

The establishment of a  
**Demonstration tree plantation**

Site: Lough Playing Fields, Manning Rd, Woollahra 2028



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## **1. Introduction**

This report has been prepared for Woollahra Municipal Council (WMC). The report is a proposal for the relevant consent authority (WMC) to establish a forest sink within the Municipality. It is a proposal that will require a formal application if this initial proposal is given approval by Council. The objective for this forest sink is to create a carbon sink to offset Council's carbon emissions from its entire vehicle fleet. The forest will then be harvested after 30 years.

The area of land selected for this proposal is known as Lough playing fields. From herein this land shall be known as the 'site'. This site was selected due it is a large level surface close to Cooper Park. It is currently used for school sporting events and general outdoor recreation.

**What is a forest sink?** Forest sinks limit the loss of native vegetation through plantations and revegetation to provide important contributions to reducing greenhouse gas emissions in Australia.

**What is Carbon accounting?** Carbon accounting is the process of estimating the carbon sequestered and emitted in a forest system, both prior to and during the life of the project. Estimating carbon sequestration in a forest sink project is important for planning and reporting purposes. The Australian Greenhouse Office (AGO) has developed the National Carbon Accounting Toolbox to enable users to estimate carbon accounts for forest sinks. This toolbox enables forest sink projects and their Carbon accounting to be determined on a similar basis to Australia's official continental-scale reporting of carbon sequestration in forest sinks. This method of carbon accounting is more appropriate for larger sites and would not be practical for a one (1) hectare site.

The greenhouse emissions figures used in this proposal have been calculated based on a method from the United States Department of Energy, Office of Science. The formula is based on research that estimates that one (1) hectare of trees (approximately 1000 trees) takes up about twenty thousand (20,000) kilograms of carbon dioxide each year. Carbon

dioxide production has been calculated by obtaining fuel consumption figures from WMC for twelve (12) months. This figure has been placed at approximately 428,571 litres. One (1) litre of fuel releases approximately 2.36 kilograms of carbon dioxide. Based on these figures WMC produces approximately 1011.42 tonnes of carbon dioxide per annum (see calculation below).

$428,571 \text{ (litres consumed)} \times 2.36 \text{ kg (of carbon dioxide produced)} = 1011427.56$

$1011427.56 / 1000 = 1011.42 \text{ tonnes}$

Although thinning will reduce the initial stocking rates, it will still be helpful to utilise this plantation for education on the use of plantations for offsetting carbon dioxide emissions.

The Federal Government has created the AGO to help develop a series of books on Planning Forest Sinks Projects. These books were used for reference for this proposal. The books are listed below:

- Planning Forest Sink Projects – A Guide to Forest Sink Planning, Management and Carbon Accounting.
- Planning Forest Sink Projects – A Guide to Legal, Taxation and Contractual Issues.
- Planning Forest Sink Projects – A Guide to Carbon Pooling and Investment Structures.

This proposal to create a forest sink at Lough playing fields is based on information from this series of books as well as the WMC Local Environment Plan (LEP), Development Control Plan (DCP) and the Plantations and Reafforestation (Code) Regulation 2001. Other legislations have been investigated for conditions that will be required to be complied with on the project. These are listed in Section 2 (Legislation).



**Plate 1:** Lough playing fields looking South. Building in the center of picture is the old Dairy building. P.Vezgoff 2/9/06

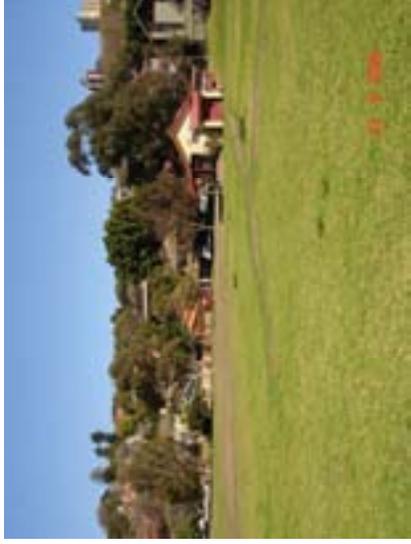
## **1.2 Location**

The site selected for this proposal is known as Lough playing fields. It is situated near Cooper Park and is bordered by Suttie Rd and Manning Rd (See Diagram 1).

