7.4 Acid Frog Habitat Provision

As outlined in section 3.2.1 and section 3.2.2 acid frogs have been identified across parts of the site. The Master Plan will cater for habitat replacement and enhancement for acid frogs (which generally require relatively shallow pools of acidic waters surrounded by heath and wallum vegetation) within the waterway open space buffer areas and adjoining sport and recreation land use areas. Whilst the CS Conservation Strategy has allowed for the retention of areas of existing Wallum Froglet habitat within the Environmental Protection Zone, the creation of new habitat within the open space waterway buffer corridors will help to solidify the long-term conservation of the species through protecting movement corridors through the site and also protecting and re-establishing habitat areas.

Additional investigations and assessments are currently being undertaken to confirm habitat extents of Federally listed frogs within CS and their connectivity to populations beyond the site boundary.

As required by the Caloundra South Development Scheme, a Flora and Fauna Management Plan will be prepared and lodged with a subsequent application to address the Acid Frog habitat and management in the vicinity of Lamerough Creek.

Furthermore the additional investigations and assessments may be incorporated within a subsequent construction and environmental management plan for subsequent applications that outlines specific protection measures including:

- Determining a suitable location for habitat provision for the Federally listed acid frog with a focus on its inclusion within the waterway open space buffer and adjoining sports and recreation land use areas.
- Species profile i.e. general ecology, conservation status, distribution within and surrounding site, habitat requirements;
- Key threats to the Wallum Sedgefrog (*Litoria olongburensis*) and the Wallum Rocketfrog (*Litoria freycineti*) and Wallum froglet (*Crinia tinnula*);
- Habitat requirements, sensitivities to disturbance including climatic influences;
- Potential impacts of the staged development of Caloundra South on these species. This will consider:
  - Changes in hydrology and water quality
  - Road kill
  - Habitat loss and fragmentation
  - Introduction of domestic animals
  - Introduction of weeds/pest species, particularly Gambusia sp.
  - Habitat degradation from human recreation activities
  - Changes to fire regimes
  - Introduction of exotic diseases, particularly Chytrid fungus
  - Avoidance of biocides and pesticides within waterway corridors and core habitat areas

- Vehicular traffic
- Infrastructure construction
- Mitigation measures to be applied e.g. relocation, buffers, provision of additional habitat, fauna crossings/fencing
- Design standards for additional habitat provision e.g. constructed wetland areas
- Habitat maintenance requirements
- Monitoring regime
- Key responsibilities

7.5 Connectivity for Wildlife Movement

As described in Section 2.4, there are three creek systems traversing Caloundra South that provide for the movement of native wildlife in an east-west direction. These are:

- Lamerough Creek;
- Bells Creek (north); and
- Bells Creek (south).

The development of Caloundra South will necessitate the construction of several waterway crossings over these creeks and drainage lines to facilitate the movement of traffic in a north-south direction. These crossings will result in the removal of areas of native riparian vegetation and could restrict fauna movement along local wildlife corridors in the long term.

Avoidance of these waterway crossings is not possible because of the need to have a functioning traffic network connecting precincts within the site and connecting the site to external transport corridors. However, management strategies can be implemented to retain/reinstate vegetation cover and maximise the ability of native fauna to pass under the waterway crossings. Recommended management strategies include:

- detailed ecological surveys of the waterways to determine the best location for waterway crossings at the time of detailed design;
- bridge design to minimise the footprint of the waterway crossings as far as possible;
- use of span bridges, where possible, and otherwise use of piers to maximise the open area under the bridge;
- maximise height clearance to allow for light penetration and revegetation of ground cover and shrub species under the bridge;
- use of pre-fabricated girders and deck units to reduce works and disturbance on site;
- use of bebo-arch design for small waterway crossings (relevant to drainage lines); and
- stringent management measures during construction.

7.6 Weed Management

Weed infestation is known to be one of the biggest issues affecting regeneration of native vegetation. The existing track network through the property and the historic use of the site for pine plantation has meant that Pine trees (*Pinus sp.*) have infiltrated many of the native vegetation communities. *Pinus elliottii* is recognised as a woody weed threat to native vegetation reserves, particularly heaths and wetlands, on the subtropical coastal lowlands of the eastern seaboard of Australia. Pines occur in all vegetation units on the site except the rainforest and the blackbutt patch.

Other weeds common at Caloundra South are Lantana (*Lantana camara*) and Groundsel (*Baccharis halimifolia*). These shrubby weeds are most prevalent in the riparian vegetation communities. Groundsel is also common within the wetland communities due to its ability to tolerate the fluctuating water table. The site is also susceptible to native weed invasion. The Paperbark (*Melaleuca quinquenervia*) is considered as one of the most serious native weeds invading the wet heaths at Caloundra South and is perpetuated by changes in the hydrology of the site. This trend could lead the heath to convert to Paperbark woodlands.

Complete eradication of weeds is not a realistic or achievable long term goal for Caloundra South because it will continue to experience anthropogenic disturbances. However, management strategies can be implemented to ensure that the native vegetation communities have the competitive ability to resist and even exclude serious weed species.

The following Environmental Management Strategies are recommended for weed management at Caloundra South.

- On-going control of major weed infestations up until the time of construction of each stage of the development;
- Implementation of weed management measures during construction, such as limiting machinery access near retained vegetation, wash-down facilities and certification of the origin of construction material;
- Edge plantings (densely planted vegetation at the edge of the conservation zone) can help to prevent weed species from penetrating areas of high conservation value. It is recommended that edge plantings be at least 5m in width;
- Use of fire for the management of Paperbark (*Melaleuca quinquenervia*) within heath land communities;
- Restoration of fire regimes (Section 6.6); and
- Restoration of hydrology in wetland and heath areas.
- Post-development weed management measures, such as regular manual and chemical control of major weed infestations as appropriate (i.e. avoid surfactants, spraying near waterways and use of herbicide during frog breeding seasons) and buffer plantings on exposed vegetation edges.
- On-going monitoring of weed invasions on the site.

7.7 Pest and Domestic Animal Management

The low diversity and abundance of ground-dwelling native fauna at Caloundra South may be attributed to the abundance of predatory or competitive feral animals, which comprise a significant portion of fauna on site. They include: dingo, cat, fox, pig, black rat, brown hare, spotted turtle-dove, cane toad, and mosquito fish (gambusia). Foxes and cats occur extensively throughout the site and pose a direct threat to small native mammals and rodents. Cane toads compete with native frog species for limited breeding sites and also prey on native frogs and tadpoles. The mosquito fish is currently found in limited numbers in the waterways on the site and can disperse into other environments in periods of flooding; they compete with native species and have been linked to declining frog populations.

It is likely that the development itself will reduce the habitat available to most feral fauna and result in a local decline. It is also possible to implement design features for permanent structures (e.g. commercial buildings, park furniture etc.) and temporary site facilities (e.g. construction site offices. etc.), which minimise harbourage of mammalian pests and roost opportunities for problematic bird species (particularly gulls, ibis and pigeons). However, this will not address the feral fauna that will remain within conservation areas on the site.

Responsible pet ownership will also be encouraged through community education, particularly regarding the proper confinement and restraint of cats and dogs. Walking of dogs unrestrained through Environmental Protection Areas will be prohibited.

Effective feral fauna control will require action beyond the boundaries of Caloundra South. It will require co-operation with State and local governments responsible for the maintenance of adjoining reserves. The pest management on the site will be consistent with current regional pest management strategies of the local and state governments.

7.8 Fire Management

The influence of altered fire regimes on the native remnants at Caloundra South is difficult to assess but should not be underestimated. It is not possible to determine what sort of fire regime patterned the original vegetation mosaic. However, the current fire regime exceeds the natural frequency and intensity required to maintain the extant biota, encourage the return of species sensitive to fire or manage weeds. Irrespective of future land use, appropriate fire management will be critical to the maintenance and restoration of native vegetation.
Varying fire regimes are recommended for different vegetation communities and will be explored in greater depth as rehabilitation progresses.

