

7. Policy Recommendations & Framework for Management

This chapter contains recommended policy framework for the management of Sandon Point together with relevant background information. Recommended policies are summarised under the following section headings:

- i. Nature Conservation and Ecological Issues
- ii. Economic Issues
- iii. Social and Cultural Issues

While these issues are presented separately, they are strongly inter-related and together form the landscape of an area.

7.1 Nature Conservation & Ecological Issues

7.1.1 Remnant Vegetation & Vegetation Conservation

Native vegetation plays an important role in the diverse natural and social systems that abound in Australia. Native vegetation provides food, shelter and breeding habitat for native animals. When native vegetation is lost, there is a follow-on effect to other native plants and animals. A range of degrading influences also affects the long-term conservation of remnant bushland. These influences are acute *and* incremental. They include complete and partial clearing for development, fragmentation and small remnant areas, encroachment by weed species and urbanisation, altered water flow regimes in riparian areas, altered fire regimes, recreational use, and the consequent weed invasion that is encouraged by all these processes. Decline in water quality is another issue associated with the loss of native vegetation resulting from processes such as soil particles, salt and nutrients entering the waterways.²³

On the 21st September 2001 the Scientific Committee made the Final Determination to list "Clearing of Native Vegetation" as a Key Threatening Process on Schedule 3 of the Threatened Species Conservation Act with clearing and/or destruction of native vegetation being recognised as a major contributing factor toward the loss of biological diversity.²⁴

The Threatened Species Conservation Act 1995 (TSC Act) came into affect in NSW on 1st January 1996. The TSC Act provides for: the protection of all threatened plants and animals native to NSW (excluding fish and marine vegetation); the preparation of recovery and management strategies; the designation of areas as critical habitat. Complimentary legislation under the Fisheries Management Act 1994 provides equivalent protection for threatened fish and marine vegetation.

The NSW Scientific Committee is an independent committee consisting of ten scientists established by the TSC Act, who are responsible for maintaining the list of species, populations, ecological communities and key threatening processes under the Act.

A key threatening process (KTP) is one which has been identified under the TSC Act as adversely affecting two or more threatened species, populations or ecological communities that are not threatened, to become threatened.

NPWS Biodiversity Management Unit (2001), **An Overview of the Conservation of Threatened Species and Ecological Communities in NSW – The NPWS Perspective.**

Management Outcomes

²³ Native Vegetation Advisory Council (2000) *Draft Native Vegetation Conservation Strategy*

²⁴ Listing of Key Threatening Processes is provided for by Part 2 of the Threatened Species Conservation Act (1995)

- ✓ Native vegetation will be managed to:
 - maintain floristic and structural diversity;
 - maintain the existing extent of remnant native bushland;
 - conserve threatened, vulnerable or uncommon species and communities;
 - encourage regeneration of degraded native vegetation to enhance habitat quality and availability.
 - encourage regeneration of 'islands' of remnant native vegetation to enhance wildlife corridors.

Action

- Native bushland with a significant conservation and habitat value will be mapped and protected;
- Any key threatening processes affecting species and/or ecological communities, either terrestrial, riparian or aquatic, occurring on the site will be identified;
- Any threatened species or ecological communities, either terrestrial, riparian or aquatic, that are listed as endangered or vulnerable in NSW will be protected as per relevant legislation (including the Threatened Species Conservation Act 1995);
- Management priorities should focus firstly on high conservation value areas;
- Any other sources of vegetation degradation and impacts should be identified;
- 'Islands' of remnant native vegetation should be protected allowing natural regeneration to occur to enhance wildlife corridors;
- Revegetation should only occur where natural regeneration is absent or after a minimum of two years of appropriate management has been implemented.
- Revegetation should be restricted to the use of locally collected and propagated native plants.
- Section 91 Licensing under the Threatened Species Conservation Act must be obtained before any activity is undertaken that may impact upon a threatened species. This includes regeneration activities in endangered ecological communities.
- Document all work carried out. Ensure this information available public perusal.

7.1.2 Wetland and Riparian Management

The condition of New South Wales' river, estuary and wetland systems is declining.²⁵ This is the result of major changes in catchments and stream conditions with the changes resulting in a widespread decline in water quality, loss of habitats and a decline in essential biophysical functions. The increasing evidence of resource degradation problems indicates that past management decisions or practices have not been fully effective in lessening the impacts of development.²⁶

The QEM Report (1992) identified that there is a relative paucity of wetland habitat north of Wollongong. The Sandon Point site is recognised as containing one of the largest wetland habitats north of Wollongong within the LGA. Few wetlands within the region are being managed for conservation purposes.²⁷ Furthermore, NPWS

²⁵ The NSW State Rivers and Estuary Policy (1992)

²⁶ The NSW State Rivers and Estuary Policy (1992)

²⁷ Quality Environmental Management for Wollongong City Council, *Local Environmental Study, Sandon Point* (1993). P4.1

adds that the significance of the wetland habitat at Sandon Point is likely to have increased since the QEM report was compiled in 1992 due to the loss or deterioration of other habitat within the region.²⁸

Within the references of the Scientific Committee in their Final Determination on 21 September 2001 to list "Clearing of Native Vegetation" as a Key Threatening Process on Schedule 3 of the Threatened Species Conservation Act, riparian zones and the organisms inhabiting them have been substantially altered as a result of clearing of native vegetation.²⁹

On the 16th November 2001, under the Fisheries Management Act (1994) the Fisheries Scientific Committee made a Final Determination to list "the degradation of native riparian vegetation along NSW water courses" as a Key Threatening Process in Schedule 6 of the Act. The Scientific Committee cites examples of the impacts of degradation of native riparian vegetation to include: an increase in sediments and nutrients reaching streams as run-off, destabilising of watercourse banks and invasion by non-native species.

Riparian vegetation refers to the vegetation fringing water courses and can be defined as any vegetation on land which adjoins, directly influences, or is influenced by a body of water. Riparian habitats thus include land immediately alongside large and small creeks and rivers, including the river bank itself; gullies and dips that sometimes run with surface water; areas around lakes; wetlands on river floodplains that interact with the river in times of flood.

NSW Fisheries Management Act (1994) Part 7A Threatened Species Conservation

Management Outcomes

- ✓ As per the Final Recommendation of the Scientific Committee, native riparian vegetation will be managed to:
 - maintain floristic and structural diversity of native riparian vegetation;
 - maintain the existing extent of remnant native riparian vegetation;
 - encourage regeneration of degraded native riparian vegetation to reduce sediment and nutrient runoff; increase bank stability; increase the amount of overhanging riparian vegetation thus increasing shade and shelter for aquatic and terrestrial fish and fauna species.
- ✓ Slow, halt or reverse the overall rate of degradation to the estuarine and creekline systems to ensure the long-term sustainability of essential biophysical functions of creeklines is established;
- ✓ Increase the natural flood mitigating properties of the waterways;
- ✓ Maintain adequate streamflows for healthy aquatic and wetland habitats;
- ✓ Improve water quality of all water courses within the Sandon Point site.

Actions

- Assign special protection under the Threatened Species Act (1995) to the Sydney Coastal Estuarine Swamp Forest Community occurring on the site, and riparian areas affected by the Final Determination by the Scientific Committee of the Key Threatening Process, the Degradation of Native Riparian Vegetation along NSW water courses;
- Reinstate, where appropriate, natural alignments of altered waterways to improve the ecological integrity of riparian ecosystems and improve water flow and quality, and terrestrial and aquatic flora and fauna habitat. NPWS recommends that

²⁸ NPWS correspondence from Conservation Programs and Planning Division to Wollongong City Council Planning and Development Unit, 14/2/01

²⁹ NSW Scientific Committee, Threatened Species Conservation Act (1995) Final Determination to list "Clearing of Native Vegetation" as a Key Threatening Process on Schedule 3 of the Act.

- Woodlands Creek be reinstated to its original course and rehabilitated to restore connectivity of the remnant SCESFC on the original creek line;³⁰
- NPWS recommends that when reinstated, the original section of Woodlands Creek containing the remnant SCESFC be managed for conservation purposes;³¹
 - Reverse, where appropriate, any stabilisation works, widening, deepening or straightening of channels that have resulted in increased flow velocities and a reduction in the diversity of native flora and fauna;
 - Regenerate areas of wetland and riparian remnant vegetation. Where natural regeneration is absent or after a minimum of two years appropriate management, consider revegetation with locally collected plant material.
 - Regenerate native vegetation on degraded creeklines and creekbanks to encourage biodiversity and creek bank stability;
 - Identify existing point source and non-point source pollution that adversely affects the environmental values of riparian ecosystems, and ensure that environmental values are remediated to avoid further contamination of waterways.;
 - Prevent any discharge of stormwater pollutants into the wetlands and conservations zones;
 - Develop and implement a regular water quality monitoring program;
 - Maintain and/or establish adequate vegetated buffer zones on all stream banks to assist in the filtration of sediment, nutrients and other surface and sub-surface pollutants;
 - Ensure catchment conditions and stream bank engineering works are not adversely affecting storm and floodwater velocity;
 - Ensure works are designed and undertaken in a manner that minimises soil erosion and avoids water pollution;
 - Ensure appropriate control measures will be undertaken where erosion threatens habitats or other values.

7.1.3 Significant Flora and Fauna

Having detailed information about all the fauna and flora that exist at Sandon Point will help land managers to prevent damage to rare or threatened species. Until such time as this information is comprehensively recorded for the site the precautionary principle should be adopted for the land management.

It is recognised that there are many species known to exist at Sandon Point classified as having local, regional, state and national conservation significance. These include the recording of 1 threatened plant species, 3 regionally rare plant species, 2 regionally uncommon plant species, the citing of 2 key threatening processes occurring on the site (affecting two or more threatened species, populations or ecological communities), and the occurrence of endangered ecological communities.

In NSW, over 80 species of plants and animals are extinct and more than 600 species are either endangered or vulnerable.
NPWS (1999) NSW Biodiversity Strategy

³⁰ NPWS correspondence from Conservation Programs and Planning Division to Wollongong City Council Planning and Development Unit, 14/2/01. P3

³¹ NPWS correspondence from Conservation Programs and Planning Division to Wollongong City Council Planning and Development Unit, 14/2/01. P3

Management Outcomes

- ✓ Ensure that management strategies for sites recorded as habitat for rare, vulnerable, endangered and significant flora and fauna, or the documented occurrence of endangered ecological communities are appropriate for the protection of the species or community and in accordance with the Threatened Species Conservation Act (1995).

Actions

- Observe any statutory protection afforded to any sites that have been recorded as habitat for rare, vulnerable, endangered and significant flora and fauna or endangered ecological communities;
- Ensure that all areas containing indicator species of the SCESFC are protected from any disturbance by an 'ecological buffer zone' for the full extent of the community to include the Wetland vegetation unit, the Scrubland vegetation unit and the Forest vegetation unit, and that the land be managed for conservation purposes only;
- That the width of the 'ecological buffer zone' to protect all vegetation units of the SCESFC be no less than 40 metres from the edge of the wetlands;³²
- Ensure that conservation management is the primary objective in areas where SCESFC occurs, and that uses for passive recreation are a secondary objective;³³
- Ensure that areas of threatened species habitat are excluded from any site disturbances/works, except management rehabilitation works;³⁴
- Undertake a comprehensive flora and fauna survey over the entire Sandon Point site that is updated on a regular basis
- Monitor habitat condition for rare, vulnerable, endangered and significant flora and fauna;
- Adopt the precautionary principle and consider any site to potentially be habitat for rare, vulnerable, endangered and significant flora and fauna, until such time as proven otherwise;
- Before any disturbance occurs on any part of the site, a detailed flora and fauna assessment should be undertaken for that area.
- Introduce appropriate management and rehabilitation strategies where sites for rare, vulnerable, endangered and significant flora and fauna are degraded or impacted upon;
- Establish adequate buffer zones around endangered ecological communities to ensure they are maintained in a healthy condition.

7.1.4 Wildlife Habitat and Wildlife Corridors

Under the Threatened Species Conservation Act (1995) the Scientific Committee made a Final Determination on 21 September 2001 to list "Clearing of Native Vegetation" as a Key Threatening Process on Schedule

³² As recommended by NPWS, correspondence from Conservation Programs and Planning Division to Wollongong City Council Planning and Development Unit, 14/2/01

³³ As recommended by NPWS, correspondence from Conservation Programs and Planning Division to Wollongong City Council Planning and Development Unit, 14/2/01

³⁴ As recommended by NPWS, correspondence from Conservation Programs and Planning Division to Wollongong City Council Planning and Development Unit, 14/2/01

3 of the Act.³⁵ Their proposal supports the determination that the “loss of biodiversity as a result of loss and/or degradation of habitat follows the clearing and fragmentation of native vegetation.”

Clearing of any native vegetation, including areas less than 2 hectares in extent, may have significant impacts on biological diversity.³⁶ The Scientific Committee cites examples of the impacts of *any* clearing of native vegetation on biological diversity to include:

- the destruction of habitat resulting in loss of local populations of individual species,
- fragmentation,
- loss of leaf litter,
- changes in soil biota,
- loss or disruption of ecological function,
- increased habitat for invasive flora and fauna species.

Management Outcomes

- ✓ Maintain healthy ecological processes and interactions to sustain healthy habitats. These ecological processes include:
 - maintenance of soil processes
 - maintenance of interactions between species (eg pollination, dispersal, competition etc)
 - nutrient cycling
 - provision of food, habitat and other resources for native species
 - maintenance of catchment scale hydrological processes

Actions

- Preserve existing wildlife corridors;
- Protect and enhance existing high and medium conservation value habitat areas;
- Maintain and/or restore species composition and native vegetation community structure;
- Coordinate planning and activities to avoid further incremental destruction of native vegetation, vegetation structure and fragmentation of potential habitat zones;
- Reduce impacts of disturbance on native vegetation, including weed invasion;
- Regenerate and revegetate, using appropriate local plant species, suitable areas to extend and connect existing wildlife corridors and create new wildlife corridors;
- Protect old trees and retain dead standing trees and as many fallen branches as possible to provide habitat and food sources;
- Ensure that regional vegetation planning is considered for the extension and consolidation of wildlife corridors beyond the site.

7.1.5 Noxious and Environmental Weeds

Native vegetation that has been disturbed is prone to weed invasion by introduced species. Weeds, often described as introduced, exotic, alien or naturalised plants, are favoured by disturbances that change the soil structure, light levels, the local

³⁵ Land Clearance is also listed as a Key Threatening Process under the Commonwealth's Environment Protection and Biodiversity Act, 1999

³⁶ NSW Scientific Committee, Threatened Species Conservation Act 1995 Final Determination to list "Clearing of Native Vegetation" as a Key Threatening Process on Schedule 3 of the Act. Listing of Key Threatening Processes is provided for by Part 2 of the Act.

fire regime and the flow of water through the ecosystem. Weeds generally grow more vigorously than native plants, and once established have the potential to;

- out-compete native species;
- repress the juvenile indigenous species;
- change the natural fire regime because of their different responses to fire;
- enrich the soil by adding nutrients
- change the food sources and habitats available to wildlife, and so change the wildlife populations.

All these effects are detrimental to the ecological values of an area.

High and Medium Conservation Value areas have the most potential to be improved with weed control works. If weeds are managed in these areas, the high resilience of the surrounding native vegetation is afforded the opportunity to out-compete the weed population. Low Conservation Value areas will require extensive resources to be significantly improved. However, weed growth in very disturbed areas often provides important shelter, foraging and breeding sites for native fauna. Such areas should be stabilised to avoid the further spread of weed species into higher conservation value zones and maintain any existing habitat values.

The Noxious Weeds Act (1993) places an obligation upon public authorities to control noxious weeds on land that they occupy.

Management Outcomes

- ✓ Introduced plant species will be controlled and, if practical, eradicated using best practice methods that protect and encourage regeneration of native vegetation;
- ✓ Ensure control of noxious weeds in accordance with the Noxious Weeds Act (1993);
- ✓ Weed control programs must include a focus on wildlife habitat protection and restoration.

