

Stockland

Bellvista II

Ecological Assessment
Report (EAR)

November 2010

ARUP

Stockland

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Ecological Assessment
Report (EAR)

November 2010

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Job number 86632-03



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Executive Summary

Stockland has commissioned Arup to undertake an Ecological Assessment Report (EAR) for the proposed development of Bellvista II on part of Lot 22 SP190373 and part of Lot 202 SP190373, located at Bellvista Boulevard, Caloundra West. Stockland propose to develop the site as a mixed use residential community. The site has a history of silvicultural and agricultural use, but since the last pine was harvested it has been largely maintained as a cleared open area. Areas of mapped remnant vegetation still persist adjacent to Lamerough Creek, which is located in the south west of the site. These vegetation communities are dominated by Broad-leaved Paperbark (*Melaleuca quinquenervia*), with a small area of wallum also present. The development footprint largely correlates with areas that have been previously cleared. Sensitive environments, such as the remnant vegetation associated with Lamerough Creek will be retained.

Arup undertook a comprehensive desktop analysis and field assessment in February and April 2009 to determine the ecological constraints and opportunities associated with Bellvista II. The field assessment consisted of a habitat assessment to ascertain the suitability of the subject site for significant species, vegetation assessment and targeted frog surveys. As a result of this study the following ecological values were identified on site:

- The site contains approximately 4 ha of regional remnant ecosystems both Not of Concern (RE12.3.6 and RE12.3.5) and Of Concern (RE12.3.4) mapped by the Queensland Herbarium. In 2008, a PMAV (Property Map of Assessable Vegetation) was prepared and forms the basis of legislatively protected vegetation on site. It differs slightly from the Herbarium mapping (refer to **Figure 4.2.1**).
- Lamerough Creek has been mapped as a 'referrable wetland' under the *Environmental Protection Regulation 2008*.
- Lamerough Creek and the associated Paperbark (*Melaleuca sp.*) is an important habitat for a number of significant species potentially occurring in the locality. It also provides an important wildlife corridor, connecting areas to the east and west of Bellvista II.
- Field investigations located a small population (3 – 4 specimens) of Christmas Bells (*Blandfordia grandiflora*) in the vicinity of the north-western boundary of the site, which are listed as Rare under Queensland's *Nature Conservation Act 1992*. No other significant flora species were located.
- The Wallum Froglet (*Crinia tinnula*) was identified using call identification as being present within and immediately adjacent to the Paperbark wetlands on Lamerough Creek at Bellvista II. The Wallum Froglet is listed as vulnerable under Queensland's *Nature Conservation Act 1992*. The Paperbark wetlands on Lamerough Creek will be fully retained and protected. No other significant fauna species were located.

An assessment of potential impacts on the ecology of Bellvista II was undertaken, with the following findings and suggested mitigation measures:

- Areas of remnant vegetation and 'essential habitat' that have been recognised in the PMAV and EPA wetlands mapping will be buffered from the development footprint. This is namely the riparian vegetation associated with Lamerough Creek.
- The development footprint is restricted to heavily disturbed areas that are not representative of natural vegetation communities. It is anticipated that the limited values associated with these communities will be replaced through site landscaping and appropriately designed drainage channels.
- From a management perspective, the development footprint will be located within areas that have been previously cleared for agricultural purposes. In consultation with Council, a minimum 50m buffer from the property boundary to mapped wetlands /

significant vegetation along Lamerough Creek has been provided with an average demonstrated buffer of 105m to development. The buffer consists of:

- A minimum additional 25m of revegetation beyond the existing riparian vegetation (potentially more in areas where the setback is in excess of 50m has been provided);
 - A minimum of 9m of passive open space (potentially more in areas where the setback is in excess of 50m has been provided); and
 - 14m of road frontage.
- Integrated stormwater management measures, water sensitive urban design (WSUD) and buffers have been modelled and/or designed to ensure that the stormwater emanating from the site results in no significant worsening of the flooding and water quality parameters currently experienced within the EPA (DERM) wetland to the south-east of the site.
 - The natural habitat (wallum and wetlands) of the Wallum Froglet will be retained and buffered from impacts of the development.
 - It is unlikely that the retention of the Christmas Bells found in the vicinity of the north-eastern boundary of the site will be possible under the current plan of development. These specimens will be translocated to an area of remnant vegetation that is being retained.

1 Introduction

Stockland has commissioned Arup to undertake an Ecological Assessment Report (EAR) for the proposed development of Bellvista II. The subject site is located at Bellvista Boulevard, Caloundra West. It can be described as the northern portion of Lot 22 SP190373 above Lamerough Creek and part of Lot 202 SP190373. These land parcels form part of an Urban Development Area, (UDA) as declared by the Urban Land Development Authority (ULDA). The subject site will form the second stage of the Bellvista development and is referred to as Bellvista II. The subject site is bound by the Caloundra Aerodrome to the north-east, Bellvista and other residential development to the north and Lamerough Creek to the south. Approximately 200m to the east of the site boundary is a large area of coastal wetland (that is soon to become part of the conservation estate) that separates Bellvista II and Pelican Waters. The area to the south and west is disused agricultural and silvicultural land (**Figure 1.0**).

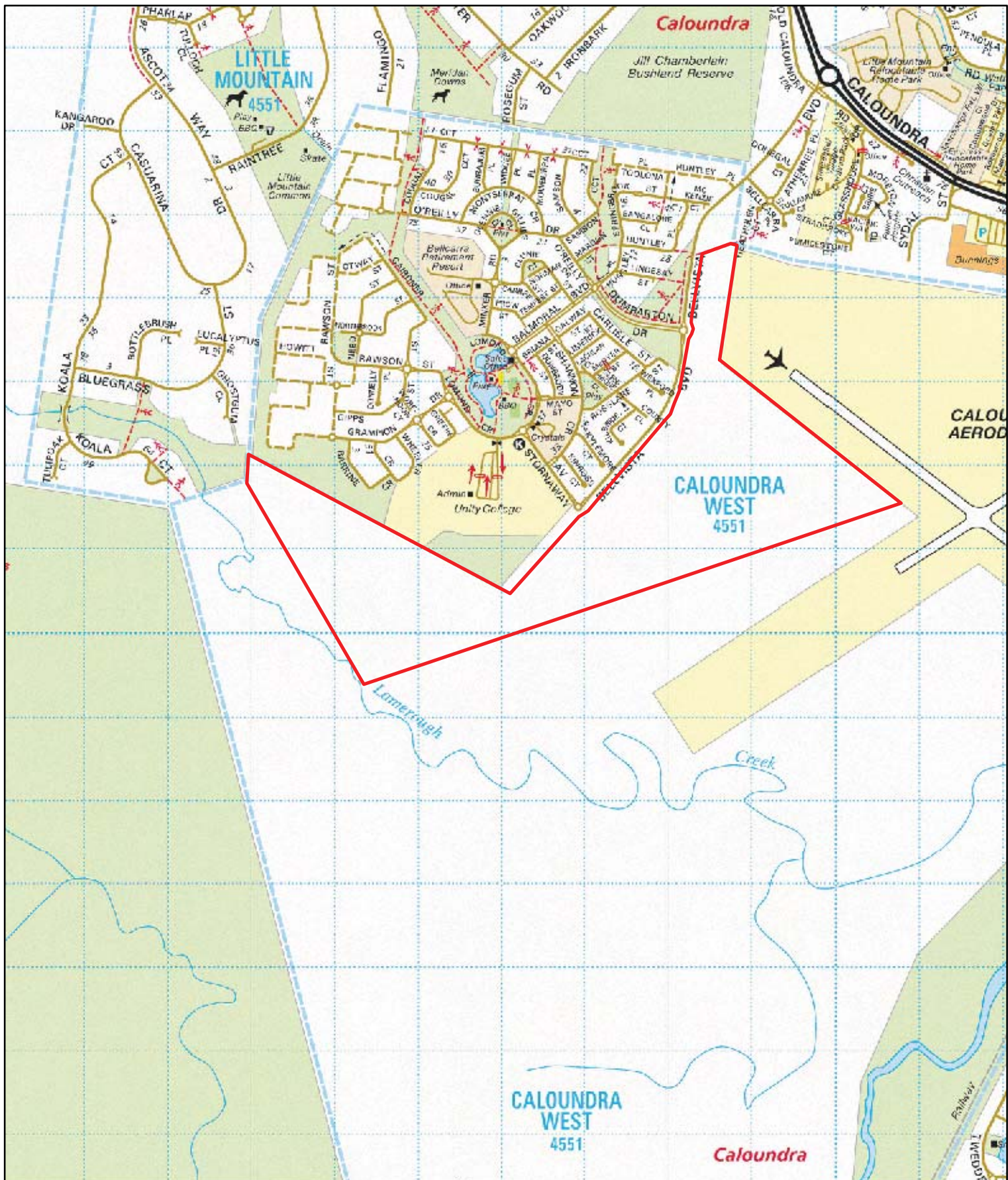
From a hydrological perspective, Bellvista II forms a low-lying coastal flood storage and conveyance area associated with Lamerough Creek. In addition to Lamerough Creek, there is a small drainage channel (man-made) running north to south across the subject site. This drainage line converges with Lamerough Creek to the south-east of the site, where there is an area of remnant wetland vegetation. Groundwater is generally acidic (pH 5.4 – 5.8), however, soil investigations did not reveal the presence of acid sulphate soils.

Bellvista II has a history of silvicultural and agricultural use, but since the last pine was harvested it has been largely maintained as a cleared open area. The cleared area is slashed regularly to a height of approximately 10 – 20cm. Areas of mapped remnant vegetation still persist adjacent to Lamerough Creek, in the south-west of the site.

1.1 Project Description

Bellvista II is proposed to be a mixed use residential development. It will provide open space areas and a variety of housing styles, including villas, townhouses and detached dwellings. The development footprint (provided to Arup in November 2010, and the basis of this report) will largely be located within areas that have been previously cleared for agricultural purposes. Sensitive environments, such as the remnant vegetation associated with Lamerough Creek will be retained. Stormwater and drainage on the site will be addressed utilising a combination of Water Sensitive Urban Design (WSUD) features such as vegetated swales and bio-retention basins that are designed to ensure water discharged from site achieves the required water quality objectives.

Figure 1.1 shows the proposed Plan of Development.



Legend

 Bellvista 2 Study Area

Imagery sourced from Brisways.
Based on or contains data provided by
the State of Queensland (Department of Natural
Resources and Water) 2009.



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Job Title

**Bellvista 2 Ecological Assessment
Report**

Drawing Title

Subject Site

Metre
0 100 200 300 400 500 600

I2	17/01/2010	SXJ/GJK	MBS	MBS
Issue	Date	By	Chkd	Appd

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Scale at A4

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For Issue

Job No

86632

Figure No

Figure 1.0

Issue

I2

Coordinate System
MGA94, zone 56

Horizontal Datum
GDA94

Vertical Datum
AHD

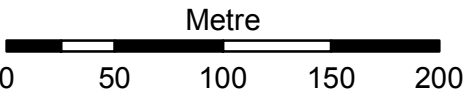
Map Units
Metres



Bellvista 2 proposed layout plan
was prepared by CONICS
(plan reference 21662-7633-28B)



I3	26/11/2010	MJD	LCM	LCM
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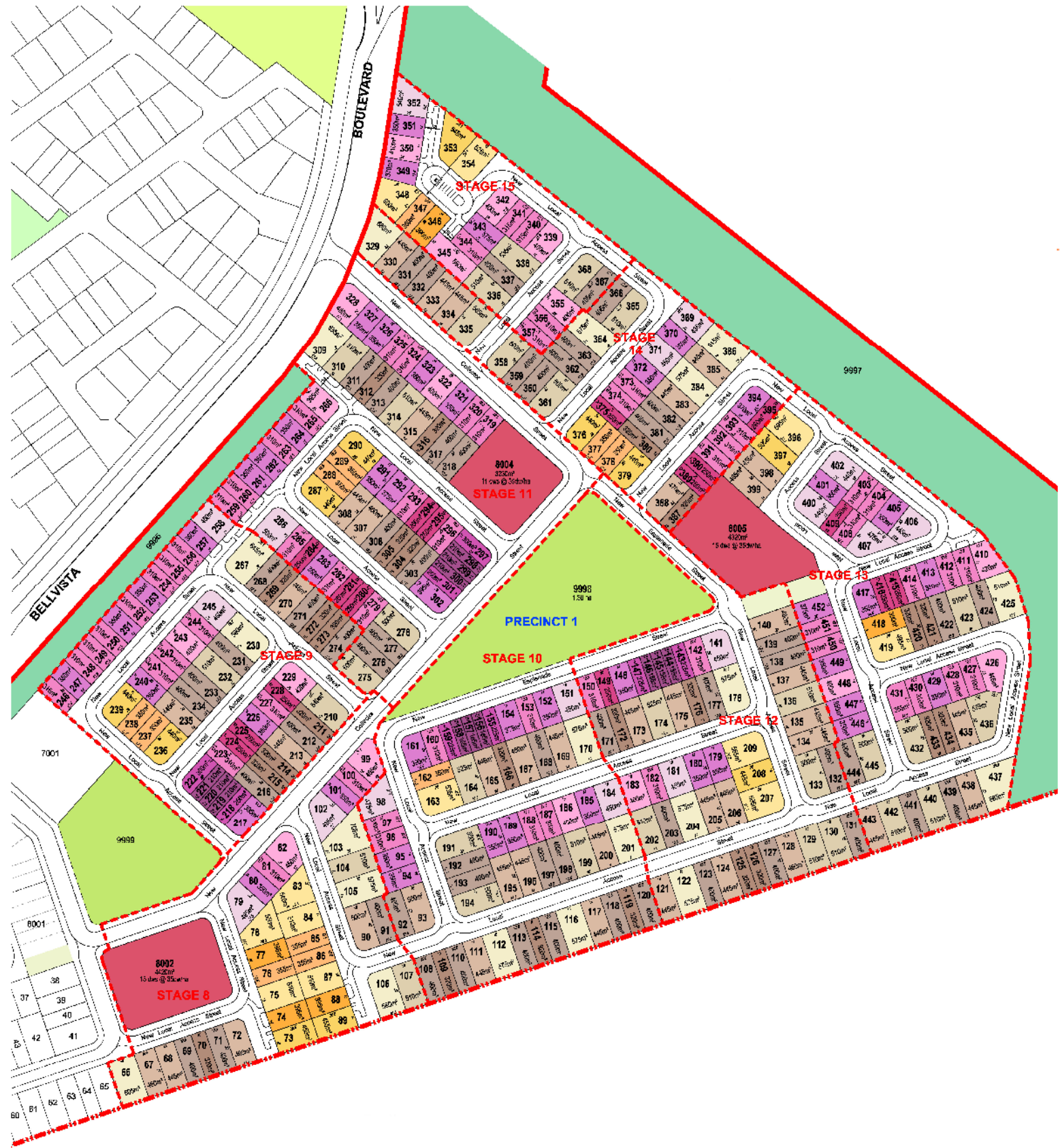
Client
Stockland