The area of the proposed forest will cover approximately one thousand (1000) square metres of this site. The site is currently used as sports fields, hired out to various schools in the area. Lough playing fields is surrounded by mostly residential development of around two (2) stories in height (Diagram 2, aerial photograph).

Within the Woollahra Local Environment Plan 1995, this land is zoned as Public Open Space. (WMC Land Use Map attached in Appendix 1).

The site has good access roads for maintenance and harvesting of the forest sink. The site will also not conflict with the views of the harbour, which are sometimes a contentious issue with the residents of WMC.



**Plate 2:** Lough playing fields. P.Vezgoff



**Diagram 2**  
 Aerial photograph of Lough Playing Fields



22/08/2006  
 28/07/06

Scale = 1:12,500  
 Metres 0 200 400 600



### **1.3 Aims of the proposal**

This proposal aims to establish what is required to establish a plantation forest to act as a carbon sink for WMC. This forest sink is proposed to be large enough to offset the carbon emissions from all registered motor vehicles that are a part of the WMC fleet. The forest will be managed as a plantation forest and harvested after 30 years.

A one (1) hectare area has been selected for this project. Some of the advantages of the one hectare alternative include;

- Lower yearly monetary inputs
- Improved tree maintenance
- Higher quality trees
- Faster growth rates
- Higher returns
- Income spread over time

This proposal will also detail who is the relevant consent authority, what Government Policies are relevant, together with references to the *Plantations and Reafforestation (Code) Regulation 2001*.

The proposal will provide a plantation plan that will detail preferred species to be planted. The plantation plan will also show how to establish, manage and harvest the forest at the end of the agreed period.

## **2. Legislation**

There are several areas of various legislation that apply to this proposal. Each piece of legislation has been listed that affect this proposal and the issue discussed on what the impact may be for the project.

### ***Plantations and Reafforestation Act 1999***

The Department of Natural Resources is responsible for the *Plantations and Reafforestation Act 1999*.

This Act does not apply to the site. In Part 1, Section 7 (Land excluded from operation of Act ) of the *Plantations and Reafforestation Act 1999* this section states;

*“(1)This Act does not Apply to the following land:*

*(a) land that is in a Local Government Area (or part of a government area) specified in Part 1 of Schedule 1”*

WMC is listed as excluded in Part 1 of Schedule 1 of this Act.

### ***Plantations and Reafforestation (Code) Regulation 2001***

Although the *Plantations and Reafforestation (Code) Regulation 2001* does not apply to the site, this proposal has used as a framework, Part 6 *Regulations of harvesting operations* for this proposal.

### ***Woollahra Municipal Council (WMC) Development Control Plan (DCP)***

Within the WMC DCP the site is classed as Open Space Zone in public ownership. The ‘development type’ comes under the category of *Works on public land (inc. planting)*. It is stated that;

*“Works on public land must be in accordance with a works program approved by Council.”*

This item is discussed further in the section 2.3 (Approval process).

### ***WMC Local Environment Plan (LEP)***

Within the WMC Local Environment Plan (LEP) 1995 for Zone 6 (the site) Section 5 states;

*“Development which may be carried out only with development consent....*

*(i) Development for the purpose of: Community facilities; recreation areas; recreation facilities and roads.”*

Section 5 of the WMC LEP is applicable to the project. The project would then be required to be a complying development. Complying development is local development (that requires consent) which is defined by predetermined development standards.

### ***Environmental Planning & Assessment Act 1979 & Regulation 1994***

Sections of the *Environmental Planning & Assessment Act 1979 & Regulation 1994* are required to be addressed in a formal application to Council. Part 5 of the Act has provisions to ensure that a proper assessment is made of the likely impacts of the proposed work before the work is approved. For this project an environmental impact statement would need to be prepared and submitted to Council.

### ***Native Vegetation Act 2003 & Reg 2005***

The Department of Natural Resources is responsible for this Act and Regulation. This Act and Regulation does not apply to the proposal. This proposal does not require the clearing of any Native vegetation.

## **2.1 Consent authority**

The consent authority for Lough playing fields is Woollahra Municipal Council (WMC). WMC has listed this area of land within the LEP 1995 as Open Space Zone (Zone No. 6).

## **2.2 Relevant Council policies**

WMC has a Tree Preservation Order (TPO) in place. This TPO is known as the Woollahra Council Tree Preservation Order 2006. This Order applies to all land both private and public within the WMC area.

