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industrial area vegetation management plan

Industrial Warehouse Facility
Governor Macquarie Drive
Warwick Farm

March 2015
(REF: A15009V)

Industrial Area
Vegetation Management Plan

Governor Macquarie Drive
Warwick Farm, NSW
March 2015

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Date:	26th March 2015
File:	A15009V

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Acknowledgement:
We thank the project team for timely assistance in resolving critical issues and specifically acknowledge the assistance of Paul Hume of SMEC Urban.

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Introduction 1

This Vegetation Management Plan (VMP) has been prepared to manage the existing fauna habitat and to integrate the proposed industrial development with the management of the Coopers Paddock foreshore reserve.

Coopers Paddock is located in to the immediate south of Warwick farm Racecourse, Warwick Farm, located off Governor Macquarie Drive within the Liverpool local government area (LGA).

Coopers Paddock Foreshore Reserve is managed by the Australian Turf Club, in accordance with the approved vegetation management plan. Restoration works within the foreshore reserve is being undertaken by the Australian Turf Club and this vegetation management plan is not to be confused with the vegetation management plan for the Foreshore reserve lands (refer Figure 2).

Figure 1 – Coopers Paddock, Warwick Farm
(Source: Google EarthPro, accessed 100910)

1.1 Background information and development proposal

Stockland are the current owners of the proposed industrial development located within the north-western portion of Coopers Paddock which was purchased from the Australian Turf Club (ATC). As part of the rezoning of Coopers Paddock, ATC are obligated to complete

restoration works within the foreshore reserve as stated within the Voluntary Conservation Agreement (figure 2).

Coopers Paddock encompasses 30.97 ha to the south of Warwick Farm Racecourse, within Lot 1 DP 581034. The Foreshore Reserve to be protected and rehabilitated by ATC is located on the southern and eastern portions of Lot 1 DP 581034 which includes remnant native vegetation and cleared lands. For clarity, this report does not relate to the VMP and works required by the Australian Turf Club in the Voluntary Planning Agreement (VPA) but rather solely for the qualities of the Industrial Land known as Lot 42 in proposed Plan of Subdivision of Lot 4 DP 1172051 being **11.49 ha** in size.

Figure 2 – Foreshore Reserve

The proposed development works include a warehouse development and associated car parking and relevant infrastructure.

The layout of the development (Figure 3) allows for landscaping areas to occur around the peripheral parts of the site which are shaded green. A 15m landscaping buffer has been applied off Governor Macquarie Drive.

However to avoid creating a further bushfire threat to the proposed facility, native grasses and groundcover species (80% by cover) and shrubs (maximum 20% by cover) are recommended within remnants portions of the site to provide a buffer between the proposed facility and the foreshore reserve. This approach is consistent with maximum planting densities permissible within asset protection zones.

A specific list of native plant species that typically occur within River-flat Eucalypt Forest & Cumberland Plain has been provided in Appendix 1. Native grasses, groundcover and shrub

species are to be selected from this species list for landscaping purposes on the interface with the Foreshore Reserve.

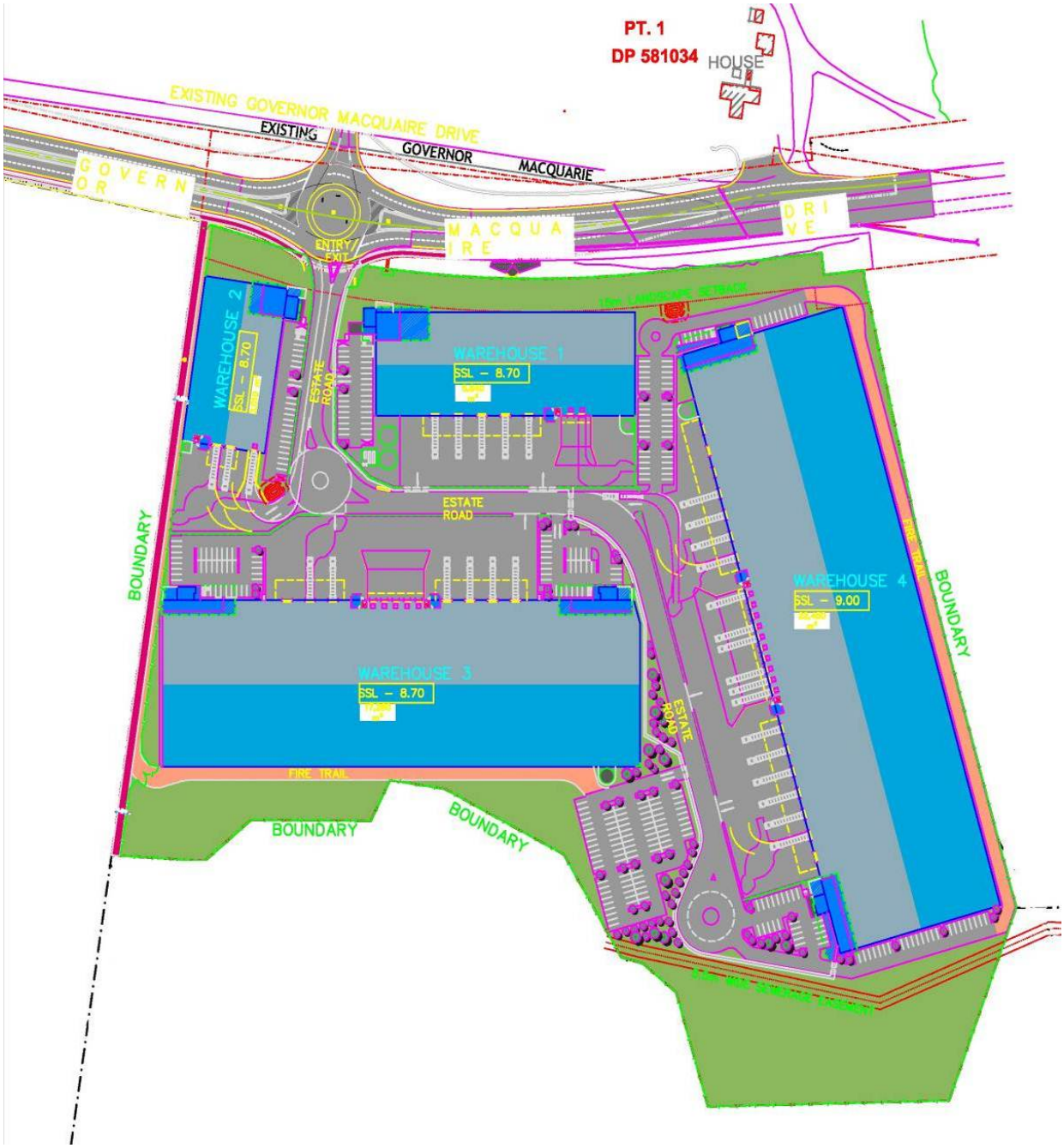


Figure 3 – Proposed development layout (preliminary only)

1.1.1 Voluntary Planning Agreement (VPA)

A VPA has been developed for the rezoning to assist in the dedication of lands for conservation and subsequent protection of EECs, fauna and their habitat attributes. The VPA works will be undertaken by the Australian Turf Club (ATC).

The VPA requires the completion of the following works as follows:

1. Offset works – ATC to carry out offset works within the designated land in accordance with the 'Ecological Constraints Report Proposed Rezoning Lot 1 DP 581034 Coopers Paddock, Governor Macquarie Drive, Warwick Farm (TBE 2011) and accepted by the NSW office of Environment and Heritage and in the Vegetation Management Plan to be approved by the Council, prior to the first to occur of (i) issue of a subdivision certificate and (ii) the issue of the occupation certificate (estimated at October 2015).
2. Management of the designated land (foreshore reserve) – ATC to carry out the program of works as specified in the vegetation management plan to be completed within 3 years from the dedication of the designated land to Council.