8 Construction Activities

Construction activities have the potential to cause damage to ecological values on site through damage to vegetation, noise and light pollution, poor water quality and damage from machinery movement. The Environmental Management Plan (s)

prepared for all construction works will detail specific protection measures such as fauna and vegetation fencing, an on-site catcher/spotter and erosion and sediment controls to protect water quality. Staging of construction over the life of the project will be a key consideration for the EMP(s).

9 Responsibilities

Stockland, as the master developer, will be responsible for the application of this Conservation Strategy whilst the site is being developed, which is likely to be staged over a period of 30 years and for a maintenance period.

Stockland's responsibilities during this period include:

- Ensuring Environmental Management Plans for construction (ecological protection measures in particular) are adhered to, with protection measures put in place prior to commencement of works;
- Ensuring appropriate rehabilitation, maintenance, monitoring and surveys are conducted in accordance with this Strategy; and
- Informing the ULDA of any significant change to the approved Conservation Strategy.

10 Monitoring

The ongoing performance of conservation protection measures will monitored during both construction and the maintenance period. Monitoring requirements will be also guided by conditions determined by SEWPAC during the PER process.

Monitoring is likely to include success of rehabilitation, the quality and stability of habitat for significant species, retention of significant species, wetland vegetation diversity and extent, prevalence of weed/pest species, impacts of recreational use of environmental protection and open space areas, pollution and water quality (as further described in the Stormwater Management Plan.

11 Summary

The Caloundra South Conservation Strategy sets out to describe how development on site will meet the requirements of the ULDA Development Scheme for the Urban Development Area.

The core ecological values of protecting and enhancing vegetation communities, essential habitat, wildlife corridors and water quality; are the focus of the conservation efforts at Caloundra South. These values are threatened by both current and future land use practices in the absence of appropriate management (as described in Table 4.0). The basic principles of threat management follow a hierarchy that recommends avoidance of impacts as a first priority. Hence, it follows that the Caloundra South Conservation Strategy first seeks to minimise impacts on core ecological values through appropriate land use planning (Section

5.0). It identifies substantial areas of Environmental Protection and Open Space that will protect and enhance these existing areas through rehabilitation.

In response to ULDA UDA wide criteria, the Caloundra South Conservation Strategy seeks to minimise impacts through the implementation of environmental management strategies that focus on:

- Revegetation and rehabilitation;
- Enhancement of essential habitat;
- Ensuring connectivity for wildlife movement;
- Weed management;
- Pest and domestic animal management;
- Construction management; and
- Acid frog habitat provision.

The Environmental Management Strategies describe the proposed ongoing on-ground management of the Environmental Protection and Open Space zones and surrounding land uses to maintain or enhance ecological values.

Proponent responsibilities and ongoing governance and monitoring requirements are also outlined.

The outcomes of this Strategy are to be achieved through:

1. the master planning process identifying and protecting the site ecological values and designating the conservation and open space areas for the protection and mitigation of wildlife corridors and buffers, creation of new habitat areas, and proposed rehabilitation outcomes.
2. the requirement for a construction and environmental management plan to be prepared with subsequent subdivision applications to manage the impacts of construction, protect wildlife corridors and mitigate impacts on existinghabitats (as outlined in section 7 of this strategy) including:
    - Mitigation measures proposed for the development;
    - A monitoring program for the implementation of the Flora and Fauna Management Plan;
    - Implementation of the outcomes from the Federal EPBC PER process.

12 References

Aerial photography

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Regional Ecosystem Mapping, Queensland Herbarium v5 2003 with updates

Water Resources Commission (1992) Pumicestone Passage, its catchment and Bribie Island – Component Study: Integrated Management Strategy.

Water quality monitoring and catchment and flood modelling (BMT WBM 2009)

WetlandsInfo Search, EPA 2009

WildNet, EPA 2009

Appendix A

Rehabilitation Strategy

Transforming ***our*** *landscapes*

Caloundra South Ecological Rehabilitation Strategy

Stockland Corporation Limited – December 2011

Greening Australia

Greening Australia

our vision
A healthy, diverse and productive environment treasured by the whole community.

our mission
To engage the community in vegetation management to protect and restore the health, diversity and productivity of our unique Australian landscapes.

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Title of Document: Caloundra South - Ecological Rehabilitation Strategy

Executive Summary

The Caloundra South Development Scheme requires that development of the Caloundra South area provides for the enhancement of natural ecosystems, and ensures important ecological and scenic values are protected and enhanced.

This is reflected in the Conservation Strategy (ARUP, Dec 2011) which outlines specific goals relating to this. To ensure that the Conservation Strategy can be realised, Stockland aims to reinstate appropriate native vegetation on the Caloundra South urban development site (the "Site"). To help achieve this goal, Stockland has engaged Greening Australia to prepare this Ecological Rehabilitation Strategy (the "Strategy") for Caloundra South.

Over 25% (592ha) of the total estimated 2310 ha Site area has been earmarked for ecological restoration, including the environmental protection zone and waterway buffers.

The Strategy incorporates a review of current relevant literature and resources related to the Site including the Caloundra South Conservation Strategy (ARUP, Dec 2011), State Government resources as well as field-based investigation and mapping. The Strategy outlines overall objectives for the site, as well as key ecological restoration principles and techniques proposed for use within specific areas, or Vegetation Management Units (VMUs).

The Strategy aims to enhance or restore significantly degraded wetlands, open paddocks and associated vegetation directly adjacent to coastal wetlands of State and International significance. This will be achieved over the next 20 years by undertaking:

- Remnant vegetation enhancement;
- Regrowth management;
- Assisted regeneration;
- Direct seeding/tubestock installation; and
- The development of restoration "Biohubs", which aim to act as dispersal points for uncommon and threatened species.

The Strategy provides broad treatment specifications and locations to encourage the development of suitable, self-sustaining corridors of vegetation. Furthermore, it lays the foundation for a specific ecological restoration plan to be aligned with the development of the Caloundra South site.

Rehabilitation work on the Site will provide significant learnings in the field of ecological restoration as currently only limited information is available for broadscale rehabilitation of the types of vegetation communities encountered on-Site. With this in mind the Strategy presents a range of practical and valuable techniques based on Greening Australia's extensive experience in native species restoration. The Strategy focuses on the development of trials and adaptive management processes that aim to identify the techniques most suitable for achieving efficient long-term rehabilitation of the Site. This

approach is recommended in order to minimise risk, achieve strategy objectives and improve long-term results.

Other recommendations that align with the intent of the Strategy are provided to help enhance and inform planning for on-ground application.

Seed collection for the project is already underway with representative species currently stored for projected works.

As a result of restoration activities, three degraded creek systems within the local area will be restored and buffered, acting as local corridors for fauna population connectivity. Once implemented, the Strategy will deliver one of the largest intensive *Melaleuca quinquenervia* wetland restoration projects in Australia with shared learnings from the project aiding in the restoration of other similar wetlands throughout Australia.

Table of Contents

1 Introduction

1.1 Background

Stockland Corporation Limited (Stockland), through the Caloundra South Conservation Strategy (ARUP, Dec 2011), has targeted key areas within the Caloundra South site (the "Site") for ecological restoration. Two main methods to achieve this as noted within the Conservation Strategy are conservation and enhancement of existing vegetation combined with reinstatement of disturbed or removed vegetation that has strategic or functional importance.

To ensure that proposed restoration works are quantified and achievable, Greening Australia was engaged to prepare an Ecological Rehabilitation Strategy (the "Strategy") for the Site. The Strategy is intended to be used to inform restoration of the Site and other related programs (eg. seed collection). The Strategy also aims to provide recommendations regarding interim treatments and programs, which can provide learning opportunities to provide more detailed on-Site information for the projected (and more detailed) Rehabilitation Plan, which will be aligned with the subsequent development stages of the Site.

Stockland wishes to promote sustainable, representative native vegetation that requires minimal maintenance. This will require protection and enhancement of remnant vegetation as well as stimulation and restoration of regrowth vegetation and open-paddock installation.

