



ECOLOGICAL RESTORATION FRAMEWORK AND ACTION PLAN (ERFAP)

for

TAMARAMA PARK

December 2010

Prepared for Waverley Council
by

BioDesign

BioDesign & Associates Pty Ltd ABN 47 100 717 342
PO Box 1685 Rozelle NSW 2039
phone 9810 5500 | **fax** 9810 5599
email admin@biodesign.com.au | **www.biodesign.com.au**

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BioDesign

BioDesign & Associates Pty Ltd ABN 47 100 717 342
PO Box 1685 Rozelle NSW 2039
phone 9810 5500 | fax 9810 5599
email admin@biodesign.com.au | www.biodesign.com.au

Project
Tamarama Park
ECOLOGICAL RESTORATION FRAMEWORK AND ACTION PLAN

Address
Tamarama Marine Drive, Tamarama

Client
Waverley Council

Project no.
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EXECUTIVE SUMMARY

Background
Tamarama Park adjoins Tamarama Beach, which lies midway between Bondi Beach (to the north) and Bronte Beach (to the south). The park includes the flat grassed area immediately behind the beach, the sandstone slope above Tamarama Marine Drive and the long, narrow gully which slopes up to Birrell Street to the west. The park, which is managed by Waverley Council, consists of two Crown Reserves - Tamarama Beach and Tamarama Park - as well as some Community Land at the head of the gully and a Road Reserve below Birrell Street. Tamarama Park is situated in a densely populated area overlooked by blocks of flats and houses. Over the years urban development and intense usage of the park have caused the original vegetation of the park to become severely degraded and many parts of the park to become weed-infested.

A Plan of Management for Tamarama Park was adopted by Waverely Council in 2007. Its vision included that the park "be a natural or semi-natural open space". A draft Concept Plan was prepared for the eastern portion of the park (Tamarama Beach) in February 2010. In April 2010, Waverley Council commissioned the preparation of this Ecological Restoration Framework and Action Plan (ERFAP) on the basis of establishing the Ecological Restoration Framework (ERF) for the entire site and an Action Plan (AP) for the part of the site not covered by the draft Concept Plan (the open space and gully areas west of Pacific Road and Tamarama Marine Parade).

Intent of documents
The intent of the ERFAP is to establish the issues, opportunities and recommendations for the park (ERF) and to develop a process and program of works (AP) to manage the existing area of remnant vegetation and to successfully revegetate, using indigenous plants, the weed infested gully and the slope above Tamarama Marine Drive.

Part 1. Ecological Restoration Framework (ERF)
Summary of findings of the site analysis
The park was analysed in terms of three overarching values ecology (environmental), community (social) and delight (aesthetic). The findings were as follows:

Ecology
The park plays a key role in the coastal corridor of open space that extends from Waverley Cemetery to Diamond Bay. Although most of the original vegetation has now gone, the park contains several micro-climates and topographies, as well as permanent running water and would have once supported a complex variety of plants and animals. It contains a high diversity of reptiles compared to other parks in Waverley.

Key issues affecting the site's ecology are: most of the indigenous vegetaton has been lost and what remains is degraded; urbanization has led to loss of ecological processes and lack connectivity; soils are disturbed, permanently altered and liable to erosion; weeds are a serious problem and include on-site and off-site sources and domestic gardening impacts; off-site impacts affect the site due to its urban context; and unsustainable management is occurring in relation to water, maintenance, weed control and impacts of domestic pets.

Three ecological zones were identified: (i) the beach front; (ii) the slopes above Tamarama Marine Drive; and (iii) the gully. The fully exposed beach front area would have once contained frontline coastal vegetation, with sand and saltwater tolerant species on the lower level behind the beach and Coastal Heath on the sandstone cliff edges above. The rocky, less exposed slopes above Tamarama Marine Drive would have once supported Coastal Heath of which a small remnant has survived on the southwestern side. The sheltered gully would have once supported Littoral Rainforest, including tall trees (tolerant to salt-laden winds), vines, palms and tree ferns.

The degrading processes in Tamarama Park can be summarised as follows:
- Clearing for development and services corridors.
- Runoff from stormwater carrying nutrients, weeds and other contaminants.
- Concentrated stormwater discharge from pipes which leads to soil erosion.
- Disturbances to soil, water regimes and vegetation that have enabled non-native species to successfully invade.
- Cultural uses of the site that impact on soils, vegetation and wildlife (landscaping, gardening in the park, garden practices and domestic pets).
- Disturbances to fire regimes that have interfered with biological life cycles.

The combined effects of these processes have been:
- The almost complete loss of the former Littoral Rainforest vegetation and the creek ecosystems of the site.
- Reduced extent, loss of species and diminished resilience (capacity of the ecosystem to sustain itself over time) in the remnant coastal heath vegetation.
- Loss of habitat and faunal diversity.
- Loss or permanent alteration of natural topsoils in most places.
- Permanent alteration to water regimes and aquatic habitat in most places.
- Extensive infestations of noxious and environmental weeds.
- Continuing loss of species in the remnant vegetation.

The high level of disturbance to the original soils and vegetation in the park and surrounding sub-catchment means that it will not be possible to restore the three vegetation communities that once existed. What is possible, however, will be to establish vegetation communities that approximate the original ones and are suited to current site conditions, and which are more sustainable and provide greater biodiversity and habitat for a range of indigenous fauna than does the existing vegetation.

Community
Tamarama Park is highly valued by the community as a large area of open space within a dense urban area that contains a variety of spaces and has the character of a "nature reserve". It forms part of the Coast Walk and plays an important role as a venue for the 'Sculpture by the Sea' exhibition. The park is used for passive recreation, exercise, dog walking and as public access to the beach from surrounding streets. A small Bushcare group currently works to regenerate the remnant vegetation above Tamarama Marine Drive.

Social issues that were identified include: a lack of shade in the grassed area behind the beach and at the western end of the gully; European heritage items have become obscured over time or are not interpreted; furniture is old or damaged; residents need programs, education and encouragement to become more engaged with the park; Council staff need training to learn how best to manage a bushland park; and Council needs to build stronger relationships with neighbouring councils to share skills and resources in managing the coastal corridor.

Delight
Tamarama Park is rich in qualities that delight the senses: the sound, sight and smell of the ocean; varied landforms, spaces and vegetation types; the colour and movement of birds and people; and rock ledges, waterfalls, winding paths and unfolding views which invite exploration. Views to the sea and into the park are available from a number of vantage points, while a series of views unfolds as one proceeds down the path from Birrell Street to the beach.

A number of aesthetic issues were identified: lack of visual cohesion and legibility exists between the different sections of the park; vegetation communities are not clearly defined nor do they relate each other; weeds are very unsightly in places and give the park a feeling of untidiness and neglect; and plant selection in parts is either ad hoc or inappropriate; the western end of the gully is dominated by the large apartment blocks above it; the waterfall and rock pools are inaccessible, overgrown and exposed to full sun; and the Birrell Street entrance, at the top of the gully, is bare grass and cluttered with signage and utilities, while the view of the ocean is obscured by weedy vegetation.

The opportunity exists to create a large bushland park which is unique in the Eastern Suburbs of Sydney. By planting the whole park - from the beach to the top of the gully - with communities of indigenous plants, it would be possible to reunite the various parts of the park to create a strong, visually cohesive identity - a park where wild nature' is juxtaposed against urban living and a park which combines mystery and surprise with comfort and safety.

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Recommendations to be addressed through the Action Plan

Three goals were identified in the Action Plan for the western areas. They are to:
1. halt the degrading processes affecting the site's environment and existing vegetation assets and to improve the ecological values;
2. build a strong and vibrant local community that engages with Tamarama Park in many different ways; and
3. enhance the experiential values of the park.

To achieve these goals over time and in a cost-effective way, a strategic approach to weeds will be required at a variety of levels (regional, sub-catchment, adjoining private property, whole of park, ecological zones and landscape management units).

The following recommendations are made:

Ecological Practices

- Retain and enhance existing vegetation wherever suitable; remove and replace with indigenous species otherwise.
- Take a catchment-based approach to stormwater. Watercourses are to form part of site's attractions.
- Work with existing soils to stabilise and improve, using simple, low-cost measures.
- Establish 3 ecological zones with all future plantings. Biodiversity, habitat, views and access are to be considered.
- Take a strategic approach to weeds and work at different levels to cover off-site and on-site sources of problems.
- Sustainable practices - work with existing resources, recycle and use local sources wherever possible.

Building Community

- Strengthen relationships with adjoining coastal councils.
- Maintain relationship with Local Aboriginal Land Council to protect Aboriginal heritage.
- Uncover and interpret European heritage.
- Train existing parks staff in Bushcare practices.
- Extend relationships with indigenous nurseries for sourcing suitable plant material.
- Set up a 'caravan' within the park to provide a focal point for the various project activities.
- Educate local residents.
- Encourage local residents to join Bushcare group.
- Engage contractors with a range of expertise.
- Continue to build a list of competent contractors for urban bushland parkland services.

Enhancing Experiential Values

- Unite the various parts of the park through indigenous plantings which clearly express the 3 ecological zones.
- Build on the existing character of the park as a "nature reserve'.
- Retain and enhance the diversity of spaces and natural features in the park.
- Develop the gully as Littoral Rainforest with tall shady trees, palms and ferns.
- Open up existing heritage paths to the waterfall and the cave to encourage exploration.
- Retain views to the sea from paths and from neighbouring houses.
- Provide additional shade trees in the grassed area behind the beach.
- Remove the visual clutter and plant out the Birrell Street entrance.

Part 2. The Action Plan (AP)

The AP is intended to be implemented over a period of 10 years. It covers actions to be undertaken within this timeframe at both a regional and a site scale. The AP is intended to be a working tool for Council and the community. It identifies particular activities, responsibilities and indicative resource requirements. A vision, goals and aims have been set. Strategies have been outlined for regional-scale works (e.g. stormwater and weeds). The site has been analysed in terms of manageable landscape units for which projects/work programs have been developed on a staged basis. Outcomes for measurement of key targets set for the 10-year implementation period are included, priorities have been set and indicative costings provided for works.

Vision, goals and aims

Based on the recommendations of the ERF, a vision, goals and aims were established as the basis of the Action Plan.

Landscape management units

The three ecological zones in Tamarama Park - Zone 1: the beach front, Zone 2: the slopes above Tamarama Marine Drive and Zone 3: the gully - are subdivided into landscape management units. Each unit represents a workable area which has similar biophysical qualities, management issues and opportunities. Recommended actions are given for each management unit and a list of recommended plant species is provided for each ecological zone. Techniques, including soil stabilization, planting and maintenance, are also provided.

Targets and measurable outcomes

A table of targets sets out how the above goals and recommendations are to be achieved. A table of measurable outcomes over the short-term (1-2 years), medium-term (3-6 years) and long-term (7-10 years) enables the success of each stage of the project to be assessed.

Monitoring

Collecting baseline data and monitoring the revegetation works over the life of the project will be essential in determining its success. Recommendations are made for the collection of baseline data and an indicative draft form is provided to track weed control, soil health, water issues, safety and amenity of planting, and rubbish removal.

Staging of works and indicative costings

The works are staged over 10 years and indicative costings have been developed to cover the resources/works required to implement the actions.

PART 1: ECOLOGICAL RESTORATION FRAMEWORK (ERF)

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INTRODUCTION

Tamarama Park is located within the Waverley Council Municipality in the Eastern Suburbs of Sydney, approximately 10km from the CBD. The park adjoins Tamarama Beach, a small, horseshoe-shaped beach which lies midway between Bondi Beach (to the north) and Bronte Beach (to the south) (see Regional Context map). The park includes the flat grassed area immediately behind the beach, the sandstone slope above Tamarama Marine Drive and the long, narrow gully which slopes up to Birrell Street to the west (see Site Plan, Sheet 06).

According to the Tamarama Park Plan of Management 2007 p9 (PoM):
The majority of Tamarama Park comprises two Crown Reserves, which are administered by the Department of Lands under the Crown Lands Act 1989…….Tamarama Beach and Tamarama Park Reserve Trusts are responsible for the care and control of the Crown reserves within the Park. There is some community land at the head of the gully, including the waterfall, which is owned by Waverley Council. This land is to be included in the proposed extension of the Tamarama Park Landscape Conservation Area in the Draft Waverley Heritage Assessment (2007). An area of land below Birrell Street is zoned open space but classified as local road reserve. Darug descendants registered a native title claim for connection to country on 4 December 2000. The claim is under mediation. In the absence of a determination by the Court of the existence of native title, Council's policy (by resolution of Council dated 20 November 2001) is to consult with native title claimants in relation to any future works proposed within the claimed area"
(Parkland Environmental Planners et al 2007p9). See also Department of Lands maps on Sheet 16 for the detailed ownership of the land.

The park is situated in a densely populated area overlooked by blocks of flats and houses. Over the years urban development and intense usage of the park has caused the original vegetation of the park to become severely degraded and many parts of the park to become weed-infested. In June 2007 the Plan of Management for Tamarama Park articulated the vision for the park:

"The beach, park and gully in Tamarama Park will become the scenic, recreational and social focal point of Tamarama. The Park will be a natural or semi-natural open space accessible to all to enjoy a variety of recreational activities in a variety of safe settings. The reserve will be acknowledged for its part in the cultural history of Tamarama and Sydney."

In April 2010 Waverley Council engaged BioDesign & Associates Pty Ltd, supported by Dr Arthur White of Biosphere Environmental Consultants Pty Ltd, to prepare an Ecological Restoration Framework and Action Plan (ERFAP) for the park with the aim of successfully restoring the weed infested gully and the slope above Tamarama Marine Drive to a more naturalized environment using indigenous plants, as well as directing the enhancement and ongoing management of the existing area of remnant vegetation (Waverley Council 2010 p2). The general aims of the project (Waverley Council 2010 p3) were to:

- Gradually replace weed species with native plant assemblages in the gully
- Preserve existing and increase biodiversity in the area.
- Create a sustainable vegetation community
- Improve the amenity of the area
- Minimise soil disturbance/ erosion and disruption to habitat
- Ensure optimum growth of plants
- Engage the community and scientific/education sector
- Influence wider ecological and recreational opportunities
- Demonstrate best practice ecological restoration.

The ERFAP is in two parts:
Part 1: the Ecological Restoration Framework (ERF), which analyses the existing site conditions within the park under the three values, ecology, community and delight; identifies the degrading processes; and makes a number of recommendations grouped as follows:

1. Ecology - ecological design (including integrated weed control and the use of sustainable practices)
2. Community - respecting the heritage of the park and the comfort and safety of its users, and building community resources
3. Delight - ensuring that the works enhance the experiential qualities of the park.

Regional Context Map (UBD 2008)

Part 2: the Action Plan (AP), provides the tools to implement the recommendations of the ERF, as follows:

1. Vision, goals and aims that are addressed through actions;
2. The landscape management units within the park including a list of issues and actions for each unit, case studies to act as models for revegetation and habitat recommendations;
3. Techniques for revegetation and slope and watercourse stabilisation;
4. Targets and measurable outcomes for progressive implementation of the AP;
5. Monitoring procedures; and
6. Staging of works and indicative costings of the different works for Zones 2 and 3 to enable Council to budget for the work over time.

SITE PLAN

Peripheral boundaries of Tamarama Park as shown on Waverley Cadastral Map, 2010.

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SITE ANALYSIS APPROACH

The focus of this report is ecology, however developing a successful and sustainable Ecological Restoration Framework & Action Plan for a highly urban park requires not only an understanding of ecology but also of how human beings interact with the park, the cultural history of the place, how locals and visitors use and perceive it, and how the park is managed over the long term. Understanding the aesthetic values of the park and how to enhance those qualities is also very important because people are much more likely to care for a place if they respond to it with all their senses.

To analyse Tamarama Park, BioDesign & Associates has utilised a landscape design approach based on a model put forward by Ian Thompson (2000) which contains three overlapping circles - ecology, community and delight:

DEFINITION OF TERMS

Endemic: Species that occur naturally only in the location described. Note that none are known for Tamarama Park.
Exotic: Species that did not occur in Australia prior to European settlement.
Indigenous: Species that occur naturally within the Sydney bioregion but not necessarily on the site.
Locally indigenous: Species that occurred naturally on the site or within close proximity to it (the local sub-catchment and coastal zone) under the same environmental conditions.
Native: Species that occur naturally in Australia but not in the Sydney bioregion.
Regeneration (assisted): Supporting the continued survival of an existing degraded native plant community (e.g. by such measures weeding, planting additional species to replace those lost from the seedbank, controlled burning and disturbing the soil in other ways to promote seed dispersal and germination).
Revegetation: Planting out an area that has been completely or substantially cleared of its native vegetation by using species from what is considered to be representative of that vegetation and trying to establish the vegetation layers that determined its structure.
Seed provenance
Whilst local seeds should be sourced wherever possible, it is extremely important to support genetically healthy, variable plant populations by also using material harvested from different sources over different seasons and climatic conditions from within the Sydney Basin Bioregion (see definition below) (Carr, 2008; Ryan, 2004).
Successional processes
In the absence of bushfire, fire dependent vegetation will gradually be replaced (succeeded) by a vegetation community consisting of fire sensitive species that are adapted to the environment of the site. The composition of the successional vegetation is determined by the availability of sources of propagules from plants within close enough proximity to the site for dispersal by animals, wind or water.
Sydney bioregion: Waverley is situated within the Sydney Basin Bioregion which is bordered to the north by the North Coast and Brigalow Belt South bioregions, to the south by the South East Corner Bioregion and to the west by the South Eastern Highlands and South Western Slopes bioregions. It encompasses the towns of Sydney, Wollongong, Nowra, Newcastle, Cessnock, Muswellbrook and Blue Mountains towns such as Katoomba and Mt Victoria (http://www.environment.nsw.gov.au/bioregions/SydneyBasinBioregion.htm).

Thompson argues that successful landscapes require a balance of the three values - ecological, social (community) and aesthetic (delight) - and that where the three circles overlap is where the best design occurs. Using this model, Buchanan (2009), developed twelve criteria for evaluating each of these values, as follows:

ECOLOGY

1. Climate (expression of and response to local climate)
2. Geology (expression of local geology)
3. Topography (sympathy with the natural landform)
4. Hydrology (support of the natural water system)
5. Soil (retention or reuse of the original soil)
6. Vegetation (conservation of or support for local vegetation & biodiversity)
7. Fauna (conservation of or support for local fauna & biodiversity)
8. Local materials & construction methods (expression of place)
9. Air, soil and water quality (minimal use of pesticides, fertilizers etc)
10. Energy sustainability (minimal energy use incl. recycling)
11. Water sustainability (recycling, harvesting, cleansing)
12. Greenhouse gases (reduction of greenhouse gases)

COMMUNITY

1. Culture & history (expression of the local culture & history)
2. Social interaction (support for)
3. Children and play (design for children)
4. Use (diversity, equity and flexibility of use)
5. Facilities (such as furniture, toilets, food outlets)
6. Accessibility and connectivity (ease of access incl. elderly & disabled)
7. Circulation (ease and clarity of movement and wayfinding)
8. Comfort (provision of shade and shelter)
9. Safety (level of safety and surveillance)
10. Community involvement (local participation and ownership)
11. Interpretation (education about history, natural processes and place)
12. Maintenance (labour and time)

DELIGHT

1. Coherence & legibility (sense of orderliness/ease of orientation/ease of understanding and remembering)
2. Complexity & mystery (richness, intricacy/ invitation to explore)
3. Prospect & refuge (places to hide and look out)
4. Scale and proportion (appropriateness of scale and proportion)
5. Diversity and flexibility of spaces (multiple use)
6. Sequence and hierarchy of spaces (expression of)
7. Light and shade (visual contrast)
8. Inside/outside relationship (permeability of interface between building and landscape)
9. Colour (effective use of colour)
10. Temporal change (response to hourly, daily, seasonal & yearly change)
11. Movement (liveliness and activity)
12. Sensory qualities(appeal to sense of smell, hearing, taste, touch, feelings)

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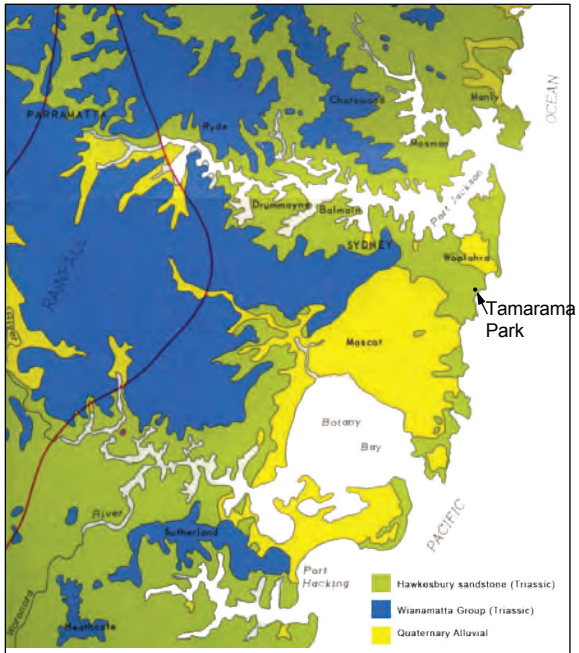
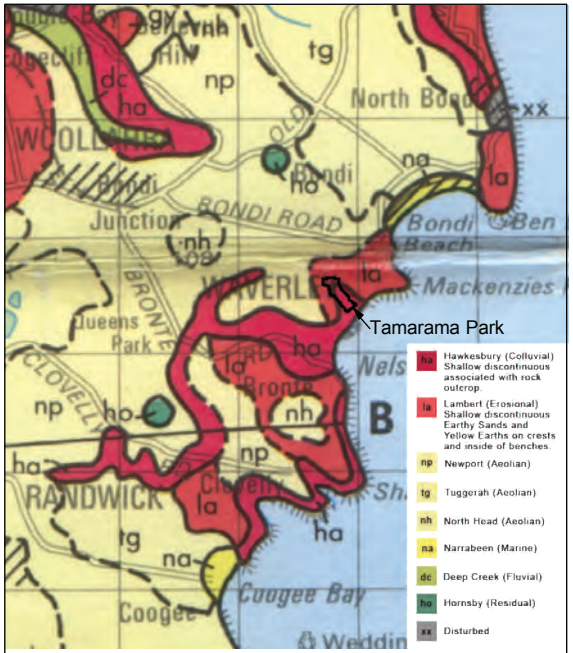
ECOLOGY - GEOLOGY, SOILS AND COASTAL CONTEXT



(Kartzoff 1969 p.16)

Geology

The underlying geology of Tamarama Park is Hawkesbury Sandstone which is clearly expressed in the cliff edges on either side of the beach and as sandstone outcrops and floaters within the slopes facing the sea and the gully.



(Chapman et al 1989)

Soils

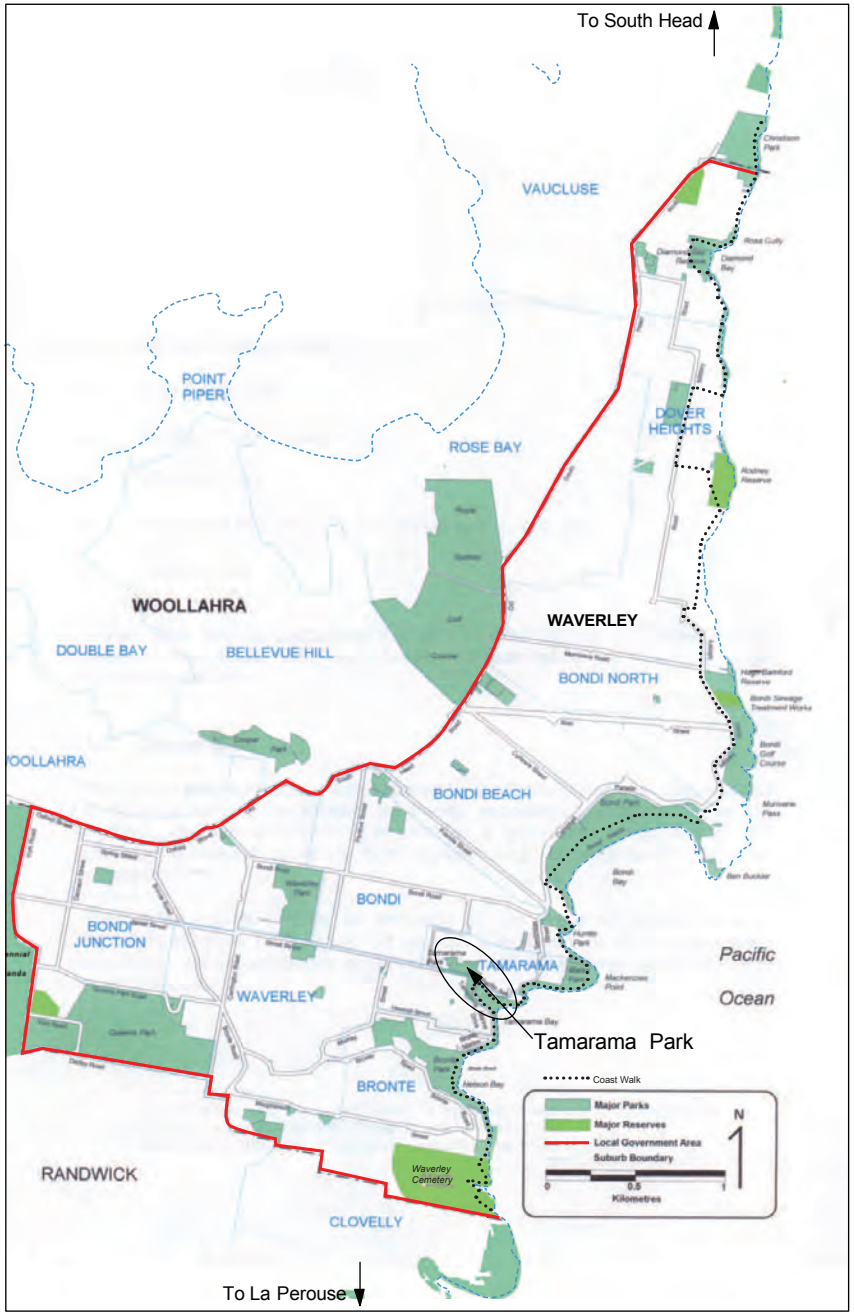
The two types of soils in Tamarama Gully - Lambert and Hawkesbury - were originally derived from Hawkesbury Sandstone but over the years filling of the creek line and on slopes below roads and houses has introduced soils of unknown origin. The beach area, including the grassed area contained by Tamarama Marine Drive, is sand that has been horticulturally modified.

Coastal Context

Within the Waverley Municipality, Tamarama Park is part of a narrow band of almost continuous open space that hugs the coastline, north to Diamond Bay and south to Waverley Cemetery. The Coast Walk provides pedestrian access along its full length. The coastline is made up of sheer sandstone cliffs, rocky points and coves, and sandy beaches.

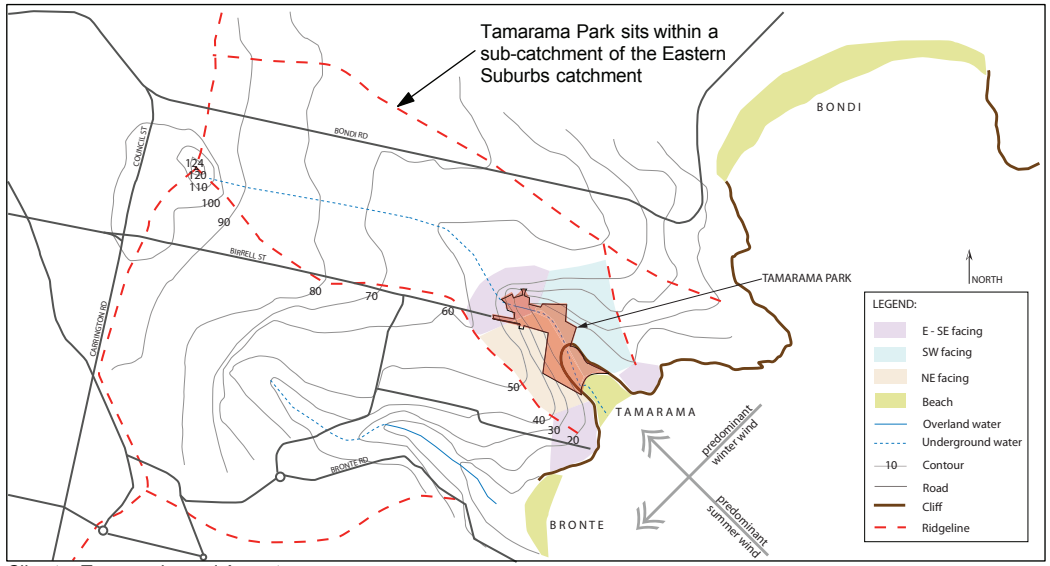
Beyond Waverley's boundaries, this coastal strip is connected north to South Head (under the management of Woollahra Council) and south to La Perouse (under the management of Randwick Council). Because of the high level of urbanisation of the Eastern Suburbs, the coastal edge provides the greatest opportunity for habitat and biodiversity connectivity for Tamarama Park.