Actions

- Coordinate Integrated weed control programs using a range of site-specific techniques within long-term planned weed management programs;
- Manage weed control works so that native vegetation affected by light weed infestation is stabilised first and relatively intact native vegetation adequately protected;
- Priority will be given to areas of weed invasion adjoining high and medium conservation value and habitat zones or where there are new and isolated occurrences;
- Coordinate weed works in consultation with programs to reinstate natural alignments of altered waterways as the manipulated watercourses are the most heavily infested areas of the site;
- Undertake community education programs to increase awareness of weed species and publicise weed control programs;
- Encourage continued education programs to increase awareness of weed species and publicise weed control programs;
- Where weed growth is providing important habitat for native fauna, stage the weed removal, or work in a mosaic pattern or patches, to reduce the negative impact on the fauna using the weeds.
- Encourage continued participation of community groups in well-planned and supervised weed control programs with appropriate support and training.

7.1.6 Fauna Conservation and Pest Animals

Any change to the natural environmental conditions tends to favour pest species such as foxes, rabbits and feral cats. The invasion of weed species such as Blackberry and Lantana provides a harbour for foxes and rabbits. Feral animals compete with and prey on native species and cause disturbance to the soil.

Feral animals known to occur at Sandon Point include rabbits, foxes and rats. Rabbits are likely to have the greater impact at this site as they destroy newly planted trees and regenerating plant species.

Impacts upon native species are likely to also be felt from predation by neighbouring domesticated cats and dogs. In the urban environment the cat is probably the species of greatest concern, causing the death of a large number of native birds, small mammals, reptiles and frogs.

Management Outcomes

- ✓ Habitat upon which native fauna species shelter forage or breed will be maintained. If this habitat is weed infested it will be maintained in the short term until suitable alternative habitat has been provided;
- ✓ Feral animals will be controlled where they have a significant impact on native plant and animal species and where control programs will be effective;

Action

- Initiate a community education program to increase awareness of the impacts of domesticated cats and dogs on native fauna populations, and the Companion Animal Act 1998;
- Where appropriate introduce feral animal control programs in cooperation with the local Rural Lands Protection Board, National Parks and Wildlife Service and adjacent landholders and managers.

7.1.7 Fire Management

The natural fire regime of Australia's vegetation is often dramatically altered in urban bushland areas where the vegetation is subject to either total fire exclusion or frequent low intensity fires.

In urban areas there are often concerns heard from neighbouring residents of fire threats to property adjoining urban bushland areas. Sandon Point has little highly wooded vegetated areas abutting private property. The north/south railway line offers a fire-break west of the Turpentine forest, the most significant fire threatening vegetation area. Interestingly, this zone exhibits the characteristics of a native forest that has had virtual fire exclusion.

Management Outcomes

- ✓ Fire will be managed to ensure:
 - protection of human life and property within and adjacent to the site
 - maintenance of plant and animal species and communities through the provision of fire regimes compatible with their conservation
 - protection of Aboriginal and cultural heritage sites
- ✓ Recommendations of the Illawarra Bush Fire Risk Management Plan are followed.

Actions

- Develop fuel management strategies appropriate to each zones level of hazard, vegetation type, habitat value and fire history;
- Consider timing, frequency and intensity of burning where controlled/ecological burns may be used in regeneration;
- Record and map any fires that occur.

7.2 Economic Issues

7.2.1 Native Vegetation, Regeneration & Site Rehabilitation

Native vegetation has a broad range of potential 'use' and 'non-use' economic values. The 'use' values are either of a direct or indirect nature. Examples of 'direct use' values include forestry or guided walks, while examples of 'indirect use' values include ecosystem functioning: clean water, biodiversity conservation and maintenance of soil quality. A variety of non-use values exist such as: option (having the right to use a resource, whether you do or not), bequest (for future generations) and existence values (simply knowing that it exists).³⁷ It is these less tangible and less easily measurable commodities of native vegetation that may be significantly impaired through development.

Degraded areas and areas in decline require more resources to manage. From an economic point of view it is more beneficial to regenerate, rehabilitate or stabilise disturbed areas than to attempt restoration of once serious degradation has occurred.

Management Outcomes

- ✓ Native vegetation on the Sandon Point site is managed so as to sustain and maintain ecological condition and habitat value;

Actions

- Ensure all requirements of Section 91 licensing under the Threatened Species Conservation Act are met before activities commence on any site where endangered ecological communities or threatened species exist.
- Bushland management programs in high conservation value zones should focus on maintenance of ecological values and mitigation of impacts;
- Improve the ecological condition of medium conservation value zones;

³⁷ Native Vegetation Advisory Council *Draft Native Vegetation Conservation Strategy* (2001)

- Establish adequate incentives to support native vegetation retention and revegetation;
- Ensure that the full range of costs and benefits of retaining and protecting native vegetation are understood by all stakeholders;
- Undertake studies into the projected long-term economic worth of the 'use' and 'non-use' values of the site to the community and future generations.

7.2.2 Stockpiles, Waste Management & Utility Services

Utility services include the installation and maintenance of electrical, communications, water, sewerage and gas services, all of which have easements traversing the Sandon Point site.

Management Outcomes

- ✓ Minimise the impacts of utility easements;
- ✓ Protect areas of native regeneration and conservation significance;
- ✓ Ensure that services and maintenance access does not adversely affect the ecological integrity and conservation value of the site;
- ✓ Ensure service authorities are adequately informed of:
 - significant flora and fauna sites
 - sites of Aboriginal and/or cultural heritage significance

Actions

- Identify present and possible future impacts of utility easements on the ecological integrity of the site;
- Ensure appropriate services buffer is established around conservation zones;
- Ensure that sufficient on-site treatment exists, or is established within adjacent residential areas to prevent any discharge of stormwater pollutants into the wetlands and conservation zones;
- Ensure that the site is not used for stockpiling of waste material;
- Avoid storing materials and parking machinery under trees;
- Initiate the removal of 'Hannah's Hill' stockpile to assist in the reinstatement of the natural floodplain between Woodlands and Hewitts Creeks.

7.2.3 Tourism & Promotion

Tourism should be considered as a cornerstone for continued growth and employment opportunities in the Illawarra.

With the escarpment backdrop and narrow coastal plain, the Illawarra landscape is both dramatic and unique. Much of the region can be viewed at a single glance from the vantage point of the high escarpment rising above the coastal plain. From various panoramic points Sandon Point appears as a large, open green swathe within an otherwise highly urbanised coastal strip.

The view looking westward from the beach and the Sandon Point headland encompasses the green belt extending from Tramway Creek to the top of the escarpment. This unrivalled vista of the Illawarra escarpment is possible because of the open space of the Sandon Point site.

Coastal 'green space' areas have historically been heavily impacted by development, particularly in coastal zones. Increasingly, residents and visitors to

these urbanised coastal environments are placing greater importance on the remaining natural areas for recreation and aesthetic reasons.

Management Outcomes

- ✓ Manage the use of Sandon Point in a culturally sensitive and ecologically sustainable way;
- ✓ Encourage and promote tourism, and general enjoyment of Sandon Point, in a manner to communicate the conservation and Aboriginal significance of the site;

Actions

- Undertake public awareness program to inform the community of the key management issues;
- Provide appropriate signage, facilities or brochures to increase tourist awareness of the values of Sandon Point.
- Establish links with regional tourist development initiatives;
- Investigate the feasibility of guided walks for special interest or educational groups;
- Identify high conservation value 'at risk' areas that may be impacted upon by recreational use and protect through appropriately designed management measures;
- Work with the local government and the local community to improve the provision and interpretation of the features, conservation and Aboriginal significance of the site;
- Provide interpretative signs at key points on public land to inform of key management issues;
- Ensure that the results of completed studies are available to the public;
- Ensure that regular updated information about management issues is available to the public.

7.2.4 Funding & Sponsorship

Management Outcomes

- ✓ A range of funding and sponsorship opportunities are in place to help manage, enhance and promote Sandon Point;

Actions

- Encourage mechanisms for interest groups to contribute to the management of the site;
- Identify groups and organisations likely to be interested in contributing to the management and protection of Sandon Point;
- Establish links with educational institutions or environmental groups to promote environmental education and awareness;
- Specify appropriate forms of recognition for funding or sponsor groups;
- Establish links with organisations that may assist in data collection to establish baseline studies.

7.3 Social and Cultural Issues

7.3.1 Native Vegetation

Native vegetation has a range of social benefits that are particularly evident in the urban environment where access to bushland can be limited by the impacts of development. These benefits include places of scenic beauty, heritage value, sites for tourism and recreation, places for research, education and scientific purposes and maintenance of the distinctive Australian landscapes.³⁸

Management Outcomes

- ✓ Knowledge of native vegetation and its various values is improved and shared.

Actions

- Identify areas where cross benefits, both social and economic, may be helpful to the management of Sandon Point, for example, where native vegetation regeneration will increase biodiversity, the amenity and tourist potential of a site and contribute to a reduction in management and maintenance costs;
- Build partnerships between groups with differing interests in native vegetation;

7.3.2 Aboriginal Heritage Values

The central Aboriginal spiritual belief is oneness with the land and all that lives upon it.³⁹ Sites of historical Aboriginal significance are critical links to traditional Aboriginal life and beliefs. In contemporary Aboriginal spirituality, historical Aboriginal sites are enduring connections to the land. Aboriginal sites are also important to non-Aboriginal people as they provide information about the past ways of life of all humans.

Numerous burial, relic and communal sites have been documented at Sandon Point.⁴⁰ The attribution of the individual significance of sites has been the subject of various opinions. What has become increasingly apparent is with each new investigation further evidence of the extent and significance of the occupation and use of the site is unearthed. As such it would seem essential to adopt a precautionary approach before determinations are concluded.

Management Outcomes

- ✓ That Aboriginal people would determine the cultural significance of Aboriginal heritage and Aboriginal artefacts of Sandon Point;
- ✓ Significant Aboriginal sites will be protected from disturbance or damage by human activities.

³⁸ Native Vegetation Advisory Council, *Draft Native Vegetation Conservation Strategy* (2001)

³⁹ Broome, R. (1982) *Aboriginal Australians: Black responses to White dominance 1788-1980*. Allen and Unwin

⁴⁰ Navin Officer Heritage Consultants Pty Ltd for Rose Consulting/Stockland Pty Ltd, *Aboriginal Sub-surface Testing Program and Aboriginal Consultation*, October 2001

Action

- The Aboriginal community and organisations will remain an integral part of developing and enhancing the range of mechanisms for management of Sandon Point;
- Undertake an independent Aboriginal Heritage Study in addition to a comprehensive independent Archaeological Study;
- NPWS recommends the Development Control Plan (DCP) for the Sandon Point site map the “known” Aboriginal sites and areas of potential sub-surface archaeological deposits;⁴¹
- NPWS recommends that areas of archaeological significance be zoned as ‘Environmental Protection Zones’ in order to ensure that land uses and management are appropriate for conservation;⁴²
- Ensure conservation of Aboriginal cultural heritage incorporates acknowledgment of the traditional and contemporary association of Aboriginal people with Sandon Point;
- Coordination with the Aboriginal communities and the Illawarra Local Lands Council will be an integral part of achieving protection of the natural and cultural heritage of Sandon Point;
- Ensure all works with the potential to impact on any Aboriginal sites will be preceded by an archaeological assessment
- Implement a precautionary approach where there could be a risk or significant or irreversible damage.

7.3.3 Cultural Heritage Values

Cultural heritage encompasses past and present cultural associations of all people in Australia including tradition, knowledge and customs. It can be tangible (ie have physical manifestation in the form of art, building etc) or intangible (ie spiritual or social associations, songs, stories and cultural practices). When natural resources acquire meaning for a particular group, they become cultural resources as well.⁴³

In this instance cultural heritage is referring to non-Aboriginal history, associated activities and works at Sandon Point. It encompasses sites, structures and relics that may have aesthetic, historic, scientific and social significance to the community and present and future generations. Sites that should be considered include the Woodlands Cottage site (located in Zone 4), Bulli Cokeworks site (located in Zone 1), Bulli to Sandon Point Tramway and Sidings site (located in Zones 1 and 2)

Management Outcomes

- ✓ Features remaining from former use of Sandon Point will be protected from disturbance but will not be actively conserved, pending the development of appropriate management strategies.

⁴¹ NPWS correspondence from Conservation Programs and Planning Division to Wollongong City Council Planning and Development Unit, 14/2/01. P8

⁴² NPWS correspondence from Conservation Programs and Planning Division to Wollongong City Council Planning and Development Unit, 14/2/01. P7

⁴³ NPWS *Corporate Plan 2002-2003*

Actions

- Historic features will be recorded and it is recommended that their significance expertly assessed. Management strategies will be based on the assessment;
- Implement a precautionary approach where there could be a risk of significant or irreversible damage until such time as assessments are completed.

7.3.4 Public Awareness, Community Ownership & Identification

Sandon Point is one of the many natural features of the Illawarra that defines the unique local landscape. The very nature of this landscape, bounded by the escarpment to the west and the ocean to the east, leaves the secluded coastal strip with a certain sense of isolation from the rest of the world. This is a community defined by the physical boundaries of the natural environment. And it is this natural environment that has contributed to a sense of self-sufficiency and a strong local identity.

The community has demonstrated a keen interest in the management and planning of Sandon Point. This interest is likely to be enhanced by an effective education and awareness program.

It is anticipated that an increasingly well-informed community will require increasingly sophisticated information with clearly defined opportunities to make their views known. This document is the one stage of a provision to offer objective information for public scrutiny, and an avenue for community comment and input.

Management Outcomes

- ✓ Increased community awareness, understanding and appreciation of the value of healthy ecosystems;
- ✓ Increased community participation in conservation programs at Sandon Point;
- ✓ Establish a group of community and relevant agency representatives to oversee the management of Sandon Point.

Actions

- Ensure public accountability for the implementation of any environmental management plans, impact assessments and environmental remediation;
- Establishment of a charter of public disclosure and accountability for the implementation of any environmental management plans;
- Work with representatives of community conservation programs to identify their needs and how best these might be met;
- Improve community access to conservation related information about Sandon Point by locating documents in local libraries, etc;
- Introduce a community education program to increase community awareness of the ecological, economic and social roles of Sandon Point within the community;
- Ensure there is public recognition of volunteer community initiatives.

8. Site Rehabilitation & Protection

Regeneration of the bushland areas of Sandon Point may involve a range of techniques and strategies aimed at achieving long-term viability and enhancement of the natural area assets. The long-term vision of all works is the protection of remnant vegetation for the enhancement of habitat for flora and fauna, and the consolidation of local and regional wildlife corridors.

Before any works commence on this site, Section 91 licensing requirements under the Threatened Species Conservation Act 1995 must be met where an activity may impact upon a threatened species. This includes bush regeneration activities in endangered ecological communities.

The following Works Program firstly outlines a proposed on-ground regeneration works program. Thereafter it focuses on resource development and community networking initiatives that may assist in the development of strategies to protect the natural assets of Sandon Point.

Map 6: Weed Density Map indicates that the areas of highest stability are those that have been minimally impacted upon by watercourse diversions and engineering interference. The greater issues of creekline manipulation will need to be addressed before full regeneration of the bushland areas at the site can be achieved.

The proposed Works Program focuses on areas where an achievable outcome is possible within the constraints existing at this time. In general those areas that are highly modified, that is the diverted, 'straightened' and gabioned sections of Hewitts and Woodlands Creeks and the piped section of Woodlands Creek, have not been addressed in this program. Instead the ramifications of these engineering works have been outlined in Chapter 6, Section 6.2 and Chapter 7.

8.1 On-Ground Works Program

Before each module of on-ground works begins it is worthwhile reviewing the aims of the works program as they relate to each work site. They may include:

1. To restore degraded areas to stable bushland
2. To regenerate the boundaries so that the core areas are protected from outside disturbance
3. To promote special features of landscape, geological, historical or archaeological interest.
4. To plan for the proper use of the area by the community.⁴⁴

Within this Bushland Management Strategy base-line information and mapping has been compiled. It is recommended that in future an ongoing photographic record of the site and any regeneration works be maintained.

