

total earth care

Vegetation Mapping Report

Warriewood Valley

2 Macpherson Street / 23-27 Warriewood Road &
18 Macpherson Street, Warriewood.

Date of Issue: 6th June 2013

Introduction

Karimbla Properties (No. 32) Pty Ltd intend to lodge a planning proposal for the properties at 2 Macpherson Street / 23-27 Warriewood Road and 18 Macpherson Street, Warriewood (the 'subject sites'). A pre-lodgement meeting has been undertaken with Pittwater Council and minutes have been provided outlining Council's expectation for information to support the request. Ecological information requirements are summarised as follows;

- Ecological Site Analysis -The subject sites have been identified to contain canopy trees including native Swamp Mahogany and exotic species. Immediately adjoining properties (4 Macpherson Street and 41 Warriewood Road) contain natural vegetation of which a component is Swamp Sclerophyll Endangered Ecological Community.
- As a minimum, a plan should be provided which indicates the general location of such communities and measures that could be employed to mitigate impacts on these communities. Although the detailed information including a detailed flora and fauna survey, Arborist Report and 7 part assessments is not required at this stage of the planning proposal process, the timing of this information needs to be specified, including justification as to why the detailed information is not necessary at this stage and needs to foreshadow likely impacts on vegetation and potential changes to the Planning Proposal submitted.

This report has been prepared by Total Earth Care in response to the above requests from Pittwater Council and contains the following;

- An inventory of native and exotic species present within the vegetated areas of each property. Species information was gathered during a site visit on 30 May 2013.
- An assessment of the vegetation communities present on site, based on species recorded and with reference to recent mapping methodologies (SMCMA Mapping – DECCW 2009).
- An assessment of the conservation significance of the vegetation communities based on the communities listing on the NSW Threatened Species Conservation Act and the Commonwealth Environmental Protection and Biodiversity Conservation Act.
- Timing of further ecological assessment information and reasons why it is not required at this stage.
- Mitigation measures to be employed to minimise impacts to these communities.

Vegetation communities assessed as present at 2 Macpherson Street / 23-27 Warriewood Road, Warriewood are illustrated in Map 01, below.



Plant species recorded at 2 Macpherson Street / 23-27 Warriewood Road, Warriewood are provided in the following table.

General Status	
*	Exotic (not native to Australia)
N()	Noxious weeds and 'Control Class' as listed on the NSW Noxious Weeds Act 1993 for the Pittwater LGA
ni	Non - indigenous native species (does not naturally occur at this locality)
Conservation Status	
CE	Critically Endangered - listed under Schedule 1A of the TSC Act
E	Endangered - listed under Schedule 1 of the TSC Act
V	Vulnerable - listed under Schedule 2 of the TSC Act
Abundance	
c	Common, species occur all over the site
o	Occasional, species occur over the survey area but not in large numbers at any occurrence
u	Uncommon, species occur only once or twice during the survey

Status	Family	Genus species	Common Name	Macpherson/Warriewood Inside	Macpherson/Warriewood Outside
	Amaranthaceae	Alternanthera denticulata	Lesser Joyweed	u	u
*	Araceae	Alocasia brisbanensis	Cunjevoi	u	-
*	Araceae	Colocasia esculenta	Taro	u	-
	Arecaceae	Livistona australis	Cabbage Fan-palm	-	u
*	Arecaceae	Livistona chinensis	Chinese Fan Palm	u	-
*	Arecaceae	Washingtonia filifera	Cotton Palm	-	u
*	Asteraceae	Ageratina adenophora	Crofton Weed	o	u
*	Asteraceae	Tagetes minuta	Stinking Roger	u	-
	Azollaceae	Azolla pinnata		u	-
N(4)	Basellaceae	Anredera cordifolia	Madeira Vine	u	u
*	Bignoniaceae	Jacaranda mimosifolia	Jacaranda	u	-
*	Cannaceae	Canna x generalis	Canna Lily	-	u
	Casuarinaceae	Casuarina glauca	Swamp Oak	c	c
	Commelinaceae	Commelina cyanea	Scurvy Weed	u	u
*	Commelinaceae	Tradescantia fluminensis	Wandering Jew	c	c
N(4)	Convolvulaceae	Ipomoea indica	Morning Glory	o	-

