Vegetation Management Plan

(Version 6)

SITE:	Lot 10 DP 878167 50 Wylie Road, Kembla Grange NSW 2526
CLIENT:	Bicorp Pty Ltd
DATE:	August 2015
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SECTION 1 INTRODUCTION

1.1 BACKGROUND INFORMATION

In December 2011, Southern Habitat (NSW) Pty Ltd was contracted by Adam Blackwell of Bicorp Pty Ltd to develop a comprehensive Vegetation Management Plan (VMP) suitable for the compliance of Condition #2, 3, 4, 5, 6 7 and 18 of Conditionally Approved Development Application 2009/1153, dated 29th April 2010.

The proposed development consists of the construction of building materials storage and recycling facility, associated entrance road-works and establishment of a riparian corridor to a tributary of Gibsons Creek running through the property from the north to south.

An adjoining road reserve, presumably for any future extension of Wylie Road, borders and forms the southern boundary of the subject site.

This VMP pertains to SSD 5300 (the state significant DA which seeks to expand operations to 230,000 tonnes) and shows the works which have been completed in relation to DA2009/1153/D - which is the DA (as modified) which has been approved by Wollongong City Council.

This report shall address the management of an imposed riparian corridor consisting of a 20 metre wide treatment zone that is to be located wholly within the boundary of Lot 10, as identified on Landscape Plan 1442 – LC01G as prepared by Ochre Landscape Architects (refer Appendix D).

Version 3 of the VMP took into account the site conditions up until June 2014 and works already undertaken on site. The works are documented under section 2.8 of this VMP. The vegetation audits and photos have been updated, as well as the restoration plan of action and costing.

Versions 4 and 5 of the VMP was adjusted to address issues raised by:

A) OEH regarding ongoing maintenance of the riparian corridor;
B) DPI regarding Fully Structured riparian corridor;
C) NSW Rural Fire Service regarding limitations to planting within the riparian corridor due to Asset Protection Zones and;
D) NSW Office of Water regarding offset planting to accommodate the above mentioned APZs.

This version, version 6, has been adjusted to reflect decisions made recently (June/July 2015) with regard to Asset protection zones now not being required by NSW RFS due to due to the storage of flammable materials being positioned away from the riparian corridor.

This allows for a fully structured riparian corridor to be required of the developer.

Sections 2.7 and 3.13 have been changed from Version 4 to reflect the above decision

This version also contains an updated Landscape Plan 1442 – LC01G (Appendix D) Dated 12/08/2015 reflecting the adjustments as detailed in the relevant sections.

1.2 REPORT PURPOSE AND OBJECTIVES

A VMP provides a clear framework for managing the transition between the built, terrestrial and aquatic environments. This transition is an ongoing process, requiring a greater emphasis on ecology and natural systems rather than the short-term reliance on traditional engineering and landscape solutions.

Specifically, this VMP aims to:

- Provide an assessment of the current flora of the site (both native and weed species);
- Provide an assessment of site habitat values and restoration potential;
- Provide recommendations for the management of native and weed species on the site;
- Provide a comprehensive works methodology to enable rehabilitation activities to take place, thereby creating a sustainable environmental state that will contribute to the overall health of the site;
- Provide a framework for the maintenance of the site during and following restoration activities;
- Provide a clear procedure and format for the monitoring and reporting of project to achieve project outcomes on the site.

1.3 LEGISLATIVE FRAMEWORK

The recommended site restoration works are to be undertaken in accordance with legislature relating specifically to the protection of threatened species and endangered ecological communities, the control of declared noxious weeds. The relevant legislature is outlined below.

1.3.1 *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*

The EPBC Act is the principal federal legislation which makes provisions for the protection and conservation of Australia's environment and biodiversity.

1.3.2 *Threatened Species Conservation Act 1995 (TSC Act)*

The TSC Act is the principal NSW state legislation which, 'outlines the protection of threatened species, communities and critical habitat in New South Wales' and has been established to, 'determine which species, populations and ecological communities should be listed as endangered, vulnerable or extinct under the Act, and also to determine key threatening process' DECC (2008).

1.3.3 *Noxious Weeds Act 1993 (NW Act)*

The NW Act makes provisions for the identification, control and management of significant weeds (Southern Councils Group, 2008). Five control classes are specified (see section 2.5). Contractors must identify and control noxious weeds as specified in the NW Act.

1.3.4 *Soil Conservation Act 1938 (SC Act)*

The SC Act makes provisions for the protection and conservation of soils, including the prevention and remediation of soil erosion. Restoration activities in the subject area must be undertaken in such a way as to minimise soil erosion and remediate existing areas of embankment degradation.

The Pesticides Act 1999

Regulates the use of pesticides in NSW. The main aim of the Act is to reduce the risks associated with pesticide use to protect human health and the environment, property and industry.

Under the Act, pesticides must be registered by the Australian Pesticides and Veterinary Medicines Authority (APVMA) before they can be manufactured, supplied, sold or used. Registered pesticides carry an APVMA-approved label that provides users with instructions that dictate best practice use to minimise any adverse impact from their use.

The Act is enforced by DECCW and offences under the Act include:

- Using pesticides in a way that causes injury or likely injury to another person, damage or likely damage to another person's property or harm to a non-target plant or animal.
- Possessing or using a pesticide not registered by the APVMA or covered by an APVMA permit.
- Using unregistered pesticides without a permit.
- Keeping a pesticide in a container that does not bear its approved label, without reasonable excuse.
- Using registered pesticides in a way that is not in accordance with the instructions on the label.

The application of pesticides (specifically herbicides) may be required during implementation of this VMP. The use of pesticides should follow the requirements of the Pesticides Act 1999. Appropriate records will be kept of any pesticide use during the project.

Riparian Corridor Management Study 2004

In 2004, the Department of Infrastructure, Planning and Natural Resources (DIPNR) undertook a comprehensive study on all the watercourses in the Wollongong Local Government Area (LGA) and part of the Shellharbour LGA. The study identified the need to create riparian buffers along creeks to protect the ecological values of the watercourse. The Riparian Corridor Management Study (RCMS) (DIPNR, 2004) classified the creek systems in the order of their environmental significance and identified appropriate corridors along most creeks.

The proposed development will interact with a tributary Gibson's Creek, which passes through the site. This section of waterway is classified as a Category 2 Riparian and aquatic habitat.