1.1.2 Offset works

For the purposes of defining the completion of works under the VPA, 'offset works' include:

- Establishment of the Foreshore Reserve through the installation of a permanent protective fence (by Australian Turf Club)
- Installation of the cycleway (by Australian Turf Club)
- Completion of any tree hollow inspection, supervision, hollow and fauna relocation works within the approved industrial subdivision area (by developer within industrial lands)
- Relocation of any biotic resources such as mulch and logs into the Foreshore Reserve for later use (by developer within industrial lands), and
- Supply and installation of nest boxes within the Foreshore Reserve (by Australian Turf Club)

Offset works are to be implemented by the Australian Turf Club under the direction of the appointed Project Ecologist. Offset works effectively enable the Foreshore Reserve to be established and the industrial area to be released for development.

1.1.3 Management of the foreshore reserve

Management of the foreshore reserve includes all habitat enhancements, weed control revegetation, regeneration and maintenance works in accordance with the approved Vegetation Management Plan within the foreshore reserve area. Management of the foreshore reserve is the responsibility of the Australian Turf Club. They form the key works required to enable the land to be handed over to Liverpool City Council is a condition to allow ongoing maintenance and public access.

Access to the foreshore reserve must be provided to enable the restoration works to be implemented. Access will need to be provided temporarily through the industrial lands for the purposes of rehabilitation at one or two points from the proposed industrial facility. Once the cycleway is installed all access to the foreshore reserve will be via the cycleway.

Works within the foreshore reserve which are the sole responsibility of the ATC, include:

- extensive vine and lantana weed control over 4 years,
- extensive revegetation works over 4 years, and

- 3 years of restoration maintenance and bush regeneration.

1.2 Objectives of the VMP

The purpose of this VMP is to define and document the actions required to be implemented to undertake best practice management for the protection and relocation of fauna and hollow-bearing resources and management of industrial land adjoining the Foreshore Reserve.

The following objectives also apply:

- To manage the interface between the industrial facility and Foreshore Reserve to minimise risk of weed invasions, waste disposal, stormwater impacts, noise and light impacts, sedimentation and erosion.
- To mitigate the impacts of tree removal within the industrial lands on hollow dependent fauna species.
- To avoid disruption to the breeding of rare and threatened native fauna.

1.3 Information collation

To achieve the above aims, *Travers bushfire & ecology* carried out a review of the following reports relating to environmental and ecological issues raised by the previous environmental assessments. Information sources reviewed include the following:

- Ecological Constraints Report (*Travers bushfire & ecology* 2011)
- Bushfire Protection Assessment (*Travers bushfire & ecology* 2010)
- Ecological and Riparian Issues Report (*Wheelans Insites* 2007)
- Habitat Offsets Analysis (*Wheelans Insites* 2009)
- Vegetation Management Plan – Foreshore Reserve, Coopers Paddock, Warwick Farm (*Travers bushfire & ecology* 2015)

The VMP has integrated the recommendations of the above reports and provides the vegetation and fauna management framework for ecological protection and enhancement for the likely impacts of the proposal.

Management Context 2

The following sections provide a brief description of proposed Coopers Paddock, its natural habitat features and its current condition. A detailed description of the existing vegetation and fauna habitats is provided within Ecological Constraints Report (*Travers bushfire & ecology* 2011).

2.1 Site description

The planning and cadastral details of the site are provided in Table 1 which summarise the geographical characteristics of the site.

Table 1 - Site details

Location	Lot 42 in proposed plan of subdivision of Lot 4 in DP 1172051 – Governor Macquarie Drive, Warwick Farm
Description of Location	Situated on the southern side of Governor Macquarie Drive with borders to the Georges River (east and south) and a Sewage Treatment Plan (west). Approximately 3km to the north-east of Liverpool and part of the Warwick Farm Racecourse (horses)
Area	11.49 ha
Topographic map	Liverpool 1:25,000
Local government area	Liverpool City Council
Existing land use	Partly remnant riparian vegetation and partly for horse training
Elevation	Approximately 0-10m AHD
Topography	Situated on gentle slopes, mostly less than 5% gradients except immediate adjacent to Georges River
Geology and soils	Geology within the site is medium rained sand, silt and clay as well as Clayey quartzose sand, and clay. Soils are weakly pedal orange heavy clays and clayey sands along the open forest areas which are often mottled; and disturbed in south-western portions where previous sandmining excavation appear to have occurred. The remaining areas have shallow to moderately deep (<100cm) hard setting mottled texture contract soils.
Catchment	Georges River
Vegetation	Open forest or woodland that is riparian in nature
Introduced weeds	Exotic vegetation occurs in high frequencies across the Industrial Land. Within remnant bushland areas the mid-storey has been highly degraded through the explosion of Lantana, Green Cestrum, Privet and Balloon Vine.
Evidence of feral, introduced or domestic fauna	Feral Cat, Horses, European red Fox, Common Blackbird, Common Mynas, Black Rat, Rock Dove, Red-Whiskered Bulbul, Spotted Turtle-doves and non-native snails were recorded during survey. These species have varying impacts on locally occurring native fauna species with particular impacts resulting from the presence of terrestrial feral mammal species.

Coopers Paddock contains moderate to steep slopes along the Georges River frontage and in the southern part of the site, with most areas vegetated occupied by degraded riparian forest communities. The site is directly connected to the Georges River foreshore.

Within the proposed Industrial Land, the amount of natural vegetation is limited. The majority of bushland along the northern perimeter is planted, and the narrow band of vegetation

along part of the western edge contains edge impacts from weeds and rubbish. The land is very flat with only a very slight slope to the south or east. There is a drainage line near to the southern edge of the Industrial Land close to the proposed car parking facilities.

Significant portions of the site have been heavily disturbed for past land uses including horse stables and training trails.

2.2 Vegetation communities

The following description of vegetation and selected images has been extracted from Ecological Constraints Report (*Travers bushfire & ecology,* 2011).

Three (3) vegetation communities were identified within industrial zones lands through aerial photographic interpretations and extensive ground truthing. These include;

- Riparian Open Forest (and variant – Planted *Corymbia citriodora*)
- Riparian Woodland (Managed Understorey)
- Cleared or Managed Landscape

2.3 Endangered Ecological Communities

***RIVER-FLAT EUCALYPT FOREST ON COASTAL FLOODPLAINS (RFEF)* – Listed Endangered Ecological Community**

General Description
The ecological community associated with silts, clay loams and sandy loams on periodically inundated alluvial flats, drainage lines and river terraces of coastal floodplains.

Habitat Requirements

- Geology / Soils: Alluvial soils of fluvial origin.
- Topography: Flood plains and associated flats and terraces.
- Most dominant canopy species of River-Flat Eucalypt Forest on Coastal Floodplains: *Eucalyptus amplifolia*, *Eucalyptus tereticornis, Angophora floribunda, Angophora subvelutina, Eucalyptus baueriana, Eucalyptus botryoides* and *Eucalyptus elata.*

Conservation Status and Distribution
Small areas of River-Flat Eucalypt Forest on Coastal Floodplains occur in existing conservation reserves, including: Blue Mountains NP, Cattai NP, Dharug NP, Georges River NP, Marramarra NP, Morton NP, Deua NP and Wadbilliga NP.