Job Title
**Bellvista 2 Ecological Assessment
Report**

Drawing Title
**Structure Plan
Application 1 Subdivision Plan**

Scale at A4 1:3,500	Coordinate System MGA94, zone 56
Drawing Status For Issue	Horizontal Datum GDA94
	Vertical Datum AHD
	Map Units Metres

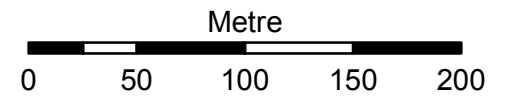
Job No 86632	Figure No Figure 1.1a	Issue I3
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Bellvista 2 proposed layout plan
was prepared by CONICS
(plan reference 21662-7633-28B)



I3	26/11/2010	MJD	LCM	LCM
Issue	Date	By	Chkd	Appd



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Client
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Job Title
**Bellvista 2 Ecological Assessment
Report**

Drawing Title
**Structure Plan
Application 2 Subdivision Plan**

Scale at A4 1:3,500	Coordinate System MGA94, zone 56
Drawing Status For Issue	Horizontal Datum GDA94
	Vertical Datum AHD
	Map Units Metres

Job No 86632	Figure No Figure 1.1b	Issue I3
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2 The Legislative Framework

The project is consistent with Federal and State Government policy and legislation. The following sections outline environmental policies and legislation that are relevant to the project and discusses their implications. A full description of relevant legislation can be found in **Appendix A**.

2.1 Commonwealth & State Legislation

A summary of relevant Commonwealth and State legislation is provided in Table 1 **Appendix A**, with those of most significance to the project outlined below:

<i>Coastal Protection & Management Act 1995</i> (Coastal Act)	This Act requires the development of State and Regional Coastal Plans. The Coastal Plans have the effect of State Planning Policies under the <i>Sustainable Planning Act 2009</i> (formerly <i>Integrated Planning Act 1997</i>).
<i>Environment Protection Biodiversity Conservation Act 1999</i> (EPBC Act 1999)	This Act aims to protect Threatened species, ecological communities, migratory species and other matters of national environmental significance. It requires referral to the federal government for development that may impact listed species.
<i>Nature Conservation Act 1992</i> (NC Act 1992) (including Regulations and Conservation Plans)	This Act aims to protect Threatened species and recognised conservation areas. It requires application to the Department of Environment and Resource Management (DERM) for the taking of Threatened flora and fauna species.
<i>Vegetation Management Act 1999</i> (VM Act 1999)	This Act aims to halt broad scale clearing in Queensland and protect mapped remnant vegetation from unauthorised clearing. It recognises regional ecosystems and has a vegetation community focus.

2.2 Urban Land Development Authority Act 2007

Under the *Urban Land Development Authority Act 2007*, the ULDA is responsible for the planning and assessment of development in declared Urban Development Areas (UDAs) across the State, which are designated to provide for Queensland's urban development needs. An Interim Land Use Plan has been prepared for Caloundra South which identifies Precincts 1 and 2 (Areas A and B in this application) as land able to be developed immediately. Figure 1 in Appendix B shows the Caloundra South UDA boundary and precincts.

3 Methodology

The basis of the investigations has been to undertake a comprehensive desktop analysis and field assessment of the ecological constraints and opportunities associated with Bellvista II. The desk top analysis relied on drawing information from existing sources:

- Aerial photography (Google 2010)
- Regional Ecosystem Mapping (Queensland Herbarium v5 2003 with updates)
- Essential Habitat Mapping (EPA v5 2003 with updates)
- SEQ Regional Coastal Management Plan mapping (EPA 2006)
- Koala Habitat Mapping (EPA 2006)
- Biodiversity Planning and Assessment Mapping (EPA v3.4 2005)
- EPBC database search tool (Department of Environment, Water, Heritage and the Arts (DEWHA) 2010)
- WildNet (DERM 2010)
- Queensland Museum fauna records
- HerbreCs (Queensland Herbarium 2010)
- WetlandsInfo Search (DERM 2010)
- Fish Habitat Areas (DPI&F 2010)
- Conservation Estate Mapping (including Marine Parks) (DERM 2010)
- Nature Refuges (DERM 2010)
- existing ecological reports for the local area, including:
 - Landscape Assessment, Management & Rehabilitation (LAMR) Pty Ltd (1999) Caloundra Downs II Study – Vegetation & Botanical Issues.
 - Hyder Environmental (1999) Caloundra Downs II – Fauna & Habitat Assessment.
 - D.P.A. Sands (1999) Caloundra Downs II – Zoological Studies – Butterflies
 - BAAM (2009) Caloundra Downs – EPBC Act Listed Flora Species and Fauna Assessment

This information was integrated into Geographical Information Systems (GIS) with an overlay of the proposed development to enable a series of GIS analyses to be undertaken. A field assessment was undertaken in February and April 2009 to ascertain the condition of reported environmental values within the site. The field assessment consisted of a habitat assessment to ascertain the suitability of the site for certain significant species¹, vegetation assessment and targeted frog surveys. The results of these analyses have been described in the report. The weather during this period was warm and humid, with rain during the evenings. It was considered appropriate weather for fauna surveys, particularly frogs.

Limitations associated with the study are largely a result of the reliance on publicly available data. Some of the mapping utilised has been developed through remote sensing and the analysis of aerial photography, which is generally associated with some degree of error due to the scale of the images available and their interpretation. Other records (e.g. significant species) are reliant on the identification skills of various unknown individuals. Hence, the accuracy of the search data utilised in this assessment is unknown. An attempt has been made to manage this limitation through undertaking a field assessment of the site to determine any gross discrepancies with the available data.

¹ Significant species are those listed as 'threatened' under the Nature Conservation Act 1992 (NC Act), Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and/or recognised within the Caloundra City Plan 2004, Policy 11.15.

It should be noted that the apparent absence of some species during field surveys does not unequivocally determine that the species does not utilise the site. It is not possible to identify all fauna species present on a site during surveys due to seasonal patterns in activity or the cryptic nature of some species. For this reason, the precautionary principle should be adopted to ascertain the likelihood of a species occurring on a site given the preferences of that species, the available habitat on the site and historic records for the species.

4 Baseline Conditions

4.1 Habitat Values

4.1.1 Landscape Ecology

Bellvista II is located on the southern fringe of the urban development that surrounds Caloundra City. The area to the south and west is disused agricultural and silvicultural land, similar to the majority of the Bellvista II site. Remnant vegetation on Bellvista II is limited to the area adjacent to Lamerough Creek. This vegetation has been recognised in the Biodiversity Planning Assessment (BPA) Mapping by Queensland's Department of Environment & Resource Management (DERM)² as State significant under the following criteria:

- Criteria B Ecosystem Value, B1 – Significant Wetland; and
- Criteria A Significant Habitat for 'At Risk' Species, i.e. remnant contains at least 1 Endangered or 2 Vulnerable or Rare species.

The Bellvista II site has not been recognised as part of a major wildlife corridor on a State or regional level, however, the vegetation along Lamerough Creek does form an important wildlife corridor permitting movement east to west (and vice versa) on a local scale (as recognised in the Caloundra City Plan, Habitat Corridors & Links Map 7.8). It also connects two major corridors; one inland and one on the coast. To the east of the site, the area surrounding the Pumicestone Passage forms a major Bioregional Wildlife Corridor recognised both within the BPA Mapping and within the Habitat Corridors & Links Map 7.8 of the Caloundra City Plan. The corridor runs north-south and is characterised by weakly connected remnant vegetation. To the west of the site, the area surrounding Beerburum State Forest and the Glasshouse Mountains are part of a nationally recognised wildlife corridor known as the 'Alps to Atherton Wildlife Corridor'. Plans for the corridor were announced in early 2007 and it consists of conservation estate and private land holdings across Victoria, New South Wales and Queensland. There is an inter-government agreement between the State's and federal government that will see the encouragement of land-holders within the corridor to undertake land care and sign voluntary conservation agreements.

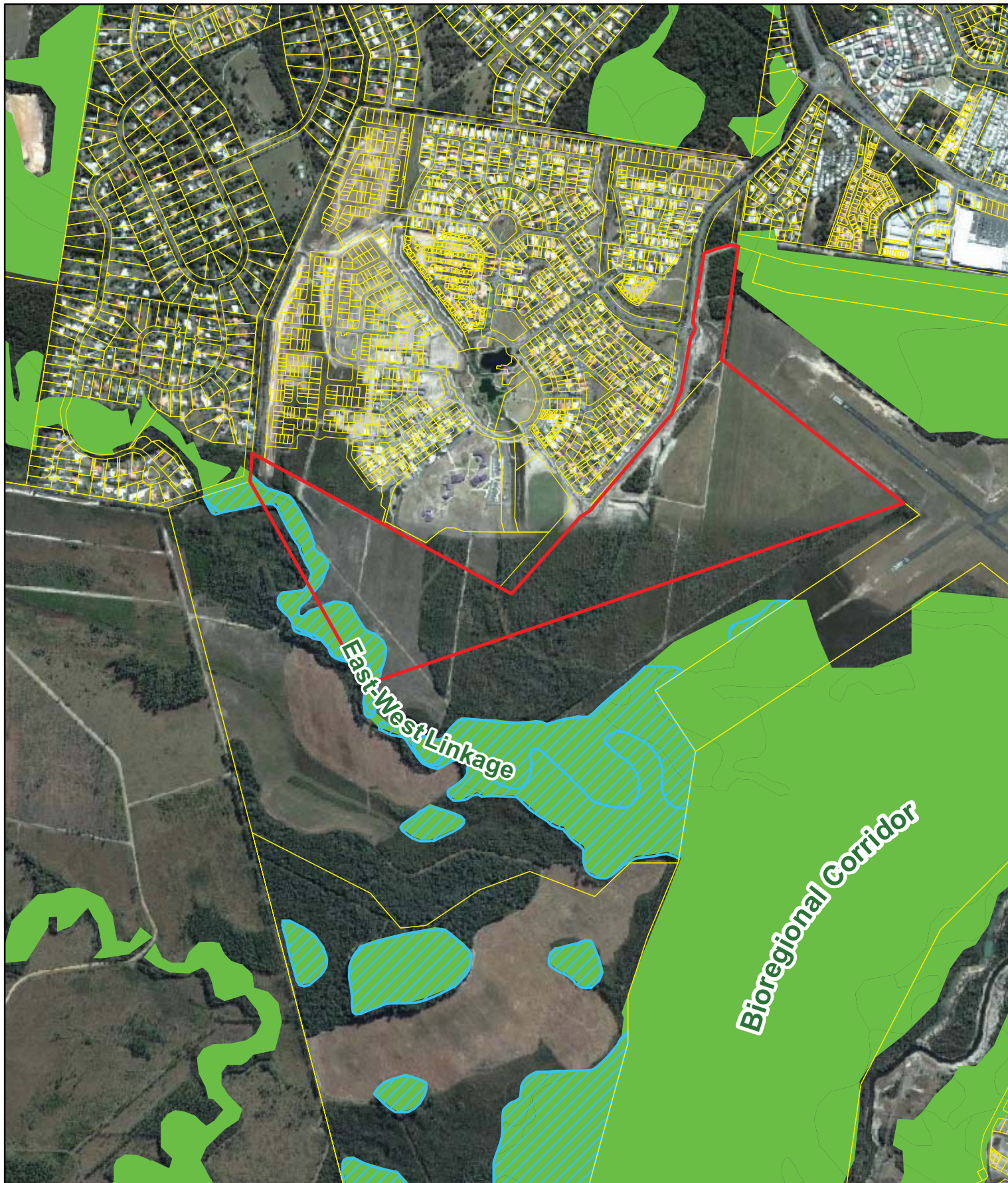
The relationship between the site and the various wildlife corridors affecting the local area is presented in **Figure 4.1.1**.

4.1.2 Habitat Types

Bellvista II has a history of agricultural and silvicultural use, but since the last pine was harvested it has been largely maintained as a cleared open area. Prior to its agricultural use Bellvista II would have supported wallum vegetation. The site lies within the 'wallum region' of the Sunshine Coast. The wallum region extends from the coast of central Queensland (Woodgate) down the eastern coast to central New South Wales (Myall Lakes). The region is characterised by non-calcerous Quaternary sands with low nutrients and acidic black waters. Vegetation is typically coastal heath and wetlands.

Historical land uses at Bellvista II have reduced the wallum habitat and introduced new communities to the site. The cleared area is slashed regularly to a height of approximately 10 – 20cm. It is dominated by grasses, but contains some native species reminiscent of wallum origins. Areas of mapped remnant vegetation still persist adjacent to Lamerough Creek. These vegetation communities are dominated by Broad-leaved Paperbark (*Melaleuca quinquenervia*). Recent assessments have classified the existing habitat into five community types. These habitats are described in **Table 4.1.2** and shown in **Figure 4.1.2**.

² Formerly Queensland Environmental Protection Agency (EPA).



Legend

- Bellvista 2 Study Area
- Cadastre
- Mapped remnant vegetation
- Surveyed Remnant Vegetation Outline (PMAV 2008/009340)

Imagery sourced from Google Earth Pro.
Based on or contains data provided by
the State of Queensland (Department of Natural
Resources and Water) 2009.



