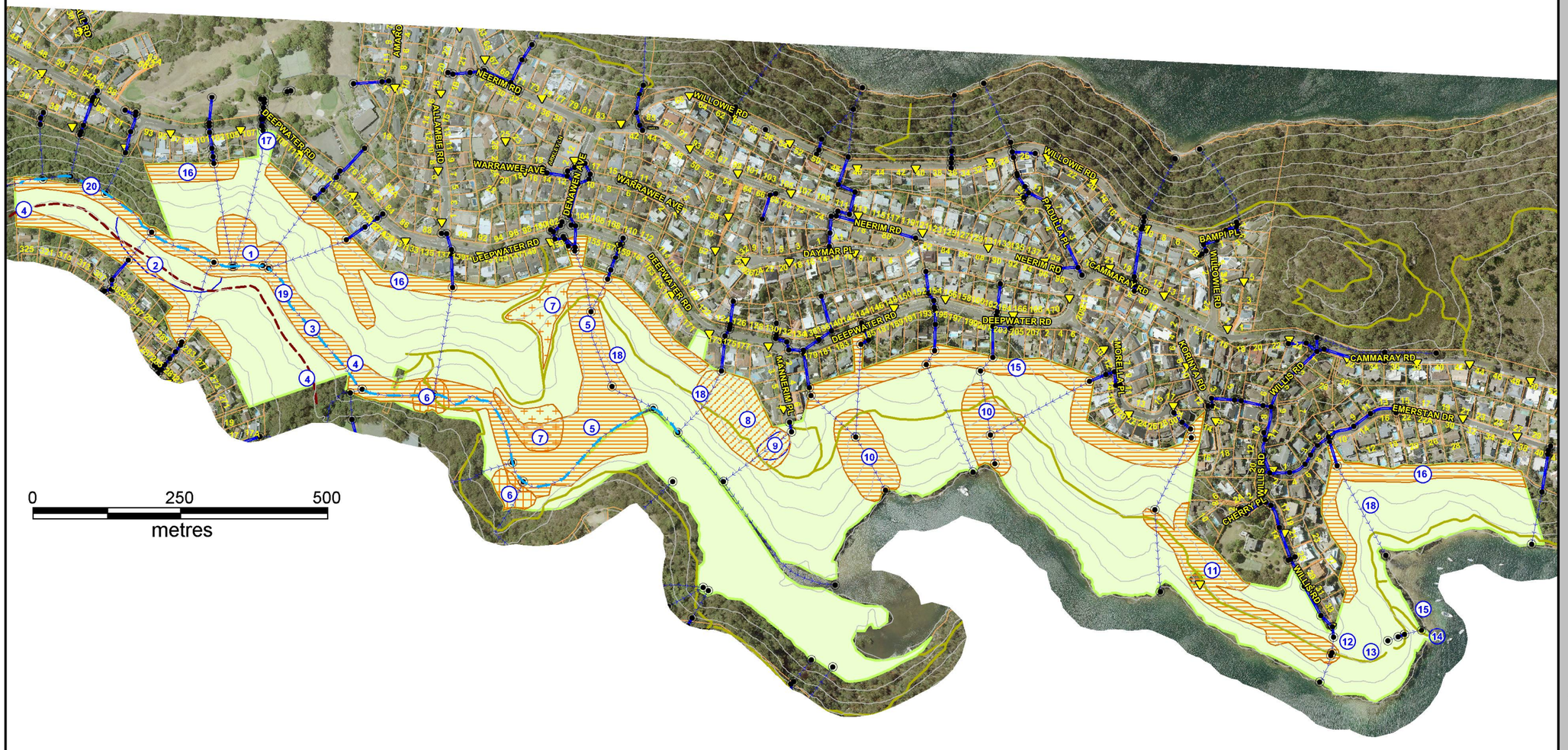
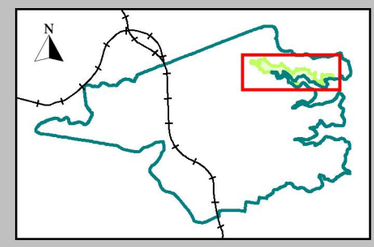
North Arm Bushland Actions

Priorities will be given to programs for the long term benefit to the reserve. Natural assets at greatest risk will be given priority to avert irreversible deterioration. All measures cannot be implemented simultaneously - resources may not be available or it may not be appropriate.