Key Threatening Processes
Clearing of native vegetation; alteration to the natural flow regimes of rivers, streams, floodplains and wetlands; invasion of native plant communities by exotic perennial grasses; predation, habitat destruction, competition and disease transmission by feral pigs;

Riparian Open Forest (and variant – Planted *Corymbia citriodora*)

This vegetation community occupies the majority of the more heavily vegetated sections around the perimeter of the industrial lands. The Riparian Open Forest is considered to be commensurate with the EEC – River-flat Eucalypt Forest on Coastal Floodplains (RFEF).

The canopy is generally 18-25m in height with the presence of common Eucalypt/Angophora species such as *Eucalyptus baueriana* (Blue Box), *Eucalyptus amplifolia, Eucalyptus bosistoana* (Coast Grey Box), *Eucalyptus botryoides* (Bangalay) and *Angophora subvelutina,* and the projected foliage cover is 10-30%. Some portions contain an overstorey of *Casuarina glauca* (Swamp Oak) on the western side of the industrial lands.

There was a sub-canopy layer present throughout most of the vegetation in close proximity to Georges River, dominated by *Acacia binervia* (Coast Myall) to a height of around 10-15m tall.

The native mid-storey layer has been heavily reduced because of the overwhelming presence of Lantana and vines. Common mid-storey species include *Acacia decurrens* (Black Wattle), *Acacia parramattensis* (Sydney Golden Wattle) and *Bursaria spinosa* (Blackthorn). There were very few other native shrubs encountered and they were generally sparse.

Photo 1 – Riparian forest vegetation on south-eastern edge of the industrial lands, 150m north of the Powerful Owl nesting area.

The ground layer of vegetation rarely exceeds 10% projected foliage cover for native species unless dominated by *Pteridium esculentum* (Bracken) and *Carex* species around the swale areas. Common species include *Themeda australis* (Kangaroo Grass), *Cynodon dactylon* (Couch), *Entolasia stricta* (Wiry Panic), *Microlaena stipoides* var. *stipoides* (Weeping Rice Grass), *Einadia hastata* (Berry Saltbush) and *Glycine clandestina* (Twining Glycine).

The vegetation comprising this community is heavily disturbed throughout by the introduction of in particular *Lantana camara* (Lantana) to the mid-storey. In gullies and swales, the additional moisture content within the soil has promoted regrowth of weeds

such as *Cardiospermum grandiflorum* (Balloon Vine) and *Ligustrum sinense* (Small-leaved Privet).

In the north-eastern portion of the Industrial Land, *Corymbia citriodora* (Lemon-scented Gum) is a dominant species in the canopy as it has been planted. Within this same area were some Large Ironbark trees *(Eucalyptus fibrosa*) and occasional Turpentine trees (*Syncarpia glomulifera*).

Photo 2 – Corymbia citriodora variant in the north-eastern corner of the industrial land

Riparian Woodland (Managed Understorey)

This vegetation community occurs as small highly disturbed clumps of vegetation in the northern portion of the Industrial Land, typically distinguished by scattered remnant trees with a mown or cleared understorey.

This area is slightly higher in elevation to the surrounding vegetation hence the useability for recreation (less constrained by flooding events).

The structure is more a woodland because of past clearing events and lack of shrub layer with a projected foliage cover of 3-10%. The most common tree was *Eucalyptus eugenioides* (Thin-leaved Stringybark). These were recorded within the Riparian Open Forest but not as a common species.

Photo 3 – Riparian woodland vegetation in the central northern portion of the industrial land.

Cleared or Managed Landscape

This vegetation community occurs in all un-vegetated areas or those which are essentially just a grassland community that is typically mown. Those areas which are not mown normally contain well in excess of 50% weed coverage in the understorey.

Previous sand mining within the southern portion of the Industrial Land has changed the natural topography and levels and caused some un-natural swales which would occasionally contain water after heavy rain, hence there is a presence of occasional tussock-type grasses, Carex and sedge species within this community.

Approximately 3/4 of the industrial site is cleared.

Photo 4 – Cleared / managed vegetation in the far north-western corner looking south-east.

2.4 Vegetation condition, connectivity and wildlife corridors

A detailed condition assessment for offsetting and vegetation management purposes had been prepared by *Travers bushfire & ecology* in accordance with OEH vegetation assessment bio-banking methodology.

A corridor is used to ensure wildlife can move between vegetation parcels that contain habitat characteristics suitable for each taxa and foraging opportunities for those taxa. In other words they need protection and food. For some wildlife the dispersal (home) range is quite small whilst others migrate over larger areas.

Vegetation connectivity to the industrial land from other local remnants is limited to the narrow strips of riparian vegetation along the fringes of the Georges River that continues to the north and south-west (Figure 4). The proposed industrial development does very little to break the existing corridor function or widths as it supports only the very outer fringe of bushland,

Remnant riparian vegetation within the adjacent Foreshore Reserve provides the largest patch of remnant trees within 2km of the industrial development, hence it becomes a haven for many fauna species and important to protect.

The riparian corridors would assist movement mainly for waterbirds, forest birds of various sizes, raptors, owls, micro-chiropteran bats, and some small reptiles. The corridors are not to be impacted by the industrial land or the proposed industrial development.

Figure 4 – Aerial appraisal showing current habitat connectivity generally associated with watercourses
(Source: Google Earth Pro 16.9.10)

2.5 Fauna

Fauna survey was conducted by *Travers bushfire & ecology* in 2011 which found a number of threatened species to be present within the industrial lands and adjoining foreshore reserve. Eight (8) threatened fauna species were recorded within or in close proximity to the industrial lands. Threatened fauna species recorded included:

- Powerful Owl (*Ninox strenua*),
- Varied Sittella (*Daphoenositta chrysoptera*),
- Little Lorikeet (*Glossopsitta pusilla*),
- Grey-headed Flying-fox (*Pteropus poliocephalus*),
- Large-footed Myotis (*Myotis macropus*),
- Eastern Bentwing-bat (*Miniopterus orianae oceansis*),
- East-coast Freetail Bat (*Micronomus norfolkensis*) and
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*).

The Yellow-bellied Sheathtail-bat was recorded only to a 'possible' level of certainty. One (1) additional threatened fauna species - Black-chinned Honeyeater (eastern subspecies - *Melithreptus gularis gularis*) has been previously recorded on the other side of the Georges River as evident from the Atlas of NSW Wildlife Database records (OEH 2011) and likely utilised the industrial land on occasion.

Two (2) protected migratory fauna species listed under the EPBC Act (1999) - Rufous Fantail (*Rhipidura rufifrons*) and Satin Flycatcher (*Myiagra cyanoleuca*) - were recorded within the industrial land.

The key breeding areas of the recorded threatened species are mostly contained within the foreshore reserve. However hollow dependent threatened species will utilise the hollows within the industrial area as breeding habitat.

The industrial land has 43 hollow bearing trees as surveyed by *Wheelans Insites,* 2008 (see Schedule 1) within the Industrial Land, and hollow dependent species will be affected by the removal of these hollows. The removal of hollow bearing trees is a listed threatening process and mitigation measures are required to minimise impacts on hollow dependent threatened species. Section 3.2 has more information on hollow-bearing trees.

Schedule 1 – Vegetation Management Plan shows the location of the threatened fauna as recorded by *Travers bushfire & ecology,* 2011. It also shows the boundary of the Powerful Owl roosting area to be protected inclusive of the revegetation buffer to further enhance the vegetative buffer present.

A visual probe or torch inspection of hollows within the mapped hollow bearing trees is to be undertaken prior to removal of trees within the proposed industrial area to allow the reuse of hollows and relocation of any resident fauna.

2.6 Habitat trees

All hollow bearing trees have been remapped for the purposes of this VMP and are located on Schedule 1 - Vegetation Management Plan. The following table shows all hollow bearing trees within Coopers Paddock. Of these habitat trees only 42 are found within the industrial lands.

