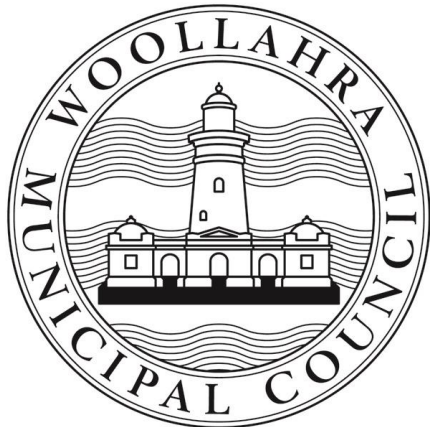


Woollahra Municipal Council

Biodiversity Conservation Strategy

2015 - 2025



APPENDICES



This report should be cited as ‘Woollahra Municipal Council, 2015. Woollahra Biodiversity Conservation Strategy 2015-2025”

APPENDIX A – PLANNING AND POLICY FRAMEWORK

This appendix describes the planning and policy framework available to assist biodiversity management in Woollahra.

International conventions

Australia is a signatory to a number of international conventions related to the conservation of biodiversity, as follows:

- Rio Declaration on Environment and Development 1992
 - International Convention on Biological Diversity 1992
 - United Nations Framework Convention on Climate Change
 - Agenda 21
- Ramsar Convention on Wetlands
- Japan-Australia Migratory Bird Agreement (JAMBA)
- China-Australia Migratory Bird Agreement (CAMBA)
- Bonn Convention

Federal Legislation and Strategies

Australia has taken some significant steps to meet its international obligations under the international treaties and conventions listed above through the development of the following national strategies:

- Intergovernmental Agreement on the Environment 1992
- Australia's National Biodiversity Conservation Strategy 2010-2030
- National Local Government Biodiversity Strategy 1998

Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

The EPBC Act provides a national scheme for environmental protection and biodiversity conservation. It incorporates referral mechanisms to the Commonwealth and environmental impact assessment processes for projects that may impact matters of national significance. Woollahra contains a number of threatened species that are listed under the EPBC Act. Management of biodiversity on Commonwealth land at HMAS Watson is also governed under the EPBC Act where approval is required for actions that are likely to have a significant impact on the environment.

State Legislation

NSW Environmental Planning and Assessment Act 1979 (EP&A Act)

The EP&A Act is the principal planning legislation for NSW, providing a framework for the overall environmental planning and assessment of development proposals. It drives the planning and development processes in Woollahra, and sets the requirements for preparation of a local environmental plan (LEP). The EP&A Act also provides for section 94 contributions and voluntary planning agreements.

National Parks and Wildlife Act 1974 (NPW Act)

Under the National Parks and Wildlife Act, the Director-General of the NPWS is responsible for the care, control and management of all national parks, historic sites, nature reserves, reserves, Aboriginal areas and state game reserves. State conservation areas, karst conservation reserves and regional parks are also administered under the Act.

NSW Threatened Species Conservation Act 1995 (TSC Act)

The TSC Act requires Council to consider potential impacts of development on threatened species, populations and communities in fulfilling their statutory responsibilities under the EP&A Act. It also provides for the preparation of recovery plans (e.g. the *Acacia terminalis subsp. terminalis* Recovery Plan (DECCW 2010)) that may bind Council to certain actions or activities on Council owned land.

Under the NSW Threatened Species Conservation Act 1995, recovery plans may be prepared for a species, a group of species, or for part of the range of a species. The NSW Government also collaborates with the Australian Government to prepare recovery plans for species listed as threatened under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999. Local Councils, Ministers and other public authorities must take any appropriate action to implement a recovery plan, and must not make decisions that are inconsistent with a recovery plan. The priorities and actions contained within the Recovery Plans relevant to Woollahra are listed below:

The priorities and actions contained within the Recovery Plans relevant to Woollahra are listed below:

*National Recovery Plan for Sunshine Wattle *Acacia terminalis subsp. terminalis**

Priority recovery actions recommended by OEH (then DEC) are to:

- Ensure personnel involved in track maintenance are aware of Sunshine Wattle locations and can identify the sub-species
- Develop an appropriate fire regime to avoid frequent fire and long absence of fire
- Undertake weed control as necessary
- Protect known sites from clearing and degradation
- Implement a monitoring program for known populations
- Undertake research into Sunshine Wattles biology and ecology (especially fire response)
- Conduct surveys of suitable habitat to search for new populations of Sunshine Wattle

Allocasuarina portuensis Recovery Plan

The plan consists of ten recovery actions which aim at the overall objective. These actions include to:

- Create and manage buffer zones to protect *A. portuensis* in Sydney Harbour National Park
- Undertake monitoring program
- Assess impacts of any activities

- Undertake habitat restoration and weed management in the original habitat of *A. portuensis* and in the buffer zones established around the planted locations
- Undertake weed management at the planted locations
- Undertake a targeted survey for *A. portuensis*
- Undertake ongoing assessment of the hybridity status of individuals of *A. portuensis* in situ and ex situ by an expert in the plant family Casuarinaceae and discontinue any hybrid plant material
- Establish and maintain a representative collection of *A. portuensis* ex situ during the recovery process
- Establish a translocation trial
- Investigate the biology and ecology of *A. portuensis*.

National Recovery Plan for Grey Headed Flying Fox

Actions for recovery of Grey-headed Flying-foxes are listed below. Some underlying principles of the actions are:

- Identify and protect foraging habitat critical to the survival of Grey-headed Flying-foxes across their range
- Enhance winter and spring foraging habitat for Grey-headed Flying-foxes
- Identify, protect and enhance roosting habitat critical to the survival of Grey-headed Flying-foxes
- Significantly reduce levels of deliberate Grey-headed Flying-fox destruction associated with commercial horticulture
- Provide information and advice to managers, community groups and members of the public that are involved with controversial flying-fox camps
- Produce and circulate educational resources to improve public attitudes toward Grey-headed Flying-foxes, promote the recovery program to the wider community and encourage participation in recovery actions
- Monitor population trends for the Grey-headed Flying-fox
- Assess the impacts on Grey-headed Flying-foxes of electrocution on power lines and entanglement in netting and barbed wire, and implement strategies to reduce these impacts
- Oversee a program of research to improve knowledge of the demographics and population structure of the Grey-headed Flying-fox
- Maintain a National Recovery Team to oversee the implementation of the Grey-headed Flying-fox National Recovery Plan

Approved Recovery Plan for Large Forest Owls

This document constitutes the formal New South Wales State recovery plan for the three large forest owls of NSW - the Powerful Owl *Ninox strenua* (Gould), Sooty Owl *Tyto tenebricosa* (Gould) and Masked Owl *Tyto novaehollandiae* (Stephens). Sightings of the Powerful Owl, and evidence of foraging, have been found at various locations in Woollahra. The Plan contains an extensive range of actions. The actions most relevant to Woollahra are listed below:

- Seek cooperative involvement of other agencies, researchers and the community in the implementation of the regional monitoring program
- Implement a regional monitoring program
- Prepare and disseminate environmental impact assessment guidelines to assist consent and determining authorities and environmental consultants to assess and mitigate the impacts of developments on the large forest owls and their habitats;
- Prepare guidelines addressing issues associated with habitat protection and management, and survey and assessment. The guidelines are to provide detailed information on the identification of significant habitat for owls, appropriate strategies for its protection, and for habitat creation as part of revegetation programs. The guidelines will be published on the DEC threatened species website and link to species profile information; Encourage CMAs to invest in actions that actively manage and/or conserve large forest owl habitat as part of their Catchment Action Plans. In addition, seek other funding opportunities in partnership with community groups, to promote owl conservation on private lands; Encourage private landholders to undertake management options to conserve and/or actively manage large forest owl habitat (and particularly nest sites) through incentive Property Vegetation Plans, Voluntary Conservation Agreements or other management initiatives.

The actions listed above are to be implemented by the Office of Environment and Heritage, Department of Primary Industries.

NSW Water Management Act 2000 (WM Act)

A controlled activity approval under the WM Act is required for certain types of developments and activities that are carried out in or near a river, lake or estuary ('waterfront land'). Under the WM Act, a controlled activity means the:

- erection of a building or the carrying out of a work
- removal of material (whether or not extractive material) or vegetation from land, whether by way of excavation or otherwise
- deposition of material (whether or not extractive material) on land, whether by way of landfill operations or otherwise
- carrying out of any other activity that affects the quantity or flow of water in a water source

NSW Fisheries Management Act 1994

A permit is required to harm (cut, remove, damage, destroy, shade etc.) marine vegetation which includes mangroves, seagrass and seaweeds under Section 205 of the Act. Some examples of activities that may require a permit in Woollahra include:

- construction of jetties - where part of the structure includes a rock or concrete structure or revetment (i.e. reclamation) or where marine vegetation may be harmed during construction, for example by establishing piles resulting in the shading of marine vegetation
- channelisation, relocation or realignment of waterways
- stream bed or bank stabilisation works involving dredging or reclamation to halt erosion

- foreshore stabilisation (e.g. seawalls, retaining walls) where 'water land' may be filled or marine vegetation may be harmed
- boardwalks or walking tracks that cross intertidal areas, mangrove wetlands, seaweeds or seagrasses
- development that may affect marine vegetation by cutting, removing, destroying, transplanting, shading or damaging in any way, e.g. trimming mangroves

The NSW Department of Primary Industries may prepare a recovery plan in accordance with the provisions of the Fisheries Management Act 1994 to promote the recovery of the endangered populations of *Posidonia australis* to a position of viability in nature.

NSW Noxious Weeds Act 1993

In NSW Councils are responsible for the implementation of the NSW Noxious Weeds Act and are referred to as Local Control Authorities. Under the Act, Councils have the authority to carry out private property inspections for noxious weeds and issue notices for their control. Council's must also control noxious weeds on their own land. The Act categorises and defines five control class requirements for various noxious weeds according to their perceived potential to harm the local environment. Each Council has its own list of declared noxious weeds. Woollahra's noxious weeds list is found on the Council website.

State Environmental Planning Policy 19 – Bushland in Urban Areas (SEPP 19)

Under SEPP 19, a consent authority such as Council cannot consent to development that impacts on designated Bushland unless it has undertaken a detailed assessment of the need to protect and preserve the bushland with regards to the aims of the policy. Under SEPP 19, the disturbance must be essential for the public purposes, the area of bushland disturbed as little as possible and as far as possible reinstated at the completion of works.

NSW Crown Lands Act 1989 (CL Act)

The CL Act governs the planning, management and use of Crown land, including provisions to reserve or dedicate lands for a prescribed public purpose and for leasing and licensing. The Department of Primary Industries, together with reserve trusts appointed by the Minister, are responsible for the administration and management of the Crown reserve system. Woollahra Council is the reserve trust manager appointed by the Minister to care, control and manage some of the Crown lands within the LGA.

NSW Local Government Act 1993 (LG Act)

The LG Act requires Council to consider biodiversity conservation and ecological sustainability in its operations. It also requires the preparation of plans of management for all Council owned community land. Council's reserves contain areas that correspond to a number of categories described in the Local Government (General) Regulation 2005, including:

- Natural areas (bushland, wetland, escarpment, watercourse or foreshore)
- Sportsgrounds
- Parks
- Areas of cultural significance
- General community use

NSW Draft Biodiversity Strategy 2010-2015

A draft NSW Biodiversity Strategy 2010-2015 was prepared by the former Department of Environment, Climate Change and Water (DECCW) and Industry and Investment NSW (I&I NSW). It aimed to provide a framework to coordinate and guide investment in biodiversity conservation in NSW.

NSW Saving Our Species Program

Saving our Species is a conservation program launched in 2013 by the Office of Environment and Heritage in 2013 that aims to maximise the number of threatened species that can be secured in the wild in *NSW for 100 years*.

Through *Saving our Species*, threatened species have been allocated to one of six management streams depending on their distribution, ecology, security, and what is known about them. Targeted actions are being developed for each species in each stream.

The six management streams are:

- site-managed species
- iconic species
- data-deficient species
- landscape-managed species
- partnership species
- keep watch species.

Grant funding for large, long term projects addressing site managed species is available through the Saving Our Species Partnership Grants program, funded by the Environmental Trust. The grant program will encourage partnerships between government, the community, non-government organisations and corporations to protect and conserve our most vulnerable plants and animals.

Local Government Legislation

Objectives for land use zones in the Woollahra LEP 2014

The following land use zones and corresponding objectives apply to land identified as key habitat (i.e. land with high biodiversity values) in this Strategy:

Zone E1 National Parks and Nature Reserves

- To enable the management and appropriate use of land that is reserved under the National Parks and Wildlife Act 1974 or that is acquired under Part 11 of that Act.
- To enable uses authorised under the National Parks and Wildlife Act 1974.
- To identify land that is to be reserved under the National Parks and Wildlife Act 1974 and to protect the environmental significance of that land.

Zone E2 Environmental Conservation

- To protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values
- To prevent development that could destroy, damage or otherwise have an adverse effect on those values

Zone RE1 Public Recreation:

- To enable land to be used for public open space or recreational purposes.
- To provide a range of recreational settings and activities and compatible land uses.
- To protect and enhance the natural environment for recreational purposes

Zone RE2 Private Recreation:

- To enable land to be used for private open space or recreational purposes.
- To provide a range of recreational settings and activities and compatible land uses.
- To protect and enhance the natural environment for recreational purposes

APPENDIX B – CURRENT MANAGEMENT PLANS

The following section provides a summary of the key plans of management and policies within Council that relate to the management of biodiversity. It should be noted that this list does not represent the range of policies, procedures and programs carried out by Council that have the opportunity to impact on biodiversity management have not been addressed in this section.

Table B-1. Summary of Current Plans of Management

Report Title	Summary of biodiversity related content	Date
Chiswick Gardens Plan of Management	<ul style="list-style-type: none"> Chiswick Gardens contains a number of established palms and Australian native rainforest trees that are on Council's Register of Significant Trees. Actions in the plan include rationalising plantings in terms of density and theme and replacing trees that are past their Safe Useful Life Expectancy Plan contains management actions relating to the conservation of established trees complement the value as fauna foraging and roosting habitat 	2010
Christison Park Plan of Management	<ul style="list-style-type: none"> Plan does not include specific biodiversity objectives 	1996
Coastal Zone Management Plan Stage 1 (DRAFT)	<ul style="list-style-type: none"> Includes results of on-ground seagrass survey, creek condition assessment, assessment of stormwater quantity and quality/ impacts on estuarine water and sediment quality, assessment of coastal ecosystem health, estuarine habitats, fauna and habitat conservation, ecological Risk assessment – in relation to climate change hazards, estuarine health assessment, assessment of recreational uses of the coastal zone and conflicts between uses Identifies and prioritises major issues Identifies data gaps Identifies potential management options 	2013
Cooper Park Plan of Management	<ul style="list-style-type: none"> Consistent with Park's biodiversity values – addresses both remnant vegetation and watercourse Includes detailed action plan covering all areas/aspects of the park with cost estimates and performance indicators. Action plan superseded by the Cooper Park Conservation Management Plan 	2001
Cooper Park Conservation Management Plan	<ul style="list-style-type: none"> Contains overall conservation principles Park is divided into precincts, and conservation policies developed for each precinct Detailed and prioritised policies for each precinct covering waterways, native vegetation, weed management, built form and infrastructure Comprehensive investigation and detailed plans 	2011
District Park Plan of Management	<ul style="list-style-type: none"> Considers biodiversity values in native planting recommendations Management objectives include maintaining a commitment to native plant regeneration and the regular upgrading of plantings 	1996

Report Title	Summary of biodiversity related content	Date
Drainage Reserve Plan of Management	<ul style="list-style-type: none"> Recognises and recommends protection and expansion of biodiversity assets where appropriate 	1997
Gap Park Masterplan, includes Fauna Report	<ul style="list-style-type: none"> Gap Park includes remnant heathland, revegetation areas, and planted littoral rainforest and park plantings Identifies fauna linkages Identifies and classifies biodiversity values. Preliminary costing for paths in littoral rainforest and indigenous plantings 	2008
Harbour View Park Plan of Management	<ul style="list-style-type: none"> Details biodiversity values of the Park Bush regeneration is the central theme of the Plan of Management Actions include continuing bush regeneration, removal of weed species (Coral Trees and Camphor Laurel) Variation in structural growth habitat to contribute to the creation of fauna is considered in selecting plant species for revegetation Installation of possum and bird boxes is suggested Detailed action plan includes actions and targets for maintenance and enhancement of native plant and animal biodiversity 	2014
Lyne Park Plan of Management	<ul style="list-style-type: none"> The plan recognises that the Park has fauna habitat and value as a refuge for bird species which inhabit the surrounding area as well as lizards, possums and other small fauna 	2003
McKell Park Plan of Management	<ul style="list-style-type: none"> Native and introduced tree species identified Considers biodiversity values and includes protection of vegetation and fauna habitat in management principles Strategy includes the provision of supplementary habitat for native wildlife if necessary. Notes that holes have been built into the McKell Park seawall to provide habitat for Little Penguins, which are known to visit the area 	2013

Report Title	Summary of biodiversity related content	Date
Natural Area (Foreshore) Plan of Management (includes Parsley Bay)	<ul style="list-style-type: none"> Provides detailed overview of the natural, recreational, and heritage values of the site Management objectives include: the protection and preservation of distinctive natural features, devising methods to prevent and treat negative environmental impacts, managing recreation to minimise the impact of recreational activity, ensuring that future development does not conflict with valued aspects of foreshore land. Management issues include heavy recreational use, the number of different management authorities, beach pollution, previous “ad-hoc” bushland management – and urban run-off, garden refuse dumping promoting weed invasion, encroachment Identifies land use conflicts and management issues 	1996
Redleaf Plan of Management	<ul style="list-style-type: none"> While the focus of the plan is on management / upgrading of Council’s buildings it includes an objective to identify, protect and improve wildlife habitats and corridors 	1997
Robertson Park Plan of Management and Action Plan	<ul style="list-style-type: none"> The plan’s vision and principles addresses native tree planting using sandstone vegetation community species adjoining the SHNP interface and recognises the pre-existing creekline and natural drainage characteristic of the site and the need to optimise wildlife corridors Specific actions address biodiversity values in park plantings 	2004
Royal Hospital for Women Park Plan of Management	<ul style="list-style-type: none"> Includes management actions to ensure the health of the park’s trees and tree canopy is maintained to conserve the park’s fauna habitat values 	2005
Rushcutters Bay Park, Yarranabbe Park and Plantation Reserve Plan of Management	<ul style="list-style-type: none"> A key objective for the plan is to protect and enhance the tree canopy – many trees are on Council’s register of significant trees which include some very large Moreton Bay Figs and Port Jackson Figs. The plan identifies the parks as a refuge for fauna – including the threatened Grey-headed Flying Foxes which use the fig trees for foraging Actions include native tree plantings and some shrub clearance to enhance views Specific actions address biodiversity values in park plantings 	2005
Trumper Park Plan of Management	<ul style="list-style-type: none"> The Plan’s objectives include implementing revegetation with indigenous plantings, managing private property encroachment/rubbish dumping through community education and signage The plan aims to re-instate the natural areas with local species and create a suitable habitat for native fauna 	1996

Report Title	Summary of biodiversity related content	Date
Water Management Plan 2009-2013	<ul style="list-style-type: none"> • Includes results of modelling of water quality loads, receiving water quality, receiving water environments, and sub-catchment analysis • Identifies potential water management initiatives, and opportunities for improved water management • Includes works program and future works plan 	2009
Woollahra Park Master Plan	<ul style="list-style-type: none"> • The plan recognises the potential water quality impacts to Rose Bay from the Rose Bay side drain and includes costed actions to improve biodiversity values on the Golf Course through vegetation management works, golf –course best environment practice and water quality improvement • Environmental values (including native vegetation identified) • Includes conceptual habitat restoration design for Rose Bay channel to improve quality of stormwater flows entering Sydney Harbour, and improve environmental values 	2013
Yarranabbe Park Plan of Management	<ul style="list-style-type: none"> • States that works should protect and enhance the natural landscapes, and promote the retention of trees and the planting of trees and to protect the area’s scenic and natural attributes 	2012

APPENDIX C – STAKEHOLDER CONSULTATION RESULTS

Community Survey

An online survey was conducted through Council's website. The survey was advertised in a media release and via email to bushcare volunteers and recipients of Council's environmental newsletter with hard copies placed in the public library, Council Chambers and Rose Bay RSL. The number of participants in the survey was very low (10 respondents). As such, the results are not representative of the views held by the residents of Woollahra. The survey showed that the Vaucluse Park, Lyne Park and Trumper Park are the most popular natural areas amongst the respondents.