Status	Family	Genus species	Common Name	Macpherson/Warriewood Inside	Macpherson/Warriewood Outside
	Dennstaedtiaceae	Hypolepis muelleri	Harsh Ground Fern	u	-
	Dicksoniaceae	Calochlaena dubia	Soft Bracken	u	-
	Euphorbiaceae	Glochidion ferdinandi var ferdinandi	Cheese Tree	o	-
N(4)	Euphorbiaceae	Ricinus communis	Castor Oil Plant	u	u
*	Fabaceae - Caesalpinioideae	Senna pendula var glabrata		o	o
*	Fabaceae - Faboideae	Erythrina crista-galli	Cockspur Coral Tree	o	o
*	Fabaceae - Faboideae	Erythrina sykesii	Coral Tree	o	o
*	Haloragaceae	Myriophyllum aquaticum	Parrots Feather	u	u
	Lemnaceae	Spirodela polyrhiza		u	-
ni	Moraceae	Ficus benamina	Fig	o	o
ni	Moraceae	Ficus elastica	Rubber Tree	o	-
	Moraceae	Ficus macrophylla	Moreton Bay Fig	o	-
	Myrtaceae	Eucalyptus robusta	Swamp Mahogany	u	c
	Myrtaceae	Melaleuca linariifolia	Flax-leaved Paperbark	u	o
	Myrtaceae	Melaleuca quinquenervia	Broad-leaved Paperbark	u	-
	Najadaceae	Najas tenuifolia	Waternymph	u	u
N(4)	Oleaceae	Ligustrum lucidum	Large Leaved Privet	o	o
N(4)	Oleaceae	Ligustrum sinense	Small Leaved Privet	o	o
	Philydraceae	Philydrum lanuginosum	Woolly Waterlily	u	u
*	Phormiaceae	Phormium tenax	NZ Flax	-	u
*	Poaceae	Arundo donax	Spanish Reed	c	u
	Poaceae	Phragmites australis	Common Reed	u	-
*	Polygonaceae	Rumex sp	Dock	o	o
*	Salicaceae	Salix babylonica		-	u
N(3)	Solanaceae	Cestrum parqui	Green Poisonberry	c	c
	Thelypteridaceae	Christella dentata	Binung	o	c
N(4)	Urticaceae	Parietaria judaica	Asthma Weed	u	-
N(4)	Verbenaceae	Lantana camara	Lantana	o	u

Species highlighted in Green are characteristic of Swamp Sclerophyll Forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregion Endangered Ecological Community.

Swamp Sclerophyll Forest EEC – 2 Macpherson Street / 23-27 Warriewood Road

The NSW Scientific Committee final determination for the EEC (NSW Scientific Committee 2005) provides the following relevant information to the subject sites.

Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions is the name given to the ecological community associated with humic clay loams and sandy loams, on waterlogged or periodically inundated alluvial flats and drainage lines associated with coastal floodplains.

Swamp Sclerophyll Forest on Coastal Floodplains has an open to dense tree layer of eucalypts and paperbarks, which may exceed 25 m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality.

The most widespread and abundant dominant trees include *Eucalyptus robusta* (swamp mahogany) with other smaller trees scattered throughout at low abundance or which may be locally common, including *Casuarina glauca* (swamp oak), *Livistona australis* (cabbage palm), *Glochidion ferdinandi* (cheese tree) and *Melaleuca linariifolia*, shrubs include *Acacia longifolia* (Sydney golden wattle) among others.

Swamp Sclerophyll Forest on Coastal Floodplains may adjoin or intergrade with several other endangered ecological communities, which collectively cover all remaining native vegetation on the coastal floodplains of New South Wales. These include Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions. (NSW Scientific Committee 2005)

Remnant Swamp Sclerophyll Forest (SSF) vegetation exists around the boundary of the Foleys Nursery site associated with the creekline along the northern and eastern boundaries and the wetland area to the west. The majority of the threatened vegetation exists either within the creekline itself or on the adjacent creekbank from the main nursery property, closer to the Lot boundary. The vegetation is generally in low/moderate condition with exotic species dominating the understorey and creek banks.

The Macpherson Street road frontage supports SSF from the south-western Lot boundary to the junction with Narrabeen Creek.

Within the nursery property two stands of regrowth SSF vegetation occur as regrowing swamp oak trees characteristic of the threatened vegetation.

Within the Warriewood Road properties SSF vegetation occurs as remnant swamp oak trees, and a mature cheese tree. The remaining vegetation in the area occurs in poor condition with exotic species dominating the understorey to the north, and all strata to the south.