There are likely to be significant hollows removed as a result of the proposed industrial development. Hollow-bearing tree removal guidelines (Section 3.2), have been incorporated into this VMP to minimise the potential impacts on residential fauna.

Table 2 – Tree hollows within Coopers Paddock & SE corner of the racecourse land
(Source: Wheelans Insites 2008)

Trees with Hollows			Number of Hollows				
Species	**Common Name**	**Number**	**Small**	**Medium**	**Large**	**Owl**	**Total**
Angophora subvelutina	Broad-leaved Apple	1	0	0	1	0	1
Corymbia citriodora	Lemon-scented Gum	1	1	0	0	0	1
Eucalyptus eugenioides	Thin-leaved Stringybark	32	38	29	6	0	73
Eucalyptus baeuriana	Blue Box	2	1	2	0	0	3
Eucalyptus botryoides	Bangalay	14	9	13	5	0	27
Eucalyptus saligna X botryoides	Blue Gum x Bangalay	13	4	26	2	0	32
Eucalyptus sp. cultivar	Cultivar	5	1	0	5	0	6
Eucalyptus tereticornis	Forest Red Gum	3	1	4	2	1	8
Stag	Stag	21	39	36	7	0	82
	Total	**92**	**94**	**110**	**28**	**1**	**233**

2.7 Removal of existing waterbodies

Removal of aquatic habitat from the existing dam within the northern part of Coopers Paddock (Industrial zoned lands) is likely to contain aquatic fauna. The Ecological Assessment for Coopers Paddock (*Travers bushfire & ecology* 2011) has not identified any threatened species within the affected dam and consequently the impact of removal of the dam is considered to be negligible.

Large areas of freshwater aquatic habitat is present particularly within Horseshoe Pond and the Georges River which has a major influence on the existing fauna populations which will continue to provide extensive foraging opportunities for threatened and migratory wildlife in the locality. The Coopers Paddock foreshore reserve provides a significant refuge for all of the recorded threatened species.

The rezoning approval requires that a pre-dewatering wildlife clearance survey is to be undertaken for any resident aquatic wildlife. Any captured native wildlife is to be relocated to existing aquatic habitat within Coopers Paddock foreshore reserve. Wildlife is to be recovered as the dam is being dewatered and progressively filled under supervision of a fauna ecologist.

2.8 Bushfire risk

The Bushfire Protection Assessment (*Travers bushfire & ecology* 2010) found that bushfire can potentially affect the proposed rezoning lands from the foreshore forest adjoining Georges River to the south and east of the Coopers Paddock site resulting in possible ember attack, radiant heat and potential flame attack.

The bushfire risk posed to the site however will be reduced to an acceptable risk if appropriate bushfire protection measures are adopted.

The assessment has concluded that the proposed rezoning can support future development with the potential to provide:

- Defendable space in accordance with *Planning for Bushfire Protection 2006 (PBP 2006)*.
- Construction of the buildings in accordance with *AS 3959 (2009) Construction of buildings in bushfire prone areas.*
- Compliance with access and egress as per Section 4.1.3 of PBP (2006) Bushfire protection measures is recommended.

Restoration Strategy 3

3.1 Overview of mitigation measures to minimise impacts of the proposed industrial development

Mitigation measures for the rezoning of the site have been stipulated in the Ecological Assessment (*Travers bushfire & ecology* 2010) and Ecological Assessment for realignment of Governor Macquarie Drive (*Travers bushfire & ecology* 2010). The mitigation measures that are appropriate to the proposed industrial development include:

- Inspection and supervised dismantling of hollow bearing trees;
- Relocation of high quality hollows as on-ground habitat within the reserve;
- Revegetation of landscape areas within the industrial land adjoining the reserve with locally occurring native species;
- Weed control;
- Recovering or aquatic wildlife during the dewatering of the northern dam
- Sediment and erosion control at the Foreshore Reserve interface;
- Chain-link fencing at the interface with the Foreshore Reserve
- Dense shade cloth adjoining the Powerful Owl protection buffer (visual and light barrier), and tall Casuarina planting as a long-term visual and sound barrier to be planted (see Schedule 1);
- Stabilisation of stormwater culverts;
- Minimised lighting within the car park to reduce light spill into the powerful owl protection zone.

3.2 Management of hollow-bearing trees

The proposed industrial development will be cause the loss of hollow bearing trees and have potential impacts upon hollow dependent fauna and their foraging behaviour. A fauna ecologist is to undertake inspections of hollow-bearing trees and assist in relocation of hollows into the foreshore reserve. The guidelines below detail the process required in this instance to limit the impacts.

All hollow-bearing trees in the Industrial Land are to be identified. Prior to tree felling, all hollows are to be inspected for fauna occupation and identification. Hollow-bearing tree removal guidelines are as follows:

I) The fauna ecologist is to inspect all potential habitat trees prior to removal and identify evidence of fauna use. All clearing of habitat trees is to be done under the direct supervision of an immunised fauna ecologist with a valid Scientific Licence under the NPWS Act.
II) When fauna are present, the animals are to be removed through section dismantling of the hollows and relocated prior to felling or the tree under the supervision of the fauna ecologist.
III) Trees should be pushed over using an excavator or similar technique only once the tree has been cleared of any wildlife allowing the recovery of high quality hollows that are to be sectionally removed and lowered to the ground before felling.
IV) Any natural hollows removed by the development are to be placed wherever

possible as ground hollows within retained bushland under the supervision of the consulting ecologist.

V) On-ground refugia is to be retained where possible consisting of rocks, logs, and wherever appropriate dense under-storey native vegetation. Felled or damage hollows from the building site are to be used within the restoration area as on ground habitat.

Hollows removed from the development are to be relocated into the foreshore reserve as on-ground refugia or to be re-erected on existing trees.

3.2.1 Handling of resident wildlife within vegetation clearance areas

To minimise the impact of tree removal on resident fauna the following procedure is to be implemented during tree removal works.

Pre Clearing

At least one week's notice will be needed prior to the planned date for clearing of any trees. This is required so as to allow suitable time for inspections of trees for use by fauna and to plan for the safe felling of the tree and removal of fauna if present. A fauna ecologist will inspect the trees for use by fauna. This may include inspection of trees at sunset (stag watching) that allows for the detection of diurnal fauna returning to hollows or nocturnal fauna leaving for the night.

In some cases physical inspections of hollows by climbing trees and insertion of camera probes may be required. This will be carried out by suitably qualified arborists under the direction and supervision of the fauna ecologist.

During Clearing

Where fauna is identified within a hollow and the risk of death or injury as a result of machine felling of the tree is high, the tree may need to be felled in sections. This will involve the removal of hollow limbs or sections by chainsaw with the hollow limb lowered to the ground for removal and relocation of fauna. These works are to be carried out by a suitably qualified arborist under the direction of the fauna ecologist.

In those trees that contain hollows and no fauna has been observed, the tree will be machine felled after recovery of high quality hollows as advised by the fauna ecologist.

The tree will first by inspected by the fauna ecologist and provide instruction on the felling technique which may require sectional dismantling or lowering of trunk sections to the ground for inspection of recovery of wildlife. All hollow limbs will be inspected after felling for occupation by fauna. Any fauna will be removed and relocated to adjoining bushland by the fauna ecologist.

Where young fauna are identified within a hollow whose survival will be at risk as a result of the removal of the hollow or the felling of the tree, then clearing will not be carried out until those young are old enough to leave the hollow and under the care of the parents. It is suggested therefore that clearing is not carried out during breeding times when young are likely to be present within hollows (spring-early summer) (eg. Wood ducks, parrots, microchiropteran bats, etc).