1.4 DEFINITIONS

For the purposes of this report:

Council: Wollongong City Council;

Ecological Restoration: the practice of repairing or reinstating the structure and function of a site's plant community, with the level of intervention determined by the site's resilience. Where the resilience is high, regeneration procedures are required, where the resilience is depleted, a reconstruction approach may be required;

Introduced Species: includes both deliberate plantings of 'native' and 'non-native' as well as self-sown species. A 'native' can be introduced to the site if it does not naturally occur in the surrounding natural landscape;

Local Provenance: plants propagated from collections from locations as close geographically and in terms of habitat as practicable to the location where the propagated plants are to be planted;

Recruitment: the supply of a species' propagules to the site. This includes seed production and fecundity; seed input and storage, either by soil-stored or canopy-stored seed banks; seed viability; seedling establishment and mortality;

Regeneration: the management of weeds on existing bushland to facilitate the natural response of indigenous plant species. It primarily involves hand weeding and chemical control;

Rehabilitation: a non-specific term encompassing revegetation and regeneration;

VMP: refer to this Vegetation Management Plan;

Subject site: also referred to as study area or subject area, and refers to the nominated bush-land management treatment area.

SECTION 2 DESCRIPTION OF ENVIRONMENT

2.1 SUBJECT AREA AND LANDSCAPE SETTING

The site is located at Lot 10 DP 878167 50 Wylie Road, Kembla Grange NSW 2526 comprising an approximate area of 20 hectares and is situated approximately 3.2km south-west of the suburban shopping centre of Unanderra, New South Wales.

The riparian corridor, which forms the basis of this VMP and herein referred to the 'subject site' consists of a surface area of 3700m^2 and encompasses a 185 lineal meter section waterway extending from the interface of zoning 4(a) and 6(b) to the southern boundary of the property.

Refer updated Landscape Plan 1442 – LC01G for graphic representation of this area.

2.2 HYDROLOGY TOPOGRAPHY, GEOLOGY, AND SOIL

The site is gently sloping from north to south; an unnamed tributary of Gibsons Creek receives surface water from the site.

The study area is mapped as being underlain by Quaternary Sediments and deeper formation of Illawarra Coal Measures (Wollongong 1:50,000 Geological Series Sheet).

The subject site is located within the Fairy Meadow (fa) soil landscape (sensu Hazelton et al. 1990), which is characterised by friable Alluvial Soils and Siliceous Sands on the upper floodplains and dark brown sands and heavier clays on lower alluvial flats.

It is noted that this soil categorisation is prone to flooding, has low wet bearing capacity and high permeability.

2.3 VEGETATION AUDIT

2.3.1 AUDIT METHODOLOGIES

The vegetation audit was undertaken on the 16th June 2014 by qualified Southern Habitat (NSW) Pty Ltd bush regenerators. The vegetation audit comprised a full floristic survey of the subject site, with all observable native and alien (i.e. weed) species identified and recorded. The audit involved a complete, comprehensive and systematic walk-through of the site. Species nomenclature followed Harden (1990-93).

The abundance of each identified species was also recorded, following a modified Braun Blanquet percentage foliage cover abundance index (Poore, 1955; Mason and French 2007; Gooden et al. 2009a, b):

(1): <5% cover and one or a few individuals;

(2): <5% cover and uncommon;

(3): <5% cover and common;

(4): <5% cover and very abundant;

(5): 5 - 20% cover;

(6): 21 – 50% cover;

(7): 51-75% cover;

(8): 76 – 100% cover.

The Braun Blanquet scale of species abundance provides an indication of the relative abundance of species at a particular site. This can subsequently be used as baseline reference data during future vegetation monitoring and reporting programs in order to gauge site responses to the recommended restoration activities contained within this VMP. That is, the Braun Blanquet scale will allow future assessments to determine whether weed control measures have been successful at reducing weed diversity and abundance, and whether ecological restoration activities have been successful at increasing the diversity and abundance of native plant species. In addition, the scale will provide a tool to determine whether any restoration or development activities are having a detrimental impact on the site's native vegetation community.

2.3.2 AUDIT RESULTS

Plant species from a total of 35 families were recorded at the site, with the vegetation assemblage comprising 28 native and 28 (Initial VMP listed 47 weeds) alien or weed species (refer Appendices A and B). NOTE – Recently installed units are not counted in the native audit.

The subject site contains low to moderate level of native species with predominant species represented by the tree species *Acacia maidenii*, *Acacia mearnsii*, *Ficus macrophylla, Glochidion ferdinandi* and throughout the mid- strata very thinly represented *Maclura cochinchinensis*, *Notelea venosa*, *Streblus brunonianus* and to a lesser extent *Pittosporum multiflorum*.

Ground strata – The subject site has been treated with herbicide and covered with mulch so only small pockets of *Pennisetum clandestinum* (Kikuyu) remain and conyinue to be treated. Natives left to spread include the aquatic herb *Persicaria decipiens* and ground cover *Commelina cyanea*.

Excluding *Lantana camara (*Lantana*) and Rubus fruiticosus* (Blackberry) no other noxious weeds were recorded on the site.

With reference to NPWS (2002) and Daly and Rudd (2005), and based on the characteristic species occurring throughout the foothills of Farmborough Heights and Kembla Grange, our determination is that the site can best be referenced to a combination of Lowland Dry-Subtropical Rainforest (LDSR) and Moist Coastal White Box Forest (MCWBF) communities, albeit it weed infested. The LDSR is a sub-formation of Illawarra Subtropical Rainforest, which is listed under the TSC Act (1995) as an Endangered Ecological Community. Note we do not propose that the site be classified as these communities.

2.4 NOXIOUS WEED CATEGORIES

2.4.1 LEGISLATIVE FRAMEWORK

The NSW Noxious Weeds Act (1993) specifies five control classes, with every declared noxious weed placed within a class (Southern Councils Group, 2007). These are as follows:

Class 1 noxious weeds are plants that pose a potentially serious threat to primary production or the environment and are not present in the State or are present only to limited extent. The Noxious Weed Act 1993 requires for a Class 1 noxious weed, 'The plant must be eradicated from the land and the land must be kept free of the plant.' The control objective for weed control Class 1 is to prevent the introduction and establishment of those plants in NSW.

Class 2 noxious weeds are plants that pose a potentially serious threat to primary production or the environment of a region but are not present in the region or are present only to limited extent. The Noxious Weed Act 1993 requires for a Class 2 noxious weed, 'The plant must be eradicated from the land and the land must be kept free of the plant.' The control objective for weed control Class 2 is to prevent the introduction and establishment of those plants in parts of NSW.

Class 3 noxious weeds are plants that pose a serious threat to primary production or the environment of an area and are not widely distributed in the area but are likely to spread in the area or to another area. The Noxious Weed Act 1993 requires for a Class 3 noxious weed, 'The weed must be fully and continuously suppressed and destroyed.' The control objective for weed control Class 3 is to reduce the area and impact of those plants in parts of NSW.

Class 4 noxious weeds are plants that pose a serious threat to primary production, the environment or human health, are widely distributed in an area and are likely to spread in the area or to another area. The Noxious Weed Act 1993 requires for a Class 4 noxious weed, 'the growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed'. The control objective for weed control Class 4 is to minimise the negative impact of those plants on the economy, community or environment of NSW.