The complex nature and large area of the Sandon Point site is such that any action plan should focus on small-scale flexible well-planned and coordinated projects that have the ability to connect as works progress. The core premise for this works program is to enhance existing high conservation value/low to medium weed density areas, with the long-term view to consolidating wildlife corridors and fauna and flora habitat potential.

When planning within the current constraints of the site, achievable regeneration zones direct works away from those areas heavily affected by engineering

⁴⁴ The National Trust of Australia (NSW), *Bush Regenerators' Handbook* (1991)

impacts. The areas that are not considered suitable for regeneration works at this time include Zones 5, 7, 8 and 10. Each of these zones is highly modified or degraded and may be subject at a later date to large scale engineering remediation works, for example, the reinstatement of the natural creek lines of Woodlands and Hewitts Creeks in Zones 7, 8 and 10. Remediation of the industrial areas should include bio-remediation, particularly near the creeks and wetlands, to reduce leaching and seepage of ground water chemicals and from contaminated soils. This is important for the continued health and recovery of the downstream wetlands and SCEFSC.

Of the remaining zones, Zone 9 is unconnected but represents a highly significant conservation value site that should be protected and enhanced. Zones 1, 2, 3, 4, 6, 11 and 12 all exhibit significant to highly significant conservation and habitat values plus achievable regeneration potential. With regeneration efforts focused on consolidating the vegetated links between these zones, the development of an expansive green corridor is possible, extending north to south and east to west across the site. [see Map 5 and Map 6] Beyond the Sandon Point site there lies the potential to link this corridor with the intermittent green corridors through Slackys Creek and onto the Illawarra Escarpment.

The following proposed plan of action should be viewed as flexible and aimed at giving direction to on-ground works programs. It should be regularly revised as circumstances change. Each area must be re-assessed after each control is carried out to designate the type of control and appropriate treatment for follow-up work. Follow-up work must be carried out after all weed control and assisted regeneration and may continue for many years. Control works are squandered if follow-up work commitments are not met.

Map 6: Weed Distribution



8.1.1 Proposed Action Plan for Bush Regeneration Works

Zone 1 & 2 – South of Tramway Creek & bicycle path					
Site description	Priority of Works	Dominant regeneration issue	Level weed infestation	Control	Notes
<i>Evolved soak around site of tramway terracing. Significant suite of native species</i>	LOW	Protection of soak habitat from further disturbance.	Medium	Low priority weed control area.	Weeds are providing significant habitat within this open grassland. As future of this zone is determined regeneration program should be revisited.
<i>Storm water line crossing bicycle path to dunes</i>	LOW	Sever erosion and scouring of dune. Invasion by Arundo donax, Lantana	High		Before any weed control or stabilisation works are commenced upstream storm water source needs to be addressed.
<i>Endangered SCESFC</i>	HIGH	Protection & regeneration of SCEFSC from weed & human impacts.	Medium	Ensure tree & shrub species of SCEFSC are not 'choked' by grassy weeds. Protect from weed competition using appropriate control measure for particular weed species.	Water quality of creekline to be determined – possibly affecting health of SCESFC tree & shrub species. Investigate options & funding to fence Complex to reduce impacts from heavy equipment.
<i>Native grassland</i>	HIGH	Slashing	Low	Grassland is predominantly weed free.	Investigate options & funding to fence grassland to reduce impacts from heavy equipment and slashing.
<i>Remnant E. robusta (Swamp Mahogany) community</i>	HIGH	Possibly water quality & flow. Weed competition for emergent & juvenile Eucalypts	Medium to High	Locate emergent Eucalypts & protect from weed competition using appropriate control measure for particular weed species.	The establishment of emergent Eucalypts will contribute long term establish of canopy that will assist shading weed species & emergence associated native species.
<i>Lantana/Bracken habitat area</i>	HIGH	Clearing	High	Low priority weed control area. Until stable green corridor established with Zone 1 should ensure minimal disturbance to this habitat.	Vegetation is providing significant habitat. As future of this zone is determined regeneration program should be revisited.
<i>Tramway Creek</i>	MEDIUM	Water flow & quality issues. Some domination by native <i>Typha orientalis</i>	Medium		Implement water quality assessments.

Zone 3 & 4 – Remnant Turpentine/Blackbutt forest					
Site description	Aspect & slope	Dominant regeneration issue	Level weed infestation	Control	Notes
<i>Grassland & emergent native shrubs & trees</i>	HIGH	Regeneration of emergent native species to nurture Zone as key area to establish E to W green corridor	Medium	Cease slashing practice. Control woody weeds & treat vines using appropriate measures for species	With cessation of slashing & follow-up control of emergent weeds the high resilience of this area will enable good regeneration. Herbaceous weeds should be monitored, but long term should be suppressed with shading by shrubs and trees. Ensure the edges of creekline are slowly & conservatively worked to minimise advantageous weed invasion & habitat disturbance during control works.
<i>Edges of forest</i>	MEDIUM	Reduce edge effect	Medium	Control occurrences of large woody weeds on edges using appropriate control measure for particular weed species.	Consolidation of the edges is a high priority in this zone.
<i>Forest</i>	MEDIUM	Control emergent weeds	Low – occasional	'Sweep' through site to eradicate woody and herbaceous weeds using appropriate control measures. Particular attention should be paid to any emergent vines.	As the sore of the site is relatively weed free it is fortuitous to maintain this status.
<i>Forest</i>	MEDIUM	Erosion Informal track network 'Cubby house' impacts	Medium	Endeavour to close informal tracks. Slow water movement down tracks with log barriers.	
<i>Forest</i>	LOW	Altered fire regime suggested by absence of emergent native species despite obvious high resilience of the site		Mosaic and/or pile burns.	Ensure adequate follow-up of emergent native and weed species
<i>Seed Collection</i>	HIGH				Important site for seed collection for propagation.
<i>Disused quarry</i>	MEDIUM	Vegetation removed Trail bike impacts	Medium on edges	Revegetate where appropriate with local plant material. Treat edge weeds as appropriate	Ensure follow-up maintenance on plantings & weed control

Zone 6 – Central 'floodplain' area of the site incorporating original Woodlands Creek line					
Site description	Priority of Works	Dominant regeneration issue	Level weed infestation	Control	Notes
<i>Remnant soaks – southern sector of zone</i>	HIGH	Consolidation & protection of remnant soaks reliant on reinstatement of Woodlands Creekline. Characteristic species of SCESFC present.	Medium	Incremental treating Kikuyu with appropriate control in areas adjacent to soaks to reduce competition & encourage regeneration.	Ensure Biactive Glyphosate only is used. Only treat in dry ground conditions.
<i>Floodplain</i>	MEDIUM	Dominance by Kikuyu. Relatively low occurrence of native species	High	Create 'islands' for potential native revegetation by treating Kikuyu with appropriate control in selected areas and planting local native stock.	Ensure areas are manageable & follow-up weeding and watering possible
<i>Throughout Zone</i>	MEDIUM	Control of woody weeds	Medium	'Sweep' through the zone controlling woody weeds using appropriate control measures.	Water quality of creekline to be determined – possibly affecting health of SCESFC tree & shrub species. Investigate options & funding to fence Complex to reduce impacts from heavy equipment.
<i>Woodlands Creek</i>	HIGH	Reinstatement of natural flow regime			Continue lobbying for reinstatement of creekline

Zone 9 – Hewitts Creek remnant swamp wetland with SCESFC characteristics					
Site description	Priority of Works	Dominant regeneration issue	Level weed infestation	Control	Notes
Remnant swamp wetland with SCEFC characteristic species	HIGH	SCESFC protection Edge consolidation.	Occasional	Bag seed heads early & late summer. Protect from Pampas Grass, Crofton Weed, Whisky Grass using appropriate control measures for weed species.	Continued site protection with fencing on west and south boundaries. Control weed invasion at edges. Lobby to protect site from development impacts. Significant seed source.

Zone 11 – Hewitts Creek from ‘straightened’ section eastward to bridge					
Site description	Priority of Works	Dominant regeneration issue	Level weed infestation	Control	Notes
<i>Southern edges of riparian vegetation</i>	MEDIUM	Control of weed species on edge and canopy protection.	Low	Priority control of low levels of potentially highly invasive weeds incl. Vines, Asparagus Fern using appropriate control for species. Consolidate edge.	In working this edge native vegetation will be encourage to expand south to link south to link with Zone 12 & 6
<i>Northern urban interface edge</i>	MEDIUM	Over clearing in weed control attempts, encroachment, informal track networking	MEDIUM	Communications strategy & bush generation workshops	
<i>Hewitts Creek</i>	MEDIUM	Water flow & quality issues.	Medium		Implement water quality assessments.

Zone 12 – Incipient Dune Zone north of Aboriginal Tent Embassy					
Site description	Priority of Works	Dominant regeneration issue	Level weed infestation	Control	Notes
<i>Northern dune area</i>	MEDIUM	Informal tracks	Low	Erect temporary fence to define beach access track to relieve trampling pressure on regenerating dune vegetation	In conjunction with fencing, this area offers the opportunity for informative signage regarding regeneration of the site. The viewpoint also affords good vista of Sandon Point vegetation through to the Illawarra Escarpment
<i>Hind dune area</i>	MEDIUM	Encourage regeneration of vegetation to link with Zone 6 and consolidate the green corridor to the west.	Low		Regeneration is already apparent in this area.

8.1 Resource Development & Community Networking

The Framework for Management (Chapter 7) recommended a variety of actions that could be implemented to assist the conservation management of Sandon Point. Many of these recommendations suggested avenues by which existing information resources may be utilised.

The following is a summary drawn from the Action Plans outlined in Chapter 7.

- Identify any other sources of impacts that may be contributing to the degradation of the site. These may include upper catchment issues. Source any water quality monitoring programs and/or develop and implement regular quality monitoring programs. Initiate a comprehensive flora and fauna survey of the entire site.
- Develop a program to monitor habitat condition.
- Undertake community education and training workshops to increase awareness of weed species and control methods and publicise weed control programs. Undertake studies into the projected long-term economic worth of the 'use' and 'non-use' values of the site to the community and future generations.
- Establish links with regional tourist development initiatives.
- Provide appropriate signage, facilities or brochures to increase tourist awareness of the values of the site.
- Investigate mechanisms for interest groups to contribute to the management of the site.
- Develop appropriate forms of recognition for funding or sponsor groups.
- Establish links with organizations that may assist in data collection to establish baseline studies where appropriate.

Whilst Wollongong City Council manages the public land of Sandon Point, many of these initiatives allow for partnerships with other authorities and interest groups.

8.2 Indicators and Monitoring

For the management plan to be effective over the long-term, and on going, a comprehensive monitoring program needs to be implemented. To adequately assess bushland and habitat recovery success, it is important to monitor the key characteristics of a species' occurrence within the habitat.

Sites that have control methods applied should be monitored according to the following criteria:

- Identification of photo points on a map, repeat at regular intervals
- Control method recorded
- Extent of control mapped
- Success of control method (was it the most effective method?)
- Record all new species identified (weed and native)
- Location and amount of seed collected
- Record flowering and fruiting times of native species
- Species used in any revegetation works
- Why revegetation was used (ie minimal natural regeneration after two years, no natives present, fill site, erosion site etc)
- Survival rate of plantings
- Rare flora and/or fauna sighted
- Record fauna sightings to establish seasonal patterns of use

After initial weed control is applied to the site, monitoring the success of that control shall identify future control methods to be applied to that site.

8.3 Further Studies & Surveys

An independent biodiversity team is presently being formed to expand the baseline data available for the site. Independent surveys that are recommended include:

- Ongoing bird survey including migratory species using the site
- Extended reptile survey
- Recordings and analysis of frog calls
- Extended plant species survey
- Extended invertebrate studies
- Extended mammal survey
- Further recording and analysis of bat calls to ascertain the presence of *Miniopterus schreibersii* (listed as a threatened species under Schedule 2 (Vulnerable Species) of the NSW Threatened Species Conservation Act 1995.)
- Additional vegetation surveys to ascertain occurrence of endangered ecological community Sydney Freshwater Wetlands
- An independent Aboriginal Archaeological and Cultural Heritage survey and assessment

It is also suggested that an independent "Eight-part Test" for the significance of the effects to threatened species and endangered ecological communities be undertaken.

9. Review

Recent determinations by the NSW Scientific Committee under the Threatened Species Conservation Act (1995) affect the bushland and riparian areas of Sandon Point. These include September 2001 listing of "Clearing of native vegetation" as a Key Threatening Process. Listings under the Fisheries Management Act (1994), also include the Key Threatening Process "the degradation of native riparian vegetation along NSW water courses" listed in November 2001.

On completion of the additional studies by the independent biodiversity team, further data may well be evident to assert the significance of the area as a local and regional biodiversity hotspot. Until the time that all data is available it would seem prudent to adopt the precautionary principle as to the conservation significance and future planning of Sandon Point before determinations are concluded.

Native Flora and Woody/Herbaceous Weed List

*Denotes species with no prior recording in this area of the site

Zone 1

Indicative Native Grassland Species noted within Zone 1

<i>Acacia longifolia</i> var <i>sophorae</i>	Coastal Wattle
<i>Agrostis avenacea</i>	Blown Grass*
<i>Caesia parviflora</i> var <i>vittata</i>	Blue Grass Lily
<i>Cynodon dactylon</i>	Native Couch
<i>Hibbertia scandens</i>	Golden Guinea Flower
<i>Imperata cylindrica</i>	Blady Grass
<i>Microlaena stipoides</i>	Weeping Grass
<i>Pittosporum undulatum</i>	Sweet Pittosporum
<i>Senecio</i> sp	Groundsel

Indicative Native Obligate Soak Species (Sedges and Rushes) noted within Zone 1

<i>Altenanthera denticulata</i>	Lesser Joyweed
<i>Carex appressa</i>	Tall Sedge
<i>Centella asiatica</i>	Swamp Pennywort
<i>Isachne globosa</i> ⁴⁵	
<i>Juncus continuosus</i>	Rush
<i>Juncus usitatis</i>	Rush
<i>Persicaria strigosa</i>	Spotted Knotweed
<i>Typha orientalis</i>	Cumbungi

Woody and Herbaceous Weed Species noted within Zone 1

<i>Ageratina adenophora</i>	Crofton Weed
<i>Andropogon virginicus</i>	Whisky Grass
<i>Aster subulatus</i>	Aster
<i>Gomphocarpus physocarpus</i>	Balloon Cotton Bush
<i>Lantana camara</i>	Lantana
<i>Lilium formosum</i>	Formosa Lily
<i>Ochna serrulata</i>	Ochna
<i>Pennisetum clandestinum</i>	Kikuyu
<i>Psoralea pinnata</i>	African Scurf Pea
<i>Rubus fruticosus</i>	Blackberry
<i>Verbena</i> sp	Purple Top

Zone 2

Indicative Remnant Native Grassland Community Species noted within Zone 2

<i>Eragrostis brownii</i>	Browns Love Grass
<i>Imperata cylindrica</i>	Blady Grass
<i>Microlaena stipoides</i>	Weeping Grass
<i>Themeda australis</i>	Kangaroo Grass

Riparian Melaleuca Community Species noted within Zone 2

<i>Acacia longifolia</i>	Sydney Golden Wattle
<i>Eucalyptus robusta</i>	Swamp Mahogany ⁴⁶
<i>Glochidion ferdinandii</i>	Cheese Tree
<i>Hibbertia scandens</i>	Guinea Flower
<i>Melaleuca styphelioides</i>	Prickly Leaved Paperbark
<i>Notelaea longifolia</i>	Mock Olive
<i>Phragmites australis</i>	Thatch Weed
<i>Pittosporum undulatum</i>	Sweet Pittosporum
<i>Pteridium esculentum</i>	Bracken
<i>Senecio hispidulus</i>	Rough Groundsell

⁴⁵ The population of *Isachne globosa* at Sandon Point is the largest recorded in the district. This species is recorded as regionally rare.

⁴⁶ *Eucalyptus robusta* (Swamp Mahogany) is recorded as uncommon north of Bellambi.

