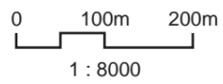




- LEGEND**
- Harp Trap
 - Anabat
 - Trap Lines
 - Site Outline



SOURCE: JWA Site Investigations;
B&P Surveys (Ref: 18279B-G.pdf)
SCALE: 1 : 8000 @ A3

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Shire of Tweed

APPENDIX 6
FIGURE 1

PREPARED: BW
DATE: 17 April 2013
FILE: N09031_Area E Survey.cdr

TITLE

AREA E
FAUNA
SURVEYS

Stag watching

Trees identified with hollows which occur immediately adjacent to the development area were observed for emerging fauna from before dusk for a period of one (1) hour. An observer positioned themselves so that the silhouette of any fauna dispersing from the tree could be clearly seen, and also utilised a 50W spotlight powered by 12V batteries to make periodic checks of the hollows. Stag watching was completed by two (2) observers on two (2) nights for a total of two (2) hours.

Type 'A' Elliott Box Traps and Cage Traps

This methodology provides an insight into the size and density of populations of ground fauna which may form a component of the diet of raptors such as the Eastern grass owl and the Masked owl. It also indicates the extent of invasion by exotic species such as the Black rat and the House mouse which allows an assessment of the 'naturalness' of the area to be made.

A total of sixty (60) type 'A' Elliott traps and twelve (12) cage traps were deployed over a period of four (4) nights. Each Elliott trap and Cage trap was baited with rolled oats, honey, peanut butter and vanilla essence. Additionally, Cage traps were baited with apple.

Elliott traps and cage traps were deployed in six (6) specific locations on the subject site as shown in **FIGURE 2** (i.e. Transects A - F). Each transect contained ten (10) Elliott traps and two (2) Cage traps.

The total trapping effort achieved in this component of the survey included two hundred and forty (240) Elliott trap nights and forty-eight (48) Cage trap nights.

Hair Tubes

A line of five (5) hair tubes was laid at each study site (i.e. Transects A - F). Each hair tube was baited with rolled oats, honey, peanut butter and vanilla essence and then set for a period of four (4) nights for a total of one hundred and twenty (120) trap nights. Samples were identified by Barbara Triggs.

Call playback techniques

Call playback was carried out over four (4) nights at various locations throughout the site for a period of one (1) hour. Target species included: Powerful owl, Masked owl, Marbled frogmouth, Koala, Yellow-bellied glider, Squirrel glider and Wallum froglet. Calls were broadcast, and then followed by a five (5) minute listening period. Spotlighting was undertaken for 10 minutes at each of the sites following call broadcast to determine whether animals had moved into the broadcast site.

Specialist avian survey

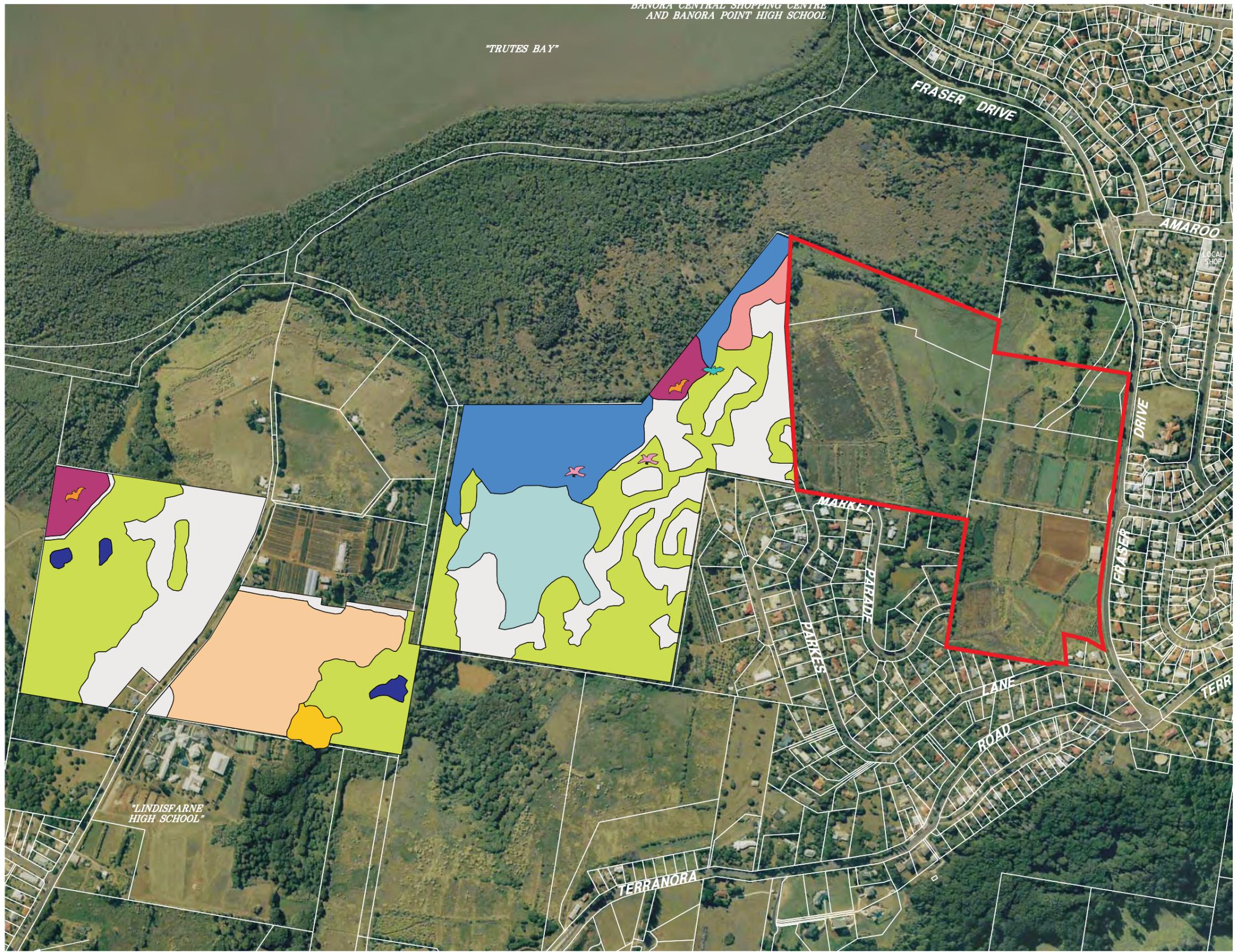
A survey was carried out to sample diurnal bird species. A dawn and dusk census was completed by two (2) scientists walking through bushland and along the edges of wetland vegetation on the site for a total of eight (8) hours over four (4) days. Incidental observations were also recorded while checking traps and mapping vegetation.

