NATURECALL ENVIRONMENTAL

Addendum Ecological Assessment:

Project:

Rainbow Beach Concept Plan – Proposed Modifications of Consent Conditions.

Client:

St Vincent's Foundation

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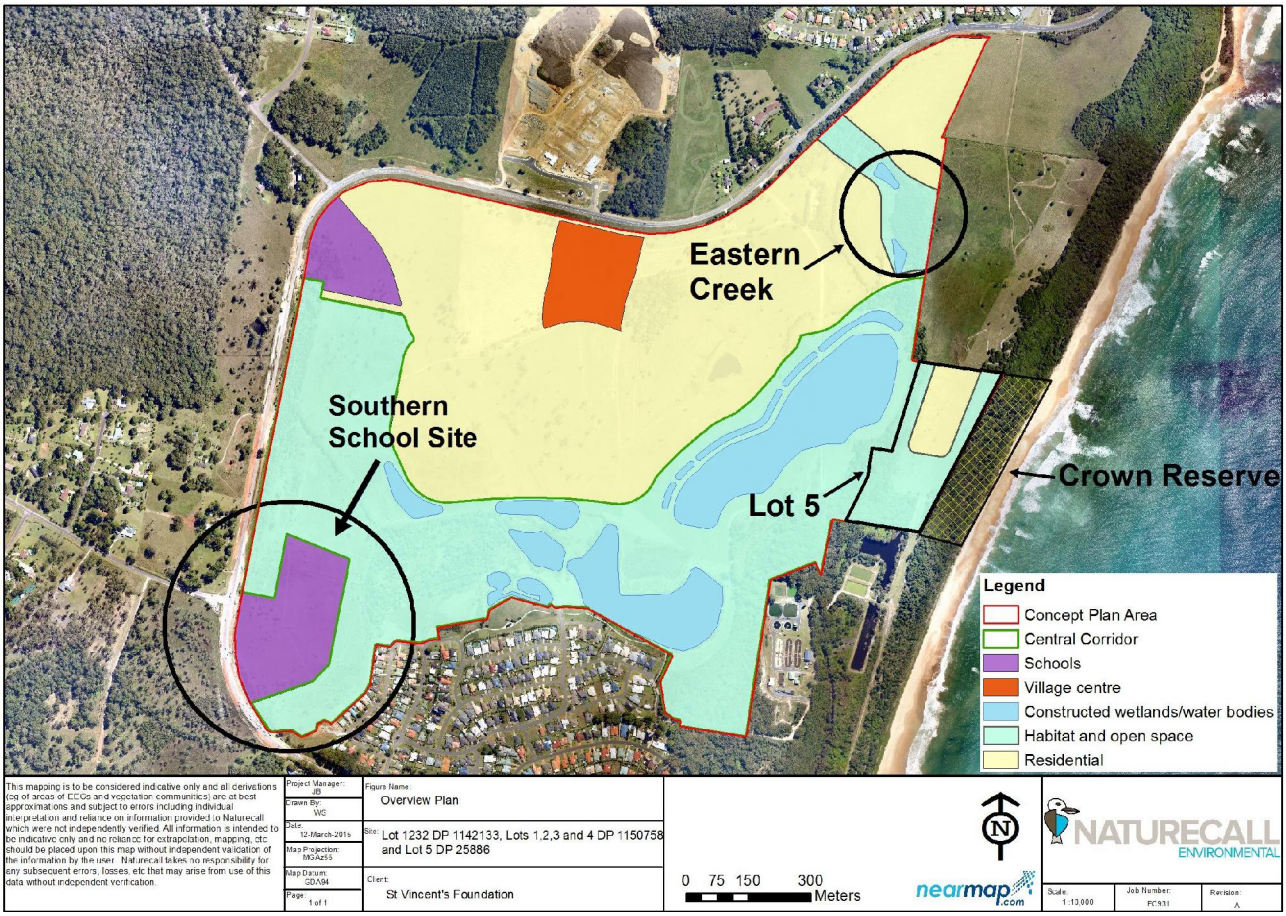
Executive Summary

Background Information

This assessment reviews specific Approval Conditions for the Rainbow Beach Concept proposal as described, in light of new information gathered by way of additional site survey, review of legal precedents, and literature review; in order to determine if they will achieve the best ecological and biodiversity outcome or should be amended to achieve this objective.