Significant flora and fauna research has been undertaken for the Site and the Strategy aims to build on this by incorporating key findings of these reports into restoration parameters. While the Strategy is designed to restore a variety of vegetation conditions into Regional Ecosystems that are able to be mapped, the primary focus has been placed on riparian corridor and fringing vegetation community rehabilitation. Similarly, within this context, emphasis has been placed on providing habitat for flora and fauna identified as being present or having the potential to inhabit the site.

The focus of the Strategy is not to remove all exotic flora and replace with native flora across the Site. This is due to the sheer size of the project area, the levels of previous impacts and the timeframe of the proposed development. Rather, focus is placed on the reinstatement of community framework species in key riparian corridor and core habitat areas as it is believed that these are the basic building blocks of long-term sustainable vegetation communities and ongoing water quality. Given the fact that the site is located on within riparian areas adjacent to significant remnants that form part of a corridor of regional significance identified by the SEQ Biodiversity Planning Assessment (EPA, 2007), the likelihood of vegetation recolonisation is assumed to be high. Opportunities to add or encourage shrub and ground layer species as well as

focal high-biodiversity areas are provided to increase chances for recolonisation of these species throughout the Site.

Overall, the Strategy aims to recognise and meet best-practice guidelines where practical by re-instating a variety of locally-occurring native Regional Ecosystems (REs) and recommending auxiliary programs that will enhance this work. Regional Ecosystems have been used as a fundamental building block within the Strategy as it is believed that the key species and inter-geological relationships described within each ecosystem type allow for major ecosystem functions and persistence within a landscape.

Recommendations are provided so that Stockland and various regulatory bodies may continue to build on strategy works. By doing so, a more robust and diverse system can be created for local flora and fauna to utilise, and local residents to interact with.

1.1.1 *Report Structure*

The report provides a summary of the assessment process to date, which has included:

- A review of estimated pre-clearing vegetation and relevant literature (including scientific journals and previous Site-specific reporting);
- On-site inspections to determine the extent and condition of native vegetation and ecological processes;
- The identification of areas suitable for restoration;
- Review of the development scheme requirements and the Conservation Strategy (ARUP, Dec 2011); and
- The division of these areas into VMUs (Vegetation Management Units) and the development of specific treatments for each VMU.

To achieve this, the Strategy follows the following structure:

- A summary of Strategy aims;
- A methodology used to gather relevant on-Site data and scientific literature;
- A results section that includes a general assessment of Site pre-clearing data and current Site characteristics;
- A treatments section that includes mapping and description of treatment areas (gathered by compiling current Site characteristics with pre-clearing RE mapping) and rehabilitation approach;
- A treatments section that includes a description of revegetation methods to be utilised during implementation of the plan;
- A summary of important discussion points relevant to the Strategy; and
- Further recommendations to consider both within the current project area/timeframe and the surrounding area during proposed construction and post construction period.

- A glossary of terms is provided in Appendix D.

1.2 Strategy Aims

The Society for Ecological Restoration International (SERI) notes ecological restoration as ". . the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed."

According to the SERI Science & Policy Working Group (2004), a restored ecosystem:

- Contains a characteristic assemblage of the species that occur in a reference ecosystem;
- Consists of indigenous species to the greatest practicable extent;
- Contains all functional groups necessary for the continued development and/or stability of the restored ecosystem;
- Is capable of sustaining reproducing populations;
- Functions normally for its ecological stage of development;
- Is suitably integrated into a larger ecological landscape;
- Has potential threats to the health and integrity of the restored ecosystem eliminated or reduced as much as possible;
- Is sufficiently resilient to endure normal periodic stress events in the local environment; and
- Is self sustaining to the same degree as a reference ecosystem.

While several of these characteristics would be difficult to quantify or qualify in the short term, this report aims to align with the spirit and intent of these claims, while also working towards a practical approach that can be achieved within allocated timeframes.

With this in mind, this project aims to align with the SERI working group"s general aim for all restoration projects, which is " . . to restore the structure, composition, function and dynamics of the pre-existing ecological communities to the highest practicable extent (SER, 1995)."

To achieve the above overarching goals, the Strategy"s key aims include the development of a rehabilitation approach that:

- Leverages environmental assessments and planning undertaken to date;
- Identifies and describes on-Site remnant vegetation and areas of key environmental interest outside of the proposed development footprint;
- Identifies areas for restoration (in the form of VMUs based on presence/absence of existing vegetation, soil type, aspect and other site factors);

- Identifies the broad types of rehabilitation that may take place (e.g. direct seeding, tubestock installation and regrowth management) and their location within each VMU;
- Identifies future works to be undertaken focusing on on-ground restoration but also including recommendations regarding seed collection, propagation and projected future public integration with plan objectives; and
- Delivers maps highlighting remnant vegetation, revegetation zones, proposed revegetation type and timing.

1.3 Assumptions

The following limitations delineate project scope:

- The Rehabilitation Strategy forms part of the Conservation Strategy (ARUP, Dec 2011) and should be read in conjunction with this document;
- Currently, no soil amelioration treatments are covered by the scope of this Strategy and are to form part of future works;
- Terrestrial boundaries of the study area are limited by the high tide mark. No in-stream recommendations are provided and no water-monitoring advice is provided;
- The Strategy describes broad Site-level approaches and considerations and is not to be considered a detailed, finalised specification for the final implementation of on-ground works since that is dependent on subsequent environment and development approvals;
- Water sensitive urban design approvals have been investigated by BMT WBM;
- Further refinement of the Strategy will be required once final groundwater levels are modeled. Following this process a secondary confirmation process will be undertaken to ensure that the most sustainable ecological communities are selected for the area;
- Some of the priority exotic weed species are very invasive and it is not expected that they would be eradicated from the site completely or permanently in the short term. A significant reduction in coverage and extent can however be expected; and
- As demonstrated in the results section there is little readily available information specific to specific rehabilitation issues on-Site. However, the coverage, complexity and species composition of the rehabilitation would be expected to increase over time (through enhancement of natural processes) towards remnant RE status. Given the recommendations within this document, it is envisaged that successful implementation would produce a robust, self-sustaining system that is locally representative and inhabitable by relevant associated fauna.

2 Methodology

The following sections outline techniques utilised to assemble core data and provide principles and guidelines for directing rehabilitation efforts.

Primary techniques utilised included:

- Review of previous reporting relating to the Site;
- Literature review of internet and scientific journal-based articles;
- On-Site survey;
- Interview with key Site personel and adjacent landholders responsible for regrowth management;
- Interview with key scientific and project management staff from university and government previously involved with similar vegetation; and
- Interview with internal Greening Australia staff responsible for restoration of similar communities elswhere in Australia.

To facilitate the writing of this report, on-Site analysis of the property was undertaken by Greening Australia Queensland in May 2010 as well as desktop analysis within the months September and October 2011.

2.1 Rehabilitation Models and Methods

To gain an understanding of rehabilitation issues on-Site, a literature review was undertaken focusing on riparian corridors and core habitat extent. This was then considered together with on-Site characteristics and history.

Various staff and specialists within the University of Queensland, Griffith University and the Queensland Herbarium were also consulted to gain a better appreciation regarding potential models and considerations to utilise within the Strategy.

2.2 Current Site Characteristics

2.2.1 *Flora and Fauna / Vegetation / Significant Weeds / Vegetation*

The following reports/resources were utilised together with recent Site surveys and aerial imagery to gain a comprehensive understanding of current Site characteristics:

- Regional Ecosystem Mapping/REDD Database, Version 6, Queensland Herbarium, 2009;
- EPBC Act Listed Flora and Vertebrate Fauna Assessment – Caloundra Downs Development Area, BAAM, 2010 (March revision);
- Caloundra South Conservation Strategy.(ARUP, Dec 2011);
- Caloundra Downs Informal Landuse Study, Supporting Technical Study No. 8, 9 and 10. Lensworth, 1999. Lensworth/Hyder Environmental.

