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia fimbriata	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia floribunda	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia implexa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia irrorata subsp. *irrorata*	0	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0
Acacia linifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0
Acacia longifolia var. *longifolia*	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Acacia maidenii	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia myrtifolia	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	3	0	0	0	1	0	0	0
Acacia suaveolens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia ulicifolia	0	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	1	1
Acianthus fornicatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	2	1	1
Acmena smithii	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Acronychia oblongifolia	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Acrotriche divaricata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1
Adiantum aethiopicum	0	0	2	0	0	0	0	3	0	1	2	5	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Adiantum formosum	0	0	0	0	0	0	0	2	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Adiantum hispidulum	0	0	0	0	0	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Ageratina adenophorum**	0	0	0	1	0	0	2	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alectryon subcinereus	0	0	0	0	0	0	0	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Allocasuarina littoralis	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0
Allocasuarina torulosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	1	0	0	1
Alphitonia excelsa	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alpinia caerulea	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Anagallis arvensis**	0	1	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Andropogon virginicus**	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Angophora bakeri	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
Angophora costata	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0	0	0	0	3	0	1	3	2	4	3	4
Angophora floribunda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Anredera cordifolia**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aphanopetalum resinosum	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Apium leptophyllum**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida ramosa	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida vagans	3	1	0	0	2	2	0	0	0	0	0	0	3	2	0	0	2	2	0	0	0	1	0	1	0	1
Arthropodium milleflorum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arthropodium minus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arthropteris tenella	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asplenium australasicum	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Astrotricha latifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrodanthonia tenuior	2	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Austrostipa pubescens	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa ramosissima	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Axonopus affinis**	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Babingtonia similis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Species Name	Q19	Q25	Q26	Q27	Q28	Q29	Q30	Q31	Q53	Q54	Q55	Q56	Q57	Q58	Q59	Q61	Q72	Q73	Q74	Q75	Q76	Q77	Q78	Q79	Q80	Q81
Backhousia myrtifolia	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baloghia inophylla	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Banksia spinulosa var. *collina*	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	2	0	0	3	0	0	0	0
Baumea articulata	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Bidens pilosa**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Billardiera scandens var. *scandens*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	1	0	0
Blechnum cartilagineum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
Blechnum nudum	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Boronia polygalifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Bossiaea prostrata	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Bothriochloa decipiens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachychiton acerifolius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Breynia oblongifolia	0	1	0	0	0	2	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1
*Briza minor**	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Briza subaristata**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brunoniella australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bursaria spinosa var. *spinosa*	2	2	0	0	3	3	0	0	0	0	0	2	0	0	1	0	2	2	0	0	0	0	0	1	0	0
Caesia parviflora var. *parviflora*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caladenia catenata	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Callistemon linearifolius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Callistemon linearis	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Callistemon rigidus	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Callistemon salignus	0	0	3	0	0	0	0	4	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Callistemon shiressii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calochilus robertsonii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calochlaena dubia	0	0	0	0	0	0	0	2	1	1	1	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0
Capparis arborea	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carex appressa	0	0	1	4	0	0	3	2	0	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carex fascicularis	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carex inversa	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carex longebrachiata	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cassine australis var. australis	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cassytha glabella forma *glabella*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Cassytha pubescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Casuarina glauca	0	0	0	5	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cayratia clematidea	0	0	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Centella asiatica	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cheilanthes sieberi subsp. *sieberi*	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Chrysocephalum apiculatum	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Cinnamomum camphora**	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Cirsium vulgare**	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Cissus antarctica	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cissus hypoglauca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Claoxylon australe	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clematis aristata	1	0	0	0	0	1	0	1	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Clerodendrum tomentosum	0	0	0	0	0	0	0	2	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0

Species Name	Q19	Q25	Q26	Q27	Q28	Q29	Q30	Q31	Q53	Q54	Q55	Q56	Q57	Q58	Q59	Q61	Q72	Q73	Q74	Q75	Q76	Q77	Q78	Q79	Q80	Q81
Commelina cyanea	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commersonia fraseri	0	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
*Conyza bonariensis**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cordyline stricta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Correa reflexa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Cortaderia selloana**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corymbia gummifera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	3	2	4	4	0
Corymbia maculata	3	0	3	0	3	3	0	1	0	0	0	2	3	3	0	4	2	4	0	0	3	0	1	0	4	0
Cryptocarya glaucescens	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Cryptocarya microneura	0	0	0	0	0	0	0	3	1	1	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
Cryptocarya rigida	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cymbidium suave	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cymbopogon refractus	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
Cynodon dactylon	0	2	0	3	2	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Cyperus brevifolius**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus polystachyos	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus sphaeroideus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus tetraphyllus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daviesia squarrosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daviesia ulicifolia	3	1	0	0	3	2	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	3
Dendrobium gracilicaule	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dendrocnide excelsa	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Desmodium gunii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Desmodium rhytidophyllum	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Desmodium varians	0	1	1	0	2	2	0	0	0	0	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
Dianella caerulea var. *producta*	2	1	0	0	0	2	0	0	0	0	1	0	1	0	0	0	1	0	1	0	1	0	1	2	0	2
Dianella revoluta var. *revoluta*	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	0	0	1	0	1	1	1	0
Dichelachne micrantha	1	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1
Dichondra repens	0	2	0	0	0	2	0	1	0	0	5	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
Dictymia brownii	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Digitaria parviflora	0	0	0	0	0	0	0	0	0	0	0	3	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Dillwynia retorta var. *retorta*	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0	3	0	1	3	0	0	0	0	0	0	0
Dioscorea transversa	0	0	1	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Diospyros australis	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diploglottis australis	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dodonaea triquetra	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	1	0	0
Doodia aspera	0	0	2	0	0	0	0	2	2	1	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Doryanthes excelsa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0	0	1	0	0
Doryphora sassafras	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drosera peltata	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Echinopogon caespitosus var. *caespitosus*	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Echinopogon ovatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
*Ehrharta erecta**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Einadia hastata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Elaeocarpus reticulatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eleocharis sphacelata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Entolasia marginata	0	0	0	0	0	0	0	3	0	0	0	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Entolasia stricta	3	0	2	0	0	2	0	0	0	0	0	0	4	0	0	4	2	4	4	0	2	4	2	3	2	2