The review focusses on issues associated with three key areas shown in the following figure:



Swamp Oak Floodplain Forest EEC Review:

For the purposes of consistency with the Urban Investigation Area (UIA) 14 Urban Growth Strategy, and the associated Comprehensive Koala Plan of Management, the vegetation community and Endangered Ecological Community (EEC) mapping of the property prepared by Biolink was generally adopted for the Environmental Assessment (EA).

Biolink mapped the EEC – *Swamp Oak Floodplain Forest on Coastal Floodplains* in the area of the subject site known as the 'Eastern Creek' (see overview plan). This area lies upstream of Duchess Gully and comprises a drainage depression with channels consisting of artificial drains. Vegetation around these drains, the edge of the drainage depression, adjacent footslopes and part of the ridgeline is Swamp Oak forest which floristically matches the Final Determination.

Review of legal precedents and significant new soil landscape data for this assessment found this EEC is restricted to a significantly smaller area than previously mapped by Biolink. It is now mapped lower down in the catchment near the upper limit of Duchess Gully. This significant change is predominantly due to the upper limit of the floodplain (even under a Climate Change scenario) being below most of the extent of the Swamp Oak community and due to soils not being alluvial in origin as required in the Final Determination.

Consequently, it is recommended:

- The maximum width of the required buffer vegetation adjacent to the residential zone is to be 25m. As an existing buffer occurs on the northern side, the new buffer only needs to be applied on the southwest. The concept development layout is to be adjusted accordingly to allow for this buffer. This buffer excludes Asset Protection Zones and road reserves, as per Condition B2.
- Where existing vegetation is absent in this buffer zone, ecotonal species (currently present in the northeast corner) typical of the locality and the edaphic position are to be planted. Example species include *Callistemon saligna, Syzygium australe, Melaleuca quinquenervia, M. styphelioides, M. linariifolia, Eucalyptus robusta, E. tereticornis, Glochidion ferdinandi, Ficus coronata, Gahnia clarkei, Lomandra longifolia, Elaeocarpus reticulatus* and *Acmena smithii*. These will not only close the edge but improve the habitability of the northwest drainage line, given Swamp Oak offers very limited habitat resources i.e. lacks nectar producing capabilities and rarely produces hollows.
- The edge is to be closed along the urban fringe by planting with pungent-leaved plants such as *Lomandra longifolia* and *Gahnia* spp. on the outermost fringe.

Weeds (generally consisted of *Paspalum* spp., Winter Senna, and Lantana) are to be controlled by standard bush regeneration techniques.

Lot 5/Crown Reserve Interface

A review was made of the benefits of a uniform 50m buffer (required by Concept Approval Condition B3 for the northeast side of Lot 5 adjacent to Littoral Rainforest in the adjacent Crown Land Reserve) or a tapered buffer as proposed by the proponent. No significant ecological benefit of either option was identified.

Conversely, failure of the recent survey to detect a population of Eastern Chestnut Mouse (ECM) in former habitat on Lot 5 (designated under another Concept Approval Condition to be managed for the ECM) and in adjacent potential refugia (within a Crown reserve) supported the proponent's proposition that the better biodiversity outcome would be to:

- Extend the proposed tapered buffer continuously from the southern limit of the current nominated buffer zone to the Bonny Hills STP boundary.
- Assist regeneration of about 1.5ha of Zone 2 into fully structured Coastal Sands Blackbutt forest and incorporate the above buffer where it falls into Zone 2.

Consequently, this option is recommended to be adopted due to its potentially higher equivalent ecological benefits, and Condition B3 be amended accordingly.

Eastern Chestnut Mouse

A targeted survey for this species in previously known habitat in the southwest of the subject land in the Open Space/Habitat/Drainage Corridor, and in open pasture/grassland on Lot 5 found:

- The small and isolated population of the species on Lot 5 (first and last recorded in 2003) is highly likely to have become extinct since the original survey, with no Eastern Chestnut Mouse (ECM) recorded despite trapping well above standard effort levels in 2013.
- Conversely, the previously recorded small population in the southwest of the site within the Open Space Corridor, has significantly increased in abundance, and expanded from the western hill area where it was previously detected into the nearby EEC regeneration areas; with other proximate sections of the Open Space area also offering suitable habitat (to varying degrees) for further population expansion.