Any tree or palm that has a spread of more than three (3) metres or five (5) metres in height is protected by the WMC TPO. For the purposes of this project this will mean that once the trees reach their height and spread, measurements the trees will be protected under the WMC TPO.

Under clause 5 (Consents 5.1) consent will be granted..

*“To Council, or its duly authorized servants or agents, may carry out the pruning or removal of a tree or trees including bushland vegetation from Council controlled, owned or managed land.”*

The application for this proposal will be in the form of a development application for tree works and will be required to be completed as a part of the development application. This application will be required if harvesting is to take place.

Clause 6.1 (Removals) will also apply to any tree works that take place on the site;

*This clause only allows removal of a tree if it is carried out in accordance with WorkCover NSW Code of Practice ‘Amenity Tree Industry’- 1988.*

This TPO could potentially stop the harvesting of this plantation when harvesting is due. It will be important that a detailed document is produced for the ‘tree works’ application so that the purposes of the project and long term goals are clearly defined and understood.

There is no expiry date on an application for tree works. It may be a consideration that the application could be completed and processed by WMC when the trees are planted. This would mean that the trees would be approved for harvesting following planting.

### **2.3 Approval process**

This is a large scale project with long term goals. WMC is the consent authority of the site and this project will require approval from WMC if it is to proceed. WMC has various approval processes that may be implemented for public or private works. Upon

meeting with the Duty Planner (Barbara Adams, 4/9/06) and discussing the proposal it was agreed that there are two (2) possible options available for the approval of this project.

- 1) Approval for this proposal would be required by WMC (the consent authority) via a Development Application (DA) being lodged to Council.
- 2) WMC could amend the Plan of Management for Lough playing fields to program the works as a Capitol Works project, this would still require approval by Council but would not require a DA.

**Option 1**, WMC may ask that the proposal is lodged as a DA. Within the WMC Local Environment Plan (LEP) 1995, the site (Zone 6) Section 5 states;

*“Development which may be carried out only with development consent....*

*Development for the purpose of: Community facilities; recreation areas; recreation facilities and roads.”*

This Section 5 of the WMC LEP may be applicable to the project. The project would then be required to be a complying development. Complying development is a local development (that requires consent) which is defined by predetermined development standards.

Section 3 (Complying development) of the WMC DCP 2005 has been attached in Appendix 7.

**Option 2**, within the WMC Development Control Plan (DCP), 2001 for exempt and complying development would not require DA approval if listed as a part of a works program. This would require an amendment to the site Plan of Management. Within the WMC DCP the site is classed as Open Space Zone in public ownership. The ‘development type’ comes under the category of *Works on public land (inc. planting)*. It is stated that *‘Works on public land must be in accordance with a works program approved by Council.’* Option 2 would not require a development application.

Option 2 would still require a very detailed plan of the project that would be submitted to Directors, General Manager and local Councilors. The proposal may also at Council's discretion, go out for public comment. This plan would also need to include costings for the entire project.

With options 1 & 2, the formal application will need to consider the following factors from the Environmental Planning and Assessment (EP&A) Regulation 1994. These factors must be considered, as this will be required if Council is giving consideration to approving this type of proposal. They are factors that a decision maker must look at in determining the likely impact of a proposal on the locality/environment.

Part 5 of the Act has provisions to ensure that a proper assessment is made of the likely impacts of the proposed work before the work is approved. For this project an environmental impact statement would need to be prepared and submitted to the decision maker. In this case, the decision maker (otherwise known as the determining authority), the Council, could ask for a statement of environmental significance to be prepared.

**228 What factors must be taken into account concerning the impact of an activity on the environment?**

(cf clause 82 of EP&A Regulation 1994)

*(1) For the purposes of Part 5 of the Act, the factors to be taken into account when consideration is being given to the likely impact of an activity on the environment include:*

*(a) for activities of a kind for which specific guidelines are in force under this clause, the factors referred to in those guidelines, or*

*(b) for any other kind of activity:*

*(i) the factors referred to in the general guidelines in force under this clause, or*

*(ii) if no such guidelines are in force, the factors referred to subclause (2).*

