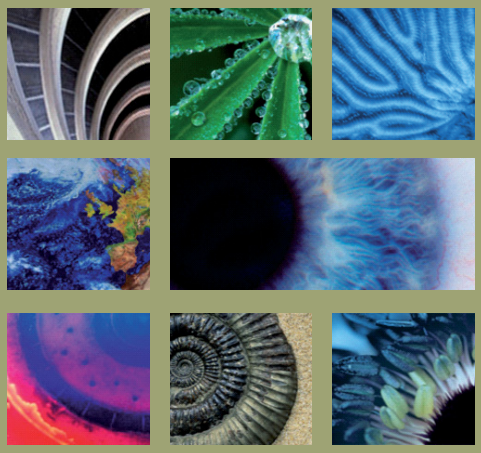

Updated EPBC Addendum Report

For Proposed Subdivision
Lot 3 DP 588206
Kanangra Drive
Gwandalan

Prepared for
Rosecorp Pty Ltd

Job Reference 24619 - September 2007

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PROJECT: EPBC ADDENDUM REPORT – LOT 3 DP588206 KANANGRA DRIVE, GWANDALAN	
CLIENT:	*ROSECORP PTY LTD*
OUR REF	*24619*
DATE:	*18TH SEPTEMBER 2007*
APPROVED BY:	*D. LANDENBERGER*
SIGNATURE:	
CHECKED BY:	*C. ANDERSON*
SIGNATURE:	

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1 INTRODUCTION

This EPBC Addendum Report has been prepared to update and supplement previous surveys which have been undertaken within Lot 3 DP588206 Kanangra Drive, Gwandalan NSW, hereafter referred to as 'the site'. In particular the survey and assessment has targeted key seasonal / cryptic threatened flora species listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*

1.1 Site Description

The site is approximately 26ha in size and adjoins the southern boundary of the Point Wolstoncroft Sports and Recreation Area on the south western shores of Lake Macquarie. To the west the site is bound by Kanangra Drive, to the east with Lake Macquarie and to the south by existing residential development and Gwandalan Primary School.

There are several existing buildings present within the site and these include a caretaker's residence and associated gardens located in the south western corner near the main entrance. The main house, swimming pool, playground equipment, tennis court and boat ramp are located on the shores of Lake Macquarie in the eastern portion of the site. Along the south eastern boundary is a number of machine sheds and chicken coop. A bunk house and Chapel are located in the north eastern section of the site. Six constructed dams to retain runoff are located throughout the property.

A disused gravel pit is located within the north western corner of the property. Approximately 15ha of the property is vegetated with native vegetation which is in various states of condition.

The soils within the site are composed of the erosional landscape of Doyalson which is described as gently undulating rises on Munmorah Conglomerate. The alluvial landscape of Wyong is present within the eastern and south eastern portions of the site. This soil landscape is underlain by Quaternary sediments.

1.2 Previous Surveys

Wildthing Environmental Consultants prepared an Ecological Constraints Report (2003a). This report included flora survey of the site according to the procedures set out in Wyong Shire Council's Flora and Fauna Survey Guidelines. Targeted threatened flora searches were also undertaken in August 2003 for *Diuris praecox* (Double-tailed Orchid), *Caladenia tessellata* (Thick-lipped Spider-orchid), *Tetratheca juncea* (Black-eyed Susan) and *Cryptostylis hunteriana* (Leafless Tongue-orchid).

Four vegetation communities were delineated which include, Established Native Garden, Disturbed Open Woodland, Narrabeen Snappy Gum Forest and Narrabeen Coastal Sheltered Peppermint-Apple Forest. Two threatened flora species were identified within the site, *Tetratheca juncea* (Black-eyed Susan) and *Syzygium paniculatum* (Magenta Lillypilly). Both of these species are listed as vulnerable under the *Threatened Species Conservation Act 1995* and the federal *Environment Protection and Biodiversity Conservation Act 1999.* It was considered that the three specimens of *Syzygium paniculatum* (Lillypilly) were planted within the Established Native Garden vegetation community as they were amongst other *Syzygium* species. 178 plants of *Tetratheca juncea* were located throughout both the Narrabeen Coastal

Sheltered Peppermint-Apple Forest and the Narrabeen Snappy Gum Forest during the targeted threatened flora surveys.

Fauna surveys also followed the Wyong Shire Council's guidelines and these included extensive trapping for mammals (including arboreal), reptile, amphibian, bird and bat surveys.

Three threatened fauna species were recorded within the site and these include *Tyto novaehollandiae* (Masked Owl), *Miniopterus australis* (Little Bent-wing Bat) and *Miniopterus schreibersii* (Large Bentwing Bat).