Coastwalk at Calga Reserve

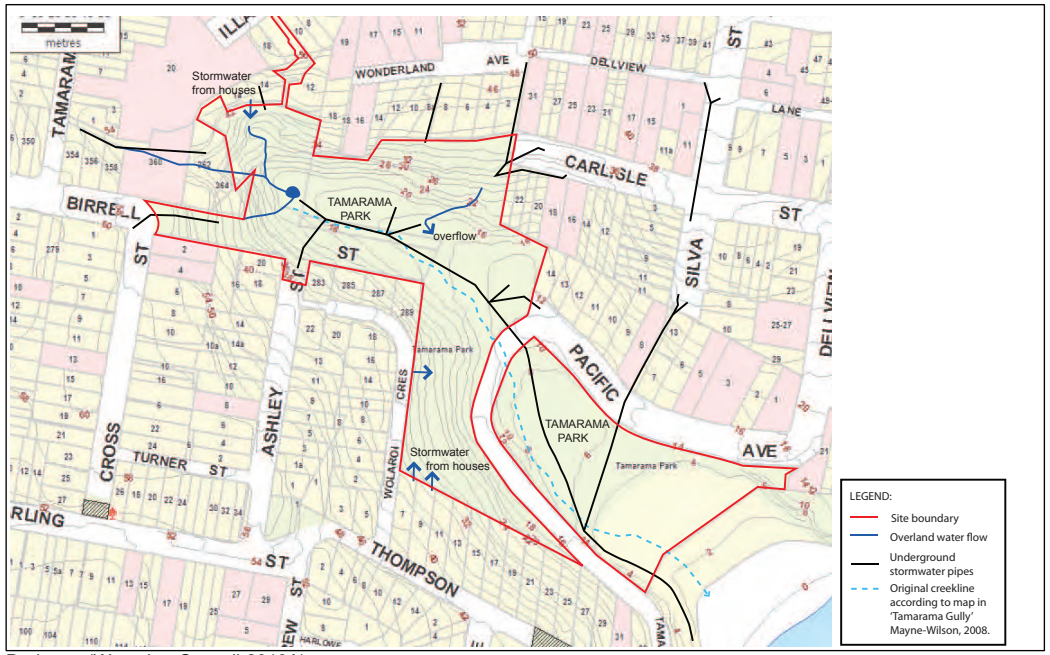


Coastal Context (Hirschfeld 1998)

ECOLOGY - CLIMATE, TOPOGRAPHY, ASPECT & HYDROLOGY



Climate, Topography and Aspect



Drainage (Waverley Council 2010A)

Tamarama Park's climate is 'temperate with warm to hot summers, cool to cold winters and mainly reliable rainfall all year round' (Bureau of Meterology 1991). The mean yearly rainfall is 1213mm. Mean maximum temperature is 21.7C and mean minimum temperature is 13.8C.

The micro-climate of the site varies as a result of different wind and salt exposure. Conditions include:

1. Exposure to saltspray from the ocean and to the prevailing salt-laden SE winds (the cliffs, beach and adjoining parkland).
2. Exposure to the prevailing salt-laden SE winds (the slope below Wolaroi Crescent and the eastern section and top edges of the northern side of the gully).
3. Protection from saltspray and wind (within the gully and its sides).

The topography of Tamarama Park is very varied, ranging from very steep (>1 in 3 to vertical) in the gully, to almost flat behind the beach, and along the gully floor.

The axis of the park is north-west to south-east, so that slopes generally face either north-east or south-west, except for the slope below Wolaroi Crescent which faces due east.

The park sits at the end of a sub-catchment of the narrow Eastern Beaches catchment (see 'Climate, topography and aspect map'). Stormwater from the sub-catchment empties into a waterfall at the western end of the gully, then is piped through the park until it reaches the ocean. Localised flooding occurs at the base of the steps from Carlisle St.


Tree shaped by salt-laden winds


Steep topography


Run-off from Carlisle St. during rain


A photograph of the now filled creek valley showing the topography shortly after Marine Drive was constructed in 1935 (Waverley Municpal Council, *Local History Fact Sheet: Tamarama: a brief history)*

ECOLOGY - VEGETATION, HABITAT & FAUNA VALUES

Vegetation

The vegetation of Tamarama Park includes:

1. Remnants of the pre-European ecological communities.
2. Plantings of indigenous and native species dating from approximately the 1970s and 1980s.
3. Turfed areas and garden beds with on-going plantings of exotic, native and indigenous species.
4. Private plantings on public land
5. Invasive weeds throughout the landscape with 100% cover in some areas.

Remnant Vegetation

The remnant Coastal Heath vegetation (shown in blue on the map) occurs mainly in two small areas (i) along the cliffs facing the ocean and (ii) on a rocky, north-east facing slope above Tamarama Marine Drive with scattered individual species (the blue dots and stripes on the map) associated with the former littoral rainforest community in more sheltered places. The area above Tamarama Marine Drive has been cared for by Bushcare volunteers since 1999. All the remnants are valuable elements to incorporate into the future plantings.

Indigenous and Native Plantings

The mature tree plantings from the 1970s and 1980s (shown in green on the map) are well-suited to the conditions of the site and provide a good framework on which to build. Not all species are local but the structure of the plantings is consistent with the former ecological communities and they provide valuable habitat in the form of suitable environmental conditions, food and nesting sites. Some specimens of *Banksia integrifolia* (Coastal Bankia) have recently died or are in decline; the cause is not certain but this has been occurring in recent years elsewhere along the coast of Sydney.

Turf and Gardens

The turf (shown in brown, orange and yellow on the map) is maintained in open, mown areas. In the level sections of the park (brown and yellow on the map) it provides sunny usable spaces for socialising and relaxation. On the slopes (orange on the map) it is mown for amenity. Garden beds in the beachside area (shown in yellow on the map) contain a mixture of ornamental plantings that have been planted by council staff on an informal basis.

Private plantings on public land

Informal gardening is occurring in a few places (shown as dotted areas on the map). Plantings include fruit trees, exotic ornamentals and indigenous species; in some cases their management contributes to on-going degrading processes on the site.

Weeds

Species on the site include listed noxious and environmental weeds as well as garden escapes. All types of terrestrial weeds (trees, woody shrubs, vines, forbs, grasses, succulent and rhizomatous, annuals and perennials) were noted. However, key problems occur in different parts of the site and are related to particular species or classes of weeds. Coral Trees (*Erythrina x sykesii*) - some planted but many self-sown - are problematic trees that self-sow prolifically and also become prone to large branch failure as they age but which provide valuable winter food resources to some birds. In places there are serious problems with vines smothering other vegetation - Madeira Vine (*Anredera cordifolia*) and Morning Glory (*Ipomea* sp.) are two key species present. *Buddleja davidii* (Butterfly Bush) has out-competed most other vegetation in the waterfall landscape. Canna Lilly (*Canna* hybrids), which may be the result of former plantings, have formed large, dense stands in places.

In some parts of the park, weeds are being controlled by Bushcare or through mowing by Council's staff; in other places they are uncontrolled.

Vegetation and habitat values in Tamarama Park

Habitat

The key habitat values of the park (shown hatched on the plan) are limited due to weed invasion and lack of biodiversity in the plantings. However, the different parts of the site contain a range of different habitat values that include:

- shady and sunny aquatic environments;
- vegetation 'structure' with a range of age classes, heights, dense understorey and a range of flower and fruiting periods (Ondinea).
- shady, moist areas with rock overhangs;
- sunny and sheltered rock ledges;
- dense, thickets of shrubs; and
- mature trees.

Weeds are a problem throughout the park but in some places they constitute most of the vegetation cover (shown in red on the plan). Some weeds provide useful habitat. The park also plays an important role as part of a coastal habitat corridor.

Fauna

Semeniuk & Ginn (2010) conducted a short fauna survey of Tamarama Gully and found a high diversity of reptiles there compared to other parks in Waverley:

Amphibians - Bleating Tree Frog (*Litoria dentata*).
Reptiles - Pale-lipped Shadeskink (*Saproscincus spectabilis*), Three-toed Skink (*Saiphos equalis*), Eastern Water-skink (*Eulamprus quoyii*), Eastern Blue-tongue (*Tiliqua scincoides*), Spiny-palmed Shinning Skink (*Cryptoblepharus carnabyi*), and Broad-tailed Gecko (*Phyllurus platurus*). The survey notes the significance of the Pale-lipped Shadeskink which was relatively common within the gully, but was not recorded at any other site within the Waverley LGA. Habitat for the species is usually rainforest and moist gullies and the species is considered patchy and rare within the Sydney area.
Mammals - Grey-headed Flying-fox (*Pteropus poliocephalus*).
The feral pest, Brown Rat (*Rattus norvegius*) is also present on the site. Additional opportunistic records included the Tawny Frogmouth and Brushtail Possum.

Semeniuk & Ginn (2010 pp18-19) records 40 bird species in the Waverley LGA including one nocturnal species, the Tawny Frogmouth (*Podargus strigoides*) at Tamarama Park.

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BioDesign & Associates Pty Ltd ABN 47 160 717 342
PO Box 1685 Rozelle NSW 2039
phone 9810 5500 | fax 9810 5599
email admin@biodesign.com.au | www.biodesign.com.au

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ECOLOGICAL RESTORATION FRAMEWORK AND ACTION PLAN

Address: Tamarama Marine Drive, Tamarama
Client: Waverley Council
Project no.: 0299
Drawing no.:
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Drawing: SITE ANALYSIS - ECOLOGY 3

Sheet: 10

ECOLOGY - THREE ECOLOGICAL ZONES

From the site analysis three ecological zones can be identified in Tamarama Park:

1. Beach front
2. Slopes above Tamarama Marine Drive
3. Gully

Each zone has distinctive biophysical characteristics:

1. Exposed to salt-spray from ocean and salt-laden winds and full sun. The grassed area on sand is exposed to occasional inundation by sea.
2. Exposed to salt-laden winds, shallow sandy soils over Hawkesbury Sandstone, full sun and alternating wet and dry conditions.
3. Protected from wind and salt; consistently moist and shady microclimate, deeper and relatively richer soils derived from Hawkesbury Sandstone.

These would have supported three distinctive vegetation communities:

1. Frontline Coastal Vegetation community on sand and Coastal Heath on cliff edges
2. Coastal Heath
3. Littoral Rainforest

Ecological Zones that can be established in Tamarama Park as the framework for its ecological restoration.

Zone 1 - Beach front

Zone 2 - Slopes above Tamarama Marine Drive

Zone 3 - Gully

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Drawing: SITE ANALYSIS - ECOLOGY 4

ECOLOGY - ZONE 1: BEACH FRONT (FRONTLINE COMMUNITY ON SAND & COASTAL HEATH ON CLIFF EDGES)

Description
A landscaped public park in a small cove defined by steep, low sandstone cliffs directly facing the ocean. The park area has been developed with several buildings set in turfed landscape with plantings of trees and shrubs in small garden beds and paths. Apart from the construction of paths and some minor landscaping in lower parts, the cliffs have not been landscaped; they contain remnants of their native vegetation but have been severely degraded by weed invasion, including woody species and Asparagus Fern that have gained a hold in crevices and cracks in the rocks and will therefore be difficult to remove. Weeds have also invaded the cracks and crevices of paths and steps and are causing damage.

The entire zone is fully exposed to sun, wind and salt-spray. The current plantings have been sculpted by these impacts and only the hardiest are thriving.

Habitat and Ecology
The grassed area located at the base of the sandstone cliffs and sandstone retaining wall was once pure sand that was occasionally inundated by the sea. It is likely that this area would have supported sand dune grasses and herbs such as *Spinifex sericeus*, *Sporobolus virginicus* (Sand Couch), *Carpobrotus glaucescens* (Pig Face) and *Scaevola calendulacea* (Scented Fan Flower) at the front, with taller species such as *Acacia longifolia* var. *sophorae, Correa alba* var. *alba* (White Correa), *Westringia fruticosa* (Coast Rosemary), *Lomandra longifolia, Leptospermum laevigatum* (Coast Tea Tree), *Melaleuca armillaris* (Bracelet Honey Myrtle), *Banksia integrifolia* (Coast Banksia) and possibly *Cupaniopsis anacardioides* (Tuckeroo) behind. Aside from a few species in rock crevices at the base of the cliffs, no remnant vegetation remains today. While some indigenous species have been planted (including *Banksia integrifolia*, *Westringia fruticosa* and *Lomandra longifolia)*, the majority of plants are either native (including *Lagunaria patersonia* (Norfolk Island Hibiscus) and *Araucaria heterophylla* (Norfolk Island Pine)) or exotic, in particular the weed species *Coprosma repens.*

The sandstone cliff edges, which contain both dry and wet areas (according to ponding and seepage patterns), would have once supported a range of stunted and wind-pruned heath species that can be seen in a few places further along the Coast Walk. The few remnant species present include *Melaleuca armillaris, Baumea juncea and Carex pumila.*

Opportunities
A draft landscape concept plan for the grassed area behind the beach was prepared in February 2010 by Thompson Berrill Landscape Design P/L. A number of opportunities exist to extend and enhance the proposed vegetation in this plan to increase biodiversity and sustainability, as well as to ensure that the Zone 1 vegetation becomes more fully integrated with that of Zones 2 and . They are to:

- remove weed species in the grassed area such as *Coprosma* spp., and replant with local indigenous species. Gradually remove or replace weed species as native plantings establish.
- introduce other shade tree species such as *Cupaniopsis anacardioides* (Tuckeroo), *Leptospermum laevigatum* (Coast Tea Tree) and *Melaleuca armillaris* (Bracelet Honey Myrtle).
- consider the removal of *Araucaria columnaris* (Cook Island Pine) when other local tree species have become established.
- increase the width of the planting beds around the western end of the area (adjacent to the sandstone retaining wall) and plant more diverse understorey plantings and more trees for shade.
- weed/regenerate/revegetate the cliff edges on both sides of the grassed area with local species.
- reinforce the cliff edge plantings by revegetating the nature strip on the southern side of the beach (next to Tamarama Marine Drive) with heath species (shown dark orange on plan).

Beachfront at Tamarama with opportunites for Coastal Heath identfied

BioDesign
BioDesign & Associates Pty Ltd ABN 47 100 717 342
PO Box 1685 Rozelle NSW 2039
phone 9810 5500 | fax 9810 5599
email admin@biodesign.com.au | www.biodesign.com.au

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SITE ANALYSIS - ECOLOGY 5

Sheet
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ECOLOGY - ZONE 2: SLOPES ABOVE TAMARAMA MARINE DRIVE (COASTAL HEATH)

Description
The slopes and base of the gully facing the ocean and west of Tamarama Marine Drive consist of three areas that have been subject to different impacts in the context of the development of the park - the northern and southern slopes and the filled and grassed base of the gully. Although the slopes and gully entry are set back from the beach front, they are still exposed to sun and salt-laden wind. The trees in this zone are sculpted and wind-pruned. The slopes are characterised by rock outcrops and floaters of Hawkesbury Sandstone with shallow soils and relatively good drainage.

Habitat and Ecology
The southern slope is valued for the remnant vegetation that has survived on it and which is the most substantial area of remnant bushland in Tamarama Park. Aside from a set of steps leading up to Wolaroi Crescent, the southern slope has not been formally landscaped but it has been disturbed by the impacts associated with development on the adjacent sites.

This area has been the focus of the National Trust Bushcare program since 1999. A Remnant Condition Assessment and a Weeds Survey was recently prepared by Danny Hirschfeld of the Sydney Bush Regeneration Company (Hirschfeld 2010). The areas above and to the south of the remnant vegetation, however, are covered in grass and weeds which create an ongoing source of weeds. Stormwater dispersed onto the site from adjoining houses is also problematic because of soil erosion and as a source of nutrients and /or contaminants.

From a comparison between today and the 1935 image taken of the newly constructed Tamarama Marine Drive (see Sheet 9) it appears that the current vegetation has grown taller. It is likely that the construction of Wolaroi Crescent and Thompson Street and the two and three-storey houses above the slope have altered the growing conditions below in terms of wind, light, soil moisture and nutrient content, creating a more sheltered environment than was there originally. This would explain why trees such as *Banksia integrifolia* are now growing freely in the remnant heath and *Glochidion ferdinandii* (Cheese Tree) is germinating successfully.

The eastern end of the northern slope has been cleared of its former vegetation and landscaped with a path and steps that provide access from the park to Carlisle Street and the residences on Wonderland Avenue. It is now mostly grassed, with a few trees established in the lower areas below a fine rock outcrop that provides views across the beachfront park to the ocean. Piped stormwater is released into an open sandstone watercourse midway down the slope which then runs beside the path to the grassed base of the gully. This watercourse is heavily infested with weeds.

Included in Zone 2 is a narrow level strip along the upper edge of the slope which gives access to the rear of a number of houses on Wonderland Avenue. The area alongside the path is turfed and planted with a few native shrubs. Young Coral Trees are a problem where they are being spread vegetatively. There are also other weeds in this area.

Opportunities
Southern slope above the remnant bushland area:
Management of stormwater, weed and turf removal, soil stabilisation and revegetation will reduce problems with weeds and also help bring about more sustainable management of this area.

A number of opportunities for improving different types of habitat exist in this area:
- increasing the diversity of plant species to provide more food sources for birds;
- removing weeds and sediment from rock shelves to provide sunning spaces for reptiles; and
- promoting increased moisture detention in the area where water seeps out amongst the rocks for frog habitat.

By allowing the natural successional processes to occur, management of the remnant will be much easier and, in the absence of bushfire, more likely to be sustainable in the long run.

Northern slope (up to Carlisle Street):
The removal of the grass and weeds, soil/slope stabilisation and the revegetation with Coastal Heath species to the slope and along the upper edge of this zone will reduce overall maintenance costs over time (through reduced labour and energy costs) and increase the biodiversity and habitat values of this area. Care needs to be taken in choosing and siting plants, however, in order to retain views.

The improvement of the watercourse by weed removal and retention of rocks and pools and planting sedges and grasses around surface drainage lines will increase the habitat values of this area.

Because of the close connection with houses in this section of the park there is a good opportunity to involve local residents in its restoration and ongoing care.

Gully floor:
It is intended that the gully floor be retained as an open grassed area. However, the role of tree and shrub planting in reducing impacts of salt-laden winds on the proposed Littoral Rainforest behind must also be recognised. The existing island of Coast Banksias near Tamarama Marine Drive is important for this reason, although the understorey plantings of *Coprosma* need to be replaced with local non-weed species. There is an opportunity to install additional shelter plantings of indigenous trees on the gully floor while still retaining large areas of grass.


Remnant vegetation 1992 (Image from National Trust of Australia, 1992).


Remnant vegetation 2010. Habitat values and species diversity have diminished.

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BioDesign & Associates Pty Ltd ABN 47 100 717 342
PO Box 1685 Rozelle NSW 2039
phone 9810 5500 | fax 9810 5599
email admin@biodesign.com.au | www.biodesign.com.au

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SITE ANALYSIS - ECOLOGY 6

Sheet
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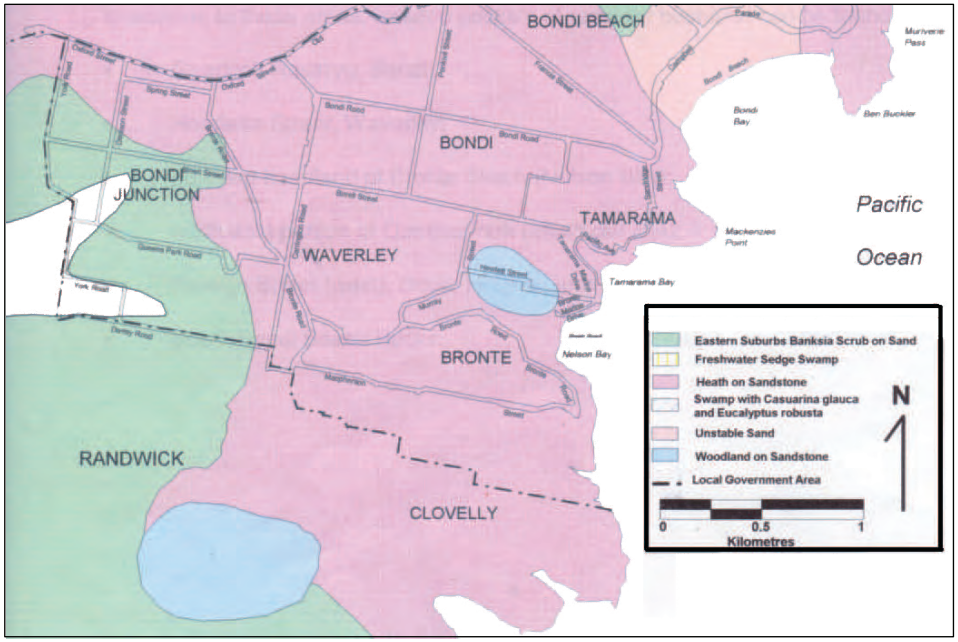
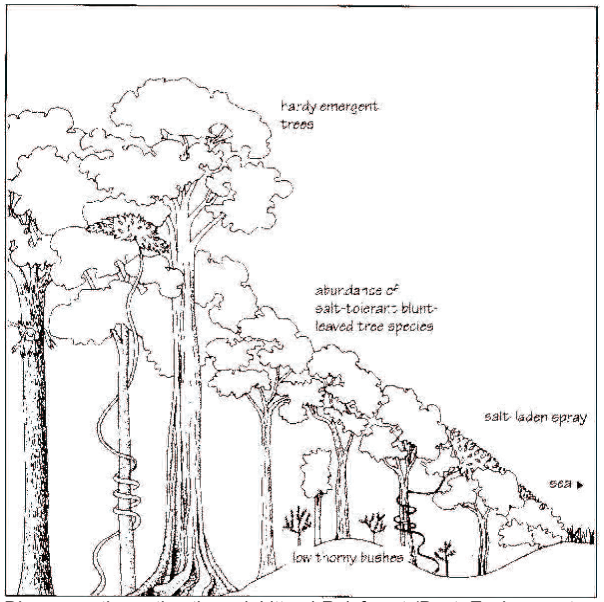
ECOLOGY - ZONE 3: GULLY (LITTORAL RAINFOREST)



Vegetation communities in the Eastern Suburbs (Hirschfeld 1998 based on Benson & Howell 1990 p.90)



Diagrammatic section through Littoral Rainforest (Dept. Environment and Climate Change NSW 2010)

Former Gully Vegetation:
Because of the extent of the changes to the gully landscape, it is impossible to know for sure what once grew there. Benson and Howell (1990 p90) map Bronte Gully as "Woodland on sandstone" and Tamarama Park as "Heath on sandstone". Hirschfeld, D. (1998 p3) reproduces the same map in "Remnant Vegetation in Waverley" (see map top left). Early descriptions, photos and drawings of Tamarama Gully, however, depict a waterfall cascading down through lush rainforest with dense tree canopy, tall palms and an understorey of ferns (Mayne-Wilson 2008) which suggest that Tamarama Gully once supported Littoral Rainforest. The biophysical conditions of the gully (topography, aspect, microclimate and the abundance of water as well as the height and health of the trees planted on the northern side of the gully) are consistent with this type of vegetation having grown there. A few old indigenous trees (*Glochidion ferdinandi* and *Ficus rubiginosa*) and a few understorey species (herbs, grasses and ferns) are possibly remnants of the former vegetation community.

Littoral Rainforest is listed as an Endangered Ecological Community (EEC) in the Sydney Basin under the Threatened Species Conservation Act (1995) and is described as follows on the NSW Dept of Environment website:

Description:
"…generally a closed forest, the structure and composition of which is strongly influenced by its proximity to the ocean (see diagrammatic section bottom left). The plant species of this community are predominantly rainforest species. Several species have compound leaves, and vines may be a major component of the canopy. These features differentiate littoral rainforest from forest of scrub, but while the canopy is dominated by rainforest species, scattered emergent individuals of sclerophyll species, such as *Angophora costata*, *Banksia integrifolia*, *Eucalyptus botryoides* and *E. tereticornis* occur in many stands. There is considerable floristic variation between stands..." (Dept. of Environment and Conservation, 2005).

Structure:
"Structure varies depending on exposure to salt-bearing winds. On the most exposed headlands, Littoral Rainforests take the form of dense, species-poor, wind-sheared thickets only a few metres tall. In more sheltered locations, the tree canopy is more diverse, sometimes includes palms, and may exceed 20 m in height. Buttressed tree trunks are very uncommon, and the understorey is usually sparse and dominated by herbs and several ubiquitous vines. There are relatively few ferns, although these and epiphytes are more common in sheltered locations" (NSW Scientific Committee, 2004).

Distribution:
"Littoral Rainforest occurs only on the coast and is found at locations in the NSW North Coast Bioregion, Sydney Basin Bioregion and South East Corner Bioregion. Littoral Rainforest is very rare and occurs in many small stands..." (Dept. of Environment and Conservation, 2005).

In the Sydney Metro area, Littoral Rainforest occurs in several places along the coast where urbanisation has not destroyed the original vegetation community. North of Sydney Harbour, a number of examples can be found in the Pittwater Council area, including at Newport, Palm Beach, Whale Beach and Bilgola. South of Sydney Harbour, Littoral Rainforest can be found at the Towra Point Nature Reserve and in Botany Bay National Park, Kurnell in the Sutherland Shire and further south in the Royal National Park at places such as Jibbon Beach (Bundeena), Burning Palms and Otford.

Habitat and ecology:
- "Occurs on sand dunes and on soil derived from underlying rocks.
- Stands on headlands exposed to strong wind-action may take the form of dense, wind-pruned thickets.
- Stands are generally taller in sheltered sites such as hind dunes, although wind-pruning may still occur on their windward sides.
- Most stands occur within 2 kilometres of the sea, though are occasionally found further inland within reach of the maritime influence.
- The species composition (flora and fauna) of a site will be influenced by its geographic location, the size of the site, its degree of exposure and rainfall, its disturbance history (including fire) and, if previously disturbed, the stage of regeneration" (Dept. of Environment and Conservation, 2005).

COMMUNITY

History

The Plan of Management (Parkland Environmental Planners *et al* 2007) describes the pre-European History of Tamarama Park as follows:

There is some uncertainty about the identity of the Aboriginal people who occupied the coastline between what is known today as Botany Bay and Sydney Harbour. Rock engravings and shell middens in this area indicate they undoubtedly had a strong connection with the sea. Aboriginal people would have made use of the abundant fresh water available at Bondi, Tamarama and Bronte, and they fished and collected seafood from these waters and shores. They also used the rock shelters around the harbour and coastline.

Diseases such as smallpox were introduced from 1788 onwards by Europeans, which greatly reduced the local Aboriginal population. Competition for land further compromised their original way of life, so that within 50 years other tribes had migrated into the area and intermarried with the survivors
(Parkland Environmental Planners et al 2007p5).

The remarkable natural characteristics of Tamarama Gully were recognized and respected by its first European settlers from the 1840s, until two entrepreneurial entertainment facilities were ruthlessly imposed on the beach end between 1888 and 1911... The Royal Aquarium and Pleasure Grounds' captured public imagination and patronage initially, but fizzled out around 1895. A decade later, the land was bought by a Mr William Anderson who created Wonderland City in 1906, modelled on Coney Island entertainment devices. These successive, insensitive developments did considerable harm to Tamarama's natural elements. That period also coincided with the rash of subdivisions all along the Gully edge, with buyers seeking to take advantage of its scenic attraction and views to the ocean…
The first person to establish a house at the head of the Gully was David Fletcher, first Mayor of Waverley, who built The Glen close to the picturesque waterfall in the mid 1870s. Subsequent development and subdivision at the head of the Gully occurred principally as a result of the need for the Fletcher family to provide land and houses for its expanding numbers. Numerous lots were carved out of the Fletcher land-holding by his descendents, regrettably with little regard for the Gully's intrinsic natural beauty and environmental flows. Subsequently, houses of all shapes and sizes crowded around its rim and even on rockbenches partway down the steep Gully slopes. In the early 1920s Waverley Council engineers converted the creek into a stormwater drain, strangling the waterfall and covering over the creek at its base, removing all trace of it.

In this incremental way, the intrinsic natural beauty and historical legacy of the Gully was gradually lost.
(Mayne-Wilson 2008).

Tamarama Park Today

Tamarama Park today has a high public profile as a popular ocean beach and park within the Eastern Beaches region of Sydney. It is serviced by the Coast Walk and plays an important role as a venue for the 'Sculpture by the Sea' exhibition during October-November. It is also highly valued by the Waverley community as a large area of green space within a highly urban environment with the character of a nature reserve that is amplified by the presence of remnant vegetation, open grassed areas, abundant birdlife, and direct access to the ocean. There is a range of spaces that provide for different uses and good social interaction.

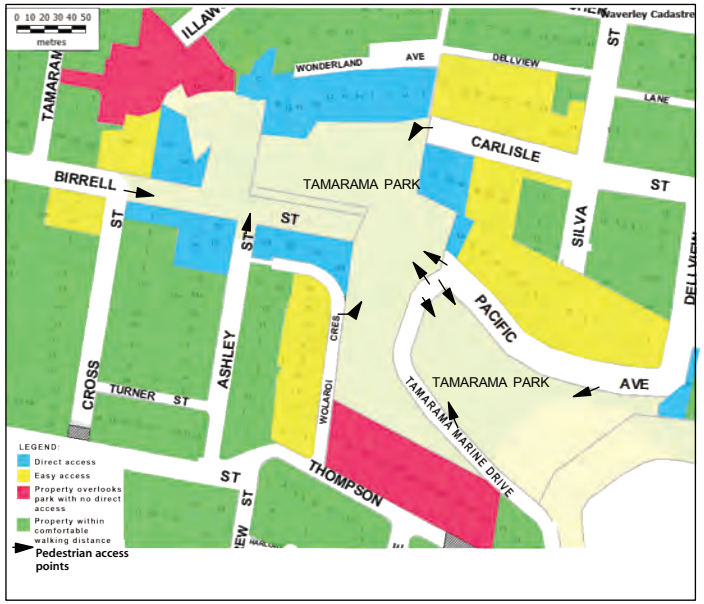
Behind the beach, Tamarama Gully is a shady and comfortable space used for passive recreation, exercise and dogwalking by locals and for public access between the beach and Birrell Street. The existing path system, although old, provides good connectivity and easy wayfinding through the park. Free of cars, the gully is a safe and inviting area for children to play and explore. The existing facilities on the beach are currently being upgraded but those within the gully area are also in need of upgrading.

The cadastral boundaries of the park do not reflect its visual boundaries (see map below left). The park is accessible from a number of streets and is within easy walking distance of visitors from outside of the area (see map below middle). The park is also surrounded by residential properties, some of which open directly onto the park (shown in blue), while others share boundaries with it but have no direct pedestrian access (shown in red). Additional residential properties have easy access to the park (shown in yellow) and many others are within a comfortable walking distance (shown in green).

For the purposes of achieving the goals of the Action Plan, the Tamarama Park community has been deemed to include: birdwatching groups, Bushcare, Councillors, Council staff, educational institutions (schools, universities and TAFE), local residents, local property owners, local business, local Aboriginal Land Council, natural history groups, state and federal agencies with an interest in the management of the park's environment and heritage and which are potential funding sources, Streamwatch, The National Trust, visitors to Tamarama Park, Waverley Council ratepayers, Waverley Council residents. Other groups may be identified during the course of the projects to implement the Action Plan.