2.2.2 *Site trajectories / resilience / key threats to obtaining remnant status*

During on-Site inspections, Herbarium pre-clearing mapping (V.6) was cross-referenced with current on-Site characteristics including seedling regeneration and advanced regrowth where present. Comments were then provided to establish whether framework or otherwise key functional species were present or likely to have seed material within the Site. The author"s judgment was then applied to determine what the VMU"s short-term trajectory and resilience would be.

2.3 Seed Collection Data

The REDD database was utilised to generate a shortlist of all key species as determined by the QLD Herbarium for each RE noted as having the potential to occur on-Site. These species were then cross-referenced with the following texts to gather fruiting period information:

- Murray, R. 2003 Growing Australian Native Plants from Seed, Second Edition. Bushland Horticulture, Fitzroy, Australia.

- Murray, R. 1999 Seed Collection of Australian Native Plants, Second Edition. Bushland Horticulture, Fitzroy, Australia.

- Hockings, D. 1990 Propagation of Australian Plants, Fifth Printing. Society for Growing Australia Plants, Queensland Region.

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- Plant Net, NSW Flora Online, Botanic Gardens Trust. Last Updated 2010. Viewed 25/05/2010. Available from: http://plantnet.rbgsyd.nsw.gov.au

2.4 VMU Boundary Development

VMU boundaries were created by assimilating data obtained from the Master Plan (see Figure 2, Version Dated 9/11/2011) for the site, the literature review (focusing on corridor width and edge to area ratios), guidance from Stockland and ARUP staff and desktop data. VMUs primarily represent areas that have similar:

- Soil type;
- RE pre-clearing data; and
- Vegetation condition/growth stage.

For example, adjacent areas of alluvium mapped as previously supporting the RE 12.3.5 with an obviously active soil (as demonstrated by regenerating species) would be grouped together into one VMU. An adjacent area with similar characteristics but demonstrating low or no recruitment (a potentially "dead" soil) would be separated into another distinct VMU.

In cases where abiotic filters were present to block successional processes (particularly changes in hydrology), target communities for VMUs have been adjusted to current hydrological conditions to ensure the success of rehabilitation efforts.

In areas where a complex of remnant native vegetation is present and management regimes are similar, such areas have been merged into a single VMU.

All VMU development will be refined following completion of final earthworks plans and highly detailed stormwater / groundwater modeling as illustrated in the diagram below (Figure 1) This process will be undertaken to ensure that vegetation on-Site is suitable and sustainable over the long-term. It is also assumed that minor development (such as tracks, stormwater treatment devices and small recreation areas) will occur within some Riparian Buffer areas although significant alterations to VMU extent or function is not anticipated.

Figure 1 **Proposed process for VMU extent refinement.**

2.5 VMU Objectives and Associated Treatments

Following examination of the results of previous sections, VMU objectives were set with a clear view to maximise existing characteristics of the VMUs with recognition of the resources required to undertake such works. To determine this, treatment levels were generated based on on-ground assessments and Greening Australia"s extensive field experience to determine cost-effective means of restoring prioritised revegetation areas.

Regional Ecosystems have been utilised as a key descriptive unit as it is believed that the key species and inter-geological relationships described within each ecosystem type allow for major ecosystem functions and persistence within a landscape.

Specific VMU objectives and associated techniques were obtained by utilising the following information:

- Pre-clearing data and current VMU characteristics;
- Previous accumulated research; and
- Integration of considerations outlined in Table 1 and Appendix A.

As an example of this, established regrowth was precribed treatments that would enhance existing site characteristics such as shrub layer diversity. Similarly, in areas that lacked functional elements for that particular system (based on preclearing/DERM data), suitable stimulation techniques and reintroduction of suitable material was recommended to ensure critical functional elements were present.

Where the potential for reinstatement or introduction of EVNT species was possible, treatments specific to these species were proposed for selected areas.

3 Site and Literature Analysis Results

3.1 Rehabilitation Models/Methods

To align with the Conservation Strategy, total riparian vegetation widths have been established as:

- 200m for Lamerough Creek and Bells Creek North; and
- 100m for Bell's Creek South.

To ensure appropriate recommendations for site rehabilitation, Greening Australia has leveraged internal experience and cross-referenced with various texts and articles within the context of the Strategy. The results of this process and their relevance regarding Strategy objectives are provided in Table 1.

Table 1 Relevant articles, selected recommendations and subsequent VMU objectives

Relevant text	Recommendations	Opportunities to integrate with Masterplan objectives
"Best Practice Guidelines for Enhancing Urban Bird Habitat: Scientific Report" (Birds Australia, 2004).	Maximise restored riparian zone width with a minimum 80m as edge effects have been demonstrated within 30m.	Minimum width of 80m across for all riparian corridors where possible.
"Managing Riparian Zones for Multiple Benefits" (Fact Sheet 13, River Landscapes Series, Land and Water Australia, 2005).	**Aquatic habitat** Recommended riparian vegetation width of two to three tree or tall shrub widths (10–20 metres) though a minimum of one tree or tall shrub width (5–10 metres) will still provide inputs if it has a healthy crown overhanging the stream.	Ensure adequate shading of riparian zone is provided.
	Terrestrial habitat Corridors of native riparian vegetation are particularly important in situations where the surrounding catchment has been substantially cleared. Greater width is likely to result in more desirable habitat for most species, as it reduces or prevents edge effects and invasion by exotic plants and animals, as well as being better able to withstand extreme climatic and natural events such as flooding. A width of 80–100 metres is recommended for most birds and animals, but if this is impractical, consider islands of 50–80 metre width, with 20 metre	Minimum width of 100m across for all riparian corridors where possible. Provide islands of greater width where this is not practical.

Relevant text	Recommendations	Opportunities to integrate with Masterplan objectives
	corridors between them.	
"Balancing Conservation and Production" (CSIRO Training Module, date unknown)/1994 Land Act (Department of Natural Resources and Mines).	Maintain 50 metres of vegetation each side of first and second order streams (gullies and small streams), 100 metres each side of third and fourth order (mid-sized) streams, and 200 metres each side of fifth order and larger streams (rivers).	Consider buffers according to stream order as listed where practical. Maximum recommended buffer width where practical is to be 200m for third / forth order streams. Minimum recommended width is to be 100m for first and second order streams where practical.
Carla Catterall, Ecologist, Griffith University (pers. comm. May 2010).	Should consider increasing buffer of *Melaleuca* communities as they are not as stable as woodland/forest communities.	Increase buffer width by 50m where practical.
"The search for fragmentation thresholds in a Southern Sydney Suburb" (Drinnen, 2005).	Networks of habitat, comprising reserves or nodes, linked by corridors or habitat features within the surrounding landscape matrix, have been proposed as a potential solution to the conservation of biodiversity in fragmented landscapes. The size of habitat remnants, or nodes, within the connected landscape is the most important factor in the design of conservation networks at this scale. The habitat nodes within the network also need to be functionally connected. Habitat nodes are recommended with a minimum size of 3.5–5 ha.	Include enhanced habitat areas of (Biohubs) along functional corridors (corridors that connect remnants).
"Is landscape context important for riparian conservation?"	Riparian corridor suitability for birds in SEQ woodlands is not reliant on just riparian corridors alone, but more importantly the context that surrounds them. Undisturbed woodland is preferable to more disturbed land uses (which	Ensure remnants connecting corridors are of suitable quality and where possible complexify vegetation and avoid open space areas.