Species Name	Q19	Q25	Q26	Q27	Q28	Q29	Q30	Q31	Q53	Q54	Q55	Q56	Q57	Q58	Q59	Q61	Q72	Q73	Q74	Q75	Q76	Q77	Q78	Q79	Q80	Q81
Epacris pulchella	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	0	0	1	0	1	0	0
Eragrostis brownii	0	4	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0
Eremophila debilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Erythrina X sykesii**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus acmenoides	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Eucalyptus capitellata	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	3	2	0	0	0
Eucalyptus fergusonii subsp. dorsiventralis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus fibrosa	3	0	0	0	4	3	0	0	0	0	0	2	0	0	1	5	5	4	0	0	2	0	0	0	4	3
Eucalyptus globoidea	0	0	0	0	0	0	0	0	0	0	0	0	2	0	3	1	0	1	3	0	0	0	0	2	1	2
Eucalyptus grandis	0	0	3	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus moluccana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus paniculata subsp. *paniculata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus piperita subsp. *piperita*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus propinqua var. *propinqua*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus punctata	0	0	0	0	2	0	0	0	0	0	0	2	0	0	0	0	1	1	0	0	0	0	0	0	1	0
Eucalyptus resinifera subsp. *resinifera*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Eucalyptus robusta	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus saligna	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0
Eucalyptus siderophloia	0	0	3	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus sparsifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus tereticornis	0	4	0	0	0	0	0	0	0	0	1	2	0	0	3	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus umbra subsp. *umbra*	1	0	0	0	0	3	0	0	0	0	1	0	2	0	1	3	0	0	0	0	2	1	2	0	1	3
Eupomatia laurina	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
Euroschinus falcata var. *falcata*	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eustrephus latifolius	2	0	1	0	0	2	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	2
Exocarpos cupressiformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exocarpos strictus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ficus coronata	0	0	0	0	0	0	0	2	2	1	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Ficus rubiginosa	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ficus watkinsiana	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fimbristylis dichotoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Foeniculum vulgare**	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gahnia aspera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Gahnia clarkei	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	3	0	0	0	0	4	0
Gahnia melanocarpa	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium binifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galium proquinquum	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Geitonoplesium cymosum	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
Geranium homeanum	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Glochidion ferdinandii	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0
Glycine clandestina	1	2	0	0	2	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0
Glycine tabacina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1
*Gnaphalium americanum**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gompholobium grandiflorum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Species Name	Q19	Q25	Q26	Q27	Q28	Q29	Q30	Q31	Q53	Q54	Q55	Q56	Q57	Q58	Q59	Q61	Q72	Q73	Q74	Q75	Q76	Q77	Q78	Q79	Q80	Q81
Gonocarpus tetragynus	2	0	0	0	0	0	0	0	0	0	0	1	2	3	0	1	1	2	1	0	0	1	1	0	2	0
Goodenia hederacea subsp. *hederacea*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0
Goodenia heterophylla subsp. *heterophylla*	1	0	0	0	2	1	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	1	0	1
Goodenia ovata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodenia rotundifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gratiola latifolia	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grevillea parviflora* subsp. *parviflora	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	2	0	0	0	0
Guioa semiglauca	0	0	0	0	0	0	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gymnostachys anceps	0	0	0	0	0	0	0	2	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Hakea sericea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hardenbergia violacea	2	0	0	0	0	2	0	0	0	0	0	1	1	0	0	1	0	1	1	0	0	0	0	2	1	1
Hibbertia aspera	1	0	0	0	0	2	0	0	0	0	0	3	2	3	0	0	1	0	0	0	2	0	0	1	0	0
Hibbertia dentata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hibbertia empetrifolia subsp. uncinata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hibbertia pedunculata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1
Hibbertia scandens	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hibiscus heterophyllus	0	0	0	0	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hovea linearis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0
Howittia trilocularis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hybanthus monopetalus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Hydrocotyle bonariensis**	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrocotyle geraniifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrocotyle peduncularis	0	0	2	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrocotyle tripartita	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
*Hypochaeris radicata**	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypoxis hygrometrica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Imperata cylindrica var. *major*	0	1	0	0	2	0	2	0	0	0	1	3	0	0	2	0	0	0	0	0	3	0	0	0	0	2
Indigofera australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isolepis nodosa	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isopogon anemonifolius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Jacksonia scoparia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Joycea pallida	4	2	0	0	4	5	0	0	0	0	0	0	3	4	0	5	4	4	0	0	0	5	5	4	3	2
Juncus mollis	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus usitatus	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kennedia rubicunda	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lachnagrostis aemulus	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lagenifera stipitata	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lambertia formosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
*Lantana camara**	0	1	1	5	0	1	2	2	1	1	1	2	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Lastreopsis acuminata	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lastreopsis decomposita	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidosperma laterale	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1	3	1	0	0	0	0	1	1	0	0
Leptospermum polygalifolium subsp. *polygalifolium*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	3	0	2	0	0	0	0	1
Leptospermum trinervium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	0	0
Leucopogon juniperinus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Species Name	Q19	Q25	Q26	Q27	Q28	Q29	Q30	Q31	Q53	Q54	Q55	Q56	Q57	Q58	Q59	Q61	Q72	Q73	Q74	Q75	Q76	Q77	Q78	Q79	Q80	Q81
Leucopogon lanceolatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Libertia paniculata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lindsaea linearis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Lindsaea microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lissanthe strigosa subsp. *strigosa*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	0	0	0	0	0	0	0	0
*Lolium perrenne**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lomandra confertifolia var. pallida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	0	0	2	0	0	1	4	0
Lomandra cylindrica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lomandra filiformis subsp. *coriacea*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	2	0	0	0	0	0	0	0	0
Lomandra filiformis subsp. *filiformis*	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0	2
Lomandra glauca subsp. *glauca*	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	3	3	2	0	2
Lomandra longifolia	0	0	2	0	0	2	0	0	0	1	0	5	0	0	2	0	0	0	0	2	0	0	0	0	0	0
Lomandra multiflora	2	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	2	3	0	0	1	0	1	2	2	2
Lomandra obliqua	0	0	0	0	0	0	0	0	0	0	0	0	4	4	0	0	0	1	2	0	0	2	3	2	0	2
Maclura cochinchinensis	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrozamia reducta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Marsdenia rostrata	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Marsdenia suaveolens	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Maytenus silvestris	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Melaleuca decora	0	0	0	0	0	0	0	0	0	0	0	3	0	1	3	0	4	0	0	0	0	0	0	0	0	0
Melaleuca ericifolia	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Melaleuca linearifolia	0	0	0	0	0	0	3	0	0	0	0	4	0	0	3	0	0	0	0	0	0	0	0	0	0	0
Melaleuca nodosa	3	1	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Melaleuca quinquenervia	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Melaleuca styphelioides	1	0	0	0	0	0	0	2	0	0	6	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
Melia azedarach var. *australasica*	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Melicope micrococca	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microlaena stipoides var. *stipoides*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microsorum scandens	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microtis parviflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mirbelia rubiifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Mischocarpus australis	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Morinda jasminoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Muehlenbeckia gracillima	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Muellerina eucalyptoides	1	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neolitsea australiensis	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neolitsea dealbata	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Notelaea longifolia	1	0	2	0	1	2	0	2	0	1	1	0	0	0	0	0	0	0	0	1	0	0	1	2	0	0
Notelaea ovata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Notelaea venosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Ochna serrulata**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Olearia microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Omalanthus populifolius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Species Name	Q19	Q25	Q26	Q27	Q28	Q29	Q30	Q31	Q53	Q54	Q55	Q56	Q57	Q58	Q59	Q61	Q72	Q73	Q74	Q75	Q76	Q77	Q78	Q79	Q80	Q81
Onopordum acanthium subsp. *acanthium*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opercularia aspera	1	0	0	0	2	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Oplismenus aemulus	0	0	2	0	0	0	0	2	2	2	0	3	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Oplismenus imbecillus	0	0	2	0	0	0	0	2	1	1	5	2	0	0	0	0	0	0	0	3	0	0	0	0	0	0
Oxalis perennans	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ozothamnus diosmifolius	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Pandorea pandorana	1	0	0	0	0	2	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
*Panicum maximum**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Panicum simile	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	1	0	1	0	0	0	0	0
Pararchidendron pruinosum var. *pruinosum*	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parsonsia straminea	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paspalidium distans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Paspalum dilatatum**	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Paspalum urvellei**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passiflora herbertiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pellaea falcata	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pellaea paradoxa	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Pennisetum clandestinum**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Persicaria lapathifolia	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Persoonia levis	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	2	0	0
Persoonia linearis	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	2	0	1
Phebalium squamulosum subsp. *squamulosum*	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Phragmites australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllanthus hirtellus	0	0	0	0	0	2	0	0	0	0	0	0	2	1	0	0	1	0	0	0	1	1	1	2	1	2
Pimelea linifolia subsp. *linifolia*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Piper novae-hollandiae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pittosporum multiflorum	2	0	2	0	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pittosporum revolutum	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pittosporum undulatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Planchonella australis	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plantago debilis	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Plantago lanceolata**	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Platycerium bifurcatum subsp. *bifurcatum*	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plectranthus parviflorus	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Poa affinis	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Poa labillardieri var. *labillardieri*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	1	0	0
Podolobium ilicifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Podolobium scandens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polymeria calycina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Polyscias sambucifolia	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	1
Pomax umbellata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Poranthera microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pratia purpurascens	0	1	0	0	2	3	2	0	0	0	1	3	2	0	4	0	3	2	0	0	0	0	0	3	2	2
Prostanthera incisa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Pseuderanthemum variabile	1	0	0	0	0	2	0	0	0	0	1	0	2	0	0	1	1	1	0	0	2	0	1	1	2	1

Species Name	Q19	Q25	Q26	Q27	Q28	Q29	Q30	Q31	Q53	Q54	Q55	Q56	Q57	Q58	Q59	Q61	Q72	Q73	Q74	Q75	Q76	Q77	Q78	Q79	Q80	Q81
Pteridium esculentum	0	0	0	0	0	0	2	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Pterostylis curta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pterostylis longifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pterostylis nutans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pterostylis sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ptilothrix deusta	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0	0	0	2	0	0	0	4	4	1	0	4
Pultenaea spinosa	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Pultenaea daphnoides	0	0	0	0	0	2	0	0	0	0	0	0	4	0	0	1	0	0	0	0	0	0	0	3	4	3
Pultenaea paleacea var. *paleacea*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	3	0	0	2	0	0	0	0
Pultenaea retusa	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pultenaea villosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0
Pyrrosia rupestris	0	0	0	0	0	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ranunculus inundatus	0	0	0	2	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rapanea howittiana	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rapanea variabilis	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Raphanus raphanistrum**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodamnia rubescens	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Ripogonum album	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rubus moluccanus var. trilobus	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rubus parvifolius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Rubus rosifolius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Rubus ulmifolius**	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sarcopetalum harveyanum	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scaevola ramosissima	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scolopia braunii	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scutellaria mollis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio linearifolius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Senecio madagascariensis**	0	2	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Senna pendula var. *glabrata**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Setaria gracilis**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sicyos australis	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Sida rhombifolia**	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sigesbeckia orientalis	0	0	0	0	0	0	0	0	0	0	2	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Smilax australis	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
Smilax glyciphylla	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
*Solanum mauritianum**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum prinophyllum	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum pungetium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solanum stelligerum	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Sonchus oleraceus**	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Sporobolus africanus**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stellaria flaccida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Stellaria media**	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stephania japonica var. *discolor*	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Streblus brunonianus	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stylidium graminifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Syncarpia glomulifera	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0

Species Name	Q19	Q25	Q26	Q27	Q28	Q29	Q30	Q31	Q53	Q54	Q55	Q56	Q57	Q58	Q59	Q61	Q72	Q73	Q74	Q75	Q76	Q77	Q78	Q79	Q80	Q81
Synoum glandulosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Syzygium australe	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tasmannia insipida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tetrastigma nitens	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tetratheca juncea	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0
Thelymitra purpurata	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Thelymitra sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Themeda australis	0	0	0	0	4	0	0	0	0	0	0	4	5	5	0	4	5	4	4	0	3	4	0	4	5	5
*Thunbergia alata**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thysanotus tuberosus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Toona ciliata	0	0	0	0	0	0	0	1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trachymene incisa subsp. *incisa*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Tradescantia fluminensis**	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trema tomentosa var. *viridis*	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tricoryne elatior	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Trifolium repens**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Triglochin procerum	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trochocarpa laurina	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tylophora barbata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Typha orientalis	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urtica incisa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Verbena bonariensis**	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Verbena rigida**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vernonia cinerea var. *cinerea*	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Veronica plebia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Villarsia exaltata	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Viola betonicifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Viola hederacea	0	0	3	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Wahlenbergia gracilis	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wilkiea heugeliana	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xanthorrhoea latifolia subsp. *latifolia*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	2	0	2	0	0
Xanthorrhoea macronema	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Zieria smithii	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 3 – Flora Quadrat Records Continued