Private property but within the visual catchment of the park

Park Boundaries (Source of base map: Waverley Cadastral, 2010.)



Park Acccessibility (Source of base map: Waverley Cadastral, 2010.)

Neighbouring property with direct access to park

Planting works by community Bushcare group

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PO Box 1685 Rozelle NSW 2039
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SITE ANALYSIS - COMMUNITY

COMMUNITY - LEGISLATIVE CONTEXT

According to maps from the NSW Department of Lands (at right), the bulk of the land at Tamarama Park is Crown Reserve (shown as dark green hatching). The road reserve below Birrell Street (shown as grey hatching) is also Crown land. An area at the top of the gully (shown as mauve) is an unidentified parcel.

Section 11 of the *NSW Crown Lands Act 1989* lays out the principles for the use and management of Public Reserves as follows:
(a) that environmental protection principles be observed in relation to the management and administration of Crown land,
(b) that the natural resources of Crown land (including water, soil, flora, fauna and scenic quality) be conserved wherever possible,
(c) that public use and enjoyment of appropriate Crown land be encouraged,
(d) that, where appropriate, multiple use of Crown land be encouraged,
(e) that, where appropriate, Crown land should be used and managed in such a way that both the land and its resources are sustained in perpetuity, and
(f) that Crown land be occupied, used, sold, leased, licensed or otherwise dealt with in the best interests of the State consistent with the above principles.

Key Environmental Legislation affecting Tamarama Park
The Tamarama Park Plan of Management 2007 (PoM) lists some of the NSW Acts that relate generally to the site, but key legislation considered for the purposes of developing the ERFAP can be grouped as follows:

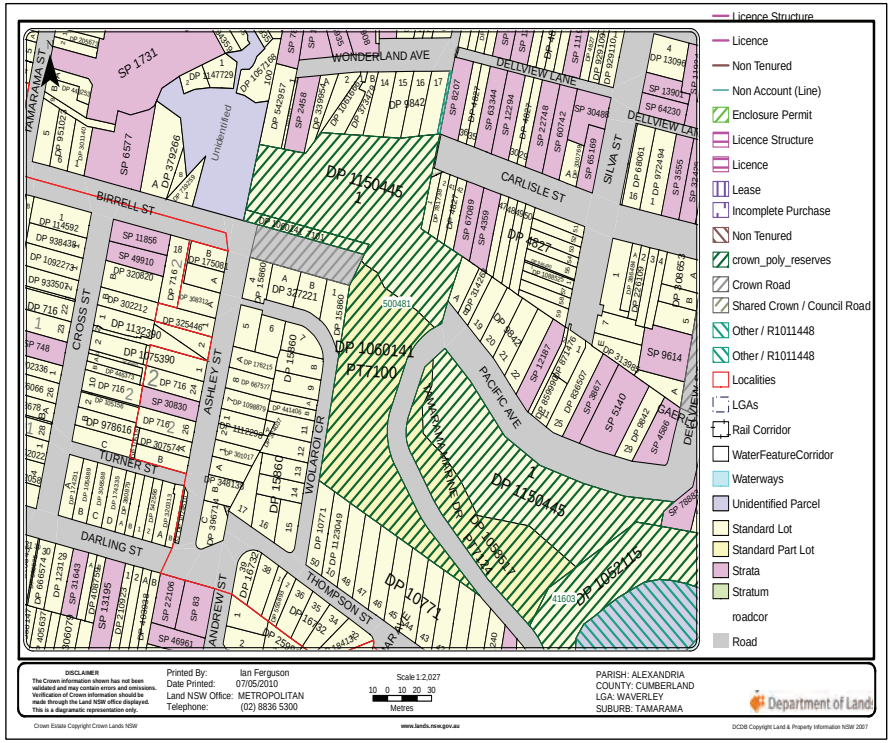
Key environmental legislation that the ERFAP directly supports:
- Environmental Planning & Assessment Act 1979 (NSW);
- Noxious Weeds Act 1993 (NSW).
- Threatened Species Act 1995 (NSW);
- Water Management Act 2000 (NSW);
- SEPP 19 Bushland in Urban Areas; and
- SEPP 71 Coastal Protection.

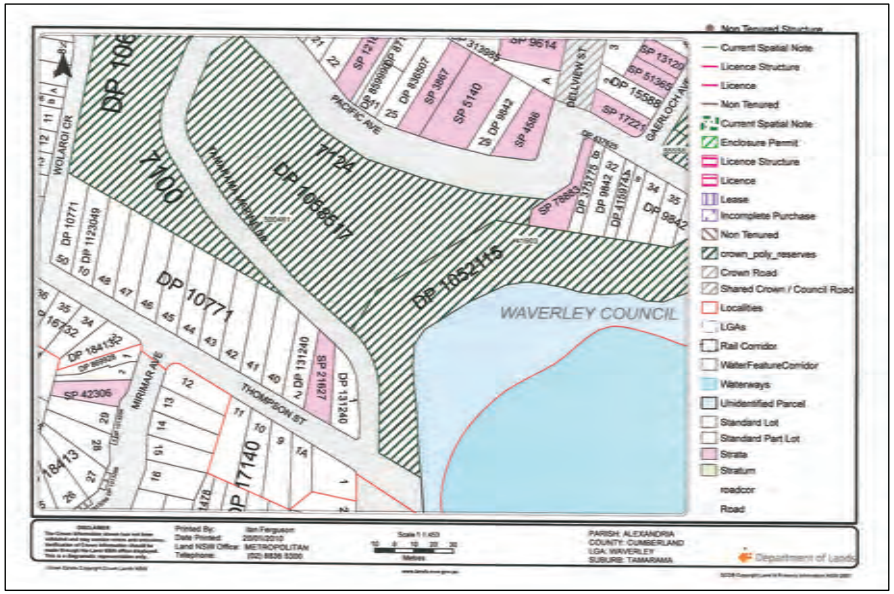
Legislation that needs to be considered by Council in relation to any proposed works:
- Heritage Act and the National Parks and Wildlife Services Act 1974 (NSW);
- Environmental Planning & Assessment Act 1979 (NSW);
- Crown Lands Act 1989 (NSW);
- Local Government Act 1993 (NSW);
- Noxious Weeds Act 1993 (NSW);
- Occupational Health & Safety Act 2000 (NSW); and the
- Water Management Act 2000 (NSW).

Legislative tools that will assist in achieving key outcomes:
- EP&A Act 1979 (NSW);
- Noxious Weeds Act 1993 (NSW); and the
- Companion Animals Act 1998 (NSW).

Refer to Appendix A for D. Hirschfeld's *Waverley Flora Study Report 2010 - Appendices 1-3* which provide a detailed assessment of the acts, regulations and planning instruments that apply to remnant vegetation, indigenous plant species and weeds in Waverley - Commonwealth and State legislation (Appendix 1), Commonwealth and State plans, policies, guidelines and strategies (Appendix 2) and Council plans, orders etc (Appendix 3).

Issues of tree vandalism can be dealt with under the EP&A Act but Council also has policy as part of its Tree Management Plan. Both the Noxious Weeds Act and the Companion Animals Act 1998 can be used as tools to require local residents to address problems resulting from their activities, including the removal of some weeds and the control of cats and dogs. These tools, however, should be seen as simply part of an overall policy to engage the community in participating in halting degrading processes affecting the park.





NSW Department of Lands maps showing ownership of land inTamarama Park (top) and Tamarama Beach (bottom) (Source: Ian Ferguson, 7/05/2010, Land NSW Office: Metropolitan).

DELIGHT

Tamarama Park sits beside the Pacific Ocean where the sounds, sights and smell of the ocean are an intrinsic part of its character. The park contains a range of clearly-defined landforms, spaces and vegetation types - the beach is a small, intimate cove defined by tawny sandstone cliffs; the grassed horse-shoe shaped area behind the park is enclosed by the sandstone walls supporting Tamarama Marine Drive; the sunny, heath-covered slopes look out towards the ocean; the grassed areas at the base of the long, narrow gully contrast with the forested slopes; and a rain-fed waterfall provides a dramatic focus at the end of the gully. The park is perceived by residents as a 'nature reserve'. Many native birds use the park and add to its natural character, as well as adding movement, colour and sound.

Views to the sea and into the park are available from a number of vantage points, while a series of views unfolds as one proceeds down the path from Birrell Street to the beach. Hidden rock ledges and old steps leading up through established tree plantings on the northern side of the gully invite exploration.

There are a number of issues, however, that detract from these positive qualities. The different sections of the park lack cohesion and legibility because of the fragmentation of vegetation and the predominance of weeds. The original vegetation communities are not clearly defined nor do they relate each other. The weeds are very unsightly in places and give the park a feeling of untidiness and neglect. The grassed area behind the beach lacks sufficient shade and planting is not effective. The western end of the gully is dominated by the large apartment blocks above it and it lacks shade and visual complexity. The waterfall and rock pools are inaccessible, overgrown and exposed to full sun. The Birrell Street entrance, at the top of the gully, is bare grass and cluttered with signage and utilities, while the view of the ocean is obscured by weedy vegetation.

Rainbow Lorikeets are a delight in the park

Old sandstone steps

Established tree plantings & rock ledges

Cave

POSITIVE VALUES

NEGATIVE VALUES

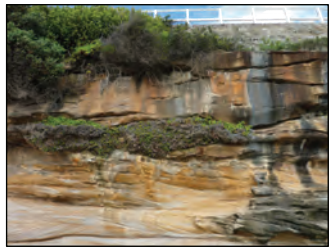
Apartment buildings dominate the park and the gully vegetation is weedy, and unsightly.

Waterfall

The ocean view is obscured by weedy vegetation.

Remnant heath vegetation

The Birrell St entrance is bare grass and is cluttered with signage and utilities.



Sandstone cliff with remnant vegetation

Tamarama Beach and the Pacific Ocean

POSITIVE VALUES

NEGATIVE VALUES

The different parts of the park lack a shared visual identity. The grassed area behind the beach lacks shade and the plantings are ad hoc.

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BioDesign & Associates Pty Ltd ABN: 47 100 757 342
PO Box 1685 Rozelle NSW 2039
phone 9810 5500 | fax 9810 5599
email admin@biodesign.com.au | www.biodesign.com.au

Project
Tamarama Park
ECOLOGICAL RESTORATION FRAMEWORK AND ACTION PLAN

Address
Tamarama Marine Drive, Tamarama

Client
Waverley Council

Project no. 0299
Drawing no.

Drawn AB
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Issue A
Date 05/12/2010

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Drawing
SITE ANALYSIS - DELIGHT

Sheet 17

PROCESSES LEADING TO DEGRADATION OF TAMARAMA PARK

Identification of degrading processes was a key aim of the site analysis and understanding of these processes forms the basis of the Action Plan. In order to ensure that money is not wasted during the ecological restoration of the park, actions need to be developed to prevent or minimise the degrading processes that affect the site.

Tamarama Park is located in an urban area that has been cleared of almost all its former vegetation. Links to remnant vegetation along the coastal cliffs facing the ocean have been broken by urban development, roads, path systems and landscaping. The beach and gully were also divided by an elevated road (Tamarama Marine Drive), atop an extensive retaining wall system.

Over time the park landscape has been modified in various ways to support its use for recreational purposes. The frontline vegetation was extensively cleared to open up the beach area, with only pockets retained in the steeper, rockier areas. Early clearing on the gully slopes was carried out to provide access via paths and steps to different parts of the site and this has been extended over time. The lower section of the gully, which once contained an open creek, was cleared and filled and stormwater piped underground. Overhead wires and lighting were installed within the Birrell Street road reserve. Lighting was also installed in the lower parts of the park with underground cabling.

As the park sits at the lowest end of a small drainage sub-catchment it is subject to urban runoff from the landscapes above it. Stormwater is piped and released into the park from both the Sydney Water stormwater drainage system and private properties adjoining the park. Urban stormwater contains chemical pollutants, nutrients, weed seeds and material from roads and gardens which is then released into the park (the full extent of this impact cannot be identified because of the current heavily vegetated conditions at the end of the gully).

Parts of the park have been filled with material from unknown sources including the road reserve below Birrell Street, the western end of the gully, and the corner of the park above the remnant coastal heath. The area associated with the access from Carlisle Street also appears to have been filled in places (the full extent of this impact could not be determined due to current vegetation cover).

Over time the environment of the park in terms of both solar access and exposure to winds has been modified as a result of both development and clearing of the original vegetation. Changes to solar access have been particularly significant in the upper end of the gully where the tree canopy has been lost and no new tree plantings have been established. The lower end of the gully is possibly more sheltered today than before settlement due to the construction of buildings.

Since European settlement the planting of local (Sydney bioregion), native (Australian) and non-local (exotic) species within the park and the adjoining gardens and streetscapes, has resulted in a mixture of vegetation throughout the park. Landscaping works have established turfed areas and garden beds in the flatter, filled areas. Private gardening within the park by residents occurs within the Birrell Street road reserve and in front of the Wonderland Avenue residences (that directly access the park), while poor garden practices within adjoining properties provide a constant source of weeds, pesticides and fertilisers.

As the park is much-used by dogwalkers, dogs contribute to the over-enrichment of soils as well as disturbing understorey habitat. Domestic cats have easy access to the park and present a constant threat to native fauna. Brown Rats (*Rattus norvegius*) out-compete and eat native fauna as do foxes, of which there have been anecdotal sightings.

Bushfire, a key process in the life cycle of many of the indigenous plant species associated with the former heath vegetation of the site no longer occurs. Over time, this results in loss of species that require fire or the soil disturbances and renewal processes it produces for seed dispersal and/or germination.

The degrading processes in Tamarama Park can be summarised as follows:
- Clearing for development and service corridors.
- Runoff from stormwater carrying nutrients, weeds and other contaminants.
- Concentrated stormwater discharge from pipes which leads to soil erosion.
- Disturbances to soil, water regimes and vegetation that have enabled non-native species to successfully invade.
- Cultural uses of the site that impact on soils, vegetation, wildlife and habitat (landscaping, gardening in the park, garden practices and domestic pets).
- Disturbances to fire regimes that have interfered with biological life cycles.

The combined effects of these processes have been:
- The almost complete loss of the former Littoral Rainforest vegetation and the creek ecosystems of the site.
- Reduced extent, loss of species and diminished resilience (capacity of the ecosystem to sustain itself over time) in the remnant Coastal Heath vegetation.
- Loss of habitat and faunal diversity.
- Loss or permanent alteration of natural topsoils in most places.
- Permanent alteration to water regimes and aquatic habitat in most places.
- Extensive infestations of noxious and environmental weeds.
- Continuing loss of species in the remnant vegetation.

Gardening within Birrell St road reserve

Litter in waterfall from stormwater runoff

Domestic pets impact on soils, vegetation, wildlife and habitat

Weeds are covering rock faces and choking aquatic habitat

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phone 9810 5500 | fax 9810 5599
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DEGRADING PROCESSES

RECOMMENDATIONS TO BE ADDRESSED THROUGH THE ACTION PLAN

VISION

While the high level of disturbance to the original soils and vegetation in the park means that it will not be possible to fully restore the three vegetation communities that once existed, it is possible to establish sustainable vegetation communities that approximate the original ones and which provide habitat for a range of indigenous fauna. On this basis, the best approach in Tamarama Park would be to work according to the following principles: ecological practices (including integrated weed control and sustainability); building community and enhancing the experiential values of the park. This approach will address any legal issues that have been identified.

1. ECOLOGICAL PRACTICES

A. Existing Vegetation

- Support regeneration of existing indigenous remnant vegetation wherever possible by measures that include weed control, planting and/or seeding into new areas, and controlling weedy local species.
- Retain existing framework of planted indigenous and native trees.
- Remove all non-indigenous shrub plantings (Coprosma, NZ Flax, etc.) in accessible areas as part of maintenance works, in a staged way.
- Remove or prune hazardous trees in accordance with Council's Tree Management Plan.
- Remove Coral Trees over time in accordance with Council's Tree Management Plan.

B. Water

- Engage a stormwater/environmental engineer to deal with the various stormwater and erosion issues on and adjoining the site, and to identify and seek external funding.
- Expose the various watercourses in the park, especially the main waterfall and its tributaries as the centrepiece of the park.
- Uncover and reinstate the heritage path that gives access to the main waterfall.
- Remove/control the source of rubbish entering watercourses refer to Environmental Services.
- Explore alternative ways to make the stormwater inlet at the base of the waterfall safe.

C. *Soils*

- Stabilise slopes with simple, low-cost measures such as recycled logs from tree removals and coir logs such as Ecologs'.
- Work with existing soils using imported mulch and new plantings to improve soil biology, health and structure.

D. *New plantings (revegetation)*

- As non-indigenous trees age and/or die, replace them with indigenous species.
- Select plants from list for appropriate zone only.
- Aim to maintain a high diversity of species in all parts of the site.
- Trial plants in different parts of the site (e.g. relating to aspect, moisture conditions, exposure to wind and salt spray). to identify reliable species.
- Do not replant species that fail to thrive in any part of the site.
- In gully area, establish hardy canopy trees first to help shade out weeds, establish a suitable microclimate for rainforest understorey and to provide an alternative food source to Coral trees.
- Plant tall trees in lower sections of the gully and smaller trees in upper areas to maintain views.
- Do not plant tall trees beneath overhead wires.

E. *Fauna and Habitat*

- Identify and develop areas of dense prickly shrubs to provide habitat for small birds.
- Identify and develop areas along watercourses where ponds may provide for aquatic habitat.
- Do not shade out sunny rock shelves with high habitat potential for lizards and skinks.
- Educate local residents about the effect of cats and dogs on wildlife.
- Replace winter-flowering tree Coral Trees with local species such as *Eucalyptus robusta* (Swamp Mahogany) planted in the lower sections of the gully.

F. *Integrated Weed Control*

- Engage a Weeds Officer to Identify and control weed sources both on and off-site and to identify and seek external funding.
- Take an integrated approach across whole of site from the beginning to minimise costs and resource use.
- Stage removal of specimens or groups of weeds that provide key benefits (e.g. slope stability; habitat loss, shelter for new plantings) as their benefits are replaced.
- Target selected weeds on the basis of:
    - Control of noxious weeds across the site as the first priority.
    - Control of woody environmental weeds as alternative species become established.
    - Removal of succulent weeds immediately prior to revegetation works in specific sections.
    - Prevention of annuals and succulents from flowering by slashing or hand removal of flower heads.
    - Continuous control of vines and stoloniferous grasses to prevent smothering of existing or new tree plantings and achieve low-cost on-going control within 5 years.
    - Removal of turf immediately prior to revegetation works in affected areas.
    - Protection of existing high-value areas of vegetation.
    - Prevention of further damage to walls and paths.
- Dispose off-site all material that is:
    - Seed infested.
    - Capable of vegetative propagation (e.g. Coral Trees; Madeira Vine; Cape Ivy) regardless of treatment measures.
- Work across the contours starting from the top of the slope.

G. *Sustainable Practices*

- Develop sustainable practices based on working with existing resources, recycling wherever possible and using local sources of materials, as follows:
- Use the existing path system:
    - Stabilise/rebuild existing paths where necessary.
    - Recycle old concrete slabs where possible.
    - Ensure any new plantings will not become a management problem in relation to access along paths.
- Establish a protocol for green waste that ensures:
    - Sources of weeds are removed from the site.
    - Green waste is recycled into the landscape as mulch and compost.
    - Woody material is used for slope stabilisation and/or habitat.
- Plant material:
    - Use small-container sizes (tubestock, cells, or plugs) for fast-growing species.
    - Use larger size containers (e.g. 200mm) for slow-growing species.
    - Harvest seed from existing remnants in Waverley where possible.
    - Collaborate with other coastal councils to share seed and plant material.
- Use existing water resources:
    - Harvest stormwater wherever possible for reuse.
    - Reflect water resources of the different parts of the site through plant selections.
    - Keep watering of new plantings to a minimum.
    - Consider opening up the central water-course through the base of the gully in the long term.
- Coordinate activities for weed control and extend works to link to other sites and minimise off-site impacts.

2. BUILDING COMMUNITY

- Strengthen relationships with adjoining coastal councils.
- Maintain relationship with Local Aboriginal Land Council to protect Aboriginal heritage.
- Uncover and interpret European heritage.
- Train existing parks staff in simple weed control practices and indigenous plant identification to enable immediate and ongoing benefits at low-cost.
- Extend relationships with indigenous nurseries for sourcing of suitable plant material from Sydney bioregion.
- Set up a caravan within the park to provide a focal point for the various project activities.
- Educate local residents about weeds and garden escapes and using local plants in gardens.
- Encourage local residents to join the Bushcare groups.
- Engage contractors with a combination of expertise in:
    - Bushland management and weed control.
    - Horticultural management of public spaces.
    - Construction of small walls, paths and bushland drainage channels.
    - Community involvement.
- Continue to build a list of competent contractors for urban bushland parkland services.

3. ENHANCING EXPERIENTIAL VALUES

- Replace weeds with indigenous vegetation
- Build on the existing character of the park as a "nature reserve'.
- Retain and enhance the diversity of spaces and natural features in the park.
- Unite the various parts of the park through re-establishing the original vegetation communities.
- Develop the gully as Littoral Rainforest with tall shady trees, palms and ferns.
- Open up existing heritage path to the waterfall to encourage exploration.
- Retain views to the sea from paths and from neighbouring houses.
- Provide additional shade trees in the grassed area behind the beach.
- Remove the visual clutter and enhance the Birrell Street entrance with planting.

PART 2: ACTION PLAN (AP)

INTRODUCTION

This Action Plan (AP) forms Part 2 of the Ecological Restoration Framework and Action Plan for Tamarama Park (ERFAP) and is to be read in conjunction with Part I: the Ecological Restoration Framework (ERF). The Action Plan provides the tools to implement the recommendations of the ERF. It identifies three key goals encompassing the aims of the recommendations that address the vision for Tamarama Park:

1. Halt the degrading processes affecting Tamarama Park's environment and existing vegetation assets and improve the ecological values of the site.
2. Develop a strong and vibrant local community that engages with Tamarama Park in many different ways.
3. Enhance the experiential values of Tamarama Park.

A Strategic Approach

The successful implementation of the ERFAP must be considered at two key scales, as follows:

Regional

The regional context is complex. In terms of drainage it is defined by the contours of the ridges of the stormwater sub-catchment and sources of inputs outside these boundaries. In terms of weed management problems, it is within the Sydney Central Weed Committee region. In terms of the indigenous biota, it lies within the coastal corridor of the Sydney bioregion. In terms of community resource allocations it is part of the Waverley local government area (LGA). In terms of community use, it serves the suburb of Tamarama but also sits within the framework of the Bondi to Bronte Coast Walk that forms part of the coastal walking paths of the eastern beaches and attracts tourism at all scales.

Site specific

The site specific scale of the park includes the different ecological zones that have been identified within the site, the landscape units defined within the zones and also the interfaces with the surrounding private and public domain. However, it will not be possible to achieve the site specific outcomes without addressing the regional context and the off-site causes of degrading processes.

A Key factor in the success of the Action Plan will be the control of weeds on the site. By taking a strategic approach, sustainable control of weeds will be achieved in the long-term. Specific targets for weed control on the site are to:

- eliminate noxious weeds; and
- manage environmental weeds so that they do not require on-going high level control measures within the site or invade new areas and give rise to new costs.

Achieving this will require a coordinated approach that operates at different levels On-site measures must be supported by actions that address off-site sources of weeds in public land and putting in place measures to educate and enforce the community to control weeds on private property. The following hierarchy of control must be addressed:

- Regional (cross-council boundaries and LGA-wide)
- Tamarama Park sub-catchment (public and private land in the stormwater drainage area defined by the ridgelines of the Tamarama Park valley (see Climate, Topography and Aspect (Sheet 9: Site Analysis - Ecology 2).
- Whole of Tamarama Park site
- Vegetation Zones defined for Tamarama Park (see Sheet 11: Site Analysis - Ecology 4)
- Landscape Management Units defined within Zones (see Sheets 23 to 36)

Intensive control measure will be required during the first two yours of the program to bring the sources of weeds within the site under control (by preventing them from flowering or propagating vegetatively) and steadily preventing weeds the germinate from the soil seedbank from flowering and setting seed.

Whilst this Action Plan is intended to be implemented over a period of 10 years, it will be necessary to maintain a weed control program thereafter, due to the context of the site within an urban catchment. However, once the weed control targets are achieved, the on-going costs will be reduced as sources of weeds disappear and the community participates in preventing their re-emergence.

This Action Plan contains the following structure:

1. Vision, goals and aims that are addressed through actions;
2. The landscape management units within the park including a list of issues and actions for each unit, case studies to act as models for revegetation and habitat recommendations;
3. Techniques for revegetation and slope and watercourse stabilisation;
4. Targets and measurable outcomes for progressive implementation of the AP;
5. Monitoring procedures; and
6. Staging of works and indicative costings of the different works for Zones 2 and 3 to enable Council to budget for the work over time

It provides specific actions, targets and measurable outcomes for Zones 2 and 3, with staging of works and indicative costings. Zone 1 is not included in this AP because it is covered by another council project.

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VISION, GOALS AND AIMS

Vision Statement

Tamarama Park will be sustainably managed and contain vegetation communities that reflect its former natural heritage and provide habitat for a range of indigenous fauna.

Goals and Aims

Three key goals have been established that will enable this vision to be achieved within the framework recommended in Part 1 of this report, the Ecological Restoration Framework (ERF). Each goal encompasses particular aims that reflect the recommendations listed on page 19 of the ERF. Pages 23 to 25 contain Targets and Measurable Outcomes that address the recommendations of the ERF.

Goal 1: Halt the degrading processes affecting the environment and existing vegetation assets of Tamarama Park and improve the site's ecological values.

Aims:

A. Existing Vegetation

Ecological practices will enable suitable existing indigenous vegetation, tree assets and valuable habitat for fauna to be safely retained and improved so that they contribute to the future of the site. The remnant vegetation of the site will represent the species diversity and abundance, vegetation structure and habitat resources of a self-sustaining coastal heath plant community.

B. Watercourses

Stormwater in the Tamarama Park sub-catchment will be managed in accordance with the applicable legislation and best practice measures to ensure that it contributes positively to the ecological and amenity values of the site.

C. Soils

Existing soils will be retained, stabilised and improved cost-effectively.

D. Future Planting

Locally indigenous species will be preferentially planted on the site within a framework of three different ecological zones. Appropriately rich species diversity in the plantings will be established.

E. Fauna and Habitat

The site will contain a variety of different types of habitat that support locally indigenous fauna. Wildlife corridors will be enhanced by plantings of locally indigenous species in areas lacking regeneration potential.

F. Integrated Weed Control

Weeds will be cost-effectively controlled throughout the site within the lifetime of the Tamarama Park restoration program. Off-site weeds throughout Waverley LGA will be managed.

G. Sustainable Practices

The costs of maintaining Tamarama Park as a site of locally important biodiversity will be equitable and sustainable for the Waverley community. The vegetation of Tamarama Park will consist of predominantly locally indigenous species. Vegetation will be healthy, resilient and sustainable in terms of costs and naturally renewing processes. Biodiversity and habitat values will be high and strong links to areas of remnant vegetation and habitat resources beyond the site will be established. Trees will be managed for risk, habitat and weed potential in accordance with Waverley's Tree Management Plan. Indigenous plant material will be locally sourced and propagated.

Goal 2: Develop a strong and vibrant local community that engages with Tamarama Park in many different ways.

Aims:

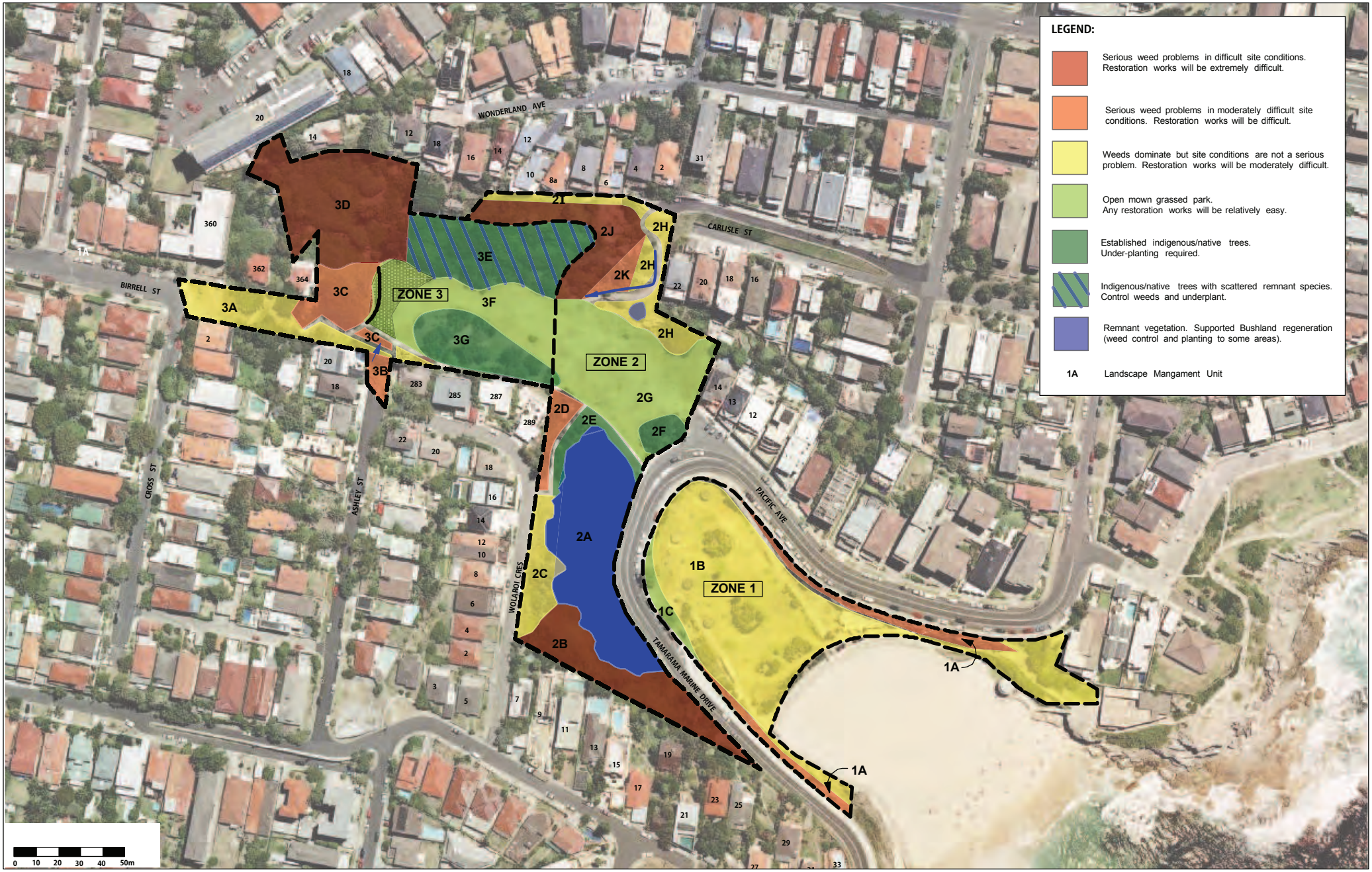
Tamarama Park will contribute to the life of the community at all levels (local, regional and international) by supporting a rich variety of uses and experiences that are built around its natural values and coastal location. The ecological values of the site will provide educational and recreational resources and have scientific value. Local residents and community groups will support Council staff and contractors to actively manage the park through projects that assist with care of the plantings, monitoring of problems and surveying of biodiversity values. Public and private landscapes within the vicinity of the park will be sensitively managed so as not impact adversely on the park. Plantings in domestic landscapes will contribute to the genetic pools and habitat values of the park and domestic pets will not cause problems. The community will be educated in weed management issues. Council's park's maintenance staff will manage its vegetation, habitat and heritage paths and steps in accordance with the particular needs of the site, using appropriate bushland management and weed control practices at all times. People will add to the park's liveliness and interest.