Relevant text	Recommendations	Opportunities to integrate with Masterplan objectives
(Martin.T. *et.al.,* 2005).	promote generalist foragers). Aim to complexify vegetation in adjacent areas and avoid lots of open space such as ovals where possible.	Consider installation of increased habitat nodes along length of corridor.
"Coastal Wetlands of Southeast QLD" (QLD Herbarium, 2001)	Approximately 35% of the distribution of *Melaleuca* wetlands is on State or Local Government reserves. The highest priority for management of SEQ coastal wetlands is the need to conserve as much as possible of the remaining areas of *Casuarina glauca* and *Melaleuca quinquenervia* communities included in the "of concern" Regional Ecosystems 12.1.1, 12.3.5, and 12.3.6.	While common on-site, the importance of *Melaleuca* communities (particularly 12.3.5) should not be undervalued in favour of trying to establish alternative preclearing communities that may not persist due to a change in biotic and abiotic thresholds (e.g. land mounding and filling on ex-forestry land).
Dale Tomkinson, Greening Australia Victoria Consultant (pers. comm. April, 2010).	In coastal sandy-based communities in Victoria increased nutrient levels favour *Leptospermum spp.* and grasses over other native vegetation. Many species indicative of these communities (e.g. Epacrids) are impossible to direct seed and even propagation can be problematic. Soils without active native biota representative of previous existing communities ("dead" soils) represent a biotic barrier for rehabilitation. Rehabilitation of pre-existing vegetation on such soils may need appropriate microorganism structures to establish and persist.	Focus intensive installation of problematic species in key node areas rather than whole of site. Avoid long-term open paddock areas due to failure risk and if undertaking works in such areas consider inoculation trials to avoid failure.
"Restoration Ecology" (Van Andel *et al.,* 2006).	Use of knowledge regarding pre-disturbance community may be helpful for determining Site targets, but consideration must be given to biotic and abiotic thresholds.	Utilise preclearing RE data where appropriate but if biotic/abiotic thresholds have been breached then a compromise regarding the quality and quantity of reinstalled vegetation should be acknowledged.
"Restoration Ecology"	While re-introduction of EVNT species can be utilised in ecological restoration projects, such introductions should not take precedence over functional	Functional reinstatement of vegetation is to take precedence over EVNT restoration. EVNT

Relevant text	Recommendations	Opportunities to integrate with Masterplan objectives
(Van Andel *et al.*, 2006).	reinstatement. Many EVNT reintroductions typically fail due to either misunderstanding the site or the target species.	restoration is to be carefully planned and implemented within key intensive management areas.
"Edges – Their Effect on Vegetation and Wildlife". Land for Wildlife Technical Note No. 4 (Rowley, L. et.al. 1999)	The „depth" of the effect in habitat varies greatly with the length of the edge, the contrast in edge, the width of the habitat, the type of vegetation, the species of wildlife and the stability of the vegetation. The best way to reduce negative edge effects is to reduce the length (perimeter) of the edge. Rounded edges achieve this, and also increase the „core" size.	Minimal use of straight lines were utilised wherever possible in delineating VMU boundaries. Where possible large blocks of key VMU areas were linked rather than leaving large curves which would normally increase edge-area ratios.

3.1.1 *Integration of Findings into Core Strategy Objectives*

The Site is delineated by a large (offsite) remnant to the east with three main riparian lines that flow from the west, through the Site, and into this area.

As the southern corridor connects to highly disturbed, non-remnant habitat (the *Pinus* species plantations to the west), its main functions should be considered to be water quality and core habitat enhancement.

In comparison, the northern corridor (Bell"s Creek North and Lamerough creek) connects to remnant native forest and wetlands (remnant sections of Beerwah State Forest and Caloundra Conservation Park) in the northwest. This linkage also represents a connection between two regionally significant terrestrial corridors (as outlined in the 2007 SEQ Biodiversity Planning Assessment). With this in consideration, more resources should be utilised to heighten the connectivity of this corridor in addition to improving water management and core habitat values.

Also, there is an opportunity for riparian buffers to be aligned with stream classes with wider sections on key areas (e.g. intersections with remnant vegetation and drain confluences). These areas can act as biodiversity hubs where more intensive management can be undertaken to increase biodiversity, habitat diversity and seed dispersal throughout the Site.

3.2 Current Site Characteristics

The Site is located approximately 6 km south-west of the city of Caloundra in an area that is dominated by agricultural and forestry land uses. Site boundary landmarks include the Caloundra Aerodrome to the northeast, the Bruce Highway to the west, Bells Creek road to the south and conservation land to the east.

Other important adjacent land uses include conservation to the east. Volume Two of the Coastal Wetlands of Southeast Queensland (EPA, 1999) highlights the following conservation areas (reference codes are noted) that either adjoin or are closely associated with the site:

- Lamerough Creek (reference 138): „State significance" (as outlined in the SEQBPA process) wetland part of the Bells Creek/Lamerough Creek Complex, and the last big area of tall *Melaleuca* in very good condition in the district, habitat for rare and vulnerable birds and the vulnerable wallum froglet;
- Bells Creek North (139): „State significance" area, part of the Bells Creek/Lamerough Creek Complex. Surrounded by intact bushland and a habitat for rare birds and the vulnerable wallum froglet;
- Bells Creek (140): „State significance" area, part of the Bells Creek / Lamerough Creek Complex. Unique *Melaleuca–Lophostemon suaveolens* mix that is limited on the mainland and habitat for rare birds and the vulnerable wallum froglet;
- Pumicestone Bottleneck (149): „State significance" wetland that adjoins seagrass areas and is habitat for waders and dugong. The area is a declared Fish Habitat Area and is Ramsar-listed; and
- Bells Creek mouth (141/144).

The Site is also located on a connection point between two regionally significant terrestrial corridors (SEQ Biodiversity Planning Assessment, 2007).

Previous land use has been dominated by pine plantation forestry with some grazing in central sections of the Site for at least the last 20 years. Currently, the Site is being managed for three main purposes:

- Pending urban development;
- Open field/leased-pasture management with a view to urban expansion; and
- Vegetation management with a view to retention, expansion and enhancement as part of future urban infrastructure works.

Surrounding land uses include forestry (recently acquired by the Hancock Natural Resource Group) to the west and southwest. Urban infrastructure (including an aerodrome and the urban development of Bellvista) exists to the north and northeast

with grazing and forestry to the south. The Bruce Highway borders the west of the Site and there are small native forestry and pine forestry holdings to the north.

For summaries of relevant characteristics as they apply to projected VMUs, refer to Appendix A.

3.2.1 *Terrestrial Characteristics*

The area covered by the Strategy is relatively flat, with a gentle slope from west to east. Soils on-Site are predominately duplex alluvial sands with some outliers of soils derived from sedimentary rock.

Other main characteristic features of the Site include the Bells Creek and Lamerough riparian corridors, which bisect the Site east-west. These creeks vary in stream order as summarised in Table 2.

Table 2 summarises all major waterways within the property. Figure 3 provides waterway order mapping as supplied by DERM (DERM, 2010).

Table 2 Major vegetated waterways on-site

Waterway	Waterway stream order (DERM, 2010)
Bells Creek South	2 in the west moving to 4 on the eastern property boundary.
Bells Creek North	3 in the west moving to 4 on the eastern property boundary.
Lamerough Creek	1 in the west moving to 2 on the eastern property boundary.