Vegetation communities assessed as present at 18 Macpherson Street, Warriewood are illustrated in Map 02, below.



Plant species recorded at 18 Macpherson Street, Warriewood are provided in the following table.

General Status	
*	Exotic (not native to Australia)
N()	Noxious weeds and 'Control Class' as listed on the NSW Noxious Weeds Act 1993 for the Pittwater LGA
ni	Non - indigenous native species (does not naturally occur at this locality)
Abundance	
c	Common, species occur all over the site
o	Occasional, species occur over the survey area but not in large numbers at any occurrence
u	Uncommon, species occur only once or twice during the survey

Status	Family	Genus species	Common Name	18 Macpherson Inside	18 Macpherson Outside
	Apiaceae	Hydrocotyle verticillata	Shield Pennywort	o	-
*	Asteraceae	Ageratina adenophora	Crofton Weed	u	-
	Casuarinaceae	Casuarina glauca	Swamp Oak	c	u
	Commelinaceae	Commelina cyanea	Scurvy Weed	u	-
*	Commelinaceae	Tradescantia fluminensis	Wandering Jew	o	o
	Cyperaceae	Schoenoplectus validus		c	-
*	Fabaceae - Caesalpinioideae	Senna pendula var glabrata		u	-
	Fabaceae - Faboideae	Kennedia rubicunda	Dusky Coral Pea	u	-
	Fabaceae - Mimosoideae	Acacia implexa	Hickory Wattle	c	-
	Fabaceae - Mimosoideae	Acacia longifolia ssp longifolia	Sydney Golden Wattle	c	-
	Juncaceae	Juncus kraussii ssp	Sea Rush	o	-
	Juncaceae	Juncus usitatus	Common Rush	o	-
	Lomandraceae	Lomandra longifolia	Spiny-headed Mat-rush	o	-
	Myrtaceae	Eucalyptus robusta	Swamp Mahogany	u	u
ni	Myrtaceae	Eucalyptus sp.		u	-
*	Poaceae	Andropogon virginicus	Whisky Grass	o	-
N(3)	Poaceae	Cortaderia selloana	Pampas Grass	u	-
*	Poaceae	Paspalum dilatatum	Paspalum	o	-
	Polygonaceae	Persicaria lapathifolia	Pale Knotweed	o	-
*	Polygonaceae	Rumex sp	Dock	o	-
N(4)	Solanaceae	Cestrum parqui	Green Poisonberry	o	-
	Typhaceae	Typha orientalis	Broadleaf Cumbungi	u	-
N(4)	Verbenaceae	Lantana camara	Lantana	u	-

Species highlighted in Green are characteristic of Swamp Sclerophyll Forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregion Endangered Ecological Community.

Species highlighted in Blue are characteristic of Freshwater Wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregion Endangered Ecological Community.

Swamp Sclerophyll Forest EEC – 18 Macpherson Street

Information from the NSW Scientific Committee final determination for the EEC is as above for the occurrence of the community on the 18 Macpherson Street property.

The majority of the SSF vegetation present within the Lot boundaries of 18 Macpherson Street occurs as regrowth swamp mahogany, swamp oaks and *Acacia longifolia*, with one remnant swamp mahogany inside the boundary fence towards the north-eastern corner of the Lot. The smaller occurrence of SSF vegetation towards the centre of the property is more species rich than the larger area along the eastern boundary. Both of which occur in low to low/moderate condition and are heavily infested with exotic groundcover species.

Two remnant swamp mahogany trees occur in the north-eastern corner of the property as components of Swamp Sclerophyll Forest, one of which is within the boundary fence, the other occurs on the adjacent side of the fence on the Narrabeen Creek bank.

The remaining vegetation along the northern Lot boundary consists of non-native trees such as large-leaf privet and rubber tree *Ficus elastica*.

Freshwater Wetlands EEC – 18 Macpherson Street

The NSW Scientific Committee final determination for the EEC (NSW Scientific Committee 2005) provides the following relevant information to the subject site.

Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions is the name given to the ecological community associated with periodic or semi-permanent inundation by freshwater, although there may be minor saline influence in some wetlands.

The structure of the community may vary from sedgelands and reedlands to herbfields, and woody species of plants are generally scarce. Typically these wetlands form mosaics with other floodplain communities, and often they include or are associated with ephemeral or semi-permanent standing water (Goodrick 1970).