Goal 3: Enhance the experiential values of Tamarama Park.

Aims:

Tamarama Park will offer diverse aesthetic experiences and opportunities for people to relax/socialize in different spaces with different qualities. Watercourses and rock formations will be cleared of weeds and made accessible. Trees will provide shade, shelter and spatial definition in the park without blocking significant views. Heritage paths and steps will be uncovered and repaired to provide access to different parts of the site. Key natural features of the park (vegetation communities, waterfall, cave, outlooks) will be accentuated by the park's design. Visitors to the park will be able to see and experience examples of Sydney's coastal ecological communities and how they can be revegetated and sustained in urban environments. The park will be visually connected to other areas of healthy natural vegetation along the coastline. Visitors will feel safe and remember each visit as a positive experience.

LANDSCAPE MANAGEMENT UNITS - ISSUES AND RECOMMENDED MANAGEMENT ACTIONS



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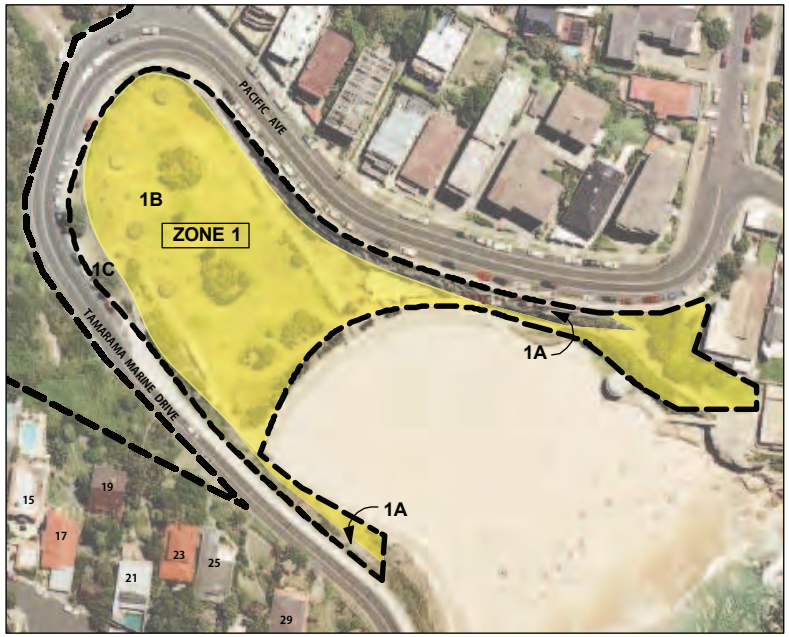
LANDSCAPE MANAGEMENT UNITS

Sheet 23

MANAGEMENT OF LANDSCAPE UNIT 1B



Landscape Unit: 1B	
Priority: High	
Beach Front (Frontline community on sand – grassed area behind beach)	
Issues	**Recommended Management Actions**
Current planting practices	Use Frontline Community on Sand species list for Zone 1 in all future plantings
Existing specimens of Cook Island Pine and Norfolk Island Pine	Replace with local shade tree species (as species decline)
Proposed plantings in Thompson Berrill Draft Landscape Masterplan are not consistent with recommendations of this report.	Use Frontline Community on Sand species list for Zone 1 in all future plantings and under existing plantings.
	Increase width of planting beds at western end (adjacent to sandstone retaining wall) to achieve more sustainable visually stronger plantings.

PLANT LIST

ZONE 1- BEACHFRONT (Frontline community on sand)			
Remnant species*	**Botanical Name**	**Common Name**	**Reference**
	Trees		
*	*Banksia integrifolia*	Coast Banksia	Hirschfeld 1998
	Cupaniopsis anacardioides	Tuckeroo	BioDesign suggestion
*	*Glochidion ferdinandi*	Cheese Tree	Hirschfeld 1998
*	*Leptospermum laevigatum*	Coast Tea-tree	National Trust 1992, Hirschfeld 1998 - planted?
*	*Melaleuca armillaris*	Bracelet Honey Myrtle	Hirschfeld 1998
*	*Monotoca elliptica*	Tree Broom-heath	National Trust 1992, Hirschfeld 1998
	Shrubs		
*	*Acacia longifolia var. sophorae*	Coast Wattle	National Trust 1992, Hirschfeld 1998
*	*Baeckea imbricata*	Ridged Heath Myrtle	National Trust 1992, Hirschfeld 1998
*	*Banksia ericifolia*	Heath Banksia	National Trust 1992, Hirschfeld 1998
	Correa alba var.alba	White Correa	BioDesign suggestion
	Phebalium squamulosum ssp. argentum		BioDesign suggestion
*	*Olearia tomentosa*		Hirschfeld 1998
*	*Pimelea linifolia*		Hirschfeld 1998
	Westringia fruticosa	Coast Rosemary	
	Clumpers, Grasses, Sedges & Rushes		
	Dianella caerulea	Paroo Lily	
	Dianella congesta	Coastal Flax Lily	
	Lomandra longifolia	Spiny-headed Mat-rush	National Trust 1992, Hirschfeld 1998
	Gound Covers, Vines and Scramblers		
	Carpobrotus glaucescens	Pigface	
	Scaevola calendulacea	Scented Fan Flower	BioDesign suggestion
	Hibbertia scandens		BioDesign suggestion
	Tetragonia tetragonioides	Warragal Greens	Waverley Council suggestion
*** Surveyed in Tamarama Park in 1995 (from lists and maps in Hirschfeld 1998)**			

EXAMPLES

Pig-face

Banksia growing in sand

Tuckeroo

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BioDesign & Associates Pty Ltd ABN 47 100 717 342
PO Box 1685 Rozelle NSW 2039
phone 9810 5500 | fax 9810 5599
email admin@biodesign.com.au | www.biodesign.com.au

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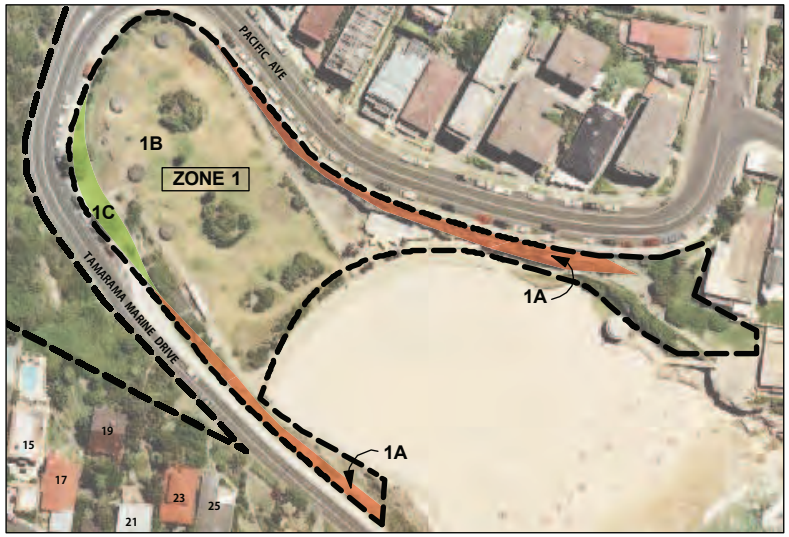
LANDSCAPE MANAGEMENT UNIT 1B

Sheet
24

MANAGEMENT OF LANDSCAPE UNITS 1A & 1C



Landscape Unit: 1A	
Priority: Medium	
Beach Front (Coastal Heath on cliff edges)	
Issues	**Recommended Management Actions**
OH&S: steep cliffs, possible loose rocks, difficult to access and strong winds.	Employ experienced, qualified contractors.
Weeds in rock crevices and garden beds (e.g. Asparagus Fern, Coprosma repens and Ficus pumila)	Integrated weed control program based on monthly, site-wide coverage. Target noxious weeds first, then environmental weeds.
	Work from beach edges outwards to build public awareness.
Soil stability	Plant into soil pockets at time of weed removal where rapid regeneration is unlikely to occur
Habitat values of some weed vegetation (e.g. Coprosma repens thickets).	Stage removal of weeds providing habitat.
Nearby plantings that are weed sources (e.g. Lagunaria patersonia, Metrosideros excelsa, NZ Flax)	Ensure plantings in nearby landscapes are of suitable species.
	Revegetate existing grassed area next to Tamarama Marine Drive (southern side) with Coastal Heath species to protect remnants on cliff edge.

Landscape Unit: 1C	
Priority: Medium	
Beach Front (Coastal Heath on cliff edges)	
Issues	**Recommended Management Actions**
Lack of connectivity with cliff edges	Remove grass, spread mulch and install Coastal Heath species from Zone 2 list.
Lack of biodiversity	Ensure that a range of species are included.
Visibility along road and into park	Plant canopy trees with low heath understorey to allow views to park from road.

PLANT LIST

ZONE 1 - BEACHFRONT (Coastal Heath on cliff edges)			
Remnant Species*	**Botanical Name**	**Common Name**	**Reference**
	Small Trees & Tall Shrubs (1- 6m)		
*	*Acacia longifolia var. sophorae*	Coast Wattle	National Trust 1992, Hirschfeld 1998
	Allocasuarina distyla		BioDesign suggestion - see Case Study
*	*Banksia ericifolia*	Heath Banksia	National Trust 1992, Hirschfeld 1998
*	*Hakea teretefolia*	Dagger Hakea	National Trust 1992, Hirschfeld 1998
*	*Lambertia formosa*	Mountain Devil	Hirschfeld 1998
*	*Melaleuca armillaris*	Bracelet Honey Myrtle	Hirschfeld 1998
*	*Monotoca elliptica*	Tree Broom-heath	National Trust 1992, Hirschfeld 1998
	Small Shrubs 300mm-1m		
*	*Baeckea imbricata*	Ridged Heath Myrtle	National Trust 1992, Hirschfeld 1998
	Pimelea linifolia	Rice Flower	BioDesign suggestion - see Case Study
*	*Westringia fruticosa*	Coast Rosemary	National Trust 1992, Hirschfeld 1998
	Clumpers, Grasses, Sedges & Rushes		
	Dianella congesta	Coastal Flax Lily	BioDesign 2007
*	*Ficinia nodosa (syn. Isolepis nodosa)*	Knobby Club Rush	National Trust 1992, Hirschfeld 1998
*	*Isolepis cernua*		Hirschfeld 1998
*	*Lachnagrostis billardierei*		Hirschfeld 2010
*	*Lachnagrostis filiformis*		Hirschfeld 2010
	Lomandra longifolia	Spiny-headed Mat-rush	National Trust 1992, Hirschfeld 1998
*	*Paspalum vaginatum*		Hirschfeld 2010
*	*Spinifex sericeus*		Hirschfeld 2010
*	*Sporobolus virginicus*	Sand Couch	Hirschfeld 1998
	Zoysia macrantha	Coast Couch	BioDesign 2007
	Ground Covers, Vines and Scramblers		
	Carpobrotus glaucescens	Pigface	National Trust 1992, Hirschfeld 1998
*	*Samolus repens*	Creeping Brookweed	Hirschfeld 1998;
*	*Tetragonia tetragonoides*	Warrigal Spinach	Hirschfeld 1998
* Surveyed in Tamarama Park in 1995 (from lists and maps in Hirschfeld 1998)			

EXAMPLE

Coastal Heath at Point Solander, Kurnell

BioDesign
BioDesign & Associates Pty Ltd ABN 47 100 717 342
PO Box 1685 Rozelle NSW 2039
phone 9810 5500 | fax 9810 5599
email admin@biodesign.com.au | www.biodesign.com.au

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Tamarama Park
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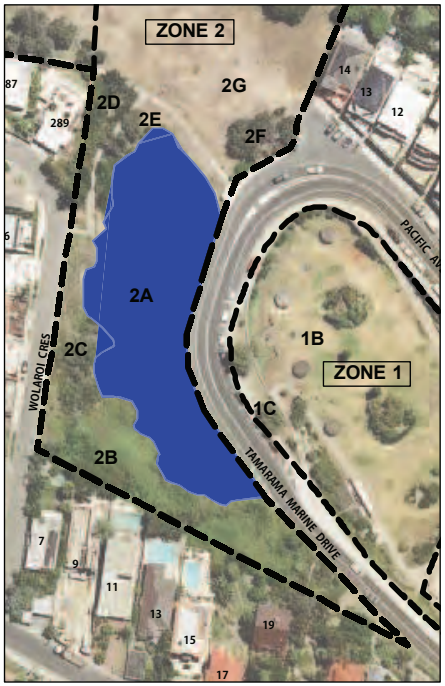
Drawing
LANDSCAPE MANAGEMENT UNITS 1A & 1C

Sheet
25

MANAGEMENT OF LANDSCAPE UNIT 2A



Landscape Unit: 2A	
Priority: High	
Slope above Tamarama Marine Drive (remnant Coastal Heath)	
Issues	**Recommended Management Actions**
Size of remnant and lack of connectivity	Support regeneration/natural succession by controlling weeds using bush regeneration practices. Revegetate adjoining areas (2E, 2D, 2G, 2C, 2B) with Coastal Heath species keeping a distinct barrier (minimum 2m) from remnant areas.
On-going resources to counter uncontrollable degrading processes (lack of bushfire, loss of species)	Work with natural successional processes (do not remove self-sown indigenous species that thrive in the conditions; accept that fire dependent vegetation may be replaced by fire sensitive vegetation)
Low quality habitat due to low species diversity, lack of cover and on-going degrading processes (sedimentation, no natural controls on growth of vegetation)	
Impacts due to management of adjacent landscapes	Improve management of adjacent areas (2B, 2C, 2D and 2E) by controlling weeds, stormwater management, soil stabilisation and revegetation as well as engaging residents in programs about weeds species and garden practices.
Participation rates of Bushcare group members	Council to employ qualified bush regenerators to control weeds until Bushcare can reliably do so
	Build community resources.

HABITAT RECOMMENDATIONS - ZONE 2

Small ponds can be created at stormwater outlets for Striped Marsh Frogs (*Limnodynastes peronii*) and Common Eastern Froglets (*Crinia signifera*).

The prime reptile species of concern is the Pale-lipped Shadeskink (*Saproscincus spectabalis).* This species has such a small range in Sydney that it needs all the help that it can get. It utilises rocky ledges and feeds in leaf litter and undergrowth but it also needs areas where it can sun itself without being unduly exposed to predators. Areas along the exposed sandstone in the park can be developed to assist this species.

Two other reptile species should be targeted: Eastern Water Skink (*Eulamprus quoyii)* and the Southern Leaf-tailed Gecko (*Phyllurus platurus)*. Eastern Water Skink can be assisted by weed removal around the water course and stormwater pond areas. Southern Leaf-tailed Gecko can be assisted by the control of weeds along the northern sandstone areas of the park.

On-going rehabilitation of the remnant Coastal Heath vegetation should target the habitat needs of honeyeaters (New Holland, White Plumed, Eastern Spinebill, Red Wattlebird), wrens (Superb Blue), silvereyes and thornbills.

Rainbow Lorikeets (*Trochoglossus haematodus*) are a feature of the area and rely on the Coral Trees as a food resource in winter. These trees should be sequentially removed following replacement by winter-flowering *Eucalyptus robusta*.

Map of Potential Habitat for Lizards, Birds & Frogs

RECOMMENDED PLANT LIST FOR ZONE 2 - UNITS 2B - 2K

Remnant Species*	Botanical Name	Common Name	Reference
	Small Trees & Tall Shrubs (1- 6m)		
*	*Acacia longifolia var. sophorae*	Coast Wattle	National Trust 1992, Hirschfeld 1998
	Acacia suaveolens	Sweet-scented Wattle	BioDesign 2007
*	*Acacia terminalis subsp. terminalis*		Hirschfeld 1998
	Allocasuarina distyla		BioDesign suggestion - see Case Study
*	*Banksia ericifolia*	Heath Banksia	National Trust 1992, Hirschfeld 1998
*	*Banksia integrifolia*	Coast Banksia	Hirschfeld 1998
*	*Banksia marginata*	Silver Banksia	National Trust 1992, Hirschfeld 1998
*	*Banksia oblongifolia*		Hirschfeld 1998
*	*Banksia serrata*	Old Man Banksia	Hirschfeld 1998
*	*Breynia oblongifolia*		Hirschfeld 1998
*	*Callistemon spp.*		National Trust 1992, Hirschfeld 1998 - planted? Deleted Hirschfeld 2010
*	*Callistemon citrinus*		Hirschfeld 1998
*	*Callistemon linearis*		Hirschfeld 1998
*	*Cassytha spp.*		National Trust 1992, Hirschfeld 1998
*	*Glochidion ferdinandi*	Cheese Tree	Hirschfeld 1998
*	*Hakea gibbosa*		Hirschfeld 1998
*	*Hakea teretefolia*	Dagger Hakea	National Trust 1992, Hirschfeld 1998
*	*Kunzea ambigua*	Tick Bush	Hirschfeld 1998
*	*Lambertia formosa*	Mountain Devil	Hirschfeld 1998
*	*Lasiopetalum ferruginum var.ferruginum*	Rusty Petals	National Trust 1992, Hirschfeld 1998
*	*Leptospermum laevigatum*	Coast Tea-tree	National Trust 1992, Hirschfeld 1998 - planted?
*	*Leptospermum polygalifolium subsp. polygalifolium*		Hirschfeld 1998
	Leptospermum squarrosum	Pink Tea-tree	BioDesign suggestion
*	*Melaleuca nodosa*	Ball Honey Myrtle	National Trust 1992, Hirschfeld 1998
*	*Monotoca elliptica*	Tree Broom-heath	National Trust 1992, Hirschfeld 1998
*	*Monotoca scoparia*		Hirschfeld 1998
*	*Omalanthus populifolius*		Hirschfeld 1998
*	*Opercularia aspera*	Stinkweed	National Trust 1992, Hirschfeld 1998
*	*Phyllanthus gasstroemii*	Spurge	Hirschfeld 1998
	Pimelea linifolia	Rice Flower	BioDesign suggestion - see Case Study
*	*Pittosporum revolutum*	Hairy Pittosporum	National Trust 1992, Hirschfeld 1998 - deleted Hirschfeld 2010
*	*Platysace lanceolata*		Hirschfeld 1998
	Small Shrubs 300mm-1m		
*	*Baeckea imbricata*	Ridged Heath Myrtle	National Trust 1992, Hirschfeld 1998
*	*Bauera rubioides*	Dog Rose	National Trust 1992, Hirschfeld 1998
	Conospermum spp?		BioDesign suggestion
*	*Crowea saligna*		Hirschfeld 1998
*	*Dillwynia retorta*		Hirschfeld 1998
*	*Grevillea speciosa*	Red Spider Flower	Hirschfeld 1998
	Isopogon anemonofolius?	Broad-leaved Drumsticks	BioDesign suggestion
*	*Olearia tomentosa*		Hirschfeld 1998
*	*Opercularia aspera*	Stinkweed	National Trust 1992, Hirschfeld 1998
	Pelargonium australe	Native Geranium	BioDesign 2007
*	*Pimelea linifolia*		Hirschfeld 1998
*	*Pultenaea linophylla*		Hirschfeld 1998
*	*Westringia fruticosa*	Coast Rosemary	National Trust 1992, Hirschfeld 1998
*	*Xanthosia pilosa*	Woolly Xanthosia	Hirschfeld 2010

* Surveyed in Tamarama Park in 1995 (from lists and maps in Hirschfeld 1998)

Remnant Species*	Botanical Name	Common Name	Reference
	Ferns		
*	*Adiantum aethiopicum*	Common Maidenhair	Hirschfeld 1998
*	*Blechnum ambiguum*		Hirschfeld 1998
*	*Blechnum cartilagineum*	Gristle Fern	Hirschfeld 1998
*	*Calochlaena dubia*	Soft Bracken Fern	Hirschfeld 1998
*	*Histiopteris incisa*	Bat's Wing Fern	National Trust 1992, Hirschfeld 1998
*	*Lindsaea microphylla*		Hirschfeld 1998
*	*Pellaea falcata var. falcata*		Hirschfeld 1998
*	*Pteridium esculentum*		Hirschfeld 1998
*	*Sticherus flabellatus*		Hirschfeld 1998
	Clumpers, Grasses, Sedges & Rushes		
*	*Crinum pendunculatum*	Swamp Lily	Hirschfeld 1998
*	*Deyeuxia quadriseta*	Reed Bent Grass	Hirschfeld 2010
	Dianella caerulea	Paroo Lily	National Trust 1992, Hirschfeld 1998 - possibly planted?
*	*Dianella spp.*		Hirschfeld 2010
	Dianella congesta	Coastal Flax Lily	BioDesign 2007
*	*Dianella revoluta*	Mauve Flax Lily	Hirschfeld 1998
*	*Dichelachne crinita*	Long-hair Plume Grass	National Trust 1992, Hirschfeld 1998
*	*Eragrostis brownii*	Brown's Love Grass	Hirschfeld 1998
*	*Imperata cylindrica*	Brady Grass	Hirschfeld 1998
*	*Ficinia nodosa (syn. Isolepis nodosa)*	Knobby Club Rush	National Trust 1992, Hirschfeld 1998
*	*Juncus krausii*	Sea-rush	Hirschfeld 1998
*	*Juncus pallidus*		Hirschfeld 1998
*	*Lomandra longifolia*	Spiny-headed Mat-rush	National Trust 1992, Hirschfeld 1998
*	*Microlaena stipoides var. stipoides*	Weeping Grass	Hirschfeld 1998
*	*Themeda australis*	Kangaroo Grass	Hirschfeld 1998
*	*Wahlenbergia gracilis*	Native Bluebell	Hirschfeld 1998
	Xanthorrea resinosa or X. arborea?	Grass Trees	BioDesign suggestion
	Zoysia macrantha	Coast Couch	BioDesign 2007
	Herbs, Gound Covers, Vines and Scramblers		
	Actinotus helianthi	Flannel Flower	BioDesign suggestion - see Case Study
*	*Billardiera scandens*		Hirschfeld 1998
*	*Carpobrotus glaucescens*	Pigface	National Trust 1992, Hirschfeld 1998
	Carpobrotus decumbens var.decumbens	Pigface	BioDesign 2007
*	*Centella asiatica*		Hirschfeld 2010
	Commelina cyanea	Scurvy Weed	Hirschfeld 1998
	Dichondra repens	Kidney Weed	BioDesign 2007
*	*Gonocarpus teucrioides*	Germander Raspwort	Hirschfeld 1998
	Hibbertia scandens	Snake Vine	BioDesign 2007
*	*Lobelia alata*	Winged Lobelia	National Trust 1992, Hirschfeld 1998
*	*Pandorea pandorana*	Wonga Wonga Vine	National Trust 1992, Hirschfeld 1998
	Rulingia hermanniifolia	Wrinkled Kerrawang	BioDesign suggestion
*	*Smilax glyciphylla*	Native Sarsparilla	Hirschfeld 1998
*	*Stephania japonica var. discolor*	Stephania, Snake Vine	Hirschfeld 1998

* Surveyed in Tamarama Park in 1995 (from lists and maps in Hirschfeld 1998)

BioDesign
BioDesign & Associates Pty Ltd ABN 47 100 717 342
PO Box 1685 Rozelle NSW 2039
phone 9810 5500 | fax 9810 5599
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Issue A
Date 05/12/2010

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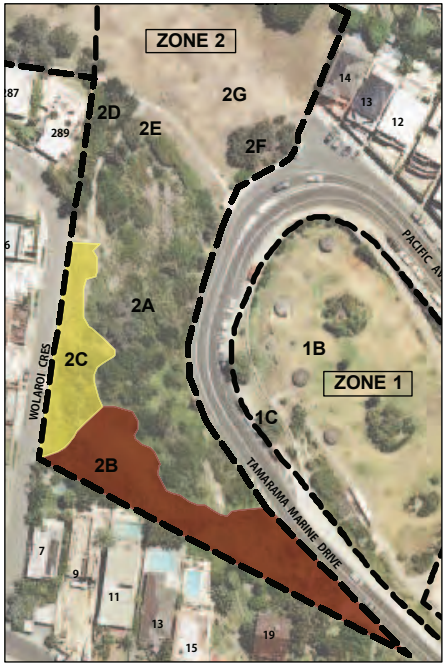
Drawing
PLANT LIST ZONE 2

LANDSCAPE MANAGEMENT UNIT 2B & 2C



Landscape Unit: 2B	
Priority: High (due to impacts on 2A)	
Slope along southern boundary of park (above remnant Coastal Heath)	
Issues	**Recommended Management Actions**
Soil quality and stability, site conditions and scale of problems	Contractors to carry out site stabilisation works, mulching, planting out with Coastal Heath species from Zone 2 list & maintenance until established. Commence revegetation 3m away from remnant area.
Weeds (including Coral Trees, vines and shrubs)	Integrated weed control program based on monthly, site-wide coverage. Target noxious weeds first, then environmental weeds.
	Stage removal of Coral Trees as alternative winter-flowering trees mature (in accordance with Waverley's Tree Management Plan and Tree Preservation Order).
Low quality habitat due to low species diversity, lack of cover and on-going degrading processes (sedimentation, no natural controls on growth of vegetation)	Improve habitat for small birds by plantings of diverse, dense, prickly indigenous shrubs and for reptiles by controlling vegetation to provide sunny rock ledges and floaters for basking. Create aquatic habitat for frogs in wet area below rock outcrop.
Weed control during establishment	Contractor to carry out weed control during plant establishment and ongoing maintenance.
Coral Trees being lopped and spread	Remove all Coral Tree green waste from site to prevent regrowth.
Stormwater from private property releasing directly into area	Council's Stormwater /Environmental Engineer to work with residents to provide alternative solution.

Landscape Unit: 2C	
Priority: High (due to impacts on 2A)	
Slope adjoining Wolaroi Crescent (above remnant Coastal Heath)	
Issues	**Recommended Management Actions**
Requires mowing and potential for biodiversity and environmental benefits is not being exploited	Contractors to carry out site stabilisation works, mulching, planting out with Coastal Heath species from Zone 2 list & maintenance until established. Commence revegetation 3m away from remnant area.
Cannas and other weeds will spread to 2A	Integrated weed control program based on monthly, site-wide coverage. Target noxious weeds & Cannas first, then environmental weeds.
	Revegetate with Coastal Heath species from list for Zone 2.
Low quality habitat due to low species diversity, lack of cover and on-going degrading processes (sedimentation, no natural controls on growth of vegetation)	Improve habitat for small birds by plantings of diverse, dense, prickly indigenous shrubs and for reptiles by controlling vegetation to provide sunny rock ledges and floaters for basking.
Weed control during establishment	Contractor to carry out weed control during plant establishment and ongoing maintenance.
Dogs use the area for defecation	Control dogs – install signage and new meshed fence; educate residents.
Run-off from road	Council's Stormwater /Environmental Engineer to manage stormwater to control run-off. Slow flow with plantings of sedges / grasses.
Grass growing over rock shelves	Maintain vegetation-free rock platforms for reptile habitat
View corridor from residences across the road	Do not plant tall trees that will obstruct views at maturity.

CASE STUDY

Location of coastal heath at Point Solander

Examples of Coastal Heath close to Tamarama Park that have not become degraded through the impacts of development are uncommon. The best example of Coastal Heath in its natural state which shares similar biophysical conditions (aspect, elevation, geology, slope, soil depth and drainage) to that of Tamarama Park can be seen on Cape Solander Drive, Point Solander, Botany Bay National Park, Kurnell. The cliff edge south of the whale-watching area provides a good model for restoration of vegetation in Areas 1A and 1C while the slope on the western side of the road (opposite the whale-watching area) provides a good model for Areas 2A-2E.

A study of the Coastal Heath at Point Solander reveals that there are relatively few species that grow in large numbers, forming a dense thicket ranging in height from 1-3m, as follows: *Acacia longifolia* var. *sophorae*, *Banksia integrifolia, Banksia ericifolia*, *Casuarina distyla*, *Leptospermum laevigatum*, *Lomandra longifolia*, *Melaleuca armillaris* (cliff edges), *Monotoca elliptica*, *Westringia fruticosa*.

On the edge of the road can be found scattered specimens of the following: *Actinotus helianthi*, *Baeckea imbricata*, *Carpobrotus glaucescens*, *Hakea teretifolia*, *Pimelea linifolia*.