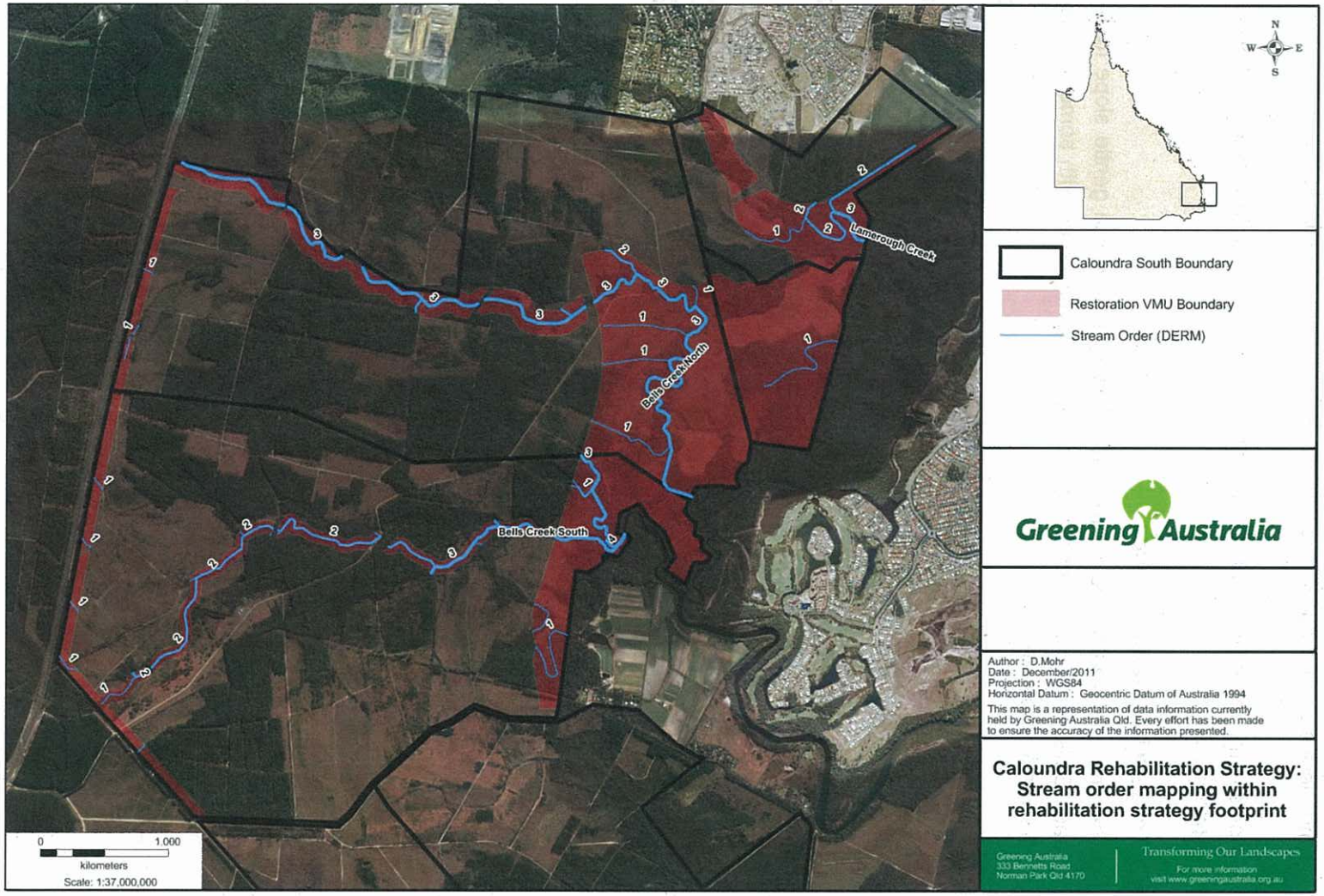

Figure 3 **Stream Order Mapping overlap within Rehabilitation Strategy Area**

3.3 Vegetation

Table 3 lists current remnant vegetation and pre-clearing vegetation as listed within the QLD Herbarium REDD database and associated mapping release, Version 6 (DERM, 2010). Figures 4 and 4a delineate the extent of remnant and previously occurring vegetation on, and adjacent to, the Site.

In general, the condition of remnant vegetation on-Site is of moderate to poor quality with thin riparian corridors showing considerable edge effects, which have been exacerbated by recent fire events. Quality of such vegetation generally improves as edge to area ratios decrease. Patches occurring adjacent to remnant vegetation to the east are also generally of higher quality with a wider variety of ground and shrub layer species.

Regrowth on-Site is generally limited to areas buffering riparian lines and is dominated by *Melaleuca quinquenervia* (broad-leaved paperbark), the dominant framework species within the area. Some localised occurrences of *Acacia spp.* are present, generally in drier areas.

Land to the east of the Site have significantly higher regrowth rates due to lack of agricultural management apart from periodic chopper-rolling.