Species Name	Q82	Q83	Q84	Q85	Q86	Q87	Q88	Q89	Q90	Q91	Q92	Q93	Q94	Q95	Q96	Q97	Q98	Q99	Q100	Q101	Q103	Q104	Q105	Q106
Abrophyllum ornans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Acacia binervata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia elongata	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia falcata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
Acacia fimbriata	0	0	0	0	0	0	0	0	0	0	3	0	0	4	3	0	0	0	4	0	0	4	4	0
Acacia floribunda	0	0	0	0	2	0	2	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	1	2
Acacia implexa	0	0	0	0	0	1	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia irrorata subsp. *irrorata*	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Acacia linifolia	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Acacia longifolia var. *longifolia*	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia maidenii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3
Acacia myrtifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia suaveolens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia ulicifolia	0	2	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Acianthus fornicatus	4	0	0	2	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Acmena smithii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acronychia oblongifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acrotriche divaricata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Adiantum aethiopicum	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Adiantum formosum	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	1	0	0	0	2
Adiantum hispidulum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1
*Ageratina adenophorum**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3
Alectryon subcinereus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Allocasuarina littoralis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Allocasuarina torulosa	0	1	0	0	2	0	2	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0
Alphitonia excelsa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	2
Alpinia caerulea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Anagallis arvensis**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Andropogon virginicus**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Angophora bakeri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Angophora costata	0	5	0	0	0	2	0	0	0	0	0	3	2	1	0	0	0	2	0	0	0	0	0	0
Angophora floribunda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Anredera cordifolia**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aphanopetalum resinosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Apium leptophyllum**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida ramosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aristida vagans	0	0	1	1	0	1	0	1	0	0	0	0	0	1	0	1	0	0	2	0	0	0	2	0
Arthropodium milleflorum	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Arthropodium minus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arthropteris tenella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asplenium australasicum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Astrotricha latifolia	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrodanthonia tenuior	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0
Austrostipa pubescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austrostipa ramosissima	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Axonopus affinis**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Babingtonia similis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Backhousia myrtifolia	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Baloghia inophylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Banksia spinulosa var. *collina*	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
Baumea articulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Species Name	Q82	Q83	Q84	Q85	Q86	Q87	Q88	Q89	Q90	Q91	Q92	Q93	Q94	Q95	Q96	Q97	Q98	Q99	Q100	Q101	Q103	Q104	Q105	Q106
*Bidens pilosa**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Billardiera scandens var. *scandens*	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Blechnum cartilagineum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Blechnum nudum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Boronia polygalifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bossiaea prostrata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bothriochloa decipiens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachychiton acerifolius	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Breynia oblongifolia	1	0	0	1	1	1	1	0	0	1	0	0	0	1	0	0	2	1	1	0	0	1	0	0
*Briza minor**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Briza subaristata**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brunoniella australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bursaria spinosa var. *spinosa*	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0
Caesia parviflora var. *parviflora*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caladenia catenata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Callistemon linearifolius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0
Callistemon linearis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Callistemon rigidus	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Callistemon salignus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Callistemon shiressii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Calochilus robertsonii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calochlaena dubia	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1
Capparis arborea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carex appressa	0	0	0	0	2	0	1	0	0	2	0	0	0	0	0	0	1	0	0	0	2	0	0	2
Carex fascicularis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carex inversa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carex longebrachiata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cassine australis var. australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cassytha glabella forma *glabella*	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cassytha pubescens	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Casuarina glauca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cayratia clematidea	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	1	0
Centella asiatica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0
Cheilanthes sieberi subsp. *sieberi*	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0
Chrysocephalum apiculatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Cinnamomum camphora**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Cirsium vulgare**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cissus antarctica	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	3
Cissus hypoglauca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Claoxylon australe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0	3
Clematis aristata	2	0	0	0	0	0	2	1	0	0	0	0	0	1	1	0	0	0	0	0	0	2	1	2
Clerodendrum tomentosum	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commelina cyanea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Commersonia fraseri	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
*Conyza bonariensis**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cordyline stricta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Correa reflexa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Cortaderia selloana**	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corymbia gummifera	0	4	0	0	0	0	0	0	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	0
Corymbia maculata	2	0	4	2	2	4	2	4	5	1	3	0	3	3	4	4	0	4	3	4	0	4	3	1
Cryptocarya glaucescens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cryptocarya microneura	1	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Cryptocarya rigida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Species Name	Q82	Q83	Q84	Q85	Q86	Q87	Q88	Q89	Q90	Q91	Q92	Q93	Q94	Q95	Q96	Q97	Q98	Q99	Q100	Q101	Q103	Q104	Q105	Q106
Cymbidium suave	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Cymbopogon refractus	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	2	0	2	1	0	0	0	0	0
Cynodon dactylon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0
*Cyperus brevifolius**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus polystachyos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus sphaeroideus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyperus tetraphyllus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Daviesia squarrosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daviesia ulicifolia	0	3	0	2	0	4	0	3	3	0	0	0	3	4	3	3	0	3	2	0	0	3	2	0
Dendrobium gracilicaule	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dendrocnide excelsa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Desmodium gunii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Desmodium rhytidophyllum	0	0	4	1	0	0	0	0	0	0	0	0	0	3	0	0	0	2	1	0	0	2	0	0
Desmodium varians	1	0	0	0	1	0	1	0	0	1	1	0	0	1	2	0	0	0	2	2	0	0	1	0
Dianella caerulea var. *producta*	1	2	2	2	2	2	2	2	2	0	1	1	1	2	1	1	1	1	2	2	0	2	0	0
Dianella revoluta var. *revoluta*	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	2	0	0	0	0	0	0
Dichelachne micrantha	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Dichondra repens	3	0	0	1	2	0	0	0	0	1	0	0	0	1	0	0	0	0	2	2	2	0	3	0
Dictymia brownii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Digitaria parviflora	0	0	2	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	2	0	1	0
Dillwynia retorta var. *retorta*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioscorea transversa	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	2
Diospyros australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diploglottis australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Dodonaea triquetra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Doodia aspera	0	0	0	0	2	0	3	0	0	3	0	0	0	0	0	0	1	0	0	2	0	0	0	2
Doryanthes excelsa	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Doryphora sassafras	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drosera peltata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Echinopogon caespitosus var. *caespitosus*	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0
Echinopogon ovatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
*Ehrharta erecta**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Einadia hastata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Elaeocarpus reticulatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eleocharis sphacelata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Entolasia marginata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Entolasia stricta	6	0	4	2	0	1	0	2	2	0	1	2	2	5	3	3	0	5	0	0	0	4	0	0
Epacris pulchella	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Eragrostis brownii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Eremophila debilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Erythrina X sykesii**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus acmenoides	0	0	0	0	3	0	4	0	0	1	3	0	2	0	0	0	4	0	2	3	0	3	0	1
Eucalyptus capitellata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus fergusonii subsp. dorsiventralis	0	0	0	0	3	3	0	0	0	0	2	0	3	3	4	0	0	1	4	2	0	3	4	0
Eucalyptus fibrosa	0	0	4	1	0	0	0	3	3	0	0	0	0	2	2	3	0	3	2	0	0	0	1	0
Eucalyptus globoidea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus grandis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus moluccana	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus paniculata subsp. *paniculata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus piperita subsp. *piperita*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Species Name	Q82	Q83	Q84	Q85	Q86	Q87	Q88	Q89	Q90	Q91	Q92	Q93	Q94	Q95	Q96	Q97	Q98	Q99	Q100	Q101	Q103	Q104	Q105	Q106
Eucalyptus propinqua var. *propinqua*	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	1
Eucalyptus punctata	0	0	0	0	0	2	0	1	2	0	0	0	0	1	1	0	0	0	2	0	0	2	0	0
Eucalyptus resinifera subsp. *resinifera*	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus robusta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus saligna	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3
Eucalyptus siderophloia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0
Eucalyptus sparsifolia	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus tereticornis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus umbra subsp. *umbra*	3	0	0	4	0	2	0	2	2	0	0	0	0	3	2	2	0	3	0	0	0	0	3	0
Eupomatia laurina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Euroschinus falcata var. *falcata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eustrephus latifolius	3	2	0	3	0	1	0	1	1	0	0	0	0	1	2	0	0	2	1	2	0	1	1	0
Exocarpos cupressiformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exocarpos strictus	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ficus coronata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Ficus rubiginosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ficus watkinsiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fimbristylis dichotoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
*Foeniculum vulgare**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gahnia aspera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gahnia clarkei	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gahnia melanocarpa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0
Galium binifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	1	0	0
Galium proquinquum	0	0	0	0	1	2	1	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Geitonoplesium cymosum	0	0	0	0	1	0	2	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0
Geranium homeanum	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0
Glochidion ferdinandii	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	2	0	0	0
Glycine clandestina	1	0	0	1	1	1	1	0	1	0	0	0	1	0	1	1	0	0	1	0	2	1	1	0
Glycine tabacina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
*Gnaphalium americanum**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gompholobium grandiflorum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gonocarpus tetragynus	0	2	0	3	1	1	0	0	0	0	0	2	0	2	0	2	0	0	0	0	0	0	0	0
Goodenia hederacea subsp. *hederacea*	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
Goodenia heterophylla subsp. *heterophylla*	0	0	2	0	0	1	0	1	1	0	1	0	1	1	0	2	0	0	1	0	0	0	0	0
Goodenia ovata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Goodenia rotundifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gratiola latifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grevillea parviflora* subsp. *parviflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Guioa semiglauca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gymnostachys anceps	1	2	0	0	2	0	3	0	0	0	1	0	0	0	0	0	0	0	1	3	0	0	0	1
Hakea sericea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hardenbergia violacea	0	0	2	1	0	0	1	0	1	0	0	1	0	1	1	1	0	0	1	1	0	2	1	0
Hibbertia aspera	0	1	0	3	1	2	1	2	1	0	0	2	2	3	1	0	0	3	3	0	0	0	0	0
Hibbertia dentata	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Hibbertia empetrifolia subsp. uncinata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hibbertia pedunculata	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Hibbertia scandens	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Hibiscus heterophyllus	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0