<i>Syncarpia glomulifera</i>	Turpentine
<i>Typha orientalis</i>	Cumbungi
<i>Zoysia macrantha</i>	Coast Couch

Woody and Herbaceous Weeds noted within Zone 2

<i>Acacia saligna</i>	Sally Wattle
<i>Ageratina adenophora</i>	Crofton Weed
<i>Andropogon virginicus</i>	Whiskey Grass
<i>Crasascephalum</i> sp.	Thick Head
<i>Dipogon lignosus</i>	Dolichos Pea
	Giant Barbed Wire Grass
<i>Lantana camara</i>	Lantana
<i>Lonicera japonica</i>	Japanese Honey Suckle
<i>Paspalum dilatatum</i>	Paspalum
<i>Polygala virgata</i>	Polygala
<i>Psoralea pinnata</i>	African Scurf Pea
<i>Rubus fruticosus</i>	Blackberry
<i>Senecio madagascariensis</i>	Fireweed
<i>Sida rhombifolia</i>	Paddy's Lucerne
<i>Ulex europaeus</i>	Gorse

Zone 3

Dominant Native Species noted within Zone 3

<i>Acacia implexa</i>	Hickory Wattle
<i>Acacia longifolia</i> var <i>sophorae</i>	Sydney Golden Wattle
<i>Billardaria scandens</i>	Apple Dumplings*
<i>Breynia oblongifolia</i>	Breynia
<i>Clematis aristata</i>	Old Man's Beard *
<i>Dianella caerulea</i>	Paroo Lily
<i>Dichelachne crinata</i>	Plume Grass
<i>Dichondra repens</i>	Kidney Grass
<i>Eragrostis brownii</i>	Browns Love Grass
<i>Glochidion ferdinandii</i>	Cheese Tree
<i>Hibbertia dentata</i>	Toothed Guinea Flower
<i>Hibbertia scandens</i>	Guinea Flower
<i>Imperata cylindrica</i>	Blady Grass
<i>Kennedia prostrata</i>	Running Postman*
<i>Lomandra longifolia</i>	Spiny Mat Rush
<i>Microlaena stipoides</i>	Weeping Grass
<i>Notelea longifolia</i>	Mock Olive
<i>Pittosporum revolutum</i>	Yellow Pittosporum
<i>Pittosporum undulatum</i>	Sweet Pittosporum
<i>Polyscias sambucifolia</i>	Elderberry Panax*
<i>Pteridium esculentum</i>	Bracken
<i>Rapanea variabilis</i>	Muttonwood*
<i>Syncarpia glomulifera</i>	Turpentine
<i>Themeda australis</i>	Kangaroo Grass
<i>Zieria smithii</i>	Sandfly Zieria*

Dominant Woody and Herbaceous Weed Species within Zone 3

<i>Acacia saligna</i>	Sally Wattle*
<i>Ageratina adenophora</i>	Crofton Weed
<i>Andropogon virginicus</i>	Whiskey Grass
<i>Araujia sericifolia</i>	Moth Vine
<i>Briza maxima</i>	Quakey Grass
<i>Gomphocarpus physocarpus</i>	Balloon Cotton Bush
<i>Ipomea indica</i>	Morning Glory
<i>Lantana camara</i>	Lantana*
<i>Ligustrum sinense</i>	Small Leaf Privet
<i>Lonicera japonica</i>	Japanese Honey Suckle
<i>Rubus fruticosus</i>	Blackberry*
<i>Senecio madagascariensis</i>	Fire Weed
<i>Senna pendula</i>	Cassia
<i>Sida rhombifolia</i>	Paddy's Lucerne

<i>Solanum mauritianum</i>	Wild Tobacco*
<i>Ulex europaeus</i>	Gorse*
<i>Verbena sp</i>	Purple Top

Zone 4

Dominant Native Species within Zone 4

<i>Acacia longissima</i>	Slender Wattle
<i>Acacia stricta</i>	Hop Wattle
<i>Clematis aristata</i>	Old Mans Beard*
<i>Clerodendrum tomentosum</i>	Hairy Clerodendrum
<i>Dianella caerulea</i>	Paroo Lily
<i>Dicondra repens</i>	Kidney Grass
<i>Dipodium punctatum</i>	Hyacinth Orchid
<i>Doodia aspera</i>	Rasp Fern
<i>Entolasia stricta</i>	Wiry Panic
<i>Eucalyptus pilularis</i>	Blackbutt
<i>Eustrephis latifolius</i>	Wombat Berry*
<i>Geitnoplesium cynosum</i>	Scrambling Lily
<i>Glycine microphylla</i>	Slender Love Creeper
<i>Gymnostachys anceps</i>	Settlers Flax*
<i>Hibbertia dentata</i>	Toothed Guinea Flower
<i>Hibbertia scandens</i>	Guinea Flower
<i>Lomandra longifolia</i>	Spiny Mat Rush*
<i>Notelaea longifolia</i>	Mock Olive
<i>Oplismenus aemulus</i>	Basket Grass
<i>Pandorea pandorana</i>	Wonga Wonga Vine*
<i>Pittosporum revolutum</i>	Yellow Pittosporum
<i>Pittosporum undulatum</i>	Sweet Pittosporum
<i>Polyscias sambucifolia</i>	Elderberry Panax
<i>Pseudoranthemum variable</i>	Pseudoranthemum*
<i>Rapanea variabilis</i>	Muttonwood
<i>Smilax australis</i>	Lawyer Vine*
<i>Smilax glycyphylla</i>	Native Sarsparilla*
<i>Syncarpia glomulifera</i>	Turpentine
<i>Tylophera barbata</i>	Bearded Tylophora*
<i>Zieria smithii</i>	Sandfly Zieria

Dominant Woody and Herbaceous Weed Species in Zone 4

<i>Cinnamomum camphora</i>	Camphor Laurel
<i>Dietes vagita</i>	Wild Iris
<i>Lantana camara</i>	Lantana*
<i>Ligustrum lucidum</i>	Large Leaf Privet
<i>Ligustrum sinense</i>	Small Leaf Privet
<i>Lonicera japonica</i>	Japanese Honey Suckle
<i>Ochna serrulata</i>	Mickey Mouse Bush
<i>Olea europaea</i>	African olive
<i>Psoralea pinnata</i>	African Scurf Pea
<i>Rubus discolor</i>	Blackberry
<i>Senna pendula</i>	Cassia

Old cottage site and boundary plantings

Agapanthus	
Cotoneaster	
European Pine*	
Prunus sp.	
Wild Iris	
<i>Acacia longifolia</i>	Coastal Acacia*
<i>Banksia integrifolia</i>	Coastal Banksia
<i>Eucalyptus robusta</i>	Swamp Mahogany*
<i>Hakea sp.</i>	

Zone 5

Herbaceous and Woody Weeds

<i>Lantana camara</i>	Lantana
<i>Ligustrum sinense</i>	Small Leaf Privet
<i>Olea europaea</i>	African Olive
<i>Plantago lanceolata</i>	Common Plantain
<i>Senecio madagascariensis</i>	Fire Weed
<i>Senna pendula</i>	Cassia
<i>Ulex europaeus</i>	Gorse
<i>Verbena sp</i>	Purple Top

Zone 6

Dominant Native Species within Zone 6

<i>Acacia implexa</i>	Hickory Wattle
<i>Acacia longifolia</i>	Golden Wattle
<i>Breynia oblongifolia</i>	Breynia
<i>Casuarina glauca</i>	Coastal Sheoak
<i>Hibbertia scandens</i>	Guinea Flower
<i>Imperata cylindrica</i>	Blady Grass
<i>Isachne globosa</i> ⁴⁷	
<i>Typha orientalis</i>	Cumbungi

Woody and Herbaceous Weed Species within Zone 6

<i>Ageratina adenophora</i>	Crofton Weed
<i>Lantana camara</i>	Lantana
<i>Pennisetum clandestinium</i>	Kikuyu
<i>Ulex europaeus</i>	Gorse
<i>Verbena bonariensis</i>	Purple Top

Zone 7

Dominant Native Species within Zone 7

<i>Acacia longifolia</i>	Sydney Golden Wattle
<i>Acacia melanoxylon</i>	Blackwood
<i>Casuarina glauca</i>	Coastal She Oak
<i>Culcita dubia</i>	Soft Bracken
<i>Cyperus gracilis</i>	Sedge
<i>Cyperus polystachyos</i>	Sedge
<i>Epilobium billardierianum</i>	Willow Herb
<i>Gleichenia dicarpa</i>	Pouched Coral Fern
<i>Glochideon ferdinandi</i>	Cheese Tree
<i>Juncus continuous</i>	Common Rush
<i>Juncus ursitatus</i>	Tussock Rush
<i>Kennedia rubicunda</i>	Dusky Coral Pea
<i>Typha orientalis</i>	Cumbungi

Dominant Woody and Herbaceous Weed Species within Zone 7

<i>Andropogon virginicus</i>	Whisky Grass
<i>Conzia sp.</i>	Fleabane
<i>Dipogon lignosus</i>	Dolichos Pea
<i>Ipomea indica</i>	Morning Glory
<i>Lantana camara</i>	Lantana
<i>Oleander sp.</i>	Oleander
<i>Pennisetum clandestinum</i>	Kikuyu
<i>Psoralea pinnata</i>	African Scurf Pea
<i>Ricinus communis</i>	Castor Oil Plant
<i>Senna pendula</i>	Cassia
<i>Ulex europaeus</i>	Gorse

⁴⁷ The population of *Isachne globosa* at Sandon Point is the largest recorded in the district. This species is recorded as regionally rare.

Zone 8

Dominant Native Species within Zone 8

<i>Acacia implexa</i>	Hickory
<i>Acacia longifolia</i>	Golden Wattle
<i>Eucalyptus bicostata</i>	Tasmanian Blue Gum
<i>Ficus coronata</i>	Sand Paper Fig
<i>Hakea serecia</i>	Hakea
<i>Parsonsia straminea</i>	Common Silkpod
<i>Syncarpia glomulifera</i>	Turpentine

Dominant Woody and Herbaceous Weed Species within Zone 8

<i>Acetosa sagittata</i>	Turkey rhubarb
<i>Ageratina adenophora</i>	Crofton Weed
<i>Bidens pilosa</i>	Cobbler's Pegs
<i>Hedychium gardnerianum</i>	Ginger Lily
<i>Hydrocotyle bonariensis</i>	Kumell Curse
<i>Lantana camara</i>	Lantana
<i>Ligustrum sinense</i>	Small Leaf Privet
<i>Lonicera japonica</i>	Japanese Honey Suckle
<i>Olea europaea</i>	African Olive
<i>Paspalum dilatatum</i>	Paspalum
<i>Pennisetum clandestinum</i>	Kikuyu
<i>Senna pendula</i>	Cassia
<i>Sida rhombifolia</i>	Paddy's Lucerne
<i>Tradescantia albiflora</i>	Wandering Jew
<i>Watsonia bulbifera</i>	Watsonia

Zone 9

Dominant Wetland Community Species

<i>Acacia binervia</i>	Coast Myall
<i>Acacia longifolia</i>	Coastal Acacia
<i>Agrostis avenacea</i>	Blown Grass
<i>Casuarina glauca</i>	Coastal Sheoak*
<i>Entolasia stricta</i>	Wiry Panic
<i>Ficus coronata</i>	Sand Paper Fig
<i>Hibbertia scandens</i>	Guinea Flower
<i>Isolepis nodosa</i>	Knobby Rush
<i>Juncus continuous</i>	Common Rush
<i>Juncus usitatus</i>	Tussock Rush
<i>Melaleuca styphelioides</i>	Prickly Melaleuca ⁴⁸
<i>Microlaena stipoides</i>	Weeping Grass
<i>Paspalum distichium</i>	Water Couch
<i>Persicaria hydropiper</i>	Water Pepper
<i>Persicaria lapathifolium</i>	Knotweed
<i>Persicaria strigosa</i>	Spotted Knotweed
<i>Syncarpia glomulifera</i>	Turpentine
<i>Typha orientalis</i>	Broadleaf Cumbungi

Woody and Herbaceous Weeds

<i>Ageratina adenophora</i>	Crofton Weed
<i>Andropogon virginicus</i>	Whisky grass
<i>Cordateria selloana</i>	Pampas grass*
<i>Hydrocotyle bonariensis</i>	Pennywort

Zone 10

⁴⁸ *Melaleuca styphelioides* is recorded as uncommon north of Corrimal

Indicative native species noted within the estuarine Community of Zone 10

<i>Acacia binervia</i>	Two veined Hickory
<i>Acacia floribunda</i>	White Sallow Wattle
<i>Acacia longifolia</i>	Coastal Acacia
<i>Acacia maidenii</i>	Maidens Wattle
<i>Acacia melanoxylon</i>	Blackwood *
<i>Adiantum hispidulum</i>	Giant Maidenhair
<i>Casuarina glauca</i>	
<i>Banksia integrifolia</i>	Coastal Banksia
<i>Casuarina glauca</i>	Coastal Sheoak *
<i>Crinum pedunculatum</i>	Swamp Lily ⁴⁹
<i>Dicondra repens</i>	Kidney Herb
<i>Doodia aspera</i>	Rasp Fern
<i>Ficus coronata</i>	Sand Paper Fig
<i>Hibbertia scandens</i>	Guinea Flower
<i>Hibiscus diversifolius</i> ⁵⁰	Swamp Hibiscus
<i>Imperata cylindrica</i>	Blady Grass
<i>Kennedia rubicunda</i>	Dusky Coral Pea *
<i>Livistona australis</i>	Cabbage Tree Palm
<i>Lomandra longifolia</i>	Spiny Matt Rush
<i>Microlaena stipoides</i>	Weeping Grass *
<i>Omalanthus nutans</i>	Bleeding Heart
<i>Phragmites australis</i>	Thatch Weed
<i>Pittosporum revolutum</i>	Rough Fruit Pittosporum
<i>Pittosporum undulatum</i>	Sweet Pittosporum
<i>Rapanea variabilis</i>	Muttonwood
<i>Rubus hillii</i>	Native Blackberry
<i>Sigesbeckia orientalis</i>	Indian Weed
<i>Stephania japonica</i>	Snake Vine
<i>Syncarpia glomulifera</i>	Turpentine
<i>Trema aspera</i>	Native Peach

Woody and Herbaceous Weeds noted within Zone 10

<i>Acer negundo</i>	Box Elder
<i>Acetosa sagittata</i>	Turkey Rhubarb
<i>Anredra cordeteria</i>	Madeira Vine
<i>Delaria odorata</i>	Cape Ivy
<i>Erharta erecta</i>	Panic Veldtgrass
<i>Erythrina sykesii</i>	Coral Tree
<i>Ficus hillii</i>	Hills Weeping Fig*
<i>Hedychium gardnerianum</i>	Ginger Lily
<i>Hydrocotyle bonariensis</i>	Pennywort
<i>Ipomoea carica</i>	Coastal Morning Glory
<i>Ipomoea indica</i>	Morning Glory
<i>Lagunaria patersonii</i>	Norfolk Island Hibiscus
<i>Lantana camara</i>	Lantana*
<i>Ligustrum sinense</i>	Small Leaf Privet
<i>Lonicera japonica</i>	Japanese Honey Suckle
<i>Ochna serrulata</i>	Mickey Mouse Bush
<i>Olea europaea var africana</i>	African Olive
<i>Protoasparagus aethiopicus</i>	Asparagus Fern
<i>Ricinus communis</i>	Castor Oil
<i>Rubus discolor</i>	Blackberry
<i>Salix babylonica</i>	Willow*
<i>Senna pendula</i>	Cassia
<i>Tagetes minuta</i>	Stinking Roger
<i>Thunbergia alata</i>	Black Eyed Susan
<i>Tropaeolum majus</i>	Nasturtium
<i>Ulex europaeus</i>	Gorse
<i>Phoenix canariensis</i>	Phoenix Palm