Anabat Recording

An Anabat II sonar detector (Titley Electronics, Ballina) was used to down-load the ultrasonic calls of Microchiropteran bats. Recording was undertaken for ten (10) hours per night over four (4) nights. A total of forty (40) hours of recording was

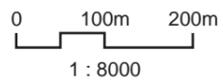
BANORA CENTRAL SHOPPING CENTRE
AND BANORA POINT HIGH SCHOOL

"TRUTES BAY"



LEGEND

-  Eastern long-eared bat (*Nyctophilus bifax*)
-  Grey-headed flying-fox (*Pteropus poliocephalus*)
-  Rose-crowned fruit-dove (*Ptilinopus regina*)
-  Community 1: Tall closed forest (*Cinnamomum camphora*)
-  Community 2: Tall open/closed swamp sclerophyll forest (*Melaleuca quinquenervia*)
-  Community 3: Tall open/closed swamp sclerophyll forest (*Archontophoenix cunninghamiana* +/- *Melaleuca quinquenervia*)
-  Community 4: Tall open/closed forest (*Ficus virens*)
-  Community 5: Tall open moist sclerophyll forest (*Lophostemon confertus* +/- *Corymbia intermedia*)
-  Community 6: Banana plantation
-  Community 7: Tall closed sedgeland/rushland/grassland
-  Community 8: Cleared land
-  Community 9: Dams
-  Site Outline



SOURCE: JWA Site Investigations;
B&P Surveys (Ref: 18279B-G.pdf)
SCALE: 1 : 8000 @ A3
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APPENDIX 6
FIGURE 2
PREPARED: BW
DATE: 17 April 2013
FILE: N09031_Area E Fauna.cdr

TITLE **AREA E**
THREATENED
FAUNA RECORDS &
VEGETATION
COMMUNITIES

undertaken. Recording times commenced from slightly before dusk. Recording was undertaken by positioning the Anabat II sonar detector facing across possible bat flyways. Anabat records were identified by Dr. Greg Richards.

Harp trapping

Two (2) harp traps were installed within potential flyways utilised by microchiropteran bats. These traps were left in position for four (4) nights for a total of eight (8) trap nights. These traps were checked each morning and evening and any bats captured were identified and released.

Spotlighting

Spotlighting was undertaken by two (2) scientists for one and a half (1.5) hours over four (4) nights for a total of twelve (12) hours spotlighting. Vegetated areas were traversed on foot and spotlighting was carried out using 50W spotlights powered by 12V batteries. The observers walked at approximately 1km/hr allowing intensive listening as an adjunct to visual detection.

1.2.1.3 Summary of survey effort

A summary of the survey effort is provided in **TABLE 1** below.

**TABLE 1
SUMMARY OF SURVEY EFFORT**

Trap/survey type	Survey effort
Active searching	12 hours
Elliott trapping	240 trap nights
Cage traps	48 trap nights
Hair tubes	120 trap nights
Anabat (bat calls)	4 nights (40 hours)
Harp trapping	4 nights
Spotlighting	12 hours
Call playback	4 nights
Bird survey	Diurnal dusk/dawn survey - 8 hrs, 5 days opportunistic records

1.3 Results and Discussion

1.3.1 *Fauna Survey*

1.3.1.1 Introduction

This section provides the results of all records and observations of fauna for the duration of the survey. Approximate locations of all Threatened species recorded on or adjacent to the subject site are shown in **FIGURE 2**.

1.3.1.2 Amphibians

Five amphibian species were recorded during site surveys, and are shown in **TABLE 3**. No Threatened amphibians were recorded.

**TABLE 3
AMPHIBIAN SPECIES RECORDED ON THE SUBJECT SITE**

Common name	Scientific name	Method of identification
Tusked frog	<i>Adelotus brevis</i>	Call
Common eastern froglet	<i>Crinia signifera</i>	Call
Eastern dwarf tree frog	<i>Litoria fallax</i>	Call
Striped marsh frog	<i>Limnodynastes peronii</i>	Call, Capture
Cane toad	<i>Bufo marinus</i>	Capture (Elliott trap/Active searches)

1.3.1.3 Reptiles

Five (5) reptile species were recorded during the fauna survey and are shown in TABLE 4. No Threatened reptiles were recorded.

**TABLE 4
REPTILE SPECIES RECORDED ON THE SUBJECT SITE**

Common name	Scientific name	Method of identification
Dark flecked sun skink	<i>Lampropholis guichenoti</i>	Capture (Active searches)
Common garden skink	<i>Lampropholis delicata</i>	Capture (Active searches)
Eastern water dragon	<i>Physignathus lesueurii</i>	Observed
Eastern brown snake	<i>Pseudonaja textilis</i>	Anecdotal
Red-bellied black snake	<i>Pseudechis porphyriacus</i>	Observed

1.3.1.4 Birds

Forty (40) bird species were recorded in the Study area including one (1) Threatened species - the Rose-crowned fruit-dove (*Ptilinopus regina*). Birds recorded during the survey are shown in TABLE 5.

**TABLE 5
BIRD SPECIES RECORDED DURING THE SURVEY**

Common Name	Scientific Name
Black duck	<i>Anas superciliosa</i>
Brown thornbill	<i>Acanthiza pusilla</i>
Crested pigeon	<i>Ocyphaps lophotes</i>
Eastern rosella	<i>Platycercus eximius</i>
Eastern spinebill	<i>Acanthorhynchus tenuirostris</i>
Eastern yellow robin	<i>Eopsaltria australis</i>
Fan-tailed cuckoo	<i>Cacomantis flabelliformis</i>
Galah	<i>Eolophus roseicapillus</i>
Grey fantail	<i>Rhipidura fuliginosa</i>
Grey shrike thrush	<i>Colluricincla harmonica</i>
Kookaburra	<i>Dacelo novaeguineae</i>
Lewin's honeyeater	<i>Meliphaga lewinii</i>
Magpie	<i>Gymnorhina tibicen</i>
Magpie-lark	<i>Grallina cyanoleuca</i>
Masked lapwing	<i>Vanellus miles</i>
Mistletoe bird	<i>Dicaeum hirundinaceum</i>
Noisy minor	<i>Manorina melanocephala</i>
Pied butcherbird	<i>Cracticus nigrogularis</i>
Pied currawong	<i>Strepera graculina</i>

Common Name	Scientific Name
Rainbow lorikeet	<i>Trichoglossus haematodus</i>
Red-backed wren	<i>Malurus melanocephalus</i>
Rose-crowned fruit-dove	<i>Ptilinopus regina</i>
Scaly breasted lorikeet	<i>Trichoglossus chlorolepidotus</i>
Scarlet honeyeater	<i>Myzomela sanguinolenta</i>
Silvereye	<i>Zosterops lateralis</i>
Spotted pardalote	<i>Pardalotus punctatus</i>
Superb fairy wren	<i>Malurus cyaneus</i>
Tawny frogmouth	<i>Podargus strigoides</i>
Torresian crow	<i>Corvus orru</i>
Welcome swallow	<i>Hirundo neoxena</i>
Whistling kite	<i>Haliastur sphenurus</i>
White cheeked honeyeater	<i>Phylidonyris nigra</i>
White faced heron	<i>Egretta novaehollandiae</i>
White ibis	<i>Threskiornis molucca</i>
White-breasted woodswallow	<i>Artamus leucorhynchus</i>
White-necked heron	<i>Ardea pacifica</i>
White-throated treecreeper	<i>Cormobates leucophaeus</i>
Willie wagtail	<i>Rhipidura leucophrys</i>
Wood duck	<i>Chenonetta jubata</i>
Yellow faced honeyeater	<i>Lichenostomus chrysops</i>

Threatened species are shown in bold

1.3.1.5 Mammals

Eleven (11) mammal species were recorded including two (2) Threatened species - the Grey-headed flying-fox (*Pteropus poliocephalus*), and Eastern long-eared bat (*Nyctophilus bifax*). A complete list of mammals recorded on the site is shown in TABLE 6.