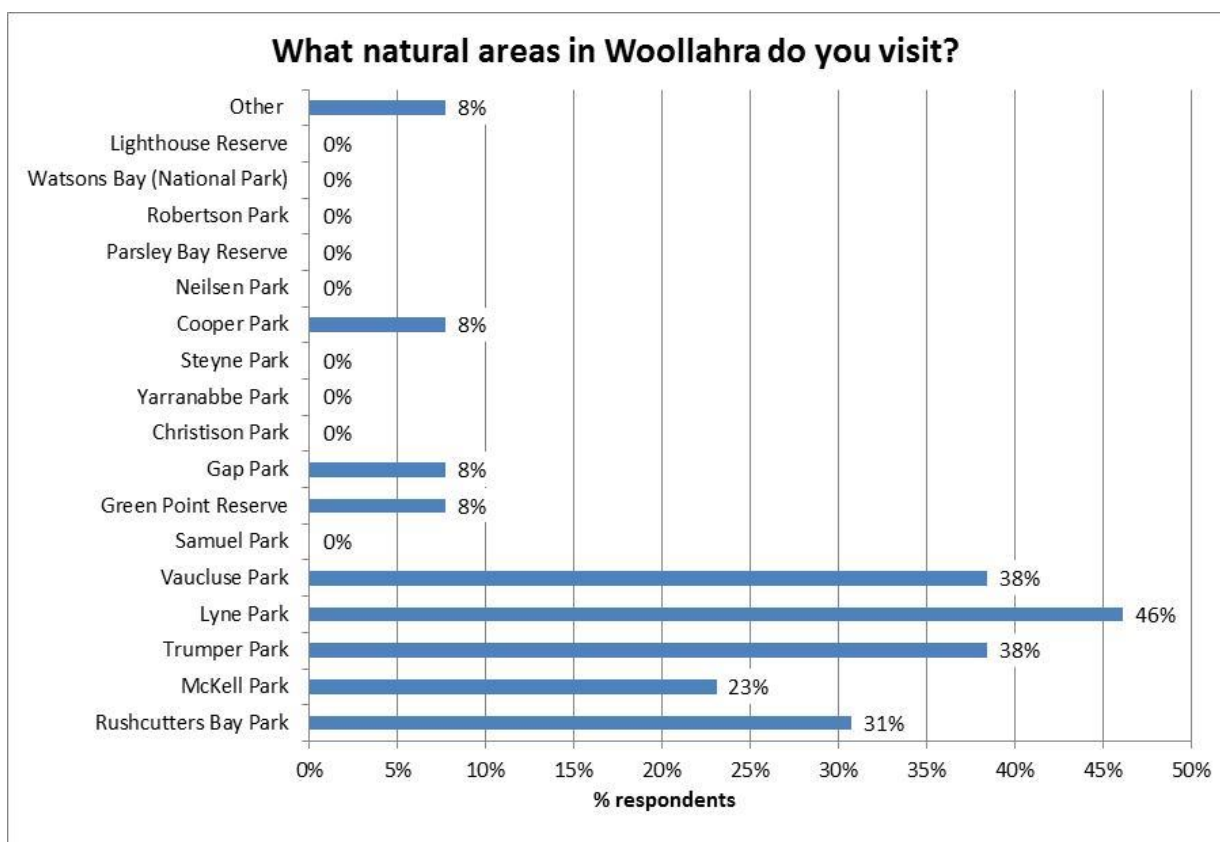


Figure C-1. Online Biodiversity Survey Results: Visitation of Natural Areas

The survey showed that the level of satisfaction with Council's management of the natural environment varies, with 54% respondents indicating that they are either satisfied or very satisfied, and 39% indicating that they are either dissatisfied or very dissatisfied.

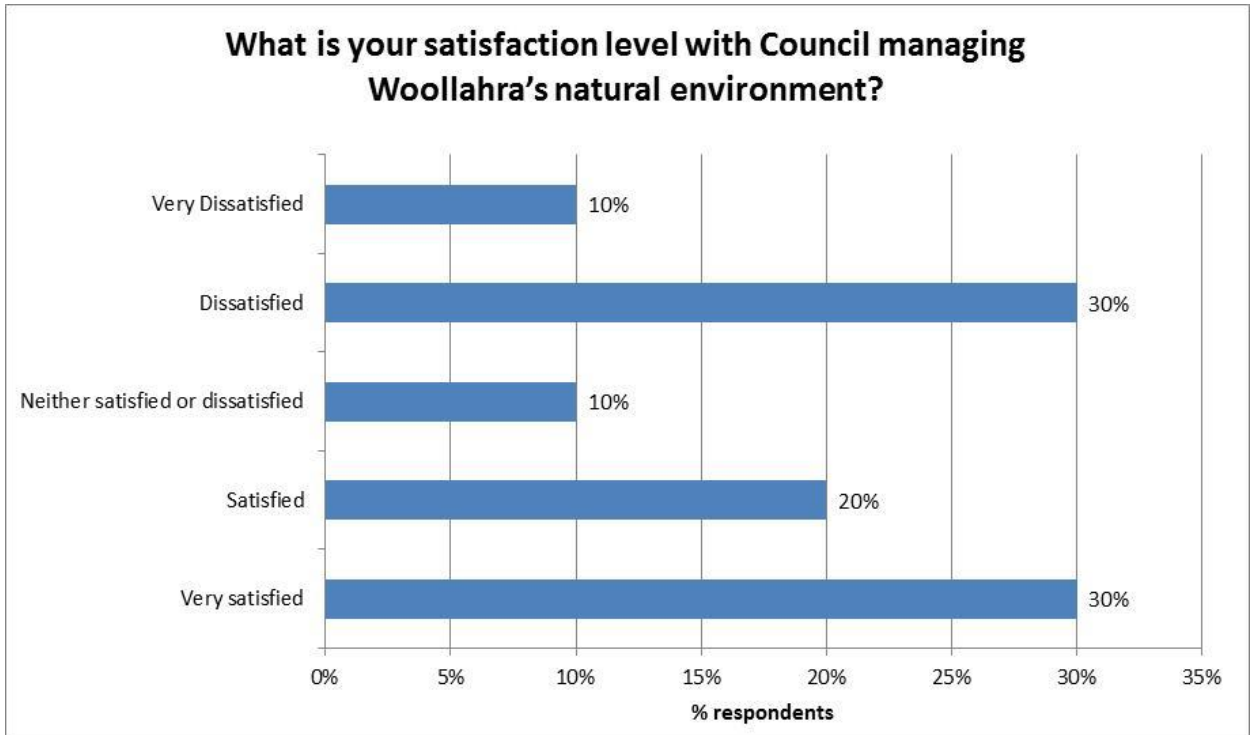


Figure C-2. Online Biodiversity Survey Results: Satisfaction with Council management of natural areas

The survey showed that the clearance of vegetation for development and the weed invasion of bushland, and litter in waterways/on beaches were considered the most significant threats among the participants.

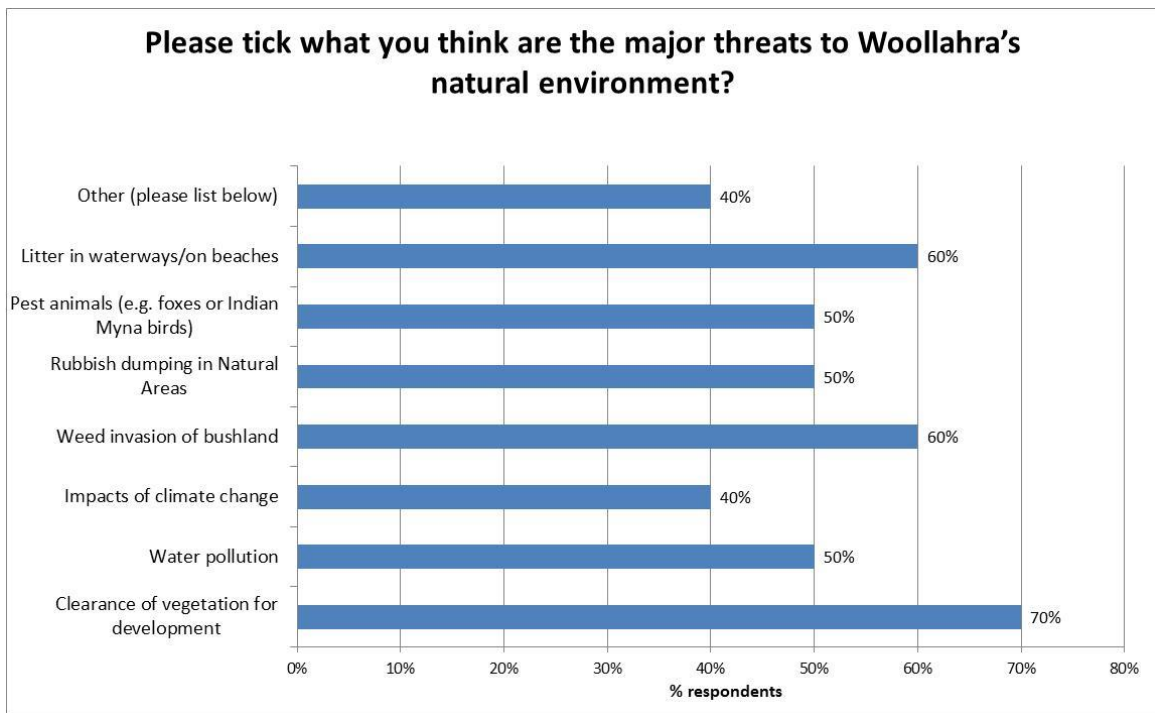


Figure C-3. Online Biodiversity Survey Results: Threats to Woollahra's natural environment

The survey showed that reducing the impact of pollution on local biodiversity and improving water quality of local catchments were considered extremely important by the highest number of participants (7 of the 10 participants). Reintroduction of once occurring local native flora, creating and enhancing bushland/ wildlife corridors, providing environmental education for the community, creating wildlife habitat outside Council reserves, providing Council leadership in managing the natural environment and reducing negative impacts from development on the natural environment were considered extremely important by 6 of the 10 participants.

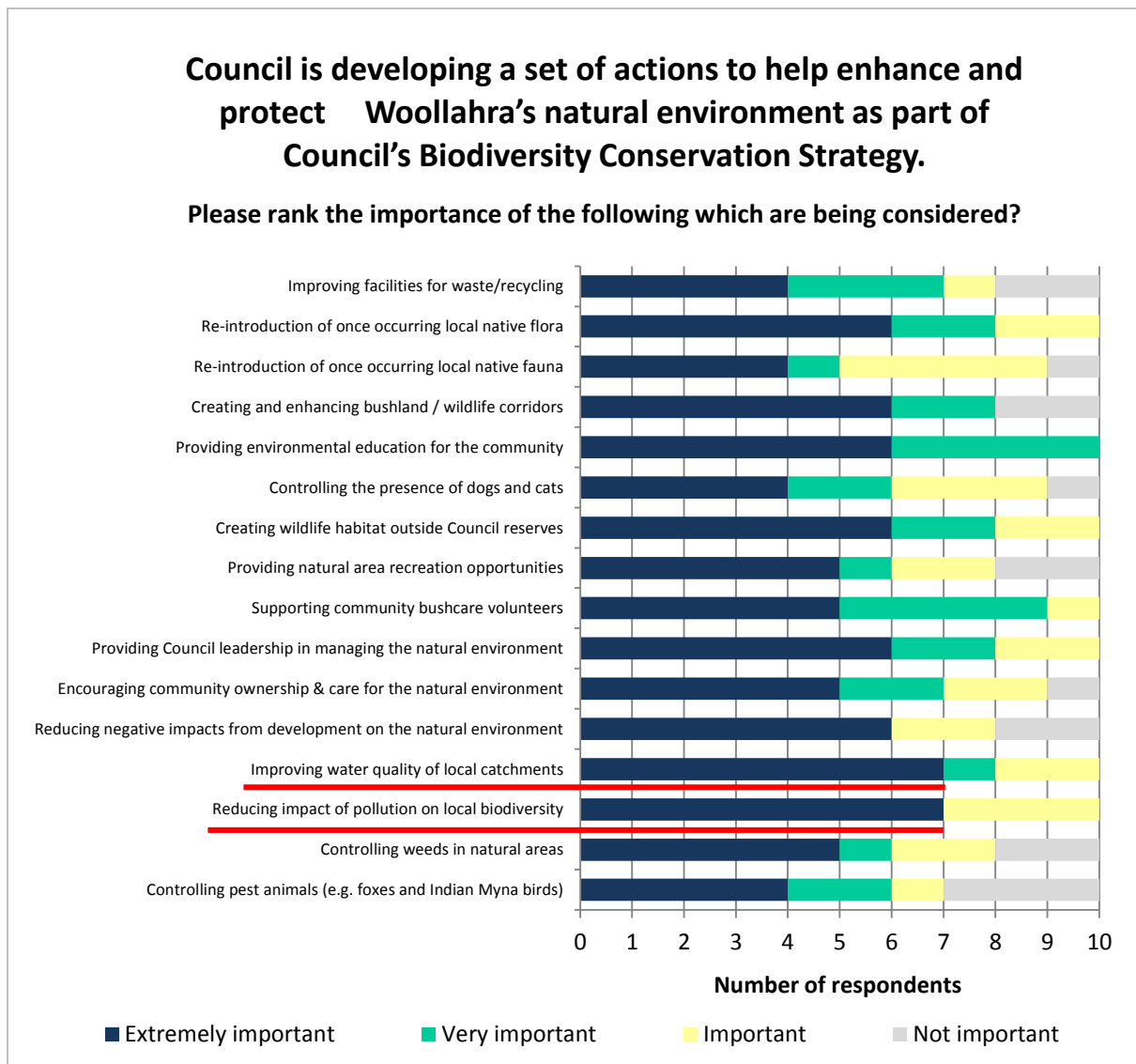


Figure C-4. Online Biodiversity Survey Results: Actions to be included in the Biodiversity Conservation Strategy

Coastal Zone Management Plan Consultation

Community consultation was carried out during the preparation of the Coastal Zone Management Plan Stage 1. Resident and non-resident respondents were asked to select issues or aspects that they felt were important. Of the options, the following issues were related to biodiversity:

- Controlling the presence of dogs and cats
- Protection of the aquatic environment
- Protecting and enhancing bushland including wildlife corridors
- Protection of threatened species

The survey had 55 participants, of these 37 were residents and 18 were non-residents. Figure C-5 summarises the results of this aspect of the survey.