The Concept Plan Approval has two conditions relative to the ECM:

- B5: "*The identified Common Planigale and Eastern Chestnut Mouse habitat area (the entire drain and a fully vegetated buffer zone of at least 30m to the east as recorded in Appendix 6 of the Environmental Assessment) west of the southern school site is excluded from any filling, clearing, etc. This area is to be collectively fenced off, revegetated with southwest dry sclerophyll/swamp forest (as per the Environmental Land Use Management Plan), and the total area regenerated and managed appropriately for these species to maximise the potential viability of these small populations. These excluded areas must be fenced off and incorporated into the central corridor as shown in Plan I*."

- B6: "*The concept plan and principles plan provided with the PPR is to be amended to make provision for the identified ECM habitat on Lot 5 DP 25886 as recorded in Appendix 6 of the Environmental Assessment. This area is to be collectively fenced off; revegetated by way of Coastal Sands Forest Regeneration (as per the Environmental Land Use Management Plan); and the total area regenerated and managed appropriately for these species in perpetuity to maximise the potential viability of this small population. This excluded area must be fenced off and incorporated into the central corridor as shown in the amended Principles Plan in Plan II*."

As detailed in Section 8.2, Condition B6 is considered redundant given the evidence from the latest intensive survey strongly indicates the species is locally extinct from Lot 5, and has only (at best) remote chance of ever re-colonising the area and/or establishing a long term viable population due to a range of limitations (including insufficient habitat to sustain a viable population on Lot 5).

The proponent thus proposes to significantly extend on Condition B5 and reduce the footprint of the Southern School Site by about 2.5ha to increase the area of ECM habitat in the southwest, as an offset to allowing a nominated portion of Zone 2 to regenerate into full forest. As both measures will significantly enhance overall corridor functional effectiveness; potential ECM population size (and hence viability); and centralise management of the ECM species to a single distinct area (increasing practicality): this offer is recommended to be supported and the Consent Conditions amended.

Beach Access Construction Area

A review of the threats to the high value vegetation (littoral rainforest) adjacent to the existing access track as a result of the future formalisation of the beach access was undertaken to address Condition

B1 of the Project Application determination, as linked to Condition C1(23) of the Concept Application, which states:

> "*Prior to lodgement of any development application for residential subdivision, the proponent must prepare and implement a vegetation management plan for the Crown land reserve to the east identified as R754444 to the satisfaction of Council. The plan must demonstrate:*
>
> *a) The establishment of a 'vegetated regeneration area';*
>
> *b) Removal of all weed species and retention of all native vegetation within the vegetated regeneration area';*
>
> *c) Replanting of endemic rainforest species within vegetated regeneration area';*
>
> *d) Erection of temporary fencing;*
>
> *e) Erection of fencing enclosing regeneration area*."

In addition to measures recommended to be implemented to meet parts (b) to (d), it was determined, via weed density mapping and the aforementioned impact review, that the nominated 'vegetated regeneration area' should be limited to 25m north and south of the track alignment. This area includes the highest weed infestations within 50m of the track; and infill planting of this nominated area will effectively enclose the track and address impacts associated with the access.

The remainder of the Reserve will remain under current and on-going management of Council and Landcare, which has been previously supported by the proponent.

Conclusion

This assessment has collated and submitted significant new information which supports a review of the specified Consent Conditions.

The amendments proposed should not only maintain the intent of these Conditions but if appropriately implemented, are expected to achieve a significantly higher net ecological and conservation benefit

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1.0 Introduction

This firm has been requested by James Dunn, Minedor Pty Ltd (on behalf of the proponents, St Vincent's Foundation), to undertake additional ecological assessment on a number of issues relating to Consent Conditions associated with determinations made 1 March 2012 of Concept Plan 06_0085 and Project Application 07_0001.