Where possible, hollow limbs removed from trees will be collected by the fauna ecologist for re-erection/ reuse at a later date. High quality hollows may be used for reinstallation into trees as a replacement for constructed nest boxes of similar size and type. Any fauna injured during clearing will be handed to WIRES for care and rehabilitation.

3.3 Revegetation works

Revegetation of landscape areas adjoining the reserve are to utilise locally occurring native species derived from River-flat Eucalypt Forest. Other non-invasive but attractive native species may also be selected in accordance with the approved landscape plan and Schedule 1 – Vegetation Management Works. The use of such species will assist in minimising edge impacts of the adjoining foreshore reserve. Appendix 1 provides a list of recommended species from this EEC and the local area that is to be used for revegetation works at the bushland interface.

Revegetation of the southern interface adjoining the reserve (main revegetation area) is to be undertaken in an integrated manner with the proposed stormwater treatment devices and the landscape plan.

General recommendations on planting densities include:

- Trees – 1 per 50m^2 (reduced to 1 per 200m^2 within an asset protection zone)
- Shrubs – 1 per 3-4m^2 (maximum 20% by cover within an asset protection zone)
- Ground covers – 5 per m^2

3.3.1 Plant protection

Plant protection will be provided by the following measures:

- Use of 2L cardboard or equivalent plastic guards around tubestock plants (trees and shrubs only) to protect against weather phenomena and grazing animals in the early stages of growth,
- Installation of sediment fences around external or internal weed infestations to protect restoration areas from invasive grass species,
- Placement of mulch around individual plants to minimise soil moisture loss and to slow weed growth (not to be used in translocation areas but in landscaped areas only).

3.4 Weed control

Weed control is to be undertaken around the perimeter of the Industrial Land to minimise weed impacts within retained bushland. Noxious and environmental weeds are the highest priority to be removed with annuals the lowest priority. Weed control priorities have been allocated for all observed exotic species found within Coopers Paddock; these are shown in Appendix 2.

Of particular note is the presence of Alligator Weed which is located just outside of the Industrial Land near the south-western boundary. Any activities within the industrial lands that direct water to the infestation must be by managed to prevent the spread of this species.

3.4.1 Alligator Weed control

Alligator Weed is a weed of national significance and a class 3 noxious weed in the Liverpool LGA. A class 3 noxious weed are plants that pose a potentially serious threat to primary production or the environment of a region to which the order applies, are not widely distributed in the area and are likely to spread in the area or to another area. The plant must be fully and continuously suppressed and destroyed.

Alligator weed to date has only been found within the foreshore reserve. But due to its close

proximity to the proposed industrial facility all weed control operations are to maintain an active search for other occurrences and implement immediate control actions as recommended.

In addition any drainage or excavation works that affect the existing infestation must not spread this species to any parts within or offsite through soil excavation or removal of weed vegetation. It must be fully treated and eradicated in situ and is a no go area for any works unless under the approval of the NSW Department of Primary Industries.

Photo 6 – Alligator Weed

The following information is supplied in the even that Alligator Weed is found to occur or re-establish within the landscaping areas of the development site.

It is very unlikely that immediate eradication will be achieved with herbicides alone; however herbicides are used to help with eradication. Infestations should receive initial herbicide treatments before being subjected to physical removal. This reduces the risks of spreading viable fragments, reduces the bulk of the above-ground biomass, and creates better visual access to the site.

Physical controls (mechanical or manual) are appropriate for small and isolated situations and are useful in removing initial invaders of a catchment if they can be located early enough, all above and below-ground plant material must be removed. Care must be exercised during removal to ensure that broken plant sections are not dispersed on equipment or in downstream flow.

Excavation has successfully eradicated small infestations, but follow-up treatment of regrowth of missed plant material is necessary.

No stormwater diversion is to be put into the drainage line where Alligator Weed is present.

3.5 Management of asset protection zones

No Asset protection zones are to encroach within the Coopers Paddock foreshore reserve and must be fully contained within the industrial zoned lands. Asset protection zone maintenance includes the provision of a perimeter access around the warehouses which adjoin protected bushland in the Foreshore Reserve, as well as maintenance of trees,

shrubs and ground layer to achieve target fuel load levels in accordance with Planning for Bush Fire Protection, 2006.

Techniques considered suitable for such a development include the annual pruning of limbs from trees and shrubs within asset protection zones, mowing or slashing of ground layer fuels, thinning of shrub layers, creation of canopy breaks in the vegetation of at least 2m and sufficient separation of the layers to minimise the risk of crown fires.

It would be expected that shrubs would be thinning initially, and canopy breaks created. Maintenance of trees and shrubs should be conducted annually thereafter including limbing prior to the bushfire season, i.e. conducted prior to September.

The ground layer should be slashed on a monthly basis during the main growth period (warm months) and possibly every 6-8 weeks in the cooler more dormant months. The ground layer should be slashed to below 10cm in height if grassy.

3.6 Sediment and erosion control

Sediment and erosion control measures are required to be installed around the perimeter fence of the Industrial Land prior to the commencement of any construction works. This will assist in minimising sediment laden runoff into the Foreshore Reserve.

Sediment fences are effective temporary measures to discourage rabbit access to smaller restoration areas which also perform other functions such as exclusion of invasive grasses and / or vines.

Temporary hale bale and filter fences are to be installed where needed to minimise erosion and sedimentation within protected areas. All temporary sediment and erosion control measures are to be maintained when 40% capacity is reached, and reinstated or removed once the ground surface is stable. All sediments left behind after removal of the temporary sediment control measures is to be removed and the ground surface “made good” in accordance with the approved landscape plans.

Any existing native vegetation or drainage line not being altered by approved stormwater and drainage construction works shall be protected by sediment fences along the top of bank, temporary sand bags used in areas that are eroding or appear to have potential to erode in larger storm events during the course of construction works.

Sandbags and other pollution containment devices are to be installed around stormwater drains and any other locations where required to prevent sediment entering the trunk stormwater system.

Any stockpiles of excavated soil and demolition / construction waste must be located where risk of erosion and sediment is minimal, and must be protected from wind and water erosion.

3.7 Owl protection measures

Dense shade cloth affixed to a 1.8m high chain-link fence surrounding the southern-eastern boundary shall be utilised during construction to limit reflected sunlight and night light shine from vehicles or equipment into the Powerful Owl buffer and nesting area. The use of such a barrier will also assist slightly in filtering noise to the sensitive area.

Post construction, a planted row of *Casuarina glauca will* be installed as a visual barrier to filter out car park and other lighting in the long term. The planted trees are expected to grow

to an approximate height of 13-20m when mature and will provide a long term visual barrier to minimise breeding disturbance.

Following the competition of construction works, the shade cloth may be removed.

3.7.1 Construction work timing

The sensitivity of a breeding pair of owls is likely to be greatest during the nesting, egg-laying, incubating and pre-fledging stages from March to November but critically between May to September. This is when both adults are in the vicinity of the nest and most likely to be disturbed. As this species is nocturnal, the adults are likely to be out foraging during the night, however, there will still usually be one owl remaining roosting on the eggs / chicks. Therefore, it is possible that nocturnal construction activities during this period may also disrupt the breeding cycle. Mitigation measures have been proposed as part of the construction activities to minimise disturbance during daylight hours and construction in the evening (from 7PM to 6AM) is to be avoided during May to September.

3.8 Pest fauna management

Pest fauna management will be undertaken extensively within the adjoining Foreshore Reserve which should reduce the pressure on revegetation and landscaping works in the industrial facility. Only standard vermin control is likely to be required around the facility. Pest management for the protection of revegetation areas is via the use of temporary plant guards. These should be utilised on all native tubestock planting to minimise risk of grazing by rabbits and protection against winter frosts in the first season of planting.