1. Bush Regeneration Contractors to complete natural area restoration works in riparian zone targeting the removal of Privet, Arundo Grass, Asparagus Fern and Mist Flower.
2. Monitor area for reserve impacts from sewer line overflows.
3. Water monitoring site conducted by Sydney Water quarterly and macroinvertebrate surveying completed biannually.
4. Bush track maintenance access path to be defined further with vegetation pruned to allow continuous access for bushland restoration works.
5. Bush Regeneration Contractors to complete natural area restoration works in riparian and estuary zone.
6. North Arm Reserve and Scotts Creek Parkcare Bushcare groups to periodically visit sites along Scotts Creek to complete restoration work in riparian zone.
7. Willoughby City Council's (WCC) Bushland Regeneration Team and Fire and Rescue NSW to prepare and conduct two separate prescribed burns along the Sydney Water access road, entry between 149 and 153 Deepwater Road. The burns will encourage the regeneration of the listed rare Eucalyptus luehmanniana.
8. Bush Regeneration Contractors to complete natural area restoration work across two stormwater lines.
9. Continue to monitor stormwater line for erosion.
10. Bush Regeneration Contractors to complete natural area restoration works along stormwater lines removing woody weeds and vines.
11. Bush Regeneration Contractors to complete natural area restoration works on fill embankment.
12. WCC Bushland Support Team to periodically trim vegetation on roadway to allow clear access to Willis Road Wharf.
13. Monitor and remove debris from inlet pit from road side gutter.
14. Monitor and investigate options for permanent storage of dinghies informally kept on foreshore.
15. Bush Regeneration Contractors to monitor and treat woody and vine weed species, particularly Asparagus Fern along reserve boundaries with residents.
16. WCC Bushland Support Team to continue weed control in stormwater line and adjacent to reserve.
17. Monitor, manage and retain sandstone drainage lines as threatened species habitat as per bushland management principle q) and the Save Our Species Program.
18. Contractors to collect litter along the creekline to the estuary.
19. Monitor encroachments along Deepwater Road, Mannerim Place, Morella Drive, Willis Road, Cherry, Place, Emerstan Drive and Eastern Valley Way, as per Council records.
20. Contractors to conduct periodic litter clearing along Scotts Creek down to the estuary and on all drainage lines into the reserve, approximately alternate months (with adjustment for rain events that overflow rubbish past the GPTs).



RESERVE ACTION PLAN
NORTH ARM RESERVE



Plan details

Status:	Final
Prepared by:	N. Yu
Drawn by:	N. Prasad
Date printed:	10/02/2021
Approximate Scale:	1:6600 on A3

Legend

- 16 — Property number
- 12 — Action plan activity
- Stormwater node
- Sewer access chamber **
- Approximate fire hydrant location
- Power pole
- 35 — 10m contours
- Stormwater network - Underground *
- Stormwater network - Overground / Unknown *
- Creek
- Bushland Track / Path *
- Maintenance Track / Path *
- Property boundary
- Reserve / bushland
- Council staff regeneration site
- Council bush regeneration contractors
- BushCare group
- Proposed prescribed burn area

* The accuracy of this data is not guaranteed and must be verified prior to use.

References

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North Arm Reserve Action Plan

Reserve Profile

North Arm Reserve is a long linear bushland reserve 45.9ha in size that follows the northern shoreline of Fig Tree Cove located in Scotts Creek catchment, Castle Cove and Middle Cove.