TABLE 6
MAMMALS RECORDED DURING THE FIELD SURVEY

Family/Scientific Name	Common Name	Method of Identification
<u>Dasyuridae</u>		
<i>Antechinus stuartii</i>	Brown antechinus	Elliott trap
<u>Paramelidae</u>		
<i>Isoodon macrourus</i>	Northern brown bandicoot	Cage
<u>Phalangeridae</u>		
<i>Trichosurus vulpecula</i>	Common brushtail possum	Spotlighting
<u>Macropodidae</u>		
<i>Wallabia bicolor</i>	Swamp wallaby	Observed/Scat
<u>Pteripodidae</u>		
<i>Pteropus poliocephalus</i>	Grey-headed flying fox	Call, Spotlighting
<u>Muridae</u>		
<i>Mus musculus</i>	House mouse*	Elliott
<i>Rattus fuscipes</i>	Bush rat	Elliott
<i>Rattus rattus</i>	Black rat*	Elliott
<u>Canidae</u>		

Family/Scientific Name	Common Name	Method of Identification
<i>Canis familiaris</i>	Dog*	Observed/tracks
<u>Vespertilionidae</u>		
<i>Nyctophilus gouldi</i>	Gould's long-eared bat	Anabat
<i>Nyctophilus bifax</i>	Eastern long-eared bat	Anabat

* Introduced species

Threatened species are shown in bold

APPENDIX 7 - AQUATIC ECOLOGY IN ENVIRONMENTAL IMPACT ASSESSMENT (2003)

Preparing the Aquatic Ecology Studies

Use of existing information

- If no existing information is available, then need to compile a description of the area and then undertake further, more detailed investigations on the flora and fauna present.
- If there is some existing information, further studies may involve sampling habitats or locations not sampled previously but that are potentially affected by the proposal.

Sampling methodology

- a) Describing aquatic habitats - Two approaches are used commonly -
 - a simple inventory of habitats
 - quantitative measures of extent and distribution (e.g Morris and Therivel 1995)

Habitat Inventory

The simplest description normally made is to visit the site and compile an inventory of habitats present.

Quantitative description of habitats

Methods used to describe quantitatively habitats will depend upon the proposed project and the spatial scale of interest to the investigation. Four types of quantitative description are seen in EISs, including:

- habitat mapping from the ground using base maps or remote imagery (e.g. aerial photographs and satellite imagery)
- defining the boundaries of habitats or features within habitats
- determining patch size of features within habitats or within a mosaic of habitats
- modelling the extent of habitats under different environmental conditions.

The following description of the vegetation components of the dams was extracted from the Ecological Assessment (2010).

5b - Pond/Dam communities

Location

Several dams are scattered throughout the Study area (refer FIGURE 9 and SECTION 4.2.3 from main body of report).

Description

A few constructed dams/ponds occur on the Subject site and contain common aquatic species such as Water lily (*Nymphaea* sp.) and Smartweed (*Persicaria* spp.). Fringing aquatic species include sedges and grasses e.g. *Juncus* spp., *Cyperus* spp, *Typha* sp.

Conservation status

Areas of vegetation within dams and ponds in the Study area have little

conservation status. These environments are man made, and may contain weed species in addition to native vegetation. There is no appropriate CRA or TVMS classification for this community. The highly modified nature of the dams and associated drain lines lowers the conservation values.

No Significant plant species were found in this community. The conservation status of Community 5b is considered to be low.

b) Sampling biota within habitats

Freshwater habitats - amphibian and reptile surveys completed in 2008, 2010 and 2011.

c) Laboratory work - not completed due to lack of sampling.

Water quality analysis - Gilbert & Sutherland to provide.

The fauna recorded on the Altitude site are listed in **APPENDIX 5**

A small diversity of amphibians and reptiles were recorded.

Thirty-eight (38) bird species were recorded on the Altitude site. No Threatened species were recorded.

A detailed fauna survey was completed in the adjoining land (Lot 1 DP 17523465, lot 3 DP 622318 and Lot 7 DP 740104 in 2008. The results of this survey are contained in BELOW. Two farm dams were included in the survey area. These dams are similar in every way to the dams occurring on the Altitude Aspire site. The amphibian and reptile results (TABLE 1 & 2) are as follows:

**TABLE 1
AMPHIBIAN SPECIES RECORDED ON THE ADJOINING LAND**

Common name	Scientific name	Method of identification
Tusked frog	<i>Adelotus brevis</i>	Call
Common eastern froglet	<i>Crinia signifera</i>	Call
Eastern dwarf tree frog	<i>Litoria fallax</i>	Call
Striped marsh frog	<i>Limnodynastes peronii</i>	Call, Capture
Cane toad	<i>Bufo marinus</i>	Capture (Elliott trap/Active searches)

**TABLE 2
REPTILE SPECIES RECORDED ON THE ADJOINING LAND**

Common name	Scientific name	Method of identification
Dark flecked sun skink	<i>Lampropholis guichenoti</i>	Capture (Active searches)
Common garden skink	<i>Lampropholis delicata</i>	Capture (Active searches)
Eastern water dragon	<i>Physignathus lesueurii</i>	Observed
Eastern brown snake	<i>Pseudonaja textilis</i>	Anecdotal
Red-bellied black snake	<i>Pseudechis porphyriacus</i>	Observed

All of the above species are considered to be common in the locality and region. None are contained in the Schedule to the Threatened Species Conservation Act (1995) as Endangered or Vulnerable.

In November 1992, November 1994 and March 1995 James Warren Biological and Environmental Consultants completed fauna surveys of the Vintage lakes site on Fraser Drive (approximately 1.5km to the north of the Altitude Aspire site). The survey methodologies variously included nocturnal spotlighting, pitfall trapping, habitat searches and frog call replays. The common eastern froglet (*Crinia signifera*), eastern dwarf tree frog (*Litoria fallax*), striped rocket frog (*L. nasuta*), Peron's tree frog (*L. peroni*), the brown striped frog (*Limnodynastes peronii*) and cane toad (*Bufo marinus*) were recorded in borrow pits, filled with fresh water, on the site.