*(2) The factors referred to in subclause (1) (b) (ii) are as follows:*

- (a) any environmental impact on a community,*
- (b) any transformation of a locality,*
- (c) any environmental impact on the ecosystems of the locality,*
- (d) any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality,*
- (e) any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations,*
- (f) any impact on the habitat of protected fauna (within the meaning of the National Parks and Wildlife Act 1974),*
- (g) any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air,*
- (h) any long-term effects on the environment,*
- (i) any degradation of the quality of the environment,*
- (j) any risk to the safety of the environment,*
- (k) any reduction in the range of beneficial uses of the environment,*
- (l) any pollution of the environment,*
- (m) any environmental problems associated with the disposal of waste,*
- (n) any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply,*
- (o) any cumulative environmental effect with other existing or likely future activities.*

*(3) For the purposes of this clause, the Director-General may establish guidelines for the factors to be taken into account when consideration is being given to the likely impact of an activity on the environment, in relation to activities generally or in relation to any particular kind of activity.*

*(4) The Director-General may vary or revoke any guidelines in force under this clause.*

Once the plantation has reached a height in excess of five (5) metres it will be protected under the WMC TPO. Harvesting of the plantation would require an application for approval to remove and harvest these trees from this site (see section 2.2 Relevant Council policies).

### **3. Site details**

Lough playing fields would have been, prior to European settlement, tall woodland forest in this protected valley. Some of the species that existed here were Bangalay (*Eucalyptus botryoides*), Scribbly Gum (*Eucalyptus haemastoma*), Forest Red Gum (*Eucalyptus tereticornis*), Red Mahogany (*Eucalyptus resinifera*), Sydney Red Gum, (*Angophora costata*) (Benson & Howell). Following settlement, the trees were removed and the land leveled. The land was then used for dairy farming and one of the original buildings still exists. This sandstone building is in use today as a mechanic's garage.

The Woollahra area is situated on many sandstone slopes and gullies. The topography of the site is now relatively level as it has been used as sports fields for several years (see Contour map in Appendix 3).

A portion of land along the Northern end of the site is owned by Energy Australia.

#### **3.1 Soil testing methodology**

##### **pH test**

Four (4) pH tests were conducted at the site. The locations of the tests are shown in Diagram 3. These pH tests were conducted using a Manutec™ Soil Test Kit. The results are shown in Table 1.

Each horizon of the soil profile was also tested. These results are shown in Table 2.

##### **Field Texture Assessment**

A Field Texture Assessment (FTA) was completed at four (4) locations next to the pH test sites. These results are shown in Table 1.

##### **Compaction test**

A simple compaction test was undertaken with a 12" screwdriver. Walking randomly over the site, the screw driver was pushed into the ground.

### **Site soil profile**

Soil profiles would normally be dug at several locations over a site. Due to limited time and resources only one (1) soil profile has been excavated on this site. The location of the test site was approximately forty (40) metres South of the toilet block. The profile was excavated to a depth of one (1) metre.

## **3.2 Soils**

### **Soils introduction**

Four (4) pH tests were conducted at the site. A Field Texture Assessment (FTA) was completed at four (4) locations next to the pH test sites. These results are shown in Table 1. A simple compaction test was conducted at random intervals around the site. A soil profile was excavated approximately forty (40) metres South of the toilet block to a depth of one thousand (1000) millimetres.

### **Acid Sulfate Soils (ASS)**

The site has been assessed by WMC as an Acid Sulfate Soils (ASS) area. Following the CSIRO Acid Sulfate Soil Technical Manual (version 1.2) WMC has classed this site as Category 3 (Class 1 being the most likely and Class 5 being the least likely to be ASS effected). Council has placed these Categorized areas onto a map that is available from Council. These maps developed by WMC do not describe the severity of ASS in an area or on a particular site. These maps provide an initial indication that ASS could be present on land. A copy of this map can be found in Appendix 2.

The ASS map is also associated with the table below (Table 1). The table sets out for each class of land those types of work that, if carried out, are likely to present an environmental risk.

**Table 1: ASS classification**

Class of land (as shown on acid sulfate soils planning map)	Works
1	Any works
2	Works below existing ground level Works by which the water table is likely to be lowered
3	Works beyond 1 metre below existing ground level Works by which the water table is likely to be lowered beyond 1 metre below existing ground level
4	Works beyond 2 metres below existing ground level Works by which the water table is likely to be lowered beyond 2 metres below existing ground level
5	Works within 500mm of adjacent Class 1,2,3 or 4 land which are likely to lower the water table below 1 metre Australian Height Datum (AHD) on adjacent Class 1,2,3 or 4 land.