The proponents are seeking to modify the following conditions of the consents:

1. **Concept Approval**
    - Condition B2 – Buffer areas to northeastern portion of the site/Duchess Gully
    - Condition B3 - Buffer area within Lot 5 DP 25886, adjacent to Crown Reserve R754444
    - Condition B5 – Eastern Chestnut Mouse habitat area within Southern School Site
    - Condition B6 – Eastern Chestnut Mouse habitat area within Lot 5 DP 25886
    - Condition C1. 23) – Vegetation Management Plan for Crown Reserve R754444
2. **Project Approval**
    - Condition B1 – Pedestrian access path to beach

The environmental assessment information in this report has been prepared to address the proposed modifications. This report is an update of a draft prepared in 2013 by Darkheart Eco, which merged with Naturecall in April 2014.

2.0 Background Information

2.1. Previous Ecological Assessments

Prior to the acquisition by the St Vincent's Foundation (SVF), the property was approved for a large commercial sports facility, which was commenced in the early 1980's (Cox and Corkill 1983) but never completed. Prior to, and as a result of the uncompleted sports facility's partial construction, the last major phase of clearing appears to have led to the current vegetation patterns.

Darkheart Eco (now incorporated into Naturecall) surveyed the property over various periods from 2003 to date. In terms of vegetation communities now present all have been subject to some form of disturbance, with some communities derived from this disturbance of previous communities or via colonisation of new habitat, e.g. pasture/pastoral woodland and most of the Swamp Oak swamp forest. Most of the vegetation communities currently present have been mapped as part of the *UIA 14 Masterplan* (Diecke Richards 2004, 2003) and *Koala Plan of Management* (Biolink 2005) (KPoM). Their approximate areas are shown below in Table 1.

Table 1: Types and extent of vegetation communities on the property

Vegetation Community/Habitat	Total Area (ha)
Blackbutt-Tallowwood-Needlebark Dry Sclerophyll Forest	1.98
Brushbox Wet Sclerophyll Forest	0.72
Blackbutt Dry Sclerophyll Forest	2.11
Grey Ironbark-Grey Gum Dry Sclerophyll Forest	2.39
Paperbark-Swamp Mahogany-Swamp Oak Swamp Forest/Woodland	10.45
Pasture/Pastoral Woodland	150.12
Dune Scrub	1.19
Swamp Oak	4.29
Aquatic	5.75
	179ha (approx.)

Two low to medium quality condition Endangered Ecological Communities (EECs) listed under the *Threatened Species Conservation Act* (TSCA) *1995* occur on the property (previously mapped in the UIA 14 KPoM). These comprise about 14.74ha in extent:

- *Swamp Sclerophyll Forest on Coastal Floodplains*: This EEC is considered to constitute the swamp forest in the mid-southwest, northwest and southeast of the property. Overall, all examples of this EEC on the property were considered to only qualify as low to medium quality examples due to the extent of disturbance and modification. Collectively the EEC – *Swamp Sclerophyll Forest* occurs over approximately 10.45ha of the property.
- *Swamp Oak Floodplain Forest*: This EEC was considered to constitute the portion of Swamp Oak located in the northeastern section of the property (known as Eastern Creek) which actually occurs legally defined floodplain. The community was estimated to occupy 4.29ha of the property.

In addition to this, littoral rainforest (listed as an EEC at the State and Federal level) occurs in the adjacent Crown Reserve to the east and northeast of Lot 5 (see Section 7).

The following threatened species have been previously recorded on specific sections of the property by previous studies:

- **Koala**: Recorded in former swamp forest now cleared in the southwest (Clancy and Ayres 1983). More recently recorded in the Paperbark/Swamp Mahogany/Swamp Oak on the western fringe of the sewage treatment works by Biolink (2003) followed by a sighting by Darkheart. The Atlas of Wildlife/Bionet database also has records in the southeast and south of the property.
- **Eastern Chestnut Mouse**: Grassland east of Duchess Gully, in Bladey Grass dominated grassland and associated *Babingtonia pluriflora* dominated drainage line in the west-southwest (Berrigan 2003a).