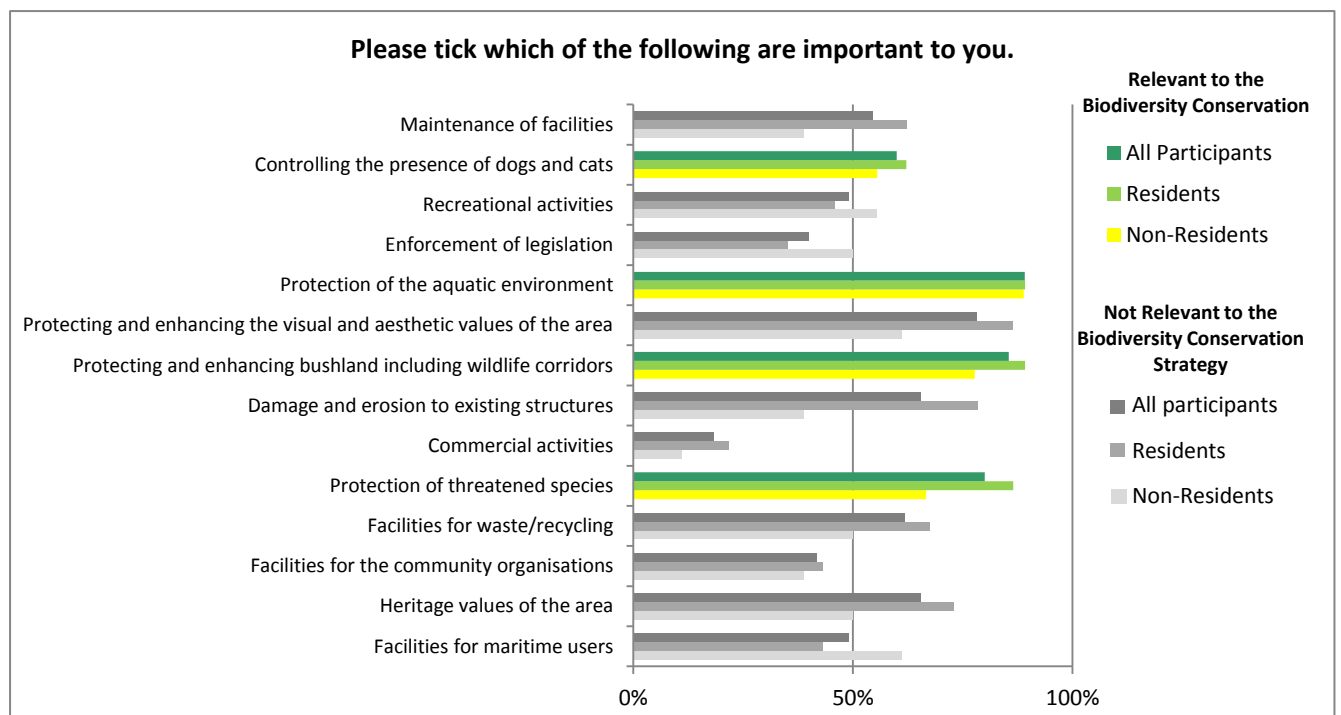


Figure C-5. Coastal Zone Management Plan Survey Results – Important Issues

APPENDIX D – AEOLIAN SOILS MAP

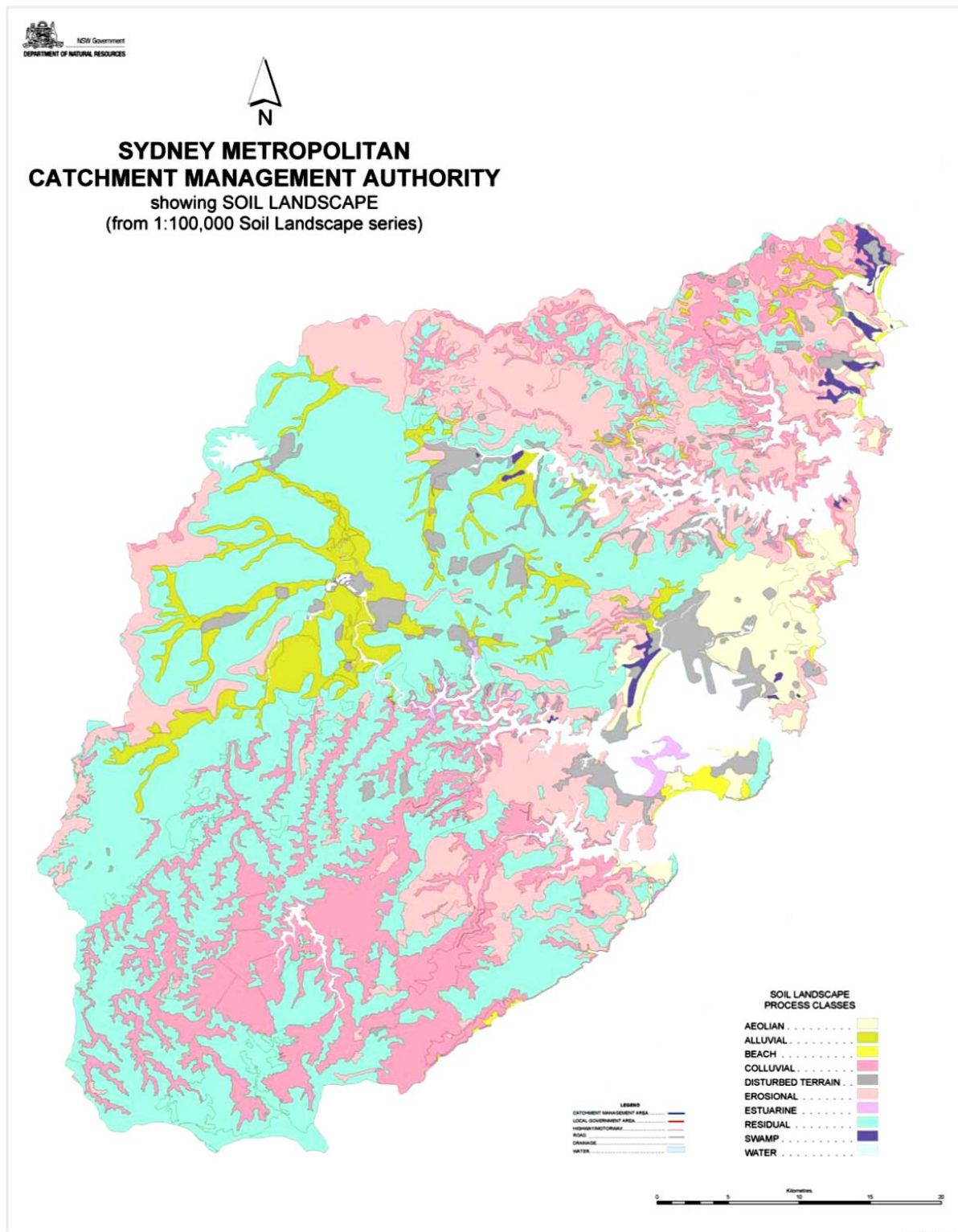


Figure D-1. Soil Landscape showing Aeolian Soils

APPENDIX E – VEGETATION TYPE DESCRIPTIONS

Code	Vegetation Type
S_HL14	Coastal Cliff-top Marsh
S_WSF08	Sydney Foreshores Shale Forest
S_DSF06	Coastal Sandstone Foreshores Forest
S_HL06	Coastal Headland Banksia Heath
S_RF02	Coastal Sandstone Gallery Rainforest
S_WSF02	Coastal Enriched Sandstone Moist Forest
S_HL03	Coastal Sand Mantle Heath
S_SW01	Estuarine Mangrove Forest
S_W03	Seagrass Meadows

Coastal Cliff-top Marsh (S_HL14)

Coastal Cliff-top Marsh is a very low, wind-pruned, open to closed, shrub community found on cliffline soaks and seepages that face the open ocean. Coast rosemary (*Westringia fruticosa*), *Baeckea imbricata*, and Coast wattle (*Acacia longifolia*) are common woody shrub species, though one or more may be absent at individual sites. The ground layer is a variable mix of sedges and graminoids that reflect the damp to wet soils that lie near the salt-spray zone. Some, like knobby club-rush (*Ficinia nodosa*), *Samolus repens*, and *Zoysia macrantha*, can tolerate the salt-spray zone and proliferates on lower cliff positions. Elevated cliff soaks are less exposed to the continual mist from the crashing waves and retain a combination of freshwater wetlands plants include *Baumea* spp., *Schoenus brevifolius*, *Springelia incarnata*, and *Drosera* spp.

Sydney Foreshores Shale Forest (S_WSF08)

Sydney Foreshores Shale Forest is found on localised patches of shale-enriched sandstone which occur on crests and slopes of minor sandstone scarps adjoining the coastal waterways of Sydney. It is a tall open eucalypt forest with a sparse shrub layer and a dense cover of graminoids (grasses, sedges, rushes). The canopy generally includes grey-gum (*Eucalyptus punctata*) and smooth-barked apple (*Angophora costata*) while forest red gum (*Eucalyptus tereticornis*) may dominate locally. Often the shrub and small tree layer is only sparse cover of wattles or casuarinas. In contrast the ground is characterised by dense clumps of spiny-headed mat-rush (*Lomandra longifolia*) above a low cover of other grasses and herbs. Naturally rare, Sydney Foreshores Shale Forest is restricted to the Sydney region where it occurs at elevations between 6 and 20 meters above sea level and where mean annual rainfall exceeds 1100mm. Patches are small and discontinuous, often surrounded by sandstone forests and woodlands.

Coastal Sandstone Foreshores Forest (S_DSF06)

Coastal Sandstone Foreshores Forest is found on sheltered sandstone slopes along the foreshores of Sydney's major waterways and coastal escarpments. It is an open forest with a moist shrub layer and a ground cover of ferns, rushes and grasses. The flora of this community has a maritime influence given its exposure to prevailing sea breezes. The canopy can be dominated by pure stands of smooth-barked apple (*Angophora costata*), though more regularly this is found in combination with other tree species. Localised patches of bangalay (*Eucalyptus botryoides*) and coast banksia (*Banksia integrifolia*) occur closest to the coast, whereas Sydney peppermint

(*Eucalyptus piperita*) and blackbutt (*Eucalyptus pilularis*) prefer more protected locations and in the case of the latter some minor shale enrichment in the soil. A prominent layer of hardy mesic small trees and shrubs is present. These include sweet pittosporum (*Pittosporum undulatum*), cheese tree (*Glochidion ferdinandi*) and blueberry ash (*Elaeocarpus reticulatus*). In the suburban environment the proliferation of these species in the understorey at long unburnt sites has generated considerable debate, particularly as there appears to be strong correlation between time since fire and their density (Rose and Fairweather 1997). It is also appears that these species are more common in these littoral zones than in other sheltered sandstone forests situated further away from the coast.

Coastal Sandstone Gallery Rainforest (S_RF02)

This depauperate warm-temperate rainforest is found on sandy alluvium or rocky streams in deep protected sandstone gully systems across the greater Sydney region. Coachwood (*Ceratopetalum apetalum*) usually dominates the tallest stratum with black wattle (*Callicoma serratifolia*), lilly pilly (*Acmena smithii*), water gum (*Tristaniaopsis laurina*) and tree ferns (*Cyathea* spp.) forming a scattered cover of small trees in the sub-canopy layer. These are rainforests of low species diversity compared to more complex rainforests associated with richer soils. The array of lianes and climbers that are common in other rainforest assemblages are absent here. Instead, the ground cover is an open cover of ferns amongst sandstone boulders and fallen logs.

Coastal Headland Banksia Heath (S_HL06)

Coastal Headland Banksia Heath is a closed heath community found on Hawkesbury sandstone rock platforms associated with ocean and harbour headlands. These exposed environments are underlain by a skeletal and infertile soil. Typically heath-leaved banksia (*Banksia ericifolia* subsp. *ericifolia*) and scrub she-oak (*Allocasuarina distyla*) form the dominant upper strata. Tick bush (*Kunzea ambigua*) may also be common, and sample sites where this species was dominant appear to have suffered some soil disturbance in the past. These larger shrubs may be over-topped by a sparse cover of emergent mallee-form eucalypts. Other woody shrubs include wattle (*Acacia longifolia*), needlebush (*Hakea teretifolia*), *Darwinia fascicularis*, and pink tea-tree (*Leptospermum squarrosum*). The rare sprawling shrub wrinkled kerrawang (*Rulingia hermanniifolia*) is also encountered in the lower shrub layer. Many sites have impeded drainage because the sandstone bedrock is very close to the surface. The ground can at times have a sparse cover of sedges amongst clumps of forbs.

Coastal Sand Mantle Heath (S_HL03)

Coastal Sand Mantle Heath is an open to closed heath found on shallow to moderately deep sand mantles that are perched above some of Sydney's major sandstone headlands. It is recognised as part of Eastern Suburbs Banksia Scrub, an Endangered Ecological Community under the NSW TSC Act. The soils on which it occurs are components of ancient dune systems formed from deposits of wind-blown sand. As a result of their age they have been exposed to long periods of weathering and soil leaching, producing highly podsolised soils. These shallower dunes support a wallum heath community that is unlike those found on Pleistocene dunes elsewhere in the greater Sydney region. The heath has a diverse range of larger shrubs with Coast Tea-Tree (*Leptospermum laevigatum*), Wallum Banksia (*Banksia aemula*), Scrub She-Oak (*Allocasuarina distyla*) and Heath-Leaved Banksia (*Banksia ericifolia*) commonly recorded, though no single species dominates at all

sites. The composition of the heath, such as the prominence of the heath-leaved banksia, appears to reflect a transitional environment between the sandstone headland heaths nearby and the heaths found on deeper dunes.

Eastern Suburbs Banksia Scrub

Note: this vegetation community does not currently exist in Woollahra; however it is suspected that a seed bank exists in Cooper Park which could allow the community to regenerate in the future.

An open to closed heathland found on shallow to moderately deep sand mantles that are perched above some of Sydney's major sandstone headlands. The heath tends to have a diverse range of larger shrubs with *Leptospermum laevigatum* (Coast Tea-tree), *Banksia aemula* (Wallum Banksia), *Banksia ericifolia* (Heath-leaved Banksia) and *Allocasuarina distyla* (Scrub She-oak) recorded although no one species dominates at all sites. Occasionally there are localised patches of low growing eucalypts that include *Angophora costata* (Smooth-barked Apple), and *Corymbia gummifera* (Red Bloodwood). A number of other small plants are indicative of a sand heath assemblage. These include *Ricinocarpos pinifolius* (Wedding Bush), *Xanthorrhoea resinosa* (Grass Tree) and *Monotoca elliptica* (Tree Broom-heath).

Coastal Flats Swamp Mahogany Forest (S_FoW02)

Coastal Flats Swamp Mahogany Forest is found in areas of impeded drainage near coastal swamps, lagoons and along low-lying drainage flats. This open forest is dominated by Swamp Mahogany (*Eucalyptus robusta*) with a smaller tree layer of Swamp Oak (*Casuarina glauca*) and paperbarks (*Melaleuca linariifolia*, *Melaleuca styphelioides*). A distinct mesic element is present in the understorey, with Cheese Tree (*Glochidion ferdinandi*) and Cabbage Tree Palm (*Livistona australis*) most prominent. Climbers such as Snake Vine (*Stephania japonica*) and Common Silkpod (*Parsonsia straminea*) may be found winding around tree trunks and fallen branches. The ground cover is periodically wet, with standing water rarely persistent throughout the year. While some sedges do occur amongst the ground cover, ferns, grasses and herbs are the most abundant.

Estuarine Mangrove Forest (S_SW01)

Stands of mangroves form a low closed to open forest on mudflats in Sydney's harbour, river coves and estuaries. There are two mangrove species found in Sydney. Grey mangrove (*Avicennia marina*) is the taller and more common, often seen in pure stands. Stands of grey mangrove comprise very few species other than the canopy, with the understorey mostly an open mudflat sometimes with scattered saltmarsh herbs. The second mangrove species is river mangrove (*Aegiceras corniculatum*). It is more often a small tree or shrub found scattered amongst swathes of grey mangrove or along upper reaches of coastal riverbanks. It occurs where freshwater influences from runoff or rivers cause lower salinity levels.

Seagrass Meadows (S_SW03)

Seagrass Meadows are found on estuaries and lagoons of the Hacking, Georges and Parramatta River. Typical species includes *Posidonia australis* (Seagrass) *Zostera capricorni*, *Zostera muelleri* and *Heterozostera tasmanica*.

Table E- 1. HISTORIC VEGETATION – RECOMMENDED REVEGETATION SPECIES

Historic Vegetation Type	Common Name	Scientific Name
Woodland and Forest on Sandstone	Smooth-barked Apple	<i>Angophora costata</i>
	Red Mahogany	<i>Eucalyptus resinifera</i>
	Forest Red Gum	<i>Eucalyptus tereticornis</i>
	Bangalay	<i>Eucalyptus botryoides</i>
	Scribbly Gum	<i>Eucalyptus haemastoma</i>
Alluvial Forest	Forest Red Gum	<i>Eucalyptus tereticornis</i>
	Swamp Mahogany	<i>Eucalyptus robusta</i>
	Bangalay	<i>Eucalyptus botryoides</i>
	Butterfly Bush	<i>Kunzea ambigua</i>
	Tantoon	<i>Leptospermum polygalifolium</i> subsp. <i>polygalifolium</i>
	Swamp Paperbark	<i>Melaleuca ericifolia</i>
Swamp Woodland	Cabbage Tree Palm	<i>Livistona australis</i>
	Giant Honey Myrtle	<i>Melaleuca quinquenervia</i>
Source: Benson and Howell 1990a		

APPENDIX F – KEY AND LOCAL HABITAT AREAS

Table F-1. Key Habitat Areas

Key Habitat Areas					
Site Name	Suburb	Total Area (Ha)	Planted / Reconstructed / Non-Remnant / Exotic Vegetation (Ha)	Historic Vegetation Type (Ha) ¹	Current Native Vegetation Type (Ha) ²
Trumper Park	Paddington	6.5	4.7	Woodland on Sandstone - 8.2	-
Cooper Park	Woollahra, Bellevue Hill	17.9	5.1	Heath on Sandstone - 3.5 Woodland on Sandstone - 14.3	S_RF02 0.82 S_DSF06 10.89 S_WSF02 0.001
Woollahra Golf Club	Rose Bay	15.8	3.5	ESBS - 13.1 Freshwater Sedge Swamp - 2.8	-
Nielsen Park	Vaucluse	20.4	3.3	Heath on Sandstone - 5.9	S_HL06 4.03 S_DSF06 9.34
Hermitage Foreshore	Vaucluse	3.5	0.8	Woodland on Sandstone - 15.2 Heath on Sandstone - 3.5	S_HL06 0.34 S_DSF06 1.19 S_SW03 0.002
Vaucluse House	Vaucluse	8.9	3.0	Woodland on Sandstone – 9.3	S_DSF06 2.62 S_FoW02 0.68
Parsley Bay Reserve	Vaucluse	3.7	0.6	Heath on Sandstone - 3.1 Woodland on Sandstone - 0.7	S_DSF06 2.40 S_S_SW01 0.008
Christison Park	Vaucluse	6.2	0.3	Heath on Sandstone - 6.2	S_HL06 0.18
Gap Park	Watsons Bay	4.6	1.0	Heath on Sandstone - 4.6	S_HL06 5.40
Green Point	Watsons Bay	1.2	0.1	Heath on Sandstone - 1.3	S_HL06 0.58
South Head		6.7	1.7	Heath on Sandstone - 6.7	_SHL06 1.52 S_DSF06 0.046
Gap Bluff		7.6	0.6	Heath on Sandstone - 7.6	S_HL06 5.4
Estuarine foreshore and Seagrass areas	Darling Point, Double Bay Rose Bay, Parsley Bay and Watsons Bay	90.5	N/A	Estuarine Mangrove Forest – 0.19 ² Seagrass Meadows – 12.87 ²	S_SW03 4.85 S_SW01 0.19