Exclusion fencing involves the erection of fences as a barrier to pest species movements into and out of the industrial land. Exclusion fences may be fully enclosing but are not intended to stop the movement of all wildlife. Sediment fences are effective temporary measures to discourage rabbit access to smaller restoration areas which also perform other functions as exclusion of invasive grasses and sediment control during the initial growth stages of landscape revegetation works.

3.9 Stormwater management

At the time of preparation of the VMP, a Stormwater Management Plan was prepared by *MPN Consulting.* The stormwater treatment devices are shown on Schedule 1 – Vegetation Management Plan. *S*tormwater runoff from the roof of the proposed warehouses will be collected by rainwater harvesting tanks for reuse purposes. Overflow from these tanks will discharge into the proposed underground drainage system which will discharge into the adjoining Georges River to the east and to existing drainage lines within the foreshore reserve to the south.

The proposed underground pit and pipe network will discharge to Georges River, as per existing conditions, via stormwater treatment devices which will collect hydrocarbons, sediments and nutrients.

3.9.1 Native species to use in open water bodies, open stormwater drains and stormwater culverts

In the event that open basins, bio-retention swales, stormwater culverts or open drainage lines are constructed the following species are recommended for stabilisation within and immediately surrounding the structures.

Table 3 – Recommended bioretention basin ground covers

Species	**Common name**	**Recommended location**
Aristida vagans	Three awn speargrass	Dry or moist soil
Austrostipa setacea	Corkscrew grass	Dry or moist soil
Carex appressa	Tall Sedge	Drains and water edges
Cymbopogon refractus	Barbed Wire grass	Dry or moist soil
Danthonia tenuior	Wallaby grass	Dry or moist soil
Dianella caerulea / longifolia	Flax lily	Dry soils surrounding water and drains
Dichelachne micrantha	Short-hair Plume-grass	Dry or moist soil
Echinopogon ovatus	Forest Hedgehog grass	Dry or moist soil
Entolasia stricta	Wiry Panic grass	Dry or moist soil
Eragrostis leptostachya	Paddock Love-Grass	Dry or moist soil
Ficinia nodosa	Knobby Club Rush	Wet soil
Gahnia sieberiana	Red-fruit Saw-sedge	Wet soil
Juncus usitatus	Common Rush	Wet soil
Lomandra longifolia	Spiny-headed Mat-rush	Dry or moist soil
Microlaena stipoides	Weeping Grass	Dry or moist soil
Poa labillardierei	Tussock	Dry or moist soil
Pratia purpurascens	Whiteroot	Dry or moist soil
Themedia australis	Kangaroo grass	Dry or moist soil

Planting densities typically recommended within bioretention basins may be double that of landscaping beds, i.e. 6-8 plants per m^2.

3.9.2 Stormwater outlets and drainage lines

The main stormwater outlet is located approximately 50m south of where Governor Macquarie Drive passes over the Georges River. A further two stormwater outlets are proposed to the southern boundary to deliver overflows into an existing drainage line within the Foreshore Reserve. Stormwater is to be delivered into a stable drainage line or water body to prevent bed scour or bank erosion.

All proposed stormwater outlets to the Georges River and any drainage line are to be fully stabilised to the standards of the NSW Office of Water guidelines. Culverts are to be lined with rock over the top of geotextile or open weave jute mesh, and planted to 6 plants per m2 with no identifiable bed or bank erosion. The choices of plant material should be sourced from Table 3. Open weave jute mesh is to be installed on all embankments to minimise erosion.

Any native vegetation removed during the installation the proposed outlets of stormwater drainage lines will be reinstated using locally occurring species in accordance with the Coopers Paddock Foreshore Reserve Vegetation Management Plan (*Travers bushfire & ecology* 2015).

Any stormwater being delivered to southern aspect is to prevent any stormwater from entering the existing Alligator Weed infestation and must be diverted in an easterly direction into the existing drainage line. The Alligator weed infestation is to be quarantined from any proposed action unless approved by the NSW Department for Primary Industries to eradicate and remove the existing infestation.

3.10 Recovery of wildlife from existing water bodies

The approval for realignment of Governor Macquarie Drive requires that a pre-dewatering wildlife clearance survey is to be undertaken for any resident aquatic wildlife within the northern most affected dame. This dam is located within both the proposed road corridor and the industrial lands and as such, is also the responsibility of Stockland upon commencement of bulk earthworks. Any captured native wildlife is to be relocated to existing aquatic habitat within Coopers Paddock Foreshore Reserve. Wildlife is to be recovered as the dam is being dewatered and progressively filled under supervision of a fauna ecologist.

Monitoring & Site Audits

4

Monitoring of the progress of plantings and fauna protection works is to be undertaken throughout the construction phase, with compliance certificates submitted to Liverpool City Council upon completion of satisfactory works. Monitoring activities will include:

1 Hollow-bearing tree checks and dismantling supervision.
2 Noxious weed monitoring and feedback to weed control teams

Monitoring of the site is required to be set up at the commencement of protection works and prior to and vegetation clearance works. The monitoring and review process will also focus on the presence / absence of exotic species, floristic diversity of planted areas, progress and success, monitoring of any sediment fencing or protective.

Inspections of the site by the consulting Project Ecologist should be undertaken to see that appropriate protection procedures are being maintained.

The first stage of monitoring incorporates the checking of hollow-bearing trees for fauna occupation. Consequent stages of monitoring include the checking of sediment fencing to ensure that it has been installed satisfactorily and checked after periods of heavy rainfall. Regular checks need to be made on planted areas including species diversity, use of appropriate species and protection by plant guards and mulch. A regular check on weed types and densities in landscaping beds is also required.

Compliance certificates will be issued by the project ecologist for the following items:

- Engagement of an independent project ecologist,
- Appropriate supervision of hollow dismantling and relocation into the Foreshore Reserve as on ground habitat,
- Installation of all protective fencing and sediment and erosion control measures,
- Removal of waste,
- Stabilisation of stormwater drains and outlets, and
- Satisfactory completion of all maintenance tasks.

Performance Targets 5

Vegetation management performance targets apply to the proposed industrial facility. Site audits are to be undertaken on an annual basis and compliance certificates issued to assess the achievement of the following performance targets:

1 The effectiveness and appropriateness of weed control within the industrial area on the reserve interface.
2 The effective control and removal of waste and litter within the industrial area on the reserve interface and stormwater treatment devices.
3 All stormwater outlets, constructed drainage channels are to be fully stabilised with a minimum of 5 endemic native plants per m^2 with no identifiable bed or bank erosion.
4 The boundary of the conservation area is to be protected with a minimum a 5 wire strand with dog exclusion fencing or 1.8m chain-link fence. Shade cloth is to be installed on the fence adjoining the Powerful Owl buffer.
5 The felling of all hollow-bearing trees is to be undertaken under the supervision of a fauna ecologist to allow the removal and management of any resident fauna. Hollows of high quality or with fauna recorded residing within should be sectionally dismantled and used as ground refugia in the Foreshore Reserve.
6 Surface drainage is to be collected and directed away from the conservation zone so as to minimise the potential for weed invasion.
7 Effective recovery of wildlife from the northern most dam and relocation into an adjoining freshwater water body within the foreshore reserve.
8 All landscaping immediately adjacent to the Foreshore Reserve is to be planted with locally occurring native plant species.

Program of Works 6

The *Program of Works* (Table 4 below) is aimed at providing a management framework for enacting revegetation, maintenance, monitoring and review works as required under this VMP. Stockland is to undertake works as stipulated within this VMP in accordance with Schedule 1 – Vegetation Management Plan.