It is Council's largest bushland reserve and is part of a continuous green corridor from Explosives Reserve to the north, Willis Park to the west, and Harold Reid Reserve to the south.

It consists of steep sandstone slopes that form a large valley running down to Scotts Creek and the northern embankment of Fig Tree Cove.

The 4.5km North Arm Walking Track passes through the entire reserve, connecting Explosives Reserve to Harold Reid Reserve.

PLANT COMMUNITY: The reserve is primarily Coastal Sandstone Gully Forest [S_DSF09] with Coastal Upland Wet Heath Swamp [S_FrW02] at the mouth of Scotts Creek to Fig Tree Cove. The rest of the reserve is comprised of scattered areas of Esturine Mangrove Forest [S_SW01], Coastal Enriched Sandstone Dry Forest [S_DSF04], Coastal Sandstone Gallery Rainforest [S_RF02] and Coastal Enriched Sandstone Moist Forest [S_WSF02].

Statement of Significance

North Arm Reserve is classified as bushland as defined in State Environmental Planning Policy No 19 (*Vol 1, 1.4), and is protected under State and Commonwealth Legislation (*Vol 1, 1.5.2). It is zoned E2 Environmental Conservation in the Willoughby Local Environment Plan (WLEP) 2012. North Arm is designated as a Wildlife Protection Area under the *Companion Animals Act* 1988.

ABORIGINAL CULTURAL SIGNIFICANCE: The Gamaragal clan originally occupied North Arm Reserve. Indigenous people utilised this area for its clean fresh and saltwater resources. The reserve contains significant sandstone rock ledges that were used for shelter. Middens, shelter middens and shelter deposit sites have been recorded in the reserve.

NATURAL HERITAGE SIGNIFICANCE: North Arm Reserve is significant due to its connectivity with other surrounding bushland reserves. The reserve also provides a variety of habitats for both terrestrial and marine species. Rocky foreshore provides habitat for small reptiles and invertebrates. The thick forest undergrowth and sandstone heath provides habitat for large Marcopods such as Swamp Wallabies.

HISTORIC CULTURAL SIGNIFICANCE: Adjoining the reserve is a castle residence that Dr Henry Willis began constructing in 1903 using sandstone quarried on his 52 acre property. It took 18 months to complete and was named Innisfallen Castle after a ruined abbey in Killarney, Ireland. At that time access was only by boat, so a private wharf was constructed to carry supplies to the building site. Both the castle and wharf are now listed as heritage items on the NSW Heritage Register and Local Government Heritage Register, respectively.

The Scotts Creek Sewage Aqueduct which stretches across Scotts Creek spanning 46.3m in length is also listed on the Local Government Heritage Register. It was constructed in 1929 as part of the Northern Suburbs Ocean Outfall Sewer and is registered for its past and ongoing use, technology of construction and setting with the steep valley of Scotts Creek.

HABITAT SIGNIFICANCE: Due to its large size, diverse plant communities, topography and minimal tracks, North Arm Reserve provides refuge for many wildlife species. The reserve encircles a large area of mangrove with remnant saltmarsh and the upper reaches of the creek provide fresh water. As a wildlife corridor it allows species to pass east/west and north/south. Significant species include Swamp Wallaby, Long-nosed Bandicoot, Short-beaked Echidna, Brown Antechinus, Red Crowned Toadlet, Superb Lyrebird, Buff-banded Rail, Azure Kingfisher and Powerful Owl.

Reserve Impacts

North Arm Reserve is long and relatively thin, with a walking track dissecting it through the middle and is subject to urban impacts and pressures. Numerous stormwater and sewer lines pass through the reserve creating soil disturbance and weed outbreaks in these areas.

Scotts Creek after rainfall carries significant amounts of water via stormwater from the hard surfaces further upstream in Chatswood causing erosion along the creek bank. Large amounts of rubbish, increased nutrient and sediment loads are also carried by stormwater. Rubbish accumulates along the entire length of the creek bank particularly in the estuary zone at the creek mouth. The increased sediment flowing down the creek over a long time has also led to the enlargement of the mangroves in the estuary. Further stormwater management is required in the upper catchment in the Chatswood CBD to mitigate rubbish and sediments from washing down into North Arm Reserve.