1.3 Memorandum of Understanding (MOU)

A MOU has been signed between the Minister for Environment, the Minister for Planning, Coastal Hamlets Pty Ltd and Lakeside Living Pty Ltd in which 86ha has been set aside for development and the remaining 310ha is proposed to be an environmental offset. The development lands are located at both Catherine Hill Bay and Gwandalan (this site). The offsets include lands at Catherine Hill Bay and Wallarah Pennisula adjoining Lake Macquarie.

1.4 Brief of Current Survey

This report has been prepared to update and supplement the previous report by Wildthing Environmental Consultants. The main focus was to perform targeted seasonal surveys for threatened EPBC flora species that may occur within the site. These species include *Diuris praecox* (Double-tailed Orchid), *Caladenia tessellata* (Thick-lipped Spider-orchid), *Tetratheca juncea* (Black-eyed Susan), *Microtis angusii*, and *Cryptostylis hunteriana* (Leafless Tongue-orchid). *Syzygium paniculatum* (Magenta Lillypilly) was also searched for as this species was previously noted by Wildthing (2003), and is EPBC listed.

The second objective of this report was to review existing literature in relation to key threatened EPBC species that could occur within the site, to ensure that all matters/species of relevance to the *Environment Protection and Biodiversity Conservation Act 1999* are adequately addressed.

Thirdly, the findings of above were related to the known ecological characteristics of the proposed offset areas, to assess their adequacy and suitability in this regard.

2 METHODS

2.1 Field Methods

A variety of field survey techniques were employed over the course of fieldwork for this assessment to target threatened flora species across the site. Where possible survey methods followed "Flora and Fauna Guidelines for Development" (Wyong Shire Council, 1999). The document "Wyong Ground Orchid Survey" (Gunninah Environmental Consultants 2003) was also consulted to obtain further information on the habitat of the targeted threatened orchids.

Whilst the Wyong Shire Council's guidelines suggest that some of the orchids mentioned above are best searched whilst performing Transects and Quadrat surveys of the site, all searches were undertaken using the Random Meander Technique. This involves walking in a random manner throughout the site, visiting the full range of potential habitats and recording any threatened flora species (Cropper, 1993). Where particular habitat was noted (eg *Diruris praecox* is known to prefer Grassy areas of *Themeda australis*), parallel transects were also utilised to maximise the chances of finding a species.

All vegetated areas were searched utilising the above technique by two ecologists on the 13th August 2007 and 12th September 2007.

2.2 Limitations of Methodology

A limitation of this survey is that it was performed outside the flowering period for *Cryptostylis hunteriana* (Leafless Tongue-orchid). Table 2-1 is a list of the threatened flora species targeted and their optimum flowering periods in which survey should ideally take place to maximise detection rates.

Table 2-1 Flowering Periods of Threatened Flora

Threatened Flora Species	TSC listed	EPBC listed	Survey Notes	Flowering Period (Best time to Survey) in Months of the Year											
				J	F	M	A	M	J	J	A	S	O	N	D
Caladenia tessellata	V	V										■	■	■	
Cryptostylis hunteriana	V	V												■	■
Diuris praecox	V	V									■	■			
Microtis angusii	E	E								■	■	■	■	■	
Syzygium paniculatum	V	V	Survey anytime											■	■
Tetratheca juncea	V	V		■								■	■	■	■

3 RESULTS

3.1 Caladenia tessellata

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 east of the site. Gunninah Environmental Consultants (2003) report that this species favours low open forest with heathy or sometimes grassy understorey and Coastal Heathland.

No individuals of this species were located within the site despite targeted searches performed during the flowering period for this species. Potential habitat is present within the Narrabeen Snappy Gum Forest vegetation community within the site. This species favours low open forest with a heathy understorey and this habitat occurs within the Narrabeen Snappy Gum Forest vegetation community as mapped by Wildthing (2003).

3.2 Cryptostylis hunteriana

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. Local records exist from the Wallarah Peninsula to the north of the site (NPWS Database Atlas).

No individuals of this species were detected however this species can occur anywhere that *Cryptostylis subulata* or *C. erecta* occur (Gunnindah Environmental Consultants, 2003). Both of the aforementioned species were recorded throughout both the Narrabeen Snappy Gum Forest and the Narrabeen Coastal Sheltered Peppermint-Apple Forest (Plate 3-1) within the site. These two species both flower at the same time as *Cryptostylis hunteriana* however they both have an aboveground leaf for the majority of the year, whereas *C. hunteriana* has no above ground leaf and exists as an underground tuber, except when flowering. Whilst no individuals of this species were detected, the survey was performed outside the flowering period (Table 2-1). Given the recorded presence of *C. subulata* and *C. erecta*, it is considered that there is potential habitat for *C. hunteriana* throughout the site.