1. Benson And Howell (1990a)
2. OEH, 2013a

Table F-2. Locally Significant Habitat Areas

Locally Significant Habitat Areas							
Site Name	Suburb	Owner	Total Area (Ha)	Non-Remnant / Exotic Vegetation (Ha)	Historic Vegetation Type	Native Vegetation (Ha)	Potential OEH Plant Community Type ¹
Bellevue Park	Bellevue Hill	Council	1.5	0.4	Heath on Sandstone, Woodland on Sandstone	-	
Blackburn Gardens	Double Bay	Council	0.3	0.2	Heath on Sandstone	-	S_HL06, S_WSF03
Redleaf	Double Bay	Council	0.6	0.1	Heath on Sandstone	-	S_HL06, S_WSF03
Camp Cove Reserve	Watsons Bay	Council	0.2	0.2	Heath on Sandstone	-	S_HL06, S_WSF03
Darling Point Reserve	Darling Point	Council	0.1	0.03	Woodland on Sandstone	-	S_WSF02, S_FoW02, S_SW01
Dumaresq Reserve	Rose Bay	Council	0.3	-	Heath on Sandstone	0.004	S_HL06, S_WSF03
Euroka Reserve	Woollahra	Council	0.04	0.04	Woodland on Sandstone	-	S_WSF02, S_FoW02, S_SW01
Gibsons Beach Reserve	Vaucluse Watsons Bay	Council	0.3	0.1	Heath on Sandstone	-	S_HL06, S_WSF03
Harbour View Park	Woollahra	Council	0.9	0.7	Heath on Sandstone	-	S_HL06 S_WSF03
HMAS Watson	Watsons Bay	Department of Defence	9.4	0.9	Heath on Sandstone	1.69	S_HL06, S_WSF03
Holdsworth Street Community Centre	Woollahra	Council	0.02	0.02	Heath on Sandstone	-	S_HL06, S_WSF03
Johnston's Lookout	Vaucluse	Crown	0.24	0.24	-	-	-
Lighthouse Reserve	Vaucluse	Council	2.6	0.3	Heath on Sandstone	-	S_HL06, S_WSF03
Lough Playing Fields	Bellevue Hill Double Bay Woollahra	Council	1.7	0.1	Swamp with <i>Casuarina glauca</i> and <i>Eucalyptus robusta</i> , Woodland on Sandstone	-	S_RF02, S_WSF02, S_FoW02, S_SW01

Locally Significant Habitat Areas							
Site Name	Suburb	Owner	Total Area (Ha)	Non-Remnant / Exotic Vegetation (Ha)	Historic Vegetation Type	Native Vegetation (Ha)	Potential OEH Plant Community Type ¹
Lower Harris St Reserve	Paddington	Council	0.1	0.06	Woodland on Sandstone	-	S_WSF02, S_FoW02, S_SW01
Lyne Park	Rose Bay	Council	4.7	1.6	Eastern Suburbs Banksia Scrub on Sand	-	S_W03
Macquarie Lightstation	Vaucluse	SHFT	1.7	0.3	Heath on Sandstone	-	S_HL06, S_WSF03
Marine Biological Station Park	Watsons Bay	SHFT	0.2	0.03	Heath on Sandstone	-	S_HL06, S_WSF03
Marine Parade Reserve	Watsons Bay	Council	0.2	0.03	Heath on Sandstone	0.001	S_HL06, S_WSF03
McKell Park	Darling Point	Council	0.7	0.7	N/A	-	N/A
Pat Thompson Park	Woollahra	Council	0.1	0.1	Heath on Sandstone	-	S_HL06, S_WSF03
Percival Park	Rose Bay	Council	0.1	0.1	Eastern Suburbs Banksia Scrub on Sand	-	S_W03
Plumb Reserve	Woollahra	Council	0.4	0.04	Heath on Sandstone	-	S_HL06, S_WSF03
Robertson Park	Watsons Bay	Council	2.7	0.2	Heath on Sandstone	-	S_HL06, S_WSF03
Rose Bay Park	Point Piper Rose Bay	Council	1.1	0.8	Heath on Sandstone	0.02	S_HL06, S_WSF03
Royal Sydney Golf Club	Rose Bay	Private	54.3	12.2	Eastern Suburbs Banksia Scrub on Sand/ Freshwater Sedge Swamp		
Samuel Park	Vaucluse	Council	0.6	0.2	Heath on Sandstone Woodland on Sandstone	-	S_HL06, S_WSF03 S_WSF02, S_FoW02 S_SW01
Signal Hill Reserve	Vaucluse	Council	0.9	0.2	Heath on Sandstone	0.09	S_HL06, S_WSF03

Locally Significant Habitat Areas							
Site Name	Suburb	Owner	Total Area (Ha)	Non-Remnant / Exotic Vegetation (Ha)	Historic Vegetation Type	Native Vegetation (Ha)	Potential OEH Plant Community Type ¹
Soudan St Playground	Paddington	Council	0.1	0.1	Woodland on Sandstone	-	S_WSF02, S_FoW02, S_SW01
Spicer Lane Reserve	Woollahra	Council Reserve	0.1	0.07	Heath on Sandstone	-	S_HL06, S_WSF03
Steyne Park	Double Bay	Council	1.8	0.3	Swamp with <i>Casuarina glauca</i> and <i>Eucalyptus robusta</i> Woodland on Sandstone	-	S_RF02, S_WSF02, S_FoW02, S_SW01
Strickland House	Vaucluse	State Property Authority	4.2	1.9	Heath on Sandstone	0.49	S_HL06, S_WSF03
Suttie Reserve	Woollahra	Council	0.02	0.02	Woodland on Sandstone	-	S_WSF02, S_FoW02, S_SW01
Tingira Memorial Park	Rose Bay	Council	0.2	0.08	Eastern Suburbs Banksia Scrub on Sand	-	S_W03
Upper Harris Street Reserve	Paddington	Council	0.1	0.1	Woodland on Sandstone	-	S_WSF02, S_FoW02, S_SW01
Victoria Wharf Reserve	Watsons Bay	Council	0.1	-	Heath on Sandstone	-	S_HL06, S_WSF03
Watsons Bay Tea Gardens	Watsons Bay	Council	0.03	-	Heath on Sandstone	-	S_HL06, S_WSF03
1. OEH, 2013a							

Table F-3. Locally Significant Habitat Areas

Complementary Habitat Areas						
Site Name	Suburb	Owner	Total Area (Ha)	Non-Remnant / Exotic Vegetation (Ha)	Historic Vegetation Type	Potential OEH Plant Community Type ¹
Bradley Avenue Reserve	Bellevue hill	Council	0.1	-	Heath on Sandstone	S_HL06 S_WSF03
Chiswick Gardens	Woollahra	Council	0.2	0.2	Heath on Sandstone	S_HL06 S_WSF03
Elms Reserve	Woollahra	Council	0.1	-	Heath on Sandstone	S_HL06 S_WSF03
Gaden Reserve	Woollahra	Council	0.2	0.1	Heath on Sandstone	S_HL06 S_WSF03
Moncur Reserve	Woollahra	Council	0.2	-	Heath on Sandstone	S_HL06 S_WSF03
Raoul Wallenburg Reserve	Woollahra	Council	0.04	0.03	Heath on Sandstone	S_HL06 S_WSF03
Rushcutters Bay Park	Darling Point	Council	5.3	1.6	Swamp with Casuarina glauca and Eucalyptus robusta Woodland on Sandstone	S_RF02 S_WSF02
Sir David Martin Reserve	Darling Point	Council	0.2	-		S_FoW02 S_SW01
Wallis St Reserve	Woollahra	Council	0.04	-	Heath on Sandstone	S_HL06 S_WSF03
Yarranabbe Park	Darling Point	Council	2.1	0.2	Woodland on Sandstone	S_WSF02 S_FoW02 S_SW01
1. OEH, 2013a						

APPENDIX G – ECOSYSTEM HEALTH REPORT CARD

This Appendix provides a summary of the findings of the following assessments carried out by Cardno (2013) to inform the development of the Coastal Zone Management Plan – Stage 1:

- Ecological Risk Assessment - Climate Change Impacts on Estuarine Ecology
- Estuarine Health Assessment

Figure E-1 illustrates the 5 zones used in the Woollahra Coastal Zone Management Plan (Stage 1).

The Ecological Risk Assessment - Climate Change Impacts on Estuarine Ecology was carried out for all five zones. The Ecosystem Health Report Card was conducted for zones 3 and 5.

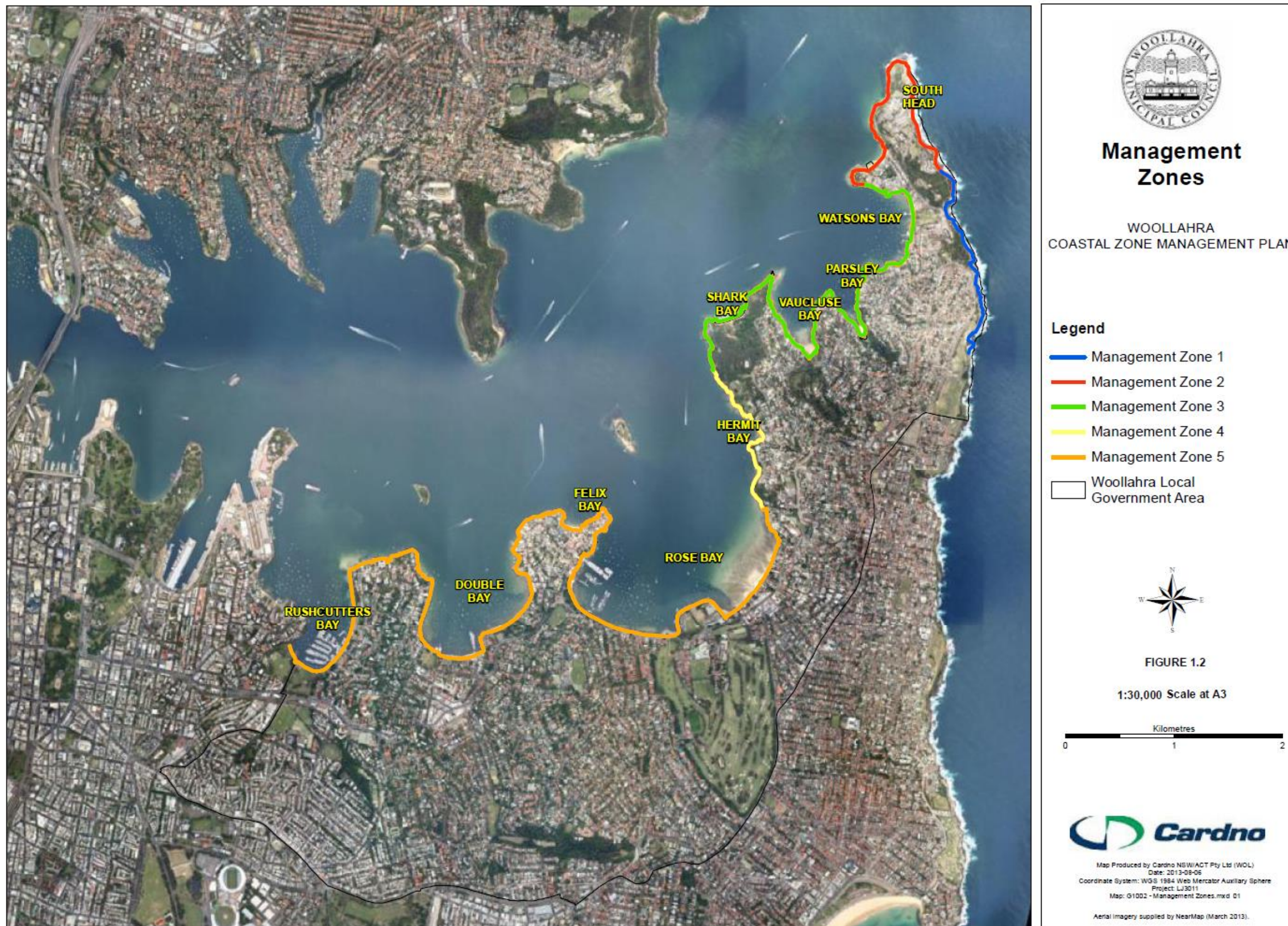


Figure G-1. Coastal Zone Management Plan - Management Zones (Source: Woollahra Coastal Zone Management Plan (Cardno, 2013)).

Ecological Risk Assessment - Climate Change Impacts on Estuarine Ecology

A qualitative ecological risk assessment was undertaken by Cardno (2013) to assess the likelihood and consequences of hazards resulting from climate change impacting on the key attributes of the estuarine ecosystem. The general approach to the risk assessment would be to:

- Assess the current vulnerabilities of the estuarine ecosystem (i.e. aspects that have low adaptive capacity)
- Assess the future (2050 and 2100) vulnerability under climate change conditions, and see how the risk profile changes over time
- Identify and prioritise vulnerable estuarine habitats; and Identify the most significant pressures (or combination of pressures) impacting on estuarine ecosystem health.

The results are provided in Table E-1 below. The hazards that presented the highest risk in 2013 are:

- **Terrestrial vegetation:** introduced species and pests (i.e. weeds) inhibiting native vegetation
- **Fauna:** habitat loss due to degradation as a result of human activities
- **Intertidal Rock Platform:** Direct human impacts, impacting on the rock platforms (e.g. constriction of seawalls, collecting fauna)
- **Water and Sediment Quality:** Human activities directly and indirectly adversely impacting on water quality (e.g. litter carried to receiving waters by stormwater runoff, discharge from marine vessels).
- **Seagrasses:** Direct human impacts adversely impacting on seagrasses (e.g. physical disturbance during swimming or snorkelling, swing moorings and marine vessels); indirect human impacts adversely affecting seagrasses (e.g. decreased light penetration due to shading from structures).

The coastal area from Shark Point to the southernmost point of Hermitage Foreshore Walk at Bayview Hill Road, including Hermit Bay (zone 4) and the coastal area 5 from the southernmost point of Hermitage Foreshore Walk to Rushcutters Creek (western most extent of LGA), including Rose Bay, Double Bay and part of Rushcutters Bay (zone 5) appear to have the greatest level of level of risk to estuarine ecosystems resulting from climate change

Table G-1. Present and Future Risks to Estuarine Ecosystems (Cardno, 2013)

Aspects	Hazards	2013	2050	2100
Zone 1: South-eastern most point of LGA up to and including Gap Park and coastal cliffs)				
Water & Sediment Quality	Sewage overflows adversely impacting on receiving waters.	Low	Low	Low
	Human activities directly and indirectly adversely impact on water quality (e.g. litter carried to receiving waters by stormwater runoff, discharge from marine vessels).	Low	Low	Medium
Seagrasses	Direct human impacts adversely impacting on seagrasses (e.g. physical disturbance during swimming or snorkelling, swing moorings and marine vessels).	N/A to this Zone. Seagrass is not known to occur in Management Zone 1.		
	Indirect human impacts adversely affecting seagrasses (e.g. decreased light penetration due to shading from structures).			
	Climate change causing a change in distribution, composition and/or abundance (e.g. increase in sea level).			
Intertidal Rock Platforms	Direct human impacts on the rock platforms (e.g. construction of seawalls, collecting fauna).	Low	Low	Low
	Increased extent inundation duration due to Sea Level Rise (SLR) resulting in loss of intertidal habitat.	Low	Low	Low
Terrestrial Vegetation	Direct human impacts resulting in the destruction of vegetation by recreational users due to trampling, littering and dogs/pets, illegal removal of trees to improve views.	Medium	Medium	Medium
	SLR changing the extent of terrestrial vegetation. Landward migration of terrestrial vegetation is dependent on adjacent structures and other land uses.	N/A to this Zone. SLR inundation not possible due to steep topography.		
	Introduced species and pests (i.e. weeds) inhibiting native vegetation.	Medium	Medium	Medium
Fauna	Habitat loss due to degradation as a result of human activities.	Low	Low	Medium
	Disturbance and/or displacement of fauna due to human users (e.g. dog walking, blockages to fish passage).	Low	Low	Medium
Zone 2: From Sydney Harbour National Park where it commences immediately north of Gap Parl to Green Point, including Camp Cove				
Water & Sediment Quality	Sewage overflows adversely impacting on receiving waters.	Low	Medium	Medium
	Human activities directly and indirectly adversely impacting on water quality (e.g. litter carried to receiving waters by stormwater runoff, discharge from marine vessels).	Medium	High	High

Aspects	Hazards	2013	2050	2100
Seagrasses	Direct human impacts adversely impacting on seagrasses (e.g. physical disturbance during swimming or snorkelling, swing moorings and marine vessels).	N/A to this Zone. No seagrass was found during ground-truthing.		
	Indirect human impacts adversely affecting seagrasses (e.g. decreased light penetration due to shading from structures).			
	Climate change causing a change in distribution, composition and/or abundance (e.g. increase in sea level).			
Intertidal Rock Platforms	Direct human impacts on the rock platforms (e.g. construction of seawalls, collecting fauna).	Medium	Medium	Medium
	Increased extent inundation duration due to SLR resulting in loss of intertidal habitat.	Low	Medium	Medium
Terrestrial Vegetation	Direct human impacts resulting in the destruction of vegetation by recreational users due to trampling, littering and dogs/pets, illegal removal of trees to improve views.	Medium	High	High
	SLR changing the extent of terrestrial vegetation. Landward migration of terrestrial vegetation is dependent on adjacent structures and other land uses.	Low	Low	Low
	Introduced species and pests (i.e. weeds) inhibiting native vegetation.	High	High	High
Fauna	Habitat loss due to degradation as a result of human activities.	High	High	Extreme
	Disturbance and/or displacement of fauna due to human users (e.g. dog walking, blockages to fish passage).	Medium	High	High
Zone 3: From Green Point to Shark Point, including Watsons Bay, Parsley Bay, Vaucluse Bay, Shark Bay and Nielsen Park				
Water & Sediment Quality	Sewage overflows adversely impacting on receiving waters.	Low	Medium	Medium
	Human activities directly and indirectly adversely impacting on water quality (e.g. litter carried to receiving waters by stormwater runoff, discharge from marine vessels).	Medium	High	High
Seagrasses	Direct human impacts adversely impacting on seagrasses (e.g. physical disturbance during swimming or snorkelling, swing moorings and marine vessels).	Medium	High	High
	Indirect human impacts adversely affecting seagrasses (e.g. decreased light penetration due to shading from structures).	Low	Low	Low