Reptiles recorded included the grass skink (*Lampropholis delicata*), eastern water dragon (*Physignathus lesueurii*), striped skink (*Ctenotus robustus*), eastern long-necked tortoise (*Chelodina longicollis*), common tree snake (*Dendrelaphis punctulata*), red-bellied black snake (*Pseudechis porphyriacus*) and lace monitor (*Varanus varius*).

None of the above species are recorded in the schedule to the Threatened Species Conservation Act (1995) as Endangered or Vulnerable.

Methodology to assist in determining the level of detail required for an EIS

The following methodology has been developed to assist in determining the level of investigation required for a particular proposal and is based on general types of study approach and factors that should be considered while scoping the works to be done on aquatic ecology for the EIS. TABLE 3 shows the major factors that should be considered in determining the level of study and TABLE 4 shows 4 indicative study protocols that are recommended. The two components are linked by the formula:

$$Ls = (T + Ri + Rs + Rr + S) \times Rk \times Cu \times Im$$

Where the level of study Ls = level of sufficiency, i.e. the score corresponding to the indicative study protocol in TABLE 3; T = type of disturbance; relative significance of Ri , = inertia, Rs = stability and Rr = resilience, S = scale of the proposed project, Rk = the degree of uncertainty, Cu = likelihood of cumulative effects and Im = importance of the decision variable considered (TABLES 3 & 4).

TABLE 3
FACTORS TO CONSIDER IN DETERMINING LEVEL OF STUDY DETAIL FOR AN EIS

Factors to consider	Symbol	Level	Relative significance
Type of disturbance	T	Pulse	1
		Press	2
		Catastrophic	3
Response of decision variable	Ri	Inertia - High	1
		Inertia - Moderate	2
		Inertia - Low	3
	Rs	Stability - High	1
		Stability - Moderate	2
		Stability - Low	3
Rr	Resilience - High	1	
	Resilience - Moderate	2	
	Resilience - Low	3	
Scale of proposed project compared to similar approved projects elsewhere	S	Small	1
		Medium	3
		Large	6
Degree of uncertainty in predictions	Rk	Low	1
		High	2
Risk of cumulative effects	Cu	Low	1
		High	2
Importance of the component in the area that could be affected	Im	Small	1
		Moderate	2
		High	4
		Critical	8

TABLE 4
DETERMINING THE LEVEL OF STUDY DETAIL FOR AQUATIC ECOLOGICAL INVESTIGATIONS FOR AN EIS

Level of investigation	Range of sufficiency scores (Ls)	Indicative study protocol
Level 1	5-7	a. Existing information and consultation b. Site description including habitat inventory of area of proposed project
Level 2	8-29	a. Existing information and consultation b. Site description including habitat inventory of area of proposed project c. Quantitative snapshot survey of selected ecosystem components in area proposed for project and 2 or more control sites
Level 3	30-59	a. Existing information and consultation b. Site description including habitat inventory of area of proposed project c. Quantitative surveys of selected ecosystem components/area of proposed project and 2 or more control sites. Surveys to be done on at least 2 occasions
Level 4	≥60	a. Existing information and consultation b. Site description including habitat inventory of area of proposed project c. Quantitative surveys of selected ecosystem components in area proposed for project and 2 or more control sites. Surveys to be done on at least 2 occasions d. Issue-oriented or process studies of critical ecosystem components (eg. decision variables such as toxicity tests, small-scale manipulations, numerical modelling)

Based on the above methodology to assist in determining the level of detail required for an EIS, an assessment of the Altitude Aspire site has been completed and is provided in TABLE 5.

TABLE 5
ASSESSMENT TO DETERMINE LEVEL OF STUDY DETAIL FOR ALTITUDE ASPIRE SITE

Factors to consider	Symbol	Level	Relative Significance
Type of Disturbance	T	Catastrophic	3
Response of decision variable	Ri Rs Rr	High High High	1 1 1
Scale of proposed project	S	Medium	3
Degree of uncertainty in predictions	Rk	Low	1
Risk of cumulative effects	Cu	Low	1
Importance of the component in the area that could be affected	Im	Small	1

$$\begin{aligned}
 L_s &= (3 + 1 + 1 + 1 + 3) \times 1 \times 1 \times 1 \\
 &= 9 \times 1 \\
 &= 9
 \end{aligned}$$

The assessment to determine the level of study detail indicates that a level 1/2 investigation is required i.e:

- a. Existing information and consultation
- b. Site description including habitat inventory of area of proposed project
- c. Quantitative snapshot survey of selected ecosystem components in area proposed for project and 2 or more control sites.

JWA have:

1. Reviewed the existing information for the area i.e. data base searches and local data (**APPENDIX 5 - TABLE 1**; Survey data from nearby sites has been provided in **APPENDIX 6** above);
2. Provided a site description including photographs (**APPENDIX 3** and Section 4.2.3);
3. Completed a snapshot survey in and around the dam sites in March 2010 and May 2011. Although these surveys were opportunistic in nature a similar suite of amphibian and reptile species were detected as were detected on adjacent sites. Full survey methodology was utilised for adjacent sites.

It is considered that the guidelines contained in the Aquatic Ecology in Environmental Impact Assessment Guidelines (2003) have been met and satisfied.

APPENDIX 8 - BAM ASSESSMENT - LOWLAND RAINFOREST

1. Introduction

A detailed vegetation assessment was completed at the subject site on 11th and 12th May 2011 to ground-truth previously mapped areas of Lowland rainforest EEC. Previous mapping completed in 2010 utilised aerial photography, gps coordinates and on-ground identification of the presence/absence of regenerating rainforest species. The recent detailed assessment utilised the BioBanking Assessment Methodology (BAM) (DECCW 2008) to determine the status of the vegetation.

The BAM is a tool used to determine the number of ecosystem credits that can be created at a biobank site or required at a development site, but is also recognised as a useful tool for determining the status of vegetation on development sites.

2. Methodology

Background

Section 3 of the BAM sets out how to assess and measure biodiversity values, other than certain threatened species or populations, to determine the number of ecosystem credits that can be created at a biobank site or required at a development site. These are referred to as general biodiversity values.

Vegetation types are used as surrogates for general biodiversity values. The information on each vegetation type is contained within the Vegetation Types Database. This database is held by DECCW and is publicly available. The Vegetations Benchmarks Database identifies the range of quantitative measures that represent the benchmark condition for the vegetation type. This database is also held by DECCW and is publicly available.

Plot & transect surveys

Plot and transect surveys of the sites are used to provide quantitative measures of 10 site attributes in each vegetation zone. The 10 site attributes, listed in **TABLE 1**, are assessed to calculate the number of ecosystem credits that can be created at a biobank site or are required at a development site.

Line transects must be used to assess the site attributes that are measured by percentage foliage cover. Other site attributes are assessed by plots. The plot and transect surveys are conducted in the vegetation zone to sample vegetation condition across the zone.