ZONE 11

⁴⁹ *Crinum pedunculatum* is recorded as regionally rare in Northern Illawarra

⁵⁰ *Hibiscus diversifolius* is recorded as regionally rare in the Illawarra

Indicative native species noted within the estuarine community of Zone 11

<i>Acacia longifolia</i>	Coastal Acacia
<i>Banksia integrifolia</i>	Coastal Banksia
<i>Casuarina glauca</i>	Coastal Sheoak *
<i>Crinum pedunculatum</i>	Swamp Lily ⁵¹
<i>Dicondra repens</i>	Kidney Herb
<i>Hibbertia scandens</i>	Guinea Flower
<i>Hibiscus diversifolius</i> ⁵²	
<i>Imperata cylindrica</i>	Blady Grass
<i>Kennedia rubicunda</i>	Dusky Coral Pea *
<i>Lomandra longifolia</i>	Spiny Matt Rush
<i>Microlaena stipoides</i>	Weeping Grass *
<i>Phragmites australis</i>	Thatch Weed
<i>Pittosporum revolutum</i>	Rough Fruit Pittosporum
<i>Pittosporum undulatum</i>	Sweet Pittosporum
<i>Rapanea variabilis</i>	Muttonwood
<i>Rubus hillii</i>	Native Blackberry
<i>Sigesbeckia orientalis</i>	Indian Weed
<i>Stephania japonica</i>	Snake Vine

Woody and Herbaceous Weeds noted in Zone 11

<i>Erharta erecta</i>	Panic Veldtgrass
<i>Hydrocotyle bonariensis</i>	Pennywort
<i>Ipomoea carica</i>	Coastal Morning Glory
<i>Ipomoea indica</i>	Morning Glory
<i>Lagunaria patersonii</i>	Norfolk Island Hibiscus
<i>Lantana camara</i>	Lantana*
<i>Lonicera japonica</i>	Japanese Honey Suckle
<i>Ochna serrulata</i>	Mickey Mouse Bush
<i>Olea europaea var africana</i>	African Olive
<i>Protoasparagus aethiopicus</i>	Asparagus Fern
<i>Rubus discolor</i>	Blackberry
<i>Senna pendula</i>	Cassia
<i>Tropaeolum majus</i>	Nasturtium

Zone 12

Dominant Native Species within Zone 12

<i>Acacia sophorae</i>	Coastal Golden Wattle
<i>Banksia integrifolia</i>	Coast Banksia
<i>Casuarina glauca</i>	Swamp Sheoak
<i>Crinum pedunculatum</i>	Swamp Lily
<i>Juncus usitatis</i>	Rush

Woody and Herbaceous Weed Species within Zone 12

<i>Hydrocotyle bonariensis</i>	Kumell Curse
<i>Pennisetum clandestinum</i>	Kikuyu
<i>Rubus discolor</i>	Blackberry

⁵¹ *Crinum pedunculatum* is recorded as regionally rare in Northern Illawarra

⁵² *Hibiscus diversifolius* is recorded as regionally rare in the Illawarra

Appendix A2

Plant Species List: Tramway Creek & Wetlands

Compiled by Marcel Van Wijk 27 July 2001

Botanical Name	Common Name	Reference
<i>Acacia binervata</i>	Two Veined Hickory	2,3
<i>Acacia falcata</i>	Sickle Wattle	6
<i>Acacia floribunda</i>	Sally Wattle	6
<i>Acacia longifolia</i> var. <i>longifolia</i>	Sydney Golden Wattle	1,4,5,6
<i>Acacia longifolia</i> var. <i>sophorae</i>	Coastal Wattle	1,2,3,4,6
<i>Acacia implexa</i>	Hickory	3
<i>Acacia maidenii</i>	Maidens Wattle	1,2,3
<i>Acacia mearnsii</i>	Black Wattle	1,2,3
<i>Acacia paradoxa</i>	Kangaroo Thorn	6
<i>Acacia stricta</i>	Hop Wattle	1,6
<i>Acmena smithii</i>	Lilly Pilly	1,3,5,6
<i>Adiantum hispidulum</i>	Rough Maidenhair Fern	6
<i>Agrostis</i> sp.	Blown Grass	6
<i>Allocasuarina torulosa</i>	Forest Oak	1
<i>Alternanthera denticulata</i>	Lesser Joyweed	3,5,6
<i>Apium prostratum</i> var. <i>filiforme</i>	Sea Celery	3,5 ⁵³ ,6
<i>Azolla filiculoides</i> var. <i>rubra</i>	Pacific Azolla	6
<i>Banksia integrifolia</i>	Coastal Banksia	1,2,3,4,6
<i>Banksia serrata</i>	Old Man Banksia	4,6
<i>Baumea juncea</i>	Bare Twig-rush	5,6
<i>Baumea rubiginosa</i>	Soft Twig-rush	3,6
<i>Blechnum patersonii</i> (?)	Water Fern	3
<i>Billardiera scandens</i> var. <i>scandens</i>	Apple-berry	6
<i>Bolboschoenus</i> sp.	Rush	6
<i>Bothriochloa macra</i>	Red Leg	2,3,6
<i>Breynia oblongifolia</i>	Breynia	1,6
<i>Caesia parviflora</i>	Pale Grass Lily	1,6
<i>Caesia parviflora</i> var. <i>vittata</i>	Blue Grass Lily	6
<i>Calystegia marginata</i>	Forest Bindweed	1
<i>Calystegia sepium</i>	Bindweed	6
<i>Calystegia soldanella</i>	Calystegia	1
<i>Canavalia maritima</i>	Beach Bean	4
<i>Carex appressa</i>	Tall Sedge	1,2,3,5,6
<i>Carex inversa</i>	Sedge	6
<i>Carex longibrachteata</i>	Drooping Sedge	1,6
<i>Carex pumila</i>	Strand Sedge	6
<i>Carpobrotus glaucescens</i>	Pigface	4,6
<i>Casuarina glauca</i>	Swamp Oak	1,2,3,4,5,6
<i>Centella asiatica</i>	Swamp Pennywort	1,6
<i>Cheilanthes distans</i>	Bristly Cloak Fern	6
<i>Christella dentata</i>	Fern	6
<i>Commelina cyanea</i>	Scurvy Weed	1,6
<i>Correa alba</i>	White Correa	4,6
<i>Crinum pedunculatum</i>	Swamp Lily	1,2,3,4,6
<i>Cupaniopsis anacardioides</i>	Tuckeroo	4
<i>Cyathea australis</i>	Rough Tree Fern	6

⁵³ Listed by Connell Wagner as *Ciclospermum prostratum*

Botanical Name	Common Name	Reference
<i>Cymbopogon refractus</i>	Barbed Wire Grass	6
<i>Cynodon dactylon</i>	Couch Grass	1,2,3,5,6
<i>Cyperus gracilis</i>	Sedge	6
<i>Cyperus polystachyos</i>	Sedge	5,6
<i>Cyperus sphaeroideus</i>	Sedge	5
<i>Desmodium varians</i>	Slender Tick-trefoil	6
<i>Dianella caerulea</i>	Paroo Lily	1,3,6
<i>Dianella longifolia</i>	Flax Lily	6
<i>Dichondra repens</i>	Kidney Grass	1,6
<i>Doodia aspera</i>	Rasp Fern	6
<i>Enchylaena tomentosa</i>	Creeping Saltbush	6
<i>Entolasia marginata</i>		1,6
<i>Entolasia stricta</i>	Wiry Panic	3,6
<i>Epilobium billardierianum</i> subsp. <i>cinereum</i>	Smooth Willow-herb	1
<i>Epilobium hirtigerum</i>	Hoary Willow-herb	5,6
<i>Eragrostis brownii</i>	Browns Love Grass	6
<i>Eragrostis elongata</i>	Love Grass	5
<i>Eucalyptus amplifolia</i>	Cabbage Gum	4
<i>Eucalyptus botryoides</i>	Bangalay	4
<i>Eucalyptus robusta</i>	Swamp Mahogany	1,3,4,5,6
<i>Ficus macrophylla</i>	Moreton Bay Fig	4
<i>Ficus obliqua</i>	Small-leaved Fig	4
<i>Ficus rubiginosa</i>	Port Jackson Fig	4
<i>Fimbristylis dichotoma</i>	Sedge	6
<i>Fimbristylis ferruginea</i>	Sedge	5,6
<i>Gahnia sieberiana</i>	Red-fruited Saw Sedge	1,2,3,6
<i>Geranium homeanum</i>	Northern Cranesbill	6
<i>Geranium solanderi</i>	Australian Cranesbill	1,2,6
<i>Gleichenia dicarpa</i>	Coral Fern	6
<i>Glochidion ferdinandi</i>	Cheese Tree	1,3,4,5,6
<i>Glycine clandestina</i>	Twining Glycine	1,2,6
<i>Glycine microphylla</i>	Glycine	6
<i>Glycine tabacina</i>	Love Creeper	6
<i>Gonocarpus teucrioides</i>	Raspwort	3
<i>Hardenbergia violacea</i>	Purple Twining Pea	1,3,4,6
<i>Hibbertia scandens</i>	Snake Vine	1,2,3,4,5,6
<i>Hibiscus diversifolius</i>	Swamp Rosella	1,2,3,4,6
<i>Hydrocotyle peduncularis</i>	Swamp Pennywort	5,6
<i>Hypolepis muelleri</i>	Harsh Ground Fern	5
<i>Imperata cylindrica</i>	Blady Grass	1,2,3,5,6
<i>Indigofera australis</i>	Native Indigo	6
<i>Isachne globosa</i>	Swamp Millet	1,5,6
<i>Isolepis inundatus</i>	Swamp Club-rush	1,6
<i>Isolepis nodosa</i>	Knobby Club-rush	1,2,6
<i>Juncus continuus</i>	Common Rush	1
<i>Juncus kraussii</i> subsp. <i>australiensis</i>	Sea Rush	1,2,5,6
<i>Juncus planifolius</i>	Broad Rush	1,6
<i>Juncus subsecundus</i>	Finger Rush	5,6
<i>Juncus usitatus</i>	Tussock Rush	1,5,6
<i>Juncus vaginatus</i>	Rush	5
<i>Kennedia rubicunda</i>	Dusky Coral Pea	1,2,3,4,5,6
<i>Lepidosperma longitudinale</i>	Pithy Sword Sedge	2,3
<i>Leptinella longipes</i>	Herb	5,6
<i>Leptospermum laevigatum</i>	Coastal Tea Tree	4,6
<i>Leucopogon parviflorus</i>	Coast Beard Heath	4
<i>Livistona australis</i>	Cabbage Palm	4
<i>Lobelia alata</i>	Herb	5,6

Botanical Name	Common Name	Reference
<i>Lomandra longifolia</i>	Spiny Headed Mat Rush	3,4,5,6
<i>Lycopus australis</i>	Water Horehound	5,6
<i>Lythrum hyssopifolia</i>	Lesser Loosestrife	6
<i>Maundia triglochinosides</i>	Maundia	3
<i>Melaleuca ericifolia</i>	Swamp Paperbark	4
<i>Melaleuca hypericifolia</i>	Hillock Bush	4,6
<i>Melaleuca linariifolia</i>	Snow in Summer	3,4
<i>Melaleuca styphelioides</i>	Prickly-leaved Paperbark	1,2,3,4,5,6
<i>Microlaena stipoides</i>	Weeping Meadow Grass	1,6
<i>Microtis oblonga</i>	Onion Orchid	6
<i>Myoporum acuminatum</i>	Northern Boobialla	4,6
<i>Myoporum boninense</i>	Boobialla	2,4
<i>Notelaea longifolia</i>	Large Mock Olive	2,3
<i>Omalanthus nutans</i>	Bleeding Heart	4
<i>Opercularia aspera</i>	Common Stinkweed	3,6
<i>Oplismenus aemulus</i>	Basket Grass	6
<i>Oxalis exilis</i>	Herb	6
<i>Oxalis perennans</i>	Herb	6
<i>Oxalis rubens</i>	Herb	6
<i>Ozothamnus diosmifolius</i>	Ball Everlasting	3
<i>Paspalum distichum</i>	Water Couch	5,6
<i>Persicaria decipiens</i>	Slender Knotweed	5,6
<i>Persicaria hydropiper</i>	Water Pepper	3,6
<i>Persicaria strigosa</i>	Spotted Knotweed	1,5,6
<i>Phragmites australis</i>	Common Reed	1,2,3,5,6
<i>Pittosporum revolutum</i>	Yellow Pittosporum	1,3,6
<i>Pittosporum undulatum</i>	Sweet Pittosporum	1,2,3,5
<i>Poa labillardieri</i>	Tussock Grass	3
<i>Polymeria calycina</i>	Swamp Bindweed	6
<i>Portulaca oleracea</i>	Pig Weed	5
<i>Pratia purpurascens</i>	White Root	6
<i>Pseudognaphalium luteo-album</i>	Jersey Cudweed	6
<i>Pteridium esculentum</i>	Bracken Fern	1,2,3,5,6
<i>Ranunculus inundatus</i>	River Buttercup	1,6
<i>Ranunculus lappaceus</i>	Common Buttercup	6
<i>Ranunculus plebeius</i>	Hairy Buttercup	1
<i>Rapanea variabilis</i>	Muttonwood	1,6
<i>Rubus hillii</i>	Broad Leaved Bramble	5
<i>Rubus parvifolius</i>	Native Raspberry	6
<i>Rumex brownii</i>		
<i>Sambucus australasica</i>	Yellow Elderberry	5
<i>Samolus repens</i>	Creeping Brookweed	1,6
<i>Scaevola calendulacea</i>	Beach Fan Flower	4
<i>Schoenoplectus validus</i>	River Clubrush	5,6
<i>Schoenus sp.</i>	Bog Rush	6
<i>Senecio linearifolius</i>	Fireweed Groundsel	1,2,3,6
<i>Senecio hispidulus</i>	Rough Groundsel	1,2,6
<i>Sigesbeckia orientalis</i>	Indian Weed	6
<i>Sonchus oleraceus</i>	Sowthistle	6
<i>Spinifex sericeus</i>	Hairy Spinifex	1,2,3,6
<i>Spirodela pusilla</i>	Small Duckweed	2,3
<i>Spirodela polyrhiza</i>	Duckweed	5
<i>Sporobolus virginicus</i>	Sand Couch, Salt Grass	1,2,6
<i>Syncarpia glomulifera</i>	Turpentine	1
<i>Tetragonia tetragonoides</i>	Warrigal Cabbage	6
<i>Themeda australis</i>	Kangaroo Grass	1,2,3,5,6

Botanical Name	Common Name	Reference
<i>Triglochin microtuberosum</i>	Water Ribbons	1,6
<i>Triglochin striata</i>	Streaked Arrowgrass	1, 6
<i>Typha domingensis</i>	Cumbungi	5,6
<i>Typha orientalis</i>	Bulrush, Broad Leaf Cumbungi	1,2,3,5,6
<i>Wahlenbergia gracilis</i>	Australian Bluebell	1,6
<i>Westringia fruticosa</i>	Coastal Rosemary	4,6
<i>Zoysia macrantha</i>	Coast Couch	1,6

Number of species: 166

Conservation significance of the vegetation

Large areas of remnant vegetation community bordering the creeks are representative of the Sydney Coastal Estuarine Swamp Forest Complex, which is listed as an Endangered Ecological Community under the Threatened Species Conservation Act 1995.

Maundia triglochinoidea is listed as vulnerable under Schedule 2 of the Threatened Species Conservation Act 1995.

Hibiscus diversifolius is regionally rare in Illawarra.

Melaleuca styphelioides is uncommon north of Corrimal.

Eucalyptus robusta is uncommon north of Bellambi.

Crinum pedunculatum is regionally rare in northern Illawarra.

Isachne globosa is the largest population recorded in the district and is regionally rare (pers. comm. A. Bofeldt).