Coastal Heath at Point Solander, Kurnell

Coastal Heath at Point Solander, Kurnell

Westringia fruticosa

Baeckea imbricata

Banksia integrifolia

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PO Box 1685 Rozelle NSW 2039
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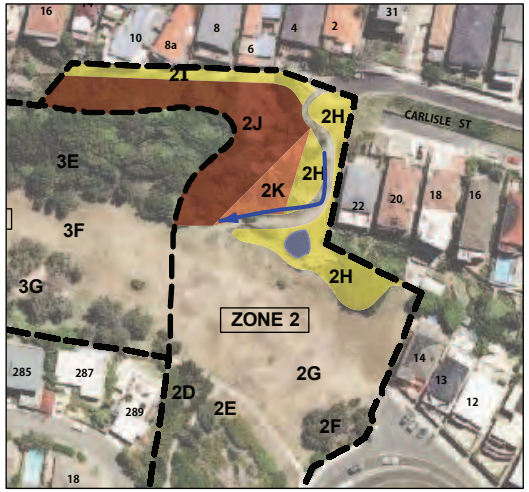
LANDSCAPE MANAGEMENT UNITS 2B & 2C

LANDSCAPE MANAGEMENT UNITS 2D, 2E, 2F & 2G

Landscape Unit: 2D	
Priority: High (due to impacts on 2A)	
Slope adjoining No.289 Wolaroi Crescent (above remnant Coastal Heath)	
Issues	**Recommended Management Actions**
Area adjacent to private property that is part of site's visual catchment.	Work with owner of 289 Wolaroi Crescent to achieve whole-of-site approach to plantings and to jointly control weeds.
Stormwater from private property releasing directly into area.	Council's Stormwater /Environmental Engineer to work with owner to address stormwater management.
Tree deaths and heavy lopping.	Contractors to carry out site stabilisation works, mulching, planting out with Coastal Heath species from Zone 2 list & maintenance until established.
Plantings obstruct public pathways and views.	Ensure plantings at maturity will not obstruct access along path and steps or views from house.
Heavy weed infestation, including noxious weeds (Cestrum) and lack of weed control during establishment of new plantings.	Contractor to carry out weed control, including during plant establishment.
Low quality habitat due to low species diversity, lack of cover and on-going degrading processes (sedimentation, no natural controls on growth of vegetation)	Improve habitat for small birds by plantings of diverse, dense, prickly indigenous shrubs.
Landscape Unit: 2E	
Priority: High (due to impacts on 2A)	
Strip on eastern side of path and adjoining park (adjoining remnant Coastal Heath)	
Issues	**Recommended Management Actions**
Species of plantings	Retain mature plantings of Lophostemon confertus but replace with Coastal Heath species from Zone 2 list when they die
Access along paths	Replant existing Leptospermum laevigatum specimens farther away from the path to improve access and visibility.
Weed control during establishment	Ensure that weeds are controlled during establishment.
Low quality habitat due to low species diversity, lack of cover and on-going degrading processes (sedimentation, no natural controls on growth of vegetation)	Improve habitat for small birds by plantings of diverse, dense, prickly indigenous shrubs.

Landscape Unit: 2F	
Priority: High (due to visual impacts at entrance to park)	
Island of existing planting adjoining Tamarama Marine Drive (indigenous trees and mixed shrub plantings)	
Issues	**Recommended Management Actions**
Access / desire lines	Repair / replace barrier fence to prevent people walking through the bed.
Provenance of plantings and weed issues	Remove all non-indigenous and weed species that are isolated specimens not providing bird habitat. Underplant with dense Coastal Heath species from Zone 2 list to provide better habitat.
Plan of Management action to remove trees	Retain trees and add additional specimens to provide frontline barrier for Littoral Rainforest species in the gully.
Low quality habitat due to low species diversity, lack of cover and on-going degrading processes (sedimentation, no natural controls on growth of vegetation)	Improve habitat for small birds by plantings of diverse, dense indigenous shrubs, grasses and forbs.
Landscape Unit: 2G	
Priority: Low	
Gully Floor (grassed)	
Issues	**Recommended Management Actions**
Fill over former creek bed and the undergrounding of stormwater	Council to consider options to open up creek system in the long-term.
Weeds in turf	Control weeds in turf by mowing.
Watering of turf	Council to explore options to harvest rainwater / stormwater for irrigation of turf during dry periods.

LANDSCAPE MANAGEMENT UNITS 2H, 2I, 2J & 2K



Landscape Unit: 2H	
Priority: Low	
Gully Floor (grassed)	
Issues	**Recommended Management Actions**
Weeds (including the turf)	Control weeds, including those in drainage channel (shown as blue arrow).
Loss of biodiversity and habitat	Contractors to remove turf, control weeds and prepare site for planting with Coastal Heath species from Zone 2 list.
	Retain open, sunny rock shelves which provide habitat for reptiles. Retain ponds and enhance habitat for frogs.
Slope stability	Contractor to stabilise slopes before planting.
Views	Ensure tree plantings will not obstruct key views.
Mature Coral trees in lower section	Retain Coral Trees in the short-term but monitor and ensure that no green waste is disposed of on-site. Remove Coral Trees as alternative winter-flowering trees mature.
Existing remnant Ficus rubiginosa	Retain and protect Ficus rubiginosa.
Access to rear gardens of Carlisle Street properties	Retain access to these properties through new plantings.
Oleanders planted in boundary zone of 14 Tamarama Marine Drive	Work with owners to substitute local species for Oleanders.
Informal gardening practices	Educate local residents to ensure they don't plant weeds and minimise their use of pesticides and fertilisers. Develop Native Haven's program to encourage residents to plant indigenous plants and provide habitat in their gardens.
Flooding of drainage channel	Council's stormwater/Environmental Engineer to resolve flooding and examine option of harvesting stormwater runoff at end of stream where it releases into the parkland at the bottom of the steps.

Landscape Unit: 2I	
Priority: Low	
Grassed strip(adjoining path behind houses)	
Issues	**Recommended Management Actions**
Mowing	Remove turf and establish indigenous shrub and ground cover plantings.
	Engage residents of adjacent properties in the project
Weeds	Integrated weed control program based on monthly, site-wide coverage. Target noxious weeds first, then environmental weeds.
Views	Ensure tree plantings will not obstruct key views.
Lack of biodiversity	Plant out with a range of Coastal Heath species from Zone 2 list.
Domestic cats	Educate residents to control cats, especially at night.
Landscape Units: 2J and 2K	
Priority: Low	
Vegetated slope with cave and rock ledges	
Issues	**Recommended Management Actions**
Severe weed infestation in places	Prevent noxious and environmental weeds from spreading while undertaking works in other parts of the park.
Young Coral Trees	Remove (young) Coral Trees in accordance with Waverley's Tree Management Plan and Tree Preservation Order.
Species of plantings	Retain mature plantings of Lophostemon confertus but replace with Coastal Heath species from Zone 2 list when they die
Heritage steps leading to cave	Remove overgrown vegetation to open up access to cave.
	Maintain/repair heritage steps and cave area. Remove rubbish.
	Install new path/steps to provide access from gully floor.
	Install interpretative signage.

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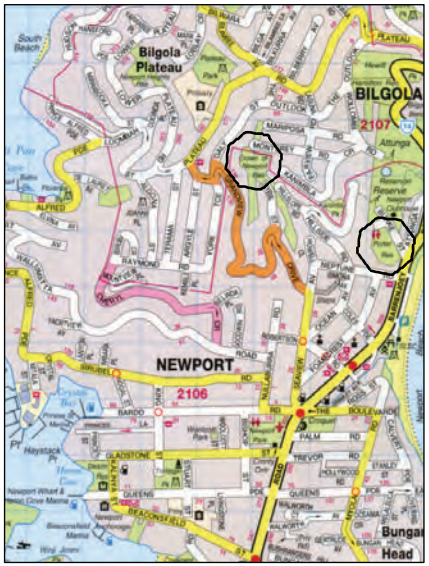
LANDSCAPE MANAGEMENT UNIT 2H-2K

ZONE 3 - LITTORAL RAINFOREST CASE STUDY



Location of littoral Rainforest in Pittwater

Examples of remnant Littoral Rainforest south of Sydney Harbour are uncommon unless one travels to the Royal National Park. Some good examples of Littoral Rainforest, which share similar biophysical conditions (aspect, elevation, distance from the sea, geology, slope, soil depth and drainage) to that of Tamarama Park can be seen in Newport within the Pittwater Council LGA at the Crown of Newport Reserve (at the end of Hillslope Road) and the Crown to the Sea Bushwalk behind Porter Reserve (at end of Burke Street). Although degraded these make good models for the restoration of Tamarama Park because they clearly demonstrate the species and experiential quality of Littoral Rainforest. Pittwater Council is currently restoring their patches of Littoral Rainforest and have skills and expertise that 0will be very helpful for Waverley Council (Pittwater Council Factsheet - undated).

The dominant canopy species observed were:
Acmena smithii, Banksia integrifolia, Eucalyptus botryoides, Ficus rubiginosa, Glochidion ferdinandii, Livistona australis, Pittosporum undulatum.

The dominant understorey species observed were:
Cissus spp., Cyathea cooperi / australis, Doodia aspera, Livistona australis (juveniles), *Lomandra longifolia.*

A list of common species in Pittwater's Littoral Rainforest can be found at:
http://www.pittwater.nsw.gov.au/__data/assets/pdf_file/0014/35132/Pittwater_Littoral_Rainforest_Brochure_-_final.pdf

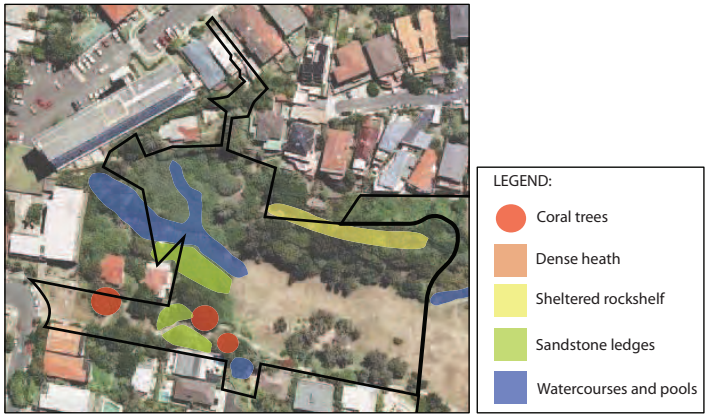

Littoral Rainforest at Porters Reserve, Newport





Littoral Rainforest at Porters Reserve, Newport

HABITAT RECOMMENDATIONS



Map of Potential Habitat for Lizards, Birds & Frogs

RECOMMENDATIONS
Small ponds can be created at stormwater outlets for Striped Marsh Frogs (*Limnodynastes peronii*) and Common Eastern Froglets (*Crinia signifera*).

The creekline should be improved to establish habitat for Stoney Creek Frogs (*Litoria wilcoxi)* and Eastern Dwarf Tree Frogs (*Litoria fallax)*.

The prime reptile species of concern is the Pale-lipped Shadeskink (*Saproscincus spectabalis).* This species has such a small range in Sydney that it needs all the help that it can get. It utilises rocky ledges and feeds in leaf litter and undergrowth but it also needs areas where it can sun itself without being unduly exposed to predators. Sandstone ledges area in the south-west corner of the park could be developed as habits (providing the weed cover is removed or controlled). Other areas along the sandstone exposures around the park can also be developed to assist this species.

Two other reptile species should be targeted: Eastern Water Skink (*Eulamprus quoyii)* and the Southern Leaf-tailed Gecko (*Phyllurus platurus*). Eastern Water Skink (*Eulamprus quoyii)*: can be assisted by weed removal around the water course and stormwater pond areas. Southern Leaf-tailed Gecko (*Phyllurus platurus):* can be assisted by the control of weeds along the northern sandstone areas of the park.

Rainbow Lorikeets (*Trochoglossus haematodus*) are a feature of the area and rely on the Coral Trees as a food resource in winter. These trees should be sequentially removed and replaced with winter-flowering *Eucalyptus robusta*.

ZONE 3 - SECTION

Restoration of Gully Littoral Rainforest:

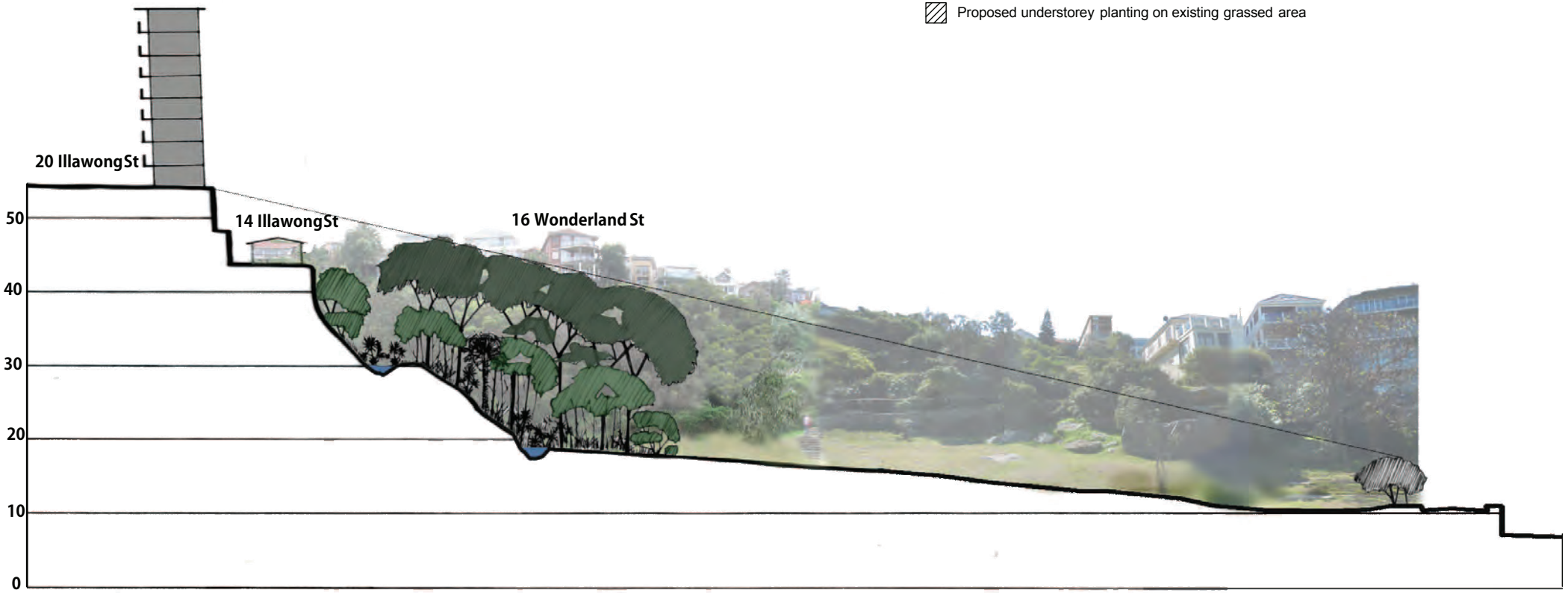
1. Establish dense tree canopy at the western end of the gully, with the aim of shading out weeds, establishing shade and shelter and replacing Coral Trees as a winter food source for birds (eg. *Eucalyptus robusta*). Tree species for this first stage of work would be selected for their ability to withstand the salt-laden winds and their flowering times.

2. During the period of establishment, weeds will need to be controlled but not necessarily removed in all cases. This will allow existing habitat (Lantana and Erythrina spp.) elsewhere in the park to remain until vegetation that replaces its habitat value has been established. Provided it is prevented from setting seed, Buddleia need not be removed completely prior to the next planting stages.

3. Once the tree canopy is established (approximately five years) rainforest understorey species can be planted.

Proposed littoral rainforest

Proposed understorey planting on existing grassed area



East West Section through Tamarama Gully NTS

BioDesign

BioDesign & Associates Pty Ltd ABN 47 100 757 342
PO Box 1685 RozelleNSW 2039
phone 9810 5500 | fax 9810 5599
email admin@biodesign.com.au | www.biodesign.com.au

Project
Tamarama Park
ECOLOGICAL RESTORATION FRAMEWORK AND ACTION PLAN

Address
Tamarama Marine Drive, Tamarama

Client
Waverley Council

Project no. 0299
Drawing no. 16

Drawn AB
Checked SH

Issue A
Date 05/12/2010

Scale na

North

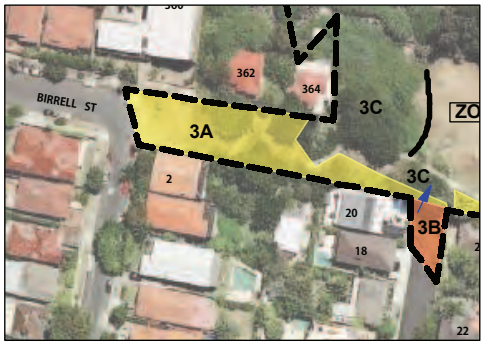
Drawing
ZONE 3 - SECTION

ZONE 3 - RECOMMENDED PLANT LIST (LITTORAL RAINFOREST)

GENERAL RANGE	SPECIES NAME	COMMON NAME	REFERENCE
North from	**Trees (6m+)**		
Widespread	*Acmena smithii*	Lilly Pilly	Hirschfeld 1998 - planted? www.environment.nsw.gov.au
Widespread	*Acronychia oblongifolia*	White Aspen	www.environment.nsw.gov.au
Widespread, flowers January-June?	*Banksia integrifolia subsp. integrifolia*	Coastal Banksia	Hirschfeld 1998 - planted? www.environment.nsw.gov.au
Widespread	*Cryptocarya glaucescens*	Jackwood	www.environment.nsw.gov.au
Widespread	*Cryptocarya microneura*	Murrogun	www.environment.nsw.gov.au
Widespread	*Cyclophyllum longipetalum (formerly Canthium coprosmoides)*	Coastal Canthium	www.environment.nsw.gov.au
Widespread	*Dendrocnide excelsa*	Giant Stinging Tree	www.environment.nsw.gov.au
Widespread	*Ehretia acuminata*	Koda	www.environment.nsw.gov.au
Widespread	*Elaeodendron australe (formerly Cassine australis)*	Red Olive Berry	www.environment.nsw.gov.au
Widespread	*Eucalyptus tereticornis*	Forest Red Gum	www.environment.nsw.gov.au
Widespread	*Ficus rubiginosa*	Port Jackson Fig	www.environment.nsw.gov.au
Widespread	*Glochidion ferdinandi*	Cheese Tree	Hirschfeld 1998 - planted? www.environment.nsw.gov.au
Widespread	*Livistona australis*	Cabbage Tree Palm	www.environment.nsw.gov.au
Widespread	*Myoporum acuminatum*	Boobialla	www.environment.nsw.gov.au
Widespread	*Notelaea longifolia*	Large Mock-olive	Hirschfeld 1998 - planted? www.environment.nsw.gov.au
Widespread	*Pittosporum undulatum*	Sweet Pittosporum	www.environment.nsw.gov.au
Sydney	*Melaleuca quinquenervia*	Broad-leaved Paperbark	www.environment.nsw.gov.au
Illawarra	*Cupaniopsis anacardioides*	Tuckeroo	www.environment.nsw.gov.au
Illawarra	*Melicope micrococca*	White Euodia	www.environment.nsw.gov.au
Illawarra	*Pararchidendron pruinosum var. pruinosum*	Snow Wood	www.environment.nsw.gov.au
Illawarra	*Celtis paniculata*	Native Celtis	www.environment.nsw.gov.au
Illawarra	*Diospyros pentamera*	Myrtle Ebony	www.environment.nsw.gov.au
Illawarra	*Pisonia umbellifera*	Birdlime Tree	www.environment.nsw.gov.au
Illawarra	*Planchonella australis*	Black Apple	www.environment.nsw.gov.au
Illawarra	*Syzygium oleosum*	Blue Lilly Pilly	www.environment.nsw.gov.au
Ulladulla	*Synoum glandulosum*	Scentless Rosewood	www.environment.nsw.gov.au
Batemans Bay	*Diospyros australis*	Black Plum	www.environment.nsw.gov.au
Jervis Bay	*Podocarpus elatus*	Plum Pine	www.environment.nsw.gov.au
Jervis Bay	*Polyscias elegans*	Celery Wood	www.environment.nsw.gov.au
Jervis Bay	*Scolopia braunii*	Flintwood	www.environment.nsw.gov.au
Jervis Bay	*Wilkiea huegeliana*	Veiny Wilkiea	www.environment.nsw.gov.au
Ulladulla	*Endiandra sieberi*	Hard Corkwood	www.environment.nsw.gov.au
Ulladulla	*Litsea reticulata*	Bolly Gum	www.environment.nsw.gov.au
Batemans Bay	*Archontophoenix cunninghamiana*	Bangalow Palm	www.environment.nsw.gov.au
Batemans Bay	*Duboisia myoporoides*	Corkwood	www.environment.nsw.gov.au
Batemans Bay	*Guioa semiglauca*	Guioa	www.environment.nsw.gov.au
Batemans Bay	*Rhodamnia rubescens*	Scrub Turpentine	www.environment.nsw.gov.au
Bega	*Claoxylon australe*	Brittlewood	www.environment.nsw.gov.au
Bega	*Ficus obliqua*	Small-leaved Fig	www.environment.nsw.gov.au
Bega	*Sarcomelicope simplicifolia*	Yellow Aspen	www.environment.nsw.gov.au
Gully slopes, flowers late summer to autumn	*Eucalyptus gummifera*	Red Bloodwood	BioDesign/Arthur White suggestion
Gully bottom, flowers June to November, to replace Coral trees	*Eucalyptus robusta*	Swamp Mahogany	BioDesign/Arthur White suggestion

North from	Small Trees & Shrubs (~1.5 - 6m)	Common Name	Reference
Widespread	*Acacia binervata*	Two-veined Hickory	www.environment.nsw.gov.au
Widespread	*Breynia oblongifolia*	Coffee Bush	www.environment.nsw.gov.au
	Elaeocarpus reticulatus		Hirschfeld 1998 - planted?
Widespread	*Eupomatia laurina*	Bolawarra	www.environment.nsw.gov.au
Widespread	*Ficus coronata*	Sandpaper Fig	www.environment.nsw.gov.au
Widespread	*Myrsine variabilis (formerly Rapanea variabilis)*	Rapanea	www.environment.nsw.gov.au
Widespread	*Pittosporum multiflorum*	Orange Thorn	www.environment.nsw.gov.au
	Pittosporum undulatum		Hirschfeld 1998
Widespread	*Planchonella cotinifolia var. cotinifolia*	Yellow Lemon	www.environment.nsw.gov.au
Sydney	*Cordyline stricta*	Narrow leaved Palm-lily	www.environment.nsw.gov.au
Illawarra	*Alyxia ruscifolia*	Prickly Alyxia	www.environment.nsw.gov.au
Batemans Bay	*Syzygium australe*	Brush Cherry	www.environment.nsw.gov.au
	Ferns		
Widespread	*Arthropteris tenella*	Arthropteris	www.environment.nsw.gov.au
Widespread	*Asplenium australasicum*	Birds Nest Fern	www.environment.nsw.gov.au
Widespread	*Doodia aspera*	Prickly Rasp Fern	www.environment.nsw.gov.au
	Grasses		
Widespread	*Lomandra longifolia*	Spiny-headed Mat-rush	www.environment.nsw.gov.au
Widespread	*Oplismenus imbecillis*	Basket Grass	www.environment.nsw.gov.au
	Herbs		
Widespread	*Viola banksii*	Native Violet	www.environment.nsw.gov.au
Illawarra	*Dioscorea transversa*	Native Yam	www.environment.nsw.gov.au
Illawarra	*Pollia crispata*	Pollia	www.environment.nsw.gov.au
	Epiphytes		
Widespread	*Platycerium bifurcatum*	Elkhorn	www.environment.nsw.gov.au
	Vines and Scramblers		
Widespread	*Cissus hypoglauca*	Water Vine	www.environment.nsw.gov.au
Widespread	*Eustrephus latifolius*	Wombat Berry	www.environment.nsw.gov.au
Widespread	*Geitonoplesium cymosum*	Scrambling Lily	www.environment.nsw.gov.au
Widespread	*Glycine clandestina*	Twining Glycine	www.environment.nsw.gov.au
Widespread	*Morinda jasminoides*	Sweet Morinda	www.environment.nsw.gov.au
Widespread	*Pandorea pandorana*	Wonga Wonga Vine	www.environment.nsw.gov.au
Widespread	*Ripogonum album*	White Supplejack	www.environment.nsw.gov.au
Widespread	*Smilax australis*	Lawyer Vine	www.environment.nsw.gov.au
Widespread	*Stephania japonica var. discolor*	Snake Vine	www.environment.nsw.gov.au
Widespread	*Trophis scandens subsp. scandens*	Burny Vine	www.environment.nsw.gov.au
Sydney	*Flagellaria indica*	Whip Vine	www.environment.nsw.gov.au
Illawarra	*Cayratia clematidea*	Native Grape	www.environment.nsw.gov.au
Jervis Bay	*Cissus sterculiifolia*	Yaroong	www.environment.nsw.gov.au
Ulladulla	*Maclura cochinchinensis*	Cockspur Thorn	www.environment.nsw.gov.au
Ulladulla	*Smilax glyciphylla*	Native Sarsparilla	www.environment.nsw.gov.au
Bega	*Cissus antarctica*	Kangaroo Vine	www.environment.nsw.gov.au
Bega	*Parsonsia straminea*	Common Silkpod	www.environment.nsw.gov.au
Bega	*Piper novae-hollandiae*	Giant Pepper Vine	www.environment.nsw.gov.au

LANDSCAPE MANAGEMENT UNITS 3A & 3B



Landscape Unit: 3A	
Priority: High to Medium (due to visual impacts at entrance to park)	
Birrell Street Road Reserve	
Issues	**Recommended Management Actions**
Visual clutter and lack of biodiversity at top entrance to park	To the top entrance (flat area at the end of Birrell Street) remove grass and revegetate with Littoral Rainforest species from Zone 3 plant list.
Overhead wires	Underground wires and install new lighting (if not possible, do not plant tall trees under wires).
Informal gardening in road reserve	Engage local residents in the revegetation project and remove informal retaining walls & exotic plantings.
Stormwater runoff and soil erosion	Council's Stormwater /Environmental Engineer to prevent excess water flow & stabilise watercourses (see Techniques - 2, Sheet 38)
Coral trees	Remove (young) Coral Trees in upper section (near top of path) in accordance with Waverley's Tree Management Plan and Tree Preservation Order.
Weeds including Cannas	Integrated weed control program based on monthly, site-wide coverage. Target noxious weeds first, then environmental weeds.
	Prevent Cannas from spreading in the first two years but undertake complete removal before revegetation proceeds.
Loss of biodiversity	To sloped area, contractors to remove grass, control weeds, stabilise soil, spread mulch and plant with Littoral Rainforest species from Zone 3 plant list.
Fill and vegetation over rock formations	Remove fill and expose underlying rock formations where possible.
	Maintain vegetation-free rock platforms for reptile habitat.
Access to private properties	Maintain visual access to private properties.
Exotic plants from private properties overhanging paths and landscape areas	Engage local residents in the revegetation project, educate them about garden escapes and remove overhanging material/plants. Develop 'Native Havens' program to encourage residents to plant indigenous plants and provide habitat in their gardens.
Landscape Unit: 3B	
Priority: Medium	
End of Ashley Street	
Issues	**Recommended Management Actions**
Proximity to houses	Engage nearby local residents in project.
Weeds	Remove weeds before revegetating.
	Negotiate with owners of 283 Wolaroi Cres.to remove tall Date Palm from garden adjoining park.
Overhead wires	Do not plant tall trees under wires.
Steep slopes	Stabilise soils as necessary.
Plantings of exotic trees	Remove exotic plantings and mulch and plant with Littoral Rainforest species from Zone 3 plant list.
Habitat values	Establish habitat for frogs by creating low weir across drainage channel.
	Maintain vegetation-free rock platforms for reptile habitat.
Adjacent to access path from Ashley St	Maintain clear sightlines and access along path by pruning vegetation.

BioDesign
BioDesign & Associates Pty Ltd ABN 47 100 717 342
PO Box 1685 Rozelle NSW 2039
phone 9810 5500 | fax 9810 5599
email admin@biodesign.com.au | www.biodesign.com.au

Project
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ECOLOGICAL RESTORATION FRAMEWORK AND ACTION PLAN

Address
Tamarama Marine Drive, Tamarama

Client
Waverley Council

Project no. 0299
Drawing no. 15

Drawn AB
Checked SH

Issue A
Date 05/12/2010

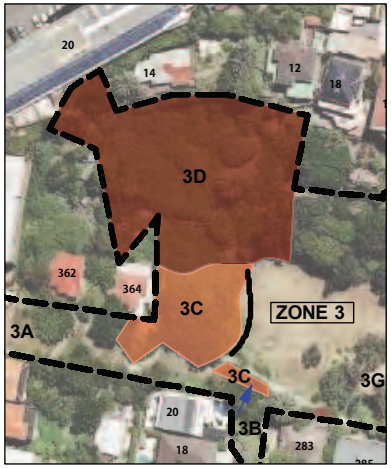
Scale na

North

Drawing
LANDSCAPE MANAGEMENT UNITS 3A & 3B

Sheet
34

LANDSCAPE MANAGEMENT UNITS 3C, 3D



Landscape Unit: 3C	
Priority: High to Medium	
Slope below 364 Birrell Street and end of Ashley Street	
Issues	**Recommended Management Actions**
Weeds	Integrated weed control program based on monthly, site-wide coverage. Target noxious weeds first, then environmental weeds.
	Control weeds around planted canopy trees while they are establishing. Remove remaining weeds when revegetation works proceed.
Overhead wires	Underground wires if possible.
Mature Coral trees	Remove Coral trees under wires at end of Ashley Street (in accordance with Waverley's Tree Management Plan and Tree Preservation Order) and replace with lower-growing Littoral Rainforest species from Zone 3 list that will not require pruning.
	Retain other Coral Trees in the short-term but remove as alternative winter-flowering trees mature. Prevent new Coral Trees from establishing in the interim.
Loss of biodiversity	Revegetate area below 364 Birrell St. in two stages:
	1. Contractors to selectively clear weeds and plant canopy trees of Littoral Rainforest species from Zone 3 list.
	2. Once shade is established (approx. 5 years), remove remaining weeds, spread mulch and plant with understorey species.
Slope stability	Stabilise slopes as necessary during revegetation process.
Stormwater runoff and soil erosion	Council's stormwater / Environmental Engineer to prevent excess water flow and stabilise watercourses (see Techniques - 2, Sheet 38.)
Habitat for reptiles	Clear weeds off rock platforms and retain as open sunny areas for reptile habitat. Ensure that Littoral Rainforest plantings do not shade these areas out.
Views	Plant taller trees at base of gully and small trees near top of gully to retain ocean views from surrounding houses and flats (see Sheet 32).