6.1 Program of works

For the purposes of the program of works, the listed tasks are divided into the following category of works.

Pre-Construction Works

Pre-construction works refers to all site preparation activities such as site fencing and access tracks (generally prior to the commencement of construction works), hollow-bearing tree inspections and dismantling, as well as sediment and erosion control fencing followed by major earthworks.

Construction Works

Construction works refers to the period during which construction of buildings, roads and other facilities are being installed. It is during this phase that primary weed control and preliminary landscape works such as final batter forming and topsoil placement are completed.

Primary clearing works include the completion of primary and secondary weed control and protective fencing. Practical completion of the primary clearing phase is determined by the project ecologist at which point all primary actions need to have been completed and the installed landscape plants are well established and only requiring periodic maintenance or watering. Should there be a delay in the completion of works, for any reason, then contingency landscape works may be required by the project ecologist.

Post Construction Works

Post construction works is essentially maintenance activities unless further contingency works are identified by the project ecologist for auditing purposes. Maintenance will be undertaken by a landscape maintenance crew for a minimum of 1 year from completion of construction works.

Table 4 – Program of works

Action	Responsibility
Stage 1 – Pre-construction Works	
• Formation of site management team & establish supervision and consultation processes – minimum project ecologist, and site manager	• Site project manager
• Identification and erection of erosion control fencing and installation of temporary exclusion fencing.	• Site manager / project ecologist
• Hollows to be inspected and relocated as advised by the project ecologist and/or fauna ecologist	• Tree climber under direction of project ecologist
• Provide certificates of compliance	• Project Ecologist
Stage 2 – Construction Works	
• Supervision of vegetation clearance and hollow relocation works	• Site project manager in association with the project ecologist
• Monitor erosion control measures (monthly – especially after heavy rain) and replace if required	• Contractor with advice of project manager
• Maintenance of fencing	• Contractor / suitably qualified bushland regenerator
• Stormwater drainage stabilisation works and revegetation of surrounding disturbed areas	• Earthworks contractor / suitably qualified bushland regenerator
• Provide certificates of compliance	• Project ecologist
Stage 3 – Post Construction Works	
• Monitoring of retained vegetation at 6 months, 12 months and annually until achievement of restoration performance targets.	• Project ecologist
• Provide certificates of compliance as required	• Project ecologist

Recommended Native Species for planting

A1

Species listed in Table A1.1 below are relatively common in River-flat Eucalypt Forest. These are the preferred species to be utilised for landscaping. Some additional Cumberland Plain Woodland species would also be acceptable.

Species planting lists for bioretention basins are in the body of the report (section 3.9).

Table A1.1 – Recommended native flora for planting

Family	Scientific Name	Common Name
TREES		
Myrtaceae	*Angophora floribunda*	Rough-barked Apple
Myrtaceae	*Angophora subvelutina*	Broad-leaved Apple
Casuarinaceae	*Casuarina glauca*	Swamp Oak
Myrtaceae	*Eucalyptus eugenioides*	Thin-leaved Stringybark
Myrtaceae	*Eucalyptus amplifolia ssp. amplifolia*	Cabbage Gum
Myrtaceae	*Eucalyptus tereticornis*	Forest Red Gum
Myrtaceae	*Eucalyptus bauerana*	Blue Box
Myrtaceae	*Eucalyptus tereticornis*	Forest Red Gum
Myrtaceae	*Melaleuca decora*	
Myrtaceae	*Melaleuca quinquenervia*	Broad-leaved Paperbark
SHRUBS		
Mimosaceae	*Acacia implexa*	Hickory
Mimosaceae	*Acacia decurrens*	Black Wattle
Mimosaceae	*Acacia falcata*	
Mimosaceae	*Acacia falciformis*	Broad leaved Hickory
Mimosaceae	*Acacia parramattensis*	Parramatta Wattle
Pittosporaceae	*Bursaria spinosa* var. *spinosa*	Blackthorn
Euphorbiaceae	*Breynia oblongifolia*	Coffee Bush
Myrtaceae	*Callistemon salignus*	Willow Bottlebrush
Fabaceae	*Daviesia ulicifolia*	Gorse Bitter Pea
Fabaceae	*Dillwynia sieberi*	Prickly Parrot-pea
Sapinadeae	*Dodonea triquetra*	Hopbush
Fabaceae	*Indigofera australis*	Native Indigo
Epacridaeae	*Leucopogon juniperinus*	Prickly Beard-heath
Myrtaceae	*Melaleuca nodosa*	Ball Honey Myrtle
GROUNDCOVERS		
Poaceae	*Aristida vagans*	Three-awn Speargrass
Poaceae	*Austrodanthonia racemosa*	Wallaby Grass
Poaceae	*Austrodanthonia tenuior*	Wallaby Grass
Apiaceae	*Centella asiatica*	Swamp Pennywort

Family	Scientific Name	Common Name
Poaceae	*Cymbopogon refractus*	Barbwire Grass
Phormiaceae	*Dianella caerulea* var. *caerulea*	Flax Lily
Phormiaceae	*Dianella longifolia*	-
Poaceae	*Dichelachne micrantha*	Short-hair Plume Grass
Convolvulaceae	*Dichondra repens*	Kidney Weed
Poaceae	*Echinopogon caespitosus* var. *caespitosus*	Tufted Hedgehog Grass
Chenopodiaceae	*Einadia hastata*	Berry Saltbush
Geraniaceae	*Geranium homeanum*	Northern Cranesbill
Goodeniaceae	*Goodenia hederacea* subsp. *hederacea*	Ivy-leaved Goodenia
Dilleniaceae	*Hibbertia aspera*	Rough Guinea Flower
Lamiaceae	*Plectranthus parviflorus*	Cockspur Flower
Lomandraceae	*Lomandra longifolia*	Spiky-headed Mat-rush
Poaceae	*Microlaena stipoides* var. *stipoides*	Weeping Rice Grass
Poaceae	*Poa labillardieri* var. *labillardieri*	Tussock Grass
Lobeliaceae	*Pratia purpurascens*	Whiteroot
Poaceae	*Themeda australis*	Kangaroo Grass
VINES		
Fabaceae	*Glycine clandestina*	Forest Clematis
Fabaceae	*Hardenbergia violacea*	False Sarsparilla

Target Weed Species

A2

The following weed species were recorded onsite and are to be targeted on a priority basis subject to their respective level of invasive and implications for regeneration of native flora.

Table A2.1 - Target weed species for the site

Scientific Name	Common Name	Target Weed Control Priority
TREES		
Ligustrum lucidum	Broad leaved Privet	*High*
SHRUBS		
Chrysanthemoides monifera	Bitou Bush	*Very High*
Ligustrum sinense	Small-leaved Privet	*High*
Phytolacca octandra	Inkweed	*Medium*
Rubus anglocandicans	Blackberry	*Very High*
Senna pendula	Senna/Cassia	*Medium*
GROUND COVERS		
Alternanthera philoxeroides	Alligator Weed	*Very High*
Amaranthus viridis	Green Amaranth	*Low Priority*
Anagallis arvensis	Scarlet Pimpernel	*Low Priority*
Asparagus virgatus	Asparagus Fern	*High*
Asphodelius fistilosus	Onion Weed	*Low Priority*
Bidens pilosa	Cobbler's Pegs	*Low Priority*
Brassica rapa subsp. sylvestris	Wild Turnip	*Low Priority*
Bromus catharticus	Prairie Grass	*High*
Bryophyllum delagoense	Mother of Millions	*High*
Chloris gayana	Rhodes Grass	*High*
Cirsium vulgare	Spear Thistle	*Low Priority*
Conyza bonariensis	Flax-leaf Fleabane	*Low Priority*
Cyperus eragrostis	Umbrella Sedge	*Low Priority*
Eragrostis curvula	African Lovegrass	*High*
Gamochaeta spicata	Cudweed	*Low Priority*
Hypochaeris radicata	Flatweed	*Low Priority*
Lepidium africanum	Common Pepperwort	*Low Priority*
Malva sylvestris	Tall Mallow	*Low Priority*
Modiola caroliniana	Red-flowered Mallow	*Low Priority*
Oxalis corniculata	Yellow Wood Sorrel	*Low Priority*
Paspalum dilatatum	Paspalum	*High*
Pennisetum clandestinum	Kikuyu	*High*
Pennisetum setaceus		*High*
Plantago lanceolata	Ribwort	*Low Priority*
Rumex crispus	Curled Dock	*Low Priority*
Senecio madagascarensis	Fire Weed	*Low Priority*
Setaria parviflora	Slender Pigeon Grass	*Low Priority*
Sida rhombifolia	Paddy's Lucerne	*Low Priority*
Solanum nigrum	Black Nightshade	*Low Priority*
Soliva sessilis	Jojo	*Low Priority*