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Report**

Drawing Title

Wildlife Corridors

Metre

0 100 200 300 400 500 600

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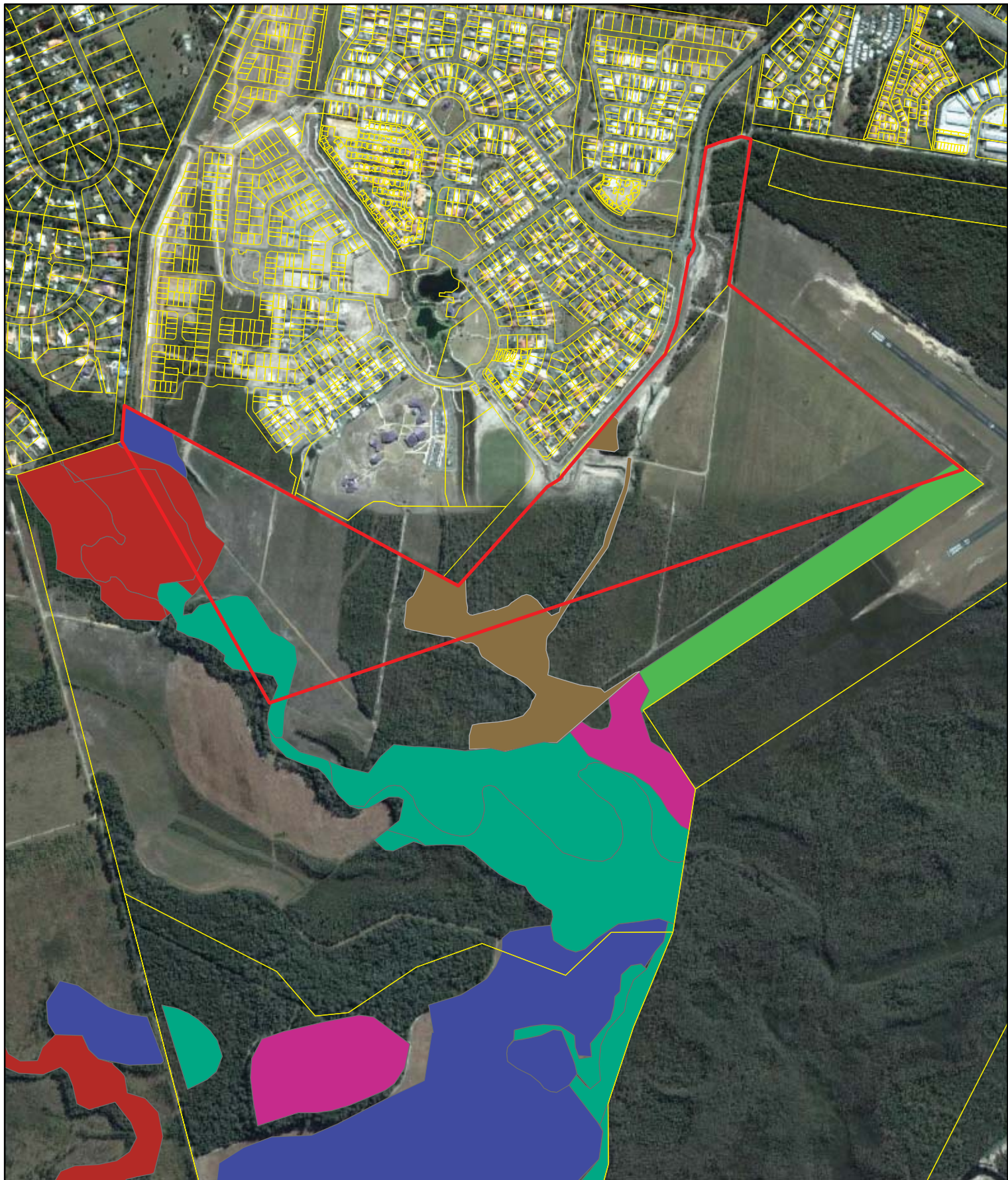
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Figure No

Figure 4.1.1

Issue
I2

Coordinate System
MGA94, zone 56
Horizontal Datum
GDA94
Vertical Datum
AHD Map Units
Metres



Legend

- | | |
|---|---|
| Bellvista 2 study area | Lowlands rainforest |
| Cadastre | Blackbutt (mixed eucalypt open forest) |
| Habitat type: | Reed dominated drainage lines |
| Melaleuca/Forest red gum | Maleleuca swamp |
| Heath | Paperbark and pine regrowth |
| Wallum | |
| Open water | |

Imagery sourced from Google Earth Pro. Based on or contains data provided by the State of Queensland (Department of Natural Resources and Water) 2009.



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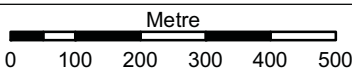
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Bellvista 2 Ecological Assessment Report

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Habitat Types



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Drawing Status

For Issue

Job No
86632

Figure No

Figure 4.1.2

Issue
I2

Coordinate System
MGA94, zone 56
Horizontal Datum
GDA94
Vertical Datum
AHD Map Units
Metres

Table 4.1.2 Habitat types within Bellvista II

Habitat and Description	Photographic Representation	Description
1. Cleared areas supporting rank grasses.		This community makes up the majority of the site. Rank exotic grasses to 1.3m, this community is very dense. Due to impeded drainage and low-lying characteristics it is dominated by exotic pasture grasses (<i>Cynodon dactylon</i>, <i>Pennisetum sp.</i> and <i>Urochloa sp.</i>) and Swamp Foxtail (<i>Pennisetum alopecuroides</i>). However, it does contain occasional heath and wallum species such as Hatpins (<i>Xyris complanata</i>), Spoon-leaf Sundew (<i>Drosera spatulata</i>), Grey Sedge (<i>Lepironia articulata</i>), Soft Twigrush (<i>Baumea rubiginosa</i>), Bungwall Fern (<i>Blechnum indicum</i>), Devil's Rice (<i>Conospermum taxifolium</i>), Wallum Heath (<i>Epacris pulchella</i>), <i>Gleichenia sp.</i> and <i>Isolepis sp.</i>
2. Paperbark <i>Melaleuca quinquenervia</i> and Blue Gum <i>Eucalyptus tereticornis</i> dominated riparian habitats. Aligns with RE12.3.4 and RE12.3.5		This community is associated with Lamerough Creek. Tall, open forest dominated by Paperbark (<i>Melaleuca quinquenervia</i>) to 16m, patchy emergent Blue Gum (<i>Eucalyptus tereticornis</i>) can reach 22m. The mid-dense shrub layer is characterized by the presence of Blueberry Ash (<i>Elaeocarpus reticulatus</i>), Black Wattle (<i>Acacia leiocalyx</i>), Cheese tree (<i>Glochidion sumatranum</i>), She-oak (<i>Allocasuarina littoralis</i>), Wild May (<i>Leptospermum polygalifolium</i>) and Monkey Rope (<i>Parsonsia straminea</i>). Wetter ground layers are dominated by Grey Sedge (<i>Lepironia articulata</i>) and Twiggy Rush (<i>Cladium procerum</i>), grading into Soft Twigrush (<i>Baumea rubiginosa</i>), and Bungwall (<i>Blechnum indicum</i>). This community is generally in good condition although it is variously invaded by Slash Pine (<i>Pinus elliottii</i>), Lantana (<i>Lantana camara</i>) and Guinea Grass (<i>Megathyrsus maximus</i>).
3. Drainage channel and Paperbark and Pine regrowth		This vegetation community is aligned with the drainage line running north to south. It consists of a mixture of <i>Melaleuca quinquenervia</i> and <i>Pinus elliottii</i> to 15m. The mid-storey is largely absent except for the occasional wattle (<i>Acacia sp.</i>) and the understorey is dominated by exotic grasses and occasional <i>Baccharis halimifolia</i> (Groundsel) and <i>Ludwigia octovalvis</i> (Willow Primrose).

Habitat and Description	Photographic Representation	Description
4. Heavily disturbed wallum		This community occurs in the far west corner of the site. It has been continually slashed to 20 – 30cm height. A small area of intact wallum exists to the north of the slashed area. The species composition of the coastal wallum is Saw-sedge (<i>Gahnia sieberiana</i>), Geebung (<i>Persoonia sericea</i>) and Blue Tongue (<i>Melastoma affine</i>). The very dense lower ground layers are characterized by <i>Gleichenia mendellii</i> , Soft Twigrush (<i>Baumea rubiginosa</i>) and <i>Empodisma minus</i> , Sedge (<i>Cyperus melanostachys</i>), Prickly Guinea Flower (<i>Hibbertia acicularis</i>), Hatpins (<i>Xyris complanata</i>), Heath Platysace (<i>Platysace ericoides</i>), Wallum Heath (<i>Epacris pulchella</i>) and Native Iris (<i>Patersonia glabrata</i>). Within the mature wallum to the north of the site there are emergent Black Wattle (<i>Acacia leiocalyx</i>), evident above and upper stratum.
5. Paperbark dominated swamp Aligns with RE12.3.5 and RE12.3.6		This community is associated with Lamerough Creek. Wetland vegetation with a mid-dense canopy averaging 28m is dominated by Paperbark (<i>Melaleuca quinquenervia</i>). The very sparse sub-canopy layer is dominated by the occasional Cheesetree (<i>Glochidion sumatranum</i>) and Cabbage Tree Palm (<i>Livistona australis</i>). The sparse shrub layer is characterized by Blue Tongue (<i>Melastoma affine</i>) and Black Wattle (<i>Acacia leiocalyx</i>). The dense ground layer is a patchwork of Grey Sedge (<i>Lepironia articulata</i>) and Bungwall (<i>Blechnum indicum</i>).

4.2 Vegetation

The vegetation communities on Bellvista II are reminiscent of wallum habitat (heath and wetlands). They are associated with land zone 3 (alluvial / colluvial deposits), which is generally indicative of high moisture content and a riparian or wetland environment. Lamerough Creek has been mapped as a 'referrable wetland' (as has a large relict of wallum adjacent to the east) (see Figure 1 **Appendix B**).

Wetlands are also mapped under the *SEQ Coastal Management Plan* (which is part of the *State Coastal Management Plan*). Currently, Lamerough Creek is affected by 'Significant Coastal Wetlands' (Map 8, SEQ Regional Coastal Management Plan) and 'Coastal Wetlands' (Map 9, SEQ Regional Coastal Management Plan) (see Figure 2 **Appendix B**). The *SEQ Coastal Management Plan* states that development in or within 100m of a 'Significant Coastal Wetland' must have a land use compatible with retaining the values of the wetland, provide appropriate buffers to the wetland and undertake water quality management. Similarly development in or within 100m of a 'Coastal Wetland' must maintain, protect and enhance the current extent of the wetland.

A review of the *State Coastal Management Plan* has found that regional coastal plans are an unnecessary additional regulatory layer in coastal management. Hence, DERM have developed a new *Draft Queensland Coastal Plan* that will repeal the existing regional plans and the *State Coastal Management Plan*. The *Draft Queensland Coastal Plan* (which includes a *Draft State Planning Policy (SPP) Coastal Protection* and *Draft State Policy Coastal Management*) is currently under review after a period of public consultation (which closed on 30 November 2009). In the *Draft Queensland Coastal Plan* Bellvista II is indicated as being within a 'Terrestrial Coastal Zone' and Lamerough Creek is indicated as an area of 'high ecological significance' (see Figure 3 **Appendix B**).

4.2.1 Vegetation communities

As mentioned earlier, the majority of Bellvista II consists of cleared land with areas of remnant vegetation being retained in association with Lamerough Creek (Not of Concern RE12.3.6 and RE12.3.5, and Of Concern RE12.3.4). A description of the regional ecosystems mapped on site by Queensland Herbarium is provided in **Table 4.2.1a** below.

Table 4.2.1a: Remnant RE's on Bellvista II

Regional Ecosystem	Status	Description
RE12.3.4	<i>Of Concern</i>	<i>Melaleuca quinquenervia</i> , <i>Eucalyptus robusta</i> open forest on or near coastal alluvial plains.
RE12.3.5	<i>Not of Concern</i>	<i>Melaleuca quinquenervia</i> open-forest to woodland. Understorey depends upon duration of water logging; sedges and ferns, especially <i>Blechnum indicum</i> , in wetter microhabitats and grasses and shrubs in drier microhabitats.
RE12.3.6	<i>Not of Concern</i>	<i>Melaleuca quinquenervia</i> , <i>Eucalyptus tereticornis</i> , <i>Lophostemon suaveolens</i> ± <i>Corymbia intermedia</i> open-forest to woodland with a grassy ground layer dominated by species such as <i>Imperata cylindrica</i> .

In 2008 a PMAV (Property Map of Assessable Vegetation) was prepared utilising data from vegetation surveys on the site and approved under the *Vegetation Management Act 1999* (VM Act). The PMAV differs from the RE mapping by the Queensland Herbarium which was produced using aerial photography at a scale of 1:50,000 rather than site surveys. The PMAV identifies areas of vegetation on Bellvista II that comply with the legislative definition for remnant vegetation, that is:

- a. a species composition in accordance with a recognisable RE;
- b. 50% mature canopy cover; and
- c. 75% mature canopy height.

In accordance with the VMA 1999, the PMAV now forms the basis for all vegetation assessment and permitting conducted by DERM. **Figure 4.2.1** provides details of the vegetation recognised within the PMAV in comparison to the mapped remnant vegetation.

Generally speaking, the vegetation communities present on Bellvista II are reflective of Vegetation Unit W3 (*Melaleuca quinquenervia*, *Eucalyptus tereticornis* & *Lophostemon suaveolens* associations) as identified in the Caloundra Biodiversity Strategy (2006). The Strategy indicated that the total area remaining of Vegetation Unit W3 was 479.6ha within the local government area of Caloundra City at the time of publication. The values associated with this Vegetation Unit are shown in **Table 4.2.1b**.

Table 4.2.1b: Environmental values of vegetation communities at Bellvista II

Vegetation Unit	Biodiversity#	Weeds*	Significant Species	Local Priority
W3	Medium	Medium - high	None known	Moderate

NB. # Biodiversity – innate floristic diversity, * Weeds – propensity to weed invasion.