Landscape Unit: 3D	
Priority: High to Medium	
Slope below 364 Birrell Street and end of Ashley Street	
Issues	**Recommended Management Actions**
Difficult, unknown site conditions	Develop detailed strategies as area opened up.
Heritage paths and steps to waterfall	Open up and repair existing paths and steps (use recycle dumped material where possible).
Dumping in creek bed (old concrete slabs and sandstone from former structures)	Remove dumped material and recycle on site for paving and low walling if possible.
Safety barrier to stormwater inlet at base of waterfall	Explore alternatives to fencing such as a low sandstone wall 600mm high with low, informal planting.
Stormwater runoff and soil erosion	Council's Stormwater / Environmental Engineer to prevent excess water flow and stabilise watercourses (see Techniques - 2, Sheet 38.)
Stormwater from private residences	Council's Stormwater /Environmental Engineer to work with residents to provide alternative solution.
Weeds	Integrated weed control program based on monthly, site-wide coverage. Target noxious weeds first, then environmental weeds, vines and Buddleia.
	Control weeds around planted canopy trees while they are establishing. Remove remaining weeds when revegetation works proceed.
Weeds on adjacent private properties	Work with adjacent private property-owners to coordinate weed control (noxious and environmental weeds) and new plantings.
Loss of biodiversity	Revegetate area in two stages:
	1. Contractors to selectively clear weeds and plant canopy trees of Littoral Rainforest species from Zone 3 list.
	2. Once shade is established (approx. 5 years), remove remaining weeds, spread mulch and plant with understorey species.
Slope stability	Stabilise slopes as necessary during revegetation process.
Views	Plant taller trees at base of gully and small trees near top of gully to retain ocean views from surrounding houses and flats (see Sheet 32).

BioDesign
BioDesign & Associates Pty Ltd ABN 47 100 717 342
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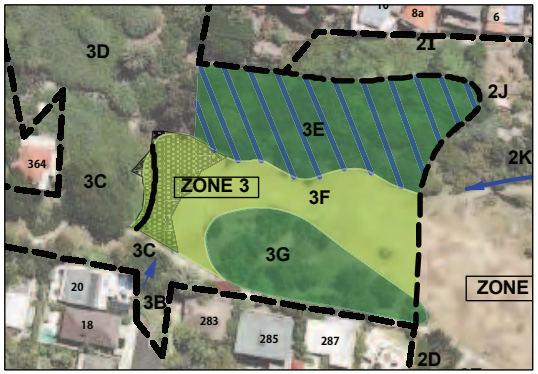
North

Drawing
LANDSCAPE MANAGEMENT UNITS 3C & 3D

Sheet 35

LANDSCAPE MANAGEMENT UNITS 3E, 3F & 3G



Landscape Unit: 3E	
Priority: High	
Forested area on northern slope of gully	
Issues	**Recommended Management Actions**
Mature indigenous tree plantings with a few exotic / native species	Retain indigenous and native trees and remove exotic specimens over time. As trees senesce, replace with Littoral Rainforest species from Zone 3 list.
Unsustainable weed control and mowing	Remove grass, weeds and non-indigenous understorey species, spread mulch and plant out with Littoral Rainforest understorey species from Zone 3 list.
Informal gardening	Educate adjoining property owners to prevent further informal gardening.
Weeds on adjacent private properties	Work with adjacent private property-owners to coordinate weed control (noxious and environmental weeds) and new plantings. Develop 'Native Havens' program to encourage residents to plant indigenous plants and provide habitat in their gardens.
Landscape Unit: 3F	
Priority: High (western end near waterfall)	
Gully Floor (grassed)	
Issues	**Recommended Management Actions**
Fill over former creek bed and the undergrounding of stormwater	Council Stormwater /Environmental Engineer to consider options to open up creek system in the long-term.
Weeds in turf	Control weeds in turf.
Watering of turf	Harvest rainwater / stormwater for irrigation of turf during dry periods.
Loss of wind protection in Zone 3.	Remove approx. 500 sq. metres grass at end of gully, mulch area and plant with tall Littoral Rainforest tree species from Zone 3 list to reinforce plantings and increase shelter to Areas 3C and 3D.
Access to waterfall from Birrell Street path	Construct new path across gully floor to link Birrell Street path to heritage path beside waterfall (see curved solid line).
Landscape Unit: 3G	
Priority:	
Indigenous trees and mixed shrub plantings in grass or garden bed	
Issues	**Recommended Management Actions**
Senescent trees	Retain sound, healthy trees in grass or trees and shrubs in mulched garden bed.
	Remove dead / dying trees and add new trees from Littoral Rainforest species list for Zone 3.
	Monitor mature trees regularly.
	Control weeds.
Selection of understorey species	Remove non-indigenous understorey species as other plantings become established.
Lack of biodiversity	Increase numbers and diversity of understorey species from Littoral Rainforest species list for Zone 3.

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Drawing
LANDSCAPE MANAGEMENT UNITS 3E - 3G

TECHNIQUES

Soil stabilisation
Ensure that any stormwater runoff above the park is redirected away from the slopes that are to be revegetated.
Use simple, sustainable, non-engineered methods wherever possible.
Where drainage channels need stabilisation, use recycled stone and concrete as detailed.
Use only sandstone in retaining walls, paving or edging.
Soil stabilisation in revegetated areas shall be done using staggered recycled logs or coir logs as detailed.

Weed Removal
Do not overclear (to minimise erosion).
Minimise soil disturbance through sensitive works practices.
Employ best practice bushland regeneration/management methods.

Soil Improvement
Wherever possible work to improve the existing soil, using the plants themselves and applied mulch to create new topsoil over time.
Only remove soil from site if it is contaminated.
If imported soil is required use only clean, crushed sandstone from a reputable source.

Planting
Planting works are best carried out after rain when the soil is moist but not water-logged.
Do not plant in mid-summer (December, January and February) or during hot, windy periods at other times.
Plant material shall be in squat tube, viro-cells, tubestock or 150mm size for all plants except for tree species in Zone 3 where 200mm pot size may be used.
Plant material shall be healthy, vigorous and not root-bound.
Allow to plant 5 plants per square metre, with a mixture of trees, shrubs and understorey plants to ensure layers of growth and biodiversity. For every 4 sq. metres, allow 2 trees, 8 shrubs and 10 understorey plants.
Plant trees in groups, with centres as close as 300mm in places.
Plant irregularly (not in rows) and in small clumps plant three to five
Overplant trees by at least 25% to ensure that a large number survive.

Fertiliser
Apply a root conditioner equivalent to 'Seasol' at the time of planting to be applied at the manufacturer's recommended rates.

Mulching
Mulch shall be aged, weed-free recycled leaf litter / tree loppings.
Allow any fresh mulch to be stockpiled on site and aged for at least 6 weeks before using.
In areas where weeds are particularly difficult to remove apply thick layers of wet newspaper before mulching.
Spread mulch at a depth of 75mm to all revegetated areas. No mulch to Remnant Coastal Heath area zone 2A.

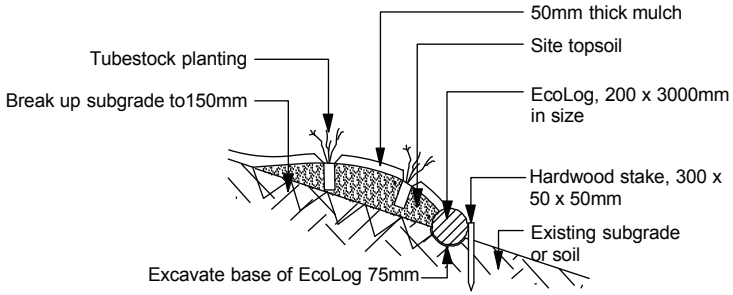
Staking
Provide 1 no. only hardwood marker stake 50x50 x 600 mm for every tree and tall shrub (no ties).

Protective Fencing
Install temporary protective fencing of star-pickets and wire in areas vulnerable to damage by pedestrian movement.
Install signage at same time to notify residents of the problem.

Watering
Deep water immediately after planting.
Water for establishment purpose only - water after 1 week, then 2 weeks then one month if the weather is dry.
Watering may not be required in wet weather.

Maintenance
Maintain the revegetated areas in a weed-free and rubbish free condition.
Regularly replace any plants that die; keep spare stock on order to ensure that supplies are always available.
Do not replace species that do not thrive in the same location.
Top up mulch regularly to ensure that revegetated areas well-mulched at all times.
If young plants show signs of yellowing apply iron sulfate at the manufacturer's recommended rates.

INDICATIVE EROSION CONTROL



INDICATIVE ECOLOG EMBANKMENT STABILISATION
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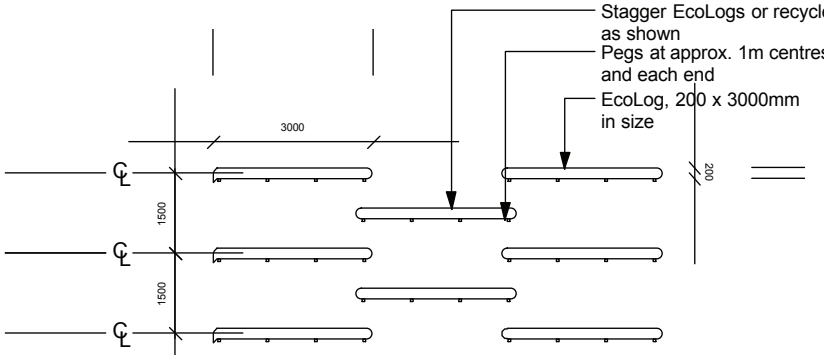

INDICATIVE EMBANKMENT STABILISATION
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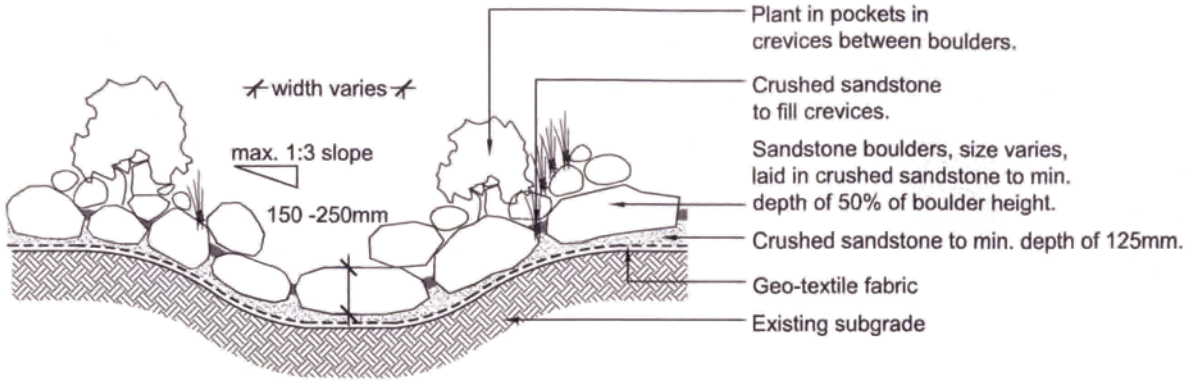
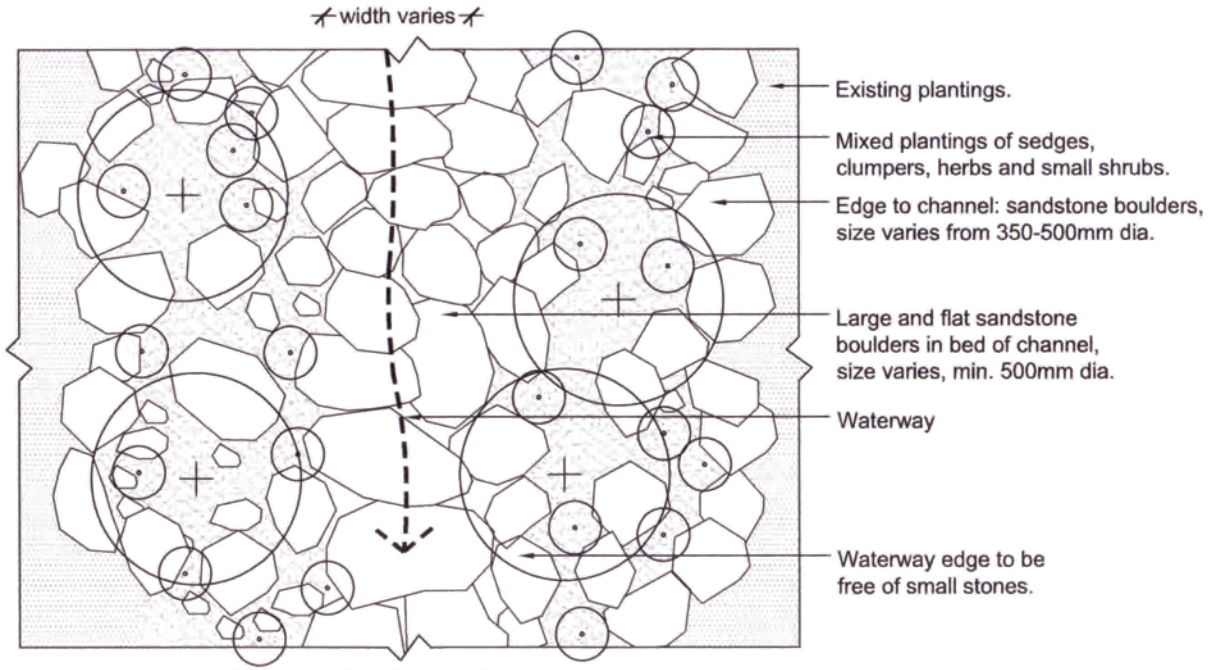
TECHNIQUES

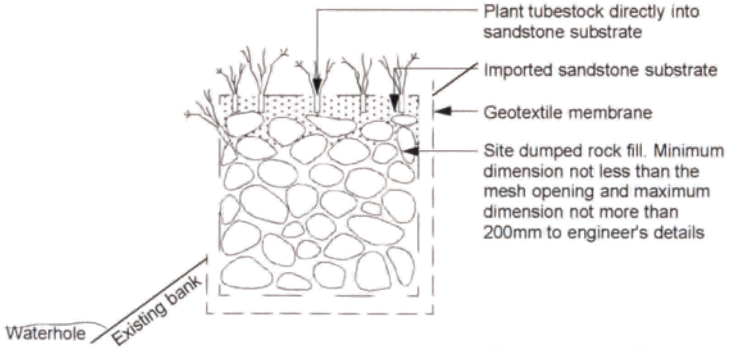


1 INDICATIVE DRAINAGE/ EROSION CONTROL DETAILS SCALE 1:25
SECTION



Note: All proposed works are to be approved by Council's engineer.

2 INDICATIVE DRAINAGE/ EROSION CONTROL DETAILS SCALE 1:25
PLAN



INDICATIVE GABION RETAINING WALL USING ONSITE ROCK FILL
SECTION scale N.T.S.

TARGETS AND MEASURABLE OUTCOMES

The Targets and Measurable Outcomes for Zones 2 and 3 are listed in the table below (note that recommendations for Zone 1 are part of a separate project by Waverley Council and are not included in this Action Plan). Refer to map in Sheet 23: Landscape Management Units for clarification of the three zones.

TARGET	MEASURABLE OUTCOMES		
	Short-term (0 - 2 years)	**Medium (3 - 6 years)**	**Long-term (7 - 10 years)**
1. ECOLOGICAL PRACTICES			
A. Existing vegetation			
1. Remnant indigenous vegetation is maintained or improved in comparison to the 2009/2010 Flora survey levels.	A program for bush regeneration works in unit 2A is in place and operational funds are allocated.	A program for bush regeneration works in unit 2A continues and operational funds are allocated.	Maintenance of unit 2A is decreasing because plantings in units 2B, 2C,2D and 2E are well established and weed-free, and stormwater is managed.
		Indigenous vegetation in unit 2A is being regularly maintained: weeds are controlled; natural regeneration is occurring; vegetation structure and floristics is representative of coastal heath.	Remnant vegetation in unit 2A is healthy and vigorous - species richness has increased, all appropriate vegetation layers are present, there are no adverse impacts from weeds, natural regenerative processes are occurring.
2. Existing framework of native and indigenous trees are retained where possible. No trees present high or medium risks to users of the park.	A tree risk management plan has been prepared for all mature trees in the park, operational funds have been allocated and the work implemented by an Arborist.	The tree risk management plan continues to be implemented by Council and no trees present high or medium risks to users of the park.	The tree risk management plan continues to be implemented by Council and no trees present high or medium risks to users of the park.
3. Coral Trees are removed over time in accordance with Council's Tree Management Plan and Tree Preservation Order and replaced by indigenous winter-flowering species.	Seeding and young Coral Trees have been removed from areas 2H, 2J and 3A in accordance with Council's Tree Management Plan and Tree Protection Order.	Coral Trees are being progressively removed in accordance with Council's Tree Management Plan and Tree Preservation Order.	All Coral Trees have been removed in accordance with Council's Tree Management Plan and Tree Protection Order.
	Planting of winter-flowering trees to replace Coral Trees has been completed throughout park.	All indigenous winter-flowering trees that replace Coral Trees are healthy and vigorous.	Indigenous winter-flowering trees are well-established and Coral Trees have been removed.
4. Plantings of non-indigenous shrub species (such as Coprosma and New Zealand Flax) are removed.	Non-indigenous shrub species (such as Coprosma and New Zealand Flax) are removed in units 2F, 3E and 3G.	Non-indigenous shrub species (such as Coprosma and New Zealand Flax) are removed from the rest of the park.	All non-indigenous shrub species (such as Coprosma and New Zealand Flax) have been removed.
B. Water			
1. Stormwater in the Tamarama Park sub-catchment is being managed in accordance with legislation and best practice drawing on all available sources of funding.	Operational funds have been allocated, the Stormwater Consultant has undertaken an initial assessment of the stormwater and erosion issues in the park and resolved stormwater issues in units 2A, 2B, 2D, 3A and the waterfall in 3D. Additional sources of funding have been identified and applied for.	Operational funds have been allocated and the Stormwater Consultant has resolved stormwater issues in units 2H and 2K.	All stormwater and erosion issues in the park have been resolved.
2. Watercourses are visible, contain indigenous plants in riparian zones and are free of rubbish.	Watercourses in units 3C and 3D are visible, free of weeds and planted with indigenous riparian species (refer to drainage map Sheet 09). Rubbish is prevented from entering the site via stormwater and is regularly removed from site.	Watercourses in units 2H and 2K are visible, free of weeds and planted with indigenous riparian species (refer to drainage map Sheet 09). Rubbish is prevented from entering the site via stormwater and is regularly removed from site.	All watercourses are visible, free of weeds and planted with indigenous riparian species. Rubbish is prevented from entering the site via stormwater and is regularly removed from site.
3. Pedestrian access to the main waterfall in unit 3D is provided via the heritage path.	Path access to the main waterfall in unit 3D via the heritage path and steps has been completed.	Path access to the main waterfall in unit 3D is well-maintained.	Path access to the main waterfall in unit 3D is well-maintained.
4. The stormwater inlet at the base of the waterfall is safe.	An unobtrusive protective barrier around the stormwater inlet at the base of the waterfall has been completed.	The protective barrier around the stormwater inlet at the base of the waterfall is being maintained.	The protective barrier around the stormwater inlet at the base of the waterfall is being maintained.
C. Soils			
1. Slopes are stabilized, erosion is controlled and sedimentation is minimal.	Slopes prone to erosion in units 2B, 2C and 2D have been stabilized.	Slopes prone to erosion in units 2H, 2J, 2K, 3A, 3B, 3C and 3D have been stabilized.	Slopes prone to erosion throughout park have been stabilized.
2. Soils are mulched and healthy, as evidenced by such factors as biological acitvity, smell and successful plant establishment.	New planting areas in units 2B, 2C, 2D, 3A (top entry area), 2F, 3E and 3G are mulched and the plants are healthy and vigorous.	All new planting areas in units 2H, 2I, 2J, 2K, 3A, 3B, 3c and 3D are mulched and the plants are healthy and vigorous.	Soils on the site are healthy, stable and able to support the ecological communities with minimal management.

TARGET	MEASURABLE OUTCOMES		
	Short-term (0 - 2 years)	**Medium (3 - 6 years)**	**Long-term (7 - 10 years)**
D. New plantings (revegetation)			
1. All new plantings are locally indigenous species. Suitable plant material is readily available for the park's planting projects.	Additional sources of funding have been identified and applied for. Seed collection from local sources and plant propagation of indigenous plants by Randwick Nursery have commenced. Hardy coloniser species make up the bulk of plant species in units with no tree cover (units 2B, 2C, 2D and 3A (top entry area). Shade-tolerant species have been grown for units 2F, 3E and 3G.	Seed collection and plant propagation of indigenous plants continue. Hardy coloniser species make up the bulk of plant species with no tree cover (units 2H, 2I, 2J and 2K). Shade-tolerant species have been grown for units 3A (lower area), 3B, 3C and 3D.	Seed collection and plant propagation of a more diverse range of indigenous plants (including more delicate species) for infill planting continue.
	A program for bush revegetation works is in place, operational funds for a second Bushcare team have been allocated and a team established (see 3. Building Community).	A program for bush revegetation works continues and operational funds for the second Bushcare team continue (see 3. Building Community).	A program for bush revegetation works continues and operational funds for the second Bushcare team continue (see 3. Building Community).
2. Two distinctive zones of vegetation are present (Zones 2 and 3). High levels of diversity are present as a result of successful trials of species from the plant lists for each zone.	Planting works in units 2B, 2C, 2D, 3A (top entry area), 2F, 3E and 3G are completed. Units 2E and 2F are well weeded and mulched. Unit 2F has been planted with understorey species.	Planting works in units 2B, 2C, 2D, 3A (top entry area), 2F, 3E and 3G are well-established. Planting works in units 2H, 2I, 2J, 2K, 3A (lower area), 3B, 3C and 3D are completed. Infill planting is being carried out where plant deaths or damage occurs, according to suitability of plant species to a particular location. Range of species trialled increases as microclimate improves.	Zones 2 and 3 are clearly differentiated by the plant communities that occupy them. Plants are healthy, vigorous and species richness is high.
3. Hardy canopy trees are established in the western end of Zone 3 and a rainforest microclimate exists. Tall trees are present in the lower areas that provide food for fauna. Trees in the upper areas do/will not obstruct significant views across the site. Trees do not require pruning for clearance beneath overhead wires.	Shade trees have been planted and mulched in unit 3D and weeds are being controlled around them. Small tree species are planted at upper levels where views are an issue; tall tree species are planted at lower levels (see Section p32). No tall trees are planted under overhead wires.	Shade trees are well-established in unit 3D and are shading out weeds. Plantings in units 3A, 3B and 3C and winter-flowering trees at the western end of unit 3F are well-established. Understorey plantings of indigenous species in unit 3D are completed.	Plantings in units 3A to 3D are healthy and vigorous - all appropriate vegetation layers are present, a high diversity of species is present, there are no adverse impacts from weeds, natural regenerative processes are occurring and trees are not blocking views or interfering with overhead wires.
E. Fauna and Habitat			
1. Areas of prickly shrubs exist and support small birds.	Protective mesh has been added to existing fence along Wolaroi Crescent to prevent dogs from entering units 2A, 2B and 2C.	Habitat values of the site have improved - new habitat is established in units 3A and 3C and existing habitat has been extended and improved in units 2A, 2B and 2C.	Fauna survey shows increased usage of the park by small birds in terms of species and abundance (against baseline data).
2. Aquatic habitat exists along watercourses		Frog habitat is established in units 2H, 2K, 3B and 3D (watercourses) and a pilot project is underway to introduce new frog species.	At least one pilot project for the reintroduction of fauna (eg frogs) is running in Tamarama Park.
			A variety of habitat areas for aquatic fauna exists across the site. Fauna survey shows increased usage of the park by frogs in terms of species and abundance (against baseline data).
3. Rock shelves are exposed in suitable locations for reptile habitat.	Rock ledges in units 2A, 2B and 2C are clear for reptiles to sun themselves.	Rock ledges in units 3A, 3C and 3D are clear for reptiles to sun themselves.	Rock ledges in Zones 2 and 3 are clear for reptiles to sun themselves. Fauna survey shows increased usage of the park by reptiles in terms of species and abundance and reduced numbers of feral pests (against baseline data).
			Key species (Pale-lipped Skink and Leaf-tailed Gecko) are well established on the site.
4. Cats and dogs are controlled by their owners. Feral animals (e.g. rats, foxes) are controlled by Council.	Education program for residents about cat and dog control is funded and in place. Council program to eradicate feral animals (e.g. rats, foxes and birds) is also in place.	Domestic pets do not impact on fauna – dog owners control dogs and clean up after them; cat owners keep cats indoors at night and prevent them from accessing key habitat sites in the park during the day. Feral rats, foxes and birds are controlled.	Impacts on fauna by feral animals (rats, foxes, birds) are continuing to be addressed. Fauna survey shows increased usage of the park by all indigenous fauna in terms of species and abundance (against baseline data).
5. Indigenous winter-flowering tree species are established to replace Coral Trees.	See 1A Existing vegetation - 3. Coral Trees	See 1A Existing vegetation - 3. Coral Trees	See 1A Existing vegetation - 3. Coral Trees

TARGET	MEASURABLE OUTCOMES		
	Short-term (0 - 2 years)	**Medium (3 - 6 years)**	**Long-term (7 - 10 years)**
F. Integrated Weed Control			
1. A Weed Officer has been employed by Waverley Council with responsibilities for developing and over-seeing the implementation of a council-wide weed control strategy that is linked into any regional weed control strategies for Sydney Central Regional Weeds Committee (SCPWC)	Operational funds have been allocated, a Weed Officer has been appointed and an initial assessment of the weed issues in the park within a Council-wide and regional context has been undertaken. Additional sources of funding have been identified and applied for. A weed control program has been developed and is being implemented.	A Council-wide weed control strategy that addresses this Action Plan has been developed and is being implemented. Waverley Council is actively collaborating with Randwick and Woollahra Councils to control of weeds at interfaces of LGA boundaries.	Control of weeds is coordinated across council boundaries, Waverley Council LGA, Tamarama Park sub-catchment and Tamarama Park. Management practices of off-site landscape (including adjoining residences) do not contribute to weed control problems in Tamarama Park.
2. Weed control has been carried out to protect high-value vegetation and prevent further damage to walls and paths.	The weed control program has given high priority to control of weeds in the vicinity of unit 2A and of woody and succulent weeds causing damage to walls and paths and these problems have been controlled.	Areas in the vicinity of unit 2A (units 2B, 2C and 2D) are free of weeds. Walls and paths are free of weeds.	Areas in the vicinity of unit 2A are free of weeds. Walls and paths are free of weeds. Costs of weed control are reduced and walls and paths do not require repair due to impacts of weeds.
3. Noxious weeds are controlled across the site.	Noxious weeds throughout the park are controlled.	The park is free of noxious weeds and on-going control measures are part of routine landscape maintenance activities.	Elimination or low-cost control of noxious weeds is established throughout the Tamarama Park sub-catchment and no off-site sources of weeds threaten the site's ecological communities.
4. Woody environmental weeds are controlled across the site.	Woody environmental weeds are regularly controlled across the site; no mature specimens are present.	No mature woody environmental weeds are present on the site and germination rates are low.	Woody environmental weeds are controlled throughout the Tamarama Park sub-catchment. No mature specimens are present in Tamarama Park, control of juveniles prevents flowering or setting of seed and germination rates from the site's soil are minimal. Costs of weed control have reduced.
5. Succulent and annual weeds are controlled across the site.	Succulent and annual weeds are controlled in units 2B, 2C, 2D, 2E, 2F, 3A (top entry area), 3E and 3G. No mature specimens are present. Regular control is occurring.	Succulent and annual weeds are controlled in all units. Costs of control are reduced. No mature specimens are present and regular control is occurring.	Succulent and annual weeds are controlled throughout Tamarama Park; no mature specimens are present; no flowering specimens are present. Costs of weed control are reduced.
6. Vines and stoloniferous grasses are controlled across the site.	Vines and stoloniferous grasses are controlled in units 2B, 2C, 2D, 2E, 2F, 3A (top entry area), 3E and 3G. No mature specimens are present. Regular control is occurring.	Vines and stoloniferous grasses are contolled in units 2H, 2I, 2J, 2K, 3A (lower area), 3B, 3C and 3D. Germination rates are low and regular control in other units is preventing plant establishment.	The site is free of vines and stoloniferous grasses, germination rates are low and costs of control are reduced.
7. New planting areas, which are located where turf grew previously, are free of turf species.	Units 2C, 3A (top entry area), 3E and 3G are free of turf (grass) species. Areas 2G and 3F (turf) are regularly mown and weeds are not flowering or spreading.	Areas 2G and 3F (turf) are regularly mown and weeds are not flowering or spreading. Units 2H, 2I, 2J, 2K, 3A, 3B and 3C are free of weeds and turf (grass) species.	Areas 2G and 3F (turf) are regularly mown and weeds are not flowering or spreading. All new planting areas are free of turf (grass) species.
G. Sustainability			
1. Existing paths and steps have been stabilised/rebuilt using sustainable means.	Old building materials from the site have been recovered and used to repair paths and steps where possible.	Paths and walls are in safe and good condition and costs of maintenance are low.	Paths and walls are in safe and good condition and costs of maintenance are low.
2. New plantings do/will not obstruct access along paths or interfere with services.	The overhead power lines in the Birrell Street road reserve have been changed by Energy Australia to Aerial Bundled Cabling and new trees (to replace Coral Trees) are planted away from power lines. Low shrubs and ground covers are planted next to paths and steps.	Council parks maintenance staff do not need to prune vegetation. Trees are not pruned to maintain clearance for overhead wires. Shrubs are not pruned next to steps and paths.	Council parks maintenance staff's need to prune vegetation is reduced. Trees are not pruned to maintain clearance for overhead wires. Council does not incur any costs for pruning to provide access or clearance.
3. Green waste is being disposed of or recycled as appropriate.	A protocol is in place for contractors, maintenance staff and Bushcare groups to separate green waste into material that is to be disposed of off-site and material that is to be recycled within the site. Recycled material is classified as either for composting, converting into mulch or use for site stabilisation, edging or habitat (old logs in vegetation thickets.). Areas for composting, mulch production and storage of logs have been identified and are being used. Removal of material for off-site disposal is occurring. Compost. mulch and logs for stabilisation are being used in preference to imported material.	Minimal quantities of green waste are removed from the site. Slope stabilization has been achieved through the use of low cost measures that include using stems of trees from the site. Compost and mulch are sourced from on-site in the first instance. The protocols for green waste management are being followed by all users of the park.	Minimal quantities of green waste are removed from the site. Slope stabilization has been achieved through the use of low cost measures that include using stems of trees from the site. Compost and mulch are sourced from on-site in the first instance. The protocols for green waste management are being followed by all users of the park.