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Appendix B

Bird list – Sandon Point and surrounds

Prepared by Jill Molan and Daryl McKay

RA†	Species	Scientific Name	Source
S	Brown Quail	<i>Coturnix ypsilophera</i>	2, 6, 7, 16
C	Australian Wood Duck	<i>Chenonetta jubata</i>	3, 7, 9, 15
C	Grey Teal	<i>Anas gracilis</i>	1, 4, 6
MC	Chestnut Teal	<i>Anas castanea</i>	6, 7
C	Pacific Black Duck	<i>Anas superciliosa</i>	2, 3, 5, 6, 7, 9, 15
C	Australasian Grebe	<i>Tachybaptus novaehollandiae</i>	6
MC	Little (Fairy) Penguin	<i>Eudyptula minor</i>	7, 9 ⁵⁴
C	Fluttering Shearwater	<i>Puffinus gavia</i>	7 ⁵⁵
U	Sooty Shearwater	<i>Puffinus griseus</i>	9 ⁵⁶
C	Short-tailed Shearwater	<i>Puffinus tenuirostris</i>	7, 9 ⁵⁷
R	White-tailed Tropicbird	<i>Phaethon lepturus</i>	12 ⁵⁸
S	Darter	<i>Anhinga melanogaster</i>	7, ⁵⁹ 8, ⁶⁰ 9, ⁶¹ 13, ⁶² 17
C	Great Cormorant	<i>Phalacrocorax carbo</i>	1, 2, 4, 7, 9, 15
C	Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>	2, 6, 7, 9, 15, 16
C	Little Pied Cormorant	<i>Phalacrocorax melanoleucos</i>	6, 7, 9, 15, 16
U	Pied Cormorant	<i>Phalacrocorax varius</i>	1, 2, 4, 5, 7, 9
C	Australian Pelican	<i>Pelecanus conspicillatus</i>	7, 8, 9
MC	Australasian Gannet	<i>Morus serrator</i>	7
MC	Great Egret	<i>Ardea alba</i>	1, 2, 4, 6, 7, 15
R	Intermediate Egret	<i>Ardea intermedia</i>	9 ⁶³
C	Cattle Egret	<i>Ardea ibis</i>	1, 2, 4, 5, 6, 7, 9, 15, 16
S	Little Egret	<i>Ardea (Egretta) garzetta</i>	6, 9
S	Eastern Reef Egret	<i>Ardea (Egretta) sacra</i>	3, 15
C	White-faced Heron	<i>Ardea novaehollandiae</i>	1, 2, 5, 6, 7, 9, 15, 16
U	White-necked Heron	<i>Ardea pacifica</i>	3, 7, ⁶⁴ 12, 15
U	Rufous (Nankeen) Night Heron	<i>Nycticorax caledonicus</i>	7 ⁶⁵
R	Australasian Bittern	<i>Botaurus poiciloptilus</i>	7 ⁶⁶
MC	Royal Spoonbill	<i>Platalea regia</i>	3, 6, 15

⁵⁴ 1 bird beachwashed McCauley's beach: 01.01.98

⁵⁵ Several huge rafts of thousands of birds feeding both out to sea and close off the rock platform north of Sandon Point: 03.11.02

⁵⁶ A raft of birds resting behind breakers off McCauley's beach: Dec 98

⁵⁷ Beachwashed birds: 01.01.98 and early Summer each year; 03.11.01 one beachwashed

⁵⁸ Oct 1998: sitting on handrail of cycleway over Hewitt's Creek. Flew away uninjured, appeared healthy and strong.

⁵⁹ Hewitts Creek: 28.01.02

⁶⁰ One female flew in and landed in estuary lagoon at eastern end of Tramway Creek, 06.11.01.

Observers Jill Molan, Eva and Maurice Sempe.

⁶¹ Hewitts Creek: 10.11.01.

⁶² Hewitt's Creek lagoon: 3.12.99

⁶³ Tramway Creek lagoon: Nov 1997

⁶⁴ Woodlands Creek at the point of diversion towards Hewitt's Creek, one bird: 25.08.01.

⁶⁵ Roosting in casuarinas Hewitts Creek 22.12.01

⁶⁶ 1 bird flushed north of pumping station on Woodlands Creek, flew south west up Tramway Creek until disappeared behind vegetation: 20.10.01. Observers Darryl McKay, Jill Molan, Terrill Nordstrom.

RA†	Species	Scientific Name	Source
U	Yellow-billed Spoonbill	<i>Platalea flavipes</i>	E(H)
C	Australian White Ibis	<i>Threskiornis molucca</i>	3, 6, 15
MC	Straw-necked Ibis	<i>Threskiornis spinicollis</i>	1, 4, 15
U	Whistling Kite	<i>Haliastur sphenurus</i>	6
MC	White-bellied Sea-eagle	<i>Haliaeetus leucogaster</i>	6, 7, 9, 14 ⁶⁷
U	Swamp (Marsh) Harrier	<i>Circus approximans</i>	1, 4, 6, 7
MC	Black-shouldered Kite	<i>Elanus axillaris</i>	1, 2, 3, 5, 7, 8, ⁶⁸ 9, 15, 16
MC	Brown Goshawk	<i>Accipiter fasciatus</i>	7, 16
MC	Grey Goshawk	<i>Accipiter novaehollandiae</i>	9, ⁶⁹ 7 ⁷⁰
MC	Australian Kestrel	<i>Falco cenchroides</i>	2, 3, 5, 7, 9, 15
U	Australian Hobby	<i>Falco longipennis</i>	3, 9, 15
U	Peregrine Falcon	<i>Falco peregrinus</i>	7 ⁷¹ , 9
U	Brown Falcon	<i>Falco berigora</i>	3, 15
MC	Dusky Moorhen	<i>Gallinula tenebrosa</i>	2, 3, 5, 6, 7, 9, 15, 16
C	Purple Swamphen	<i>Porphyrio porphyrio</i>	1, 2, 4, 6, 7, 9, 15, 16
MC	Eurasian Coot	<i>Fulica atra</i>	3, 15
S	Lewin's Rail	<i>Dryolimnas pectoralis</i>	2, 3, 7, ⁷² 15
U	Buff-banded Rail	<i>Gallirallus philippensis</i>	3, 11 ⁷³ , 14 ⁷⁴ , 12, ⁷⁵ 15
MC	Ruddy Turnstone	<i>Arenaria interpres</i>	8 ⁷⁶
S	Latham's Snipe	<i>Gallinago hardwickii</i>	1, 2, 4, 5, 7, ⁷⁷ 8 ⁷⁸ , 10, ⁷⁹ 15
U	Whimbrel	<i>Numenius phaeopus</i>	7 ⁸⁰
MC	Black-winged Stilt	<i>Himantopus himantopus</i>	6
MC	Sooty Oystercatcher	<i>Haematopus fuliginosus</i>	3, 8, 9, 15
MC	Red-capped Plover	<i>Charadrius ruficapillus</i>	3, 6, 8 ⁸¹ , 15,
C	Masked Lapwing	<i>Vanellus miles</i>	1, 2, 4, 5, 7, 9, 15, 16

⁶⁷ Dominic Leahy 7.04.02 One adult. Seen from Sandon Point surf club as it fished offshore and along McCauleys beach where it caught at fish at the exit of Tramway Creek. Then flew to the turpentine forest.

⁶⁸ Nesting winter 2001. Two young fledged. Nested again spring-summer 2001. Two young fledged.

⁶⁹ White phase

⁷⁰ Grey phase, south of Hewitt's Creek, east of Woodlands Creek Diversion: 20.10.01. Observers Darryl McKay, Jill Molan, Terrill Nordstrom.

⁷¹ Hewitt's creek eastern end, bird with prey item (bird), 29.09.01

⁷² 29.09.01; 20.10.01 near the confluence of Tramway and the unnamed creek north of Cookson's Plibrico. Observers Darryl McKay, Jill Molan & Terrill Nordstrom. Flushed from reeds 23.03.02 DM:JM: Sally Forsstrom

⁷³ In his backyard, Hill St, Bulli over a period of weeks: 1998

⁷⁴ Reported in Illawarra Bird Observers' Club newsletter 2001. Sighting by John Bisset in wetland on Woodlands Creek, 02.03.01

⁷⁵ Alex Peterson, from 23.08.02 onwards, frequent sightings near the mouth of Hewitt's Creek.

⁷⁶ Pass through on northerly migration route to northern hemisphere (our Autumn). Gather in small flocks and feed before departing.

⁷⁷ Two birds, Woodlands creek, level with pumping station, 29.09.01

⁷⁸ One bird flushed from the western edge of cycleway crossing Tramway Creek, 5.45am, 31.01.01. Observers Jill Molan & Stefanie Hoy.

⁷⁹ Tramway Creek Lagoon: 29.11.00, 8-9am; 28.12.00, 8am. Marcel van Wijk. Woodlands Creek: 29.9.01, 4pm. Jill Molan & Darryl McKay 2 birds flushed from Woodland Creek just north of the pumping station, flew south west and landed in Tramway creek.

⁸⁰ Solitary bird. Several sightings around the period 25.09.01 to 4.10.01

⁸¹ Intermittent sightings McCauley's beach e.g. 21.07.01 & 22.07.01

RA†	Species	Scientific Name	Source
MC	Artic Jaegar	<i>Stercorarius parasiticus</i>	9 ⁸²
S	Pacific Gull	<i>Larus pacificus</i>	9
MC	Kelp Gull	<i>Larus dominicanus</i>	2, 3, 6, 7, 9, 15
C	Silver Gull	<i>Larus novaehollandiae</i>	1, 2, 4, 6, 7, 9, 15, 16
C	Crested Tern	<i>Sterna bergii</i>	3, 6, 7, 8, 9, 15
U	Common Tern	<i>Sterna hirundo</i>	7
MC	Topknot Pigeon	<i>Lopholaimus antarcticus</i>	9 ⁸³
MC	Crested Pigeon	<i>Ocyphaps lophotes</i>	3, 9
C	Feral Pigeon* (Rock dove)	<i>Columba livia</i>	1, 4, 5, 7, 9, 16
C	Spotted Turtle-dove*	<i>Streptopelia chinensis</i>	1, 2, 5, 7, 9, 15, 16
MC	Yellow-tailed Black-Cockatoo	<i>Calyptorhynchus funereus</i>	7, 8, 9, 16
LC	Long-billed Corella	<i>Cacatua tenuirostris</i>	7, 9
LC	Little Corella	<i>Cacatua sanguinea</i>	2, 7, 9, 16
MC	Sulphur-crested Cockatoo	<i>Cacatua galerita</i>	2, 3, 7, 9, 15, 16
C	Galah	<i>Cacatua roseicapilla</i>	1, 2, 4, 5, 7, 9, 15
MC	Rainbow Lorikeet	<i>Trichoglossus haematodus</i>	5, 7, 9, 16
R	Scaly-breasted Lorikeet	<i>Trichoglossus chlorolepidotus</i>	9 ⁸⁴
U	Little Lorikeet	<i>Glossopsitta pusilla</i>	9 ⁸⁵
MC	Australian King Parrot	<i>Alisterus scapularis</i>	7, 9
C	Crimson Rosella	<i>Platycercus elegans elegans</i>	7, 9, 16
C	Eastern Rosella	<i>Platycercus eximius</i>	E (H)
U	Red-rumped Parrot	<i>Psephotus haematonotus</i>	E (H), 8 ⁸⁶
R	Swift Parrot	<i>Lathamus discolor</i>	E ⁸⁷
C	Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>	1, 2, 4, 7, 8, 9
MC	Horsefield's Bronze-Cuckoo	<i>Chrysococcyx basalis</i>	9 ⁸⁸
MC	Common Koel	<i>Eudynamys scolopacea</i>	7, 8, 9
MC	Channel-billed Cuckoo	<i>Scythrops novaehollandiae</i>	7, 8, 9
C	Southern Boobook	<i>Ninox novaeseelandiae</i>	3
U	Barn Owl	<i>Tyto alba</i>	7 ⁸⁹ , 12 ⁹⁰
MC	Tawny Frogmouth	<i>Podargus strigoides</i>	3
MC	White-throated Needletail	<i>Hirundapus caudacutus</i>	E (H)
U	Azure Kingfisher	<i>Alcedo azurea</i>	7, 9, 12 ⁹¹
C	Sacred Kingfisher	<i>Todiramphus sanctus</i>	3, 6, 9, 15
C	Laughing Kookaburra	<i>Dacelo novaeguineae</i>	2, 3, 7, 9, 15
MC	Dollarbird	<i>Eurystomus orientalis</i>	7, 9
C	White-throated Treecreeper	<i>Cormobates leucophaeus</i>	2
C	Superb Fairy-wren	<i>Malurus cyaneus</i>	1, 2, 4, 5, 7, 9, 15, 16
MC	Variegated Fairy-wren	<i>Malurus lamberti</i>	1, 2, 4, 7, 9
U	Southern Emu-wren	<i>Stipiturus malachurus</i>	1, 2, 4, 5, 6, 7 ⁹² , 9, 16

⁸² Offshore Thirroul beach: Dec 97

⁸³ North side McCauley's hill: 5.2.00

⁸⁴ Just after the big storm - 2 birds: 18.08.98

⁸⁵ Pine trees, McCauley's Hill: 12.11.00

⁸⁶ 3 birds seen nearby in Park Rd Bulli Dec 2000

⁸⁷ per Chris Chafer

⁸⁸ Base of track behind pumping station: 01.09.00

⁸⁹ Located in trees western side Woodlands Creek diversion, flew westward: 14.07.01 early afternoon

⁹⁰ Alex Peterson & Gill Voza near Woodlands Creek diversion: 04.08.01 noon

⁹¹ Hewitt's Creek

RA†	Species	Scientific Name	Source
C	Spotted Pardalote	<i>Pardalotus punctatus</i>	2, 7
C	White-browed Scrubwren	<i>Sericornis frontalis</i>	1, 2, 4, 5, 7, 9, 16
C	Yellow (Little) Thornbill	<i>Acanthiza nana</i>	3, 5, 7, 9, 15
C	Striated Thornbill	<i>Acanthiza lineata</i>	1, 2, 4, 5, 9
C	Yellow-rumped Thornbill	<i>Acanthiza chrysorrhoa</i>	8 ⁹³
C	Brown Thornbill	<i>Acanthiza pusilla</i>	2, 7
C	Red Wattlebird	<i>Anthochaera carunculata</i>	5, 7, 9, 16
MC	Little Wattlebird	<i>Anthochaera chrysoptera</i>	1, 2, 4, 7, 9, 15, 16
MC	Noisy Friarbird	<i>Philemon corniculatus</i>	E (H)
C	Noisy Miner	<i>Manorina melanocephala</i>	E (H)
C	Lewin's Honeyeater	<i>Meliphaga lewinii</i>	3, 7, 9, 15, 16
C	Yellow-faced Honeyeater	<i>Lichenastomus chrysops</i>	2
C	New Holland Honeyeater	<i>Phylidonyris novaehollandiae</i>	1, 2, 4, 5, 7, 9, 16
S	White-cheeked Honeyeater	<i>Phylidonyris nigra</i>	1, 2, 4, 5, 7 ⁹⁴ , 9
C	Eastern Spinebill	<i>Acanthorhynchus tenuirostris</i>	1, 2, 4, 5, 7, 9, 15
U	Scarlet Honeyeater	<i>Myzomela sanguinolenta</i>	9 ⁹⁵
C	Eastern Yellow Robin	<i>Eopsaltria australis</i>	2, 7, 9
C	Eastern Whipbird	<i>Psophodes olivaceus</i>	3, 7, 9, 15, 16
MC	Golden Whistler	<i>Pachycephala pectoralis</i>	7 ⁹⁶
C	Grey Shrike-thrush	<i>Colluricincla harmonica</i>	7 ⁹⁷ , 9 ⁹⁸
MC	Black-faced Monarch	<i>Monarcha melanopsis</i>	E ⁹⁹
MC	Leaden Flycatcher	<i>Myiagra rubecula</i>	E ¹⁰⁰
MC	Rufous Fantail	<i>Rhipidura rufifrons</i>	9 ¹⁰¹
C	Grey Fantail	<i>Rhipidura fuliginosa</i>	1, 2, 4, 5, 7, 9, 15
C	Willie Wagtail	<i>Rhipidura leucophrys</i>	1, 2, 4, 5, 7, 9, 15, 16
U	Spangled Drongo	<i>Dicrurus bracteatus</i>	7, 10 ² , 9 ¹⁰³
C	Magpie-lark	<i>Grallina cyanoleuca</i>	1, 2, 4, 5, 7, 9, 15, 16
C	Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>	2, 3, 7, 9, 15
-	Barred Cuckoo-shrike	<i>Coracina lineata</i>	9 ¹⁰⁴
U	Figbird	<i>Sphecotheres viridis</i>	9 ¹⁰⁵
R	White-breasted Woodswallow	<i>Artamus leucorhynchus</i>	9 ¹⁰⁶
MC	Grey Butcherbird	<i>Cracticus torquatus</i>	7, 9, 15, 16
C	Australian Magpie	<i>Gymnorhina tibicen</i>	2, 3, 7, 9, 15, 16
C	Pied Currawong	<i>Strepera graculina</i>	2, 3, 7, 9, 15, 16
C	Australian Raven	<i>Corvus coronoides</i>	1, 2, 4, 5, 7, 9, 15, 16
C	Satin Bowerbird	<i>Ptilonorhynchus violaceus</i>	7

⁹² Some sightings near eastern end Hewitt's Creek (quite close to bridge) 11.02.01 (4 birds including 2 male); north of pumping station 18.02.01 (4 birds including 1 male); 24.03.01.