Class 5 noxious weeds are plants that are likely, by their sale or the sale of their seeds or movement within the State or area of the State, to spread in the State or outside the State. The Noxious Weed Act 1993 requires for a Class 5 noxious weed, 'the requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with.' The control objective for weed control Class 5 is to prevent the introduction of those plants into NSW, the spread of those plants within NSW or from NSW to another jurisdiction. The aim is to prevent their sale, propagation and distribution.

* Class 1, 2 and 5 weeds are Notifiable Weeds under the Noxious Weeds Act 1993. As Notifiable Weeds, their presence must be reported to the LCA (IDNWA) within 3 days of occupiers becoming aware of any plants on the land. They also must not be sold, propagated or knowingly transported. A Permit under Section 34 of the Noxious Weeds Act 1993 is required prior to the movement or transportation of any notifiable weed material.

2.4.2 IDENTIFIED NOXIOUS WEEDS

Two noxious weeds were identified from the vegetation audit: *Lantana camara* (Class 4) and *Rubus fruiticosus* (Class 4) refer to restoration works contained within this VMP for the control and eradication of these species (see Section 3).

2.5 WEED ECOLOGY

'A plant is only a weed where it interferes with a human's use of the land for particular purposes, with their well being, or with the quality of their environment' (Auld & Medd 1987). We believe this definition should be viewed with a greater emphasis on the latter part of the above statement – that is, the influence with which weeds affect the quality of the environment. Weeds can be further categorised into 'groupings' which describe their potential to impact the environment. A weed can be classified as a:

- Noxious weed – harmful to agriculture, human health and community;
- Environmental weed – an escapee from a garden or nursery that has invaded a natural ecosystem;
- Keystone Weed – an introduced plant that poses a serious and immediate threat to the native plant community in which it occurs. A keystone (or primary target weed) can be either a noxious weed or environmental weed – either way; it

must be given priority in any weed management program.

How weeds threaten the existence of native species on the subject site forms the foundation of the restoration approach presented in this report.

2.6 LANDSCAPE DEGRADATION AND IMPACTS

In general terms, landscape degradation can mean a reduction in environmental quality and is caused by any disturbance or force that causes any changes in habitat or community structure and composition, such as a natural event or human activities. Applying this to the subject site, we can interpret landscape degradation to mean one or more of the following:

- The loss/reduction of floristic diversity (native plant species);
- The loss/reduction of fauna using the site;
- The increase in weed species diversity and distribution;
- The presence of rubbish/waste over the site.

At present, we consider the most significant factors (i.e. disturbance or force) contributing to the landscape degradation of the site to be:

- The presence of Lantana camara and Rubus fruiticosus awhich should be eradicated (ongoing works should accomplish this);
- The low, but continued presence invasive exotic grass Pennisetum clandestinum throughout the riparian corridor;
- Latency of seed bank, particularly the capacity of Anredera cordifolia, Aruajia hortorum and Acestosa sagittata to reinfest the site. once initial weed control measures have been completed.

These pose both a direct and indirect threat to the existing assemblage of native species that occur on site. Excluding the above impacts, the site exhibits low to moderate levels of disturbance (read degradation).

2.7 RESTORATION POTENTIAL

As earlier defined, ecological restoration is the practice of repairing or reinstating the structure and function of the natural plant community at a particular site, with the level of intervention determined by the site's resilience. Where the resilience is high, regeneration procedures are required. However, where the resilience is depleted, a reconstructive approach may be required to rehabilitate the site.

The key to the above term is 'resilience', or the measure of recoverability of the natural plant community. That is, if the site contains a high resilience there is a good chance that natural restoration will occur with minimal intervention. Conversely, if the site contains low resilience, greater intervention is required to deliver restoration outcomes.

The subject site contains an assemblage native species with low to moderate structural diversity (i.e. ground, shrub, vines and trees) and as such can be considered to have low to moderate level of resilience. Any restoration (revegetation) activities will be designed to complement native species recruitment in the subject site and to increase the shading out of in-stream sections of the waterway.

We consider then implementation of fully structured riparian vegetation to be necessary on this site to achieve the best environmental outcomes for this site. The occupation of *Pennisetum clandestinum* (Kikuyu) on the site, whilst an exotic species, requires a phasing out approach, which can be best achieved via increasing the level of canopy (shade) on the site. The benevolence afforded by this species whilst canopy establishes does improve filtration of sediments potential entering the riparian corridor and also suppresses the occupation of other aggressive weed species.

2.8 WORKS UNDERTAKEN SINCE ISSUE OF ORIGINAL VMP

As recorded in Daily Work Summaries –

Date	Activities
09/08/2013	Induction to site covering OHS issues and plan of Management. Cut and paint of Lantana south of bridge with mulching of resultant material. Slashing of Kikuyu, Crofton and Thistles on bank edges south of entry Bridge Cut paint and removal of Senna in same area.
12/08/2013	Brush cutting of in stream weeds and banks north of entry bridge. Cut and paint of Senna and lantana north of entry bridge on eastern bank, removal of propagules.
13/08/2013	Cut and paint of Senna and lantana north of entry bridge on western bank, removal of propagules. Slashing of Kikuyu, Crofton and Thistles south of entry Bridge.
23/08/2013	Isolation around Native plants and trees at northern extent of site.

Date	Activities
	Cut and paint of Senna and lantana northern extent of site
26/08/2013	Chemical application to all weeds remaining throughout entire site. Foliar application of Round up Biactive at 1:100.
11/09/2013	Mechanical processing of all cured weed biomass throughout site.
18/09/2013	Chemical application targeting emerging weeds Throughout entire site. Cut and paint of any reshooting woody weeds previously treated. Hand mulching of any remaining cured weeds.
05/10/2013	Installation of mulch to entirety of site.
22/04/2014	Chemical application across site targeting re – emerging exotic grasses, Lantana, Crofton weed, Mist Flower and cape ivy.
14/05/2014	Installation and staking of 550 units in southern zones. All plants inserted with Terraform and watered in.
15/05/2014	Installation and staking of 565 units north of bridge. All plants inserted with Terraform and watered in.
20/05/2014	Watering of all installed units

Date	Activities
24/05/2014	Watering of all installed units
30/05/2014	Watering of all installed units
06/06/2014	Installation and staking of 290 units into north eastern embankment. All plants inserted with Terraform and watered in.
09/06/2014	Watering of all installed units

It should be noted that maintenance activities have been carried out since the planting has occurred up until June 2015. An exclusion fence was also erected in July 2014 defining and protection the ISR remnant on the eastern embankment.

2.9 PHOTOS (JUNE 2014)

Photo 1 – South of entry bridge

Photo 2 – Northern extent of site

Photo 3 – Intact ISR remnant, Eastern embankment.

Photo 4- Eastern embankment adjacent to remnant.