Freshwater Wetlands on Coastal Floodplains may adjoin or intergrade with several other endangered ecological communities, which collectively cover all remaining native vegetation on the coastal floodplains of New South Wales. These include Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions, among others.

Freshwater Wetlands on Coastal Floodplains are sometimes fringed by trees, such as *Casuarina glauca* (swamp oak) and *Melaleuca quinquenervia* (paperbark), indicating transitional zones to forested communities of the floodplains. The boundaries between these communities are dynamic and may shift in response to changes in hydrological regimes, fire regimes or land management practices (Johnston *et al.* 2003, Stevenson 2003). (NSW Scientific Committee 2005)

Freshwater Wetland (FW) vegetation occurs on the 18 Macpherson Street property towards the south-eastern corner of the Lot adjacent to the southern extent of the regrowth Swamp Sclerophyll Forest. The FW vegetation occurs in a waterlogged depression supporting a number of wetland sedges including *Juncus usitatus*, *Persicaria lapathifolia*, *Schoenoplectus validus* and *Typha orientalis* all listed as characteristic species of Freshwater Wetland vegetation on the Scientific Committee's final determination for the endangered listing of the community (NSW Scientific Committee 2005).

The community occurs as regrowth vegetation in an area previously supporting buildings as part of the former land owner's infrastructure. Nevertheless the occurrence of the particular assemblage of species characteristic to the threatened community, in the correct area of occurrence, with the required soil habitats, results in the assertion of the presence of the threatened Freshwater Wetland vegetation community in the area.

Draft Warriewood Valley Strategic Review Report

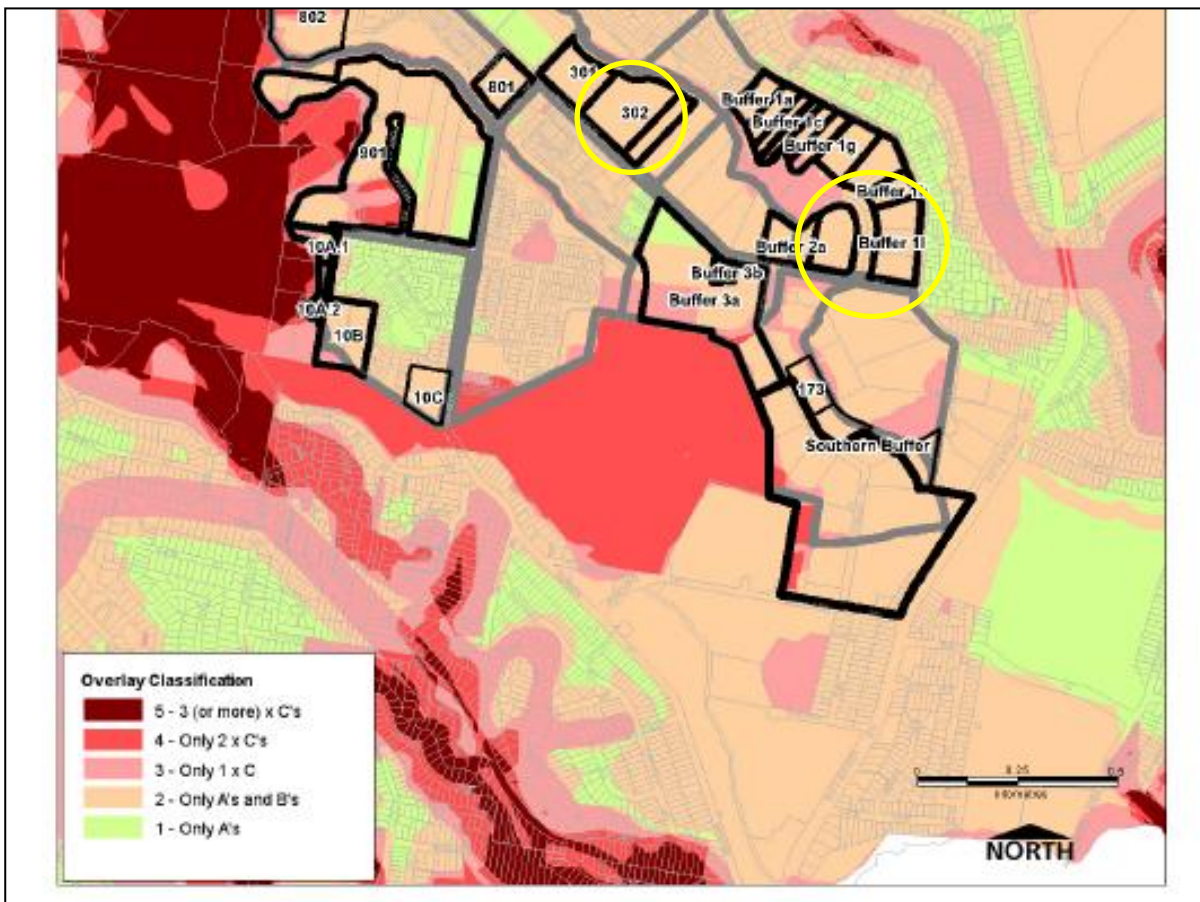
Within the Draft Warriewood Valley Strategic Review Report (NSW DPI 2012), land capability has been assessed based on a number of geographical layers and environmental characteristics, one being biodiversity values. Land Capability Assessment has been mapped within the Report with capabilities divided into the following 3 classes;