Legend

- | | |
|---|---|
| Bellvista 2 Study Area | Mapped remnant vegetation |
| Cadastre | (with daily updates to 27/02/2009) |
| Surveyed Remnant Vegetation Outline (PMAV 2008/009340) | |
| Significant flora located in 2009 | Endangered |
| Significant flora located in 1999 | Of Concern |
| | Not of Concern |

Imagery sourced from Google Earth Pro. Based on or contains data provided by the State of Queensland (Department of Natural Resources and Water) 2009.



Client

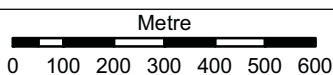
Stockland

Job Title

Bellvista 2 Ecological Assessment Report

Drawing Title

Vegetation



I2	17/01/2010	SXJ/GJK	MBS	MBS
Issue	Date	By	Chkd	Appd

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Scale at A4

1:15,000

Drawing Status

For Issue

Job No
86632

Figure No

Figure 4.2.1

Issue
I2

Coordinate System
MGA94, zone 56
Horizontal Datum
GDA94
Vertical Datum
AHD Map Units
Metres

4.2.2 Significant Flora Species

Significant species are listed as 'threatened'³ under the Queensland *Nature Conservation Act 1992* (NC Act) and the Commonwealth *Environment Protection & Biodiversity Conservation Act, 1999* (EPBC Act). Under the NC Act, 'taking'⁴ of a threatened species is subject to assessment and approval by the Department of Sustainability, Environment, Water, Population and Communities (SEWPC). The EPBC Act requires that activities likely to have a significant impact on threatened species are referred to SEWPC for assessment and approval.

. Recent searches for floristic data (**Appendix C**) have indicated the potential presence of several significant flora species within proximity of the development site (**Table 4.2.2**).

Table 4.2.2 Significant Flora Species within the Local Area

Common Name	Species Name	Local	EPBC Act	NC Act
Attenuate Wattle	<i>Acacia attenuata</i>		V	V
Tiny wattle	<i>Acacia baueri</i>			V
Mt Emu She Oak	<i>Allocasuarina emuina</i>		E	E
Christmas Bells	<i>Blandfordia grandiflora</i>			R
Heart-leaved Bosistoa	<i>Bosistoa selwynii</i>		V	
Three-leaved Bosistoa	<i>Bosistoa transversa</i>		V	
Miniature Moss-orchid	<i>Bulbophyllum globuliforme</i>		V	R
Stinking Cryptocarya	<i>Cryptocarya foetida</i>		V	V
Swamp Stringybark	<i>Eucalyptus conglomerata</i>		E	E
Swamp Mahogany	<i>Eucalyptus robusta</i>	L		
Lesser Swamp-orchid	<i>Phaius australis</i>		E	E
Swamp Orchid	<i>Phaius tancarvilleae</i>		E	E
Wallum Leek	<i>Prasophyllum wallum</i>		V	V
- an orchid	<i>Prasophyllum exilis</i>			R
Minute Orchid	<i>Taeniophyllum muelleri</i>		V	

NB. CE – Critically endangered, E – endangered, V – vulnerable, R – rare, L – locally significant

Bellvista II has been subject to several ecological surveys and reports since 1999. In the vegetation and fauna surveying undertaken in 1999 (LAMR, Caloundra Downs II Informal Land Use Investigation), only two significant flora species were located in the area to the south of Lamerough Creek: *Alyxia ilicifolia* spp. *magnifolia* (Large-leaved Chain Fruit) and *Blandfordia grandiflora* (Christmas Bells). The likelihood of locating *Phaius* spp. (Swamp Lily) within wetland habitats was highlighted, although the species was not found during surveys.

Of the 15 significant flora species known from the local area, only nine species (listed below) may potentially occur within the wetland habitats on the Bellvista II site. This analysis has taken into account the availability of suitable habitats on site and known records within the local area. It is noted that most other significant flora species known from the locality (**Table 4.2.2**) require remnant rainforest habitats.

³ Extinct, Critically Endangered, Endangered, Vulnerable or Rare species are collectively referred to as 'threatened'.

⁴ To take is to 'hunt, shoot, wound, kill, skin, poison, net, snare, spear, trap, catch, dredge for, bring ashore or aboard a boat, pursue, lure, injure or harm the animal; or gather, pluck, cut, pull up, destroy, dig up, fell, remove or injure the plant or any part of the plant; or attempt to do so.

- Attenuate Wattle
- Tiny wattle
- Mt Emu She Oak
- Christmas Bells
- Swamp Stringybark
- Lesser Swamp-orchid
- Swamp Orchid
- Wallum Leek
- *Prasophyllum exilis*

Only one significant flora species has been located on Bellvista II. Site investigations conducted in February and April 2009 located only a small population (3 – 4 stems) of Christmas Bells on the north-west boundary of the property, adjacent to Unity College, Bellvista. No other significant species were located. The location of the Christmas Bells is shown in **Figure 4.2.1**

Christmas Bells

Christmas Bells (*Blandfordia grandiflora*) are slow-growing, grass-like plants with narrow leaves and bell-shaped flowers produced on stems arising from the centre of the clump. They are commonly known as "Christmas Bells" as they generally flower in December-January and are most prolific two years after fire. The attractive flower has lead to the plant being cultivated and harvested for the florist trade. Cultivation has proved difficult due to its particular soil moisture requirements and susceptibility to soil borne pathogens, namely *Pythium* species and *Phytophthora* species (Agnote, DPI 2003).

Christmas Bells are usually found in wet coastal heaths on sandy soils in south-eastern Australia. Its range is from Sydney to Fraser Island in Queensland (24° S), including occurrences in the lower and middle Blue Mountains. They were once quite common but many of the coastal swamps they were known from have been cleared and drained for pine plantations and housing. Christmas Bells are now rarely found outside reserves and state forests. Other threats to the species include harvesting, changed bushfire regimes and weed infestation. Removal of these plants from the wild now requires a permit from DERM under the NC Act.

There is limited information available about the distribution and population dynamics of the species. It is known from a few areas on the Sunshine Coast, including: Lake Weyba, Mooloolah River, Marcoola Wallum, Point Arkwright Mudjimba Coastal Strip, Noosa National Park and Bribie Island.

4.3 Fauna

Studies conducted in 1999 found fauna within the disused silvicultural and agricultural lands to be of low diversity and abundance. This can be attributed to the patchiness of vegetation and a lack of corridors. The faunal groups most affected by the disturbance appeared to be reptiles and mammals. Of the vegetation communities remaining at Bellvista II, the riparian complexes (Habitats 2 and 5, **Table 4.1.2**) are the most important as several significant species are associated with these habitats. Recent searches (**Appendix C**) have indicated the presence of several significant and migratory⁵ fauna species in the local area (**Table 4.3**).

Table 4.3 Significant Fauna Species within the Local Area

Common Name	Species Name	EPBC Act	NC Act
Threatened			
Australian Fritillary Butterfly	<i>Argyreus hyperbius inconstans</i>		E
Illidge's ant-blue butterfly	<i>Acrodipsas illidgei</i>		V
Richmond birdwing butterfly	<i>Ornithoptera richmondia</i>		V
Regent Honeyeater	<i>Anthochaera phrygia</i>	E	
Coxen's Fig-Parrot	<i>Cyclopsitta diophthalma coxeni</i>	E	E
Red Goshawk	<i>Erythrotriorchis radiatus</i>	V	E
Grey Goshawk	<i>Accipiter novaehollandiae</i>		V
Swift Parrot	<i>Lathamus discolor</i>	E	E
Ground Parrot	<i>Pezoporus wallicus</i>		V
Glossy Black Cockatoo	<i>Calyptorhynchus lathami</i>		V
Australian Painted Snipe	<i>Rostratula australis</i>	V	
Lewin's Rail	<i>Lewinia pectoralis</i>		R
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>		R
Black-breasted Button-quail	<i>Turnix melanogaster</i>	V	V
Wallum Sedgefrog	<i>Litoria olongburensis</i>	V	V
Wallum Rocketfrog*	<i>Litoria freycineti</i>		V
Wallum Froglet*	<i>Crinia tinnula</i>		V
Honey Blue Eye	<i>Pseudomugil mellis</i>	V	V
Oxleyan Pygmy Perch	<i>Nannoperca oxleyana</i>	V	V
Elf Skink	<i>Erotoscincus graciloides</i>		R
Burrowing Skink	<i>Ophioscincus truncatus</i>		R
Koala*	<i>Phascolarctus cinereus</i>		V
Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	V	R
Long-nosed Potoroo	<i>Potorous tridactylus tridactylus</i>	V	V
Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>	V	

⁵ Migratory species are protected under the EPBC Act.

Common Name	Species Name	EPBC Act	NC Act
Migratory			
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	M	
White-throated Needletail	<i>Hirundapus caudacutus</i>	M	
Rainbow Bee-eater	<i>Merops ornatus</i>	M	
Black-faced Monarch	<i>Monarcha melanopsis</i>	M	
Spectacled Monarch	<i>Monarcha trivirgatus</i>	M	
Rufous Fantail	<i>Rhipidura rufifrons</i>	M	
Great Egret	<i>Ardea alba</i>	M	
Cattle Egret	<i>Ardea ibis</i>	M	
Latham's Snipe	<i>Gallinago hardwickii</i>	M	
Australian Cotton Pygmy-goose	<i>Nettapus coromandelianus albipennis</i>	M	
Painted Snipe	<i>Rostratula benghalensis s. lat</i>	M	
Locally Significant			
White-Striped Freetail Bat	<i>Nyctinomus australis</i>	-	-
Ornate Rainbowfish	<i>Rhadinocentrus ornatus</i>	-	-
Southern sedge-darter	<i>Telicota eurychlora</i>	-	-
White spot Rush-skipper	<i>Trapezites luteus</i>	-	-
Swamp Wallaby	<i>Wallabia bicolor</i>	-	-

* indicated as occurring in 'essential habitat' (VM Act 1999) associated with Lamerough Creek

Of the 25 threatened and 11 migratory fauna species known from the local area, only nine threatened and six migratory species (listed below) may potentially occur within the cleared grassland, and wetland habitats on the Bellvista II site. This analysis has taken into account the availability of suitable habitats on site and known records within the local area. It is noted that four of the species listed above inhabit the cleared areas of the site (Australian Painted Snipe, Cattle Egret, Latham's Snipe and Painted Snipe). Other species found in the locality, but unlikely on the site prefer rainforest, eucalypt forest or large undisturbed areas.

- Australian Fritillary Butterfly
- Glossy Black Cockatoo
- Australian Painted Snipe
- Lewin's Rail
- Wallum Sedge Frog
- Wallum Froglet
- Burrowing Skink
- Grey-headed Flying-fox
- Rainbow Bee-eater
- Black-faced Monarch

- Spectacled Monarch
- Rufous Fantail
- Cattle Egret
- Latham's Snipe
- Painted Snipe

Site investigations conducted in February and April 2009 located Wallum Froglet to the south-west of Bellvista II; no specimens were physically sited within Bellvista II. The species was noted to be calling from other areas within and adjacent to the wetland vegetation on the site. No other significant species were located on the site itself. The absence of Honey Blue Eye, Oxleyan Pygmy Perch and Wallum Rocketfrog was attributed to changes in site run-off characteristics due to clearing, whereby the area flushes too quickly to maintain the still, black, acidic waters preferred by these species. Due to the altered hydrology of the site the streams have lost characteristics typical of wallum habitat, showing evidence of high sediment load, turbidity and pH. The wallum species appear to have been replaced by their 'non-acid' relatives i.e. Striped Rocketfrog (*Litoria nasuta*) and Sedgefrog (*Litoria fallax*).

Koalas

There is no suitable habitat on the site itself for koalas. Their presence has been recorded in Palmview to the north. The site is not recognised as koala habitat under the *Nature Conservation (Koala) Conservation Plan 2006 and Management Program 2006 – 2016*. Nor is it recognised as protected koala habitat under the State Planning Policy 2/10 South East Queensland Koala Conservation or *SEQ Koala State Planning Regulatory Provisions* (2010).

Wallum Froglet

No Wallum Froglets were physically sited on-site; however they were identified through call identification as being present in and immediately adjacent to the Paperbark dominated swamp associated with Lamerough Creek at Bellvista II. Population density surveys have not been undertaken, so the size of the population at Bellvista II is unknown.