Plate 3-1 *Cryptostylis erecta* leaves in Narrabeen Snappy Gum Forest

3.3 Diuris praecox

This species is found predominantly in coastal Eucalypt forests on hilltops or slopes. and has been recorded at a number of dry woodland locations to the south east of Lake Macquarie.

The soils of Doyalson group, the Narrabeen Snappy Gum Forest and the Narrabeen Coastal Sheltered Peppermint-Apple Forest within the site provides habitat for *Diuris praecox.* In addition, there is habitat in the form of grassy understorey with *Themeda australis* which this species has been previously associated with throughout the two aforementioned vegetation communities (Gunnindah Environmental Consultants, 2003). Several individuals who were identified as possible early morph *Diuris praecox* were revisited on 12th September 2007 to check identification after flowering. These plants were subsequently identified as *Burchardia umbellata* (Milkmaids) and not *Diuris praecox*.

3.4 Microtis angusii

Recorded 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) cited in NPWS (2005) in the Lake Macquarie State Recreation area, which occurs to the south of Gwandalan.

No specimens of this species was recorded during the current survey, however the ecotone between the Narrabeen Snappy Gum Forest and the Narrabeen Coastal Sheltered Peppermint Forest located in the south east of the site, provides potential habitat for this species.

3.5 Syzygium paniculatum

A shrub to small tree, found in sub-tropical and littoral rainforest on sandy soils or sheltered gullies mostly near water courses. Distribution is mainly between Bulahdelah and Jervis Bay. Hunter Region records confined to the Lake Macquarie hinterland (Atlas of NSW Wildlife data).

This species was located by Wildthing (2003) in the Native Garden in the south east of the site and these species are planted as they occur with other Syzygium species which are not locally occurring. In addition, there is no rainforest present within the site and it is considered that no potential (natural) habitat for this species is present within the site.

3.6 Tetratheca juncea

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 the Gwandalan peninsula (Atlas of NSW Wildlife data).

Wildthing (2003) conducted intensive targeted searches for this species and located 178 specimens throughout the native vegetation areas of the site. The current survey confirmed the extent of the population and the species was budding up with a few flowers present on some specimens. The main population was observed to be within the Narrabeen Snappy Gum Forest within the north west of the site, however the species occurred throughout the site (as mapped by Wildthing 2003a).

4 CONCLUSIONS

The following EPBC listed species were identified within the site:

- *Tetratheca juncea* was confirmed as occurring within the site.
- Three specimens of *Syzygium paniculatum* were identified within the Established Native Garden vegetation community and are probably planted.

The following EPBC listed species have some potential habitat within the site but were not identified during the current survey:

- *Caladenia tessellata;*
- *Cryptostylis hunteriana;*
- *Diuris praecox; and*
- *Microtis angusii.*

4.1 Vegetation Communities in Offset Lands

As part of the MOU (Section 1.3) 310ha of land of which the majority is native vegetation will be set aside for environmental offsets. Wildthing (2003b & 2003c) have performed intensive surveys over part of the environmental offsets and the proposed development area at Catherine Hill Bay. The vegetation communities that were delineated include:

1. Estuarine Swamp Oak Forest (EEC – under TSC Act 1995);
2. Estuarine Mangrove – Saltmarsh Complex (EEC – under TSC Act 1995);
3. Coastal Swamp Mahogany – Paperbark Swamp Forest (EEC – under TSC Act 1995);
4. Narrabeen Wallarah Sheltered Grassy Forest;
5. Munmorah Palm – Apple Drainage Line Forest; and
6. Coastal Headland Complex (Shrubland Variant).

A parcel of land to the north of the Part Lot 6 DP774923 has not to date been subject to any ecological investigations. Aerial photograph interpretation and use of the Bell (2002) mapping was undertaken to predict possible vegetation communities in this offset area, as follows:

1. Estuarine Swamp Oak Forest (EEC – under TSC Act 1995);
2. Estuarine Mangrove – Saltmarsh Complex (EEC – under TSC Act 1995);
3. Coastal Swamp Mahogany – Paperbark Swamp Forest (EEC – under TSC Act 1995);
4. Narrabeen Wallarah Sheltered Grassy Forest;
5. Narrabeen Foreshore Redgum Ironbark Forest; and
6. Munmorah Palm – Apple Drainage Line Forest.