SECTION 3 RESTORATION PLAN OF ACTION

3.1 SCOPE OF WORKS

Considering the current state of the site and works already completed riparian restoration of the subject site shall encompass the following scope of works:

- Protection of existing vegetation;
- Implementation of supplementary planting program to achieve fully structured riparian corridor;
- Implementation of maintenance program.

3.2 PROTECTION OF EXISTING VEGETATION

It is recommended that the erection of a standard three strand wire fence be undertaken around the extent of the ISR to indicate and protect this particular remnant. A buffer zone of 5m shall apply within this fencing. (approx. 140m^2)

(**Installed July 2014**)

3.3 MAINTENANCE

A minimum period of two (2) years is to apply to the maintenance of the subject site. The maintenance period shall commence following completion of primary weed control and revegetation throughout the corridor. Maintenance activities will focus on the prevention of secondary weed invasion, the protection and consolidation of tubestock throughout the CRZ.

Following this maintenance period and final report it should be noted that the ongoing maintenance shall continue for the operational life of the facility. This maintenance will require the compilation and submission of an annual report to relevant stakeholders and must be prepared by a suitably qualified person/organization.

The annual report must include but is not limited to –

Site conditions:

1) Weed cover percentage
2) Native cover percentage
3) Identification and determination of actions to remedy any issues pertaining to the ongoing maintenance of the riparian vegetation for the 12 months following the report.

SECTION 4 MAINTENANCE

4.1 GENERAL

A minimum period of two years is to apply to the maintenance of the subject site in order to meet Condition 6 (Office of Water) requirements for the rehabilitation of the site. The maintenance period shall commence following completion of all revegetation activities on the site. Performance of the site will be assessed on a six-monthly basis and if targets have not been met the monitoring will continue in 6-monthly blocks until such time that the performance targets are achieved. Maintenance activities will focus on the establishing native plantings throughout subject site, prevention of secondary weed invasion and erosion prevention of the site.

All maintenance works within the subject site are to be conducted by a suitably qualified contractor with experience in the identified vegetation communities, whom shall devise a schedule of maintenance based upon the performance of the site, weed presence and success of remediation. A minimum frequency of monthly visitation to the site for the purposes of maintenance is to apply for the entire two-year maintenance period.

See 3.3 for On-going maintenance requirements

4.2 WEED CONTROL

During the maintenance period, the Contractor is to control weed growth throughout the whole of the riparian corridor and prevent any weeds from setting seed or dispersing propagules. Weed control is to occur at minimum monthly intervals for the entire maintenance period. Throughout the maintenance period, it is anticipated the following weeds will require due diligence to ensure successful restoration outcomes for the site:

Acetosa sagittata, Araujia hortorum, Anredera cordifolia, Gomphocarpus fruiticosus, Lantana camara and Rubus fruiticosus.

Table 4.1 - Proposed Techniques for the Weed Control Activities in the CRZ

Botanical Name	Common Name	Control Methodology
Acer negundo	Box Elder	Cut and paint base of specimen with undiluted 'Round-Up Biactive', mechanical chip and remove green waste from site. Hand pulling of emergent seedling throughout maintenance period.
Acetosa sagittata	Turkey Rubarb	Hand remove all vegetative components prior to flower/seed cycle. All waste is to be bagged and removed from site. Where foliar spray is appropriate, a solution of 'Round-Up Biactive' at 1% dilution rate, 1 grm Metsulfuron/15Lts water, 30ml/10L of Synetrol surfactant and indicator dye to product label.
Agapanthus africanus	African Lily	Apply foliar spray 'Round-up' at product label dilution rate, 30ml/10L of Synetrol surfactant and indicator dye to product label; vegetative material to be cut-up and retained on site as mulch. Brush cut dead biomass to retain as mulch on site. Reapply to emergent regrowth.
Ageratina adenophora	Crofton	Cut and paint base of specimen with undiluted 'Round-Up Biactive', removal of reproductive material from site. Herbicide rosette emergence with undiluted herbicide spray.
Ageratina riparia	Mistflower	Apply foliar spray 'Round-up' at product label dilution rate, 30ml/10L of Synetrol surfactant and indicator dye to product label; vegetative material to be cut-up and retained on site as mulch. Brush cut dead biomass to retain as mulch on site. Reapply to emergent regrowth.
Anredera cordifolia	Madeira Vine	Skirting of target if found to be ascending canopy. Remove underground tubers from

Botanical Name	Common Name	Control Methodology
		site.Application of foliar herbicide 'Starane Advanced' to emergent target.
Araujia hortorum	Moth Vine	Hand removal of all components of target weed. All waste is to be bagged and removed from site. Cut and paint stems adjacent to stream if hand pulling is likely to cause soil disturbance.
Asparagus aethiopicus	Asparagus Fern	Hand crown and remove all components of target. Bag and remove from site.
Bidens pilosa	Bidens	Hand removal of all components of target weed. All waste is to be bagged and removed from site.
Camelia japonica	Camelia	Check to see if these can be transplanted and given to a garden owner. If not cut and paint with undiluted Round-up.
Canna indica	Canna Lily	Cut and paint base of specimen with undiluted 'Round-Up Biactive', removal of reproductive material from site. Herbicide rosette emergence with undiluted herbicide spray.
Celtis sinensis	Celtis	Cut and paint base of specimen with undiluted 'Round-up biactive' removal of all vegetative material from site.
Conyza bonariensis	Fleabane	Cut and paint base of specimen with undiluted 'Round-Up Biactive', removal of reproductive material from site. Herbicide rosette emergence with undiluted herbicide spray. If hand pulling results in soil disturbance, cut and paint with undiluted biactive round-up.
Delairea odorata	Cape Ivy	Hand tracing of all components of target weed, bag and remove from site. Where foliar spray is appropriate, a solution of 'Round-Up Biactive' at 1% dilution rate, 1 grm Metsulfuron/15Lts water, 30ml/10L of Synetrol surfactant and indicator dye to product label.