ENCROACHMENTS: Most encroachments are extensions of gardens and lawns beyond property boundaries. All known encroachments are identified on the front of this plan.

Wildlife Habitat Issues

Threats to wildlife and habitat include: predation by foxes, rats and feral and/or domestic cats, loss of tree hollows to invasive feral European honey bees, degradation of habitat from illegal vegetation removal, weed encrochments from adjacent property boundaries, erosion and sediment build up along the banks of Scotts Creek, stormwater and sewer lines, as well as pollution from sewer overflows and stormwater. Tracks and drainage lines provide habitat for a threatened species. Current maintanence and management practices can harm this species and reduce its habitat, requiring specific measures to avoid these impacts.

Achievements

Track upgrades have been completed throughout the whole reserve to improve access, particularly from Mannerim Place to H.C. Press Park. The bridge over Scotts Creek below the Scotts Creek sewage aqueduct has been maintained including armouring of embankments.

Restoration work along the estuary and the Sydney Water access road has been completed and continues. This work included the removal of weeds, bank stabilisation, transplantation of mangroves and revegetation with native plants.

Sandstone restoration work of the sea wall has been completed at the Willis Road Wharf and at the boat storage area.

Stormwater lines have been improved and stabilised by rock armouring and revegetated with native plants

A large prescribed burn was completed at the western side of the Sydney Water access road to enhance the diversity of plants and wildlife found in the reserve and to also reduce fuel loads for bushfire risk management.

The feasibility of installing a gangway and pontoon access from the existing infrastructure at the Willis Road Wharf, owned by NSW Maritime was reviewed in conjunction with Transport NSW but is not proceeding at this time.

Liaison with residents adjacent to the reserve has been ongoing to minimise reserve impacts

Bushland Management Goals

To This bushland Reserve Action Plan has identified the following management aims from the Urban Bushland Plan of Management 2014 as priority objectives:

5.3b: To create and or maintain conditions in which creek and drainage lines are protected from increased erosion and/or sedimentation due to urban impacts.

5.4b: To maintain the integrity of bushland reserves through the reduction of encroachments and other boundary impacts.

6.2f: To preserve and increase ecological links across the LGA and regionally to assist the movement of fauna.

6.2g: Maintain natural habitat formations and supplement with manufactured structures where natural habitat has been depleted.

6.3b: To implement weed control programs which are based on regeneration and restoration principles and which increase bushland resilience to further weed infestation.

7.1g: To manage fire such that the fire regime and implementation of the burn is beneficial to flora and fauna diversity and habitat.

10.1b: To ensure that leases and licences for activities undertaken in, or adjoining, or impacting on, bushland areas are compatible with the sustainable management of bushland.

Bushland Management – General Principles and Actions

a) Bushland regeneration is a long term process requiring staged weed removal to ensure establishment of native plant communities. Work will proceed from good bush to degraded areas with techniques that encourage regeneration.

b) If possible, weed refuse and natural debris composted on-site.

c) If natural regeneration is deemed inadequate, supplementary plantings to mimic local plant communities and landscapes will be used with local provenance species.

d) Standing dead trees and forest litter (including logs/branches) to be kept for wildlife habitat unless deemed a risk to safety.

e) Monitor, maintain and enhance vegetation connectivity for wildlife habitat within the reserve and reserve networks.

f) Phytophthora cinnamomi (a root rot pathogen) is listed as a key threatening process in NSW. Bushland workers are to use hygiene protocols to minimise risk.

g) Report and record all reserve encroachments. Monitor for tree vandalism and/or removal and report to Council Compliance for appropriate action.

h) Monitor wildlife habitat and supplement where necessary.