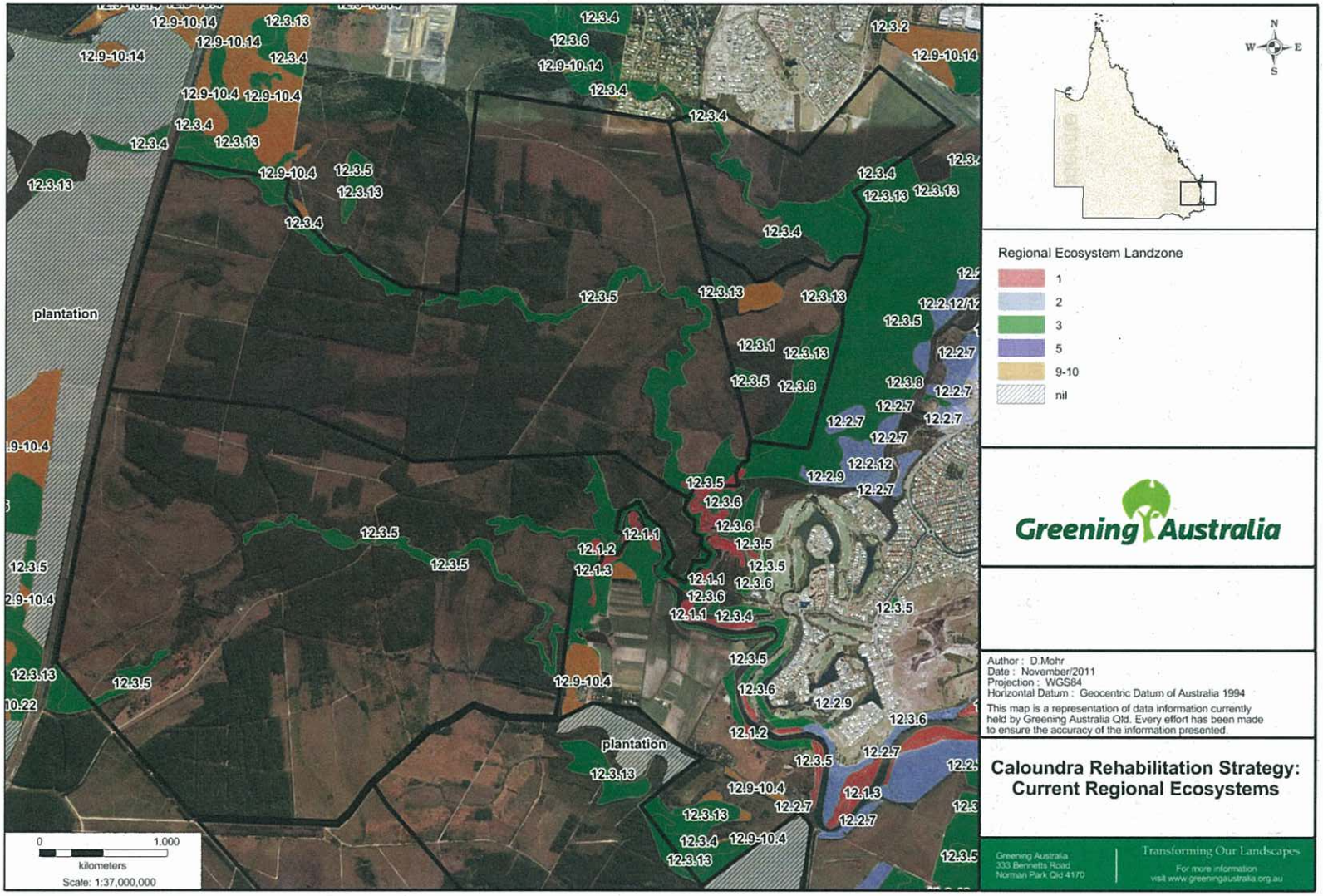

Figure 4 Current Vegetation

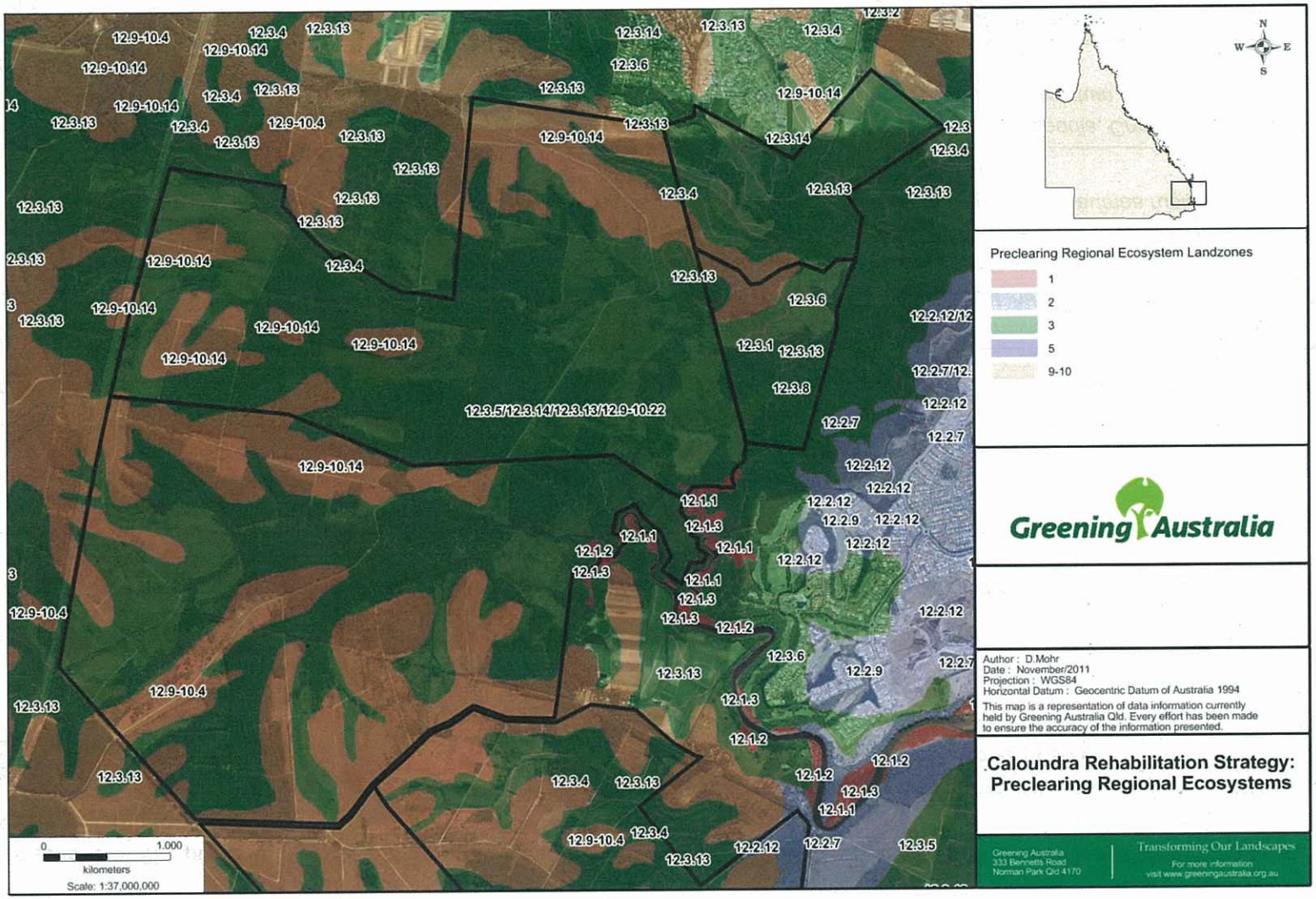

Figure 4a Previously Occurring Vegetation

Table 3 Descriptions of Site pre-clearing REs and key associated flora species. All REs are represented as remnant vegetation on-site with the exception of shaded Res, which are currently no longer represented on the property)

Regional Ecosystem	Description	VMA status	Species present
12.1.1	*Casuarina glauca* open forest on margins of marine clay plains	OC	*Casuarina glauca*, Mangroves
12.1.2	Saltpan vegetation including grassland, herbland and sedgeland on marine clay plains	LC	*Sporobolus virginicus*, *Zoysia macrantha* subsp. *macrantha*
12.1.3	Mangrove shrubland to low closed forest on marine clay plains and estuaries	LC	Mangroves
12.2.15	Swamps with *Baumea* spp., *Juncus* spp. and *Lepironia articulata*	LC	*Baumea* spp., *Juncus* spp., *Lepironia articulate*, *Gahnia* spp., *Eleocharis* spp.
12.2.7	*Melaleuca quinquenervia* or *Melaleuca viridiflora* open forest to woodland on sand plains	LC	*Melaleuca quinquenervia*, *Melaleuca viridiflora* , *Eucalyptus tereticornis*, *Corymbia intermedia*, *Eucalyptus bancroftii*, *Eucalyptus latisinensis*, *Eucalyptus robusta*, *Lophostemon suaveolens*, *Livistona decora*, *Melastoma malabathricum* subsp. *malabathricum*, *Banksia robur*, *Pteridium esculentum*, *Blechnum indicum*, *Schoenus brevifolius*, *Baloskion tetraphyllum*, *Baumea rubiginosa*, *Gahnia sieberiana*, *Imperata cylindrica*
12.3.1	Gallery rainforest (notophyll vine forest) on alluvial plains	E	*Waterhousea floribunda*, *Cryptocarya hypospodia*, *Cryptocarya obovata*, *Cryptocarya triplinervis*, *Argyrodendron trifoliolatum*, *Ficus coronata*, *Ficus fraseri*, *Ficus macrophylla*
12.3.13	Closed heathland on seasonally waterlogged alluvial plains near coast	LC	*Melaleuca thymifolia*, *Banksia robur*, *Xanthorrhoea fulva*, *Hakea actites*, *Leptospermum* spp., *Baeckea frutescens*

Regional Ecosystem	Description	VMA status	Species present
12.3.14	*Banksia aemula* woodland on alluvial plains near coast	OC	*Banksia aemula* , *Eucalyptus latisinensis*, *Corymbia intermedia*, *Eucalyptus robusta*, *Lophostemon confertus*
12.3.4	*Melaleuca quinquenervia*, *Eucalyptus robusta* woodland on coastal alluvium	OC	*Melaleuca quinquenervia*, *Eucalyptus robusta*
12.3.5	*Melaleuca quinquenervia* open forest on coastal alluvial plains	LC	*Melaleuca quinquenervia*, *Blechnum indicum*, *Leersia hexandra*, *Imperata cylindrica*, *Baumea rubiginosa*, *Gahnia sieberiana*, *Lepironia articulate*, *Schoenus brevifolius*, *Schoenus scabripes*, *Lygodium microphyllum*, *Stenochlaena palustris*, *Lophostemon suaveolens*, *Eucalyptus robusta*, *Eucalyptus tereticornis*, *Eucalyptus bancroftii*, *Eucalyptus latisinensis*, *Corymbia intermedia*, *Melaleuca salignus*, *Livistona australis*, *Casuarina glauca*, *Endiandra sieberi*, *Melastoma malabathricum* subsp. *malabathricum*, *Glochidion sumatranum*, *Melicope elleryana*
12.3.6	*Melaleuca quinquenervia*, *Eucalyptus tereticornis*, *Lophostemon suaveolens* woodland on coastal alluvial plains	LC	*Melaleuca quinquenervia*, *Eucalyptus tereticornis*, *Lophostemon suaveolens*, *Corymbia intermedia*, *Imperata cylindrica*
12.3.8	Freshwater swamps with *Cyperus* spp., *Schoenoplectus* spp. and *Eleocharis* spp.	OC	*Cyperus* spp.,*Schoenoplectus* spp., *Philydrum lanuginosum*, *Eleocharis* spp., *Leersia hexandra*, *Triglochin procerum*, *Nymphaea* spp., *Nymphoides indica*, Persicaria spp., *Phragmites karka*, *Typha* spp.
12.9-10.14	*Eucalyptus pilularis* tall open forest on sedimentary rocks	LC	*Eucalyptus pilularis*, *Syncarpia glomulifera* subsp. *glomulifera*, *Syncarpia verecunda*, *Corymbia intermedia*, *Angophora woodsiana*, *Eucalyptus microcorys*
12.9-10.4	*Eucalyptus racemosa* woodland on sedimentary rocks	LC	*Eucalyptus racemosa* subsp. *racemosa*, *Angophora leiocarpa*, *Eucalyptus seeana*, *Eucalyptus siderophloia*, *Corymbia intermedia*, *Eucalyptus tindaliae*, *Lophostemon suaveolens*, *Melaleuca quinquenervia*, *Eucalyptus tereticornis*
12.2.12	Closed heath on seasonally waterlogged sand plains	LC	*Banksia spp. ,Banksia robur ,Boronia slcifolia,Epacris spp. Baeckea frutescens,Schoenus brevifolius ,Leptospermum spp.*