Botanical Name	Common Name	Control Methodology
Foeniculum vulgare	Fennel	Cut and paint base of specimen with undiluted 'Round-Up Biactive', removal of reproductive material from site. Throughout maintenance period, hand pull emergent seedlings prior to reaching seed set maturation.
Gomphocarpus fruiticosus	Cotton Bush	Cut and paint base of specimen with undiluted 'Round-Up Biactive', removal of reproductive material from site. Throughout maintenance period, hand pull emergent seedlings prior to reaching seed set maturation.
Lantana camara	Lantana	Cut and paint base of specimen with undiluted 'Round-Up Biactive', removal of reproductive material from site. Brush mulch remainder, reducing material to a fine ground mulch.
Ligustrum lucidum	Large-leaf Privet	Cut and paint base of specimen with undiluted 'Round-Up Biactive', mechanical chip and remove green waste from site. Hand pulling of emergent seedling throughout maintenance period.
Morus nigra	Black Mulberry	Cut and paint base of specimen with undiluted 'Round-Up Biactive', mechanical chip and remove green waste from site. Hand pulling of emergent seedling throughout maintenance period.
Nerium oleander	Oleander	Cut and paint base of specimen with undiluted 'Round-Up Biactive', mechanical chip and remove green waste from site. Hand pulling of emergent seedling throughout maintenance period.
Ochna serrulata	Mickey Mouse	Stem scrape target with undiluted 'Round-up biactive' allow target to die in-situ.
Olea europea var africanus	African Olive	Cut and paint base of specimen with undiluted 'Round-Up Biactive', mechanical chip and remove green waste from site. Hand pulling of emergent seedling throughout maintenance period.
Onopordium acanthium	Scotch Thistle	Remove seed head (bag) and apply foliar spray 'Round-Up Biactive' at 0.9% dilution rate, 30ml/10L of Synetrol surfactant and indicator dye to product label; vegetative material

Botanical Name	Common Name	Control Methodology
		to be cut-up and retained on site as mulch. Brush cut dead biomass to retain as mulch on site.
Opuntia vulgaris	Prickly Pear	Cut and paint base of specimen with undiluted 'Round-Up Biactive', removal of all material from site.
Passiflora subpeltata	Passionfruit	Cut and paint base of specimen with undiluted 'Round-Up Biactive', removal of reproductive material from site.
Pennisetum clandestinum	Kikuyu	Isolation of target from occupant native species. Where potential competition arises from establishing native tree and shrub species, apply a selective monocot herbicide (Select) to reduce pressure.
Phoenix canariensis	Date Palm	Strip off fronds and inject base with undiluted 'Round-up biactive'
Phytolacca octandra	Inkweed	Cut and paint base of specimen with undiluted 'Round-Up Biactive', removal of reproductive material from site.
Plantago lanceolata	Lambs Tongue	Remove seed head (bag) and apply foliar spray 'Round-Up Biactive' at 0.9% dilution rate, 30ml/10L of Synetrol surfactant and indicator dye to product label; vegetative material to be cut-up and retained on site as mulch. Brush cut dead biomass to retain as mulch on site.
Prunus sp	Peach	Cut and paint base of specimen with undiluted 'Round-Up Biactive', mechanical chip and remove green waste from site.
Ricinus communis	Castor Oil Plant	Cut and paint base of specimen with undiluted 'Round-Up Biactive', mechanical chip and remove green waste from site. Hand pulling of emergent seedling throughout maintenance period.
Rubus fruiticosus	Blackberry	Apply foliar herbicide spray (garlon 600). Ensure this work is completed within the period October 15th to April 15th, as any application of herbicide outside of this time will not

Botanical Name	Common Name	Control Methodology
		succeed.
Sida rhombifolia	Paddy's Lucerne	Cut and paint base of specimen with undiluted 'Round-Up Biactive', removal of reproductive material from site, brush mulch remainder of material on site.
Senecio madagascariensis	Fireweed	Hand removal of all parts of target. Bag and remove from site.
Senna pendula var glabrata	Cassia	Cut and paint base of specimen with undiluted 'Round-Up Biactive', removal of reproductive material from site, brush mulch remainder of material on site.
Sida rhombifolia	Paddy's Lucerne	Cut and paint base of specimen with undiluted 'Round-Up Biactive', removal of reproductive material from site, brush mulch remainder of material on site
Solanum mauritanium	Tobacco	Cut and paint base of specimen with undiluted 'Round-Up Biactive', removal of reproductive material from site, brush mulch remainder of material on site.
Sonchus oleraceus	Scotch Thistle	Cut and paint base of specimen with undiluted 'Round-Up Biactive', removal of reproductive material from site, brush mulch remainder of material on site.
Tradescantia fluminensis	Wandering Jew	Hand rake target, bag and remove from site. Apply Starane-Advanced at product label rates to emergent re-growth.
Verbena bonariensis	Purple-top	Cut and paint base of specimen with undiluted 'Round-Up Biactive', removal of reproductive material from site, brush mulch remainder of material on site.
Vicia sativa ssp augustifolia	Vetch	Hand removal of all parts of target. Bag and remove from site.
Verbena bonariensis	Purple Top	Cut and paint base of specimen with undiluted 'Round-Up Biactive', removal of reproductive material from site.
Washingtonia robusta	Washington Palm	Cut and paint base of specimen with undiluted 'Round-Up Biactive', removal of reproductive material from site.

4.3 WATERING

All plants installed as revegetation tubestock throughout the subject site shall be regularly watered to maintain a healthy growth rate. The Contractor is to be aware of the natural rainfall of the site and adjust the watering program accordingly.

4.4 PEST AND DISEASE CONTROL

During the contract period, pests and disease are to be controlled via natural means (i.e. the use of organic sprays, manual removal and disposal of pests). No chemicals, other than glyphosate- based herbicides, are to be applied within the subject site.

4.5 EROSION CONTROL

The Contractor is to remediate any erosion or soil disturbance that may occur during the maintenance period. Erosion and sediment control devices are to be inspected, maintained and reinstated if there is a likelihood of sediments on the embankments becoming mobile and entering the waterway. Sediment and erosion control shall be undertaken in accordance with industry best practice and in accordance with the approved Soil and Water Management Plan.

4.6 FIRE MANAGEMENT

No works proposed as part of the revegetation are likely to cause a bushfire. Nor will the vegetation added to the site increase the risk of fire to adjoining properties. Burning off within any riparian or roadside vegetation corridors is not permitted during revegetation works or the maintenance period.

4.7 RUBBISH REMOVAL

During the maintenance period, the subject site is to be kept free of all rubbish.

4.8 PLANT REPLACEMENT

During the maintenance period, the Contractor is to monitor the success of establishing revegetation tubestock. In the event of plant species failure, the Contractor is to supply and install replacement planting consistent with the prescribed planting recommendations contained within this VMP. Provision is to be made at the time of collection and propagation of native seed stock to ensure adequate replacement plant material will be available and is consistent with the genetic integrity of the local provenance of the site.

SECTION 5 MONITORING AND REPORTING PROGRAM

5.1 MONITORING

A monitoring program will provide an objective measurement of any changes to the site at a species, population and community level. Monitoring should provide both qualitative (visual) and quantitative (statistical) assessment of the site. Qualitative assessments can be in the form of photographs taken from permanent photo points, whilst quantitative assessments can be measured against the original description of the environment outlined in Section 2 of this report (i.e. comparing Braun Blanquet indices between monitoring events to see if the abundance of weed and native species has changed). Results should be regularly assessed and presented in report format (refer to Section 5.2).

Performance indicators have been established for this project to ensure that the recommended program of works and strategies are achieved. Both quantitative and qualitative assessment of the floristic value of the site should be assessed at the recommended intervals. In general, performance indicators for the subject are described in Table 5.1 below.