- **Class A: Low restriction to intensification of development.** Existing development may require generic management prescriptions to achieve sustainable land use. Intensification of development must be confined to defined targets to maintain sustainability.
- **Class B: Moderate restriction to intensification of development.** Existing development forms require generic management prescriptions to achieve sustainable land use. Any intensification needs site specific investigation and must address constraints.
- **Class C: Significant restriction to intensification of land use.** Existing development forms require site specific and detailed management prescription to achieve sustainable land use. Any intensification must fully address each specific constraint.

Biodiversity Capability has been classified as per the following table:

Map Layer	Objective	Sustainability Link	Layer	Criteria
Biodiversity	Preserve Biodiversity	Environmental	A	Other Land
			B	Category 2 Bushland; Wildlife Corridors (category 2)' Seabed Areas
			C	Includes endangered ecological communities (Littoral Rainforest areas, Pittwater Spotted Gum, Freshwater Wetlands, Swamp Forest, Duffy's Forest, Salt Marsh, and Themeda Grassland); Category 1 Bushland > 400 sqm; Wildlife Corridors (Category 1); Seagrass Beds; Mangroves; Tidal Flats; National Parks.

Composite Capability Map (Draft Warriewood Valley Strategic Review Report)



As per the above map taken from the Draft Warriewood Valley Strategic Review Report, both the site at 2 Macpherson Street / 23-27 Warriewood Road and 18 Macpherson Street are mapped as Class A & B restrictions to development.

The presence of EEC vegetation may increase the restrictions on areas within the subject properties to Class C.

2 Macpherson Street / 23-27 Warriewood Road

Threatened vegetation at the 2 Macpherson Street / 23-27 Warriewood Road property is generally contained within the riparian areas of the site and hence in areas not well suited for development. Vegetation management measures will be developed at the design and construction stage of the proposal and their implementation will protect the threatened vegetation on the site. Potential mitigation measures are provided below.

18 Macpherson Street

The EEC vegetation at 18 Macpherson Street occurs in an area where it is likely development and construction will be undertaken. The occurrence of this threatened vegetation does not preclude the area for development but it does mean the proposal will need to be assessed under the provisions of the NSW Environmental Planning and Assessment Act 1979, including an Assessment of Significance. The Assessment of Significance will evaluate the impacts of the development on the EEC vegetation (along with any other potentially occurring threatened flora and fauna) and form a conclusion as to whether the impacts will be 'significant' or 'non-significant' on threatened flora and fauna.

Should a significant impact be assessed, the proposal may require a Species Impact Statement to be prepared which will again assess the impacts of the development.

This will occur once the proposal has passed through the Gateway and will include the identification of necessary mitigation measures / offsets to respond to the findings of the assessments (as required).