TARGET	MEASURABLE OUTCOMES		
Sustainability contd.	**Short-term (0 - 2 years)**	**Medium (3 - 6 years)**	**Long-term (7 - 10 years)**
4. Plant material is locally sourced wherever possible.	New plantings on the site are from sources in the Sydney bioregion, with high numbers sourced from the Eastern Beaches catchment of Sydney. Nurseries that propagate material from sources as close to the site are to be identified as primary suppliers.	The plantings on the site are from sources in the Sydney bioregion, with high numbers sourced from the Eastern Beaches catchment of Sydney. The plantings on the site are a source of seed and propagules for plant material in the new plantings and elsewhere in Waverley.	The vegetation of Tamarama Park is predominantly plantings of material from sources in the Sydney bioregion, with high numbers sourced from the Eastern Beaches catchment of Sydney. Self-sown material is present. The plantings on the site are a source of seed and propagules for plant material in the new plantings and elsewhere in Waverley.
5. Plant material for new plantings is of the smallest suitable size.	Plant orders do not include any containers greater than 200mm.Containers for all plant material other than trees are less than 200mm.	Plant orders do not include any containers greater than 200mm.Containers for all plant material other than trees are less than 200mm.	Plant orders do not include any containers greater than 200mm.Containers for all plant material other than trees are less than 200mm.
6. Mains water is not used for watering of the site and recycling of water supports the vegetation and reduces stormwater loads.	A Stormwater Consultant has advised Council on opportunities for developing and overseeing water sensitive design in Tamarama Park.	Stormwater is being harvested and reused within the park.	The costs of landscape maintenance in terms of water in Tamarama Park are reduced. Water supply is not a constraint in the management of Tamarama Park. Harvested stormwater is available to water new plantings in the park as feasible following advice from Stormwater Consultant.
7. Links to remnant vegetation beyond the site are improved.	Develop a bushcare program for the remnant vegetation in the coastal landscapes adjoining Tamarama Park. Review Tree Management Plan and Biodiversity studies to address tree plantings that connect Tamarama Park to other sites through the urban forest of Waverley.	Coastal remnants in the vicinity of the site are being cared for by bush regenerators. Increased numbers of indigenous trees are present in the streets and parks. Increased numbers of indigneous plants are present in the front gardens of private properties.	Vegetation in the coastal cliff zones adjoining Tamarama Park is being cared for by bushland regenerators; it is predominantly locally indigenous and is connected to the plantings in Tamarama Park.
8. Weed control is coordinated to link to off-site programs and works.	Development of the weed control program has been in consultation with staff from parks and streetscapes and is linked to their programs for controlling weeds and undesirable species.	Weeds in Tamarama Park are not contributing to weed problems in other parts of Waverley. Street and park tree plantings do not impact on the plantings in Tamarama Park. Control of noxious and enivronmental weeds is regularly occurring in other parts of Tamarama and Waverley. No noxious or mature environmental weeds are present in the Tamarama Park subcatchment.	Tamarama Park and the Tamarama Park sub-catchment are free of noxious and environmental weeds and costs of control are minimal. Weeds from other parts of Waverley and the nearby council areas do not contribute to weed problmes and control costs in Tamarama Park.
2. BUILDING COMMUNITY			
1. Waverley Council and its neighbouring councils are working to manage assets and problems that cross local government boundaries.	Key staff have identified their counterparts in adjoining councils and relevant regional programs affecting the management of Tamarama Park (eg regional weeds committee; Randwick Community Nursery). Working relationships have been established where none existed and joint opportunities identified in relation to this project.	Key council staff meet/consult with their counterparts in relation to activities that include weed control, plant materials, bushcare and stormwater management.	Strong relationships with neighbouring councils and regional groups exist and integration of programs is occurring in support of Tamarama Park and nearby ecological assets.
2. Heritage assets of Tamarama Park are visible and visitors to the park can appreciate them.	An interpretation plan for the heritage paths and other items has been developed by a heritage consultant. The paths have been opened to public access.	Interpretative signage is installed and access to heritage is maintained in accordance with the interpretation plan.	Interpretation of and access to the site's European heritage is established and being well-used.
3. Council's park maintenance staff have the skills to control weeds without damaging indigenous plantings on the site.	The maintenance crew in Tamarama Park has been trained in plant identification (weeds and indigenous species) and weed control, is applying bushland management practices in areas where indigenous plantings are present and supports Bushcare groups.	Council's park maintenance crew for Tamarama Park remains skilled and active in caring for the ecological values of the park.	Council's park maintenance crew for Tamarama Park remains skilled and active in caring for the ecological values of the park.
4. A mobile/temporary storage and meeting shelter ('caravan') is available to support working groups at Tamarama Park.	A 'caravan' has been set up in the park to provide educational and physical support for the projects in Tamarama Park.	The 'caravan' for resourcing works is well-provisioned and functional.	The local community is strongly involved with care of the park and a network of volunteers/Council staff is established.
5. Council maintains regular contact with the community and supports residents through education and notification of activities in the park.	A site on the Waverley council website has been developed to promote and support community involvement in Tamarama Park.	The Tamarama Park website is up-to-date and well-used.	The Tamarama Park website is up-to-date and well-used.
6. Local residents understand the problems with management of non-indigenous plants in domestic gardens and are encouraged to provide habitat in private gardens.	Educational workshops and plantings days have been held and were well attended.	Educational workshops and planting days are regularly held and well attended.	The community is well-educated about responsible landscape management to minimize run-off and weed dispersal. Local residents from the properties that directly access the park are actively participating in different activities in the park.
	The 'Native Havens' Program has been established and resourced.	The 'Native Havens' Program continues to be resourced. A bird-watching group is established, the website has been updated to support them and they contribute to on-line data-collection.	The 'Nature Havens Program continues to be resourced. A fauna monitoring group is established, the website has been updated to support them and they contribute to on-line data-collection.

TARGET	MEASURABLE OUTCOMES		
Building Community contd.	**Short-term (0 - 2 years)**	**Medium (3 - 6 years)**	**Long-term (7 - 10 years)**
7. Local residents participate in the Bushcare activities in the park.	Bushcare is actively promoted by Council. Bushcare group #1 is regularly caring for unit 2A. Bushcare group #2 is established and resourced with with tools & equipment. Volunteers are supervised by suitably qualified staff. Bushcare #2 group takes care of community day plantings in units 2F, 3A (top entry area), 3E, 3F(western end) and 3G.	Bushcare group #1 is regularly caring for units 2A to 2E. Bushcare group #2 is regularly caring for accessible areas in units 2F, 2H-2K, 3A, 3B, 3C, 3E, 3F (western end) and 3G.	Bushcare group #1 is regularly caring for units 2A to 2E. Bushcare group #2 is regularly caring for accessible areas in units 2F, 2H-2K, 3A, 3B, 3C, 3D, 3E, 3F (western end) and 3G.
8. All works on the site by contractors are in accordance with the particular needs of the site that include bushland management and weed control techiques, horticultural management of public spaces, low-cost construction and maintenance of paths, walls and drainage in bushland, and community participation.	It is accepted that works require specialised services and quotations are being invited on the basis of the particular needs of each project. Projects have been coordinated to allow for small specialists working as part of a team. It has been ensured that all contractors guaranteed and delivered the particular expertise required for each project.	A list of contractors whose work has been of a high standard and of the special services they offer is being maintained. Quotations continue to be invited on the basis of the particular needs of each project and allowing for small specialists to work as part of a coordinated team.	Contractors are not expected to be needed in Tamarama Park any longer. However, the list developed through this project is available to similar projects in Waverley.
9. Suitable contractors are readily available to the site at all times.	A list of suitable contractors for the range of services needed is developed in accordance with legal constraints. Names are added to and removed from the list on the basis of ensuring high quality and competitive costs.	A list of contractors whose work is known to be of a high standard is being maintained, with new names added and unsuitable contractors removed.	A list of suitable contractors is maintained for similar projects in Waverley, with new names added and unsuitable contractors removed.
3. ENHANCING EXPERIENTIAL VALUES			
1. The park's plantings are consistent within three vegetation zones and in accordance with the species lists for each zone. Vegetation in Zones 2 and 3 is clearly differentiated - Zone 2 is established as Coastal Heath and Zone 3 is established as Littoral Rainforest with tall, shady trees, palms and ferns.	Short-term targets for 1. Ecological Practices are being addressed through this Action Plan.	Medium-term targets for 1. Ecological Practices are being addressed through this Action Plan.	Targets for 1. Ecological Practices have been met. Educational institutions are aware of the projects that have been undertaken and are proposed in the park and are helping to identify opportunities for research and education.
2. The character of vegetation has a strong sense of place (i.e. belonging to the Sydney coast).	Short-term targets for 1. Ecological Practices are being addressed through this Action Plan.	Medium-term targets for 1. Ecological Practices are being addressed through this Action Plan.	Targets for 1. Ecological Practices have been met. There is strong support for the continued management of the Park without the need for redesign or new works.
3. The park has the character of a "nature reserve".	Short-term targets for 1. Ecological Practices are being addressed through this Action Plan.	Medium-term targets for 1. Ecological Practices are being addressed through this Action Plan.	Targets for 1. Ecological Practices have been met.
4. The park contains a diversity of spaces and natural features that are of high amenity.	A new mulched path across the western end of area 3F links the Birrell St path to the waterfall.The whole site is free of rubbish and fresh litter is regularly removed by contractors, Council staff and 'Bushcare' groups.The cave is accessible and free of litter.	The whole site is free of rubbish and fresh litter is regularly removed. Paths and steps throughout the site are accessible and in good repair.	High level of visitation to the park at all times. The whole site is free of rubbish and fresh litter is regularly removed.
5. The heritage path to the waterfall is opened up and interpreted.	See 2.2	See 2.2. Interpretive signage has been installed at key points.	Interpretive signage and paths are in good condition.
6. New tree plantings do not obstruct views to the sea from paths and from neighbouring houses.	New tree plantings will give consideration for mature heights in relation to surrounding properties.	Problems with vandalism of trees that can be recognised as relating to obstruction of views do not occur in Tamarama Park. Applications to prune trees under the TPO are not received for trees in Tamarama Park. Problems with vandalism of trees that can be recognised as relating to obstruction of views do not occur in Tamarama Park.	Applications to prune trees under the TPO are not received for trees in Tamarama Park. Problems with vandalism of trees that can be recognised as relating to obstruction of views do not occur in Tamarama Park.
7. The Birrell Street entrance is upgraded and planted with indigenous species.	Works are undertaken in this area (see New Plantings and Weed Control).	Plantings are being maintained and successfully establishing. Weeds are controlled.(See New Plantings and Weed Control)	This area contains established indigenous plantings, minimal signage and is maintained free of litter and weeds.

MONITORING

Collecting the baseline data and conducting ongoing monitoring of planting works should be carried out by independent, suitably qualified ecological and fauna consultants. Their input will be required for at least the first 5 years by to ensure that the work proceeds in accordance with the ERFAP and that the desired outcomes are achieved.

Baseline Data

Immediately prior to the commencement of works, baseline data is to be collected. Baseline data shall include a detailed weed survey of the whole site and a series of colour photographs that fully and clearly document every part of the site where works will occur. A site plan which shows the location, angle and date of each photo taken should also be prepared. Photos shall include internal shots as well as those from a range of vantage points around the park, including if possible from the apartments that overlook the western end of the gully. An aerial photo of the site should also be commissioned to enable accurate comparisons to be made over time.

Ongoing Monitoring

Ongoing monitoring of the project of new works should be carried out monthly in the first 2 years, then quarterly for the next 3 years. From Years 6 to 10 monitoring can be a carried out on a six monthly basis. Every year photographs should be taken from the same positions as in the baseline data. Updated aerial photos could be acquired every two to three years. Regular progress reports should be prepared which are distributed to the contractor and Council. An indicative monitoring form is presented below:

Tamarama Park, Tamarama - Monitoring Report

BioDesign

Zone or Landscape Unit No.

Review Period: Stage 1 - July 1st 2010 to June 30th 2011

Assessment date: Assessor:

Aims for this Stage

1. Continued implementation of long-term weed control program
2. Implementation of soil improvement measures, particularly mulching
3. Slope stabilization measures to control erosion.
4. Implementation of planting program including ordering of plant material and commencement of staged planting
5. The site is safe and provides good amenity for its users.

Outcome Sought	Result	Comments
Weeds		
1. Noxious Weeds • Any plants left *in situ* are dead or dying. • No flowering stems or seed heads on the plants. • No established plants of additional species to those surveyed to be present.		
2. Environmental weeds and undesirable species • No flowering stems or seed heads on the plants. • The level of infestation will be lower in each section of the site compared to the baseline data. • Paths are free of weeds.		
Soil		
3. Protection and health • Mulching of the landscape has commenced. • Measures have commenced or been completed in accordance with the methods proposed by the contractor at the start of the contract.		
4. Erosion • If soil erosion is present, the contractor has consulted with Council regarding its control. • For erosion control measures previously advised, checks will be made within 1 week of the date given for their completion.		
Water		
5. Waterfall • Weeds have been cleared along path to waterfall to provide access • Paths and steps to waterfall are safe • Weeds amongs rocks in creekline of waterfall area have been controlled to allow clear views of waterfall		
6. Stormwater • Council's stormwater engineer has identified management issues to be addressed. • Stormwater is being intercepted to prevent soil erosion and to provide habitat.		

Zone No.: Stage No. – Works period

Tamarama Park, Tamarama - Monitoring Report

BioDesign

Outcome Sought	Result	Comments
Plantings		
7. Ordering • Plant orders have been placed with Council		
Safety and Amenity		
8. Plantings • No dead specimens of planted material are left in the landscape. • The contractor will be asked to advise on what measures are in place or are planned and when they will be implemented to deal with dying, yellowing or in other ways unhealthy plants. • Vegetation along paths does not obstruct access. • Sightlines exist along paths and across the site. • Understorey plantings are not too dense where sightlines are important.		
9. Green Waste • No large items of plant material present on the site. • Small dead plants not to be readily visible from paths.		
10. Litter • No weathered items of litter to be present.		
11. Dumped material • No old dumped material to be present.		
12. Reporting of Problems • If problems with furniture, fittings or infra-structure are noted, the contractor has notified Waverley Council's Park's Manager.		

Comments:

Zone No.: Stage No. – Works period

STAGING OF WORKS & INDICATIVE COSTINGS (ZONES 2 and 3)

YEAR 0	CONTRACTORS/ CONSULTANTS	COSTS	COMMUNITY/ BUSHCARE	COSTS	COUNCIL STAFF	COSTS
PLANNING & SUPERVISION					Put together business case for appointing/ training maintenance staff (weed identification & removal techniques plus revegetation techniques) and explore external funding opportunities.	In house
					Establish baseline data of the park including current aerial photo and detailed photos.	In house
					Prepare a consultation plan for program delivery	In house
					Appoint Council Weeds Officer (3 days per week) to begin assessment of weed issues in Tamarama Park and surrounding sub-catchment. Note that this appointment is essential if weed control within park is to be successful long-term.	$42,000 EAP*
	Appoint Stormwater Consultant on casual basis to undertake initial assessment of stormwater and erosion issues in park and provide preliminary costings.	$10,000 EAP*				
					Undertake tree risk hazard /SULE/dilapidation assessment and develop a tree risk management plan for all mature trees in park and investigate correctional pruning and/or possible removal of any trees rated high and medium risk in accordance with Council's Tree Management Plan.	In house
					Establish panel of suitable bush regeneration contractors with a range of expertise including working with the community in public places and constructing simple rock walls, paths and drainage channels.	In house
					Scope opportunities for temporary caravan and equipment to service contractors, residents, Bushcare groups and Council staff (including signage, notice board, tea/lunch facilities, meeting/education space, tool storage plus small fenced area for temporary storage of materials & plants).	In house
					Scope opportunities for establishing Bushcare Group #2 / Civic pride and pockets park group	In house
					Begin community consultation / capacity building through Council's website and advertising aimed at local residents, schools, businesses and Coastal Councils.	$10,000
LANDSCAPE MANAGEMENT UNITS					Investigate locations and management for dog-poo bins at entrances to park.	In house
2A (3,000 sqm)			Continue Bushcare supervision (Bushcare Group #1)	$6,000		
2E (371 sqm)			Continue Bushcare supervision (Bushcare Group #1)	Incl. above	Supply mulch to planted area and remove rubbish as required.	In house
SUBTOTAL		**$10,000 EAP***		**$6,000**		**$42,000 EAP* + $10,000**
TOTAL YEAR 0						**$68,000**

***EAP – item could be funded through Council's Environmental Action Plan. Funding is dependent on the proposed rates variation being successful.**

YEAR 1	CONTRACTORS/ CONSULTANTS	COSTS	COMMUNITY/ BUSHCARE	COSTS	COUNCIL STAFF	COSTS
PLANNING & SUPERVISION			Establish Bushcare Group #2 for gully area (incl. tools, equipment & supervisor 5 hrs/wk) – dependent on Year 0 planning / funding.	$25,000 EAP*	Start internal training for Council dedicated team for revegetation maintenance (weed identification & removal techniques plus revegetation techniques) through courses.	$5,400
	Appoint Arborist on casual basis to remove or prune high and medium risk trees according to tree risk management plan.	$20,000 EAP*				
					Appoint bush regeneration contractors: (1 supervisor + 3 bush regenerators x 3 days/wk x 52 weeks).	In house
					Determine planting lists for each landscape management unit.	In house
					Continue Randwick Council Nursery's program of collecting seed and propagating tubestock plants @ $2.20 ea for areas 2B, 2C, 2D and top of 3A & trees only in 3D.	$35,000
					Install dog-poo bins (allow for 3 no.).	$1,500
					Set up temporary caravan and equipment in gully	$50,000
					Install PVC piping and hose cocks for water services throughout park.	$15,000
					Continue community consultation & education, including promotion of Bushcare Groups #1 and #2.	$10,000
					Investigate 'Native Havens Program' to educate residents about garden practices, native plantings and pets.	In house
					Monitor progress of project and update information.	In house
WEED CONTROL	Control noxious weeds throughout park and environmental weeds such as vines in units 2H, 2J, 2K, 3C and 3D (allow 4 bush regenerators to cover whole site once a month for whole year).	$25,000 EAP*				
LANDSCAPE MANAGEMENT UNITS						
2A (3,000 sqm)			Continue Bushcare supervision (Bushcare Group #1)	$6,000		
	SW Consultant to resolve stormwater issues in units 2B and 2C based on advice sought in Year 0.	$10,000 EAP*				
2B (1,571 sqm)	Remove weeds & grass, stabilize slopes, spread mulch and plant with Coastal Heath species 4/sqm. Maintain until Year 3.	$31,420 EAP*			Add new protective mesh to existing fence along Wolaroi Crescent to control dogs entering site. Supply Eco-logs & stakes. Supply mulch to planted areas and remove rubbish as required.	$5,000 $2,500 In house
2C (702 sqm)		$14,040 EAP*				
2D (291 sqm)		$5,820 EAP*				
2E (371 sqm)			Continue Bushcare supervision (Bushcare Group #1)	Incl. above		
3A (384 sqm) - top entry level off Birrell Street.	Upgrade top entry area as the upper gateway to the project including relocation of the existing post storage box, painting the existing timber fence and installing a new seat and interpretive signage.	$10,000	Community planting day eg National Tree Day - spread mulch & plant with Coastal Heath species 4/sqm. Bushcare Group #2 to maintain area after planting.	$3,456 EAP*	Investigate undergrounding of electricity wires in Birrell Street road reserve. Remove grass & prepare planting area for community planting day. Supply mulch to planted areas and remove rubbish as required.	In house In house In house

3D (2,957 sqm)	Resolve stormwater issues along waterfall including slope stabilization and SW Consultant fees. Locate and repair heritage paths and steps and install interpretive signage incl. Heritage Consultant fees. Clear vegetation from old paths, steps & rock ledges in gully according to Heritage Consultant's advice. Remove rubbish from watercourse. Clear weeds where tree planting to occur. Spread mulch, plant tall trees (incl. winter-flowering trees) to shade out weeds long-term and install marker stakes. (Note: contractors to continue to control weeds around trees until Year 5).	$50,000 EAP* $30,000 $15,000 EAP*			Supply mulch to planted areas and remove rubbish as required.	In house
SUBTOTAL		**$171,280 EAP* + $40,000**		**$28,456 EAP* + $6,000**		**$124,400**
TOTAL YEAR 1						**$370,136**
***EAP – item could be funded through Council's Environmental Action Plan. Funding is dependent on the proposed rates variation being successful.**						

YEAR 2	**CONTRACTORS/ CONSULTANTS**	**COSTS**	**COMMUNITY/ BUSHCARE**	**COSTS**	**COUNCIL**	**COSTS**
PLANNING & SUPERVISION			Support Bushcare Group #2 for gully area incl. supervisor 8 hrs/wk.	$30,000 EAP*	Continue internal training for Council dedicated team for revegetation maintenance (weed identification & removal techniques plus revegetation techniques) through courses.	$1,800
					Continue Randwick Council Nursery's program of collecting seed and begin propagation of plants for 2F, 3E, 3F (western end) & 3G as well as infill plants for completed areas.	$25,000
					Maintain temporary caravan and equipment in gully	$10,000
					Continue community consultation & education, including promotion of Bushcare Groups #1 and #2.	$10,000
					Establish 'Native Havens Program' to educate residents about garden practices, native plantings and pets.	$20,000 EAP*
					Continue to implement tree risk management plan.	In house
					Monitor progress of project and update information.	In house
WEED CONTROL	Control noxious weeds and environmental weeds throughout park (allow 4 bush regenerators to cover whole site once a month for whole year).	$25,000 EAP*				
LANDSCAPE MANAGEMENT UNITS						
2A			Continue Bushcare supervision (Bushcare Group #1)	$6,000		
2B	Maintain until Year 3.	$15,710 EAP*			Supply mulch to planted areas and remove rubbish as required.	In house
2C		$2,808 EAP*			Supply mulch to planted areas and remove rubbish as required.	In house
2D		$1,164 EAP*			Supply mulch to planted areas and remove rubbish as required.	In house

2E			Continue Bushcare supervision (Bushcare Group #1)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2F (266 sqm)	Remove *Coprosma* and prepare for planting	$1,330 EAP*	Community planting day - replant understorey with local species 2/sqm. Bushcare Group #2 to maintain area after planting.	$1,596 EAP*	Organise community planting day. Supply mulch to planted areas and remove rubbish as required.	In house
3A (top entry level off Birrell Street)			Continue maintenance of top entry (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
3D	Continue to control weeds and maintain mulch around shade trees	$2,500 EAP*			Supply mulch to planted areas and remove rubbish as required.	In house
3E (2,216 sqm)	Remove exotic plants and weeds at base of rock shelf. Remove *Coprosma* specimens in grass. Complete planting works after community planting day.	$11,080 EAP*	Community planting day – spread mulch & plant with Littoral Rainforest understorey species 2/sqm. Maintain area after planting (Bushcare Group #2)	$4,432 EAP*	Organise community planting day. Remove grass & prepare planting area. Supply mulch to planted areas and remove rubbish as required.	In house In house In house
3F (western end near waterfall) (approx. 500 sqm)	Construct new path & steps (if required) across western end of 3F linking Birrell St path to waterfall – allow 50m long x 1m wide.	$5,000	Community planting day - spread mulch and plant with winter-flowering shade trees 1/sqm. Maintain area after planting (Bushcare Group #2)	$3,836 EAP*	Organise community planting day. Remove grass & prepare planting area	In house In house
3G (1,214 sqm) (under established trees)			Community planting day – spread mulch & plant with Littoral Rainforest understorey species 2/sqm. Maintain area after planting (Bushcare Group #2)	$2,428 EAP*	Organise community planting day. Remove grass & prepare planting area. Supply mulch to planted areas and remove rubbish as required.	In house In house In house
SUBTOTAL		**$59,592 EAP* + $5,000**		**$42,292 EAP* + $6,000**		**$20,000 EAP* + $46,800**
TOTAL YEAR 2						**$179,684**

***EAP – item could be funded through Council's Environmental Action Plan. Funding is dependent on the proposed rates variation being successful.**

YEAR 3	**CONTRACTORS/ CONSULTANTS**	**COSTS**	**COMMUNITY/ BUSHCARE**	**COSTS**	**COUNCIL**	**COSTS**
PLANNING & SUPERVISION			Maintain Bushcare Group #2 for gully area incl. Supervisor 10 hrs/wk.	$35,000 EAP*	Continue internal training for Council dedicated team for revegetation maintenance (weed identification & removal techniques plus revegetation techniques) through courses.	$1,800
					Continue Randwick Council Nursery's program of collecting seed and begin propagation of plants for 3A, 3B and 3F (eastern end) as well as infill plants for completed areas.	$10,000
					Maintain temporary caravan and equipment in gully	$10,000
					Continue community consultation & education, including promotion of Bushcare Groups #1 and #2.	$5,000
					Continue 'Native Havens Program' to educate residents about garden practices, native plantings and pets.	$5,000 EAP*
					Continue to implement tree risk management plan.	In house
					Monitor progress of project and update information.	In house
WEED CONTROL	Continue controlling environmental weeds (allow 4 bush regenerators to cover 1/3 site once a month for whole year).	$12,500 EAP*			Weeds Officer to review status of noxious & environmental weeds. Remove rubbish.	In house In house

LANDSCAPE MANAGEMENT UNITS						
2A			Continue Bushcare supervision (Bushcare Group #1)	$6,000		
2B, 2C & 2D	Hand over maintenance to Bushcare Group #1.			Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2E			Continue Bushcare supervision (Bushcare Group #1)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2F			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2G (eastern end of gully)			Community planting day - spread mulch and plant additional trees across gully to create additional shelter for rainforest area. Maintain area after planting (Bushcare Group #2)	$2,500 EAP*	Organise community planting day. Remove grass & prepare planting area Supply mulch to planted areas and remove rubbish as required. Install new furniture.	In house In house In house $7,500
3A (lower section of Birrell St. road reserve) **(768 sqm)**	Stormwater Consultant to resolve any issues with stormwater. Engage Arborist to begin removal of Coral Trees at top of slope. Remove weeds & grass, stabilize slopes, spread mulch and plant 4/sqm. Repair existing path and steps as required.	$5,000 EAP* $10,760 EAP* $7,500	Continue maintenance of top entry level (Bushcare Group #2)	Incl. above	Supply Eco-logs & stakes. Supply mulch to planted areas and remove rubbish as required.	$5,000 In house
3B (183 sqm)	Remove weeds & grass, stabilize slopes, spread mulch and plant 4/sqm.	$2,915 EAP*			Construct frog habitat in waterfall. Supply Eco-logs & stakes. Supply mulch to planted areas and remove rubbish as required.	$2,000 $1,500 In house
3D	Continue to control weeds and mulch around trees as required.	$2,500 EAP*			Supply mulch to planted areas and remove rubbish as required.	In house
3E & 3G			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
3F (western end near waterfall)			Continue maintenance (Bushcare Group #2)	Incl. above	Install new furniture. Supply mulch to planted areas and remove rubbish as required.	$7,500 In house
SUBTOTAL		**$33,675 EAP* + $7,500**		**$37,500 EAP* + $6,000**		**$5,000 EAP* + $50,300**
TOTAL **YEAR 3**						**$139,975**

***EAP – item could be funded through Council's Environmental Action Plan. Funding is dependent on the proposed rates variation being successful.**