Table5.1 - Performance Criteria

	Performance Indicator	**How Measured**
Weed Control throughout CRZ	95% eradication of all identified keystone weeds in subject area	Using the weed species audit in this Report as baseline data, undertake a similar audit at the 1 month after completion of weed control throughout subject area to ensure Performance Indicator is met.
Successful installation of all revegetation tubestock.	Recommended plant material installed at prescribed densities and	Review of daily planting summaries.
	composition.	Random plot sampling (minimum of 6 samples, consisting of 10 metres x 10 metres).

Successful establishment of revegetation material	95% survivorship across whole of site.	6-monthly inspections to determine percentage loss. Random plot sampling (minimum of 6 samples, consisting of 10 m x 10 m).
Continued reduction and control of weeds throughout subject site.	Continual reduction and control of all weed species within CRZ to a maximum of 3% of weed cover.	Using the weed species audit in this Report as baseline data, undertake a similar weed species audit at the 12 month interval to ensure that the number of weed species has reduced to a maximum of 3% of weed cover.

5.2 REPORTING

A series of reports will be prepared during the recommended reporting period, with the aim to provide an objective assessment of the performance of the site against the Performance Criteria outlined in Table 5.1. As well as this quantitative comparison, the interim reports will also provide a review of the protection, enhancement and rehabilitation measures being undertaken as outlined in this VMP.

A report shall be prepared by the consultant every six (6) months during the recommended maintenance period. (see section 3.13 regarding reporting after this period) The reporting period shall be for the duration of the two-year maintenance period that commences at the completion of revegetation on the subject site and any subsequent monitoring period that may be required. Once completed, reports shall be submitted to the client and Office of Water.

Contents of the six monthly interim reports shall include but not be limited to:

- Performance criteria assessment;
- Photo Diary;
- Maintenance summary for the period;
- Recommendations for forthcoming maintenance period to address any short fall in performance criteria.

A suggested pro-forma for these interim reports is provided in Appendix D.

SECTION 6 PROJECT COSTS

6.1 PROJECT COSTS

Table 6.1 Estimate of costs associated with implementation of the recommendations contained within this report.

Restoration Activity	Description	Cost
Site Preparation	Project Safety Plan (PSP), including Safe Work Method Statements, Risk Assessment and Hazard Identification, Emergency Evacuation Plan and Materials Handling Plan. Seed Collection.	$420.00
Protection of Existing Vegetation	Identification of significant species within CRZ. Identification and fencing off of ISR (EEC)	$1,920.00
Primary Weed Control	Completion of primary weeding throughout CRZ employing use of hand held and mechanical-trittering of weed biomass throughout site.	$8,800.00
Mulching of CRZ interface	Supply and installation of mulch to eastern and western interface of CRZ.	$1,140.00
Plant Material Supply	The supply of all plant material nominated for installation within CRZ.	$5,790.00
Install Plant Material	Installation of all plant material listed within VMP.	$5,740.00
Maintenance of Site	24-months maintenance of Riparian Corridor.	$18,000.00
Monitoring and Reporting	6-monthly audits and inspections, preparation of reports, submission to relevant authorities.	$2,400.00
	Sub-total (ex GST)	**$44,210.00**

Table 6.1.1 - Estimate of Costs associated with the ongoing maintenance of the riparian for the operational life of the facility.

Restoration Activity	Description	Cost
Annual maintenance of Riparian Zone	Weed control throughout the Riparian zone	$7,500.00

6.2 BANK GUARANTEE STRUCTURE

We suggest the following structure regarding security for this project.

BANK GUARANTEE 1		
Restoration Activity	**Description**	**Cost**
Site Preparation	Project Safety Plan (PSP), including Safe Work Method Statements, Risk Assessment and Hazard Identification, Emergency Evacuation Plan and Materials Handling Plan. Seed Collection.	$420.00
Protection of Existing Vegetation	Identification of significant species within CRZ. Identification and fencing off of ISR (EEC)	$1,920.00
Primary Weed Control	Completion of primary weeding throughout CRZ employing use of hand held and mechanical-trittering of weed biomass throughout site.	$8,800.00
Mulching of CRZ interface	Supply and installation of mulch to eastern and western interface of CRZ.	$1,140.00
Plant Material Supply	The supply of all plant material nominated for installation within CRZ.	$5,790.00
Install Plant Material	Installation of all plant material listed within VMP.	$5,740.00
Bank Guarantee 1 To be released upon completion of all restoration activities listed above.		**$23,810.00**

BANK GUARANTEE 2		
Restoration Activity	**Description**	**Cost**
Maintenance	Provision of the necessary labour and resource to ensure restoration outcomes are achieved throughout the subject site. Costs have been calculated for the provision of 24-months maintenance commencing at completion of all recommended plantings through the site.	$18,000.00
Monitoring and Reporting	Undertake 6-monthly interval monitoring and assessment of the site; Preparatino and lodgement of reports.	$2,400.00
Bank Guarantee 2 To be released upon completion of all restoration activities listed above.		**$20,400.00**

SECTION 7 CONCLUSION

7.1 CONCLUSION

This VMP provides the guiding documentation for the site's rehabilitation in accordance with the legislative framework and guidelines from Office of Water. The VMP will provide the agreed basis for the restoration of the subject site.

The provision of a prescriptive Performance Criteria will allow the objective evaluation of the site's performance over the two year maintenance period and effective determination of whether successful environmental restoration has been achieved on the site.

If adopted, the recommendations made in within this report will dramatically improve the health of vegetation along this remnant of bushland and contribute to the positive contribution of the operators of the industrial facility on the site.

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APPENDIX A. NATIVE PLANT AUDIT

(Undertaken on 6th June 2014)

Family Name	Botanical Name	Common Name	Cover
MIMOSACEAE	*Acacia maidenii*	Maiden's Wattle	3
MIMOSACEAE	*Acacia mearnsii*	Black Wattle	5
ARECACEAE	*Archontophoenix cunninghamiana*	Banglow Palm	1
CYPERACEAE	*Carex longebrachiata*	Bergalia Tussock	1
COMMELINACEAE	*Commelina cyanea*	-	2
CYATHEACEAE	*Cyathea australis*	Rough Tree Fern	1
CYATHEACEAE	*Cyathea cooperi*		1
CONVOLVULACEAE	*Dichondra repens*	Kidney-weed	2
MORACEAE	*Ficus coronata*	Sand Paper Fig	3
MORACEAE	*Ficus macrophylla*	Moreton Bay Fig	3
GERANIACEAE	*Geranium homeanum*	Northern Cranesbill	1
EUPHORBIACEAE	*Glochidion ferdinandi*	Cheese tree	3
SAPINDACEAE	*Guoia semiglauca*	Guoia	2
MALVACEAE	*Hibiscus hetrophyllus*	Native Rosella	1
FABACEAE	*Kennedia rubicunda*	Dusky Coral-pea	2
MORACEAE	*Maclura cochinchinensis*	Cockspur Thorn	2
MELIACEAE	*Melia azedarach*	White Cedar	3
OLEACEAE	*Notelaea venosa*	Mock Olive	1
POACEAE	*Oplismenus imbecillis*	Basket Grass(1)	1
BIGNONIACEAE	*Pandorea pandorana*	Wonga-Wonga Vine	1
POLYGONACEAE	*Persicaria decipiens*	Spotted Knotweed	4
PITTOSPORACEAE	*Pittosporum undulatum*	Sweet Pittosporum	3
PITTOSPORACEAE	*Pittosporum multiflorum*	Orange Thorn	1
ROSACEAE	*Rubus parvifolius*	Native Raspberry	1
MORACAEAE	*Streblus brunonianus*	Whalebone Tree	3