Potential Mitigation Measures to Minimise Impacts to Threatened Vegetation at Detailed Design and Construction Stage

Notes from the Pre-lodgement meeting with Pittwater Council included a request to outline measures that could be employed to mitigate impacts on threatened communities occurring on the development sites. Appropriate measures will be determined at the development application stage to respond to the detailed design of the new development. These measures could include the following;

- Minimise, where possible, removal of threatened vegetation, should its occurrence cross-over with areas designated for development / infrastructure.
- If possible, retain patches of threatened vegetation as green-space areas within the proposed development plans. Areas retained should be fenced (where appropriate) to ensure access is restricted for future residents.
- Where appropriate undertake translocation of the soil seed bank in areas where threatened vegetation may be removed to appropriate recipient sites. Implement vegetation management measures to ensure its successful establishment.
- Building designs should be sensitive to the potential indirect impact on any retained threatened vegetation such as shading, alterations to stormwater run-off and interruption of vegetative link corridors.
- Ensure, wherever possible, future development maintains drainage and overland flow conditions in areas where threatened vegetation is retained, future stormwater should not be released into areas affecting retained threatened vegetation.
- Prior to the commencement of construction activities prepare Vegetation Management Plans which prescribe in detail the measures to be undertaken pre, during and post construction activities to protect and enhance retained vegetation. Ensure these management actions are implemented.
- Ensure all Landscape Plans prescribe planting to be with species either characteristic of those within adjacent threatened vegetation, or species that will not disperse into threatened vegetation habitats and become weeds.
- Ensure the preparation of a Construction Environmental Management Plan in order to properly manage the environmental risks, compliance with any environmental conditions of approval for the project, and include a section on the retention and protection of the threatened vegetation. Provide environmental information in site inductions for all staff.
- Ensure the CEMP adequately addresses tree protection measures, and in particular has exclusion fencing in place to prevent access to the drip zone of significant trees. Where work needs to be done within the drip line of trees. Any soil compaction or filling required around the base of retained trees should be minimised and ensure fill does not bury any section of the trees' trunks.
- Prepare a Fire Management Plan to ensure the natural fire regimes of the threatened vegetation communities are not significantly impacted by the long-term exclusion of fire adjacent to residential development.
- Ensure a staged and controlled planning, procurement and construction plan is adhered to, i.e. a Quality Assurance program that incorporates Occupational Health and Safety and Environmental Management.

- Ensure statutory obligations are met, including the following legislation where relevant:
 - *Threatened Species Conservation Act 1995.*
 - *Fisheries Management Act 1994.*
 - *Water Management Act 2000.*
 - *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).*
 - *Environmental Planning and Assessment Act 1979.*
 - *National Parks and Wildlife Act 1974.*
 - *Noxious Weeds Act 1999.*
 - *Heritage Act 1977.*
 - *Protection of the Environment Operations Act (POEO Act), 1997.*
 - *Occupational Health and Safety Act 2000.*
 - *Waste Avoidance and Resource Recovery Act 2001.*
- During construction activities ensure protected vegetation to be retained is fenced to exclude access by all construction staff.
- Sedimentation and stormwater controls should be installed to protect threatened vegetation from potential pollution via uncontrolled stormwater.
- Ensure regular environmental audits are undertaken to check protection measures installed are maintained and functioning correctly.
- Employ a Project Ecologist to oversee the implementation of the Vegetation Management Plans and assist in the supervision of activities with the potential to impact directly or indirectly on the threatened vegetation.
- Remove all noxious weed species listed under the *Noxious Weeds Act 1993* for the Warringah LGA at the subject site.
- Undertake programmes of bush regeneration to improve, not only the ecological quality of the vegetation, but the aesthetic value to promote its retention within the development sites.
- No machinery parking or materials storage is to occur in areas of the subject site beyond the construction footprint where impacts are possible on threatened vegetation.
- No wash off of machinery, equipment, chemicals and excess construction materials is to occur in, or be carried out in, an area that may affect the retained vegetation of the subject site.
- Implementation of Phytophthora management protocols during any and all works where persons are required to enter areas of retained threatened vegetation.

References

Goodrick GN (1970) A survey of wetlands of coastal New South Wales. Technical Memorandum No. 5. CSIRO, Canberra.

Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions Endangered Ecological Community listing - NSW Scientific Committee: Final Determination.

<http://www.environment.nsw.gov.au/determinations/FreshwaterWetlandsEndSpListing.htm> Accessed 06.06.2012

Johnston SG, Slavich PG, Hirst P (2003) Alteration of groundwater and sediment geochemistry in a sulfidic backswamp due to *Melaleuca quinquenervia* encroachment. *Australian Journal of Soil Research* 41, 1343-1367.

NSW Department of Primary Industries (2012) Draft Warriewood Valley Strategic Review Report

Stevenson, M (2003) Remote sensing and historical investigation of environmental change and *Melaleuca* encroachment in Tuckean Swamp, north-eastern NSW. Unpublished report. School of Environmental Science and Management, Southern Cross University, Lismore.

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