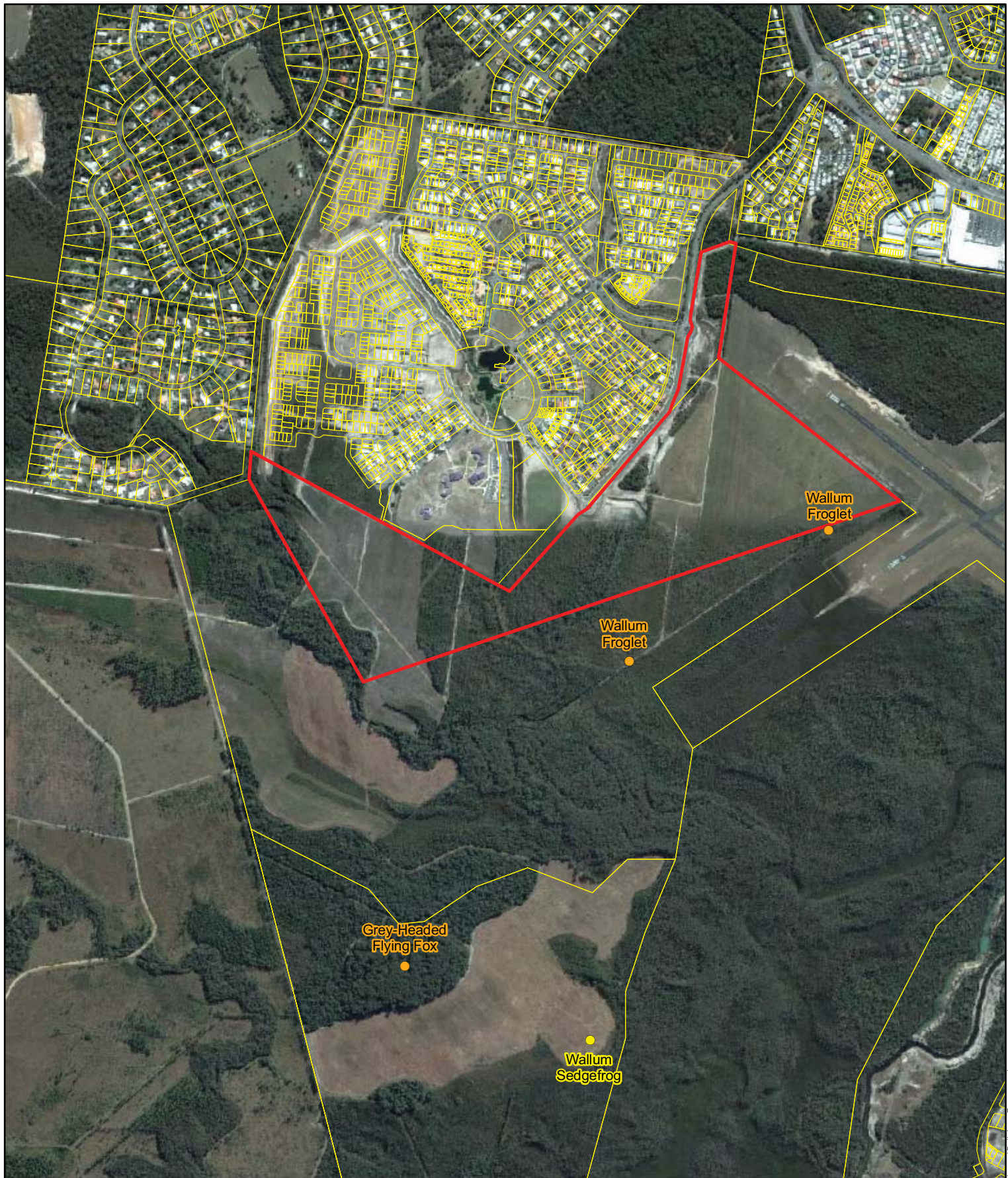
Two individuals were sited in wet furrows within the cleared areas outside of the site boundary, immediately to the east of the site (**Figure 4.3**). In this situation, the size and distribution of the population of Wallum Froglet in some cleared areas adjacent to the wetlands is a consequence of the current land management regime. The frogs are attracted to the furrows created in wet areas adjacent to the Paperbark vegetation during slashing, which fill with nutrient-poor and acidic waters. Whilst this species is endemic to the site, prior to current land management practices it would have been restricted to its natural habitat of temporary pools within the remnant paperbark open forest / wetland, heath and sedgeland along Lamerough Creek corridor.

The Wallum Froglet only occurs in lowland coastal habitats in SEQ and north-east New South Wales and on the sand islands off the Queensland coast (Fraser, Bribie, Moreton and North Stradbroke Islands). The species range once extended from just north of Bundaberg in Queensland to the Sydney area in New South Wales. Although large populations have persisted in some of Queensland's protected areas, its distribution has been significantly reduced and fragmented. The Sunshine Coast is known to support a number of populations of the species, although on a national level the population trend over the last 50 years has been shown to be decreasing. An estimate of the total number of adults present in the species entire range is >50,000 individuals⁶. The accuracy of this estimate is unknown.

⁶ Frogs Australia, 2009. www.frogsaustralia.net.au

The Wallum Froglet is listed as vulnerable under Queensland's *Nature Conservation Act 1992*. Under the Act it is illegal to 'take'⁷ this species, but the Act offers no legislative protection to the areas that the species inhabits.

⁷ "take" in relation to an animal, means to hunt, shoot, wound, kill, skin, poison, net, snare, spear, trap, catch, dredge for, bring ashore or aboard a boat, pursue, lure, injure or harm the animal.



Legend

Bellvista 2 Study Area

Cadastre

Significant Fauna Species

● 1999

● 2009

Client

Stockland

Job Title

Bellvista 2 Ecological Assessment Report

Drawing Title

Fauna

Metre

0 100 200 300 400 500 600

I2	Date	By	Chkd	Appd
12	17/01/2010	SXJ	MBS	MBS



Imagery sourced from Google Earth Pro. Based on or contains data provided by the State of Queensland (Department of Natural Resources and Water) 2009.

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Scale at A4

1:15,000

Drawing Status

For Issue

Job No

86632

Figure No

Figure 4.3

Issue

I2

Coordinate System

MGA94, zone 56

Horizontal Datum

GDA94

Vertical Datum

AHD

Map Units

Metres

5 Potential Impacts

The proposed development is essentially an extension of the Bellvista residential area to the west of the site and it is intended to be developed in a similar way. The majority of the development footprint coincides with the occurrence of cleared areas. Areas of remnant vegetation that have been recognised in the PMAV and DERM wetland mapping will be buffered from development, which will result in the conservation of the following habitats on the site:

- Habitat 2 - Paperbark *Melaleuca quinquenervia* and Blue Gum *Eucalyptus tereticornis* dominated riparian habitats.
- Habitat 4 – Heavily disturbed wallum
- Habitat 5 – Paperbark dominated swamp

These habitats will be mostly retained at the periphery of Bellvista II (it is possible some minor disturbance will occur for the installation of infrastructure). The two habitats that will be removed by the development are reflective of the anthropogenic disturbances that have occurred historically on the site, for example, cleared areas dominated by pasture grasses; the drain associated with Paperbark and Pine regrowth.

The potential impacts of the development are discussed in detail in **Sections 5.1 – 5.4** and have been categorised as:

- Habitat loss
- Impacts on retained vegetation, and
- Impacts on Significant Flora & Fauna.

5.1 Potential Impacts from Habitat Loss

The two habitat types that will be removed from Bellvista II as a result of the development are representative of communities that have suffered extensive anthropogenic disturbance already. The drainage channel and the cleared areas are a result of historical agricultural uses on the site and stormwater management in adjacent developments. These areas are no longer representative of natural vegetation communities and they hold little habitat value that cannot easily be replaced elsewhere on the site.

5.1.1 Removal of Drain associated with Paperbark and Pine regrowth

The existing drain through the centre of the site was originally constructed to drain the surrounding wetlands, which enabled the retention of pasture grasses for agricultural pursuits on the site. The date of the original construction is unknown and it is currently used to discharge stormwater from developments to the north of Bellvista II into Lamerough Creek. Over time the drain has become colonised by Paperbark (*Melaleuca quinquenervia*) and Pine (*Pinus elliottii*), which forms a single line of trees either side of the drain. Towards the southern end of the drain, the Paperbark and Pine community expands and connects with the Paperbark swamp associated with Lamerough Creek (refer to **Figure 4.1.2**). The area affected by this vegetation community is approximately 3.27 ha.

The species composition of these areas is not representative of a recognised Regional Ecosystem (RE) and the vegetation is not considered remnant. The canopy is co-dominated by Paperbark and Pine to a height of 15m, with an average DBH of 20cm. The mid-storey is largely absent except for the occasional wattle (*Acacia sp.*) and the understorey is dominated by exotic grasses and occasional *Baccharis halimifolia* (Groundsel) and *Ludwigia octovalvis* (Willow Primrose) to 1.5m. In its current condition, this vegetation community holds little habitat value. There may be some habitat value, associated with the drain, for water birds and some aquatic fauna that are less susceptible to fluctuating hydrology and water quality. However, these habitat values are easily replaced through the stormwater management systems proposed for the site.

The development proposes to replace the drain that currently runs through the centre of the site with a system of drainage channels and detention areas (refer to **Figure 1.1**). The newly constructed drainage channels will collect and treat stormwater prior to discharge to Lamerough Creek. They will be constructed to replicate natural drainage channels (as opposed to the straight drain existing on the site) and be landscaped with native species, endemic to the regional ecosystems found on and adjacent to the site. Hence, it is considered that the impact of removing the existing drain and Paperbark and Pine vegetation community will be offset by the implementation of the proposed drainage system.

5.1.2 Removal of Cleared Areas

The values associated with the cleared areas on the site relate to the potential to provide habitat to wading and migratory birds known from the local area that are associated with open water and rank grasslands, including:

- Cattle Egret (Migratory, EPBC Act)
- Latham's Snipe (Migratory, EPBC Act)
- Painted Snipe (Migratory, EPBC Act)
- Australian Painted Snipe (Vulnerable, EPBC Act)

It is not anticipated that the removal of the cleared areas will have a significant impact on these migratory bird species, as there has been no evidence presented within studies conducted over the past 10 years that the birds are breeding or feeding in large numbers on the site. The open space and drainage and detention system proposed may provide some form of compensatory habitat to continue to attract these species to the site.

5.2 Potential Impact to Retained Vegetation Communities

The vegetation communities remaining on the subject site post-development are associated with Paperbark communities adjacent to Lamerough Creek. The development proposes to replace the drain that currently runs through the centre of the site with a system of drainage channels and detention areas (refer to Figure 1.1). The newly constructed drainage channels will collect stormwater and redistribute it to Lamerough Creek. The existing flow rates to Lamerough Creek from the site will be maintained, with flow dissipaters installed so that discharge does not cause erosion to the waterway. Integrated stormwater management measures, water sensitive urban design (WSUD) and buffers have been modelled and/or designed to ensure that the stormwater emanating from the site results in no significant worsening of the flooding and water quality parameters currently experienced within the DERM wetland retained in the south-east of the site. The potential impacts on this vegetation community and the proposed management of stormwater at Bellvista II is discussed in more detail in **Sections 5.2.1 and 5.2.2**.

5.2.1 Impact to Lamerough Creek and Wildlife Corridor

Lamerough Creek and the associated Paperbark (*Melaleuca sp.*) is an important habitat for a number of significant species potentially occurring in the local area. It also provides an important wildlife corridor, connecting areas to the east and west of Bellvista II. The release of stormwater into the Lamerough Creek system has the potential to alter the hydrology of the system to a point where in-stream habitats and surrounding vegetation communities may become affected. For example, an influx of a large amount of water can cause scouring and erosion of banks which destroys the natural pool and riffle system that aquatic species may rely on. Similarly, the release of stormwater into the creek system also has the potential to decrease water quality through the addition of high levels of nutrients and sedimentation.

To cater for water quality, bank stabilisation and wildlife movement requirements, it will be important for the development to provide an adequate buffer to the creek system. The

Caloundra South Interim Land Use Plan requires that the Lamerough Creek riparian corridor is appropriately managed; no preferred buffer width is recommended.

DERM have advised that a minimum buffer width of 47m from the edge of the existing remnant vegetation was acceptable provided the values of Lamerough Creek could be protected. It was recommended the buffer should contain at least 16m road, 8m non-vegetated space and 22m of revegetation.

Arup reviewed the ecological values associated with Lamerough Creek, which are:

- Provision of a wildlife corridor within the landscape
- Remnant vegetation
- Habitat for common and significant flora and fauna
- Wetland and riparian values

The development has been designed to result in a buffer to remnant vegetation and mapped wetlands associated with Lamerough Creek with an average width of 104m (ranging from 50-295m). A minimum width of 25m of revegetation will occur adjacent to existing riparian vegetation within the Lamerough Creek corridor to function as a buffer support area. An esplanade road (14-16m) and 9m of grass/passive open space will be provided to protect residents against biting insects and bushfire hazard. This satisfies DERM's requirements.

The development of Bellvista II has adequately provided for the protection and management of the ecological values associated with Lamerough Creek. It has achieved this outcome through the provision of a buffer area of sufficient width, which will be complimented by ongoing management of the corridor.

It will also be essential for Bellvista II to embrace stormwater harvesting and WSUD principles to prevent further degradation of the Lamerough Creek system.

Stormwater management on Bellvista II has two elements:

- the stormwater run-off created by the addition of impervious surfaces, and
- the stormwater run-off entering the site from developments further upstream.

In order to adequately manage stormwater, it will be essential for Bellvista II to manage both elements of the system. These elements are discussed.

Management of stormwater run-off on site

Stormwater run-off created by the development of the subject site will be managed in a similar way as it has been in Bellvista, which is through a combination of rainwater tanks and rain gardens, bio-retention systems and detention basins fitted within the roadways and open space areas. The rainwater tanks will be fitted to each household to support the use of rainwater for irrigation and some domestic uses. Bioretention systems located within road reserve and open space areas will be used to treat excess runoff from roofs, road runoff and other sources. Some stormwater discharge infrastructure may be included in the buffer area, required some minor disturbance to existing vegetation. Integrated stormwater management measures have been modelled and designed to meet water quality requirements for stormwater emanating from the site. Detention basins will be located across the site to capture flows up to and including a 100 year ARI event. The release of stormwater runoff to Lamerough Creek will be managed in accordance with a Stormwater Management Plan.

Management of stormwater run-off entering the site

The site currently receives flows from a number of upstream locations. These flows travel through the site and are discharged into Lamerough Creek at various points. The majority of Bellvista stormwater runoff is collected via a number of man-made and natural channels and

is discharged to Lamerough Creek between Precincts 1 and 2 on the current proposal. Smaller catchments to the east and west of this main catchment discharge into the creek to the north of the proposed Precinct 1 and the western part of proposed Precinct 2 respectively. Runoff from the site itself also currently discharges at these points and some other locations. It is proposed to maintain the post-developed flows for Bellvista II at the pre-developed level at each discharge location. This will occur through the implementation of a number of detention basins and stormwater channels, with flow dissipation so that discharge is not concentrated at one point.

5.2.2 Impact to DERM Wetland

There is a narrow strip of wetland along Lamerough Creek. It is classified as a 'not of concern' RE12.3.5 and RE12.3.6 (Paperbark *Melaleuca quinquenervia* wetland). Many of the significant species potentially occurring in the local area are associated with this vegetation community.

Integrated stormwater management measures have been modelled and designed to ensure that the stormwater emanating from the site results in no significant worsening of the flooding and water quality parameters currently experienced within the wetland.

5.3 Potential Impacts to Significant Flora & Fauna

The three habitat types proposed for retention on Bellvista II are suitable to support the significant flora and fauna that was listed as potentially occurring within the local area in **Sections 4.2.2** and **4.3**. Site inspections conducted in February and April 2009 noted that there are two significant species (Christmas Bells (Rare, NC Act) and Wallum Froglet (Vulnerable, NC Act)) that may be impacted by development.