Species Name	Q82	Q83	Q84	Q85	Q86	Q87	Q88	Q89	Q90	Q91	Q92	Q93	Q94	Q95	Q96	Q97	Q98	Q99	Q100	Q101	Q103	Q104	Q105	Q106
Hovea linearis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Howittia trilocularis	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hybanthus monopetalus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Hydrocotyle bonariensis**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrocotyle geraniifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrocotyle peduncularis	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	0	2	0	0	0	0
Hydrocotyle tripartita	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Hypochaeris radicata**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypoxis hygrometrica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Imperata cylindrica var. *major*	0	4	3	3	0	2	0	0	1	0	3	1	0	2	2	1	0	2	2	1	0	0	3	0
Indigofera australis	0	0	0	0	0	0	1	0	0	0	2	0	0	2	0	0	0	0	0	4	0	0	3	0
Isolepis nodosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isopogon anemonifolius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jacksonia scoparia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Joycea pallida	0	0	3	0	0	4	0	3	5	0	2	4	2	1	3	5	0	0	0	0	0	0	0	0
Juncus mollis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juncus usitatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Kennedia rubicunda	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lachnagrostis aemulus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lagenifera stipitata	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0	0
Lambertia formosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Lantana camara**	4	0	0	0	1	0	0	0	0	4	0	0	0	2	0	0	3	0	1	3	6	5	0	2
Lastreopsis acuminata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lastreopsis decomposita	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidosperma laterale	0	0	0	0	0	0	0	2	1	0	0	0	1	2	2	2	0	0	0	0	0	0	0	0
Leptospermum polygalifolium subsp. *polygalifolium*	0	1	0	0	0	0	0	0	0	0	0	3	1	0	0	1	0	0	0	0	0	0	0	0
Leptospermum trinervium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leucopogon juniperinus	1	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Leucopogon lanceolatus	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Libertia paniculata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Lindsaea linearis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lindsaea microphylla	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Lissanthe strigosa subsp. *strigosa*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
*Lolium perrenne**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lomandra confertifolia var. pallida	0	0	2	2	0	2	0	1	3	0	0	0	1	1	0	2	0	2	2	0	0	2	2	0
Lomandra cylindrica	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Lomandra filiformis subsp. *coriacea*	0	0	3	0	0	0	0	2	2	0	0	0	0	2	3	3	0	0	0	0	0	0	0	0
Lomandra filiformis subsp. *filiformis*	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lomandra glauca subsp. *glauca*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lomandra longifolia	2	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	3	4	0	0	0	0	0	0
Lomandra multiflora	0	0	3	0	0	2	0	2	0	0	1	2	0	1	2	1	0	2	2	0	0	2	1	0
Lomandra obliqua	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
Maclura cochinchinensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrozamia reducta	0	0	2	1	2	3	0	2	1	0	2	0	2	2	3	0	0	0	3	3	0	0	0	0
Marsdenia rostrata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Marsdenia suaveolens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Maytenus silvestris	1	0	0	0	1	0	1	0	0	0	1	0	1	2	1	0	0	2	2	1	0	2	0	0
Melaleuca decora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Melaleuca ericifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Melaleuca linearifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Melaleuca nodosa	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0
Melaleuca quinquenervia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Species Name	Q82	Q83	Q84	Q85	Q86	Q87	Q88	Q89	Q90	Q91	Q92	Q93	Q94	Q95	Q96	Q97	Q98	Q99	Q100	Q101	Q103	Q104	Q105	Q106
Melaleuca styphelioides	4	0	0	0	2	0	3	0	0	3	0	0	0	0	0	0	3	0	0	2	0	0	0	3
Melia azedarach var. *australasica*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Melicope micrococca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1
Microlaena stipoides var. *stipoides*	0	0	0	2	0	0	0	0	0	0	0	0	0	1	2	0	0	2	0	0	0	0	0	0
Microsorum scandens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microtis parviflora	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mirbelia rubiifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mischocarpus australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Morinda jasminoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Muehlenbeckia gracillima	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Muellerina eucalyptoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neolitsea australiensis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neolitsea dealbata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Notelaea longifolia	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2
Notelaea ovata	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Notelaea venosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Ochna serrulata**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Olearia microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Omalanthus populifolius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Onopordum acanthium subsp. *acanthium*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opercularia aspera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Oplismenus aemulus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Oplismenus imbecillus	4	0	0	0	1	0	3	0	0	2	0	0	0	0	0	0	1	0	0	2	3	1	2	3
Oxalis perennans	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	1	0	0	0
Ozothamnus diosmifolius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0
Pandorea pandorana	2	0	0	1	1	2	0	0	0	0	1	0	1	1	2	0	0	1	0	0	0	0	0	0
*Panicum maximum**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Panicum simile	0	0	0	2	0	1	0	1	0	0	0	1	0	1	0	1	0	0	2	0	0	2	0	0
Pararchidendron pruinosum var. *pruinosum*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parsonsia straminea	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
Paspalidium distans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Paspalum dilatatum**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Paspalum urvellei**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Passiflora herbertiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Pellaea falcata	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2	0	0	0	2
Pellaea paradoxa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Pennisetum clandestinum**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Persicaria lapathifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Persoonia levis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Persoonia linearis	0	0	0	0	0	2	1	0	0	0	0	1	0	0	1	0	0	2	0	0	0	0	0	0
Phebalium squamulosum subsp. *squamulosum*	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Phragmites australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllanthus hirtellus	0	2	0	0	0	1	0	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0
Pimelea linifolia subsp. *linifolia*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Piper novae-hollandiae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pittosporum multiflorum	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Pittosporum revolutum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Pittosporum undulatum	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0
Planchonella australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plantago debilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Species Name	Q82	Q83	Q84	Q85	Q86	Q87	Q88	Q89	Q90	Q91	Q92	Q93	Q94	Q95	Q96	Q97	Q98	Q99	Q100	Q101	Q103	Q104	Q105	Q106
*Plantago lanceolata**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Platycerium bifurcatum subsp. *bifurcatum*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plectranthus parviflorus	1	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Poa affinis	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poa labillardieri var. *labillardieri*	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	5	0	0	4	0
Podolobium ilicifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Podolobium scandens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polymeria calycina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polyscias sambucifolia	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0	1	0	0
Pomax umbellata	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Poranthera microphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0
Pratia purpurascens	0	0	0	3	1	1	2	1	0	0	1	1	0	1	0	1	1	1	2	2	1	1	1	0
Prostanthera incisa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pseuderanthemum variabile	0	2	3	2	1	0	0	1	1	0	1	0	1	2	2	1	0	2	3	1	0	2	2	0
Pteridium esculentum	0	4	0	0	0	2	0	0	0	0	0	2	0	0	0	0	1	1	0	2	0	0	0	0
Pterostylis curta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Pterostylis longifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Pterostylis nutans	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pterostylis sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Ptilothrix deusta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pultenaea spinosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pultenaea daphnoides	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pultenaea paleacea var. *paleacea*	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Pultenaea retusa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pultenaea villosa	0	0	5	2	0	0	0	2	1	0	0	0	3	0	0	1	0	1	0	0	0	0	0	0
Pyrrosia rupestris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ranunculus inundatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Rapanea howittiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rapanea variabilis	0	0	0	0	1	0	2	0	0	0	1	0	0	2	0	0	0	2	0	2	0	0	3	0
*Raphanus raphanistrum**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0
Rhodamnia rubescens	0	0	0	0	2	0	3	0	0	3	0	0	0	0	0	0	0	0	0	2	0	0	0	1
Ripogonum album	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rubus moluccanus var. trilobus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	2	0	0	0
Rubus parvifolius	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0	0
Rubus rosifolius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
*Rubus ulmifolius**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sarcopetalum harveyanum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Scaevola ramosissima	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scolopia braunii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scutellaria mollis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senecio linearifolius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
*Senecio madagascariensis**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senna pendula var. *glabrata**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Setaria gracilis**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Sicyos australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Sida rhombifolia**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sigesbeckia orientalis	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Smilax australis	3	0	0	1	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	1
Smilax glyciphylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Solanum mauritianum**	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Solanum prinophyllum	0	0	0	0	1	0	0	0	0	0	1	0	0	2	0	0	0	0	0	2	0	1	0	0
Solanum pungetium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Species Name	Q82	Q83	Q84	Q85	Q86	Q87	Q88	Q89	Q90	Q91	Q92	Q93	Q94	Q95	Q96	Q97	Q98	Q99	Q100	Q101	Q103	Q104	Q105	Q106
Solanum stelligerum	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1
*Sonchus oleraceus**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Sporobolus africanus**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stellaria flaccida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	0	0
*Stellaria media**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stephania japonica var. *discolor*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	1
Streblus brunonianus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stylidium graminifolium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Syncarpia glomulifera	0	0	0	0	2	0	3	0	0	3	0	0	0	0	1	0	2	1	0	2	2	0	0	0
Synoum glandulosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Syzygium australe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tasmannia insipida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tetrastigma nitens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tetratheca juncea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thelymitra purpurata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thelymitra sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Themeda australis	0	0	0	0	3	3	0	5	0	0	1	1	0	2	0	0	0	0	5	0	0	0	0	0
*Thunbergia alata**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Thysanotus tuberosus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Toona ciliata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Trachymene incisa subsp. *incisa*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Tradescantia fluminensis**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trema tomentosa var. *viridis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Tricoryne elatior	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Trifolium repens**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Triglochin procerum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trochocarpa laurina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tylophora barbata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Typha orientalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urtica incisa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Verbena bonariensis**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*Verbena rigida**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vernonia cinerea var. *cinerea*	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0	0	0	0	2	0	0	2	1	0
Veronica plebia	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Villarsia exaltata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Viola betonicifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Viola hederacea	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	3	0	0	0	0
Wahlenbergia gracilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wilkiea heugeliana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Xanthorrhoea latifolia subsp. *latifolia*	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Xanthorrhoea macronema	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zieria smithii	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX C Fauna Species List

EXPECTED FAUNA SPECIES LIST

Below is a list of fauna species that could be *reasonably* expected to be found within the study area at some occurrence. Such an approach has been taken given the unlikelihood to record *all* potentially occurring species within an area during formal fauna surveys (due to seasonality, climatic limitations, crypticism etc).

Family sequencing and taxonomy follow for each fauna class:

Birds – Christidis and Boles (1994).

Herpetofauna - Cogger (1996).

Mammals - Strahan (ed) (1995) and Churchill (1998).

KNOWN AND EXPECTED BIRD LIST

Appendix Key: ✓ = Species Detected
* = Introduced species
(E) = Species listed under NSW TSC Act 1995 as Endangered.
(V) = Species listed under NSW TSC Act 1995 as Vulnerable.
(V*) = Species listed under the Commonwealth EPBC Act 1999 as Vulnerable
(E*) = Species listed under the Commonwealth EPBC Act 1999 as Endangered
(M*) = Species listed under the Commonwealth EPBC Act as Migratory
Species indicated in **BOLD** font are those threatened species known from within 10km of site (Atlas of NSW Wildlife 2008)

Data Source: **1**= Species recorded within Tank Paddock
1a= Tank Paddock - Anecdotal Records Green Corridor Coalition
2= Species recorded within Stockrington and George Booth Drive lands

Family Name	Scientific Name	Common Name	1	1a	2
Megapodiidae (Mound Builders)	*Alectura lathami*	Australian Brush-turkey			✓
Phasianidae (True Quails, Pheasant and Fowls)	*Coturnix ypsilophora*	Brown Quail			✓
Anseranatidae (Magpie Goose)	***Anseranas semipalmata***	**Magpie Goose (V)**			
Anatidae (Swans, Geese and Ducks)	*Dendrocygna arcuata*	Wandering Whistling-duck	✓		
	Anas castanea	Chestnut Teal	✓		
	Anas gracilis	Grey Teal	✓		
	Anas superciliosa	Pacific Black Duck	✓		✓
	Aytha australis	Hardhead			
	Chenonetta jubata	Australian Wood Duck			
	Oxyura australis	**Blue-billed Duck (V)**			
	Stictonetta naevosa	**Freckled Duck (V)**			
Podicipedidae (Grebes)	*Tachybaptus novaehollandiae*	Australasian Grebe	✓		
	Podiceps cristatus	Great Crested Grebe			
Anhingidae (Darters)	*Anhinga melanogaster*	Darter			
Phalacrocoracidae (Cormorants)	*Phalacrocorax carbo*	Great Cormorant			