- **Common Planigale**: *Babingtonia pluriflora* dominated drainage line in the west-southwest (Berrigan 2003a).
- **Little Bent-wing Bat**: Along track under dry sclerophyll forest canopy in east-southeast behind the isolated hill (Berrigan 2003a).
- **Wallum Froglet**: Two discrete populations. One small population in *Babingtonia pluriflora* dominated drainage line in the west-southwest; and another large population (>50) in the heath-dominated artificial depression north of the Eastern lagoon (south-southwest of the proposed wetland) (Berrigan 2003a).
- **Wompoo Fruit-dove**: Single bird recorded roosting for a short period in the west-southwest patch of dry sclerophyll forest adjacent to Ocean Drive in the west-southwest of property, and four birds observed flying along the Littoral Rainforest to the east (Berrigan 2003a).
- **Swift Parrot**: An unknown observer has added a sighting in the northwest of the property on the 15/8/05 to the Atlas of Wildlife/Bionet (OEH 2015a).

The eastern and western sides of the property are also mapped by the Office of Environment and Heritage (OEH) as part of the Lake Cathie-Camden Haven Regional Corridor, which links Lake Innes Nature Reserve to the Grants Beach area (as well as being part of the Habitat Corridors designated in the Lake Cathie – Bonny Hills Structure Plan 2004). This regional link is fragmented by cleared private land, a main road, and ongoing residential development. No OEH sub-regional corridors were mapped in close proximity to the property. However, due to the current habitat fragmentation, the area designated as regional corridor is more likely to function as a sub-regional corridor. No portion of the property is mapped as Key Habitat.

The upper limits of Duchess Gully and Swamp Oak community in the northeastern corner of the property is identified in the UIA 14 Structure Plan as part of a northern corridor; and the broad drainage line running from the southwest to the east across the property to Duchess Gully is identified as a major east-west link to the dune vegetation and to Bonny Hills. Current habitat in these corridors however offers limited potential suitability due to fragmentation, immaturity and limited diversity. Hence an effective corridor through these areas is likely to require that existing forest habitats be significantly augmented by habitats with a diversity of structure and composition (e.g. dry and wet sclerophyll forest, swamp forest, sedgelands) and with continuous wooded cover linking to existing remnants.

The revised Structure Plan has also removed the previously mapped northern-most section of the northern corridor (ie from Ocean Drive to Lake Cathie) on adjoining land which linked to Lake Innes Nature Reserve. This vegetation has recently been cleared for an approved subdivision on the neighbouring land. Consequently, this and Ocean Drive constricts the northern corridor's effectiveness to only highly mobile fauna such as birds and bats with limited value to terrestrial/arboreal species such as the Koala.

2.2. Current Rehabilitation Status

2.2.1. History of Rehabilitation Work and Management Techniques

In early 2007, in consultation with representatives from AECOM (known as EDAW at the time) and Cardno (who were both working on the Part 3A applications), it was proposed to 'get an early start' on certain areas of bush regeneration that would always be part of the proposed Central/Habitat Corridor and that could benefit from some accelerated attention at that time.

With the Part 3A approval processes continuing, the proponent made the decision to fast-track elements that would be of most benefit the long term biodiversity of the Central Corridor and the proposed bush regeneration works associated with the Part 3A applications.

A timeline of the works is as follows (James Dunn, pers. comm.):

1. **2007**

Work during the first year included:

- New fencing approximately along the lines of the proposed Central Corridor;
- Removal of cattle from the areas fenced off;
- Trials of various Torpedo Grass *(*Panicum repens)* control methods including mechanical removal, pre-treatment for spraying, spraying, hand removal and shade-out methods;
- Control of woody weeds including Lantana, Winter Senna and Bitou;
- Species list compilation and revegetation planning; and,
- Seed collection and nursery establishment.

2. **2008**

Work during the second year included:

- Weeding in areas fenced for natural regeneration;
- Preparation of large areas for regeneration by planting;
- Removal of Torpedo grass (mechanically) from main waterbody;
- Maintenance spraying targeting Torpedo Grass;
- Woody weed control of Lantana, Winter Senna and Bitou;
- Hazard reduction burn in central area of the Habitat Corridor (also called the 'island' area);
- Installation of sediment fencing;
- Seed collection on-site and at nearby State Forest (with permit);
- Further preparation of restoration and management plan in conjunction with AECOM and Cardno;
- Maintaining nursery;
- Planting a total of 6,694 tubestock;

- General site maintenance including mowing, whipper-snipping, hand weeding and mulching; and,
- Photographic monitoring on a 6 monthly basis

3. **2009**

Work during the third year of bush regeneration works included:

- Planting a total of 17,741 terrestrial tubestock;
- Planting a total of 6,350 macrophytes around existing waterbodies;
- Further preparation of areas for future revegetation;
- Targeted spraying of Torpedo Grass within the waterbodies;
- Continuing woody weed control – mainly Lantana and Bitou Bush;
- Treat areas of previous woody weed removal;
- Seed collection on-site and particularly targeting macrophytes for the upcoming season;
- Adjust revegetation plan in consultation with AECOM and Cardno;
- Propagation of approximately 13,300 tubestock on-site for the 2010 year;
- Maintain nursery areas and general site maintenance;
- Commence water monitoring in consultation with Cardno, WRL and John Laxton (Water Quality Consultant);
- Prepare 20 year costing plan and estimate; and,
- Attend site tours with Council and State Government agency representatives.

4. **2010**

Work during the fourth year was similar to 2009 but included:

- Planting a total of 21,267 terrestrial tubestock;
- Planting a total of some 1,613 macrophytes around existing waterbodies;
- Further preparation of additional areas for future revegetation; and,
- A continuation of the longer term plan for the areas gradually being included for regeneration work.

5. **2011**

Work during 2011 included was again similar to previous years but included:

- Planting a total of 13,153 terrestrial tubestock;
- Planting a total of some 2,956 macrophytes around existing waterbodies; &
- Preparation of additional areas for revegetation and continuing long term regeneration plan.

6. **2012**

Work during 2012 comprised:

- Planting a total of approximately 17,399 terrestrial tubestock;
- Planting a total of some 4,059 macrophytes around existing waterbodies;
- Ongoing work with respect to the regeneration plan; and,
- Planning for large scale propagation (not yet commenced) in order to cater for construction works that may commence in either 2013 or 2014.

7. **2013**

Work during 2013 comprised:

- Planting of 10 735 terrestrial tubes and macrophytes
- Ongoing work with respect to the regeneration plan

8. **2014**

Work during 2014 comprised:

- Planting of approximately 3000 terrestrial tubes.
- Planting of approximately 4000 macrophytes.
- Ongoing bush regeneration maintenance.

9. **2015**

Works budgeted for this year include:

- 5500 tubestock allocated for this year.
- Ongoing bush regeneration maintenance.

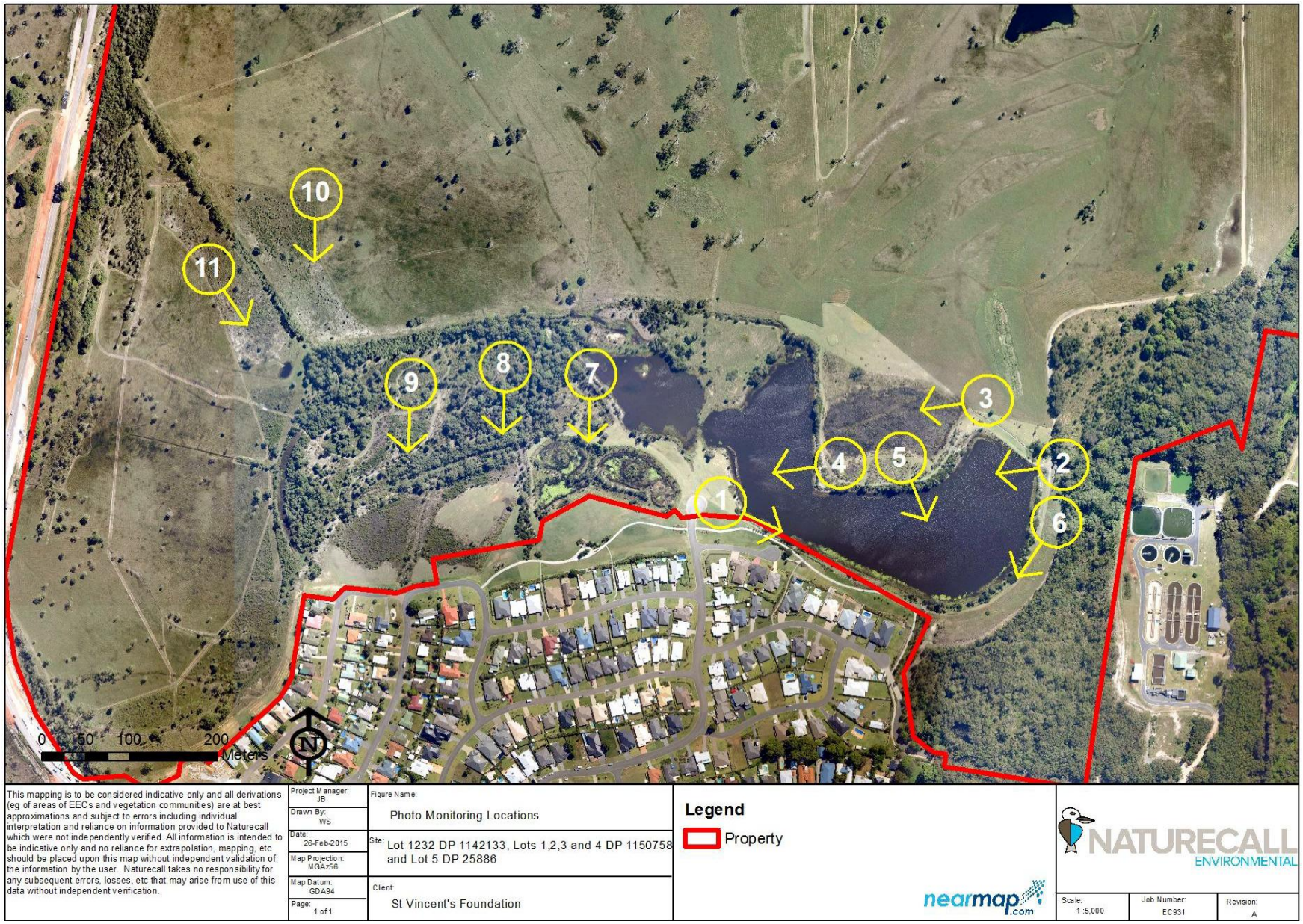
In summary, approximately 101 500 plants have been incorporated into the open space areas as part of the major regeneration works to date, including over 10,000 koala food tree species.