Aspects	Hazards	2013	2050	2100
	Climate change causing a change in distribution, composition and/or abundance (e.g. increase in sea level).	Low	Medium	Medium
Intertidal Rock Platforms	Direct human impacts on the rock platforms (e.g. construction of seawalls, collecting fauna).	High	High	High
	Increased extent inundation duration due to SLR resulting in loss of intertidal habitat.	Low	High	High
Terrestrial Vegetation	Direct human impacts resulting in the destruction of vegetation by recreational users due to trampling, littering and dogs/pets, illegal removal of trees to improve views.	Medium	Medium	Medium
	SLR changing the extent of terrestrial vegetation. Landward migration of terrestrial vegetation is dependent on adjacent structures and other land uses.	Low	High	High
	Introduced species and pests (i.e. weeds) inhibiting native vegetation.	Low	Low	Low
Fauna	Habitat loss due to degradation as a result of human activities.	Medium	High	High
	Disturbance and/or displacement of fauna due to human users (e.g. dog walking, blockages to fish passage).	Medium	Medium	Medium
Zone 4: From Shark Point to the southernmost point of Hermitage Foreshore Walk at Bayview Hill Toad, including Hermit Bay				
Water and Sediment Quality	Sewage overflows adversely impacting on receiving waters.	Low	Medium	Medium
	Human activities directly and indirectly adversely impacting on water quality (e.g. litter carried to receiving waters by stormwater runoff, discharge from marine vessels).	Medium	High	High
Seagrasses	Direct human impacts adversely impacting on seagrasses (e.g. physical disturbance during swimming or snorkelling, swing moorings and marine vessels).	Medium	Medium	Medium
	Indirect human impacts adversely affecting seagrasses (e.g. decreased light penetration due to shading from structures).	Low	Low	Low
	Climate change causing a change in distribution, composition and/or abundance (e.g. increase in sea level).	Low	Medium	Medium
Intertidal Rock Platforms	Direct human impacts on the rock platforms (e.g. construction of seawalls, collecting fauna).	High	High	High
	Increased extent inundation duration due to SLR resulting in loss of intertidal habitat.	Low	High	High

Aspects	Hazards	2013	2050	2100
Terrestrial Vegetation	Direct human impacts resulting in the destruction of vegetation by recreational users due to trampling, littering and dogs/pets, illegal removal of trees to improve views.	Medium	High	High
	SLR changing the extent of terrestrial vegetation. Landward migration of terrestrial vegetation is dependent on adjacent structures and other land uses.	Low	High	High
	Introduced species and pests (i.e. weeds) inhibiting native vegetation.	High	High	High
Fauna	Habitat loss due to degradation as a result of human activities.	High	High	Extreme
	Disturbance and/or displacement of fauna due to human users (e.g. dog walking, blockages to fish passage).	Medium	High	High
Zone 5: From the southernmost point of Hermitage Foreshore Walk to Rushcutters Creek (western most extent of LGA), including Rose Bay, Double Bay and part of Rushcutters Bay.				
Water & Sediment Quality	Sewage overflows adversely impacting on receiving waters.	Medium	High	High
	Human activities directly and indirectly adversely impacting on water quality (e.g. litter carried to receiving waters by stormwater runoff, discharge from marine vessels).	High	High	High
Seagrasses	Direct human impacts adversely impacting on seagrasses (e.g. physical disturbance during swimming or snorkelling, swing moorings and marine vessels).	High	High	High
	Indirect human impacts adversely affecting seagrasses (e.g. decreased light penetration due to shading from structures).	High	High	High
	Climate change causing a change in distribution, composition and/or abundance (e.g. increase in sea level).	Low	Medium	Medium
Intertidal Rock Platforms	Direct human impacts on the rock platforms (e.g. construction of seawalls, collecting fauna).	Low	Low	Low
	Increased extent inundation duration due to SLR resulting in loss of intertidal habitat.	Low	Low	Low
Terrestrial Vegetation	Direct human impacts resulting in the destruction of vegetation by recreational users due to trampling, littering and dogs/pets, illegal removal of trees to improve views.	Medium	Medium	Medium
	SLR changing the extent of terrestrial vegetation. Landward migration of terrestrial vegetation is dependent on adjacent structures and other land uses.	Low	Low	Low
	Introduced species and pests (i.e. weeds) inhibiting native vegetation.	Low	Medium	Medium

Aspects	Hazards	2013	2050	2100
Fauna	Habitat loss due to degradation as a result of human activities.	Medium	Medium	High
	Disturbance and/or displacement of fauna due to human users (e.g. dog walking, blockages to fish passage).	Low	Low	Medium

Ecosystem Health Status

The key finding of the Ecosystem Health Status study is that estuarine systems within Woollahra are generally in good condition, although they can deteriorate periodically under certain conditions, or in different parts of the waterway. Human activities in the catchment have the potential to impact indirectly on the health of the ecosystem, while other activities conducted in the waterway and along the foreshore have a more direct impact on the estuary health. A number of key issues have been identified in Woollahra with the potential to affect factors such as water and sediment quality, estuarine and riparian flora and estuarine fauna. The Ecological Health Report Card relevant to biodiversity are provided below. The Ecosystem Health Report Card was conducted for zones 3 and 5.

Table G-2: Categories of Status for Ecological Health Report Card

Status	Descriptor
5	Very Good - Slight effects from human activities (or ≥ 90% of data falls within the guidelines).
4	Good - General slight effects, or few sites with moderate effects (or 76-90% of data within the guidelines).
3	Fair - General moderate effects, or some sites with serious effects (or 51-75% of data within the guidelines).
2	Poor - General serious effects (or 11-50% of data within the guidelines).
1	Very Poor - Very serious effects (or <10% of data within the guideline).

The likely future pressures on particular indicators are described and the possible resultant trends in the indicator have been assigned one of four values:

↔	Stable
👍	Improving
👎	Worsening
?	Insufficient data
ND	No data

Table G-3. Ecosystem Health Report Card

Indicator	State					Reference Value	Status		Potential Sources	Trend	
	Management Zones - Current Values						ANZECC (2000) Lowland Rivers	Zone 3			Zone 5
	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5						
Catchment Water Quality											
pH (-log [H ⁺])	ND	ND	Mean All areas: 7.38 (5%) ¹ Parsley Bay: 7.51 (4.2%) Vaucluse Bay: 7.15 (6.25%)	ND	All areas: 6.68 (33.8%) ¹ Rose Bay: 6.39 (66.7%) Double Bay: 6.95 (75%) Rushcutters Bay: 6.71 (21.7%)	6.5 - 8.0	5	3	Input of chemicals & detergents associated with urban runoff, rock & soil weathering.	👎	
Total Nitrogen (µg/L)	ND	ND	All areas: 2,095 (100%) ¹ Parsley Bay: 2,263 (100%) Vaucluse Bay: 1,963 (100%)	ND	All areas: 2,792 (100%) ¹ Rose Bay: 2,292 (100%) Double Bay: 2,779 (100%) Rushcutters Bay: 3,306 (100%)	500	1	1	Sewage, stormwater runoff, domestic animals & wildlife, fertilisers, & bank erosion.	👎	
Total Phosphorous (µg/L)	ND	ND	All areas: 82.5 (45%) ¹ Parsley Bay: 85.4 (50%) Vaucluse Bay: 73.8 (37.5%)	ND	All areas: 204.5 (67.7%) ¹ Rose Bay: 135 (66.7%) Double Bay: 65 (50%) Rushcutters Bay: 413.5 (87%)	50	3	2	Soil/rock erosion, fertiliser use.	👎	
Chlorophyll a (mg/m ³)	ND	ND	All areas: 1.42 (10%) ¹ Parsley Bay: 1.44 (12.5%) Vaucluse Bay: 1.23 (6.25%)	ND	All areas: 13.53 (25.4%) Rose Bay: 4.01 (20.8%) Double Bay: 31 (29.2%) Rushcutters Bay: 5.5 (26.1%)	3	5	3	Increased human activities incl. sewage discharge, soil erosion & stormwater runoff.	👎	
Total Suspended Solids (mg/L)	ND	ND	All areas: 14.48 ¹ Parsley Bay: 16.17 Vaucluse Bay: 16.54	ND	All areas: 24.07 ¹ Rose Bay: 18.71 Double Bay: 19.6 Rushcutters Bay: 33.9	-	?		Influx of particulate matter through stormwater runoff & bank erosion.	👎	
Turbidity (NTU)	ND	ND	All areas: 9.9 (40%) ¹ Parsley Bay: 8.8 (58%) Vaucluse Bay: 11.8 (12.5%)	ND	All areas: 22.2 (35.2%) ¹ Rose Bay: 13.9 (45.8%) Double Bay: 26.7 (37.5%) Rushcutters Bay: 26.1 (21.7%)	6 - 50	3	3	Rock weathering, soil erosion, waste discharge, urban runoff, algal growth, domestic pets/humans disturbing the water.	👎	
Faecal coliforms (cfu/100ml)	ND	ND	All areas: 28 (2.2%) ² Parsley Bay: 63 (7%) Vaucluse Bay: No data Nielsen Park: 6 Watsons Bay: 16	ND	All areas: 43. (10%) ² Rose Bay: 64 (8.3%) Double Bay: 23. (6.7%) Rushcutters Bay: ND	150	5	5	Stormwater runoff, sewage, domestic animals & wildlife.	👎	
EC (ds/m)	ND	ND	All areas: 0.58 (2.2%) ¹ Parsley Bay: 0.92 (4.2%) Vaucluse Bay: 0.36	ND	All areas: 2.0 (21.1%) ¹ Rose Bay: 1.90 (16.7%) Double Bay: 1.5 (20.8%) Rushcutters Bay: 2.7 (26.1%)	0.125 - 2.2	5	4	Stormwater discharge.	👎	
Copper (µg/L)	ND	ND	All areas: 10.35 (100%) ¹ Parsley Bay: 10.19 (100%) Vaucluse Bay: 10.88 (100%)	ND	All areas: 6.21 (80.3%) ¹ Rose Bay: 5.29 (83.3%) Double Bay: 7.1 (79.2%) Rushcutters Bay: 6.25 (78.3%)	2.5	1	2	Historic industry in Sydney Harbour, sewage, anti-fouling paints, copper pipes, roads.	👎	
Zinc (µg/L)	ND	ND	All areas: 17.68 (10%) ¹ Parsley Bay: 16.19 (4.2%) Vaucluse Bay: 20.81 (18.75%)	ND	All areas: 28.75 (32.4%) ¹ Rose Bay: 20.65 (12.5%) Double Bay: 30.00 (37.5%) Rushcutters Bay: 35.6 (47.8%)	3.1	5	3	Historic industry in Sydney Harbour, anti-fouling paints, roads.	👎	
Lead (µg/L)	ND	ND	All areas: 2.0 ¹ Parsley Bay: 2.25 Vaucluse Bay: 1.88	ND	All areas: 1.79 ¹ Rose Bay: 1.86 Double Bay: 2.35	9.4	5	5	As above.	↔	

Indicator	State					Reference Value		Status		Potential Sources	Trend
	Management Zones - Current Values										
					Rushcutters Bay: 1.15						
Aluminium (µg/L)	ND	ND	All areas: 44.83 ¹ Parsley Bay: 39 Vaucluse Bay: 51.38	ND	All areas: 43.60 ¹ Rose Bay: 79.04 Double Bay: 38.00 Rushcutters Bay: 13.75	150	5	5	As above.	↔	
Arsenic (µg/L)	ND	ND	All areas: 1.92 ¹ Parsley Bay: 1.81 Vaucluse Bay: 2.25	ND	All areas: 3.94 ¹ Rose Bay: 9.48 Double Bay: 0.80 Rushcutters Bay: 1.55	500	5	5		↔	
Cadmium (µg/L)	ND	ND	All areas: 0.1 ¹ Parsley Bay: 0.1 Vaucluse Bay: 0.1	ND	All areas: 0.09 ¹ Rose Bay: 0.10 Double Bay: 0.07 Rushcutters Bay: 0.10	0.8	5	5		↔	
Mercury (µg/L)	ND	ND	All areas: 0.1 ¹ Parsley Bay: ND Vaucluse Bay: 0.1	ND	All areas: 0.2 ¹ Rose Bay: 0.2 Double Bay: 0.2 Rushcutters Bay: 0.2	5.4	5	5		↔	
Nickel (µg/L)	ND	ND	All areas: 1.2 ¹ Parsley Bay: 1.28 Vaucluse Bay: 1.21	ND	All areas: 0.99 ¹ Rose Bay: 0.86 Double Bay: 0.90 Rushcutters Bay: 1.20	17	5	5		↔	
Geomorphology											
Extent of foreshore erosion	Negligible, limited to some localised issues. ³					No specific criteria	4		Increased pressures associated with human activities, including trampling, recreational activities & general use.	↔	
Extent of foreshore modification	Several kilometres of coastline within the study area have been modified through construction of seawalls. ³					No specific criteria	3		Foreshore development / asset protection.	👎	
Extent of bank erosion	Limited bank erosion- approximately 330 m of isolated erosion issues. ³					No specific criteria	3		Vegetation loss, stormwater erosion, natural physical processes.	👎	
Bank modification	Approximately 300 m in poor condition, 950 m in good condition. ³					No specific criteria	3		Stormwater induced erosion, vegetation loss.	👎	
Sediment Quality											
Toxicant levels	No data available relating specifically to Woollahra Council. Multiple studies have been undertaken on sediment toxicology within Sydney Harbour. Sediments in the Sydney Harbour estuary are polluted by a wide range of toxicants with concentrations among the highest reported for any major harbour in the world. Mean reported concentrations (mg/kg) are as follows: Copper = 181; Lead = 274; Zinc = 578. ⁴					Arsenic 20-70; Chromium 80-370; Copper 65-270; Lead 50; Zinc 200 (all mg/kg)	1		Historic Industry in Sydney Harbour, sewage, fertilisers.	👎	
Estuarine & Riparian Flora											
Seagrass condition and extent (depth limits)	Total Area = 47,001 m ² Halophila = 1,480 m ² Zostera = 24,410 m ² Posidonia = 93 m ² Zostera+Halophila = 17,480 m ² Zostera+Posidonia = 3,538 m ²					Historic mapping by Creese <i>et al.</i> (2009) for NSW DPI.	4		Poor water quality, high nutrient & sediment loads, potential damage from boats.	↔	
Saltmarsh condition and extent	No areas of coastal saltmarsh mapped within the Woollahra LGA. Six tiny patches reported (all less than 20 m ² in area) in poor condition totalling only 80 m ² in area, located at Rose Bay Park, Hermit Bay, Milk Beach, north of Milk Beach, Vaucluse Bay and Parsley Bay. These could not be verified in the field. ⁵					Creese <i>et al.</i> (2009); Kelleway, Williams & Allen (2007)	3		Clearing, alteration of hydrological regime, pollution by stormwater runoff, weed invasion & trampling.	👎	
Vegetation distribution and condition along the foreshore	Large areas of cleared parkland areas with high levels of weed infestations throughout Woollahra LGA. Small remnant sections of natural regrowth of <i>Banksia integrifolia</i> and other coastal heath species has occurred over the past 50 years. ⁶					No specific criteria	3		Clearing, trampling & pollution effects from increased human activities.	👎	
Estuarine Fauna											
Fish distribution & abundance	570 species of fish within Sydney Harbour. ⁷					No specific criteria	Unknown		Loss or degradation of habitat, declines in water quality	?	
Exotic fauna distribution & abundance (known or likely to occur)	29 introduced species, including noxious fish and aquatic vegetation. ⁸					No specific criteria	3		Unintentionally introduced species through Ballast Water and other shipping/ human activities	👎	

ND = No Data. For all quantitative data, grading is based on the level of exceedences as defined by Roper *et al.* (2011); while qualitative data is based on descriptive categories only, defined by Zann (2005). ¹SESL Australia (2012); All water quality data were taken within catchments. Water sampling was conducted at the mouth of 14 streams within the LGA as per the *Annual Water Quality Monitoring Report 2010-2011*. Wet and dry sampling was undertaken for all seasons from a section of the stream which exhibited good flow (i.e. was not stagnant). ²OEH (2013b) Beachwatch Monitoring Program. ³Based on Cardno site inspections. ⁴Birch and Olmos (2008). ⁵Creese *et al.* (2009); Kelleway, Williams and Allen (2007). ⁶NPWS (2010). ⁷SIMS (2012). ⁸AMBS (2002).

APPENDIX H – FLORA AND FAUNA LIST

The following tables contain the Flora and Fauna List correct as of January 2015. Note that a comprehensive flora and fauna survey has not been completed within Woollahra. The data within this report is based on a range of sightings, limited surveys, and the OEH Bionet Wildlife Atlas. This data is to be validated through a comprehensive flora and fauna survey, and will be updated regularly with sightings from Council staff and community members.

The numbers in the cells indicate the information / data reference. A legend for these references is provided in the following table.