Sonchus oleraceus	Common Sow-thistle	*Low Priority*
Tagetes minuta	Stinking Roger	*Low Priority*
Taraxacum officinale	Dandelion	*Low Priority*
Trifolium repens	White Clover	*Low Priority*
Verbena bonariensis	Purpletop	*Low Priority*
VINES		
Passiflora edulis	Common Passionfruit	*High*

The most significant of these weeds that have the most invasive properties include Alligator Weed, Balloon Vine, Blackberry, Bitou Bush, African Lovegrass, Kikuyu, Asparagus Fern, Small and Large Leaved Privet, Common Passionfruit, Mother of Millions, and Rhodes Grass. With the exception of invasive species all other low priority species can be suppressed by competitive planting or tree and shrub species and creating a dense canopy and shading.

Noxious needs that commonly occur within Liverpool City Council need to be targeted if found onsite in accordance with their respective noxious weed category and the 'best practice' methods identified for that noxious weed. Noxious Weed species are listed at a state and local government level. Please refer to Liverpool City Council for a current noxious weed species list.

Vegetation Management Works Plan

S1

Aquatic Fauna Recovery & Relocation

Stormwater culvert stabilisation works

Revegetation subject to approved landscape plan

Not to scale - 2m wide vegetation screen

No stormwater to be diverted towards Aligator Weed

Water diversion bar to be installed to prevent stormwater flowing into western channel

FORESHORE RESERVE

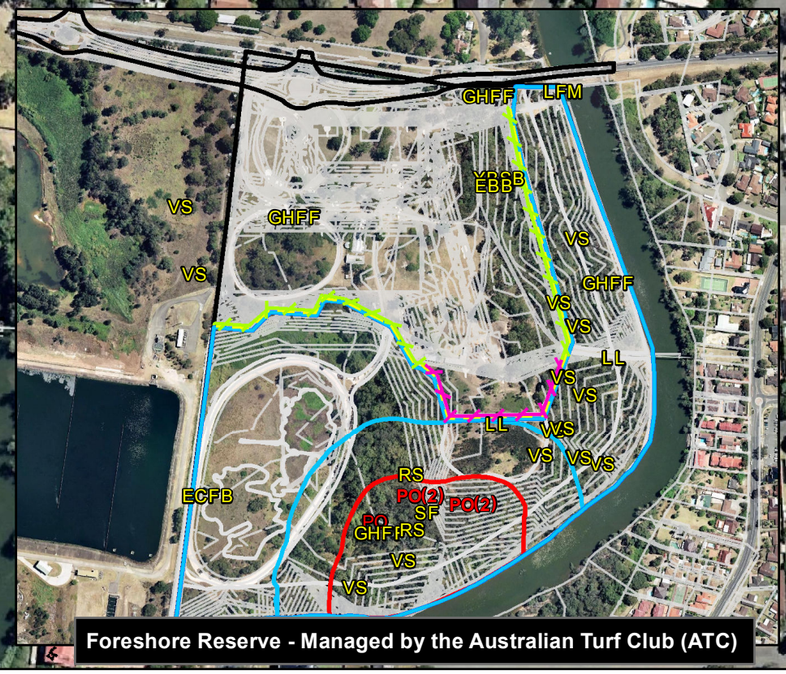
DEVELOPMENT

GHFF LFM YBSB EBB VS LL

Restoration Performance Targets – Stockland Industrial Area

Vegetation management performance targets apply to the proposed industrial facility. Site audits are to be undertaken on an annual basis to assess the achievement of the following performance targets:

1. The effectiveness and appropriateness of weed control within the industrial area on the reserve interface.
2. The effective control and removal of waste and litter within the industrial area on the reserve interface and stormwater treatment devices.
3. All stormwater outlets, constructed drainage channels are to be fully stabilised with a minimum of 5 endemic native plants per m^2 with no identifiable bed or bank erosion.
4. The boundary of the conservation area is to be protected with a minimum a 5 wire strand with dog exclusion fencing or 1.8m chain-link fence. Shade cloth is to be installed on the fence adjoining the Powerful Owl buffer.
5. The felling of all hollow-bearing trees is to be undertaken under the supervision of a fauna ecologist to allow the removal and management of any resident fauna. Hollows of high quality or with fauna recorded residing within should be sectionally dismantled and used as ground refugia in the Foreshore Reserve.
6. Surface drainage is to be collected and directed away from the conservation zone so as to minimise the potential for weed invasion.
7. Effective recovery of wildlife from the northern most dam and relocation into an adjoining freshwater water body within the foreshore reserve.
8. All landscaping immediately adjacent to the Foreshore Reserve is to be planted with locally occurring native plant species.



Foreshore Reserve - Managed by the Australian Turf Club (ATC)

Legend

- Conservation Reserve
- Site boundary
- 1.8m chain-link fence
- 1.8m chain- link fence with dense shade cloth
- Perimeter sediment fencing
- Mulch & plant native ground covers (grasses, herbs, shrubs under 1m tall) - 3 units/m2
- Planting of Casuarina glauca (visual screen - 1 tree every 5 L/m on boundary)
- Existing northern dam
- Powerful Owl 70m buffer
- Powerful Owl Protection Zone - Roosting Area
- Habitat Trees
- Cycleway (2.5m wide)
- Proposed Stormwater Drain
- Existing drainage line
- Stormwater flow
- Waterbar
- Approximate location of proposed stormwater treatment device, ground cover planting at 6 plants / m2
- Aligator Weed (target noxious weed control - canopy planting)
- Stormwater drainage stabilisation works

Fauna Survey Results

SF	Satin Flycatcher
LL	Little Lorikeet (flight direction)
VS	Varied Sittella
RS	Rufous Fantail
GHFF	Grey-headed Flying-fox
ECFB	East-coast Freetail Bat
YBSB	Yellow-bellied Sheathtail-bat
EBB	Eastern Bentwing-bat
LFM	Large-footed Myotis
PO	Powerful Owl (individual observed roosting)
PO(2)	Powerful Owl (pair roosting together)

0 25 50 75 100 m

Disclaimer: The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy, the location of all mapped features are to be confirmed by a registered surveyor.

Travers bushfire & ecology

PROJECT	REFERENCE
Coopers Paddock Industrial Development, Warwick Farm Masterplan	TBE_A15009_Schedule1_Vegetation Management Plan

SCALE	DATE (ISSUE)	TITLE
1:2,500 @ A3	26.03.15 (Issue 2)	**Schedule 1 - Vegetation Management Plan Stockland Industrial Area**