5.3.1 Christmas Bells

The Christmas Bells (3 – 4 specimens) are located in proposed Area B, within the vicinity of the west of the site on the boundary with the neighbouring school (Unity College). They occur in a narrow strip of vegetation. The currently proposed residential precinct is located in the vicinity of these specimens (refer to Figure 5.2.1). With the amount of fill required and the likely size of the lots, it is unlikely that the retention of these specimens will be possible. Although not a significant population, it is proposed that these specimens be translocated to an area that is being retained.

5.3.2 Wallum Froglet

The Wallum Froglet was identified through call identification as being present in and immediately adjacent to the Paperbark dominated swamp associated with Lamerough Creek. The natural habitat of the species is the wetland, heath and wallum areas that would have once covered the whole of the Bellvista II site. At Bellvista II the remaining areas of natural habitat (wallum and wetlands) of the Wallum Froglet will be retained and buffered from impacts of the development.

Bellvista II is also taking the opportunity to increase the area of natural habitat available for the Wallum Froglet by allowing a small area of heavily disturbed wallum west of Precinct 2 to regenerate (refer to Wallum shown on **Figure 4.1.2**). This small area of wallum (approximately 150m in width) has been slashed repeatedly under the current land management regime, but it has not yet become dominated by exotic pasture grasses. It is bordered by the Paperbark swamp associated with Lamerough Creek to the south and an area of wallum associated with open space in Bellvista to the north. In its current state, this small area of disturbed wallum on Bellvista II has limited value. However, once the surrounding landscape is transformed to an urban environment this area could provide a useful link between two complimentary habitats (i.e. wallum and paperbark swamp). The Wallum Froglet has been observed to shelter in paperbark swamps and breed within adjacent wallum areas. Hence, the regeneration and conservation of this small area of wallum will provide an ideal environment that will support different life-stages of the species.

The current level of information indicates that parts of the buffer to Lamerough Creek and perhaps some of the identified detention areas may be able to be engineered to provide additional breeding habitat for the Wallum Froglet. The feasibility of facilitating this is able to be investigated at the detailed design stage, when further information will be available about ground water levels, the length of time the ponds within the retention areas will be able to hold water and the probability of achieving the correct pH levels. This option also needs to be investigated in terms of its desirability from ULDA's perspective and its long-term maintenance requirements.

5.4 Potential Impacts to Biting Insects

Development is expected to have a positive effect on the risk from biting insects by reducing the areas suitable for breeding on the Bellvista II site and providing buffers to the adjacent wetlands. In order to ensure that no new breeding areas are generated, precautionary measures will be taken to prevent pooling and stagnation of water.

- The frog habitat requirements will result in the creation of shallow pools of water, however, evidence suggests that the mosquito larvae does not co-exist with Wallum Froglet tadpoles.

- The obligate breeding site water quality for the acid frogs (as the name suggests) is low pH (ranges between 3.0 and 5.2) with water very low in organic nutrient. These conditions are generally counterproductive for significant mosquito breeding (Floore et al 1976).
- Competition for resources (especially in water of low nutrient value) between frog tadpoles and mosquito larvae are mutually detrimental to their production (Mokany and Shine 2003).
- There have been no observational references found for mosquitoes breeding in acid frog habitat.

In addition, a buffer area consisting of a turfed area and the roadway will be positioned between areas of potential mosquito breeding habitat and the residential area.

6 Summary of Recommended Mitigation Measures

From the information presented within this report, it is apparent that there are several priorities for ecological management on Bellvista II:

- Retention of riparian habitat adjacent to Lamerough Creek in accordance with PMAV and DERM wetland requirements.
- From a management perspective, the development footprint will be located within areas that have been previously cleared for agricultural purposes. In consultation with Council, a minimum 50m buffer to mapped wetlands / significant vegetation along Lamerough Creek has been provided with an average demonstrated buffer of 104m to development. The buffer consists of:
 - A minimum additional 25m of revegetation beyond the existing riparian vegetation (potentially more in areas where the setback is in excess of 50m has been provided);
 - A minimum of 9m of passive open space (potentially more in areas where the setback is in excess of 50m has been provided); and
 - 14m of road frontage.
- Provision of adequate stormwater management with minimum disruption to existing water flow regime and water quality to ensure protection of wetlands associated with Lamerough Creek. Stormwater discharge may occur within the buffer area, provided mitigation measures contained in this report are implemented and there is no net loss of vegetation.
- The stormwater management features on the Bellvista II site are expected to provide some compensatory habitat for migratory birds and a link to open space in Bellvista, hence they will be landscaped to achieve this.
- Retention of natural habitat and further investigation into the provision of artificial Wallum Froglet habitat within the retention areas adjacent to Lamerough Creek.
- The provision of sufficient buffer from potential mosquito breeding habitat.
- The provision of sufficient buffer from potential bushfire hazard.
- The translocation of the Christmas Bells specimens to an area that is being retained, in order to conserve the species on the site.

References

- BAAM (2009) Caloundra Downs – EPBC Act Listed Flora Species and Fauna Assessment
Caloundra City Council. 2007. *Caloundra City Plan*.
- D.P.A. Sands (1999) Caloundra Downs II – Zoological Studies – Butterflies
- Floore, T.G., Harrison, B.A., and Eldridge, B.F. 1976. *The Anopheles (Anopheles) Crucians Subgroup in the United States (Diptera: Culicidae)*. Mosquito Systematics. 8 (1).
- Hyder Environmental (1999) Caloundra Downs II – Fauna & Habitat Assessment
- Landscape Assessment, Management & Rehabilitation (LAMR) Pty Ltd (1999) Caloundra Downs II Study – Vegetation & Botanical Issues.
- McGinn, D. 2009. Bellvista II Caloundra – Biting Insect Investigation and Mitigation Report. Unpublished report for Stocklands.
- Mokany, A. and Shine, R. 2003. *Competition between tadpoles and mosquito larvae*. Oecologia 135: 615-620.
- PB Australia (2008) Bellvista II Development Proposal, Environmental Planning Opportunities, Constraints and Recommendations.

Appendix A

Legislative Summary

Table 1 :Summary of relevant Federal and State Legislation

Legislation/Policy	Implications	Level
JAMBA 1974	Agreement between the Government of Australia and the Government of Japan for the protection of migratory birds in danger of extinction and their environment	International
CAMBA 1986	Agreement between the Government of Australia and the Government of China for the protection of migratory birds in danger of extinction and their environment.	International
<i>Ramsar Convention on Wetlands 1971</i>	An intergovernmental treaty which provides the framework for national action and international cooperation for the conservation of wetlands.	International
<i>Environment Protection Biodiversity Conservation Act 1999 (EPBC Act 1999)</i>	This Act aims to protect Threatened species. It requires referral to the federal government for development that may impact listed species.	Commonwealth
<i>Nature Conservation Act 1992 (NC Act 1992) (including Regulations and Conservation Plans)</i>	This Act aims to protect Threatened species and recognised conservation areas. It requires application to the Department of Environment and Resource Management (DERM) for the taking of Threatened fauna species.	Queensland
<i>Vegetation Management Act 1999 (VM Act 1999)</i>	This Act aims to halt broad scale clearing in Queensland and protect mapped remnant vegetation from unauthorised clearing. It recognises regional ecosystems and has a vegetation community focus. It requires an application to DERM for clearing of assessable vegetation.	Queensland
<i>Land Protection (Pest and Stock Route Management) Act 2002 (LP Act 2002)</i>	This Act defines noxious pests, which are formally referred to in the EPBC Act as Declared Pests. It requires management of some Declared Pests.	Queensland
<i>Fisheries Act 1994</i>	This Act defines marine plants and Fish Habitat Areas, which require permits for interference.	Queensland
<i>Water Act 2000</i>	This Act defines waterways and riparian vegetation. Permits are required for clearing of riparian vegetation and interference with a waterway.	Queensland
<i>Coastal Protection & Management Act 1995</i>	The main objects of this Act are to provide for the protection, conservation, rehabilitation and management of the coast, including its resources and biological diversity. The subject site is not within the Coastal Management District in the SEQ Coastal Management Plan.	Queensland
<i>Environment Protection Act 1994</i>	This Act puts duty of care on everyone to take reasonable steps to avoid negative impacts to the environment. It also defines an EIS process and Environmentally Relevant Activities (ERA's) that are assessable under the Act.	Queensland