Table H-1. Native and Introduced Fauna

Common Name	Scientific Name	WHOLE LGA	Cooper Park	Gap Park	Parsley Bay	Vaucluse House	Vaucluse Bay	Trumper Park	Christison Park	Royal Sydney Golf Course	Woollahra Golf Course	HMAS Watson	Nielsen Park	South Head	Watsons Bay	Wildlife Atlas record 1.1.1990 to current
Aust. Painted Lady	Vanessa kershawi		1	1	1											
Aust. Privet Hawk	Psilogramma menephron		1	1	1											
Australasian Figbird	Sphecotheres vieilloti		3										2			x
Australasian Gannet	Morus serrator			5												
Australian Hobby	Falco longipennis			5										12		
Australian King-Parrot	Alisterus scapularis															x
Australian Magpie	Cracticus tibicen/ Gymnorhina tibicen		3	2,5		2	2		2	2			2,6	12		x
Australian Pelican	Pelecanus conspicillatus		3										6			x
Australian Pipit	Anthus novaeseelandiae			5										12		x
Australian Raven	Corvus coronoides		3	4,5		2				2			6	12		x
Australian Reed-Warbler	Acrocephalus australis															x
Australian Sea-lion	Neophoca cinerea															
Australian White Ibis	Threskiornis molucca		3							2						X
Australian Wood Duck	Chenonetta jubata															x
Azure Kingfisher	Ceyx azureus/Alcedo azurea			5												x
Bandy-bandy	Vermicella annulata															x
Barking Owl	Ninox connivens			5												
Bar-shouldered Dove	Geopelia humeralis			5												
Bird Dropping Spiders	Celaenia excavata		1	1	1											
Black Ants			1	1	1											
Black Beetles	Sericesthis geninata		1	1	1											
Black Rat*	Rattus rattus		1	1	1							15				
Black-faced Cuckoo-shrike	Coracina novaehollandiae		3	4,5									6			x
Black-faced Monarch	Monarcha melanopsis															x
Blue Groper	Achoerodus viridis	19													3	
Blue Triangle	Graphium sarpedon		1	1	1											
Bogong Moth	Agrostis infusa		1	1	1											
Bottlenose Dolphin	Turpsiops truncatus			1									1			
Bronze Orange Bug			1	1	1											
Brown - Striped Marsh Frog	Limnodynastes peronii			1,5	1											

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Brown Gerygone	Gerygone mouki													12		x
Brown Goshawk	Accipiter fasciatus												6			
Brown Quail	Coturnix ypsilophora															x
Brown Rat*	Rattus norvegicus		1	1,5	1								6			
Buff-banded Rail	Gallirallus philippensis							17								
Bull Ants			17													
Bumble Bees			1	1	1											
Bush Rat	Rattus fuscipes			1,5									1,6			x
Cabbage White	Pieris rapae		1	1	1											
Caspian Tern	Sterna caspia			5												
Channel-billed Cuckoo	Scythrops novaehollandiae				14											x
Chestnut Teal	Anas castanea															x
Christmas Beetles	Anoplogathus sp.		1	1	1											
Cicadas			1	1	1											
Click Beetles	(Elateridae)		1	1	1											
Common Bentwing bat-insectivorous	Miniopterus schreibersii			5	1							15				x
Common Brush-tail Possum	Trichosurus vulpecula		1	1	1											
Common Diving-Petrel	Pelecanoides urinatrix			5												
Common Dolphin	Delphinus delphis			5									1			
Common Eastern Froglet	Crinia signifera		1		1							15				
Common Grass Blue	Zizina labradus		1	1	1											
Common Myna*	Sturnus tristis			5									6	12		X
Common Scaly-foot	Pygopus lepidopodus		3										6			
Common Starling*	Sturnus vulgaris			4,5					2				6	12		X
Common Tern	Sterna hirundo			5												
Copper - tailed skink	Ctenotus taenoides/Ctenotus taenoides											15				
Crane Fly			1	1	1											
Crested Pigeon	Ocyphaps lophotes		3	4						2			6	12		x
Crested Tern	Thalasseus bergii/ Sterna bergii			5												
Crimson Rosella	Platycercus elegans		3											12		x
Crusader Bug			1	1	1											
Cunjevoi	Pyura stolonifera	19													19	
Cup Moth	Doratifera sp.		1	1	1											
Daddy Long-legs	Pholcus phalangiodes		1	1	1											
Dark-flecked Garden Sunskink	Lampropholis delicata	18	3	1,5	1							15	1,6			X
Dinghy Swallowtail	Papilio anactus		1	1	1											
Dollarbird	Eurystomus orientalis		3											12		x

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Dwarf Green Tree Frog	Litoria fallax		1		14			17	2							
Eastern Bentwing-bat	Miniopterus schreibersii oceanensis															x
Eastern Blue - tongued lizard	Tiliqua scincoides		1	1,5	1							15	1,6			
Eastern Koel	Eudynamys orientalis				14	2		2					2,6			x
Eastern Reef Egret	Egretta sacra			5												x
Eastern Rosella	Platycercus eximius		3										6			x
Eastern Spinebill	Acanthorhynchus tenuirostris		3	5										12		x
Eastern Water Dragon	Physignathus leseurii		17		17											
Eastern Water Skink	Eulamprus quoyii		1,3	1,5	1								6			
Eastern Yellow Robin	Eopsaltria australis			5												x
Eel			1													
European Rabbit*	Oryctolagus cuniculus		1	1,5	1											
European Red Fox*	Vulpes vulpes			5									6			
Fence Skink	Cryptoblepharus virgatus		3		1											
Feral/domestic Cat*	Felis catus		1	1,5	1											
Feral/domestic Dog*	Canis domesticus		1	1,5	1											
Galah	Eolophus roseicapillus		3													x
Garden Orb Weaving Spider	Eriophora sp.		1	1	1											
Garden Skink	Lampropholis guichenoti		3	1	1							15	1			
Garfish	Hyporhamptus australis	20														
Golden Whistler	Pachycephala pectoralis												6			x
Grasshoppers			1	1	1											
Great Cormorant	Phalacrocorax carbo			5												x
Greater Broad-nosed Bat	Scoteanax rueppellii															x
Green Flower Spiders	(Thomisidae)		1	1	1											
Greenbottle Fly			1	1	1											
Grey Butcherbird	Cracticus torquatus		3	5	14			17					2			
Grey Fantail	Rhipidura albiscapa		3	5										12		x
Grey Shrike-thrush	Colluricincla harmonica		3													
Grey-headed Flying Fox	Pteropus poliocephalus		1	1	1								1,7			x
Gully Skink	Saproscincus gallii		1	1,5	1								1			
Harlequin Bug			1	1	1											
Horse Fly			1	1	1											
House Fly			1	1	1											
House Mouse*	Mus musculus			5									6			
House Sparrow*	Passer domesticus			4,5									6	12		x

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Hover Fly			1	1	1											
Humpback Whale	Megaptera novaengliae			5									1			
Huntsmen	Isopoda sp.		1	1	1											
Jumping Ants					1											
Jumping Spiders	(Salticidae) Oxyopes sp.		1	1	1											
Katydid			1	1	1											
King Parrot	Alisterus scapularis		3													
Large Citrus- Orchard Butterfly	Papilio aegaeus aegaeus		1	1	1											
Laughing Kookaburra	Dacelo novaeguineae			4						2				2		x
Leaf Hoppers			1	1	1											
Leaf-curling Spider	Phonognatha sp.		1	1	1											
Leopard Seal	Hydrurga leptonyx			4,5									1			
Lerps			1	1	1											
Lesueur's Velvet Gecko	Oedura lesueurii															
Little Black Cormorant	Phalacrocorax sulcirostris			5												x
Little Corella	Cacatua sanguinea															x
Little Penguin	Eudyptula minor			5												x
Little Pied Cormorant	Microcarbo melanoleucos			5												x
Little Wattlebird	Anthochaera chrysoptera			5									6			x
Locusts			1	1	1											
Long - necked Tortoise	Chelodina longicollis				14											
Long-finned Eel	Anguilla reinhardtii		3		1											
Longicorn Beetles	(Cerambycidae)		1	1	1											
Luderick	Girella tricuspidata	20														
Magpie-lark	Grallina cyanoleuca		3	5									6	12		x
Masked Lapwing	Vanellus miles			5			2		2	2				12		x
Meat Ants					1											
Minke Whale	Balaenoptera acutorostrata			5									1			
Mistletoebird	Dicaeum hirundinaceum															x
Mosquito Fish	Gambusia affinis				1											
Mosquitoes			1	1	1											
Nankeen Kestrel	Falco cenchroides			4,5										12		x
Native Bees			1	1	1											
Native Wasps			1	1	1											
New Holland Honeyeater	Phylidonyris novaehollandiae			4,5					2					12		x
New Holland Mouse	Pseudomys novaehollandiae															x
New Zealand Fur Seal	Arctocephalus forsteri												1			
Noisy Miner	Manorina melanocephala		3	2,4,5	2	2	2		2	2			6	12		x

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Northern Jezebel	<i>Delias argenthona</i>		1	1	1											
Oleandar/Common Aust. Crow	<i>Euploea core corinna</i>		1	1	1											
Orange Ladybird	(Coccinellidae)		1	1	1											
Other Insectivorous Bats Unidentified	(Microchiroptera)			4,5	1								6			x
Pacific Black Duck	<i>Anas superciliosa</i>		3					17		2						x
Palm Dart			1	1	1											
Peregrine Falcon	<i>Falco peregrinus</i>		3											12		
Pied Cormorant	<i>Phalacrocorax varius</i>			5									6			x
Pied Currawong	<i>Strepera graculina</i>		3	4,5		2		2		2			6	12		x
Powerful Owl	<i>Ninox strenua</i>				16						16			12		x
Psyllids			1	1	1											
Purple Swamp Hen	<i>Porphyrio porphyrio</i>					2										x
Rainbow Lorikeet	<i>Trichoglossus haematodus</i>		3	4				2	2	2			2,6	12		x
Red Back Spider	<i>Latrodectus hasselti</i>		1	1	1											
Red Crowned Toadlet	<i>Pseudophryne australis</i>												1			
Red Spider Mite			1	1	1											
Red Wattlebird	<i>Anthochaera carunculata</i>			4,5		2							6	12		x
Red-bellied Black Snake	<i>Pseudechis porphyriacus</i>			5												x
Red-browed Finch	<i>Neochmia temporalis</i>		3													x
Red-naped Snake	<i>Furina diadema</i>		1													
Red-rumped Parrot	<i>Psephotus haematonotus</i>		3													x
Red-whiskered Bulbul*	<i>Pycnonotus jocosus</i>		3	5								15		12		x
Ring Tail Possum	<i>Pseudocheirus peregrinus</i>			1												
Rock Dove*	<i>Columba livia</i>		3	4,5					2				6	12		x
Royal Albatross	<i>Diomedea epomophora</i>			5												
Rufous Fantail	<i>Rhipidura rufifrons</i>			5										12		x
Rufous Whistler	<i>Pachycephala rufiventris</i>													12		
Sacred Kingfisher	<i>Todiramphus sanctus</i>													12		
Sand Fly			1	1	1											
Satin Flycatcher	<i>Myiagra cyanoleuca</i>													12		x
Saunders Case Moth	<i>Oiketicus elongatus</i>		1	1	1											
Scaly-breasted Lorikeet	<i>Trichoglossus chlorolepidotus</i>			3												
Scarlet honeyeater	<i>Myzomela sanguinolenta</i>											15				
Scarlet Robin	<i>Petroica boodang</i>															
Sea mullet	<i>Mugil cephalus</i>	20														
Sea Urchins	<i>Centrostephanus rodgersii</i>	19													19	
Seahorse	<i>Hippocampus</i> spp.	19													19	
Shingle-back	<i>Tiliqua rugosa</i>												6			

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Short-finned Eel	Anguilla australis				1											
Short-tailed Shearwater	Puffinus tenuirostris			5												
Silver biddy	Gerres subfasciatus	20														
Silver Gull	Chroicocephalus novaehollandiae/ Larus novaehollandiae			4,5	2		2						6	12		x
Silveryeye	Zosterops lateralis		3	5										12		X
Skipper			1	1	1											
Sooty Oystercatcher	Haematopus fuliginosus													12		x
Southern Elephant Seal	Mirounga leonina												1			
Southern leaf-tailed Gecko	Phyllurus platurus			1,5	1								1			
Southern Myotis	Myotis macropus															x
Southern Right Whale	Eubalaena australis			1									1			
Spangled Drongo	Dicrurus bracteatus		3										6	12		x
Spined Citrus Bug			1	1	1											
Spotted Minnows	Gallaxias macculatus				1											
Spotted Pardalote	Pardalotus punctatus		3	5										12		x
Spotted Turtle-Dove*	Streptopelia chinensis			4								15	6	2,12		x
St. Andrews Cross	Argiope antheraea		1	1	1											
Stick Spiders			1	1	1											
Striated Pardalote	Pardalotus striatus															x
Striped Skink	Ctenotus robustus		3	1	1								1			
Sugar Ants					1											
Sulphur-crested Cockatoo	Cacatua galerita		3	4						2			6	12		x
Superb Fairy-wren	Malurus cyaneus		3	2,4,5					2					12		x
Swamp /Marsh Snake	Hemiaspis signata		3													
Swamp Rat	Rattus lutreolus															x
Sydney Rock Oyster	Saccostrea glomerata	19													19	
Tawny Frogmouth	Podargus strigoides		3													x
Thick-tailed Gecko	Underwoodisaurus milii		3										6			x
Three-toed skink	Saiphos equalis		1	1	1											
Tusked Frog	Adelotus brevis		1		1											
Two Spotted mite			1	1	1											
Variagated Fairy-wren	Malurus lamberti															x
Vine moth			1	1	1											
Wanderer/ Monarch Butterfly	Danus plexippus		1	1	1											
Wandering Albatross	Diomedea exulans			5												
Water-rat	Hydromys chrysogaster				16											x
Weasel skink	Saproscincus mustilinus				1											
Weevils	(Curculionidae)		1	1	1											

Table H-1. Native and Introduced Fauna

Common Name	Scientific Name	WHOLE LGA	Cooper Park	Gap Park	Parsley Bay	Vaucluse House	Vaucluse Bay	Trumper Park	Christison Park	Royal Sydney Golf Course	Woollahra Golf Course	HMAS Watson	Nielsen Park	South Head	Watsons Bay	Wildlife Atlas record 1.1.1990 to current
Welcome Swallow	Hirundo neoxena		3	5		2							6	12		x
White Trevally	Pseudocaranx dentex	19													3	
White-bellied Sea Eagle	Haliaeetus leucogaster		3													
White-browed Scrubwren	Sericornis frontalis			4,5										12		x
White-browed Woodswallow	Artamus superciliosus		3													
White-eared Honeyeater	Lichenostomus leucotis			5												
White-faced Heron	Egretta novaehollandiae		3	5										12		
White-headed Pigeon	Columba leucomela			5												
White-naped Honeyeater	Meliphreptus lunatus													12		
White-necked Heron	Ardea pacifica		3													
White-plumed Honeyeater	Lichenostomus penicillatus			5					2							
Willie Wagtail	Rhipidura leucophrys		3	5						2			6	12		x
Yellow Ladybird	(Coccinellidae)		1	1	1											
Yellow-bellied three-toed Skink	Saphos equalis		3													x
Yellow-faced Honeyeater	Lichenostomus chrysops								2					12		x
Yellowfin Bream	Acanthopagrus australis	20														
Yellow-tailed Black-Cockatoo	Calyptorhynchus funereus									2				12		x

Table H-2. Fauna Reference Legend

Reference #	Reference
1	Woollahra Council. 1995. Woollahra Council Flora and Fauna List 1995.
2	Eco Logical Australia (ELA). 2013. Site surveys completed to inform Woollahra Biodiversity Strategy
3	Woollahra Municipal Council. 2001. Cooper Park Plan of Management. Woollahra Council.
4	Eco Logical Australia (ELA). 2007. Ecological Assessment Fauna Report for the Gap Park Masterplan. Project No. 069-053. Report prepared for Thompson Berrill Landscape Design Pty Ltd.
5	Woollahra Municipal Council (2003). Gap Park Flora and Fauna 2002/2003. Woollahra Municipal Council, Double Bay
6	Adapted from the 'Flora list for Nielsen Park of the Council of the City of Randwick Community Nursery', compiled by D. Hirschfeld, P. Ibbetson & J.A.D. Hilliard. October 1998 to July 1999
7	NSW Department of Environment, Climate Change and Water, Parks and Wildlife Group. 2010. Sydney Harbour National Park Draft Plan of Management - Section 3 Precincts. NSW Government.
8	Office of Environment and Heritage. 2013. NSW Wildlife Atlas search tool. (Accessed September 2013).
9	Verbal correspondence with Jeff Hill Woollahra Council staff
10	Benson, D. 2011. Native plants of Sydney Harbour National Park: historical records and species lists, and their value for conservation monitoring. Cunninghamia 12(1): 61-84.
11	Benson, D.H. 1990. Taken for granted: the bushland of Sydney and its suburbs. The Royal Botanic Gardens Sydney.
12	South Head Stage 1 Draft Conservation Management Plan - Volume 1. 2007.
13	Eco Logical Australia (ELA). 2010. Cooper Park Vegetation Management Plan. Prepared for Woollahra Municipal Council
14	Woollahra Council, Parsley Bay Reserve Vegetation Management Report and recommended action plans.
15	HLA-Envirosciences Pty Limited (HLA), 2004, Bushland Management Plan HMAS Watson, prepared for Defence Maintenance Management Pty Ltd.
16	Pers Comms Woollahra BushCare staff and volunteers, 2013.
17	Pers Comms Woollahra BushCare staff and volunteers, 2014.
18	Office of Environment and Heritage. 2013. NSW Wildlife Atlas search tool (Accessed May 2014)

Table H-3. Locally Extinct Fauna Species

Common Name	Scientific Name	Status	Common Name	Scientific Name	Status
Green Tree Frog	Litoria caerulea		Rose Robin	Petroica rosea	
Australian Ringneck	Barnardius zonarius		Red-winged Parrot	Aprosmictus erythropterus	
Brown Falcon	Falco berigora		Rufous Whistler	Pachycephala rufiventris	
Brown Quail	Coturnix ypsilophora		Superb Fruit-Dove	Ptilinopus superbus	V1
Buff-banded Rail	Gallirallus philippensis		Topknot Pigeon	Lopholaimus antarcticus	
Fan-tailed Cuckoo	Cacomantis flabelliformis		Whistling kite	Haliastur sphenurus	
Fork-tailed Swift	Apus pacificus	Ma, Mi (CAMBA, JAMBA, ROKAMBA)	White-winged Triller	Lalage sueurii	
Tree Martin	Petrochelidon nigricans		Yellow-rumped Thornbill	Acanthiza chrysorrhoa	
Noisy Friarbird	Philemon corniculatus		Yellow Thornbill	Acanthiza nana	
Pallid Cuckoo	Cacomantis pallidus		Eastern Quoll	Dasyurus viverrinus	Extinct

Table H-4. Native and Introduced Flora

Common Name	Scientific Name	Camp Cove	Cooper Park	Gap Park	Gap Bluff	Nielsen Park	Parsley Bay	Vaucluse House	South Head	Trumper Park	Christison Park	Royal Sydney Golf Course	Woollahra Golf Club	Vaucluse Bay	HMAS Watson	General LGA	Wildlife Atlas record
Two-veined Hickory	Acacia binervata																X
	Acacia binervia		1				1,14										
	Acacia dealbata		1														
Black/Green Wattle	Acacia decurrens		1														
Cedar Wattle	Acacia elata		1														
	Acacia floribunda		1				1										
Hickory	Acacia implexa						1,14										
Sydney Golden Wattle	Acacia longifolia		1	1,4	1	1,6	1,14	1							15		X
Long-leaf Wattle	Acacia longissima																X
Red-stemmed Wattle	Acacia myrtifolia																X
Sydney Green Wattle	Acacia parramattensis		1				1,14	1,6							15		X
Coastal Wattle	Acacia longifolia subsp. sophorae		1	1	1		1										
	Acacia stricta		1														
Sweet-scented Wattle	Acacia suaveolens		1	1	1	1,6	1,14								15		X
Sunshine Wattle	Acacia terminalis subsp. terminalis		1,9	1	1,18 TBC	1,6	1,14								15	14	X
Prickly Moses	Acacia ulicifolia		1	1	1	1,6	1,14										X
Pixie Orchid	Acianthus fornicatus		1			6											
Lilly Pilly	Acmena smithii - white form/pink form		1	1		1,6	1,14	1							15		X
White Aspen	Acronychia oblongifolia		19			6											
Flannel Flower	Actinotus helianthi				1	1,6									15		
Lesser Flannel Flower	Actinotus minor					6											X
Maidenhair Fern	Adiantum aethiopicum		1,3	1			1,14	1									
Giant Maidenhair Fern	Adiantum formosum				1										15		