**TABLE 1
SCORING & WEIGHTING OF SITE ATTRIBUTES**

Site attribute	Site attribute score				Weighting for attribute score
	0	1	2	3	
Native plant species richness	0	>0 - <50% of benchmark	50% - <100% benchmark	≥ benchmark	25
Native over-storey cover	0 - 10% or >200% of benchmark	>10 - <50% or >150 - 200% of benchmark	50 - <100% or >100 - 150% of benchmark	within benchmark	10
Native mid-storey cover	0 - 10% or >200% of benchmark	>10 - <50% or >150 - 200% of benchmark	50 - <100% or >100 - 150% of benchmark	within benchmark	10
Native ground cover (grasses)	0 - 10% or >200% of benchmark	>10 - <50% or >150 - 200% of benchmark	50 - <100% or >100 - 150% of benchmark	within benchmark	2.5
Native ground cover (shrubs)	0 - 10% or >200% of benchmark	>10 - <50% or >150 - 200% of benchmark	50 - <100% or >100 - 150% of benchmark	within benchmark	2.5
Native ground cover (other)	0 - 10% or >200% of benchmark	>10 - <50% or >150 - 200% of benchmark	50 - <100% or >100 - 150% of benchmark	within benchmark	2.5
Exotic plant cover	>66%	>33 - 66%	>5 - 33%	0 - 5%	5
Number of trees with hollows	0	>0 - <50% of benchmark	50% - <100% of benchmark	≥ benchmark	20
Proportion of over-storey trees occurring as regeneration	0	>0 - <50%	50 - <100%	100%	12.5
Total length of fallen logs	0 - 10% of benchmark	>10% - <50% of benchmark	50 - <100% of benchmark	≥ benchmark	10

Survey sites

Plot and transect survey sites are shown in FIGURE 1a - 1d. The composition and structure of vegetation at each survey site is shown in PLATES 1 - 9.



PLATE 1: Survey site 1 viewed from north-west



PLATE 2: Survey site 2 viewed from south



PLATE 3: Survey site 3 viewed from north



PLATE 4: Survey site 4 viewed from north



PLATE 5: Survey site 4 viewed from north-east



PLATE 6: Survey site 5 viewed from west



PLATE 7: Survey site 5 viewed from north



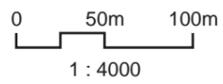
PLATE 8: Survey site 6 viewed from north



PLATE 9: Survey site 7 viewed from east



LEGEND
 Site Outline



SOURCE: Near Map Jan 2011 Aerial Photograph
 SCALE: 1 : 4000 @ A3
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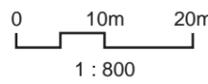
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 Fraser Drive, South Terranora, NSW
 Shire of Tweed

APPENDIX 8
FIGURE 1A
 PREPARED: BW
 DATE: 17 April 2013
 FILE: N09031_Survey.cdr

TITLE
SURVEY LOCATIONS



- LEGEND**
- Ⓜ Survey Site Number
 - ┃ 50m Transect
 - Quadrat (20m x 20m)
 - ▭ Site Outline



SOURCE: JWA Site Investigations;
Near Map Jan 2011 Aerial Photograph
SCALE: 1 : 800 @ A3

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PROJECT
Ecological Assessment
Altitude Aspire
Fraser Drive, South Terranora, NSW
Shire of Tweed

APPENDIX 8
FIGURE 1B

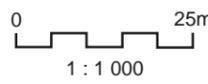
PREPARED: BW
DATE: 17 April 2013
FILE: N09031_Survey Inset A.cdr

TITLE

SURVEY LOCATIONS
- INSET A



- LEGEND**
- ⊕ Survey Site Number
 - Transects
 - Quadrats
 - Site Outline



SOURCE: JWA Site Investigations;
Near Map Jan 2011 Aerial Photograph
SCALE: 1 : 1000 @ A3
JAMES WARREN & ASSOCIATES PTY LIMITED
Environmental Consultants

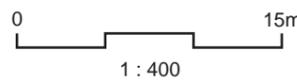
CLIENT
Newland Developers Pty Ltd
PROJECT
Ecological Assessment
Altitude Aspire
Fraser Drive, South Terranora, NSW
Shire of Tweed

APPENDIX 8
FIGURE 1C
PREPARED: BW
DATE: 17 April 2013
FILE: N09031_Survey Inset B.cdr

TITLE
SURVEY LOCATIONS
- INSET B



- LEGEND**
- ⊕ Survey Site Number
 - 50m Transect
 - Quadrat (20m x 20m)
 - ▭ Site Outline



SOURCE: JWA Site Investigations;
Near Map Jan 2011 Aerial Photograph
SCALE: 1 : 400 @ A3

JAMES WARREN & ASSOCIATES PTY LIMITED
Environmental Consultants

CLIENT
Newland Developers Pty Ltd
PROJECT
Ecological Assessment
Altitude Aspire
Fraser Drive, South Terranora, NSW
Shire of Tweed

APPENDIX 8
FIGURE 1D

PREPARED: BW
DATE: 17 April 2013
FILE: N09031_Survey Inset C.cdr

TITLE

SURVEY LOCATIONS
- INSET C

Calculating the current site value score

The current site value score is determined from the plot surveys. Ten site condition attributes are assessed against benchmark values to determine vegetation condition and the site value score.

The benchmark range is the range of numeric values identified in the Vegetation Benchmarks Database for each site attribute for vegetation types or classes, or collected from local reference sites or obtained from published sources.

The current site attribute score is either 0, 1, 2 or 3 as shown in TABLE 1. As shown in the following equation, the site attribute scores are weighted and summed, then converted to a current site value score out of 100.

Equation 1: Ecosystem credits – determining the current Site Value score for a vegetation zone at the development and biobank site

$$S_c = \frac{\left(\sum_{v=a}^j (a_v w_v) \right) + 5((a_d a_g) + (a_b a_i) + (a_h a_j) + (a_c a_k))}{c} \times 100$$

where S_c is the current Site Value score of the vegetation zone
 a_v is the attribute score for the v th site attribute (a–j) as defined in Table 1
 a_k is equal to $(a_d + a_e + a_f)/3$, the average score for attributes d, e and f
 w_v is the weighting for the v th site attribute (a–j) as defined in Table 1
 c is the maximum score that can be obtained given the attributes a–j that occur in the vegetation type (the maximum score varies depending on which attributes occur in the vegetation type under assessment).

If the lower benchmark value for any site attribute is zero, and the measure of that attribute on the site is zero, then the site attribute score of that attribute against the benchmark is 3. If the *only* benchmark value for any site attribute is zero, then the attribute is not included in Equation 1 and c is scaled accordingly.

The multipliers for ‘native over-storey cover x proportion of over-storey species occurring as regeneration’ and ‘number of trees with hollows x total length of fallen logs’ may be omitted from Equation 1 (and c recalculated accordingly) for determining Site Value at a development or biobank site if the vegetation type is from one of the following vegetation formations: Grasslands, Heathlands, Alpine Complex, Freshwater Wetlands, Saline Wetlands or Arid Shrublands.