Appendix B

Statutory Figures

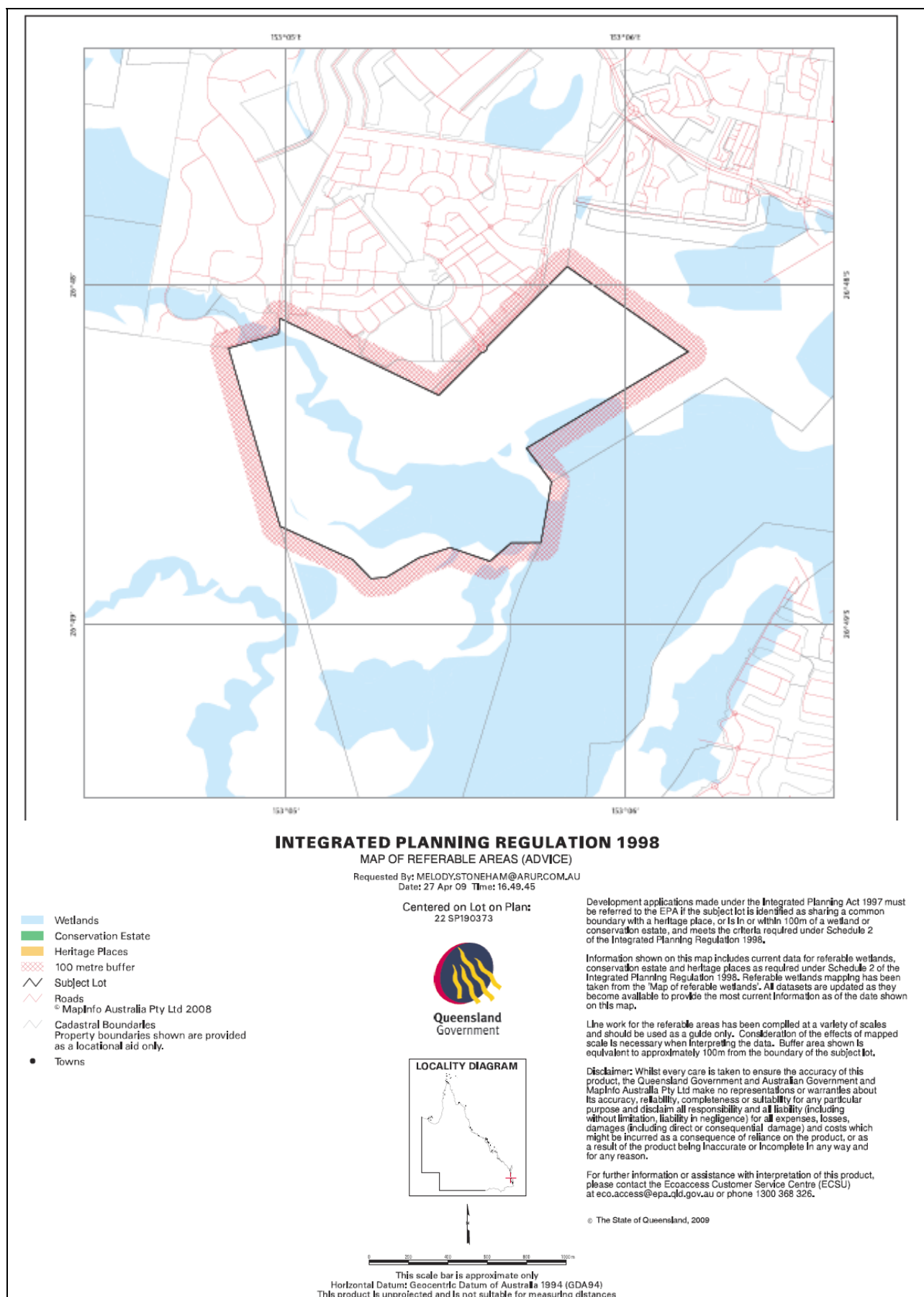


Figure 1 Map of Referable Areas

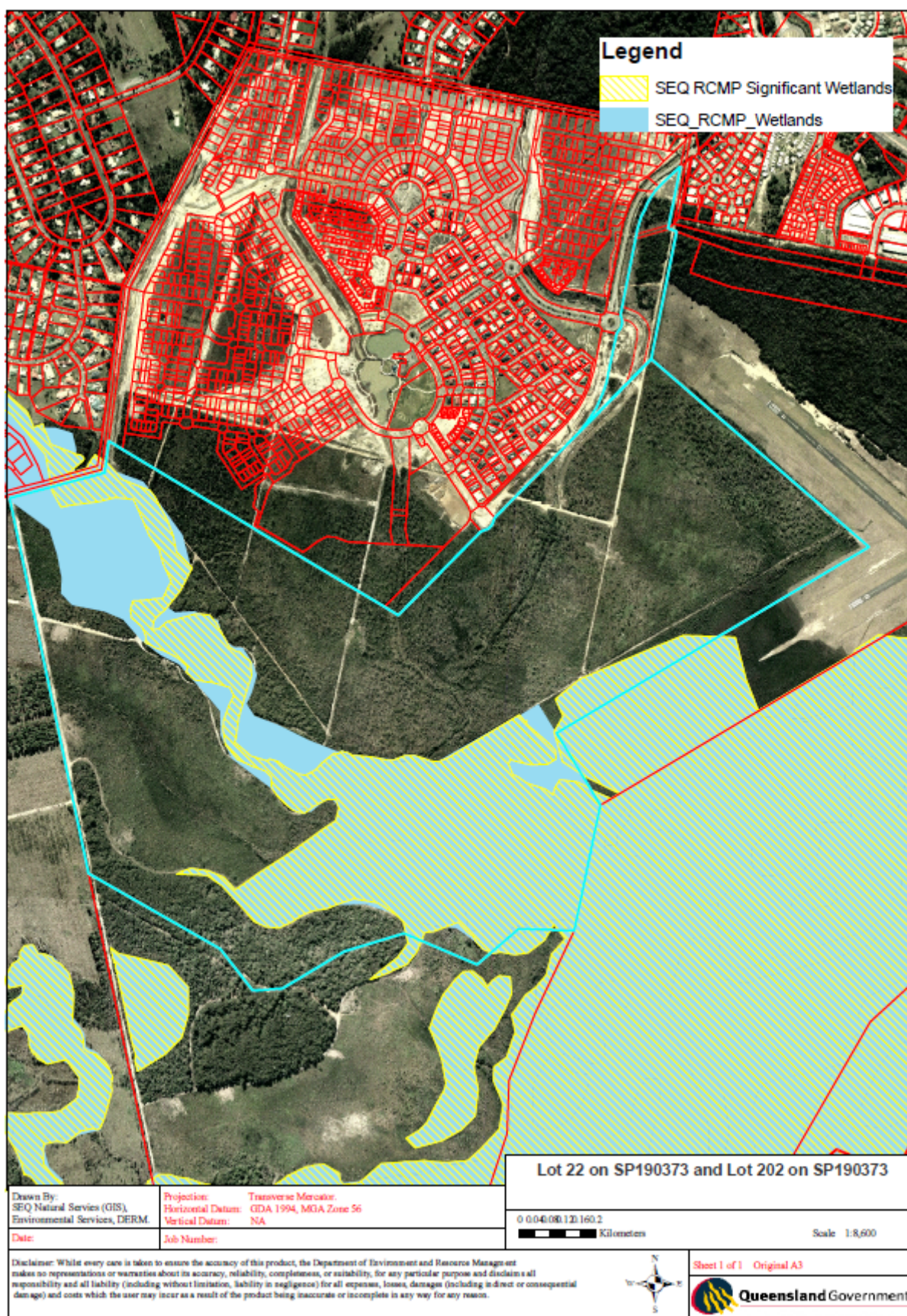


Figure 2 Significant Wetlands – SEQ Regional Coastal Management Plan

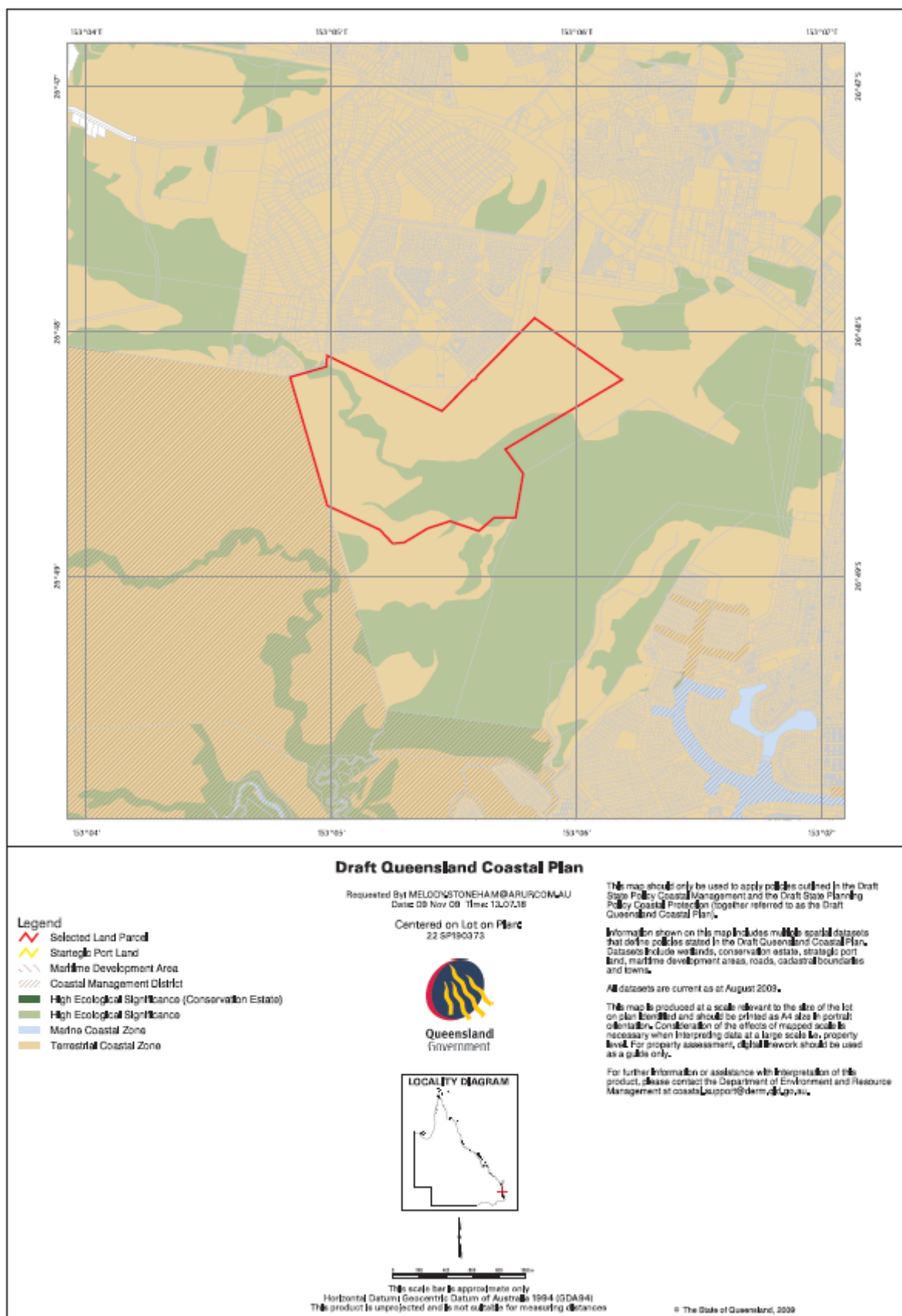


Figure 3 High Ecological Significance – Draft Queensland Coastal Plan

Appendix C

**Database Search
Results**

Environmental Reporting Tool

You are here: [Environment Home](#) > [ERIN](#) > [ERT](#)

27 April 2009 14:03

Database Report

This report includes places of national environmental significance that are registered in the Department of the Environment and Water Resources' databases, for the selected area. The information presented here has been provided by a range of groups across Australia, and the accuracy and resolution varies.

Search Type: Area

Buffer: 0 km

Coordinates: -26.80121,153.08664, -26.81389,153.08664, -26.81389,153.10260, -26.80121,153.10260



Report Contents: [Summary](#) >> [Details](#) >> [Caveat](#) >> [Acknowledgment](#)

Biodiversity

Threatened Species:	20
Migratory Species:	17
Listed Marine Species:	16
Invasive Species:	11
Whales and Other Cetaceans:	None
Threatened Ecological Communities:	None

Heritage

World Heritage Properties:	None
Australian Heritage Sites:	None

Wetlands

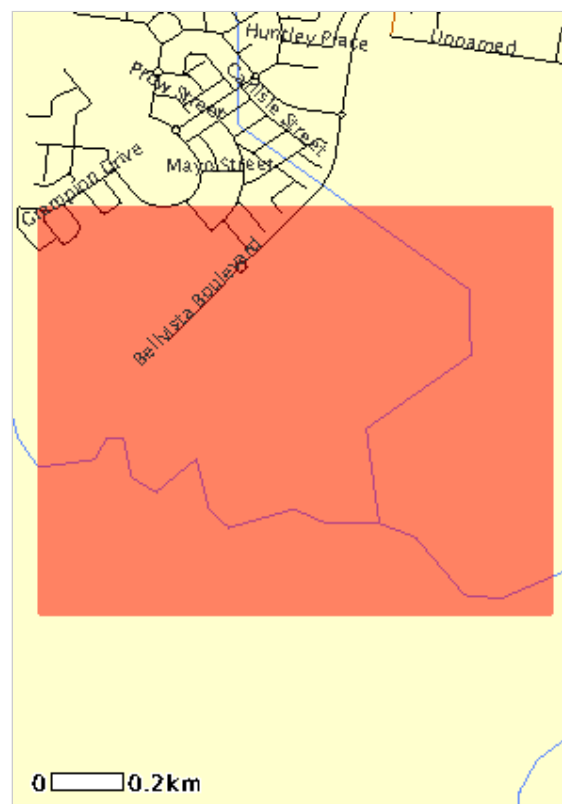
Ramsar sites: (Internationally important)	1
Nationally Important Wetlands:	1

National Pollutant Inventory

Reporting Facilities:	None
Airsheds:	1
Catchments:	1

Protected Areas

Reserves and Conservation Areas:	None
Regional Forest Agreements:	1



This map may contain data which are
© Commonwealth of Australia (Geoscience Australia)
© 2007 MapData Sciences Pty Ltd, PSMA

Biodiversity

Threatened Species [[Dataset Information](#)]

Status

Comments

Birds[*Anthochaera phrygia*](#)

Regent Honeyeater

Endangered Species or species habitat may occur within area

[*Cyclopsitta diophthalma coxeni*](#)

Coxen's Fig-Parrot

Endangered Species or species habitat likely to occur within area

[*Erythroriorchis radiatus*](#)

Red Goshawk

Vulnerable Species or species habitat likely to occur within area

[*Lathamus discolor*](#)

Swift Parrot

Endangered Species or species habitat may occur within area

[*Rostratula australis*](#)

Australian Painted Snipe

Vulnerable Species or species habitat may occur within area

[*Turnix melanogaster*](#)

Black-breasted Button-quail

Vulnerable Species or species habitat likely to occur within area

Frogs[*Litoria olongburensis*](#)

Wallum Sedge Frog

Vulnerable Species or species habitat likely to occur within area

Mammals[*Chalinolobus dwyeri*](#)

Large-eared Pied Bat, Large Pied Bat

Vulnerable Species or species habitat may occur within area

[*Potorous tridactylus tridactylus*](#)

Long-nosed Potoroo (SE mainland)

Vulnerable Species or species habitat may occur within area

[*Pteropus poliocephalus*](#)

Grey-headed Flying-fox

Vulnerable Species or species habitat likely to occur within area

Plants[*Acacia attenuata*](#)

Vulnerable Species or species habitat likely to occur within area

[*Bosistoa selwynii*](#)

Heart-leaved Bosistoa

Vulnerable Species or species habitat likely to occur within area

[*Bosistoa transversa*](#)

Three-leaved Bosistoa

Vulnerable Species or species habitat likely to occur within area

[*Bulbophyllum globuliforme*](#)

Miniature Moss-orchid

Vulnerable Species or species habitat likely to occur within area

[*Cryptocarya foetida*](#)

Stinking Cryptocarya, Stinking Laurel

Vulnerable Migration route may occur within area

[*Eucalyptus conglomerata*](#)

Swamp Stringybark

Endangered Species or species habitat likely to occur within area

[*Phaius australis*](#)

Lesser Swamp-orchid

Endangered Species or species habitat likely to occur within area

[*Phebalium distans*](#)

Mt Berryman Phebalium

Critically Endangered Species or species habitat may occur within area

[*Prasophyllum wallum*](#)

Vulnerable Species or species habitat likely to occur within area

[*Taeniophyllum muelleri*](#)

Minute Orchid, Ribbon-root Orchid

Vulnerable Species or species habitat may occur within area

Migratory Species [[Dataset Information](#)]

Status Comments

Migratory Terrestrial Species

Birds[*Cyclopsitta diophthalma coxeni*](#)

Coxen's Fig-Parrot

Migratory Species or species habitat likely to occur within area

[*Haliaeetus leucogaster*](#)

White-bellied Sea-Eagle

Migratory Species or species habitat likely to occur within area

[*Hirundapus caudacutus*](#)

White-throated Needletail

Migratory Species or species habitat may occur within area

[*Merops ornatus*](#)

Rainbow Bee-eater

Migratory Species or species habitat may occur within area

[*Monarcha melanopsis*](#)

Black-faced Monarch

Migratory Breeding may occur within area

[*Monarcha trivirgatus*](#)

Spectacled Monarch

Migratory Breeding likely to occur within area

[*Myiagra cyanoleuca*](#)

Satin Flycatcher

Migratory Breeding likely to occur within area

[*Rhipidura rufifrons*](#)

Rufous Fantail

Migratory Breeding may occur within area

[*Xanthomyza phrygia*](#)

Regent Honeyeater

Migratory Species or species habitat may occur within area

Migratory Wetland Species**Birds**[*Ardea alba*](#)

Great Egret, White Egret

Migratory Species or species habitat may occur within area

[*Ardea ibis*](#)

Cattle Egret

Migratory Species or species habitat may occur within area

[*Gallinago hardwickii*](#)

Latham's Snipe, Japanese Snipe

Migratory Species or species habitat may occur within area

[*Nettapus coromandelianus albipennis*](#)

Australian Cotton Pygmy-goose

Migratory Species or species habitat may occur within area

[*Rostratula benghalensis s. lat.*](#)

Painted Snipe

Migratory Species or species habitat may occur within area

Migratory Marine Birds[*Apus pacificus*](#)

Fork-tailed Swift

Migratory Species or species habitat may occur within area

[*Ardea alba*](#)

Great Egret, White Egret

Migratory Species or species habitat may occur within area

[*Ardea ibis*](#)

Cattle Egret

Migratory Species or species habitat may occur within area

Listed Marine Species [[Dataset Information](#)]

Status Comments

Birds[*Anseranas semipalmata*](#)

Magpie Goose

Listed - overfly marine area Species or species habitat may occur within area

[*Apus pacificus*](#)

Fork-tailed Swift

Listed - overfly marine area Species or species habitat may occur within area

[Ardea alba](#)

Great Egret, White Egret

Listed -
overfly
marine areaSpecies or species habitat may occur within
area[Ardea ibis](#)

Cattle Egret

Listed -
overfly
marine areaSpecies or species habitat may occur within
area[Gallinago hardwickii](#)

Latham's Snipe, Japanese Snipe

Listed -
overfly
marine areaSpecies or species habitat may occur within
area[Haliaeetus leucogaster](#)

White-bellied Sea-Eagle

Listed

Species or species habitat likely to occur
within area[Hirundapus caudacutus](#)

White-throated Needletail

Listed -
overfly
marine areaSpecies or species habitat may occur within
area[Lathamus discolor](#)