4.2 Habitat for Threatened Flora

Table 4-1 is a summary of the potential habitats that exist in the offset areas for the threatened flora species which have potential habitat within the site. The dominant vegetation community within the offset lands is Narrabeen Wallarah Sheltered Grassy Woodland and this vegetation community provides potential habitat for all of the EPBC listed threatened flora species that have been identified within the site or have potential habitat within the site.

Table 4-1 Potential Habitat for Threatened Flora Species in the Offset lands

Potential Habitat	Threatened Flora					
	Caladenia tessellata	*Cryptostylis hunteriana*	*Diruris praecox*	*Microtis anugusii*	*Syzygium paniculatum*	*Tetratheca juncea*
Estuarine Swamp Oak Forest						
Estuarine Mangrove – Saltmarsh Complex						
Coastal Swamp Mahogany – Paperbark Swamp Forest					✓	
Narrabeen Wallarah Sheltered Grassy Forest	✓	✓	✓	✓		✓
Munmorah Palm – Apple Drainage Line Forest					✓	
Narrabeen Foreshore Redgum Ironbark Forest	✓	✓	✓			✓
Coastal Headland Complex (Shrubland Variant).	✓		✓			✓

During the surveys conducted by Wildthing (2003), within the offset lands potential habitat for *Cryptostylis hunteriana* was observed within the Narrabeen Wallarah Sheltered Grassy Forest, with the presence of the associated *Cryptostylis subulata* observed throughout this vegetation community.

4.3 Threatened Flora Species Recorded in the Offset Lands

Wildthing (2003b) performed targeted *Tetratheca juncea* searches and recorded 55 individuals within the Narrabeen Wallarah Sheltered Grassy Woodland and eight individuals were recorded within the same community at the Catherine Hill Bay land holdings. A review of the NPWS Atlas revealed that several sightings for *Tetratheca juncea* have been recorded within the site.

4.4 Concluding Statement

The habitat for the threatened flora species which have been recorded within the site or have potential habitat within the Gwandalan site have potential habitat within proposed conservation offset lands which is far greater in area (at least 5 fold) than that which is proposed to be removed for the development. In addition, *Tetratheca juncea* has been recorded throughout the offset areas and it is not considered that

this species will be adversely impacted upon by the proposal such that the local population would be threatened with extinction.

5 REFERENCES

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Wyong Shire Council (1999) *Flora and Fauna Guidelines for Development.*

APPENDIX A CV'S OF PERSONNEL INVOLVED IN PROJECT

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 University of New England Ecological Consultants Association of NSW (ECA) Planning Institute of Australia (PIA) Frog and Tadpole Study Group (FATS) Hunter Birds Observers Club (HBOC) Bird Observers Club of Australia (BOCA) Australasian Bat Society (ABS) Hunter Heritage Network (HHN) Waterways Authority Boating Licence NSW Driver's Licence (Class C) OH&S Induction Training (Green Card) NPWS Scientific Investigation Licence NSW Animal Ethics Research Authority

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:

2001 – current	Director - Environment RPS Harper Somers O'Sullivan, Newcastle.
2000 – 2001	Senior Ecologist & NSW Projects Manager Wildthing Environmental Consultants, Salt Ash.
1996 – 1999	Ecologist Wildthing Environmental Consultants, Salt Ash.
1995 – 1996	Ecologist / Environmental Officer Pulver Cooper & Blackley, Newcastle.

Curriculum Vitae

Name: **DEBORAH LANDENBERGER**

Office: RPS HARPER SOMERS O'SULLIVAN

Position in Company: Ecologist/ Botanist

QUALIFICATIONS: B. Sc (Hons)

Memberships:
AUSTRALIAN PLANT SOCIETY
Australian Ecological Society
Australasian Native Orchid Society
NSW Driver's Licence (Class C)
OH&S Induction Training (Green Card)
NPWS Scientific Investigation Licence
NSW ANIMAL ETHICS RESEARCH AUTHORITY

Areas of Expertise:

- Botanical Surveys
  - Flora identification and habitat assessment
  - Targeted threatened flora surveys
  - Delineation and mapping of vegetation communities
  - Endangered Ecological Community (EEC) assessment
- Project Management and quote preparation
- Fauna habitat identification
- Experience with GPS/GIS for project design and mapping
- Environmental reporting and assessment
- Detailed understanding of environmental legislation

Experience Includes:

June 2006 – Current	Ecologist/ Botanist RPS Harper Somers O'Sullivan, Broadmeadow, NSW
Mar 2005 – Jun 2006	Botanist Conacher Travers, Gosford, NSW
Dec 2004 – Mar 2005	Research Assistant/Casual Demonstrator University of Newcastle, Newcastle, NSW