**What are Acid Sulfate Soils (ASS)**

Acid sulfate soils are sediments and soils containing iron sulfates that are usually found in low-lying parts of coastal floodplains, rivers and creeks. When these soils and sediments remain underwater they are stable and they do not cause problems. However, if sulfates are exposed to oxygen by disturbance of the soil or by the lowering of ground water levels, sulfuric acid is generated. Soil acidification can result in severe on-site and off-site environmental impacts.

### **Legislative framework for ASS**

The legal framework for ASS management in the Woollahra Municipality is found in clause 25D of the Woollahra LEP 1995. Clause 25D sets out:

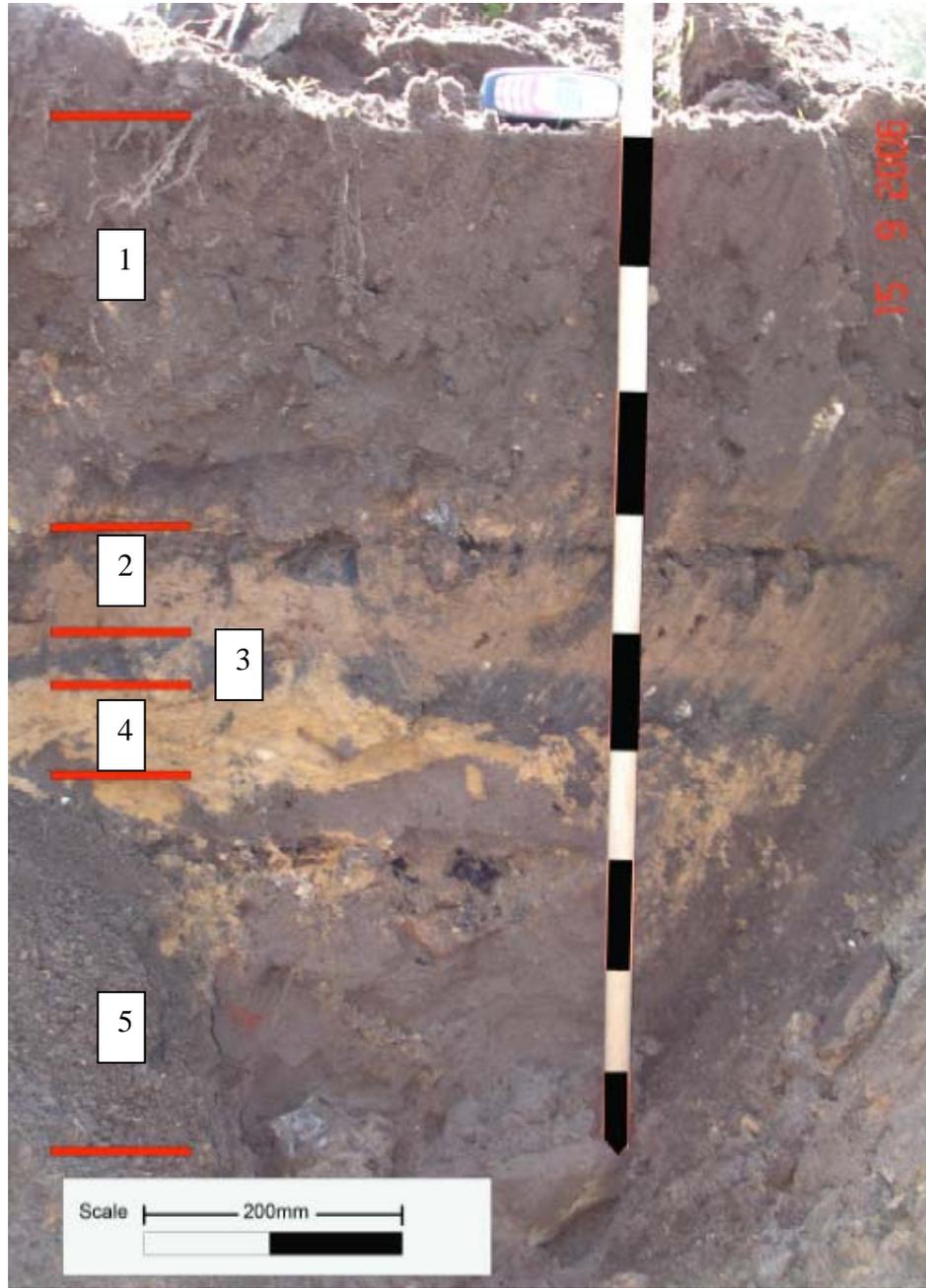
- *“Circumstances where development consent is or is not required for works relating to potential ASS land*
- *Considerations that the Council must carry out when assessing a development application*
- *Requirements for an ASS management plan*
- *The role of a preliminary assessment.”*

The preliminary assessment and ASS management plan are detailed reports that require many specific questions to be answered and detailed soil tests. A copy of the requirements for these reports can be obtained from CSIRO.