3. Results

Plot & transect surveys

During the BAM assessment data was collected from seven (7) locations on the site (FIGURES 1a - 1d). The results are provided in TABLES 2 - 8 below.

**TABLE 2
PLOT & TRANSECT SURVEY RESULTS - SITE 1**

Attribute	Benchmark [^]	Site results	Site attribute score	Weighting
a) Native plant species richness	50	7	1	25
b) Native over-storey cover	50 - 100%	10%	0	10
c) Native mid-storey cover	10 - 100%	0%	0	10
d) Native ground cover (grasses)	0 - 5%	0%	0	2.5
e) Native ground cover (shrubs)	0 - 20%	0%	0	2.5
f) Native ground cover (other)	10 - 60%	40%	3	2.5
g) Exotic plant cover	-	76.66%	0	5
h) Number of trees with hollows	0	0	0	20
i) Proportion of over-storey species occurring as regeneration	-	33%	1	12.5
j) Total length of fallen logs	0.5	0	0	10

**TABLE 3
PLOT & TRANSECT SURVEY RESULTS - SITE 2**

Attribute	Benchmark [^]	Site results	Site attribute score	Weighting
a) Native plant species richness	50	9	1	25
b) Native over-storey cover	50 - 100%	17.5%	1	10
c) Native mid-storey cover	10 - 100%	5%	0	10
d) Native ground cover (grasses)	0 - 5%	0%	0	2.5
e) Native ground cover (shrubs)	0 - 20%	10%	3	2.5
f) Native ground cover (other)	10 - 60%	30%	3	2.5
g) Exotic plant cover	-	52.9%	1	5
h) Number of trees with hollows	0	0	0	20
i) Proportion of over-storey species occurring as regeneration	-	33%	1	12.5
j) Total length of fallen logs	0.5	4	3	10

**TABLE 4
PLOT & TRANSECT SURVEY RESULTS - SITE 3**

Attribute	Benchmark [^]	Site results	Site attribute score	Weighting
a) Native plant species richness	50	9	1	25
b) Native over-storey cover	50 - 100%	30%	1	10
c) Native mid-storey cover	10 - 100%	13.75%	3	10
d) Native ground cover (grasses)	0 - 5%	0%	0	2.5
e) Native ground cover (shrubs)	0 - 20%	10%	0	2.5
f) Native ground cover (other)	10 - 60%	30%	3	2.5
g) Exotic plant cover	-	54%	1	5
h) Number of trees with hollows	0	0	-	20
i) Proportion of over-storey species occurring as regeneration	-	33%	1	12.5
j) Total length of fallen logs	0.5	0	0	10

**TABLE 5
PLOT & TRANSECT SURVEY RESULTS - SITE 4**

Attribute	Benchmark [^]	Site results	Site attribute score	Weighting
a) Native plant species richness	50	16	1	25
b) Native over-storey cover	50 - 100%	68%	3	10
c) Native mid-storey cover	10 - 100%	11.5%	3	10
d) Native ground cover (grasses)	0 - 5%	0%	0	2.5
e) Native ground cover (shrubs)	0 - 20%	40%	0	2.5
f) Native ground cover (other)	10 - 60%	12%	3	2.5
g) Exotic plant cover	-	34.5%	1	5
h) Number of trees with hollows	0	0	-	20
i) Proportion of over-storey species occurring as regeneration	-	25%	1	12.5
j) Total length of fallen logs	0.5	0	0	10

**TABLE 6
PLOT & TRANSECT SURVEY RESULTS - SITE 5**

Attribute	Benchmark [^]	Site results	Site attribute score	Weighting
a) Native plant species richness	50	9	1	25
b) Native over-storey cover	50 - 100%	0%	0	10
c) Native mid-storey cover	10 - 100%	14.5%	3	10
d) Native ground cover (grasses)	0 - 5%	0%	0	2.5
e) Native ground cover (shrubs)	0 - 20%	0%	0	2.5
f) Native ground cover (other)	10 - 60%	4%	0	2.5
g) Exotic plant cover	-	42%	1	5
h) Number of trees with hollows	0	0	-	20
i) Proportion of over-storey species occurring as regeneration	-	0	0	12.5
j) Total length of fallen logs	0.5	3	3	10

**TABLE 7
PLOT & TRANSECT SURVEY RESULTS - SITE 6**

Attribute	Benchmark [^]	Site results	Site attribute score	Weighting
a) Native plant species richness	50	9	1	25
b) Native over-storey cover	50 - 100%	25%	1	10
c) Native mid-storey cover	10 - 100%	32%	3	10
d) Native ground cover (grasses)	0 - 5%	0%	0	2.5
e) Native ground cover (shrubs)	0 - 20%	20%	3	2.5
f) Native ground cover (other)	10 - 60%	20%	3	2.5
g) Exotic plant cover	-	6%	2	5
h) Number of trees with hollows	0	0	-	20
i) Proportion of over-storey species occurring as regeneration	-	66%	2	12.5
j) Total length of fallen logs	0.5	0	0	10

**TABLE 8
PLOT & TRANSECT SURVEY RESULTS - SITE 7**

Attribute	Benchmark [^]	Site results	Site attribute score	Weighting
a) Native plant species richness	50	32	2	25
b) Native over-storey cover	50 - 100%	49%	1	10
c) Native mid-storey cover	10 - 100%	42.5%	3	10
d) Native ground cover (grasses)	0 - 5%	6%	0	2.5
e) Native ground cover (shrubs)	0 - 20%	0%	3	2.5
f) Native ground cover (other)	10 - 60%	0%	0	2.5
g) Exotic plant cover	-	27%	2	5
h) Number of trees with hollows	0	2	-	20
i) Proportion of over-storey species occurring as regeneration	-	0%	0	12.5
j) Total length of fallen logs	0.5	12	3	10

Site value scores

Site value scores were determined based on the results of the ten condition attributes collected from the plot/transect surveys. The site attribute scores were weighted and summed, then converted to a current site value score out of 100 utilising the appropriate BAM equation. The results are shown in **TABLE 9**.

**TABLE 9
SITE VALUE SCORES**

Survey site	Score (out of 100)
Site 1	1
Site 2	14
Site 3	32
Site 4	45
Site 5	14
Site 6	64
Site 7	46

4. Discussion

The purpose of the BAM assessment on the subject site was to ground-truth previously mapped EEC's on the subject site. Data collected during the BAM assessment has allowed for the refinement of mapped EEC boundaries.

The highest quality area of Lowland rainforest EEC on the site occurs at survey site 6, with a site value score of 64 out of 100, then survey sites 4 and 3, with scores of 45 and 32 out of 100 respectively.

A number of areas previously mapped as Lowland rainforest EEC have been removed from the mapping due to the results of the BAM assessment. Survey sites 1, 2 and 5

had scores of 1, 14 and 14 out of 100 respectively. These areas are not considered to represent the Lowland rainforest EEC.