i) Monitor feral animal activity and implement appropriate management actions where necessary.

j) Encourage the community to report wildlife sightings via the Wildlife Watch Program.

k) Bushfire management will be achieved through implementation of a strategic hazard reduction program consistent with the Bushfire Risk Management Plan.

l) Species diversity will be maintained by an ecological burn program in a mosaic pattern.

m) Monitor and protect Aboriginal cultural heritage sites. Bushland staff to notify Aboriginal Heritage Office prior to a burn to identify sites and implement protection measures.

n) Preserve natural features for educational purposes and continue to inform the community of bushland issues through onsite activities and signage. Maintain appropriate signage.

o) Formal tracks to be maintained and unwanted tracks to be closed to prevent damage to habitat and to impede access of feral animals, unless used for access by bushland workers.

p) Establish photo points to monitor work and review annually. Protection of habitat is required for flora and fauna species found in reserves listed under State and Commonwealth legislation as threatened species.

q) The collection of rubbish from bushland is carried out by Council contractors and bushland field staff as required.

Animal List for North Arm Reserve

North Arm Reserve provides habitat for a number native animals.

A list of these species can be found at:

https://www.willoughby.nsw.gov.au/files/sharedassets/public/ecm/willoughby-council-website/publications-reports-master-plans-strategies-action-plans/publications-reports-master-plans-strategies-action-plans/1-native_fauna_of_bantry_bay__sugarloaf_bay_catchments.pdf