## Soil test results

**Table 2:** pH and field texture assessment

Test site	1	2	3	4
pH	5	5.5	5	5
Field texture assessment	Loamy sand	Loamy sand	Loamy sand	Loamy sand



**Plate 3:** Soil profile test. P.Vezgoff.

## Soil test results

**Table 3:** Soil test of profile (Depth numbers match Plate 3)

Soil	1	2	3	4	5
Characteristic	0-320mm	320-420mm	420-490mm	490-540mm	540-890mm
Texture Class	Loamy sand	Sand	Sand	Sand	Loamy sand
Structure	Apedal	Apedal	Apedal	Apedal	Apedal
Stability	N/A	N/A	N/A	N/A	N/A
pH	5	5.5	7.5	6	5.5
Colour	N/A	N/A	N/A	N/A	Grey

## Soils test results

The soil profile revealed a highly disturbed area that has received layer after layer of sand fill over the years. The horizons that feature in Plate 3 bear no relationship to natural soil profiles and there would appear to be little natural soil component at all. When rolled in the hands all samples were unable to form peds. This would indicate that the soil is apedal. This will mean that the soil will have a low water-holding capacity and will resist compaction. These soils will however be well drained.

Between layer 1 & 2 at a depth of 320mm was a 10mm layer of charcoal. This may be evidence of the original land clearing for the dairy.

Concerns over the acidity of the site were soon put to rest following pH tests that were conducted on each visible horizon. The lowest result being 5 and the highest being 7.5. A pH range of 5.0 to 7.5 is reasonable for most nutrients and most plants.

The colours at the lower depth of the profile (Layer 5) were grey in colour. This would indicate decreasing oxidation and therefore a reduction in drainage. At this depth (540-890mm) the affect on the plantation should be minimal. For good tree growth a well drained depth of 400mm is considered adequate.

Due to this high sand content there are no issues with compaction over the site. Following heavy rains from the 6/9/06 – 8/9/06 I was able to view the site. Pooling of water on the surface was minimal indicating that the site has excellent drainage. With the high levels of sand it is likely that nutrients will leach freely from the soil. Monitoring of the nutrient levels over the life of the plantation will be required.

Further specialist advice to detail soil nutrient and chemical analysis are recommended for this site. These tests are outside the scope of this report.

### **3.3 Drainage**

The site was filled and leveled in the early 1920's. This created a relatively level playing surface for sports and recreation. Yearly turf maintenance of the site has included coring to a depth of 150mm. This coring has prevented any form of surface pooling. Also it is likely that course fill material was used on this site for leveling. As a result of the above mentioned factors the site has good drainage and little compaction.

### **3.4 Microclimate**

The site (Lough playing fields) is located on the Southern foreshores of Sydney Harbour. The harbour is approximately 1.2 kilometres to the North of the site. The Tasman Sea lies just 3.6 kilometres to the East of the site. Existing vegetation indicates that salt laden winds are not a problem at this site.

The site is located within a protected valley with Bellevue Hill to the East and Woollahra hill to the West. There are no records of frost at this site and most climatic records for Central Sydney would apply to this site.

### **3.5 Infrastructure**

Surrounding infrastructure includes mostly residential development of no more than two (2) story houses. To the North of the site is an area of land that is the property of Energy Australia. This area is currently a substation. Low Voltage (LV) mains power cables follow the line of Epping Rd on the western side.

## **Roads**

Suttie Road borders the South of the site. This road divides the site and lower Cooper Park. Manning Road borders the Western edge of the site.

## **Toilet**

A small single story toilet block is located to the North of the site. It also contains a shower and change rooms. This facility could be utilized for workers that are employed on the site. It is recommended that the plantation boundary is six (6) metres from this building.

## **Garage**

A small sandstone building lies to the South of the site. It is situated on the corner of Manning Road and Suttie Road (See Plate 4). This building was once part of a dairy farm and is heritage listed under WMC LEP95.