Of the areas fenced off and encouraged to regenerate naturally, roughly 9 hectares is currently being successfully managed by qualified bush regenerators under the project's plan.

2.3. Photographic Monitoring Examples

Since 2007, and in some other areas since 2008, all bush regeneration areas have been included in a photo monitoring regime that takes place generally in February and July. Some examples of some different areas of bush regeneration are shown below. The location on-site of the relevant location is noted in Figure 1 below.

Figure 1: Location of photo-monitoring points



2.3.1. Location 1 – Southern edge of existing waterbody.

Note initial infestation of Torpedo Grass, treatment phases, and gradual re-establishment of native macrophytes and vegetation on bank from 2009 onwards.

Waterbody looking east – February 2007

Waterbody looking east – July 2007

Waterbody looking east – February 2009

Waterbody looking east – July 2009

Waterbody looking east – July 2011

Waterbody looking east – February 2012

Waterbody looking east – July 2013

Waterbody looking east - February 2014

Waterbody looking east - July 2014

Waterbody looking east - February 2015

2.3.2. Location 2 – View west from northeastern corner of waterbody

Progressive Torpedo Grass treatment in foreground. Note gradual development of significant and very healthy growth on western bank (other side of waterbody) which is just to the south of Wallum Froglet area.

Waterbody looking west – February 2007

Waterbody looking west – July 2008

Waterbody looking west – February 2009

Waterbody looking west – July 2010

Waterbody looking west – July 2012

Waterbody looking West - February 2013

Waterbody looking West - July 2013

Waterbody looking West - February 2014

Waterbody looking West - July 2014

Waterbody looking West - February 2015

2.3.3. Location 3 – Wallum Froglet area.

This area was previously slashed in 2008. Note gradual growth of healthy Froglet habitat and control of Torpedo Grass. Broadleaved Paperbark and other dominant species are also actively controlled in order to maintain ideal wallum habitat for the Wallum Froglet and minimise predator vantage points.

Wallum Area looking west – February 2008

Wallum Area looking west – July 2008

Wallum Area looking west – February 2010

Wallum Area looking west – July 2010

Wallum Area looking west – February 2012

Wallum Area looking west – July 2012

Wallum area looking West - february 2013

Wallum area looking West - July 2013