⁹³ August 2002

⁹⁴ Two birds, causeway Tramway creek, 29.09.01

⁹⁵ seen nearby in Waterloo St Bulli: March 98

⁹⁶ Turpentine forest 27.1.02

⁹⁷ public walkway up beside turpentine forest 20.4.02

⁹⁸ McCauley's hill

⁹⁹ Uses habitat similar to Rufous Fantail, recorded nearby in Wharton's creek

¹⁰⁰ Uses habitat similar to Rufous Fantail on migration, recorded nearby in Wharton's creek

¹⁰¹ Hewitt' Creek: 24.03.01

¹⁰² Near the confluence of Hewitts creek and the Woodlands Creek diversion 20.4.02

¹⁰³ Hewitt's Creek: 27.06.98

¹⁰⁴ McCauley's hill figtrees: 24-26.11 00

¹⁰⁵ McCauley's hill figtrees

¹⁰⁶ Dec 1998 group of 4 birds - 1 sighting only

RA†	Species	Scientific Name	Source
LC	Skylark*	<i>Alauda arvensis</i>	2, 3, 15
C	Australian Pipit	<i>Anthus novaeseelandiae</i>	2, 3, 4, 7, 9, 15
U	Zebra Finch	<i>Taeniopygia guttata</i>	3, 5, 6, 15
U	Double-barred Finch	<i>Taeniopygia bichenovii</i>	9 ¹⁰⁷
C	Red-browed Finch	<i>Neochmia temporalis</i>	1, 2, 4, 7, 9, 15, 16
C	House Sparrow*	<i>Passer domesticus</i>	2, 3, 5, 7, 9, 15, 16
MC	European Goldfinch*	<i>Carduelis carduelis</i>	2, 5, 7, 9, 15, 16
MC	Mistletoebird	<i>Dicaeum hirundinaceum</i>	E (H)
C	Welcome Swallow	<i>Hirundo neoxena</i>	1, 2, 4, 5, 6, 7, 9, 15, 16
U	Fairy Martin	<i>Hirundo ariel</i>	3, 9, 7, 15
MC	Clamorous Reed-Warbler	<i>Acrocephalus stentoreus</i>	2, 3, 6, 7, 9, 15, 16
U	Little Grassbird	<i>Megalurus gramineus</i>	2, 6, 9, 15, 16
MC	Golden-headed Cisticola	<i>Cisticola exilis</i>	1, 2, 4, 5, 6, 7, 9, 15, 16
U	Rufous Songlark	<i>Cincloramphus mathewsi</i>	5
C	Silvereye	<i>Zosterops lateralis</i>	1, 2, 4, 5, 7, 9, 15, 16
MC	Red-whiskered Bulbul*	<i>Pycnonotus jocosus</i>	1, 2, 4, 5, 7, 9, 15, 16
C	Common Starling*	<i>Sturnus vulgaris</i>	1, 2, 4, 5, 7, 9, 15, 16
C	Common Mynah*	<i>Acridotheres tristis</i>	1, 2, 4, 5, 7, 9, 15, 16
U	Common Blackbird*	<i>Turdus merula</i>	7

RA† Regional Abundance in the Illawarra Area according to Chafer et al. 1999 (see below).

* Introduced species

E (H) Species listed as expected by Huggett in QEM (1992) (common names updated)

E Species expected but not yet observed on site. Reasons for listing noted in footnote.

Sources

1. QEM, Local Environmental Study: Sandon Point, Bulli/Thirroul. Flora and Fauna Assessment. 1992.
2. Rowles, cited in QEM 1992. 1982-92. pp. 3.9-3.12.
3. Glynn and Wady, cited in QEM 1992. 1991. pp. 3.9-3.12.
4. Huggett, cited in QEM 1992. 1992. pp. 3.9-3.12.
5. Daly, cited in QEM 1992. 1992. pp. 3.9-3.12.
6. Chafer, C. J., Biodiversity of Wetlands in the Illawarra Catchment. 1997.
7. Darryl McKay (NSW FOC & CBOC) & Jill Molan
8. Jill Molan (NSW FOC & CBOC & Birds Australia)
9. Ian McInlay (IBOC)
10. Marcel Van Wijk
11. Ross Dearden (Point Street Bulli resident)
12. Alex Peterson (Thirroul resident)
13. Joe Davis (Thirroul resident)
14. Other (see footnotes)
15. Alan Sefton (1983) (Illawarra Natural History Society per Max Ackerman)
16. Connell Wagner Flora and Fauna Assessment, Apr-May 2001
17. Roger Truscott (local birdwatcher)

¹⁰⁷ A pair near pumping station: 24.03.01

The order of species on this list is according to:- Morcombe, M. 2000. *Field Guide to the Birds of Australia*. Steve Parish Publishing Pty. Ltd., Archerfield Queensland.

Abundance of species in the Illawarra area is listed according to:- Chafer, C.J., Brandis, C.C.P. & Wright, D. 1999. Handbook of Birds Found in the Illawarra, Shoalhaven and Adjacent Tablelands. Illawarra Bird Observers Club, Wollongong. The following is an extract from this book which explains the 'Regional abundance' column on this table:

Status is defined ... as being the broad degree of residency each species displays while present in the region

<i>Extirpated:</i>	<i>regionally extinct, no confirmed observations for the past 50 years</i>
<i>Accidental:</i>	<i>one to few observations this century of a species well outside of its normal distribution</i>
<i>Rare (R):</i>	<i>less than 3 locations/observations reported per calendar year</i>
<i>Scarce (S):</i>	<i>present in restricted habitats, with a regional population below 200 individuals</i>
<i>Uncommon (U):</i>	<i>present in restricted habitats, with a regional population usually below 1,000 individuals</i>
<i>Moderately common (MC):</i>	<i>present in small numbers in preferred habitat(s) throughout the region</i>
<i>Locally moderately common (LMC):</i>	<i>present in small numbers in locally restricted habitats throughout the region</i>
<i>Common (C):</i>	<i>found in many habitats across most of the region in large numbers</i>
<i>Locally common (LC):</i>	<i>found in a locally restricted number of habitats across the region in large numbers</i>

Appendix C

Monthly bird counts - Sandon Point and surrounds

Prepared by Jill Molan and Daryl McKay

SPECIES	BR	14/07/01	25/08/01	29/09/01	20/10/01	3/11/01	22/12/01	28/01/02	23/03/02	20/04/02	18/05/02	29/06/02	MAX
Brown Quail	BR							4-3y					4
Black-browed Albatross												2	2
Australasian Gannet												3	3
Fluttering Shearwater						1000's							1000's
Short-tailed Shearwater						1-dead							1
Little Penguin							1	1			1	1	1
Darter								1					1
Pied Cormorant					1							1	1
Little Pied Cormorant		4	1	2	1	4	7	6	4	8	6	15	15
Great Cormorant				2		1							2
Little Black Cormorant		4		2	2	6	1	2		1			6
Australian Pelican				6		10	4	4	1	3		1	10
Pacific Black Duck		1		3					2	6		4	6
Australian Wood Duck		4		4	4				38			2	38
Chestnut Teal							3						3
Dusky Moorhen		2	2	3	1	1	5	1	5	4	1	5	5
Purple Swampphen		1		2	2	1	2	3	2	1	1	2	3
White-necked Heron			1										1
White-faced Heron				1		2	1		3		1	1	3
Great Egret				1								1	1
Cattle Egret		7	1	30	12				2	5	11	5	30
Nankeen Night Heron			1				1						1
Silver Gull		10+	10+	50+	50+	100+	100+	100+	20	30+	30	30+	100+
Kelp Gull						1	3	3	2-1imm	1	2-1imm	1	3
Crested Tern						2	3					1	3
Common Tern						7							7
White-bellied Sea-eagle							1imm						1
Black-shouldered Kite	BR	4-2imm		1	2	2	1	2	3-1imm	2	1	2	4
Peregrine Falcon				1		1			1		1		1
Brown Goshawk		1											1
Nankeen Kestrel		1		2				2				2	2
Grey Goshawk					1					1			1
Swamp Harrier								1					1
Latham's				2									2

SPECIES	BR	14/07/01	25/08/01	29/09/01	20/10/01	3/11/01	22/12/01	28/01/02	23/03/02	20/04/02	18/05/02	29/06/02	MAX
Brown Quail	BR							4-3y					4
Black-browed Albatross												2	2
Australasian Gannet												3	3
Snipe													
Australasian Bittern					1								1
Lewins Rail				2	1				1				2
Whimbrel				1	1								1
Sooty Oystercatcher											2	2	2
Masked Lapwing		4	1	2	1	5		2	2	2	2	2	5
Rock Dove *		100+		4					30+		190	54+	190
Spotted Turtle-dove *		5	2	5	3	5	12	9	3	6	4	5	12
Yellow-tailed Black-Cockatoo							1			2			2
Galah				5		5				5	4	10	10
Little Corella						2				10+			10+
Long-billed Corella				1									1
Sulphur-crested Cockatoo			2	1	2	25		6	1	20+	2		25
Rainbow Lorikeet		12		12	2	6	7	4	12	14	10	6	14
Crimson Rosella					2	3	2	2	4				4
Australian King Parrot				1			1	1					1
Fan-tailed Cuckoo							1imm				1		1
Barn Owl		1										1	1
Azure Kingfisher									1				1
Laughing Kookaburra				1				1			2		2
Dollarbird	BR						1	2					2
Superb Fairy-wren	BR	45	15	20-n	30-n	30	45-y	25	15	40	35	25	45
Variiegated Fairy-wren	BR	15	5	15	15	25	10-y	5	10	15	10	10	25
Southern Emu-wren			5	5									5
Spotted Pardalote		1										3	3
White-browed Scrubwren		10	4	8	4	10	8	4	10	10	12	2	10
Yellow Thornbill		10	5	5	5	5	10	5	5	5	10	10	10
Brown Thornbill		4			2		2	2	4	4	2	4	4
Red Wattlebird							1	2	1	2	2	2	2
Little Wattlebird	BR	4	2	25	6	6	8-1y		1	2	4	2	25
Lewin's Honeyeater		4		1		1			1	3	2	3	4
New Holland Honeyeater	BR	16	3	30	19	11	8	13	7	4	6	6	30
White-cheeked Honeyeater				2									2
Eastern Spinebill			3	1	2	2	2		6	1	1	1	6

SPECIES	BR	14/07/01	25/08/01	29/09/01	20/10/01	3/11/01	22/12/01	28/01/02	23/03/02	20/04/02	18/05/02	29/06/02	MAX
Brown Quail	BR							4-3y					4
Black-browed Albatross												2	2
Australasian Gannet												3	3
Eastern Yellow Robin		3		2			1	3	4			2	4
Golden Whistler								1	1	1		1	1
Eastern Whipbird		4	1	3	2	2	2	2	2	2	1	4	4
Grey Fantail		5	2	1						2	3	1	5
Willie Wagtail	BR	1		2	2	2	7-2y	3-1y	2	3	2	2	7
Satin Bowerbird						1							1
Magpie-lark	BR	2		1-n	2-y	2	4-1y	3		2		2	4
Grey Shrike Thrush										1			1
Black-faced Cuckoo-shrike	BR	1				2	4-n	1	1	2			4
Spangled Drongo										1			1
Grey Butcherbird	BR	1		1-n	2	3	3-1y	1	2	5-2y			5
Australian Magpie		4		1		3	2	1	6	22	10	1	22
Pied Currawong				1		1				2	1		2
Australian Raven		3	2	2	1		2-1y				2	2	3
Welcome Swallow		5	10	5	6	13	8	5	14	30+	50	30+	50
Fairy Martin				1	2	2			1				2
Australian Pipit	BR	1		2	5	2	2-1y	1	1	2		1	5
Clamorous Reed-Warbler			1	4	2	11	2	2			1		11
Golden-headed Cisticola	BR	2	5	4	4	14	12-n	6	7	5	7	5	14
European Goldfinch *		5			4	3		3	3	5	15		15
Red-browed Finch	BR	27	2	15	6	7	9	12	7	18-y	14	20+	27
House Sparrow *						2	3						3
Silvereye		13	4	15	9	16	14	9	15	34+	14	10	34
Red-whiskered Bulbul *		14	2	5	10	12	14	13	14	15	10	3	24
Common Blackbird *					1	2	2-1y	1					2
Common Starling *		6			8	1	15		3	3	12	1	15
Common Mynah *		3	2	5	2	12	13	33	1	6	20	1	33

BR Indication of breeding at Sandon Point observed

y Young

imm Immature

n

Appendix D

Mammals, reptiles, amphibia and fish list - Sandon Point and surrounds

Prepared by Jill Molan and Daryl McKay

Species	Scientific Name	Source
Mammals		
Short-beaked Echidna	<i>Tachyglossus aculeatus</i>	12 ¹⁰⁸
Eastern Pygmy Possum	<i>Cercartetus nanus</i>	9 ¹⁰⁹
Common Ringtail possum	<i>Pseudochirus peregrinus</i>	1, 7 ¹¹⁰
Bat	<i>Microchiroptera (sp. not id)</i>	1, 7, ¹¹¹ 15
Rabbit*	<i>Oryctolagus cuniculus</i>	1
House mouse (nest)*	<i>Mus musculus</i>	1
Black rat*	<i>Rattus rattus</i>	1
Brown rat*	<i>Rattus norvegicus</i>	16
Cat*	<i>Felis catus</i>	1
Bandicoot		14 ¹¹²
Small marsupial (probably Antechinus)		14 ¹¹³
Large-footed Myotis 'Fishing bat'	<i>Myotis adversus</i>	17
Flying fox	<i>Pteropus poliocephalus</i>	8, 12
Reptiles		
Eastern Water Dragon	<i>Physignathus lesueurii</i>	1, 6, 9, 7 ¹¹⁴
She-oak Skink	<i>Cyclodomorphus casuarinae</i>	1, 6, 7 ¹¹⁵
Eastern Water-skink	<i>Eulamprus quoyii</i>	1, 6, 7 ¹¹⁶
Delicate Garden Skink (Grass Skink)	<i>Lampropholis delicata</i>	1, 7 ¹¹⁷
Weasel Skink	<i>Lampropholis mustelina</i>	1, 6, 7
Common Blue-tongue	<i>Tiliqua scincoides</i>	1, 6, 7 ¹¹⁸
Three-toed skink	<i>Saiphos equalis</i>	6
Pale sunskink (probably Common Garden Skink)	<i>Lampropholis guichenoti</i>	6
Swamp Snake	<i>Hemiaspis signata</i>	1, 6
Red-bellied black snake	<i>Pseudechis porphyriacus</i>	1, 6
Golden-crowned snake	<i>Cacophis squamulosus</i>	10 ¹¹⁹
Common Scaly-foot	<i>Pygopus lepidopodus</i>	7 ¹²⁰