Areas with little to no native species in the over-storey, mid-storey and ground cover components have also been removed from the previous EEC mapping.

Investigations of Survey site 7 have confirmed that this vegetation community constitutes a Wet sclerophyll forest community, due to the canopy being comprised entirely of *Eucalypt* spp., rather than a rainforest community.

APPENDIX 9 - BAM ASSESSMENT - FRESHWATER WETLAND

1. Introduction

A detailed vegetation assessment was completed at the subject site on 11th and 12th May 2011 to ground-truth previously mapped areas of Freshwater Wetland EEC. Previous mapping completed in 2010 utilised aerial photography, GPS coordinates and on-ground identification of the presence/absence of freshwater wetland species. An assessment completed on the 10th April 2013 utilised the BioBanking Assessment Methodology (BAM) (DECCW 2008) to determine the status of the vegetation.

The BAM is a tool used to determine the number of ecosystem credits that can be created at a biobank site or required at a development site, but is also recognised as a useful tool for determining the status of vegetation on development sites.

2. Methodology

Background

Section 3 of the BAM sets out how to assess and measure biodiversity values, other than certain threatened species or populations, to determine the number of ecosystem credits that can be created at a biobank site or required at a development site. These are referred to as general biodiversity values.

Vegetation types are used as surrogates for general biodiversity values. The information on each vegetation type is contained within the Vegetation Types Database. This database is held by DECCW and is publicly available. The Vegetations Benchmarks Database identifies the range of quantitative measures that represent the benchmark condition for the vegetation type. This database is also held by DECCW and is publicly available.

A review of the database shows that the Freshwater Wetland occurring on the site is most likely an analogue of NR149 - Coastal Floodplain Wetland (sedgeland, rushland and forbland).

Plot & transect surveys

Plot, transect surveys and visual estimates of foliage cover (%) of the sites are three (3) methods which can be used to provide quantitative/qualitative measures of 10 site attributes in each vegetation zone. The 10 site attributes, listed in **TABLE 1**, are assessed to calculate the number of ecosystem credits that can be created at a biobank site or are required at a development site.

Line transects can be used to assess the site attributes that are measured by percentage foliage cover. Site attributes can also be assessed by plots. The plot and transect surveys are conducted in the vegetation zone to sample vegetation condition across the zone. The methodology allows for the estimation of attributes by visual estimation where all vegetation can be observed within a 20metre x 20 metre plot. A low shrubland or sedgeland, rushland or grassland would enable estimations to be calculated.

**TABLE 1
SCORING & WEIGHTING OF SITE ATTRIBUTES**

Site attribute	Site attribute score				Weighting for attribute score
	0	1	2	3	
Native plant species richness	0	>0 - <50% of benchmark	50% - <100% benchmark	≥ benchmark	25
Native over-storey cover	0 - 10% or >200% of benchmark	>10 - <50% or >150 - 200% of benchmark	50 - <100% or >100 - 150% of benchmark	within benchmark	10
Native mid-storey cover	0 - 10% or >200% of benchmark	>10 - <50% or >150 - 200% of benchmark	50 - <100% or >100 - 150% of benchmark	within benchmark	10
Native ground cover (grasses)	0 - 10% or >200% of benchmark	>10 - <50% or >150 - 200% of benchmark	50 - <100% or >100 - 150% of benchmark	within benchmark	2.5
Native ground cover (shrubs)	0 - 10% or >200% of benchmark	>10 - <50% or >150 - 200% of benchmark	50 - <100% or >100 - 150% of benchmark	within benchmark	2.5
Native ground cover (other)	0 - 10% or >200% of benchmark	>10 - <50% or >150 - 200% of benchmark	50 - <100% or >100 - 150% of benchmark	within benchmark	2.5
Exotic plant cover	>66%	>33 - 66%	>5 - 33%	0 - 5%	5
Number of trees with hollows	0	>0 - <50% of benchmark	50% - <100% of benchmark	≥ benchmark	20
Proportion of over-storey trees occurring as regeneration	0	>0 - <50%	50 - <100%	100%	12.5
Total length of fallen logs	0 - 10% of benchmark	>10% - <50% of benchmark	50 - <100% of benchmark	≥ benchmark	10

Survey site

The plot survey site is shown in **FIGURE 1**. The composition and structure of vegetation at the survey site is shown in **PLATES 1 & 2**.



PLATE 1: Survey site viewed from north



PLATE 2: Survey site viewed from east

Calculating the current site value score

The current site value score is determined from the plot/transect surveys. Ten site condition attributes are assessed against benchmark values to determine vegetation condition and the site value score.

The benchmark range is the range of numeric values identified in the Vegetation Benchmarks Database for each site attribute for vegetation types or classes, or collected from local reference sites or obtained from published sources.

The current site attribute score is either 0, 1, 2 or 3 as shown in TABLE 1. As shown in the following equation, the site attribute scores are weighted and summed, then converted to a current site value score out of 100.

Equation 1: Ecosystem credits – determining the current Site Value score for a vegetation zone at the development and biobank site

$$S_c = \frac{\left(\sum_{v=d}^j (a_v w_v) \right) + 5((a_d a_g) + (a_b a_i) + (a_h a_j) + (a_c a_k)) \times 100}{c}$$

where S_c is the current Site Value score of the vegetation zone
 a_v is the attribute score for the v th site attribute (a–j) as defined in Table 1
 a_k is equal to $(a_d + a_e + a_f)/3$, the average score for attributes d, e and f
 w_v is the weighting for the v th site attribute (a–j) as defined in Table 1
 c is the maximum score that can be obtained given the attributes a–j that occur in the vegetation type (the maximum score varies depending on which attributes occur in the vegetation type under assessment).

If the lower benchmark value for any site attribute is zero, and the measure of that attribute on the site is zero, then the site attribute score of that attribute against the benchmark is 3. If the *only* benchmark value for any site attribute is zero, then the attribute is not included in Equation 1 and c is scaled accordingly.

The multipliers for ‘native over-storey cover x proportion of over-storey species occurring as regeneration’ and ‘number of trees with hollows x total length of fallen logs’ may be omitted from Equation 1 (and c recalculated accordingly) for determining Site Value at a development or biobank site if the vegetation type is from one of the following vegetation formations: Grasslands, Heathlands, Alpine Complex, Freshwater Wetlands, Saline Wetlands or Arid Shrublands.

3. Results

Plot & transect surveys

During the BAM assessment data was collected from one (1) location on the site (FIGURE 1). The results are provided in TABLE 2 below.