Native Plant Species List for North Arm Reserve

FORK FERNS	*Acrotriche divaricata*	*Myrsine variabilis*
PSILOTACEAE	*Brachyloma daphnoides*	*Samolus repens*
Psilotum nudum	*Dracophyllum secundum*	PROTEACEAE
CONIFERS	*Epacris crassifolia*	*Banksia ericifolia*
CUPRESSACEAE	*Epacris longiflora*	*Banksia integrifolia*
Callitris rhomboidea	*Epacris pulchella*	*Banksia marginata*
PODOCARPACEAE	*Leucopogon amplexicaulis*	*Banksia oblongifolia*
Podocarpus spinulosus	*Leucopogon microphyllus*	*Banksia serrata*
FERNS	*Lissanthe strigosa*	*Banksia spinulosa*
PTERIDACEAE	*Monotoca elliptica*	*Conospermum longifolium*
Adiantum aethiopicum	*Styphelia longifolia*	*Grevillea buxifolia*
Adiantum formosum	*Woollsia pungens*	*Grevillea speciosa*
Adiantum hispidulum	EUPHORBIACEAE	*Hakea dactyloides*
Cheilanthes sieberi	*Monotaxis linifolia*	*Hakea gibbosa*
Pellaea falcata	*Homalanthus populifolius*	*Hakea propinqua*
ASPLENIACEAE	*Ricinocarpos pinifolius*	*Hakea salicifolia*
Asplenium australasicum	FABACEAE FABOIDEAE	*Hakea sericea*
Asplenium flabellifolium	*Bossiaea heterophylla*	*Hakea teretifolia*
BLECHNACEAE	*Bossiaea scolopendria*	*Isopogon anethifolius*
Blechnum ambiguum	*Dillwynia retorta*	*Lambertia formosa*
Blechnum cartilagineum	*Glycine clandestina*	*Lomatia myricoides*
Blechnum nudum	*Glycine tabacina*	*Lomatia silaifolia*
Doodia aspera	*Gompholobium latifolium*	*Persoonia lanceolata*
Doodia caudata	*Hardenbergia violacea*	*Grevillea linearifolia*
CYATHEACEAE	*Hovea linearis*	*Grevillea sericea*
Cyathea australis	*Phyllota phylicoides*	*Persoonia levis*
Cyathea cooperi	*Pultenaea daphnoides*	*Persoonia pinifolia*
Cyathea leichhardtiana	*Pultenaea tuberculata*	*Petrophile pulchella*
DENNSTAEDTIACEAE	*Pultenaea ferruginea*	*Telopea speciosissima*
Histiopteris incisa	*Pultenaea flexilis*	RANUNCULACEAE
Hypolepis muelleri	*Pultenaea polifolia*	*Clematis aristata*
Pteridium esculentum	*Pultenaea stipularis*	RHAMNACEAE
DICKSONIACEAE	*Viminaria juncea*	*Pomaderris aspera*
Calochlaena dubia	FABACEAE-MIMOSOIDEAE	*Pomaderris elliptica*
GLEICHENIACEAE	*Acacia binervia*	*Pomaderris intermedia*
Gleichenia dicarpa	*Acacia decurrens*	RUBIACEAE
Gleichenia microphylla	*Acacia elata*	*Gynochthodes jasminoides*
Gleichenia rupestris	*Acacia floribunda*	*Opercularia aspera*
Sticherus lobatus	*Acacia implexa*	*Opercularia hispida*
Sticherus flabellatus	*Acacia linifolia*	RUTACEAE
HYMENOPHYLLACEAE	*Acacia longifolia*	*Boronia ledifolia*
Hymenophyllum cupressiformе	*Acacia mearnsii*	*Boronia pinnata*
LINDSAEACEAE	*Acacia parramattensis*	*Chorelea saligna*
Lindsaea linearis	*Acacia suaveolens*	*Phebalium dentatum*
Lindsaea microphylla	*Acacia terminalis*	*Nematolepis squamea v. squamea*
OSMUNDACEAE	*Acacia ulicifolia*	*Phebalium squamulosum*
Todea barbara	GOODENIACEAE	*Zieria pilosa*
POLYPODIACEAE	*Dampiera stricta*	SAPINDACEAE
Microsorum scandens	*Goodenia bellidifolia*	*Dodonaea triquetra*
Notogrammitis billardierei	*Scaevola ramosissima*	STYLIDIACEAE
Platycerium bifurcatum	*Selliera radicans*	*Stylidium productum*
Pyrrosia rupestris	*Velleia spathulata*	THYMELIACEAE
SCHIZAEACEAE	HALORAGACEAE	*Pimelea linifolia*
Schizaea bifida	*Gonocarpus teucrioides*	VITACEAE
Schizaea dichotoma	LAMIACEAE	*Cissus hypoglauca*
THELYPTERIDACEAE	*Coleus parvifolius*	**MONOCOTS**
Christella dentata	*Clerodendrum tomentosum*	ARECACEAE
DICOTS	LAURACEAE	*Livistona australis*
ACANTHACEAE	*Cassytha glabella*	COMMELINACEAE