Regional Ecosystem	Description	VMA status	Species present
			Hakea actites, Melaleuca thymifolia, Melaleuca nodosa *Xanthorrhoea fulva ,Baloskion spp. , Sporadanthus spp.* *Empodisma minus, Baumea rubiginosa , Epacris microphylla* *Leptospermum liversidgei , Xanthorrhoea fulva*
12.5.3	*Eucalyptus tindaliae* and/or *Eucalyptus racemosa* open forest on remnant Tertiary surfaces	E	*Eucalyptus tindaliae , Eucalyptus racemosa subsp. racemosa* *Corymbia intermedia , Eucalyptus siderophloia* *Eucalyptus resinifera , Eucalyptus pilularis , Eucalyptus microcorys* *Angophora leiocarpa , Melaleuca quinquenervia* *Corymbia citriodora , Eucalyptus seeana , Lophostemon suaveolens*
12.9-10.22	Closed sedgeland/shrubland on sedimentary rocks Coastal parts	OC	*Schoenus brevifolius, Baumea juncea , Banksia robur , Melaleuca nodosa , Banksia aemula*

3.4 Flora

Previous auditing of vegetation (including searches for EPBC-listed species note that flora across the Site is generally representative of REDD datasets for the area (B Biodiversity Assessment and Management, 2010) (Lensworth, 1999). Where appropriate previous reporting has been utilised to determine or confirm key functional species for use in the following management-related sections.

Table 4 lists EVNT species either identified or determined as having potential habitat on-Site through previous reporting.

Table 4 EVNT flora species with potential to occur on-Site

Species (1)	Relevant Legislation/ Status	Habitat	Strategy Integration
Acacia attenuata attenuate wattle	EPBC / V	*A. attenuata* is confined to high rainfall areas on the coastal lowland sand plains of southeast Queensland. The species grows on seasonally waterlogged, infertile sandy soils or peat swamps and typically occurs in wet heathland and layered eucalypt open forest ecotones.	Integrate into biohub plantings in appropriate areas.
Alyxia ilicifolia subsp. magnifolia large-leaved chain fruit	NCA / R	Commonly occurs in wet sclerophyll forest, complex notophyll vine forest and araucarian microphyll vine forest between 130 and 800m altitude. It grows on a variety of soil types and prefers shaded sites. (Detected in 1999).	Integrate into biohub plantings in appropriate areas.
Blandfordia grandiflora Christmas bells	NCA / R	Heaths and open swamps. Requires moist, well-drained soils preferably of a light texture such as sandy loam. It appreciates some protection from full sun but is not usually present in heavy shade. It is tolerant of at least moderate frosts. Propagation may be carried out from seed which can be slow to germinate. (Detected in 1999).	Integrate into biodiversity node plantings in appropriate areas.
Eucalyptus conglomerata swamp stringybark	EPBC / E	Swampy grassland or swampy forest including rainforest, eucalypt or paperbark forest, mostly in coastal areas.	Integrate into biohub plantings in appropriate areas.
Phaius australis lesser swamp-orchid	EPBC / V	Swampy grassland or swampy forest including rainforest, eucalypt or paperbark forest, mostly in coastal areas.	Integrate into biohub plantings in appropriate areas.

Species (1)	Relevant Legislation/ Status	Habitat	Strategy Integration
Prasophyllum exilis wallum leek	NCA/R EPBC/V	Open dry heath.	Integrate into biohub plantings in appropriate areas.
Prasophyllum wallum an orchid	EPBC/V	Occurs in southeast Queensland, in wallum communities and adjacent stabilised dunes (Jones, 1991) and coastal melaleuca swamp wetlands (Joyce, 2006).	Integrate into biohub plantings in appropriate areas.

1. CE – Critically endangered, E – Endangered, V – Vulnerable, R – Rare

3.5 Fauna

Table 5 lists EPBC act-related EVNT species likely with the potential to be identified on-Site as identified in the Conservation Strategy (ARUP, Dec 2011).

Table 5 Listed species in EPBC Act protected matters report

Threatened Species (* EPBC Act listed)	Migratory Species
Glossy Black Cockatoo (*Calyptorhynchus lathami*)	White-throated Needletail (*Hirundapus caudacutus)*
Ground Parrot (*Pezoporus wallicus*)	Spectacled Monarch (*Monarcha trivirgatus*)
Regent Honeyeater (*Anthochaera phrygia*)*	Black-faced Monarch (*Monarcha melanopsis*)
Coxen"s Fig Parrot (*Cyclopsitta diopthalma coxeni*)*	Satin Flycatcher (*Myiagra cyanoleuca*)
Red Goshawk (*Erythrotriorchis radiatus*)*	Rufous Fantail (*Rhipidura rufifrons*)
Swift Parrot (*Lathamus discolour*)*	Cattle Egret (*Ardea ibis*)
Australian Painted Snipe (*Rostratula australis*)*	Great Egret (*Ardea alba)*
Black-breasted Button-quail (*Turnix melanogaster*)*	Ruddy Turnstone (*Arenaria interpres*)
Large-eared Pied Bat (*Chalinolobus dwyeri*)*	Curlew Sandpiper (*Calidris ferruginea*)
Grey-headed Flying Fox (*Pteropus poliocephalus*)*	Lesser Sand Plover (*Charadrius mongolus*)
Spot-tailed Quoll (*Dasyurus maculatus*)*	Latham"s Snipe (*Gallinago hardwickii*)
Long-nosed Potoroo (*Potorous tridactylus*)*	Grey-tailed Tattler (*Heteroscelus brevipes)*
False Water Rat (*Xeromys myoides*)*	Bar-tailed Godwit (*Limosa lapponica*)
Three-toed Snake-tooth Skink (*Coeranoscincus reticulatus*)*	Australian Cotton Pygmy-goose (*Nettapus coromandelianus albipennis*)
Honey Blue Eye (*Pseudomugil mellis*)*	Eastern Curlew (*Numemius madagascariensis*)
Oxleyan Pygmy Perch (*Nannoperca oxleyana*)*	Whimbrel (*Numenius phaeopus*)
Giant Barred Frog (*Mixophyes iteratus*)*	Pacific Golden Plover (*Pluvialis fulva*)
Wallum Sedgefrog (*Litoria olongburensis*)*	Painted Snipe (*Rostratula benghalensis*)
Green-thighed Frog (*Litoria brevipalmata*)*	Terek Sandpiper (*Xenus cinereus*)
Wallum Rocketfrog (*Litoria freycineti*)	Fork-tailed Swift (*Apus pacificus*)
Wallum Froglet (*Crinia tinnula*)	White-bellied Sea Eagle (*Haliaeetus leucogaster*)
Koala (*Phascolarctus cinereus*)	Rainbow Bee-eater (*Merops ornatus*)
Australian Fritillary (*Argyreus hyperbius inconstans*)	
Illidge"s Ant Blue (*Acrodipsas illidgei*)	
Richmond Birdwing (*Ornithoptera richmondia*)	
Satin Blue (*Nesolycaena albosericea*)	