Table H-4. Native and Introduced Flora

Common Name	Scientific Name	Camp Cove	Cooper Park	Gap Park	Gap Bluff	Nielsen Park	Parsley Bay	Vaucluse House	South Head	Trumper Park	Christison Park	Royal Sydney Golf Course	Woollahra Golf Club	Vaucluse Bay	HMAS Watson	General LGA	Wildlife Atlas record
Rough Maidenhair	<i>Adiantum hispidulum</i>						1										
Blown Grass	<i>Agrostis avenacea</i> var. <i>avenacea</i>						1										
	<i>Allocasuarina nana</i>		1														
Scrub She-oak	<i>Allocasuarina distyla</i>		1,4	1		1,6	1,14								15		x
Black She-oak	<i>Allocasuarina littoralis</i>		1,3	1		1,6	1								15		x
Nielsen Park She-Oak	<i>Allocasuarina portuensis</i>			20		1,6,18, 20		21									x
Forest Oak	<i>Allocasuarina torulosa</i>						1										
Cunjevoi	<i>Alocasia brisbanensis</i>						1,14										
	<i>Alphitonia excelsa</i>		1														
Mistletoe	<i>Amyema conger</i> ssp. <i>conger</i>					6	1										
Mistletoe	<i>Amyema</i> sp.		1														
Sydney Red Gum	<i>Angophora costata</i>		1	1	1	1,6	1,14	1,2									x
Rough Barked Apple	<i>Angophora floribunda</i>			1													
Dwarf Apple	<i>Angophora hispida</i>			1		1,6											
	<i>Anisopogon avenaceus</i>				1	6											
Gum Vine	<i>Aphanopetalum resinosum</i>		3														
	<i>Aristida vagans</i>		1														
Birds nest Fern	<i>Asplenium australasicum</i>		1,3			6	1										
Necklace Fern	<i>Asplenium flabellifolium</i>		1,3	1		6	1										
Native Tobacco	<i>Astrotricha floccosa</i>						1,14										
	<i>Atriplex australasica</i>																x
Wallaby Grass	<i>Austrodanthonia fulva</i> / <i>Rytidosperma fulvum</i>														15		
	<i>Backhousia myrtifolia</i>		1														
Heath Myrtle	<i>Baeckea imbricata</i>		1	1	1	1,6											
	<i>Baeckia microphylla</i>				1?												
	<i>Banksia ericifolia</i>		1	1,4	1	1,6											x
	<i>Banksia ericifolia</i> subsp. <i>ericifolia</i>														15		
Coast Banksia	<i>Banksia integrifolia</i>		1	1	1	1,6	1,14	1									x
	<i>Banksia integrifolia</i> subsp. <i>Integrifolia</i>														15		
Silver Banksia	<i>Banksia marginata</i>				1										15		x
	<i>Banksia oblongifolia</i>			1	1	1,6									15		x
Old Man Banksia	<i>Banksia serrata</i>		1	1		1,6		1							15		x
Hairpin Banksia	<i>Banksia spinulosa</i>			1													
Dog Rose	<i>Bauera rubioides</i> var. <i>rubioides</i>			1													
	<i>Baumea acuta</i>																x
Dumplings, Apple Berry	<i>Billardiera scandens</i>		1	1		1,6	1										x
Gristle Fern	<i>Blechnum cartilagineum</i>		1,3			6											
	<i>Blechnum</i> sp.							1									
Sydney Boronia	<i>Boronia ledifolia</i>																x
Stiff Boronia	<i>Boronia rigens</i>																x

Table H-4. Native and Introduced Flora

Common Name	Scientific Name	Camp Cove	Cooper Park	Gap Park	Gap Bluff	Nielsen Park	Parsley Bay	Vaucluse House	South Head	Trumper Park	Christison Park	Royal Sydney Golf Course	Woollahra Golf Club	Vaucluse Bay	HMAS Watson	General LGA	Wildlife Atlas record
Illawarra Flame Tree	Brachychiton acerifolius		1														
Dwarfs Apples	Breynia oblongifolia		1,3	1		1,6	1,14	1,2									x
Milksmaids	Burchardia umbellata					6											
Blue grass lily	Caesia parviflora var. vittata			1		6	1										
	Caesia parviflora var parviflora						14?										
Pink purslane	Calandrinia pickeringii			1		6	1,14										
Black Wattle	Callicoma serratifolia		1,3			1	1,14										
	Callistemon linearis x pinifolius						1										
	Callistemon citrinus		1												15		
Narrow-leaved Bottlebrush	Callistemon linearis		1	1	1	1,6									15		
	Callistemon rigidus		1			6											
Willow Bottlebrush	Callistemon salignus																x
Port Jackson Cypress	Callitris rhomboidea				1	1,6											
	Callitris sp.		3?														
Soft Bracken Fern	Calochlaena dubia		1,3			6	1,14	1									
Fringe Myrtle	Calytrix tetragona			1													
	Carex appressa						1										
Native Pigface	Carpobrotus glaucescens			1	1												
Three-veined Cassinia	Cassinia trinervia			1													
Sticky Cassinia	Cassinia uncata					1,6											
Devil's Twine	Cassytha glabella		1	1	1	6											
Devils Twine	Cassytha paniculata					6											
Downy Dodder-laurel	Cassytha pubescens																x
River Oak	Casuarina cunninghamiana		1,3														
River Oak	Casuarina cunninghamiana subsp.cunninghamiana														15		
Swamp Oak	Casuarina glauca		1,3	1			1,14	1						2			
Old Mans Beard	Caustis flexulosa					6											
Thick Twist Rush	Caustis pentandra					6											
Slender Grape	Cayratia clematidea						1,14										
	Centella asiatica		3	1	1	6	1										
	Centrolepis strigosa		3				1,14										
Coachwood	Ceratopetalum apetalum		3														
NSW Christmas Bush	Ceratopetalum gummiferum		1,3			6	1,14										
Mulga Fern	Cheilanthes sieberi			1			1,14										
Scrambling Sedge	Chordifex dimorphus			1	1												x
Binung	Christella dentata		1,3				1										
Kangaroo Vine	Cissus antarctica		1	1		6											
Five-leaved Water Vine	Cissus hypoglauca		1	1		1,6	1,14										x
	Clerodendrum tomentosum					6	1	1									
Native wandering Jew	Commelina cyanea		1,3	1	1	1,6	1,14	2							15		

Table H-4. Native and Introduced Flora

Common Name	Scientific Name	Camp Cove	Cooper Park	Gap Park	Gap Bluff	Nielsen Park	Parsley Bay	Vaucluse House	South Head	Trumper Park	Christison Park	Royal Sydney Golf Course	Woollahra Golf Club	Vaucluse Bay	HMAS Watson	General LGA	Wildlife Atlas record
	<i>Cordyline australis</i>		3(?)														
Narrow-leaved Palm Lily	<i>Cordyline stricta</i>		1,3			6		1									
Red Bloodwood	<i>Corymbia gummifera</i>					6											
Common cotula	<i>Cotula australis</i>		1,3	1		1,6	1										
Waterbuttons	<i>Cotula coronopifolia</i>					1											
Aust. stonecrop	<i>Crassula sieberiana</i>			1	1	6	1										
	<i>Crowea exaltata</i>					6											
	<i>Crowea saligna</i>		1		1	1,6	1,14								15		x
Tartan Tongue-orchid	<i>Cryptostylis erecta</i>		3	1		6	1,14										
Tuckeroo	<i>Cupaniopsis anacardioides</i>		1	1		1	1	1									
Australian Dodder	<i>Cuscuta australis</i>														15		
Rough Tree Fern	<i>Cyathea australis</i>		1,3		1	6	1,14										x
Scaly Tree Fern	<i>Cyathea cooperi</i>		1,3				1,14	1							15		x
Bears-ear	<i>Cymbonotus lawsonianus</i>														15		
	<i>Cyperus brevifolius</i>		3														x
Slender Sedge	<i>Cyperus gracilus</i>		1,3				1										
	<i>Cyperus imbecillus</i>		3				1										
	<i>Cyperus mirus</i>					6											x
	<i>Cyperus polystachyos</i>		1	1			1										x
	<i>Cyperus sanguinolentus</i>		3				1										
	<i>Cyperus sesquiflorus</i>		1,3				1										
Blue Dampiera	<i>Dampiera stricta</i>					1,6											
	<i>Darwinia fascicularis</i> sp. <i>fascicularis</i>				1												
Hares Foot Fern	<i>Davallia pyxidata</i>					6	1										
	<i>Daviesia corymbosa</i>					1,6											
Bitter Pea	<i>Daviesia</i> sp.					1											
Iron Bark Orchid	<i>Dendrobium aemulum</i>					6											
Tongue-orchid	<i>Dendrobium linguiforme</i>					6	1,14										
Rock Orchid	<i>Dendrobium speciosum</i>					6											
Bent Grass	<i>Deyeuxia quadriseta</i>			1													
Paroo lily	<i>Dianella caerulea</i>		1,3	1	1	1,6	1	1,2									x
Coastal Flax Lily	<i>Dianella congesta</i>					6											
Black anther flax-lily	<i>Dianella revoluta</i>					1,6	1										
Long-hair Plume Grass	<i>Dichelachne crinita</i>		1	1	1	6	1,14										x
Short-hair Plume Grass	<i>Dichelachne micrantha</i>			1			1,14										
Kidney Weed	<i>Dichondra repens</i>		1,3	1		6	1,14								15		
Soft Tree Fern	<i>Dicksonia antarctica</i>		1,3														
Native Summer Grass	<i>Digitaria parviflora</i>		1			6	1,14										
Eggs and Bacon	<i>Dillwynia retorta</i> sp. <i>retorta</i>			1	1	1,6											
Hop bush	<i>Dodonaea triquetra</i>		1	1		1,6	1										x

Table H-4. Native and Introduced Flora

Common Name	Scientific Name	Camp Cove	Cooper Park	Gap Park	Gap Bluff	Nielsen Park	Parsley Bay	Vaucluse House	South Head	Trumper Park	Christison Park	Royal Sydney Golf Course	Woollahra Golf Club	Vaucluse Bay	HMAS Watson	General LGA	Wildlife Atlas record
Common Rasp Fern	<i>Doodia australis</i>																x
Small Rasp Fern	<i>Doodia caudata</i>		1,3				1								15		
Gynea Lily	<i>Doryanthes excelsa</i>		1,3														
Sundew	<i>Drosera auriculata</i>					6											
Sundew	<i>Drosera peltata</i>					6											
	<i>Drosera pygmaea</i>					6											
Sundew	<i>Drosera sp.</i>		1,3														
Hedgehog Grass	<i>Echinopogon caespitosus</i>		1	1		6	1,14										
Saloop	<i>Einadia trigonos</i>			1													
Quandong	<i>Elaeocarpus grandis</i>		3														
Blueberry Ash	<i>Elaeocarpus reticulatus</i>		1,3	1	1	1,6	1,14										x
Corkwood	<i>Endiandra sieberi</i>		1,3			6	1,14										x
	<i>Entolasia marginata</i>		1	1			1,14										x
Wiry Panic Grass	<i>Entolasia stricta</i>		1	1	1	6	1,14								15		
	<i>Epacris crassifolia</i>			1	1												
Native Fuchsia	<i>Epacris longiflora</i>		1,3	1	1	1,6	1								15		x
	<i>Epacris microphylla</i>			1		1											
	<i>Epaltes australis</i>			1			1										
	<i>Epilobium billardierianum</i>		19				1										
	<i>Eragrostis benthamii</i>			1	1		1										
Brown's Love Grass	<i>Eragrostis brownii</i>		1	1		6	1										
Love Grass	<i>Eragrostis molybdea</i>			1?													
	<i>Eriostemon buxifolius</i>			1		6											x
	<i>Eriostemon sp.</i>		1														
Bangalay	<i>Eucalyptus botryoides</i>		1	1		6	1								15		
Brown Stringybark	<i>Eucalyptus capitellata x piperita ?</i>		1														
Thin Leaved Stringybark	<i>Eucalyptus eugenioides</i>					6											
	<i>Eucalyptus globoidea</i>		1														
Red Bloodwood	<i>Eucalyptus gummifera</i>					1	1,14	1									
Scribbly Gum	<i>Eucalyptus haemastoma</i>				1	1,6	1	1									
Port Jackson Mallee	<i>Eucalyptus obstans</i>			4		6											
Blackbutt	<i>Eucalyptus pilularis</i>		1	1													x
Sydney Peppermint	<i>Eucalyptus piperita</i>		1			1,6	1,14										
Grey Gum	<i>Eucalyptus punctata</i>		1														x
	<i>Eucalyptus resinifera</i>		19														
Swamp Mahogany	<i>Eucalyptus robusta</i>		1		1	1,6	1,14	1									x
	<i>Eucalyptus robusta - hybrid form</i>					1											
Sydney Blue Gum	<i>Eucalyptus saligna</i>		1														
Hard Leaved Scribbly Gum	<i>Eucalyptus sclerophylla</i>					6											
Forest Red Gum	<i>Eucalyptus tereticornis</i>		1			6	1,14	1									x

Table H-4. Native and Introduced Flora

Common Name	Scientific Name	Camp Cove	Cooper Park	Gap Park	Gap Bluff	Nielsen Park	Parsley Bay	Vaucluse House	South Head	Trumper Park	Christison Park	Royal Sydney Golf Course	Woollahra Golf Club	Vaucluse Bay	HMAS Watson	General LGA	Wildlife Atlas record
	<i>Eupomatia laurina</i>		1,3														
Wombat Berry	<i>Eustrephus latifolius</i>		1	1		1,6	1	1									x
Native Cherry	<i>Exocarpos cupressiformis</i>					1,6											
Moreton Bay Fig	<i>Ficus macrophylla</i>	1	1	1		6											
Hills Fig	<i>Ficus microcarpa</i> Hillii						14										
Port Jackson Fig	<i>Ficus rubiginosa</i>		1	1		1,6	1,14	1							15		x
Sea Fig	<i>Ficus superba</i>		1														
	<i>Gahnia clarkei</i>		1,3				1										
	<i>Gahnia melanocarpa</i>						1,14?										
	<i>Gahnia seiberiana</i>		1		1												
Scrambling Lily	<i>Geitonoplesium cymosum</i>		1	1		1,6	1	1									
	<i>Geranium homeanum</i>					6	1										
Coral Fern	<i>Gleichenia dicarpa</i>		1,3		1										15		
Rusty Coral Fern	<i>Gleichenia rupestris</i>		3		1	6											
Cheese Tree	<i>Glochidion ferdinandi</i>		1,3	1	1	1,6	1,14	1,2									x
Cheese Tree	<i>Glochidion ferdinandi</i> var. <i>ferdinandi</i>														15		
Love Creeper	<i>Glycine clandestina</i>			1	1	1,6	1										
Variable Glycine	<i>Glycine tabacina</i>																x
	<i>Gnaphalium</i> sp.		3														
Dainty Wedge Pea	<i>Gompholobium glabratum</i>																x
Large Wedge Pea	<i>Gompholobium grandiflorum</i>																x
	<i>Gonocarpus micranthus</i> ssp. <i>micranthus</i>					1,6	1										
Raspwort	<i>Gonocarpus teucrioides</i>		1,3	1	1	1,6	1,14										x
	<i>Goodenia bellidifolia</i>					1,6											
	<i>Goodenia paniculata</i>						1										x
Grey Spider-flower	<i>Grevillea buxifolia</i>					1,6											
Rosemary Grevillea	<i>Grevillea rosmarinifolia</i>														15		
Pink Spider-flower	<i>Grevillea sericea</i>		1		1												x
	<i>Guioa semiglauca</i>		1														
Broad-leaved Hakea	<i>Hakea dactyloides</i>		1														x
Needlebush	<i>Hakea gibbosa</i>														15		
Needle Bush	<i>Hakea sericea</i>				1										15		
Dagger Heath	<i>Hakea teretifolia</i>			1	1												x
	<i>Hakea teretifolia</i> subsp. <i>Teretifolia</i>														15		
Purple Twining-pea	<i>Hardenbergia violacea</i>		1	1		1,6	1	1									
Twining Guinea Flower	<i>Hibbertia dentata</i>	1				6	1										
Small Hibbertia	<i>Hibbertia linearis</i>				1												
	<i>Hibbertia nitida</i>																x
	<i>Hibbertia pedunculata</i>					1,6											
Climbing Guinea Flower	<i>Hibbertia scandens</i>		1,3	1	1		1,14								15		