ULMACEAE	*Trema tomentosa*	Native Peach	1
TYPHACEAE	*Typha orientalis*	Cumbungee (Bull Rush)	3
URTICACEAE	*Urtica incisa*	Stinging Nettle	3
		Total Native Species Recorded	**28**

APPENDIX B. WEED SPECIES AUDIT (Undertaken on 16th June 2014)

Family Name	Botanical Name	Common Name	Cover (%)
ACERACEAE	*Acer negundo*	Box Elder	0
POLYGONACEAE	*Acetosa sagittata*	Turkey Rhubarb	0
ALLIACEAE	Agapanthus africanus	African Lily	0
ASTERACEAE	*Ageratina adenophora*	Crofton Weed	1
ASTERACEAE	*Ageratina riparia*	Mistflower	1
BASELLACEAE	*Anredera cordifolia*	Madeira Vine	1
ASCLEPIADACEAE	*Araujia hortorum*	Moth Vine	1
PALMAE	*Sygarus romanzoffiana*	Cocos Palm	0
ASTERACEAE	*Bidens pilosa*	Cobblers Peg	1
CANNACEAE	*Canna indica*	Canna Lily	1
ULMACEAE	*Celtis sinensis*	Celtis	0
ASTERACEAE	*Conzya bonariensis*	Fleabane	1
ASTERACEAE	*Delairea odorata*	Cape Ivy	1
APIACEAE	*Foeniculum vulgare*	Fennel	1
ASCLEPIADACEAE	*Gomphocarpus fruiticosus*	Cotton Bush	1
VERBENACEAE	*Lantana camara*	Lantana	1
OLEACEAE	*Ligustrum lucidum*	Large-leaf Privet	0

MORACEAE	*Morus nigra*	Black Mulberry	0
APOCYNACEAE	*Nerium oleander*	Oleander	0
OCHNACEAE	*Ochna serrulata*	Mickey Mouse	1
OLEACEAE	*Olea europaea subsp. africana*	African Olive	0
ASTERACEAE	*Onopordum acanthium*	Scotch Thistle	1
CACTACEAE	*Opuntia vulgaris*	Prickly pears	0
PASSIFLORACEAE	*Passiflora subpeltata*	White Passion Fruit	1
POACEAE	*Pennisetum clandestinum*	Kikuyu	2
PALMAE	*Phoenix canariensis*	Canary Island Date Palm	1
PHYTOLACCACEAE	*Phytolacca octandra*	Inkweed	1
PLANTAGINACEAE	*Plantago lanceolata*	Lambs Tongue	0
ASPARAGACEAE	*Protasparagus aethiopicus*	Asparagus Fern	1
ROSACEAE	*Prunus sp.*	-	0
EUPHORBIACEAE	*Ricinus communis*	Castor Oil plant	2
ROSACEAE	*Rubus fruticosus (agg. spp.)*	Blackberry	1
ASTERACEAE	*Senecio madagascariensis*	Fireweed	1
CAESALPINIACEAE	*Senna floribunda*	Smooth Cassia	0
MALVACEAE	*Sida rhombifolia*	Paddy's Lucerne	1
SOLANACEAE	*Solanum mauritianum*	Wild Tobacco Tree	1
SOLANACEAE	*Solanum pseudocapsicum*	Madeira Winter Cherry	1
ASTERACEAE	*Sonchus oleraceus*	Common Sowthistle	1
COMMELINACEAE	*Tradescantia fluminensis*	Wandering Jew	1
VERBENACEAE	*Verbena bonariensis*	Purple Top	1
FABACEAE	*Vicia sativa ssp. Angustifolia*	Common Vetch	1
THEACEAE	*Camelia sasanqua*	-	0
THEACEAE	*Camelia japonica*	-	0
ARECACEAE	*Washingtonia robusta*	Washington Palm	0
EUPHORBIACEAE	*Sapium sebiferum*	Chinese Tallow	0

PASSIFLORACEAE	*Passiflora tripartita var mollissima*	Banana Passionfruit	0
ASPARAGACEAE	*Yucca filamentosa*	-	0
		Total Weed Species Recorded	**28**

APPENDIX C – PRO-FORMA INTERIM REPORT

Interim Works Summary

Period: xxxxxxx to xxxxxxx

Site Name: xxxxxxxxx

Location: xxxxxxxxxx

REPORT DATE: xxxxxx

PREPARED BY: xxxxxx

REPORT PREPARED FOR: xxxx

1. Introduction

The Vegetation Management Plan (VMP) provides a brief set of performance criteria that must be addressed by the current restoration works and subsequent interim reports. These performance criteria represent both qualitative and quantitative measures to ensure the protection, enhancement and rehabilitation of site vegetation:

- *List specific Performance Criteria as outlined in Section 5 of VMP*

This interim restoration works summary will specifically address these performance criteria as detailed in the VMP.

3. Summary of Restoration Works

- *Detailed summary of works conducted within reporting period, as outlined in Section 3 of VMP*
- *Table of any vegetation units installed (refer Appendix)*

4. Summary of Allocated Hours

Month	Hours	Activity
Total		

5. Photo Diary

The following photographs represent qualitative before-and-after analyses of changing vegetation conditions as a result of restoration works conducted by Southern Habitat (NSW) Pty Ltd between xxxxx and xxxxx 20xx.

6. Future Restoration Actions

- *Framework for next 6-month works period, including any actions to address shortfalls identified inf this report*
- *Refer Appendix*

APPENDIX: Summary of Installed Vegetation Units and 6-monthly audit

Details of 4 sample plots (10m x 10m) throughout subject site
Note that abundances of species are provided for both the initial and 6-monthly audits. Species highlighted in bold are those exhibiting changes in occurrence or abundance at the completion of 6 months restoration.