Family Name	Scientific Name	Common Name	1	1a	2
	Phalacrocorax melanoleucos	Little Pied Cormorant	✓		✓
	Phalacrocorax sulcirostris	Little Black Cormorant	✓		
	Phalacrocorax varius	Pied Cormorant			
Pelecanide (Pelicans)	*Pelecanus conspicillatus*	Australian Pelican			
Podicipedidae (Grebes)	*Tachybaptus novaehollandiae*	Australasian Grebe	✓		
Ardeidae (Herons, Bitterns and Egrets)	*Ardea alba*	Great Egret	✓		
	Ardea ibis	Cattle Egret	✓		
	Ardea intermedia	Intermediate Egret	✓		
	Ardea pacifica	White-necked Heron			
	Botaurus poiciloptilus	**Australasian Bittern (V)**		✓	
	Ixobrychus flavicollis	**Black Bittern (V)**			
	Butorides striatus	Striated Heron			
	Egretta garzetta	Little Egret			
	Egretta novaehollandiae	White-faced Heron			
	Nycticorax caledonicus	Nankeen Night Heron			
Threskiornithidae (Ibises and Spoonbills)	*Threskiornis molucca*	Australian White Ibis	✓		
	Threskiornis spinicollis	Straw-necked Ibis	✓		
Ciconiidae (Storks)	***Ephippiorhynchus asiaticus***	**Black-necked Stork (E)**			
Accipitridae (Hawks, Kites and Eagles)	*Accipiter fasciatus*	Brown Goshawk	✓		✓
	Accipiter cirrhocephalus	Collared Sparrowhawk			
	Accipiter novaehollandiae	Grey Goshawk	✓		✓
	Aquila audax	Wedge-tailed Eagle			✓
	Aviceda subcristata	Pacific Baza			✓
	Circus approximans	Swamp Harrier			
	Circus assimilis	Spotted Harrier			
	Elanus axillaris	Black-shouldered Kite			
	Haliaeetus leucogaster	White-bellied Sea-Eagle	✓		
	Haliastur sphenurus	Whistling Kite	✓		
	Hamirostra melanosternon	**Black-breasted Buzzard (V)**			
	Hieraaetus morphnoides	Little Eagle			
	Lophoictinia isura	**Square-tailed Kite**			
	Pandion haliaetus	**Osprey (V)**			
Falconidae (Falcons)	*Falco berigora*	Brown Falcon			
	Falco cenchroides	Nankeen Kestrel			
	Falco longipennis	Australian Hobby			
Rallidae (Crakes, Rails ar Gallinules)	*Fulica atra*	Eurasian Coot			
	Gallinula philippensis	Buff-banded Rail			
	Gallinula tenebrosa	Dusky Moorhen			
	Porphyrio porphyrio	Purple Swamphen	✓		
	Porzana fluminea	Australian Spotted Crake			
	Porzana pusilla	Baillon's Crake			
	Porzana tabuensis	Spotless Crake			

Family Name	Scientific Name	Common Name	1	1a	2
	Rallus pectoralis	Lewin's Rail			
	Gallinula philippensis	Buff-banded Rail			
Turnicidae (Button-Quails)	*Turnix varia*	Painted Button-quail			✓
Rostratulidae (Painted Snipe)	***Rostratula benghalensis***	**Painted Snipe (V)**			
Jacanidae (Jacanas)	***Irediparra gallinacea***	**Comb-crested Jacana (V)**			
Burhinidae (Stone-curlews)	***Burhinus grallarius***	**Bush Stone-curlew (E)**			
Charadriidae (Lapwings, Plovers and Dottrels)	***Charadrius mongolus***	**Lesser Sand Plover (M*, V)**			
	Vanellus miles	Masked Lapwing			
Haematopodidae (Oystercatchers)	***Haematopus longirostris***	**Pied Oystercatcher (V)**			
	Vanellus miles	Masked Lapwing			
Laridae (Gulls and Terns)	*Larus novaehollandiae*	Silver Gull			
	Sterna albifrons	**Little Tern (E)**			
Columbidae (Pigeons and Doves)	**Columba livia*	Rock Dove			
	Chalcophaps indica	Emerald Dove			
	Geopelia humeralis	Bar-shouldered Dove			✓
	Geopelia striata	Peaceful Dove			✓
	Leucosarcia melanoleuca	Wonga Pigeon			✓
	Macropygia amboinensis	Brown Cuckoo-Dove	✓		✓
	Lopholaimus antarcticus	Topknot Pigeon			✓
	Ocyphaps lophotes	Crested Pigeon			
	Phaps chalcoptera	Common Bronzewing			✓
	Phaps elegans	Brush Bronzewing			
	Ptilinopus magnificus	**Wompoo Fruit-dove (V)**			
	Ptilinopus regina	**Rose-crowned Fruit-Dove (V)**			
	Superb Fruit-Dove	**Ptilinopus superbus (V)**			
	**Streptopelia chinensis*	Spotted Turtle-Dove			
Cacatuidae (Cockatoos)	*Calyptrohynchus funereus*	Yellow-tailed Black-Cockatoo			
	Calyptorhynchus lathami	**Glossy Black-Cockatoo (V)**			
	Callocephalon fimbriatum	**Gang-Gang Cockatoo (V)**			✓
	Cacatua roseicapilla	Galah	✓		
	Cacatua tenuirostris	Long-billed Corella			
	Cacatua sanguinea	Little Corella			
	Cacatua galerita	Sulphur-crested Cockatoo			
Psittacidae (Parrots)	*Alisterus scapularis*	Australian King Parrot	✓		✓
	Glassopsitta pusilla	Little Lorikeet	✓		✓
	Lathamus discolor	**Swift Parrot (E, E*)**			
	Neophema pulchella	**Turquoise Parrot (V)**			
	Platycercus elegans	Crimson Rosella			
	Platycercus eximius	Eastern Rosella	✓		✓
	Psephotus haematonotus	Red-rumped Parrot	✓		
	Trichoglossus chlorolepidotus	Scaly-breasted Lorikeet			✓

Family Name	Scientific Name	Common Name	1	1a	2
	Glossopsitta concina	Musk Lorikeet	✓		
	Glossopsitta pusilla	Little Lorikeet			✓
	Trichoglossus haematodu	Rainbow Lorikeet	✓		✓
Cuculidae (Old World Cuckoos)	*Cuculus saturatus*	Oriental Cuckoo (M*)			
	Cacomantis flabelliformis	Fan-tailed Cuckoo	✓		✓
	Cacomantis variolosus	Brush Cuckoo			✓
	Chrysococcyx basalis	Horsfield's Bronze-Cuckoo	✓		
	Chrysococcyx lucidus	Shining Bronze-Cuckoo	✓		✓
	Cuculus pallidus	Pallid Cuckoo	✓		✓
	Eudynamys scolopacea	Common Koel	✓		✓
	Scythrops novaehollandia	Channel-billed Cuckoo	✓		
Centropodidae (Coucals)	*Centropus phasianinus*	Pheasant Coucal			
Strigidae (Hawk Owls)	***Ninox strenua***	**Powerful Owl (V)**	✓		
	Ninox connivens	**Barking Owl (V)**			
	Ninox boobook	Southern Boobook			
Tytonidae (Barn Owls)	*Tyto alba*	Barn Owl			
	Tyto novaehollandiae	**Masked Owl (V)**		✓	
Podargidae (Frogmouths)	*Podargus strigoides*	Tawny Frogmouth			✓
Caprimulgidae (Nightjars)	*Eurostopodus mystacalis*	White-throated Nightjar			
Halcyonidae (Kingfishers and Kookaburras)	*Dacelo novaeguineae*	Laughing Kookaburra	✓		✓
	Todiramphus sanctus	Sacred Kingfisher	✓		✓
Meropidae (Bee-eaters)	*Merops ornatus*	Rainbow Bee-eater (M*)			
Coraciidae (Typical Rollers)	*Eurystomus orientalis*	Dollarbird	✓		
Climacteridae (Australo-Papuan Treecreepers)	*Cormobates leucophaeus*	White-throated Treecreeper	✓		✓
	Climacteris picumnus	**Brown Treecreeper (V)**			✓
Maluridae (Fairy-Wrens and Emu-Wrens)	*Malurus cyaneus*	Superb Fairy-wren	✓		✓
	Malurus lamberti	Variegated Fairy-wren	✓		✓
Pardalotidae (Pardalotes, Scrubwrens, Thornbills)	*Pardalotus punctatus*	Spotted Pardalote	✓		✓
	Paradalotus striatus	Striated Pardalote	✓		✓
	Sericornis frontalis	White-browed Scrubwren	✓		✓
	Sericornis citreogularis	Yellow-throated Scrubwren			✓
	Chthonicola sagittata	**Speckled Warbler (V)**			
	Gerygone mouki	Brown Gerygone	✓		✓
	Gerygone olivacea	White-throated Gerygone	✓		
	Acanthiza pusilla	Brown Thornbill	✓		✓
	Acanthiza reguloides	Buff-rumped Thornbill			
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill	✓		
	Acanthiza nana	Yellow Thornbill	✓		✓
	Acanthiza lineata	Striated Thornbill	✓		✓
	Hylacola pyrrhopygia	Chestnut-rumped Heathwren			✓

Family Name	Scientific Name	Common Name	1	1a	2
Meliphagidae (Honeyeaters)	*Anthochaera carunculata*	Red Wattlebird			
	Plectrhyncha lanceolata	Striped Honeyeater			✓
	Anthochaera chrysoptera	Brush Wattlebird			
	Philemon corniculatus	Noisy Friarbird	✓		✓
	Xanthomyza phrygia	**Regent Honeyeater (E, E*)**			
	Manorina melanophrys	Bell Miner	✓		✓
	Manorina melanocephala	Noisy Miner	✓		✓
	Meliphaga lewinii	Lewin's Honeyeater	✓		✓
	Lichenostomus chrysops	Yellow-faced Honeyeater	✓		✓
	Lichenostomus melanops	Yellow-tufted Honeyeater			✓
	Lichenostomus penicillatu	White-plumed Honeyeater			
	Melithreptus brevirostris	Brown-headed Honeyeater			✓
	Melithreptus lunatus	White-naped Honeyeater	✓		✓
	Melithreptus gularis	**Black-chinned Honeyeater (V**			✓
	Lichmera indistincta	Brown Honeyeater			
	Phylidonyris novaehollandiae	New Holland Honeyeater			✓
	Phylidonyris nigra	White-cheeked Honeyeater			✓
	Acanthorhynchus tenuirostris	Eastern Spinebill	✓		✓
	Myzomela sanguinolenta	Scarlet Honeyeater	✓		✓
Eopsaltriidae (Robins)	*Microeca fascinans*	Jacky Winter			
	Petroica rosea	Rose Robin			✓
	Eopsaltria australis	Eastern Yellow Robin	✓		✓
	Melanodryas cucullata	**Hooded Robin (V)**			
Pomatostomidae (Australo-Papuan Babblers)	***Pomatostomus temporalis***	**Grey-crowned Babbler (V)**			
Cinclosomidae (Quail-thrushes and allies)	*Psophodes olivaceus*	Eastern Whipbird	✓		✓
Neosittidae (Sittellas)	*Daphoenositta chrysopter*	Varied Sittella			✓
Pachycephalidae (Whistlers, Shrike-tit, Shrike-thrushes)	*Falcunculus frontatus*	Crested Shrike-tit			✓
	Pachycephala pectoralis	Golden Whistler	✓		✓
	Pachycephala rufiventris	Rufous Whistler	✓		✓
	Colluricincla harmonica	Grey Shrike-thrush	✓		✓
Dicruridae (Monarchs, Fantails and Drongo)	*Monarcha melanopsis*	Black-faced Monarch	✓		✓
	Monarcha trivirgatus	Spectacled Monarch	✓		
	Myiagra cyanoleuca	Satin Flycatcher			
	Myiagra rubecula	Leaden Flycatcher	✓		✓
	Myiagra inquieta	Restless Flycatcher			
	Grallina cyanoleuca	Magpie-lark	✓		✓
	Rhipidura rufifrons	Rufous Fantail	✓		✓
	Rhipidura fuliginosa	Grey Fantail	✓		✓
	Rhipidura leucophyrs	Willie Wagtail	✓		✓
	Dicrurus bracteatus	Spangled Drongo			
Campephagidae (Cuckoo-shrikes and	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike	✓		✓