¹⁰⁸ 2 other unconfirmed sightings near Tramway Creek 2001

¹⁰⁹ Eating yellow fruit, top of brickyard track (turpentine forest side of track) 29.04.00

¹¹⁰ Possum drey sighted in turpentine tree

¹¹¹ Micro Bat unidentified species 25.08.01

¹¹² ¹¹² Backyard observation by Point Street resident. Identification unconfirmed

¹¹³ Backyard observation by Point Street resident. Identification unconfirmed

¹¹⁴ 28.01.02 Hewitts Creek

¹¹⁵ Colonies of burrows on mounds eastern edge of wetland, just west of beach; individuals sighted in various locations 29.09.01; 22.12.01

¹¹⁶ 29.09.01; 20.10.01; 22.12.01; 28.01.02; 23.03.02

¹¹⁷ 20.04.02

¹¹⁸ 29.09.01; 23.03.02; 20.04.02

¹¹⁹ near Tramway Creek, eastern end, 19.4.02

¹²⁰ 29.09.01

Amphibia		
Common Eastern Toadlet (Froglet)	<i>Crinia signifera</i>	1, 6, 7 ¹²¹
Brown-striped (Marsh) Frog	<i>Lymnodynastes peronii</i>	6, 7 ¹²²
Green and Gold Bell Frog	<i>Litoria aurea</i>	13 ¹²³
Bleating Tree Frog	<i>Litoria dentata</i>	6, 7 ¹²⁴
Peron's Tree Frog	<i>Litoria peronii</i>	6, 7 ¹²⁵
Leaf Green Tree Frog	<i>Litoria phyllochroa</i>	7 ¹²⁶
Dwarf Tree Frog	<i>Litoria fallax</i>	7 ¹²⁷
Fish		
Short-finned eel	<i>Anguilla australis</i>	1, 6, 7 ¹²⁸
Flathead gudgeon	<i>Philypnodon grandiceps</i>	6
Striped gudgeon	<i>Gobiomorphus australis</i>	1, 6
Mosquito Fish	<i>Gambusia affinis</i>	1, 6, 7
Common Jollytail or Spotted Minnow	<i>Galaxias maculatus</i>	1, 6
Sand Mullet	<i>Myxus elongatus</i>	6
Sea Mullet	<i>Mugil cephalus</i>	6
Large mouth Goby		6

* introduced species

1. QEM, *Local Environmental Study: Sandon Point, Bulli/Thirroul. Flora and Fauna Assessment*. 1992. [13 September 1992; 37 species]
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4. Huggett, *cited in QEM 1992*. 1992. pp. 3.9-3.12.
5. Daly, *cited in QEM 1992*. 1992. pp. 3.9-3.12.
6. Chafer, C. J., *Biodiversity of Wetlands in the Illawarra Catchment*. 1997.
7. Darryl McKay & Jill Molan
8. Jill Molan
9. Ian McInlay
10. Marcel Van Wijk
11. Ross Dearden
12. Alex Peterson
13. Joe Davis
14. Dominic Leahy
15. Maria Dawn Adams. Refer to bat survey in this report.
16. Identified by the Australian Museum from 3 skulls dropped by Black-shouldered Kites on the site while feeding young.
17. Gary Daly 1992 while doing the frog survey for QEM

¹²¹ 19.11.00; 03.12.00; 17.02.01; 29.09.01; calling 22.12.01; 20.04.02

¹²² 19.11.00; 03.12.00; 17.02.01; 29.09.01; calling 22.12.01; 20.04.02

¹²³ 1999, in the rushlands of Woodlands Creek, behind pumping station

¹²⁴ 19.11.00; 03.12.00; calling 22.12.01

¹²⁵ 19.11.00; 29.09.01

¹²⁶ 29.09.01

¹²⁷ 29.09.01

¹²⁸ 16.03.02 with Terrill Nordstrom

Notes and References for Appendices B, C and D, Fauna Lists

Darryl McKay & Jill Molan

NOTES

There are three fauna lists attached to this Plan of Management:

1. A comprehensive bird species list including historical data.
2. A detailed record of the bird counts that were done on the site 2001-2002 including abundances.
3. A fauna list of all incidental observations of fauna other than birds observed on the site. This includes historical records and observations made by a variety of observers.

1. Comprehensive Bird Species List

This list has been compiled from all the records available, including our own observations. The oldest records for the site are those of Alan Sefton, a member of the Illawarra Natural History Society, from the years leading up to 1983. There are also the records of Rowles cited in the QEM report as covering the period of 1982 to 1992. It must be noted that there are huge gaps in the periods of time for which records are available. For example, few records are available for the period from 1992 to 2001. Nevertheless it is pleasing to note that many species recorded here historically such as the Lewin's Rail are still using the site. It can also be seen that Latham's Snipe, for example, show a fairly consistent pattern of using the site over the 20 or so years this list covers. The presence in 2001 of the Australasian Bittern indicates that this is a suitable site for rare and vulnerable species.

There are a number of species included in the list that would not use the land area, for example seabirds such as the Australasian Gannet and Shearwaters (including dead beachwashed ones). These species have been included for two reasons. One is that of maintaining the completeness of the list, especially the historical data, so that it is available to other researchers. The second is that of consistency with the perspective taken in this Plan of Management with regard to the continuity of ecosystems, including the marine ecosystems. This is particularly relevant when it is recognised how close to shore birds like the Little Penguin and the Fluttering Shearwater feed, and how those food sources may be contaminated with runoff from the land.

A number of 'backyard observations' from local residents have also been included for this list and for the fauna list. These observations are important given the absence of hard data for the last decade. Those people whose records have been included have all been able to give clear and detailed descriptions of the birds they observed, even though they are not habitual birdwatchers. Their identification is in no doubt to us. This also applies to the vagrant record of the White-tailed Tropicbird blown off course by a storm. It is a hard bird to mis-identify at close quarters.

2. Monthly bird counts

2.1 Process

A monthly bird count was undertaken between July 2001 and June 2002 (with the exception of Feb 2002) resulting in 11 counts. Both counters are experienced amateur bird watchers (with more than 20 years birdwatching experience each), but are not professional ornithologists or consultants.

There are certain limitations on these counts and they should not be taken as formal surveys:

1. The number of observers varied. The same two counters always attended (except in May 2002 when only one attended). The two regular counters were sometimes accompanied by others, who had varying amounts of experience in bird watching.
2. The amount of time varied according to what was available. It usually involved an afternoon or part of an afternoon.
3. There were three additional counts undertaken prior to the period of this project. These have also been included.

Despite these limitations, these data are the most comprehensive that have been compiled for the Sandon Point area. The data give a much clearer picture than has previously been available of the significance of the area to the wildlife. Secretive and cryptic birds like the Australasian Bittern, Latham's Snipe and Lewin's Rail are easily missed in a one or two day visit, particularly at an inappropriate time of the year. Our visits to the site also provide a picture of seasonal movements.

2.2 Comments on specific species

Brown Quail: (*Regionally Scarce*). Observed with young, therefore is breeding on the site. Loss of grassland habitat for this species may impact on its regional population.

Southern Emu-wren (*Regionally Uncommon*) and White-cheeked Honeyeaters (*Regionally Scarce*) have both been identified as resident 'refugee' species at Sandon Point wetlands (QEM, 1992). These species showed up on some, but not all, counts. It is possible that they move into dense vegetation such as along inaccessible parts of Hewitt's creek east of the railway line. Loss of dense habitat along these parts of the creek could result in the extirpation of these species from the area.

Australasian Bittern: (*Regionally Rare*). Listed as Vulnerable (Schedule 2) under the NSW Threatened Species Act 1995. Sandon Point has long been recognised as suitable habitat for this species. Connell Wagner (2001) did an eight part test on the possibility of it being present, as required under the TSA. The first actual record at Sandon Point wetland was in 2001. These birds have fairly narrow habitat preferences — shallow vegetated freshwater or brackish swamps with a mixture of tall and short sedges. Main threats are diversion of water and salination or drainage of permanent swamps (Garnett & Crowley 2000, p. 182). Alteration to water flows in the wetland may impact upon this species.

Lewin's Rail (eastern subspecies): (*Regionally Scarce*). Recorded over the period of data available — that is, from prior to 1982 to the present. Listed by Birds Australia (Garnett & Crowley 2000, p. 204) as 'Near Threatened'. These birds rely on wetlands with dense fringing vegetation in which to hide. Main threat is loss of habitat through drainage of wetlands and diversion of streams. Some birds are killed by the effects of urbanisation including cats, traffic and mowers. The south-western sub-species is extinct, suggesting that the species is 'more vulnerable to habitat change than many other wetland birds' (p. 204). Encroaching urbanisation and alterations to creek flows are likely to impact on this species.

Latham's Snipe: (*Regionally Scarce*). This species is considered secure in NSW. Recorded at Sandon Point from prior to 1982 to the present. It is protected under the international migratory birds agreements with both Japan and China (JAMBA & CAMBA as below). It breeds in the northern hemisphere and spends the northern winter in Australia (our summer). The species relies on access to fresh water or brackish wetlands with protective vegetative cover close by to feed and roost in. Recent research (Todd 1998) has demonstrated that this species has different day-time and night-time feeding habitats, a feature which must be taken into account in determining the usefulness of a site to this species. Its main threats are drainage of swamps, river diversion, and urbanisation (including mowing which depletes suitable habitat for months at a time) (Garnett & Crowley 2000, p. 223). Encroaching urbanisation and alterations to creek flows are likely to impact on this species.

2.3 Comments on specific habitat

All species of cormorant use the area of Tramway creek lagoon, not in great numbers, but regularly. Some are present there all day most days.

Casuarina and other large trees along Hewitts Creek are important night roosting sites for Cattle Egrets, White-faced Herons and the day roosts for cormorants and the Australian Night Heron.

Grassland habitat supports species such as the Brown Quail and Golden-headed Cisticola and Latham's Snipe.

3. Fauna list

As with the bird list, a number of 'backyard' observations by local residents have been included, even where the specific species was not able to be identified (e.g. Antechinus). All were able to give a detailed account of their observation.

These observations are particularly important, because of the complete lack of formal surveys of ground and arboreal mammals to date. It is recommended that an in-depth study of the fauna of Sandon Point is carried out prior to any further excavation work being done.

The bat survey (Appendix D) is the first of its kind to be undertaken in this area and is indicative of the need for further work.

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<http://www.npws.nsw.gov.au/news/tscdets/f010504a.htm>
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Appendix E

Bat survey findings – Sandon Point and surrounds

Survey undertaken by Maria Adams
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Results of bat survey at Sandon Point, 16-17 March 2002

The survey was in two parts, one a two-hour rambling traverse of the site, the other an all-night fixed survey over Hewitt's Creek. The survey consisted of bat echolocation detection and subsequent analysis of recorded calls.

Methodology

The bat results are presented as an index of activity, number of passes (calls greater than 2 pulses long with at least 5 seconds between it and the next same species call). Passes were kept to a standard maximum of 15 seconds long. Where calls were easily identifiable to species, they were classed as Definite (def). Where the calls were most likely to represent a particular species, they were classed as Probable (prob). Where calls were likely to belong to a species but the quality or length of the call precluded a confident identification, they were classed as Possible (poss). Where the calls could have belonged to two or more species, they were classified into a species group. One call was of very poor quality and could not be reliably placed into any species or species group category - this was classified as Unknown.

General Findings

The majority of calls were quite short and poor to moderate quality (in terms of clarity). It is likely most detected bats were flying at a distance from the bat detector (close to the outer limits of the detectors range and/or passing the detector quite quickly). Additionally, there was quite a lot of noise picked up by both bat detectors during the course of the survey.

Bat calls, even of good quality, are not necessarily identifiable to species level. Many species of bats have call frequencies and shapes that overlap with those of other species. Bat calls of any given species recorded with a bat detector can represent search phase, attack phase, feeding buzzes, excitement, etc. The search phase calls are the ones typically collected for reference libraries and, therefore, the ones used to identify bats to species level. Even when only search phase calls are examined, there can be significant variation in call frequencies, making overlap with other species calls more likely. When calls are of less than good quality, the problems of call identification are intensified.

Only one pass was detected on the 2-hour transect of the site. Forty-eight passes were recorded over Hewitt's Creek, however only a few calls were good quality. The source of the noise could not be pinpointed, although it is suggested that it was from some electronic source, rather than natural. The noise may have overridden some incoming bat calls.

Because of the factors outlined in the previous paragraph, it is suggested that rather than doing more bat call surveys at present, the next logical step would be to undertake bat trapping. This would not be an easy task because of the lack of flyways at the site, which is very open. Also, permission would need to be sought to set up bat traps or mist nets.

The advantages of trapping are that:

- A. A: It can confirm the presence of particular species that may be confused with others then only bat call identification is used;
- B. B: It can increase the chances of detecting the softer calling bats if they are present, for example, *Myotis macropus* (syn. *Myotis adversus*);
- C. C: The interference encountered with the bat detectors at this site should not affect the ability of anyone to trap bats there.

Conversely, only bats flying at the level of traps or nets have a chance of being caught, whereas the bat detector's range is much larger for most bats. The use of more than one survey technique is widely acknowledged as a necessity when undertaking bat surveys.

Results of Sandon Point bat survey 16-17 March 2002

Transect: 8:10 10:10 pm

Vespadelus darlingtoni (prob) 1 (including 2 feeding buzzes)
TOTAL PASSES - 1

Hewitt's Creek: 8:20 pm - dawn

Chalinolobus gouldii (def) 1
Vespadelus darlingtoni (def) 2
C. gouldii (prob) 16
V. darlingtoni (prob) 1
Miniopterus schreibersii (prob) 2
C. gouldii (poss) 10
M. schreibersii (poss) 1
Mormopterus sp. 1 (Parnaby 1992)/*Chalinolobus gouldii* 8
V. darlingtoni/Vespadeus regulus 1
V. darlingtoni/V. regulus/ M. schreibersii 3
V. regulus/M. schreibersii 2
Unknown - 1
TOTAL PASSES - 48

***Miniopterus schreibersii* is listed as a threatened species under Schedule 2 (Vulnerable Species) of the NSW Threatened Species Conservation Act 1995. Even though it is only recorded as a probable identification for this survey (that is, it is not a definite record), its threatened status should still be taken into consideration.**

REFERENCE

Parnaby, H. (1992). An Interim Guide to Identification of Insectivorous Bats of South-eastern Australia. Technical Reports of the Australian Museum. Number 8.

Appendix F

Endangered Sydney Coastal Estuarine Swamp Forest Complex plant species assemblage

Species Name	Species Name
<i>Acacia longifolia</i>	<i>Hypolepis mulleri</i>
<i>Baumea juncea</i>	<i>Imperata cylindrica</i>
<i>Blechnum camfieldii</i>	<i>Isachne globosa</i>
<i>Blechnum indicum</i>	<i>Livistona australis</i>
<i>Calochlaena dubia</i>	<i>Melaleuca biconvexa</i>
<i>Carex appressa</i>	<i>Melaleuca ericifolia</i>
<i>Casuarina glauca</i>	<i>Melaleuca linarifolia</i>
<i>Darwinia procera</i>	<i>Melaleuca styphelioides</i>
<i>Dodonaea triquetra</i>	<i>Persicaria strigosa</i>
<i>Eucalyptus botryoides</i>	<i>Phragmites australis</i>
<i>Eucalyptus robusta</i>	<i>Pteridium esculentum</i>
<i>Gahnia clarkia</i>	<i>Triglochin procera</i>
<i>Gahnia sieberiana</i>	<i>Typha orientalis</i>
<i>Glochidean ferdinandi</i>	<i>Villarsia exaltata</i>
<i>Hydrocotyle peduncularis</i>	<i>Viola hederacea</i>

Bold typeface denotes those species that have been observed growing within the Sandon Point site.¹²⁹

The vegetation units that collectively form the SCESFC are:

- The Scrubland vegetation unit
- The Wetland vegetation unit
- The Forest vegetation unit

¹²⁹Vegetation surveys by Connell Wagner/Sainty and Associates (2001), Site Assessment by Natural Habitats Ecosystem Management (2001)