It is recommended that the plantation is boundary is 15 metres from this building. When it is time for harvesting this building will require substantial fencing for protection from the logging equipment and vehicles. The specifications for this fencing are outside the scope of this report.

**Plate 4:** Old dairy building. P.Vezgoff.

### **3.5.1 Ownership**

The site is owned by WMC. Although Council property there is no doubt that local residents would consider this open space ‘their own’. It is used by schools, walkers, dog owners and exercise classes. It is a protected, quiet space, close to Sydney’s CBD.

### **3.5.2 Surrounding use**

#### **Residential**

The site is located in a residential area that contains mostly two (2) story houses. The site is an extension of Cooper Park a wooded park that contains streams, tennis courts, playgrounds and winding paths. Only five hundred (500) metres away to the North are the excesses of salubrious Double Bay.

#### **Sports fields**

At present the site is used for sporting and public recreation events. The site is not fenced and is open to the public 24 hours a day, seven days a week. To the North of the toilet block are several netball fields. The plantation will not impose on these netball fields.

## **4. Plantation Plan**

### **Location of the plantation**

An area of approximately one thousand (1000) square metres has been selected for the plantation (Diagram 3, over page). The details for the site can be found in Section 3 (Site details).



# Diagram 3

Proposed plantation area (Red line)



22/08/2006  
paulv

pH test sites

Date of Aerial Photography: January 2002

Photography by  
**HATCH**  
Copyright 2006 Hatch Associates Pty Limited  
Issued Under License  
Phone (02) 4334 7222  
Email: hatchmap@hatch.com.au



#### 4.1 Species selection

The species I am recommending for this plantation is the flooded gum, *Eucalyptus grandis*. Although not endemic to the locality this tree has been selected due to its recorded evidence of tolerance to acid soils. Although soil test results revealed good pH results (5-7.5) the site has been classed as an Acid Sulfate Soils (ASS) area it would be a large gamble to plant a species that was not acid tolerant and have the stand fail before its recommended harvesting time. *E. grandis* has been grown on acid soils in Brazil and has done so well with appropriate stand management (CSIRO).

*Eucalyptus* species have different tolerances to canopy cover and competition. Slower growing *Eucalyptus* are more tolerant of competition. *E. grandis* is a fast growing species that will be intolerant of competition. This will affect the timing and intensity of thinning.

*E. grandis* is a coastal species of Northern New South Wales and South eastern Queensland occurring typically in fertile moist gullies, at altitudes of up to 300 m in New



South Wales and 700 m in Northern Queensland. *E. grandis* occurs in pure stands of uniform age with dense, wet sclerophyll undergrowth bordering on subtropical rainforest.

**Plate 5:** *Eucalyptus* seedlings. P.Vezgoff.

## 4.2 Stock source

As the site has a dense layer of turf and various weeds, sowing by seed is not an option. Seedlings will need to be propagated off site and then planted following cultivation of the soil.

The characteristics of parent trees are mostly passed onto the seed and then the seedling. Seed for this plantation will be sourced from a good provenance selected for timber producing qualities. The seedlings will be of good quality. It is essential that they are free of pest and disease and are not J-rooted or root-bound.

A specialist nursery will be required to source and propagate the seed. *Eucalyptus* seed do not require any special conditions for propagation (Hillis & Brown, 1984). The only major factor in a *Eucalyptus* seedling germinating and establishing is limited light although this should not be an issue in a commercial nursery.

## 4.3 Products

*Eucalyptus grandis* timber varies in colour from pink to light red with a course texture. Gum veins are common and the timber is moderately strong and durable. It is also not susceptible to lyctid borers.

This timber could be used in general construction, joinery, plywood, boat building and flooring. Some typical current (2006) wholesale prices for hardwood timber is listed below.

<b>Product</b>	<b>Typical current wholesale price</b>
Joinery	\$1300-\$2000/m <sup>3</sup>
Furniture	\$1500/m <sup>3</sup> (Kiln dried select grade)
Flooring	\$800/m <sup>3</sup> (Standard)
Green structural Products	\$700/m <sup>3</sup>

It is hard to predict timber trends in thirty (30) years time although there is sure to always be a need for hardwood timber in Australia.

#### **4.4 Stocking rates**

The final aim of this proposal is to produce large pruned sawlogs. Based on a plantation of Eucalypts the following is recommended: Plant 800st/ha. Thin and prune in a number of lifts down to 125 st/ha by age six (6) years and concentrate pruning on the best trees. At thirty (30) years it is estimated that the basal area shall be around 35 m<sup>2</sup>/ha (Reid & Steven, 1999).