Family Name	Scientific Name	Common Name	1	1a	2
Trillers)					
	Coracina tenuirostris	Cicadabird			✓
	Lalage sueurii	White-winged Triller			✓
Oriolidae (Orioles and Figbird)	*Oriolus sagittatus*	Olive-backed Oriole	✓		✓
	Sphecotheres viridis	Figbird			
Artamidae (Woodswallows, Butcherbirds,Currawon s)	*Artamus leucorynchus*	White-breasted Woodswallow	✓		
	Artamus superciliosus	White-browed Woodswallow			✓
	Artamus cyanopterus	Dusky Woodswallow			✓
	Cracticus torquatus	Grey Butcherbird	✓		✓
	Cracticus nigrogularis	Pied Butcherbird	✓		✓
	Gymnorhina tibicen	Australian Magpie	✓		✓
	Strepera graculina	Pied Currawong			✓
Corvidae (Crows and allies)	*Corvus coronoides*	Australian Raven	✓		✓
Cororacidae (Mud-nesters)	*Corcorax melanorhampho*	White-winged Chough			✓
Ptilinorhynchidae (Bowerbirds)	*Sericulus chysocephalus*	Regent Bowerbird			✓
	Ptilonorhynchus violaceus	Satin Bowerbird			✓
Motacillidae (Old World Wagtails,Pipits)	*Anthus novaeseelandiae*	Richard's Pipit			
Passeridae (Sparrows, Weaverbirds Waxbills)	**Passer domesticus*	House Sparrow			
	Taeniopygia guttata	Zebra Finch			
	Taeniopygia bichenovii	Double-barred Finch			
	Neochmia temporalis	Red-browed Finch	✓		✓
	Lonchura castaneothorax	Chestnut-breasted Mannikin			
Dicaeidae (Flowerpeckers)	*Dicaeum hirundinaceum*	Mistletoebird	✓		✓
Hirundinidae (Swallows and Martins)	*Hirundo neoxena*	Welcome Swallow	✓		✓
	Hirundo nigricans	Tree Martin			
	Hirundo ariel	Fairy Martin	✓		
Sylviidae (Old World Warblers)	*Acrocephalus stentoreus*	Clamorous Reed Warbler	✓		
	Cincloramphus mathewsi	Rufous Songlark			✓
	Cisticola exilis	Golden-headed Cisticola	✓		
	Megalurus gramineus	Little Grassbird			
	Megalurus timorensis	Tawny Grassbird			
Zosteropidae (White-eyes)	*Zosterops lateralis*	Silvereye	✓		✓
Sturnidae (Starlings and allies)	**Sturnus vulgaris*	Common Starling			
	**Acridotheres tristis*	Common Myna	✓		

KNOWN AND EXPECTED MAMMAL LIST

Appendix Key: ✓ = Species Detected
* = Introduced species
(E) = Species listed under NSW TSC Act 1995 as Endangered.
(V) = Species listed under NSW TSC Act 1995 as Vulnerable.
(V*) = Species listed under the Commonwealth EPBC Act 1999 as Vulnerable
(E*) = Species listed under the Commonwealth EPBC Act 1999 as Endangered
(M*) = Species listed under the Commonwealth EPBC Act as Migratory
Species indicated in **BOLD** font are those threatened species known from within 10km of site (Atlas of NSW Wildlife 2008)

Data Source: **1**= Species recorded within Tank Paddock
1a= Tank Paddock - Anecdotal Records Green Corridor Coalition
2= Species recorded within Stockrington and George Booth Drive lands

Family Name	Scientific Name	Common Name	1	1a	2
Tachyglossidae (Echidnas)	*Tachyglossus aculeatus*	Short-beaked Echidna			
Dasyuridae (Dasyurids)	*Antechinus stuartii*	Brown Antechinus			✓
	Antechinus swainsonii	Dusky Antechinus			
	Dasyurus maculatus	**Tiger Quoll (V, V*)**			
	Planigale maculata	**Common Planigale (V)**			
Peramelidae (Bandicoots and Bilbies)	*Isoodon macrourus*	Northern Brown Bandicoot			
	Peremeles nasuta	Long-nosed Bandicoot			
Phascolarctidae (Koala)	***Phascolarctos cinereus***	**Koala (V)**			✓
Vombatidae (Wombats)	*Vombatus ursinus*	Common Wombat			
Petauridae (Wrist-winged Gliders)	*Petaurus breviceps*	Sugar Glider			
	Petaurus norfolcensis	**Squirrel Glider (V)**			
	Petaurus australis	**Yellow-bellied Glider (V)**			
Pseudocheiridae (Ringtail Possums, Greater Glider)	*Pseudocheirus peregrinus*	Common Ringtail Possum			
	Petauroides volans	Greater Glider			
Acrobatidae (Feathertail Glider)	*Acrobates pygmaeus*	Feathertail Glider			
Phalangeridae (Brushtail Possums and Cuscuses)	*Trichosurus vulpecula*	Common Brushtail Possum			
Potoroidae (Potoroos and Bettongs)	***Potorous tridactylus***	**Long-nosed Potoroo (V, V*)**			
Macropodidae (Wallabies and Kangaroos)	*Macropus giganteus*	Eastern Grey Kangaroo			
	Macropus rufogriseus	Red-necked Wallaby			✓
	Wallabia bicolor	Swamp Wallaby			✓
Pteropodidae (Flying-foxes, Blossom-bats)	***Pteropus poliocephalus***	**Grey-headed Flying-fox (V, V*)**			
	Pteropus scapulatus	Little Red Flying-fox			
Rhinolophidae (Horseshoe-bats)	*Rhinolophus megaphyllus*	Eastern Horseshoe-bat			
Emballonuridae (Sheathtail-bats)	***Saccolaimus flaviventris***	**Yellow-bellied Sheathtail-bat (V)**			
Molossidae (Freetail-bats)	***Mormopterus norfolkensis***	**East Coast Freetail-bat (V)**		✓	

Family Name	Scientific Name	Common Name	1	1a	2
	Tadarida australis	White-striped Freetail-bat			
Vespertilionidae (Vespertilionid Bats)	***Miniopterus australis***	**Little Bentwing-bat (V)**		✓	
	Miniopterus schreibersii	**Common Bentwing-bat (V)**		✓	
	Nyctophilus geoffroyi	Lesser Long-eared Bat			
	Nyctophilus gouldii	Gould's Long-eared Bat			
	Chalinolobus dwyeri	**Large-eared Pied Bat (V, V*)**			
	Chalinolobus gouldii	Gould's Wattled Bat			
	Chalinolobus morio	Chocolate Wattled Bat			
	Falsistrellus tasmaniensis	**Eastern Falsistrelle (V)**			
	Myotis adversus	**Large-footed Myotis (V)**		✓	
	Scoteanax rueppellii	**Greater Broad-nosed Bat (V)**			
	Scotorepens greyii	Little Broad-nosed Bat			
	Scotorepens orion	Eastern Broad-nosed Bat			
	Vespadelus darlingtoni	Large Forest Bat			
	Vespadelus regulus	Southern Forest Bat			
	Vespadelus pumilus	Eastern Forest Bat			
	Vespadelus vulturnus	Little Forest Bat			
Muridae (Murids)	*Hydromys chrysogaster*	Water Rat			
	**Mus musculus*	House Mouse			
	Pseudomys novaehollandiae	New Holland Mouse			
	Rattus fuscipes	Bush Rat			
	Rattus lutreolus	Swamp Rat			
	**Rattus norvegicus*	Brown Rat			
	**Rattus rattus*	Black Rat			
Canidae (Dogs)	**Canis familiaris*	Dog			
	Canis familiaris dingo	Dingo			
	**Vulpes vulpes*	Red Fox			
Felidae (Cats)	**Felis catus*	Feral Cat			
Leporidae (Rabbit and Hare)	**Oryctolagus cuniculus*	European Rabbit	✓		
	**Lepus capensis*	Brown Hare			
Equidae (Horse and Donkey)	**Equus caballus*	Horse			
Suidae (Pigs)	**Sus scrofa*	Pig			
Bovidae (Horned Ruminants)	**Bos taurus*	Cow			
	**Capra hircus*	Goat			

KNOWN AND EXPECTED REPTILE LIST

Appendix Key: ✓ = Species Detected
(E) = Species listed under NSW TSC Act 1995 as Endangered.
(V) = Species listed under NSW TSC Act 1995 as Vulnerable.
(V*) = Species listed under the Commonwealth EPBC Act 1999 as Vulnerable
(E*) = Species listed under the Commonwealth EPBC Act 1999 as Endangered
(M*) = Species listed under the Commonwealth EPBC Act as Migratory
Species indicated in **BOLD** font are those threatened species known from within 10km of site (Atlas of NSW Wildlife data 2008)

Data Source: **1** = Species recorded within Tank Paddock
2 = Species recorded within Stockrington and George Booth Drive lands