Table H-4. Native and Introduced Flora

Common Name	Scientific Name	Camp Cove	Cooper Park	Gap Park	Gap Bluff	Nielsen Park	Parsley Bay	Vaucluse House	South Head	Trumper Park	Christison Park	Royal Sydney Golf Course	Woollahra Golf Club	Vaucluse Bay	HMAS Watson	General LGA	Wildlife Atlas record
Twiggy Hibbertia	Hibbertia virgata				1												
Native Rosella	Hibiscus heterophyllus sp. heterophyllus '95 list						1,14										
Bats Wing Fern	Histiopteris incisa		1,3	1	1	6	1	1									x
Bleeding Heart	Homalanthus populifolius		1,3	1	1	1,6	1,14	1									
Stinking pennywort	Hydrocotyle laxiflora					6	1										
	Hydrocotyle peduncularis			1													
	Hydrocotyle sp.		1?														
	Hypericum gramineum						1										
Downy Ground Fern	Hypolepis glandulifer/Hypolepis punctata		1				1,14										
Harsh Ground Fern	Hypolepis muelleri		1,3	1			1										x
Blady Grass	Imperata cylindrica		1		1	1,6	1,14	1,2									
Blady Grass	Imperata cylindrica var. major														15		
	Isolepis cernua						1										
Swamp Club-rush	Isolepis inundata		1,3				1										
Knobby Club-rush	Ficinia nodosa			1	1	6	1,14										
	Isolepis platycarpa																x
Broad-leaf Drumsticks	Isopogon anemonifolius																x
Narrow-leaf Drumsticks	Isopogon anethifolius																x
	Juncus articulatus																x
	Juncus continuus		1,3	1	1		1										x
	Juncus homalocaulis						1										
Sea Rush	Juncus kraussii						1										
	Juncus microcephalus																x
Broad Rush	Juncus planifolius		1,3	1	1		1										x
	Juncus prismatocarpus																x
Common/Tussock Rush	Juncus usitatus		1,3	1	1		1										x
Dusky Coral Pea	Kennedia rubicunda	1	1	1	1	1,6	1	1									x
Tick Bush	Kunzea ambigua		1	1, 2,4	1	1,6	1,14	1							15		x
Mountain Devil	Lambertia formosa		1	1													x
Rusty Velvet Bush	Lasiopetalum ferrugineum		1?	1?	1?	6?	1?										
	Lasiopetalum ferrugineum var. cordatum			1													
Variable Sword-sedge	Lepidosperma laterale		1	1	1	6	1										
	Lepidosperma concavum			1			1,14										
Coast Tea Tree	Leptospermum laevigatum			1	1	1,6	1,14								15		x
	Leptospermum polygalifolium		1			1											x
	Lepyrodia scariosa			19		6											x
	Leucopogon lanceolata		1														
Straggling Beard Heath	Leucopogon microphyllus			1		1,6											
Screw Fern	Lindsaea linearis					6											
Cabbage Tree Palm	Livistona australis		1	1	1	6		1,17									

Table H-4. Native and Introduced Flora

Common Name	Scientific Name	Camp Cove	Cooper Park	Gap Park	Gap Bluff	Nielsen Park	Parsley Bay	Vaucluse House	South Head	Trumper Park	Christison Park	Royal Sydney Golf Course	Woollahra Golf Club	Vaucluse Bay	HMAS Watson	General LGA	Wildlife Atlas record
	<i>Lobelia alata</i>		1,3	1	1	6	1										
	<i>Lobelia anceps</i>																x
	<i>Lobelia gracilis</i>					6											
	<i>Lobelia silaifolia</i>					6											
	<i>Lomandra filiformis</i>						1,14										
Pale Mat Rush	<i>Lomandra glauca</i> ssp. <i>glauca</i>			1													x
	<i>Lomandra gracilis</i>					6											x
Spiny-headed Mat Rush	<i>Lomandra longifolia</i>		1		1	1,6	1	1,2							15		x
	<i>Lomandra longifolia</i> ssp. <i>longifolia</i>			1													
	<i>Lomandra multiflora</i>		1	1		6											
	<i>Lomandra obliqua</i>			19													
Crinkle Bush	<i>Lomatia silaifolia</i>		1			1											
Brush Box (naturalised in region)	<i>Lophostemon confertus</i>														15		
Club Moss	<i>Lycopodium</i> sp.		3														
Lesser Loosestrife	<i>Lythrum hyssopifolia</i>				1		19										
Burrawang	<i>Macrozamia communis</i>		19														x
Common Milk Vine	<i>Marsdenia rostra</i>					6											
Scented Marsdenia	<i>Marsdenia suaveolens</i>					1,6											
Bracelet Honey Myrtle	<i>Melaleuca armillaris</i>			1	1			1									x
Honey Myrtle	<i>Melaleuca armillaris</i> subsp. <i>Armillaris</i>														15		
	<i>Melaleuca hypericifolia</i>			1	1												x
Flax-leaved Paperbark	<i>Melaleuca linariifolia</i>														15		
Ball Honey Myrtle	<i>Melaleuca nodosa</i>		1	1	1	1,6	1,14								15		x
Broad-leaved paperbark	<i>Melaleuca quinquenervia</i>			1				1,2				17			15		
	<i>Melaleuca styphelioides</i>		1														
Heath Micranthemum	<i>Micranthemum ericoides</i>			1	1												
Weeping Meadow Grass	<i>Microlaena stipoides</i>		1	1		6	1,14	2									x
Fringed Heath Myrtle	<i>Micromyrtus ciliata</i>			1	1										15		
Kangaroo Fern	New name <i>Microsorium pustulatum</i>		19			6	1										
Onion Orchid	<i>Microtis</i> sp.			1													
	<i>Mitrasacme paludosa</i>					6											
Mitre Weed	<i>Mitrasacme polymorpha</i>					1,6											x
Broom-heath	<i>Monotoca elliptica</i>		1,3		1	1,6	1,14								15		x
	<i>Monotoca scoparia</i>														15		
Morinda	<i>Morinda jasminoides</i>						1,14										
	<i>Muellerina celastroides</i>														15		
Brush muttonwood	<i>Myrsine howittiana</i>														15		
	<i>Neolitsea dealbata</i>		1,3														
Large Mock Olive	<i>Notelaea longifolia</i>		1			6	1,14	1									x
Native Olive	<i>Notelaea ovata</i>					1									15		

Table H-4. Native and Introduced Flora

Common Name	Scientific Name	Camp Cove	Cooper Park	Gap Park	Gap Bluff	Nielsen Park	Parsley Bay	Vaucluse House	South Head	Trumper Park	Christison Park	Royal Sydney Golf Course	Woollahra Golf Club	Vaucluse Bay	HMAS Watson	General LGA	Wildlife Atlas record
Smooth Mock Olive	<i>Notelaea venosa</i>						1,14										
Daisy Bush	<i>Olearia tomentosa</i>			1	1										15		
Stinkweed	<i>Opercularia aspera</i>		1	1	1	1,6	1,14								15		
Adders Tongue	<i>Ophioglossum lusitanicum</i> sp. <i>coriaceum</i>			1			1										
Basket Grass	<i>Oplismenus aemulus</i> var. <i>aemulus</i>		1	1	1	6	1	1									X
	<i>Oplismenus imbecillus</i>		1	1	1	6	1	1									X
Yellow wood sorrel	<i>Oxalis corniculata</i>		1	1	1	1	1										X
	<i>Oxalis exilis</i>														15		
	<i>Oxylobium cordifolium</i>					1,6											
Rice Flower	<i>Ozothamnus diosmifolius</i>		1			6		1									
Wonga Wonga Vine	<i>Pandorea pandorana</i> (also subsp <i>pandorana</i>)		1,3			6	14								15		
	<i>Pandorea</i> sp <i>jasminoides</i>						14										
Two Colour Panic	<i>Panicum simile</i>			1													X
	<i>Paspalidium distans</i> / <i>Paspalidium radiatum</i>		1	1		6	1,14								15		
	<i>Pelargonium australe</i>				1	6	1										
Sickle Fern	<i>Pellaea falcata</i>			1	1												
Small Sickle Fern	<i>Pellaea falcata nana</i>			1		6											
	<i>Pellaea paradoxa</i>																X
	<i>Persicaria decipiens</i>		1		1	6	1										
Lance-leafed Geebung	<i>Persoonia lanceolata</i>		1	1	1	1,6											X
Broad-leaf Geebung	<i>Persoonia levis</i>		1			1,6											
Narrow-leaf Geebung	<i>Persoonia linearis</i>					1,6											
	<i>Phebalium dentatum</i>		1														
	<i>Phyllanthus</i> sp.	?	3	?	?	?	?	?	?	?	?	?	?	?	?		
Hairy pittosporum	<i>Pittosporum revolutum</i>		1	1		1,6	1,14	1									
Sweet Pittosporum	<i>Pittosporum undulatum</i>		1	1	1	1,6	1,14	1							15		X
Slender Plantain	<i>Plantago debilis</i>					6											
Native Plantain	<i>Plantago hispida</i>				1												
Elkhorn	<i>Platycerium bifurcatum</i>		1,3	1	1	6	1										
Handsome Flat Pea	<i>Platylobium formosum</i> sp. <i>formosum</i>		1,3			6											X
Lance-leaf platysace	<i>Platysace lanceolata</i>			1	1	1,6	1,14										
Cockspur flower	<i>Plectranthus parviflorus</i>		1,3	1		6	1										
	<i>Poa affinis</i>		1	1		6	1,14										X
Plum Pine	<i>Podocarpus elatus</i>		3				19										
	<i>Podocarpus spinulosus</i>			1			1,14										
Celery Wood	<i>Polyscias elegans</i>		3														
Elderberry Panax	<i>Polyscias sambucifolia</i>		1,3			1,6	1,14	1									
	<i>Pomaderris discolor</i>		1														
Rusty Pomaderris	<i>Pomaderris ferruginea</i>						1,14										
	<i>Pomaderris</i> sp.						1,14	1									

Table H-4. Native and Introduced Flora

Common Name	Scientific Name	Camp Cove	Cooper Park	Gap Park	Gap Bluff	Nielsen Park	Parsley Bay	Vaucluse House	South Head	Trumper Park	Christison Park	Royal Sydney Golf Course	Woollahra Golf Club	Vaucluse Bay	HMAS Watson	General LGA	Wildlife Atlas record
Pomax	<i>Pomax umbellata</i>		1	1		1,6	1,14										
Small poranthera	<i>Poranthera microphylla</i>		1,3				1										
Common Purslane	<i>Portulaca oleracea</i>			1			1										
Leek Orchid	<i>Prasophyllum</i> sp.			1													
White root	<i>Pratia purpurascens</i>					6	1								15		x
	<i>Pseuderanthemum variabile</i>		1,3														
	<i>Pseudognaphalium luteoalbum</i>			1													
Skeleton Fork Fern	<i>Psilotum nudum</i>			1		6	1										
Hard Bracken	<i>Pteridium esculentum</i>		1,3	1	1	1,6	1,14										
Tender Brake	<i>Pteris tremula</i>		1,3		1		1										
Jungle Brake	<i>Pteris umbrosa</i>		3				1										
Chinese Brake	<i>Pteris vittata</i>		1				1										
	<i>Pterostylis concinna</i>			1			14										
Blunt Greenhood	<i>Pterostylis curta</i>			1			1,14										
Nodding Greenhood	<i>Pterostylis nutans</i>		19	1		6	14										
Little Red Riding Hood	<i>Pterostylis pedunculata</i>						1,14										
	<i>Pterostylis</i> sp.nutans		1?														
	<i>Pterostylis</i> sp. ??		1?														
	<i>Pultenaea daphnoides</i>	1			1												
	<i>Pultenaea linophylla</i>		1,3														
	<i>Pultenaea rosmarinifolia</i>		1,3														
Fine-leaf Bush Pea	<i>Pultenaea stipularis</i>					1,6											
	<i>Pultenaea platyphylla</i>														15		
Rock Felt Fern	<i>Pyrrosia rupestris</i>		1,3			6	1										
Muttonwood	<i>Rapanea variabilis</i>		1				1,14	1									
Wedding Bush	<i>Ricinocarpos pinifolius</i>																x
Wrinkled Kerrawang	<i>Rulingia hermanniifolia</i>					6											
Wallaby Grass	<i>Rytidosperma linkii</i>		1														
Wallaby Grass	<i>Rytidosperma longifolia</i>		1														
Smallflower Wallaby Grass	<i>Rytidosperma setaceum/ Rytidosperma setaceum/ Danthonia setacea</i>	1					14	1									
	<i>Rytidosperma</i> sp.					6											
Wallaby Grass	<i>Rytidosperma tenuior</i>			1													x
Pearl Vine	<i>Sarcopetalum harveyanum</i>					1,6	1										
Fan Flower	<i>Scaevola caedulacea</i>				1												x
Lilac lily	<i>Schelhammera undulata</i>		1,3		1		1										
Branched Comb Fern	<i>Schizaea dichotoma</i>																x
	<i>Schoenus brevifolius</i>																x
	<i>Schoenus maschalinus</i>						1										
Black Bog-rush	<i>Schoenus melanostachys</i>		19				1,14										
Swamp Selaginella	<i>Selaginella uliginosa</i>		1,3	1													

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	<i>Selliera radicans</i>			1			1										
	<i>Senecio glomeratus</i>																x
Lawyer Vine	<i>Smilax australis</i>																x
Thornless/Sweet Sarsaparilla	<i>Smilax glycyphylla</i>		1	1	1	6	1								15		
Sand Couch	<i>Sporobolus virginicus</i>			1													
Snake Vine	<i>Stephania japonica</i> var. <i>discolor</i>		1	1		1,6	1	2							15		x
Umbrella Fern	<i>Sticherus flabellatus</i> var. <i>flabellatus</i>																x
Umbrella Fern	<i>Sticherus lobatus</i>		1,3				1										
	<i>Styphelia</i> spp.					1											
Pink Five-Corners	<i>Styphelia triflora</i>					6											x
Turpentine	<i>Syncarpia glomulifera</i>		1			6	1	1									x
Bastard Rosewood	<i>Synoum glandulosum</i>		1	1			1,14	1									x
Magenta Lilly Pilly	<i>Syzygium paniculatum</i>		17				14,16,17			17							
	<i>Tasmania insipida</i>		1?														
Native /NZ spinach	<i>Tetragonia tetragonoides</i>			1			1										
Lilac Lily	<i>Thelionema umbellata</i>				1	6											
Kangaroo Grass	<i>Themeda triandra</i>	1	1	1	1	6	1, 14										
King Fern	<i>Todea barbara</i>		1,3		1		1,14								15		
Bullrush	<i>Typha</i> sp.		16			6	16										
Speedwell	<i>Veronica plebeia</i>					6	1,14										
Native Broom	<i>Viminaria juncea</i>	1															
Native Violet	<i>Viola hederacea</i>				1												
	<i>Wahlenbergia communis</i>					6											
Slender bluebell	<i>Wahlenbergia gracilis</i>		1,3	1		6	1,14										
Coastal Rosemary	<i>Westringia fruticosa</i>	1	1,3	1,4	1	1,6	1	1							15		x
Snow Wreath	<i>Woolisia pungens</i>				1												
Grass Tree	<i>Xanthorrhoea arborea</i>		1														
	<i>Xanthorrhoea resinosa</i>																x
Grass Tree	<i>Xanthorrhoea</i> sp.					6											
Woolly Xanthosia	<i>Xanthosia pilosa</i>		1,3	1	1	1	1,14										
Rock Xanthosia	<i>Xanthosia tridentata</i>					6	14										
Woody Pear	<i>Xylomelum pyriforme</i>		1														x
	<i>Ziera pilosa</i>		1														
Sandfly Ziera	<i>Ziera smithii</i>		1				1										
	<i>Ziera laevigata</i>			1													x
Prickly Couch	<i>Zoysia macrantha</i>			1													

Table H-5. Marine Flora

Common Name	Scientific Name	Rushcutters Bay	Double Bay	Rose Bay	Vaucluse Bay	Felix Bay	Hermit Bay	Parsley Bay	Watsons Bay	Milk Beach	General LGA
Type of Brown Algae	<i>Colpomenia sinuosa</i>										1
	<i>Caulerpa filiformis</i>		1								
	<i>Codium</i> sp.								1		
Red Coralline	<i>Corallina officinalis</i>										1
Type of Brown Algae	<i>Dictyota dichotoma</i>										1
Type of Brown Algae	<i>Padina crassa</i>										1
Neptune's Necklace	<i>Hormosira banksii</i>										1
Kelp	<i>Ecklonia radiata</i>								1		1
Bubbleweed	<i>Sargassum</i> sp.										1
Sea Lettuce	<i>Ulva</i> spp.										1
Salt Marsh	Coastal saltmarsh in the NSW North Coast, Sydney Basin and South East Corner bioregions			2	2		2	2		2	
Seagrass	<i>Halophila</i> sp.	1	1	1	1	1					
Seagrass	<i>Posidonia australis</i>						1		1		
Seagrass	<i>Zostera capricorni</i>	1	1	1	1	1	1		1		

Table H-6. Flora Reference Legend

Reference #	Reference
1	Woollahra Council. 1995. Woollahra Council FloraFauna List 1995.
2	Eco Logical Australia (ELA). 2013. Woollahra Biodiversity Strategy. Prepared for Woollahra Council.
3	Woollahra Municipal Council. 2001. Cooper Park Plan of Management. Woollahra Council.
4	Eco Logical Australia (ELA). 2007. Ecological Assessment Fauna Report for the Gap Park Masterplan. Project No. 069-053. Report prepared for Thompson Berrill Landscape Design Pty Ltd.
5	Woollahra Municipal Council (2003). Gap Park Flora and Fauna 2002/2003. Woollahra Municipal Council, Double Bay
6	Adapted from the 'Flora list for Nielsen Park of the Council of the City of Randwick Community Nursery', compiled by D. Hirschfeld, P. Ibbetson & J.A.D. Hilliard. October 1998 to July 1999
7	NSW Department of Environment, Climate Change and Water, Parks and Wildlife Group. 2010. Sydney Harbour National Park Draft Plan of Management - Section 3 Precincts. NSW Government.
8	Office of Environment and Heritage. 2013. NSW Wildlife Atlas search tool. (Accessed September 2013).
9	Verbal correspondance with Jeff Hill Woollahra Council staff
10	Benson, D. 2011. Native plants of Sydney Harbour National Park: historical records and species lists, and their value for conservation monitoring. <i>Cunninghamia</i> 12(1): 61-84.
11	Benson, D.H. 1990. Taken for granted: the bushland of Sydney and its suburbs. The Royal Botanic Gardens Sydney.
12	South Head Stage 1 Draft Conservation Management Plan - Volume 1. 2007.
13	Eco Logical Australia (ELA). 2010. Cooper Park Vegetation Management Plan. Prepared for Woollahra Municipal Council
14	Woollahra Council, Parsley Bay Reserve Vegetation Management Report and recommended action plans.
15	HLA-Envirosciences Pty Limited (HLA), 2004, Bushland Management Plan HMAS Watson, prepared for Defence Maintenance Management Pty Ltd.
16	Draft Biodiversity Conservation Strategy comments – Margaret Lai, Dated 23 October
17	Total Earth Care - DRAFT Biodiversity Conservation Strategy Peer Review (Site assessments) May 2014
18	Sydney Harbour National Park Plan of Management
19	Pers Comms Woollahra BushCare staff and volunteers, 2014.
20	<i>Allocasuarina portuensis</i> Recovery Plan
21	OEH Website. Nielsen Park She Oak Profile http://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10039