YEAR 4	CONTRACTORS/ CONSULTANTS	COSTS	COMMUNITY/ BUSHCARE	COSTS	COUNCIL	COSTS
PLANNING & SUPERVISION			Maintain Bushcare Group #2 for gully area incl. supervisor 10 hrs/wk.	$35,000 EAP*	Continue internal training for Council dedicated team for revegetation maintenance (weed identification & removal techniques plus revegetation techniques) through courses.	$1,800
					Continue Randwick Council Nursery's program of collecting seed and begin propagation of plants for 3C as well as infill plants for completed areas.	$7,500
					Maintain temporary caravan and equipment in gully	$10,000
					Continue community consultation & education, including promotion of Bushcare Groups #1 and #2.	$5,000
					Continue 'Native Havens Program' to educate residents about garden practices, native plantings and pets.	$5,000 EAP*
					Continue to implement tree risk management plan.	In house
					Monitor progress of project and update information.	In house
WEED CONTROL	Continue controlling environmental weeds (allow 4 bush regenerators to cover 1/3 site once a month for whole year).	$12,500 EAP*			Remove rubbish as required.	In house
LANDSCAPE MANAGEMENT UNITS						
2A			Continue Bushcare supervision (Bushcare Group #1)	$6,000		
2B, 2C & 2D			Continue maintenance (Bushcare Group #1)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2E			Continue Bushcare supervision (Bushcare Group #1)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2F			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2G			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
3A (Birrell St. road reserve)	Maintain lower slopes until Year 5.	$2,880 EAP*	Continue maintenance of top level (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
3B	Maintain until Year 5.	$915 EAP*			Supply mulch to planted areas and remove rubbish as required.	In house
3C (843 sqm)	Remove weeds & grass, stabilize slopes, spread mulch and plant 4/sqm. Keep rock ledges clear for reptile habitat. Maintain until Year 6.	$9,215 EAP*			Repair existing path and steps as required. Supply Eco-logs & stakes. Supply mulch to planted areas and remove rubbish as required.	$5,000 $5,000 In house
3D	Continue to control weeds and mulch around trees as required.	$2,000 EAP*			Supply mulch to planted areas and remove rubbish as required.	In house
3E & 3G			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
3F(western end near waterfall)			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
SUBTOTAL		**$27,510 EAP***		**$35,000 EAP* + $6,000**		**$5,000 EAP* + $34,300**
TOTAL YEAR 4						**$107,810**

***EAP – item could be funded through Council's Environmental Action Plan. Funding is dependent on the proposed rates variation being successful.**

YEAR 5	CONTRACTORS/ CONSULTANTS	COSTS	COMMUNITY/ BUSHCARE	COSTS	COUNCIL	COSTS
PLANNING & SUPERVISION			Maintain Bushcare Group #2 for gully area incl. supervisor 10 hrs/wk.	$35,000 EAP*	Continue internal training for Council dedicated team for revegetation maintenance (weed identification & removal techniques plus revegetation techniques) through courses.	$1,800
					Continue Randwick Council Nursery's program of collecting seed and begin propagation of plants for 3D as well as infill plants for completed areas.	$26,000
					Maintain temporary caravan and equipment in gully	$10,000
					Continue community consultation & education, including promotion of Bushcare Groups #1 and #2.	$5,000
					Continue 'Native Havens Program' to educate residents about garden practices, native plantings and pets.	$5,000 EAP*
					Continue to implement tree risk management plan.	In house
					Monitor progress of project and update information.	In house
WEED CONTROL	Continue controlling environmental weeds (allow 2 bush regenerators to cover remaining areas once a month for whole year).	$5,000 EAP*			Remove rubbish as required.	In house
LANDSCAPE MANAGEMENT UNITS						
2A			Continue Bushcare supervision (Bushcare Group #1)	$6,000		
2B, 2C & 2D			Continue maintenance (Bushcare Group #1)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2E			Continue Bushcare supervision (Bushcare Group #1)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2F			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2G			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
3A (Birrell St. road reserve)	Hand over maintenance of all 3A to Bushcare Group #2				Supply mulch to planted areas and remove rubbish as required.	In house
3B	Hand over maintenance to Bushcare Group #2					
3C	Maintain area until Year 6. Engage Arborist to remove Coral trees as other winter-flowering trees mature.	$2,108 EAP* $15,000 EAP*			Supply mulch to planted areas and remove rubbish as required.	In house
3D (2,957 sqm)	Remove weeds, stabilize slopes, spread mulch and plant Littoral Rainforest understorey species 4/sqm. Maintain until Year 7.	$24,785 EAP*			Supply Eco-logs & stakes. Supply mulch to planted areas and remove rubbish as required.	$7,500 In house
3E & 3G			Continue maintenance (Bushcare Group #2)	Incl. above		
3F (western end near waterfall)			Continue maintenance (Bushcare Group #2)	Incl. above		
SUBTOTAL		**$46,893 EAP***		**$35,000 EAP* + $6,000**		**$5,000 EAP* + $50,300**
TOTAL YEAR 5						**$143,193**

***EAP – item could be funded through Council's Environmental Action Plan. Funding is dependent on the proposed rates variation being successful.**

YEAR 6	CONTRACTORS/ CONSULTANTS	COSTS	COMMUNITY/ BUSHCARE	COSTS	COUNCIL	COSTS
PLANNING & SUPERVISION			Maintain Bushcare Group #2 for gully area incl. supervisor 10 hrs/wk.	$35,000 EAP*	Continue Randwick Council Nursery's program of collecting seed and begin propagation of plants for 2H, 2I, 2J & 2K as well as infill plants for completed areas.	$17,000
					Maintain temporary caravan and equipment in gully	$10,000
					Continue community consultation & education, including promotion of Bushcare Groups #1 and #2.	$5,000
					Continue 'Native Havens Program' to educate residents about garden practices, native plantings and pets.	$5,000 EAP*
					Continue to implement tree risk management plan.	In house
					Monitor progress of project and update information.	In house
WEED CONTROL	Continue controlling environmental weeds (allow 2 bush regenerators to cover remaining areas once a month for whole year) – final year.	$5,000 EAP*			Remove rubbish as required.	In house
LANDSCAPE MANAGEMENT UNITS						
2A			Continue Bushcare supervision (Bushcare Group #1)	$6,000		
2B, 2C & 2D			Continue maintenance (Bushcare Group #1)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2E			Continue Bushcare supervision (Bushcare Group #1)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2F			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2G			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2H (855 sqm)	Remove weeds & grass, stabilize slopes, spread mulch and plant with Coastal Heath species.	$5,130 EAP*			Supply mulch to planted areas and remove rubbish as required.	In house
2I (274 sqm)		$1,644 EAP*			Supply mulch to planted areas and remove rubbish as required.	In house
2J (1,359 sqm)	Remove weeds, mulch and infill plant with Coastal Heath species.	$8,154 EAP*			Supply mulch to planted areas and remove rubbish as required.	In house
2K (248 sqm)		$1,488 EAP*			Supply mulch to planted areas and remove rubbish as required.	In house
3A (Birrell St. road reserve)			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
3B			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
3C	Hand over maintenance to Bushcare Group #2				Supply mulch to planted areas and remove rubbish as required.	In house
3D	Maintain areas until established (Year 7).				Engage Arborist to remove Coral trees as other winter-flowering trees mature. Supply mulch to planted areas and remove rubbish as required.	$10,000 EAP*
3E & 3G			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
3F (western end near waterfall)			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
SUBTOTAL		**$21,416 EAP***		**$35,000 EAP* + $6,000**		**$5,000 EAP* + $42,000**
TOTAL YR 6						**$130,832**

***EAP – item could be funded through Council's Environmental Action Plan. Funding is dependent on the proposed rates variation being successful.**

YEAR 7	CONTRACTORS/ CONSULTANTS	COSTS	COMMUNITY/ BUSHCARE	COSTS	COUNCIL	COSTS
PLANNING & SUPERVISION			Maintain Bushcare Group #2 for gully area incl. supervisor 10 hrs/wk.	$35,000 EAP*	Continue Randwick Council Nursery's program of collecting seed and propagation of infill plants for completed areas.	$2,000
			Council maintenance staff & Bushcare Groups to take over control of weeds from contractors.			In house
					Maintain temporary caravan and equipment in gully	$10,000
					Continue community consultation & education, including promotion of Bushcare Groups #1 and #2.	$5,000
					Continue 'Native Havens Program' to educate residents about garden practices, native plantings and pets.	$5,000 EAP*
					Continue to implement tree risk management plan.	In house
LANDSCAPE MANAGEMENT UNITS					Monitor progress of project and update information.	In house
2A			Continue Bushcare supervision (Bushcare Group #1)	$6,000		
2B, 2C & 2D			Continue maintenance (Bushcare Group #1)	Incl. above	Supply mulch and remove rubbish as required.	In house
2E			Continue Bushcare supervision (Bushcare Group #1)	Incl. above	Supply mulch and remove rubbish as required.	In house
2F			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch and remove rubbish as required.	In house
2G			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch and remove rubbish as required.	In house
2H (855 sqm)	Maintain areas until established (Year 8).	$2,565 EAP*			Supply mulch and remove rubbish as required.	In house
2I (274 sqm)	Maintain areas until established (Year 8).	$822 EAP*			Supply mulch and remove rubbish as required.	In house
2J (1,359 sqm)	Maintain areas until established (Year 8).	$4,077 EAP*			Supply mulch and remove rubbish as required.	In house
2K (248 sqm)	Maintain areas until established (Year 8).	$744 EAP*			Supply mulch and remove rubbish as required.	In house
3A (Birrell St. road reserve)			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch and remove rubbish as required.	In house
3B			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch and remove rubbish as required.	In house
3C			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch and remove rubbish as required.	In house
3D	Hand over maintenance to Bushcare Group #2	In house			Supply mulch and remove rubbish as required.	In house
3E & 3G			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch and remove rubbish as required.	In house
3F (western end near waterfall)			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch and remove rubbish as required.	In house
SUBTOTAL		**$8208 EAP***		**$35,000 EAP* + $6,000**		**$5,000 EAP* + $17,000**
TOTAL YEAR 7						**$71,208**

***EAP – item could be funded through Council's Environmental Action Plan. Funding is dependent on the proposed rates variation being successful.**

YEAR 8	CONTRACTORS/ CONSULTANTS	COSTS	COMMUNITY/ BUSHCARE	COSTS	COUNCIL	COSTS
PLANNING & SUPERVISION			Maintain Bushcare Group #2 for gully area incl. supervisor 10 hrs/wk.	$35,000 EAP*	Continue Randwick Council Nursery's program of collecting seed and propagation of infill plants for completed areas.	$2,000
					Maintain temporary caravan and equipment in gully	$10,000
					Continue community consultation & education, including promotion of Bushcare Groups #1 and #2.	$5,000
					Continue 'Native Havens Program' to educate residents about garden practices, native plantings and pets.	$5,000 EAP*
					Continue to implement tree risk management plan.	In house
LANDSCAPE MANAGEMENT UNITS					Monitor progress of project and update information.	In house
2A			Continue Bushcare supervision (Bushcare Group #1)	$6,000		
2B, 2C & 2D			Continue maintenance (Bushcare Group #1)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2E			Continue Bushcare supervision (Bushcare Group #1)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2F			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2G			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2H to 2I	Hand over maintenance to Bushcare Group #2	In house			Supply mulch to planted areas and remove rubbish as required.	In house
2J & 2K	Hand over maintenance to Bushcare Group #2	In house			Supply mulch to planted areas and remove rubbish as required.	In house
3A (Birrell St. road reserve)			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
3B			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
3C			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
3D			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
3E & 3G			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
3F (western end near waterfall)			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
SUBTOTAL				**$35,000 EAP* + $6,000**		**$5,000 EAP* + $17,000**
TOTAL YEAR 8						**$63,000**

***EAP – item could be funded through Council's Environmental Action Plan. Funding is dependent on the proposed rates variation being successful.**

YEAR 9	CONTRACTORS/ CONSULTANTS	COSTS	COMMUNITY/ BUSHCARE	COSTS	COUNCIL	COSTS
PLANNING & SUPERVISION			Maintain Bushcare Group #2 for gully area incl. supervisor 10 hrs/wk.	$35,000 EAP*	Continue Randwick Council Nursery's program of collecting seed and propagation of infill plants for completed areas.	$2,000
					Maintain temporary caravan and equipment in gully	$10,000
					Continue community consultation & education, including promotion of Bushcare Groups #1 and #2.	$5,000
					Continue 'Native Havens Program' to educate residents about garden practices, native plantings and pets.	$5,000 EAP*
					Continue to implement tree risk management plan.	In house
LANDSCAPE MANAGEMENT UNITS					Monitor progress of project and update information.	In house
2A			Continue Bushcare supervision (Bushcare Group #1)	$6,000		
2B, 2C & 2D			Continue maintenance (Bushcare Group #1)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2E			Continue Bushcare supervision (Bushcare Group #1)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2F			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2G			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2H to 2I			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2J & 2K			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
3A (Birrell St. road reserve)			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
3B			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
3C			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
3D			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
3E & 3G			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
3F (western end near waterfall)			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
SUBTOTAL				**$35,000 EAP* + $6,000**		**$5,000 EAP* + $17,000**
TOTAL YEAR 9						**$63,000**

***EAP – item could be funded through Council's Environmental Action Plan. Funding is dependent on the proposed rates variation being successful.**

YEAR 10	CONTRACTORS/ CONSULTANTS	COSTS	COMMUNITY/ BUSHCARE	COSTS	COUNCIL	COSTS
PLANNING & SUPERVISION			Maintain Bushcare Group #2 for gully area incl. supervisor 10 hrs/wk.	$35,000 EAP*	Continue Randwick Council Nursery's program of collecting seed and propagation of infill plants for completed areas.	$2,000
					Maintain temporary caravan and equipment in gully	$10,000
					Continue community consultation & education, including promotion of Bushcare Groups #1 and #2.	$5,000
					Continue 'Native Havens Program' to educate residents about garden practices, native plantings and pets.	$5,000 EAP*
					Continue to implement tree risk management plan.	In house
LANDSCAPE MANAGEMENT UNITS					Monitor progress of project and update information. Prepare final report.	In house
2A			Continue Bushcare supervision (Bushcare Group #1)	$6,000		
2B, 2C & 2D			Continue maintenance (Bushcare Group #1)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2E			Continue Bushcare supervision (Bushcare Group #1)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2F			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2G			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2H to 2I			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
2J & 2K			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
3A (Birrell St. road reserve)			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
3B			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
3C			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
3D			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
3E & 3G			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
3F (western end near waterfall)			Continue maintenance (Bushcare Group #2)	Incl. above	Supply mulch to planted areas and remove rubbish as required.	In house
SUBTOTAL				**$35,000 EAP* + $6,000**		**$5,000 EAP* + $17,000**
TOTAL YEAR 10						**$63,000**
GRAND TOTAL						**$1,399,838**
Contingency 10%						**$139,984**
Total cost Years 1-10, as at June 2010 (excluding GST & future CPI)						**$1,539,822**

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APPENDIX A

Taken from: Hirschfeld, D. (2010), Waverley Flora Study Report 2010. Appendices 1-3

APPENDIX 1: Commonwealth and State Legislation, etc.

There are many Acts, Regulations and Environmental Planning Instruments (EPIs) which may apply to remnant vegetation, indigenous plant species and weeds. The information below is intended to introduce some of the main legislation, etc. currently relevant to Waverley.

All Commonwealth legislation may be viewed in full at www.comlaw.gov.au. All NSW legislation may be viewed in full at www.legislation.nsw.gov.au. A list of all NSW EPIs is available at www.legislation.nsw.gov.au/lif/epis.pdf. More information is available from the relevant government department administering each Act, etc. The Environmental Defenders Office NSW also provides much information regarding environmental legislation (www.edo.org.au/edonsw/site/default.php). When required, professional legal advice should be sought.

Name of Act, EPI	Aim/s & Object/s	Some examples of relevance to remnant vegetation, indigenous plant species and weed species
***Environment Protection and Biodiversity Conservation Act 1999* [Clth]**	**Objects** (3 of 8): **(a)** To provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance; **(b)** To promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources; **(c)** To promote the conservation of biodiversity.	• "Approval" required from Environment Minister for "actions" which will or are likely to have a "significant" impact on "Matters of National Environmental Significance". • Currently 7 matters of NES, including nationally threatened species and ecological communities. • In Waverley, applies to Eastern Suburbs Banksia Scrub and *Acacia terminalis* subsp. *terminalis*. • Provides for "recovery plans" to be made. Recovery plan approved for Eastern Suburbs Banksia Scrub, near approved for *Acacia terminalis* subsp. *terminalis*.
***Threatened Species Conservation Act 1995* [NSW]**	**Objects** (2 of 6): **(a)** To conserve biological diversity and promote ecologically sustainable development, **(b)** To prevent the extinction and promote the recovery of threatened species, populations and ecological communities.	• Must consider effect of development and other actions on threatened items (i.e. species, ecological communities and populations). • May require a licence, certificate, development consent, etc., to perform actions within habitat of, or which may affect, threatened items. • In Waverley, applies to Eastern Suburbs Banksia Scrub and *Acacia terminalis* subsp. *terminalis*. • Provides for "recovery plans" to be made. Recovery plan approved for Eastern Suburbs Banksia Scrub, near approved for *Acacia terminalis* subsp. *terminalis*. • Provides for stop work orders.
***Environmental Planning and Assessment Act 1979* [NSW]**	**Object** (part of 1 of 3): **(a-vi)** The protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats.	• Requires Council to consider whether there is likely to be a significant effect on threatened items when determining development applications. • Provides for the preparation of Species Impact Statements where there is likely to be a significant effect on threatened items. • Requires Council to consider the impacts on the natural environment when determining development applications.
***Local Government Act 1993* [NSW]**		• Requires Council to prepare Plans of Management for "community land". Land must be categorised, one category being "natural area", which would apply to remnant vegetation. The core objectives for such land include: **(a)** To conserve biodiversity and maintain ecosystem function, **(b)** To maintain the land … in its natural state and setting, **(c)** To provide for the restoration and regeneration of the land. • Makes it an offence to remove, injure, damage or unnecessarily disturb plants, animals, rocks and soil in / from a public place.
***National Parks and Wildlife Act 1974* [NSW]**	**Object** (part of 1 of 3): **(1a)** The conservation of nature.	• Provides for licences to perform (conservation) actions in the habitat of threatened items, eg. a s.132C Scientific Licence to do bush regeneration in the habitat of Eastern Suburbs Banksia Scrub and *Acacia terminalis* subsp. *terminalis*.
***Noxious Weeds Act 1993* [NSW]**	**Object** (1 of 2): **(a)** To reduce the negative impact of weeds on the economy, community and environment.	• Identifies noxious weed species and weed "classes". • Requires private occupiers, state authorities and Council to control weeds on their own lands. • Authorises Council to issue notices to private owners or occupiers of land to control noxious weeds. • Authorises Council to control weeds on private land, should notice not be complied with. • Requires Council to monitor the distribution of noxious weeds in the Council area. • Develop and implement Council's weed control policy and control program.
State Environmental Planning Policy No 19 – Bushland in Urban Areas	**Specific aims** (3 of 14): **(a)** To protect the remnants of plant communities which were once characteristic of land now within an urban area, **(b)** To retain bushland in parcels of a size and configuration which will enable the existing plant and animal communities to survive in the long term, **(d)** To protect habitats for native flora and fauna.	• Development consent usually required to disturb bushland on or adjacent to land zoned or reserved public open space. • Provides for bushland plans of management to be prepared.

Waverley Local Environmental Plan 1996 [NB soon to be replaced by new LEP]	**Specific aims** (1 of 11): **(4)** In relation to environmental protection: **(a)** To enhance and preserve the natural environment through appropriate planning and the provision of special controls.	• Provides Council the opportunity to appropriately zone land containing remnant vegetation to promote its protection. Zoning of all areas of remnant vegetation is indicated in Appendix 5 of this Flora Study Report. • Provides for consideration of Heritage Items in relation to development consent. Schedule 5-C: Landscape Items and Sites includes the following sites, which may include all or part of remnant vegetation areas at those locations: Coastal sandstone escarpment, Clarke Res. to Rodney Res.; Caffyn Park; Bondi Golf Course; Ray O'Keefe Res.; Bondi Beach and Park; Hunter and Marks Parks; Gaerloch Res.; Tamarama Beach, Park; Tamarama Park-Valley; Thomas Hogan Res.; Queens Park; York Road Bushland; Eastern Suburbs Banksia Scrub.

APPENDIX 2: Commonwealth and State Plans, Policies, Guidelines, Strategies, etc.

There are many plans, policies, etc. which may apply to remnant vegetation, indigenous plant species and weeds. The information below is intended to introduce some of the main ones currently relevant to Waverley.

Name of Government Plan, Policy, Guidelines, Strategy, etc.	Some examples of relevance to remnant vegetation, indigenous plant species and weed species
Eastern Suburbs Banksia Scrub Endangered Ecological Community Recovery Plan (NSW Department of Environment and Conservation 2004)	• Constitutes the Commonwealth and State recovery plan for ESBS, pursuant to the *Environment Protection and Biodiversity Conservation Act 1999* [Clth] and the *Threatened Species Conservation Act 1995* [NSW]. • Identifies locations, ecological processes, threatening processes, management issues, development assessment information, actions, etc.
Recommendation for the Identification of Critical Habitat for the Eastern Suburbs Banksia Scrub Endangered Ecological Community **[DRAFT]**. (NSW Department of Environment and Conservation 2006)	• Explains the extra level of protection that critical habitat declaration would afford and the reasoning for recommending declaration.
Best practice guidelines Eastern Suburbs Banksia Scrub. (NSW Department of Environment and Climate Change 2009)	• Includes guidelines for bushland managers and bush regenerators, including access, regeneration works, monitoring, community awareness, the requirement for licences, etc.
National Recovery Plan **– Acacia terminalis *subsp.* terminalis *(Sunshine Wattle)* DRAFT**. (NSW Department of Environment, Climate Change and Water 2010a)	• Understood this will constitute the Commonwealth and State recovery plan for *Acacia terminalis* subsp. *terminalis*, pursuant to the *Environment Protection and Biodiversity Conservation Act 1999* [Clth] and the *Threatened Species Conservation Act 1995* [NSW].
Threat Abatement Plans – pursuant to *Environment Protection and Biodiversity Conservation Act 1999* [Clth] & www.environment.gov.au/biodiversity/threatened/tap-approved.html	• Plans for Key Threatening Processes scheduled under the Act, identifying the problems and actions to ameliorate the effects. • Plans approved include those for: rabbits, root-rot fungus, European red fox, feral cats.
Threat Abatement Plans – pursuant to *Threatened Species Conservation Act 1995* [NSW] & www.environment.nsw.gov.au/threatenedspecies/ThreatAbatementPlans.htm	• Plans for Key Threatening Processes scheduled under the Act, identifying the problems and actions to ameliorate the effects. • Plans approved include those for: Bitou Bush & Boneseed, Red Fox.
Australia State of the Environment 2006. (Commonwealth of Australia 2006)	• Five-yearly report on the Australian environment. One chapter on Biodiversity reports on its state (condition), pressures on it and our management responses. Included: indicators, trends, data gaps.

NSW State of the Environment 2009. (NSW Department of Environment, Climate Change and Water 2010c)	• Three-yearly report on the NSW environment. One chapter on Biodiversity reports on its state (condition), pressures on it and our management responses. Included: indicators, trends, data gaps.
The National Strategy For the Conservation of Australia's Biological Diversity. (Commonwealth of Australia 1996b)	• Identifies local government as having a critical role in conserving biodiversity. One of its objectives is for, "Local governments [to] have assumed a major role in the conservation of Australia's biological diversity" by 2005.
NSW Biodiversity Strategy. (National Parks and Wildlife Service 1997)	• Contains an extensive list of 143 actions to protect and conserve biodiversity, including many actions relevant for local Councils.
Australian Natural Heritage Charter. (Australian Heritage Commission. 1996)	• Intended to promote a uniform, national approach to the conservation of places of natural significance mainly through the establishment of a comprehensive glossary of terms for all stages in the cycle of survey, develop, implement, monitor and review conservation plans.
Weeds of National Significance (WONS). (Commonwealth of Australia 2010)	• Attempt to prioritise weeds at the national level, to draw together meaningful indicators on which to base future weed decision-making. Provides a framework to prioritise weed management at the state, regional and local levels.

APPENDIX 3: Council Plans, Orders, etc.

There are many plans, etc., which may apply to remnant vegetation, indigenous plant species and weeds. The information in below summarises most of the main ones.

Name of Waverley Council Plan, Order	Relevance to remnant vegetation, indigenous plant species and weed species
Waverley Council Management Plan 2009-2013	• Includes the "direction" in "Making our environment and beaches sustainable" section - "The natural environment of our coastal zone is protected and improved". • Includes the "strategy" in "Making our environment and beaches sustainable" section – "Regenerate and link native vegetation to boost local populations of plants and animals". • Includes the "activities" in "Making our environment and beaches sustainable" section: "Develop and implement Council's Environmental Action Plan"; "Undertake bush regeneration"; "Manage environmental weeds"; "Maintain identified remnant bushland"; "Undertake flora … survey of LGA".
Environmental Action Plan - Version 2: October 2009	• Discussed in Section 4, *Background to the Flora Study*, above.
Coastal Reserves DRAFT Plan of Management 1996	• Applies to the following parks and reserves where remnant vegetation was recorded in 2009/2010: Clarke Res., Jensen Ave Res., Diamond Bay Res., Eastern Res., Weonga Res., Rodney Res., Raleigh Res., Hugh Bamford Res., Ray O'Keefe Res., Brighton Boulevarde Res., Hunter Park, Marks Park, Gaerloch Res. • However, the PoM only refers to remnant vegetation occurring at Diamond Bay Res., Hugh Bamford Res., Tamarama Res., below Waverley Cemetery (p.10, section 3.4). • Includes the objective: "To preserve, maintain and enhance existing vegetation" (p.14, section 4.0). • Includes the statements (pp.16, 18-20, section 5.4): o "Extension of remnant heath with regeneration programs will be facilitated." o "Ongoing maintenance programs for weed management will be carried out by operations staff". o Remnant vegetation at Diamond Bay Res. and Hugh Bamford Res. and below Waverley Cemetery will be added to Council's list of Heritage Items and that "Preservation of these historic features is of prime importance and restoration and funding avenues should be investigated where possible. o Uncovering and restoring the fort site within Hugh Bamford Res. would benefit Waverley Council. If this were to happen, special attention would need to be made to minimise disturbance and/or loss of remnant vegetation, as the fort site is in the middle of the main area of remnant vegetation in Hugh Bamford Res. • Includes the actions (pp.23, 25, section 7.1): o "Identify and protect areas of natural vegetation." o "Develop and implement revegetation and regeneration programs." o "Develop and implement a program for weed management." o "Identify and protect areas of historical significance."

Small Parks DRAFT Plan of Management 1996	• Applies to the following parks and reserves where remnant vegetation was recorded in 2009/2010: Tower St Res., Caffyn Park. • However, the PoM does not identify the above remnant vegetation. • The PoM states Council's open space management goals includes, "To protect and enhance the natural heritage … and environmental values of open space" (p.4, section 1.5).
Bondi Park and Pavilion Plan of Management 1995	• Applies to the following areas of remnant vegetation recorded in 2009/2010: Z11a and Z11c (on the "South Bondi Natural Rock Outcrop", Figure 2, between pp.22 & 23) and Z11b (on beach adjacent to Z11a). For exact locations of codes, refer to Council's geographic information system. • However, the PoM does not identify the above remnant vegetation.
Tamarama Park Plan of Management 2007	• Applies to the following areas of remnant vegetation recorded in 2009/2010: T1 (western end of Tamarama Marine Drive, western side of bend in road), T3a & T3b (cliffs on southern side of bay), T5 (beach under and around surf life saving tower), T7 (southern side of beach adjacent to cliffs). For exact locations of codes, refer to Council's geographic information system. • However, no reference could be found in the PoM to remnant vegetation areas T3a, T3b, T5 and T7. • Includes Actions for the "gully zone": "Address priorities for plant removal and revegetation in the Rehabilitation Strategy …" and "Remove weeds and clean up the upper and south-western sides of the gully", but it is unclear whether this includes remnant vegetation area T1 (p.76, section 5.2 Action Plan). • Includes Issues relating to the "gully zone: "Prepare a Rehabilitation Strategy for the gully", "Remove weeds and clean up the upper gully …", "Maintain bushland equally on the north and south sides of the gully", "Clean up the south-eastern face of the gully", but it is unclear if or how this relates to remnant vegetation area T1 (p.65, section 4.4). • No reference could be found to protecting and conserving remnant vegetation.
Bronte Park Plan of Management 2005	• Applies to the following areas of remnant vegetation recorded in 2009/2010: Z15b (part only, northern Bronte headland), B8 (cliff above baths). For exact locations of codes, refer to Council's geographic information system. • However, the PoM does not identify the above remnant vegetation, other than in the key environmental attribute: "Sandstone cliffs and remnant native heath vegetation" (p.5, Table 2). • Further, the PoM identifies land category (pursuant to the *Local Government Act 1993* [NSW]) "natural area bushland": in the gully area (where no remnant vegetation was identified in the 2009/2010 survey). It also includes the key environmental attribute: "The gully areas contain protected remnant bushland and habitat" (p.5, Table 2). It also includes the recommendation: "Actively manage bushland" (p.3, Table 1), though this also probably refers to the gully.
Waverley Cemetery Plan of Management 2008	• Appears to apply to the following areas of remnant vegetation recorded in 2009/2010: C1a and C1b (east of cemetery eastern fence, south of the gully) and C2a, C2b and C2c (east of cemetery eastern fence, north of the gully). For exact locations of codes, refer to Council's geographic information system. • Poorly describes the remnant vegetation: "The cemetery's vegetation is comprised of both indigenous flora and exotic plants…" (p.8, section 3.1, Key Environmental Attributes); "Floristic elements of [Sydney Sandstone Complex vegetation and Eastern Suburbs Banksia Scrub] remain in and around the cemetery as fragments or they have adapted to the developed nature of the place" (p.15, section 3.5 Natural Environment); "Coast Heath" described in little detail (p.23, section 4.1.5 Native Vegetation).
	• Proposes 2 different land categories, pursuant to the *Local Government Act 1993* [NSW], over the remnant vegetation, i.e. both Natural Area – Bushland and Park (p.29, Map 3). This may result in conflicting land category and management objectives. • States a "possible response" to the "issue affecting Waverley Cemetery" of "Coastal heath … along the cliff edges …" is to "Conserve and regenerate indigenous coastal heath along the cliff top …". • Remnant vegetation management does not appear in costings in Table 10 or Attachment D.
State of the Environment Report 2008	• Annual report on the environment. One chapter on Biodiversity reports on its state (condition), pressures on it and our management responses. Included: indicators, trends.
Waverley Tree Preservation Order.	• Likely to apply to only 2 of the 118 indigenous plant species recorded in this survey, i.e. *Glochidion ferdinandi* and *Pittosporum undulatum*. These two mesophyllic species are spread by birds and their extent in the local area is likely to be increasing. Where they are invading other remnant vegetation, it may be desirable to control them.