Family Name	Scientific Name	Common Name	1	2
Chelidae (Tortoises)	*Chelodina longicollis*	Long-necked Tortoise		
Agamidae (Dragons)	*Amphibolurus muricatus*	Jacky Lizard		✓
	Amphibolurus nobbi	Nobbi		
	Physignathus lesuerii	Eastern Water Dragon	✓	
	Pogona barbata	Eastern Bearded Dragon		
Pygopodidae (Legless Lizards)	*Lialis burtonis*	Burton's Snake Lizard		
	Pygopus lepidopus	Common Scaly-foot		
	Delma plebeia	Leaden Delma		
Gekkonidae (Geckoes	*Diplodactylus vittatus*	Wood Gecko		
	Phyllurus platurus	Southern Leaf-tailed Gecko		
	Oedura lesueurii	Lesueur's Velvet Gecko		
	Underwoodisaurus milii	Thick-tailed Gecko		
Varanidae (Monitors)	*Varanus gouldii*	Gould's Monitor		
	Varan us varius	Lace Monitor		✓
Scincidae (Skinks)	*Carlia tetradactyla*			
	Cryptoblepharus virgatus			
	Ctenotus taeniolatus	Copper-tailed Skink		
	Ctenotus robustus	Striped Skink		
	Cyclodomorphus casuarinae	She-oak Skink		
	Egernia cunninghamii	Cunningham's Skink		
	Egernia major	Land Mullet		
	Egernia modesta			
	Egernia striolata	Tree-crevice Skink		
	Egernia saxatilis	Black Rock Skink		
	Egernia whitii	White's Skink		
	Eulamprus quoyii	Eastern Water Skink		
	Eulamprus tenuis			✓
	Lampropholis delicata	Grass Skink	✓	✓
	Lampropholis guichenoti	Garden Skink		
	Lygisaurus foliorum	Tree-base Litter-skink		
	Morethia boulengeri	South-eastern Morethia		
	Pseudomoia platynota	Red-throated Skink		
	Saiphos equalis			
	Saproscincus mustelinus	Weasel Skink		
	Tiliqua scincoides	Eastern Blue-tongued Lizar		

Family Name	Scientific Name	Common Name	1	2
Typhlopidae (Blind Snakes)	*Ramphotyphlops bituberculatu*	Prong-snouted Blind Snake		
	Ramphotyphlops weidii	Brown-snouted Blind Snake		
	Ramphotyphlops nigrescens	Black Blind Snake		
Boidae (Pythons)	*Morelia spilota*	Diamond Python	✓	
Colubridae (Tree Snakes)	*Boiga irregularis*	Brown Tree Snake		
	Dendralaphis punctulata	Green Tree Snake		
Elapidae (Venomous Snakes)	*Furina diadema*	Red-naped Snake		
	Cacophis krefftii	Dwarf Crowned Snake		
	Demansia psammophis	Yellow-faced Whip Snake		
	Furina diadema	Red-naped Snake		
	Notechis scutatus	Eastern Tiger Snake		
	Pseudonaja textilis	Eastern Brown Snake		
	Rhinoplocephalus nigrescens	Eastern Small-eyed Snake		
	Vermicella annulata	Bandy Bandy		
	Hemiaspis signata	Black-bellied Swamp Snake		
	Pseudechis porphyriacus	Red-bellied Black Snake		

KNOWN AND EXPECTED FROG LIST

Appendix Key: ✓ = Species Detected
(E) = Species listed under NSW TSC Act 1995 as Endangered.
(V) = Species listed under NSW TSC Act 1995 as Vulnerable.
(V*) = Species listed under the Commonwealth EPBC Act 1999 as Vulnerable
(E*) = Species listed under the Commonwealth EPBC Act 1999 as Endangered
(M*) = Species listed under the Commonwealth EPBC Act as Migratory
Species indicated in **BOLD** font are those threatened species known from within 10km of site (Atlas of NSW Wildlife data 2008)

Data Source: **1** = Species recorded within Tank Paddock
2 = Species recorded within Stockrington and George Booth Drive lands

Family Name	Scientific Name	Common Name	1	2
Hylidae (Tree Frogs)	***Litoria aurea***	**Green and Golden Bell Frog (E, V*)**		
	Litoria brevipalmata	**Green-thighed Frog (V)**		
	Litoria caerulea	Green Tree Frog		
	Litoria chloris	Red-eyed Green Tree Frog		
	Litoria dentata	Bleating Tree Frog		
	Litoria fallax	Eastern Dwarf Tree Frog	✓	
	Litoria latopalmata	Broad-palmed Frog		
	Litoria lesueuri	Lesueur's Frog		
	Litoria nasuta	Rocket Frog		
	Litoria peronii	Peron's Tree Frog		
	Litoria phyllochroa	Green Leaf Tree Frog		
	Litoria tyleri	Tyler's Tree Frog		
	Litoria verreauxii	Verreaux's Frog		
Myobatrachidae (Ground Frogs)	*Adelotus brevis*	Tusked Frog		
	Crinia signifera	Common Eastern Froglet		
	Crinia tinnula	**Wallum Froglet (V)**		
	Limnodynastes dumerilli	Eastern Banjo Frog		
	Limnodynastes ornatus	Ornate Burrowing Frog		
	Limnodynastes peronii	Striped Marsh Frog		
	Limnodynastes tasmaniensis	Spotted Grass Frog		
	Mixophyes fasciolatus	Great Barred Frog		
	Pseudophryne coriacea	Red-backed Toadlet		✓
	Pseudophryne bibronii	Brown Toadlet		
	Uperoleia fusca	Dusky Toadlet		
	Uperoleia laevigata	Smooth Toadlet		

APPENDIX D Letter from Royal Botanical Gardens Sydney

ROYAL BOTANIC GARDENS SYDNEY

RECEIVED
30 JUL 2008
BY:

Ms Debbie LANDENBERGER
Harper Somers O'Sullivan
PO Box 428
Hamilton, NSW 2303
AUSTRALIA

Inquiry No: 13941
Botanical.Is@rbgsyd.nsw.gov.au
Fax No: (02) 9251 1952
Ph No: (02) 9231 8111
Date: 24 July 2008

Dear Ms LANDENBERGER,

In reply to your inquiry of 22-Jul-08, your reference 24530:DL, the following information is supplied:

I am happy to confirm the identification of your plant specimen from Stockrington as *Callistemon linearifolius*.

An invoice for 533.00 (incl. GST) will be forwarded to you separately by our finance section to cover cost of identification.

Thank you for your inquiry.

Yours sincerely

Barbara Wiecek
Identification Botanist
Botanical Information Service

Go to our online Botanical Information Services at plantnet.rbgsyd.nsw.gov.au to find out more about plants of New South Wales

The Botanical Information Email address is Botanical.Is@rbgsyd.nsw.gov.au
Mrs Macquaries Road Sydney NSW 2000 Australia • Telephone (02) 9231 8111 • Fax (02) 9251 1952

APPENDIX E Vegetation Community Photographs

Plate 1 Coastal Foothills Spotted Gum Ironbark Forest

Plate 2 Coastal Plains Smooth-barked Apple Woodland

Plate 3 Lower Hunter Spotted Gum Ironbark Forest

Plate 4 Hunter Valley Moist Forest

Plate 5 Alluvial Tall Moist Forest

Plate 6 Subtropical Rainforest

Plate 7 Hunter Lowland Redgum Forest

Plate 8 Swamp Oak Rushland Forest

Plate 9 **Swamp Mahogany – Paperbark Forest**

Plate 10 Freshwater Wetland Complex

Plate 11 Weeds and Cleared Areas

Plate 12 Dams

APPENDIX F Qualifications of Personnel

RPS HARPER SOMERS O'SULLIVAN

Curriculum Vitae

Name:	Craig Anderson
Office:	RPS Harper Somers O'Sullivan
Position in Company:	Director - Environment
Qualifications / Memberships:	Bachelor Applied Science (Environmental Assessment & Management) University of Newcastle, NSW (1994) Currently undertaking Graduate Diploma in Archaeological Heritage through UNE Ecological Consultants Association of NSW (ECA) Planning Institute of Australia (PIA) Frog and Tadpole Study Group (FATS) Hunter Birds Observers Club (HBOC) Committee Member 2008 Bird Observers Club of Australia (BOCA) Hunter Heritage Network (HHN) RFS/PIA NSW Consulting Planners Bushfire Training

Areas of Expertise:

- Production of complex ecological impact assessment documents
- Detailed understanding of environmental legislation
- Conflict resolution and environmental impact mediation
- Land and Environment Court hearings
- Flora, habitat, and fauna surveys including threatened species
- Bushfire Threat Assessment & Management reporting
- Project Management (including areas outside environmental concern)

Experience Includes:

Craig is the Director of the Environment Division at RPS HSO, and has over 14 years experience in a wide range of environmental consulting. He has undertaken and managed commissions for a diverse range of projects, including State Significant Developments such as the Hunter Economic Zone (HEZ).

Extensive background in ecological field surveys, encompassing all aspects of flora and fauna identification, targeted surveying and mapping. Involved in the initial formulation of an Association of Consulting Ecologists for NSW in 1998. Elected member on the Inaugural Council (served two terms). Has acted as an expert witness in several Land and Environment Court matters relating to ecology and bushfire assessment. An experienced negotiator of ecological / development outcomes, and has a detailed understanding of legislation related to ecological matters. Craig has been actively involved in representations to the Department of Environment on behalf of the NSW Urban Taskforce in regards to proposed changes to the NSW Threatened Species Conservation Act.

Craig has also been involved in submissions on bushfire legislation and represented industry groups such as the NSW Urban Taskforce and Urban Development Institute of Australia (UDIA) on matters relating to issues such as the proposed listing of the Lower Hunter Spotted Gum – Ironbark Forest (LHSGIF) as an endangered ecological community, and regional environmental biodiversity strategies. Craig has also recently provided advice and submission material to the UDIA in relation to the Native Vegetation Act 2003 and the operations of the Catchment Management Authority (CMA).

RPS HARPER SOMERS O'SULLIVAN

Curriculum Vitae

Name:	Matthew Doherty
Office:	RPS Harper Somers O'Sullivan
Position in Company:	Environmental & GIS Manager
Qualifications / Memberships:	BLMC (Land & Water Conservation Major) Bush Regeneration Cert II Spikeless Tree Climbing Techniques NSW Driver's Licence (Class C) OH&S Induction Training (Green Card) NPWS Scientific Investigation Licence NSW Animal Ethics Research Authority

Areas of Expertise:

- Project Design & Management
- Environmental Impact Assessment and Reporting
- Liaison and Mediation with Clients, Stakeholders & Governing Bodies
- Archaeological (European/ Aboriginal Heritage) coordination and negotiation
- Expert GIS/ GPS for Project Design and Mapping
- Ecological Flora, Fauna & Habitat Surveys (Terrestrial & Aquatic)
- Tree Climbing to Install, Monitor and Maintain Supplementary Habitat (Nestboxes)

Experience Includes:

Matthew has seven years experience in the environmental industry with key skills in project management, survey design and GIS. In his position as Environmental and GIS Manager, Matthew manages the day to day running of projects, verification of reports and other outputs and ensures clients are well informed of project progress and key findings. Matthew's background in local and state government and private consultancy gives him a high level of appreciation of the development sector and allows him to take a pragmatic approach to providing successful conservation and development outcomes.