Swift Parrot

Listed -
overfly
marine areaSpecies or species habitat may occur within
area[Merops ornatus](#)

Rainbow Bee-eater

Listed -
overfly
marine areaSpecies or species habitat may occur within
area[Monarcha melanopsis](#)

Black-faced Monarch

Listed -
overfly
marine area

Breeding may occur within area

[Monarcha trivirgatus](#)

Spectacled Monarch

Listed -
overfly
marine area

Breeding likely to occur within area

[Myiagra cyanoleuca](#)

Satin Flycatcher

Listed -
overfly
marine area

Breeding likely to occur within area

[Nettapus coromandelianus albipennis](#)

Australian Cotton Pygmy-goose

Listed -
overfly
marine areaSpecies or species habitat may occur within
area[Rhipidura rufifrons](#)

Rufous Fantail

Listed -
overfly
marine area

Breeding may occur within area

[Rostratula benghalensis s. lat.](#)

Painted Snipe

Listed -
overfly
marine areaSpecies or species habitat may occur within
area**Reptiles**[Emydocephalus annulatus](#)

Turtle-headed Seasnake

Listed

Species or species habitat may occur within
areaInvasive Species [[Dataset Information](#)]

Status

Comments

Selected Invasive Species: Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Mammals

[Capra hircus](#)

Goat

Feral

Species or species habitat may occur within area

[Felis catus](#)

Cat, House Cat, Domestic Cat

Feral

Species or species habitat likely to occur within area

[Oryctolagus cuniculus](#)

Rabbit, European Rabbit

Feral

Species or species habitat may occur within area

[Vulpes vulpes](#)

Red Fox, Fox

Feral

Species or species habitat may occur within area

Plants[Alternanthera philoxeroides](#)

Alligator Weed

WoNS

Species or species habitat may occur within area

[Cabomba caroliniana](#)

Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba

WoNS

Species or species habitat may occur within area

[Chrysanthemoides monilifera](#)

Bitou Bush, Boneseed

WoNS

Species or species habitat may occur within area

[Hymenachne amplexicaulis](#)

Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass

WoNS

Species or species habitat may occur within area

[Lantana camara](#)

Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage

WoNS

Species or species habitat likely to occur within area

[Parkinsonia aculeata](#)

Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean

WoNS

Species or species habitat may occur within area

[Parthenium hysterophorus](#)

Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed

WoNS

Species or species habitat may occur within area

Wetlands

Wetlands of International Importance (Ramsar sites) [[Dataset Information](#)][MORETON BAY](#)

Within 10 km of Ramsar site

Nationally Important Wetland Sites [[Dataset Information](#)][Upper Pumicestone Coastal Plain, QLD](#)

National Pollutant Inventory

[NPI Location Report](#)Airshed [[Dataset Information](#)]

Substances Sources

[SE Queensland, QLD](#)

56 20

Catchment [[Dataset Information](#)]

Substances Sources

[SE Queensland, QLD](#)

2 11

Other

Regional Forest Agreements [[Dataset Information](#)]

Note that all RFA areas including those still under consideration have been included.

South East Queensland RFA, Queensland

Caveat

The information presented here has been drawn from a range of sources, compiled for a variety of purposes. Details of the coverage of each dataset are included in the metadata [Dataset Information] links above.

Acknowledgment

This database has been compiled from a range of data sources. The Department acknowledges the following custodians who have contributed valuable data and advice:

- [New South Wales National Parks and Wildlife Service](#)
- [Department of Sustainability and Environment, Victoria](#)
- [Department of Primary Industries, Water and Environment, Tasmania](#)
- [Department of Environment and Heritage, South Australia Planning SA](#)
- [Parks and Wildlife Commission of the Northern Territory](#)
- [Environmental Protection Agency, Queensland](#)
- [Birds Australia](#)
- [Australian Bird and Bat Banding Scheme](#)
- [Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [Queensland Herbarium](#)
- [National Herbarium of NSW](#)
- [Royal Botanic Gardens and National Herbarium of Victoria](#)
- [Tasmanian Herbarium](#)
- [State Herbarium of South Australia](#)
- [Northern Territory Herbarium](#)
- [Western Australian Herbarium](#)
- [Australian National Herbarium, Atherton and Canberra](#)
- [University of New England](#)
- Other groups and individuals

[ANUcliM Version 1.8, Centre for Resource and Environmental Studies, Australian National University](#) was used extensively for the production of draft maps of species distribution. The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.



Queensland Government

Environmental Protection Agency Queensland Parks and Wildlife Service

Wildlife Online Extract

Search Criteria: Species List for a Specified Point
Species: All
Type: Native
Status: All
Records: All
Date: Since 1980
Latitude: 26.801
Longitude: 153.087
Distance: 1
Email: melody.stoneham@arup.com.au
Date submitted: Monday 27 Apr 2009 15:00:00
Date extracted: Monday 27 Apr 2009 15:10:30

The number of records retrieved = 81

Disclaimer

As the EPA is still in a process of collating and vetting data, it is possible the information given is not complete. The information provided should only be used for the project for which it was requested and it should be appropriately acknowledged as being derived from Wildlife Online when it is used.

The State of Queensland does not invite reliance upon, nor accept responsibility for this information. Persons should satisfy themselves through independent means as to the accuracy and completeness of this information.

No statements, representations or warranties are made about the accuracy or completeness of this information. The State of Queensland disclaims all responsibility for this information and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs you may incur as a result of the information being inaccurate or incomplete in any way for any reason.

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Acanthizidae	<i>Acanthiza pusilla</i>	brown thornbill		C		1
animals	birds	Acanthizidae	<i>Gerygone albogularis</i>	white-throated gerygone		C		1
animals	birds	Acanthizidae	<i>Sericornis frontalis</i>	white-browed scrubwren		C		1
animals	birds	Anatidae	<i>Anas superciliosa</i>	Pacific black duck		C		1
animals	birds	Apodidae	<i>Hirundapus caudacutus</i>	white-throated needletail		C		2
animals	birds	Artamidae	<i>Cracticus tibicen</i>	Australian magpie		C		2
animals	birds	Artamidae	<i>Cracticus torquatus</i>	grey butcherbird		C		3
animals	birds	Artamidae	<i>Cracticus nigrogularis</i>	pied butcherbird		C		1
animals	birds	Burhinidae	<i>Burhinus grallarius</i>	bush stone-curlew		C		1
animals	birds	Cacatuidae	<i>Eolophus roseicapillus</i>	galah		C		1
animals	birds	Campephagidae	<i>Coracina tenuirostris</i>	cicadabird		C		2
animals	birds	Campephagidae	<i>Coracina novaehollandiae</i>	black-faced cuckoo-shrike		C		2
animals	birds	Charadriidae	<i>Vanellus miles</i>	masked lapwing		C		1
animals	birds	Charadriidae	<i>Vanellus miles novaehollandiae</i>	masked lapwing (southern subspecies)		C		1
animals	birds	Climacteridae	<i>Cormobates leucophaea metastasis</i>	white-throated treecreeper (southern)		C		1
animals	birds	Columbidae	<i>Geopelia striata</i>	peaceful dove		C		1
animals	birds	Columbidae	<i>Ocyphaps lophotes</i>	crested pigeon		C		2
animals	birds	Columbidae	<i>Macropygia amboinensis</i>	brown cuckoo-dove		C		1
animals	birds	Columbidae	<i>Geopelia humeralis</i>	bar-shouldered dove		C		2
animals	birds	Coraciidae	<i>Eurystomus orientalis</i>	dollarbird		C		2
animals	birds	Corvidae	<i>Corvus orru</i>	Torresian crow		C		3
animals	birds	Cuculidae	<i>Eudynamys orientalis</i>	eastern koel		C		2
animals	birds	Cuculidae	<i>Centropus phasianinus</i>	pheasant coucal		C		1
animals	birds	Dicruridae	<i>Dicrurus bracteatus</i>	spangled drongo		C		2
animals	birds	Estrildidae	<i>Neochmia temporalis</i>	red-browed finch		C		2
animals	birds	Halcyonidae	<i>Dacelo novaeguineae</i>	laughing kookaburra		C		2
animals	birds	Halcyonidae	<i>Todiramphus sanctus</i>	sacred kingfisher		C		1
animals	birds	Maluridae	<i>Malurus lamberti</i>	variegated fairy-wren		C		2
animals	birds	Meliphagidae	<i>Meliphaga lewinii</i>	Lewin's honeyeater		C		3
animals	birds	Meliphagidae	<i>Lichmera indistincta</i>	brown honeyeater		C		1
animals	birds	Meliphagidae	<i>Lichenostomus chrysops</i>	yellow-faced honeyeater		C		1
animals	birds	Meliphagidae	<i>Anthochaera chrysoptera</i>	little wattlebird		C		1
animals	birds	Meliphagidae	<i>Melithreptus albogularis</i>	white-throated honeyeater		C		1
animals	birds	Meliphagidae	<i>Myzomela sanguinolenta</i>	scarlet honeyeater		C		2
animals	birds	Meliphagidae	<i>Philemon corniculatus</i>	noisy friarbird		C		2
animals	birds	Meliphagidae	<i>Phylidonyris niger</i>	white-cheeked honeyeater		C		1
animals	birds	Meropidae	<i>Merops ornatus</i>	rainbow bee-eater		C		1
animals	birds	Nectariniidae	<i>Dicaeum hirundinaceum</i>	mistletoebird		C		1
animals	birds	Oriolidae	<i>Oriolus sagittatus</i>	olive-backed oriole		C		2
animals	birds	Oriolidae	<i>Sphecotheres vieilloti</i>	Australasian figbird		C		1
animals	birds	Pachycephalidae	<i>Colluricincla megarhyncha</i>	little shrike-thrush		C		1
animals	birds	Pachycephalidae	<i>Pachycephala rufiventris</i>	rufous whistler		C		1
animals	birds	Pachycephalidae	<i>Pachycephala pectoralis</i>	golden whistler		C		1
animals	birds	Pachycephalidae	<i>Colluricincla harmonica</i>	grey shrike-thrush		C		3
animals	birds	Pardalotidae	<i>Pardalotus striatus</i>	striated pardalote		C		1
animals	birds	Petroicidae	<i>Petroica rosea</i>	rose robin		C		1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Petroicidae	<i>Eopsaltria australis</i>	eastern yellow robin		C		2
animals	birds	Phasianidae	<i>Coturnix ypsilophora</i>	brown quail		C		1
animals	birds	Psittacidae	<i>Alisterus scapularis</i>	Australian king-parrot		C		1
animals	birds	Psittacidae	<i>Platycercus adscitus</i>	pale-headed rosella		C		2
animals	birds	Psittacidae	<i>Trichoglossus haematodus moluccanus</i>	rainbow lorikeet		C		2
animals	birds	Psittacidae	<i>Trichoglossus chlorolepidotus</i>	scaly-breasted lorikeet		C		1
animals	birds	Psophodidae	<i>Psophodes olivaceus</i>	eastern whipbird		C		2
animals	birds	Rhipiduridae	<i>Rhipidura albiscapa</i>	grey fantail		C		2
animals	birds	Rhipiduridae	<i>Rhipidura rufifrons</i>	rufous fantail		C		2
animals	birds	Rhipiduridae	<i>Rhipidura leucophrys</i>	willie wagtail		C		2
animals	birds	Threskiornithidae	<i>Threskiornis molucca</i>	Australian white ibis		C		1
animals	birds	Timaliidae	<i>Zosterops lateralis</i>	silveryeye		C		2
animals	mammals	Macropodidae	<i>Macropus giganteus</i>	eastern grey kangaroo		C		1
animals	mammals	Muridae	<i>Melomys burtoni</i>	grassland melomys		C		1
animals	mammals	Phalangeridae	<i>Trichosurus vulpecula</i>	common brushtail possum		C		1
animals	mammals	Pteropodidae	<i>Pteropus scapulatus</i>	little red flying-fox		C		1
animals	reptiles	Colubridae	<i>Tropidonophis mairii</i>	freshwater snake		C		1
plants	ferns	Blechnaceae	<i>Blechnum indicum</i>	swamp water fern		C		2
plants	ferns	Dennstaedtiaceae	<i>Hypolepis muelleri</i>	swamp bracken		C		2
plants	ferns	Schizaeaceae	<i>Lygodium microphyllum</i>	snake fern		C		2
plants	higher dicots	Apocynaceae	<i>Parsonsia straminea</i>	monkey rope		C		1
plants	higher dicots	Myrtaceae	<i>Lophostemon suaveolens</i>	swamp box		C		2
plants	higher dicots	Myrtaceae	<i>Melaleuca quinquenervia</i>	swamp paperbark		C		2
plants	higher dicots	Phyllanthaceae	<i>Glochidion sumatranum</i>	umbrella cheese tree		C		1
plants	higher dicots	Polygonaceae	<i>Persicaria strigosa</i>			C		2
plants	higher dicots	Proteaceae	<i>Banksia robur</i>	broad-leaved banksia		C		1
plants	higher dicots	Rhamnaceae	<i>Alphitonia excelsa</i>	soap tree		C		1
plants	monocots	Arecaceae	<i>Livistona australis</i>	cabbage tree palm		C		1
plants	monocots	Cyperaceae	<i>Baumea rubiginosa</i>	soft twigrush		C		2
plants	monocots	Cyperaceae	<i>Lepironia articulata</i>			C		2
plants	monocots	Cyperaceae	<i>Rhynchospora corymbosa</i>			C		2
plants	monocots	Flagellariaceae	<i>Flagellaria indica</i>	whip vine		C		1
plants	monocots	Poaceae	<i>Leersia hexandra</i>	swamp rice grass		C		2
plants	monocots	Poaceae	<i>Entolasia marginata</i>	bordered panic		C		1
plants	monocots	Poaceae	<i>Phragmites australis</i>	common reed		C		1

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992*. The codes are Presumed Extinct (PE), Endangered (E), Vulnerable (V), Rare (R), Common (C) or Not Protected ().

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999*. The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).

This number is output as 99999 if it equals or exceeds this value. The second number located after the / indicates the number of specimen records for the taxon.

This number is output as 999 if it equals or exceeds this value.