6 monthly audit *Sample Plot Results*

Site:
Project:
Sample Plot No.:
Audit Undertaken by:
Date:

Botanical Name	Common Name	Installed No.	Audited No.	No. Loss	% loss

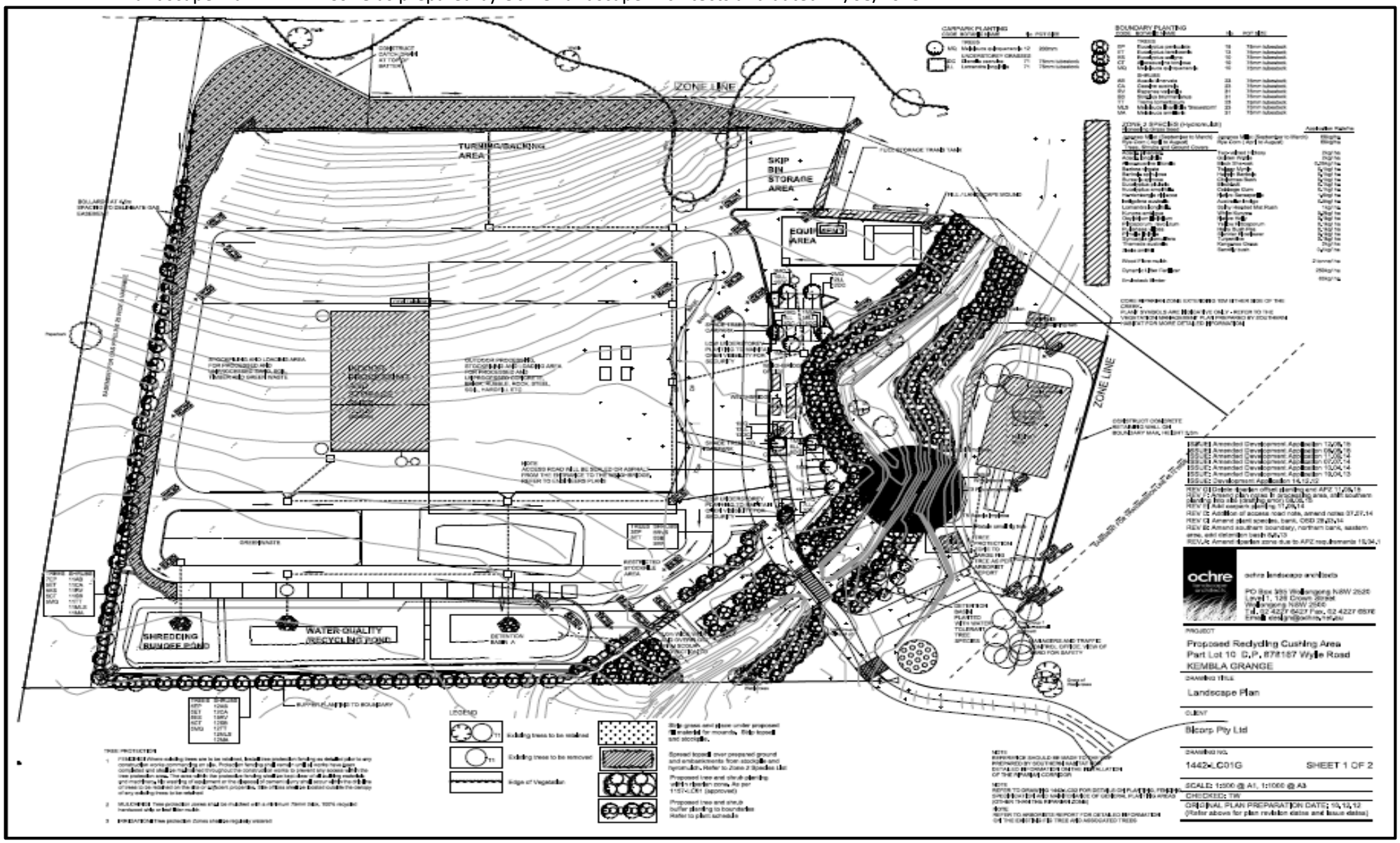
6 monthly audit

Summary of Sample Plot Results

Site:
Project:
Audit Undertaken by:
Date:

Botanical Name	Common Name	Installed No.	Audited No.	Total No. Loss	% loss	No. recommended for infill planting

APPENDIX D – Landscape Plan 1442 – LC01G as prepared by Ochre Landscape Architects and dated 12/08/2015



APPENDIX E. AERIAL VIEW OF SITE INDICATING VMP AREA

Area covered by the VMP outlined in blue – included is the Illawarra Subtropical Rainforest (EEC) shown in red.

APPENDIX F: Recommended Species to achieve fully structured riparian composition

Species type	Species	Common Name	QTY	Contribution within Species Type (%)
Ground Covers				
	Carex longebrachiata	Bergalia Tussock	1150	27.1%
	Commelina cyanea	-	800	18.8%
	Dichondra repens	Kidney Weed	800	18.8%
	Oplismenus imbecillis	Basket Grass	1150	27.1%
	Pseuderanthum variabile	Pastel Flower	350	8.2%
		Sub-total	**4250**	100%
Vine and Climbers				
	Aphanopetalum resinosum	Gum Vine	150	20%
	Cayratia clematidea	Slender Grape	150	20%
	Maclura chochinchinensis	Cockspur Thorn	150	20%
	Pandorea pandorana	Wonga Vine	150	20%
	Smilax australis	-	150	20%
		Sub-total	**750**	100%
Shrubs/Mid Canopy				
	Abutilon oxycarpum	Lantern Bush	80	11.27%
	Breynia oblongifolia	Coffee Bush	60	8.45%
	Cassine australis	Red Fruited Olive	40	5.63%
	Livistona australis	Cabbage Palm	100	14.08%
	Pittosporum multiflorum	Orange Thorn	40	5.63%
	Rapanea variabilis	Muttonwood	60	8.45%
	Rubus parvifolius	Native Raspberry	120	16.90%
	Streblus brunonianus	Whalebone	90	12.68%
	Synoum glandulosum	Rosewood	60	8.45%
	Trema tomentosa	Native Peach	60	8.45%
		Sub-total	**710**	100.00%
Canopy Tree				
	Acacia maidenii	Maiden's Wattle	60	8.63%
	Alectryon subcinereus	Native Quince	60	8.63%
	Alphitonia excelsa	Red Ash	60	8.63%
	Doryphora sassafras	Sassafras	50	7.19%
	Eucalyptus quadrangulata	White Box	120	17.27%
	Ficus coronata	Sand paper Fig	40	5.76%
	Ficus macropylla	Moreton Bay Fig	5	0.72%
	Glochidion ferdinandi	Cheese Tree	40	5.76%
	Guoia semiglauca	Guioa	35	5.04%
	Planchonella australis	Black Apple	60	8.63%
	Syzygium smithii	Lillypilly	75	10.79%
	Toona ciliata	Red Cedar	90	12.95%
		Sub-total	**695**	100.00%