Pseuderanthemum variabile	*Cassytha pubescens*	*Commelina cyanea*
ANTHERICACEAE	LOGANIACEAE	CYPERACEAE
Tricoryne simplex	*Logania albiflora*	*Carex inversa*
AZOACEAE	*Mitrasacme polymorpha*	*Caustis flexuosa*
Tetragonia tetragonioides	LORANTHACEAE	*Caustis pentandra*
ACANTHACEAE	*Amyema congener*	*Cyperus brevifolius*
Avicennia marina	*Amyema miquelii*	*Ficinia nodosa*
APIACEAE	MALVACEAE	*Gahnia clarkei*
Actinotus helianthi	*Lasiopetalum ferrugineum*	*Gahnia sieberiana*
Actinotus minor	MENISPERMACEAE	*Lepidosperma filiforme*
Centella asiatica	*Stephania japonica*	*Lepidosperma laterale*
Platysace lanceolata	*Sarcopetalum harveyanum*	*Schoenus imberbis*
Platysace linearifolia	MORACEAE	*Schoenus turbinatus*
Platysace stephensonii	*Ficus coronata*	IRIDACEAE
Xanthosia pilosa	*Ficus macrophylla*	*Patersonia glabrata*
Xanthosia tridentata	*Ficus rubiginosa*	*Patersonia sericea*
APOCYNACEAE	MYRTACEAE	JUNCACEAE
Marsdenia suaveolens	*Acmena smithii*	*Juncus kraussii*
Parsonsia straminea	*Angophora costata*	LOMANDRACEAE
Tylophora barbata	*Angophora crassifolia*	*Lomandra confertifolia*
ARALIACEAE	*Angophora hispida*	*Lomandra filiformis*
Astrotricha latifolia	*Austromyrtus tenuifolia*	*Lomandra glauca*
Astrotricha floccosa	*Corymbia gummifera*	*Lomandra longifolia*
Hydrocotyle sibthorpioides	*Darwinia fascicularis*	*Lomandra obliqua*
Polyscias sambucifolia	*Eucalyptus botryoides*	ORCHIDACEAE
ASTERACEAE	*Eucalyptus globoidea*	*Cryptostylis erecta*
Cassinia denticulata	*Eucalyptus haemastoma*	*Cryptostylis subulata*
Euchiton japonicus	*Eucalyptus luehmanniana*	*Dendrobium linguiforme*
Ozothamnus diosmifolius	*Eucalyptus pilularis*	*Pterostylis pedunculata*
Senecio hispidulus	*Eucalyptus piperita*	*Pterostylis sp.*
Sigesbeckia orientalis	*Eucalyptus punctata*	*Rimacola elliptica*
BLANDFORDIACEAE	*Eucalyptus sieberi*	POACEAE
Blandfordia nobilis	*Kunzea ambigua*	*Anisopogon avenaceus*
BIGNONIACEAE	*Kunzea capitata*	*Digitaria parviflora*
Pandorea pandorana	*Leptospermum polygalifolium*	*Deyeuxia quadriseta*
CAMPANULACEAE	*Leptospermum squarrosum*	*Echinopogon caespitosus*
Lobelia anceps	*Leptospermum trinervium*	*Echinopogon ovatus*
Lobelia purpurascens	*Syncarpia glomulifera*	*Entolasia marginata*
CASUARINACEAE	*Tristaniopsis laurina*	*Entolasia stricta*
Allocasuarina distyla	OLEACEAE	*Eragrostis brownii*
Allocasuarina littoralis	*Notelaea longifolia*	*Eragrostis trachycarpa*
Casuarina glauca	OXALIDACEAE	*Imperata cylindrica*
CHENOPODIACEAE	*Oxalis sp.*	*Microlaena stipoides*
Atriplex australasica	PLANTAGINACEAE	*Oplismenus imbecillis*
Sarcocornia quinqueflora	*Veronica calycina*	*Oplismenus aemulus*
CUNONIACEAE	PHORMIACEAE	*Panicum effusum*
Bauera rubioides	*Dianella caerulea*	*Paspalum vaginatum*
Callicoma serratifolia	*Dianella prunina*	*Poa affinis*
Ceratopetalum apetalum	PHYLLANTHACEAE	*Sporobolus virginicus*
Ceratopetalum gummiferum	*Phyllanthus hirtellus*	*Tetrarrhena juncea*
DILLENIACEAE	*Poranthera corymbosa*	*Themeda triandra*
Hibbertia aspera	*Poranthera microphylla*	RESTIONACEAE
Hibbertia dentata	PITTOSPORACEAE	*Lepyrodia scariosa*
Hibbertia linearis	*Billardiera scandens*	SMILACACEAE
Hibbertia nitida	*Pittosporum revolutum*	*Smilax glyciphylla*
Hibbertia scandens	*Pittosporum undulatum*	XANTHORRHOEACEAE
ELAEOCARPACEAE	POLYGALACEAE	*Xanthorrhoea arborea*
Elaeocarpus reticulatus	*Comesperma ericinum*	*Xanthorrhoea media*
Tetratheca ericifolia	*Persicaria decipiens*	*Xanthorrhoea resinosa*
ERICACEAE-EPACRIDOIDEAE	PRIMULACEAE	