RPS HARPER SOMERS O'SULLIVAN

Curriculum Vitae

Name: Toby Lambert

Office: RPS Harper Somers O'Sullivan

Position in Company: Senior Ecologist

Qualifications / Memberships:
Bachelor of Environmental Science
Ecological Consultants Association of NSW
NSW Driver's Licence (Class C)
OH&S Induction Training (Green Card)
NPWS Scientific Investigation Licence
NSW Animal Ethics Research Authority

Areas of Expertise:

- Environmental and ecological impact assessment reporting
- Flora, fauna and habitat survey methodology design and management
- Detailed understanding of threatened species legislation and issues
- Terrestrial fauna surveys
- Renewable energy assessment
- Bushland and vegetation management
- Complex holistic project management
- Local, State and Commonwealth project co-ordination
- Dispute resolution and mediation

Experience Includes:

Toby has over twelve years experience in undertaking and managing a diverse array of ecological and environmental surveys and assessments. Toby has produced ecological and environmental documentation for private and public projects ranging in complexity. These include a number of wind farms throughout Australia and New Zealand, coal mines and a range of infrastructure projects within the Hunter region. Toby has also managed ecological masterplanning for residential projects in Sydney, the Central Coast and the Hunter. Toby is also currently the project manager for the environmental component of the development of the Hunter Economic Zone industrial estate at Kurri Kurri, the largest industrial estate in NSW.

Toby's fields of special competence are Environmental Impact Assessment and mediation, flora, fauna and habitat survey method, design and identification, detailed understanding of legislation and threatened species issues, terrestrial fauna surveys and project management.

RPS HARPER SOMERS O'SULLIVAN

Curriculum Vitae

Name:	Deborah Landenberger
Office:	RPS Harper Somers O'Sullivan
Position in Company:	Ecologist/ Botanist
Qualifications / Awards	B. Sc (Hons – First Class) NSW Driver's Licence (Class C) OH&S Induction Training (Green Card) NPWS Scientific Investigation Licence NSW Animal Ethics Research Authority
Memberships:	Australian Plant Society Australian Network for Plant Conservation Australasian Native Orchid Society

Areas of Expertise:

- Flora identification and habitat assessment
- Targeted threatened flora surveys
- Delineation and mapping of vegetation communities
- Endangered Ecological Community (EEC) assessment
- Threatened Flora Management Plans
- Experience in PATN Statistical package
- Ecological Monitoring and Reporting
- Vegetation and Bushland Management Plans
- Project Management and quote preparation
- Experience with GPS/GIS for project design and mapping
- Detailed understanding of environmental legislation

Project Experience Includes:

Deborah Landenberger has broad range of Ecological Assessment reporting experience underpinned by over 10 years of ecological field experience. Experience within the consulting industry has primarily included a wide range of flora assessment disciplines as required by a wide range of public and private clients. Debbie has a strong grounding in threatened flora species ecology and vegetation mapping ranging from the South Coast of NSW to Guyra in the north west and Port Macquarie on the north coast of NSW.

Debbie's strong botanical interests have been central in a number of important projects, these include major vegetation mapping projects in the south of Lake Macquarie, Minmi to the west of Newcastle, Ben Lomond (near Guyra), Oberon, North Arm Cove, Singleton and Bulahdelah. Her knowledge of non-parametric statistics, such as PATN statistical program has enabled RPS HSO to undertake large mapping projects using sound scientific methodology. Her knowledge of threatened flora species includes 2 years research on the threatened flora species *Tetratheca juncea.* Debbie's wide ranging knowledge and experience of Australian flora is a vital part of RPS HSO's ability to meet the consultation and regulatory needs of the development community.

RPS HARPER SOMERS O'SULLIVAN

Curriculum Vitae

Name: Allan Richardson

Office: RPS Harper Somers O'Sullivan

Position in Company: Ecologist

Qualifications / Awards

B.Env.Sc. (Environmental Management)
B.Env.Sc. (Hons) (Biology) – Migratory Wading Bird Study
2002 Hunter Environmental Institute Scholarship
Waterways Authority Boating Licence
OH&S Induction Training (Green Card)
NSW Driver's Licence (Class C)
NPWS Scientific Licence
NSW Animal Ethics Research Authority

Memberships: Hunter Bird Observers Club

Areas of Expertise:

- Ornithological Surveys and Research
- Targeted and general Terrestrial flora and fauna surveys
- Threatened Flora & Fauna Assessment, Reporting and Legislation
- GPS Survey and GIS Mapping Projects
- High Level Nature Photography
- Tertiary and General Ecological Tutoring, Demonstrating and Presenting

Project Experience Includes:

Allan Richardson has broad range of Ecological Assessment reporting experience underpinned by over 25 years of ecological field experience. Project experience has primarily included a range of flora and fauna assessment disciplines as required by a wide range of corporate to domestic client requirements. Allan has a strong grounding in threatened species ecology in both coastal and western NSW regional areas, with specialist migratory wader studies expertise in Central NSW and Roebuck Bay in North Western Australia.

Allan's wide ranging interest across different ecological disciplines, has been a central part of important threatened species projects, including, the Critically Endangered North Rothbury Persoonia, Hunter Estuary Green and Golden Bell Frog populations, Migratory Wader habitat usage surveys and seasonal Swift Parrot movements. Allan's broad ecological experience also represents an important part of RPS HSO's threatened flora and vegetation community mapping, targeted fauna survey works and threatened species habitat assessments over both small and large spatial areas for a range of client needs. His depth of experience and a strong knowledge of Australian fauna and regional vegetation contribute strongly to RPS HSO's ability to meet the consultation and regulatory needs of the development community.

RPS HARPER SOMERS O'SULLIVAN

Curriculum Vitae

Name: Anna McConville

Office: RPS Harper Somers O'Sullivan

Position in Company: Ecologist

Qualifications / Memberships:
B.Env. Sc.
M.Phil. (Env. Sc.) Candidate
"The Ecology of the East Coast Freetail Bat (*Mormopterus norfolkensis*) in the Hunter Region"
Member of the Australasian Bat Society
Member of the Royal Zoological Society of Australia
Member of the Wildlife Preservation Society of Australia

Areas of Expertise:

- Terrestrial Flora and Fauna Surveys
- Targeted threatened flora and fauna surveys
- Ecological impact assessment and reporting
- Ecological condition and threatened species monitoring
- Geographic Information Systems mapping and analyses
- Detailed understanding of legislation and threatened species issues

Experience Includes:

Anna has over three years experience as an ecological consultant across the Hunter, Central Coast and North Coast regions of NSW. Anna is experienced in designing and conducting flora and fauna surveys for environmental impact assessment and ecological monitoring. Key experience includes large infrastructure projects such as Pacific Highway Upgrades, ecological constraints and opportunities investigations for local environmental studies and implementation of ecological monitoring programs. Anna has also recently undertaken Biodiversity Certification and BioBanking feasibility investigations in the Hunter.

Anna is also currently completing a research degree investigating the habitat preferences of the East Coast Freetail Bat (*Mormopterus norfolkensis*), a threatened species, in the Hunter Region. The project investigates landscape-scale habitat use, roost selection and diet and aims to provide essential information to develop management strategies for the species.

RPS HARPER SOMERS O'SULLIVAN

Curriculum Vitae

Name: Sam Bishop

Office: RPS Harper Somers O'Sullivan

Position in Company: Ecologist

Qualifications / Memberships: B. Env. Sc. (EAM)

Member of the Fire Protection Association Australia (FPA)
Society of Frogs & Reptiles (SOFAR)
Hunter Bird Observers Club (HBOC)
NSW Driver's Licence (Class C)
OH&S Induction Training (Green Card)
NPWS Scientific Investigation Licence
NSW Animal Ethics Research Authority

Areas of Expertise:

- Conducting Field Surveys for Flora, Fauna and Habitat Identification.
- Flora identification and targeted threatened flora species searches
- Geographical Information Systems project design and mapping
- Report Preparation including Threatened Species Assessment, Endangered Ecological Communities assessment, and Vegetation Management Plans
- Detailed understanding of environmental legislation and threatened flora species issues
- Bushfire Threat Assessment & Management reporting
- Bushfire Risk Management Plans
- Fuel Management Plans
- Tree Clearance Supervision and Fauna Handling
- Nestbox Installation & Maintenance

Experience Includes:

Sam has over 3 years experience as an ecological and bushfire consultant, working on projects across NSW. Sam has designed and undertaken flora and fauna surveys including targeted surveys for threatened flora species within the Hunter, Central Coast and Tablelands regions. Additionally, Sam has undertaken assessments of vegetation to meet Native Vegetation Act requirements. Key experience includes assessment of derelict mines for DPI for rehabilitation purposes.

Curriculum Vitae

Name: Alexandra Saddington

Office: RPS HARPER SOMERS O'SULLIVAN

Position in Company: Ecologist

Qualifications / Memberships: B. Applied.Science

Waterways Authority Boating Licence
NSW Driver's Licence (Class C)
OH&S Induction Training (Green Card)
Member ORRCA
Member Native Animal Trust Fund
Volunteer Landcare Merewether

Areas of Expertise:

- Geographical Information Systems project design and mapping
- Bushfire Threat Assessment & Management reporting
- Bushfire Risk Management Plans
- Conducting Field Surveys for Flora, Fauna and Habitat Identification.
- Report Preparation including Fauna & Flora Assessments
- Detailed understanding of environmental legislation

Experience Includes:

January 2008 – Current Ecologist
RPS Harper Somers O'Sullivan, Broadmeadow, NSW

February 2007 – December 2007 GIS Officer
The Department of Lands, Newcastle, NSW

RPS HARPER SOMERS O'SULLIVAN

Curriculum Vitae

Name: Shaun Corry

Office: RPS Harper Somers O'Sullivan

Position in Company: Ecologist

Qualifications / Memberships:
Dip Conservation and Land Mgt
NSW Driver's Licence (Class C)
Waterways Authority Boating Licence
OH&S Induction Training (Green Card)
NPWS Scientific Investigation Licence
NSW Animal Ethics Research Authority

Areas of Expertise:

- Flora and fauna identification and habitat assessment
- Targeted threatened flora and fauna surveys
- Delineation and mapping of vegetation communities
- Endangered Ecological Community (EEC) assessment
- Experience with GPS/GIS for project design and mapping
- Conducting Field Surveys for Flora, Fauna and Habitat Identification
- Report Preparation including Fauna & Flora Assessments
- Ecological Monitoring and Reporting
- Bushfire Threat Assessment & Management reporting
- Understanding of environmental legislation

Experience Includes:

Shaun has a broad range of Ecological Assessment reporting experience and ecological field experience. Experience within the consulting industry has primarily included a wide range of flora assessment disciplines as required by a wide range of public and private clients. Shaun has a strong grounding in threatened flora species, endangered ecological communities and populations throughout NSW. Shaun has undertaken flora and fauna surveys including targeted surveys for threatened flora species within the Blue Mountains, Hunter, Central Coast and Mid North Coast.