**TABLE 2
PLOT & TRANSECT SURVEY RESULTS - SITE 1**

Attribute	Benchmark [^]	Site results	Site attribute score	Weighting
a) Native plant species richness	13	12	2	25
b) Native over-storey cover	10 - 50%	N/A	N/A	10
c) Native mid-storey cover	5 - 70%	N/A	0	10
d) Native ground cover (grasses)	1 - 70%	60%	3	2.5
e) Native ground cover (shrubs)	0 - 10%	0	3	2.5
f) Native ground cover (other)	1 - 80%	35%	3	2.5
g) Exotic plant cover	-	5%	3	5
h) Number of trees with hollows	1	N/A	N/A	-
i) Proportion of over-storey species occurring as regeneration	-	N/A	N/A	12.5
j) Total length of fallen logs	0	N/A	N/A	10

Site value scores

Site value scores were determined based on the results of the ten condition attributes collected from the plot survey. The site attribute scores were weighted and summed, then converted to a current site value score out of 100 utilising the appropriate BAM equation. The result is shown in **TABLE 3**.

**TABLE 3
SITE VALUE SCORE**

Survey site	Score (out of 100)
Site 1	58

4. Discussion

Results of the BAM assessment have determined that the Freshwater Wetland EEC on the subject site is in a moderate (degraded) condition achieving a site value score of 58 out of 100.

APPENDIX 10 - OFFSETS ASSESSMENT PACKAGE

1 Impacts must be avoided first by using prevention and mitigation measures

Offsets are then used to address remaining impacts. This may include modifying the proposal to avoid an area of biodiversity value or putting in place measures to prevent offsite impacts.

Lowland Rainforest	0.36ha of Lowland Rainforest will be removed.
Freshwater Wetland	0.11ha of Freshwater Wetland will be removed.

2 All regulatory requirements must be met

Offsets cannot be used to satisfy approvals or assessments under other legislation, e.g. assessment requirements for Aboriginal heritage sites, pollution or other environmental impacts (unless specifically provided for by legislation or additional approvals).

3 Offsets must never reward ongoing poor performance

Offset schemes should not encourage landholders to deliberately degrade or mismanage offset areas in order to increase the value from the offset.

4 Offsets will complement other government programs

A range of tools is required to achieve the NSW Government's conservation objectives, including the establishment and management of new national parks, nature reserves, state conservation areas and regional parks and incentives for private landholders.

5 Offsets must be underpinned by sound ecological principles

They must:

- include the consideration of structure, function and compositional elements of biodiversity, including threatened species
- enhance biodiversity at a range of scales
- consider the conservation status of ecological communities
- ensure the long-term viability and functionality of biodiversity.

Biodiversity management actions, such as enhancement of existing habitat and securing and managing land of conservation value for biodiversity, can be suitable offsets. Reconstruction of ecological communities involves high risks and uncertainties for biodiversity outcomes and is generally less preferable than other management strategies, such as enhancing existing habitat.

6 Offsets should aim to result in a net improvement in biodiversity over time

Enhancement of biodiversity in offset areas should be equal to or greater than the loss in biodiversity from the impact site.

Setting aside areas for biodiversity conservation without additional management or increased security is generally not sufficient to offset against the loss of biodiversity. Factors to consider include protection of existing biodiversity (removal of threats), time-lag effects, and the uncertainties and risks associated with actions such as revegetation.

Offsets may include enhancing habitat, reconstructing habitat in strategic areas to link areas of conservation value, or increasing buffer zones around areas of conservation value and removal of threats by conservation agreements or reservation.

Lowland Rainforest	Approximately 1.57ha of Lowland Rainforest will be revegetated on site. This will link other conservation significant areas off-site and provide for the enhancement of biodiversity in the locality in the long-term.
Freshwater Wetland	Approximately 0.66ha to the south of the existing EEC will be regenerated to bolster the community and protect its existing biodiversity.

7 Offsets must be enduring - they must offset the impact of the development for the period that the impact occurs

As impacts on biodiversity are likely to be permanent, the offset should also be permanent and secured by a conservation agreement or reservation and management for biodiversity. Where land is donated to a public authority or a private conservation organisation and managed as a biodiversity offset, it should be accompanied by resources for its management. Offsetting should only proceed if an appropriate legal mechanism or instrument is used to secure the required actions.

Lowland Rainforest	These areas will be dedicated to Tweed Shire Council as Public Reserve.
Freshwater Wetland	

8 Offsets should be agreed prior to the impact occurring

Offsets should minimise ecological risks from time-lags. The feasibility and in-principle agreements to the necessary offset actions should be demonstrated prior to the approval of the impact. Legal commitments to the offset actions should be entered into prior to the commencement of works under approval.

Lowland Rainforest	Revegetation/regeneration works will commence as soon as possible after approval.
Freshwater Wetland	

9 Offsets must be quantifiable - the impacts and benefits must be reliably estimated

Offsets should be based on quantitative assessment of the loss in biodiversity from the clearing or other development and the gain in biodiversity from the offset. The methodology must be based on the best available science, be reliable and used for calculating both the loss from the development and the gain from the offset. The methodology should include:

- the area of impact
- the types of ecological communities and habitat/species affected
- connectivity with other areas of habitat/corridors
- the condition of habitat
- the conservation status and/or scarcity/rarity of ecological communities

- management actions
- level of security afforded to the offset site.

The best available information/data should be used when assessing impacts of biodiversity loss and gains from offsets. Offsets will be of greater value where:

- they protect land with high conservation significance
- management actions have greater benefits for biodiversity
- the offset areas are not isolated or fragmented
- the management for biodiversity is in perpetuity (e.g. secured through a conservation agreement).

Management actions must be deliverable and enforceable.

Lowland Rainforest	This information has been provided in the main body of this report.
Freshwater Wetland	

10 Offsets must be targeted

They must offset impacts on the basis of like-for-like or better conservation outcome. Offsets should be targeted according to biodiversity priorities in the area, based on the conservation status of the ecological community, the presence of threatened species or their habitat, connectivity and the potential to enhance condition by management actions and the removal of threats. Only ecological communities that are equal or greater in conservation status to the type of ecological community lost can be used for offsets. One type of environmental benefit cannot be traded for another: for example, biodiversity offsets may also result in improvements in water quality or salinity but these benefits do not reduce the biodiversity offset requirements.

Lowland Rainforest	Will be offset with revegetation of Lowland Rainforest
Freshwater Wetland	Will be offset by assisted regeneration of Freshwater Wetland

11 Offsets must be located appropriately

Wherever possible, offsets should be located in areas that have the same or similar ecological characteristics as the area affected by the development.

Lowland Rainforest	Will be revegetated/regenerated on the subject site
Freshwater Wetland	

12 Offsets must be supplementary

They must be beyond existing requirements and not already funded under another scheme. Areas that have received incentive funds cannot be used for offsets. Existing protected areas on private land cannot be used for offsets unless additional security or management actions are implemented. Areas already managed by the government, such as national parks, flora reserves and public open space cannot be used as offsets.

Lowland Rainforest	The proposed offsets are supplementary to what is already required. The proposed offset areas are not already protected or managed by the government.
Freshwater Wetland	

13 Offsets and their actions must be enforceable through development consent conditions, licence conditions, conservation agreements or a contract

Offsets must be audited to ensure that the actions have been carried out, and monitored to determine that the actions are leading to positive biodiversity outcomes.