## 5. Site preparation

Preparation of the site will not require the removal of any existing vegetation except for the turf that covers the entire area. This turf could be sprayed with a Glyphosate based herbicide several weeks before the site is ripped.

Ripping entails towing a farming tool behind a tractor that breaks the soil to a nominated depth. As the site soil profile test revealed high levels of sand compaction will not be an issue. Ripping on this site will only be required to a depth of four hundred (400) millimetres due to the soil structure.



The site will be required to be fenced off for the first season. Aris rail fencing would be recommended as it would be less visually intrusive than other forms of fencing. This type of fencing has been used frequently in this area. The main aim of the fence is to restrict pedestrian access to the site for Occupational Health and Safety issues.

**Plate 6:** *Eucalyptus* in 45ltr bags. P.Vezgoff.

## **6. Planting and establishment**

### **6.1 Spacings**

It is calculated that the spacings for the plantation will be as close as 2 x 3 metres. With this spacing the branch growth shall be restricted by this crowding. As the stand grows there will be opportunities when thinning to select attractive stems to retain for the final crop. This dense spacing will also restrict grass and weed growth.

Thinning will play an essential role in this plantation (see section 8. Thinning). If these initial planting spacings are not thinned then tree growth will be restricted due to the competition with each other.

### **6.2 Planting**

The seedlings for the project are recommended to be grown to advanced seedlings in bags 15cm x 30cm deep. It has been found that various *Eucalyptus spp* perform better grown in this size container rather than smaller ones (Hillis & Brown, 1984). Once the seedlings have reached this age at the selected nursery they will be delivered directly to the site for planting.

Planting will generally be done by hand with the use of hand tools. This may be a stage that schoolchildren may be introduced to the project. In winter rainfall zones planting is generally done during winter is at or near field capacity and transpiration is minimal. In summer and sub-tropical rainfall areas, planting time is more variable (Hillis & Brown, 1984). Data obtained from the Bureau of Meteorology would indicate that the highest rainfall period for Sydney is the summer months.

### **6.3 Planting pattern**

Due to the crown shyness that is a genetic trait of *Eucalyptus spp*, a symmetrical planting pattern is recommended. Seedlings would be planted following a grid pattern. This option may look out of place in this location so consideration may have to be given to planting in a more random pattern at the price of a lower yield.

#### **6.4 Potential problems following planting**

Once planting is complete there are many hazards that may arise early on that will be to the detriment of the newly planted saplings. Some of these issues are listed below.

**Grazing local fauna** may become an issue. Possum may attack the newly planted seedlings. Applications of 'Possoff' applied to the saplings may help in eliminating this issue.

**Rabbits** have been seen in the area from time to time. These could have a devastating effect on the stand. It would be recommended that a trapping program is started before the plantation is started. This trapping program may have to continue for at least the first four (4) years of the plantation establishment.

**Local dogs** that are not leashed may damage seedlings in search of blood and bone fertilizer. Fertilizer choice will need to be considered.

**Drought** may become an issue with Sydney's increasingly warmer summers. A watering program is recommended for the first two (2) years of establishment.

**Theft and vandalism** are likely to be expected. Any damaged trees should be removed and replaced within the first two (2) years of establishment. It would not be viable to replace seedling after this period as they would find it hard to compete with the already established plantation.

**Strong winds** may blow over young or poorly planted seedlings. Not much can be done in this situation. It would be recommended to pull out the damaged stock and leave it to decompose for organic matter. The site is relatively protected, so strong winds should not be an issue.

## **7. Maintenance**

### **7.1 Pruning**

High value timber contains either very small knots or no knots at all. Regular pruning will increase the proportion of clearwood. Knots larger than 5 or 6 cm in diameter result in timber being unsuitable for many structural grades as well as aesthetic timber grades. The trees on this site will require regular pruning to prevent knots becoming large.

The choice of season for pruning is important in limiting the risk of infection and dormancy of the cambium. For temperate areas the pruning of *Eucalyptus* is generally recommended in late winter (Glass & McKenzie, 1989).

Annual pruning of this forest is recommended. Although there will be a greater number of visits this frequency of pruning may be more cost effective due to the smaller branches required to be removed.

### **7.2 How to prune**

Branches should be pruned by natural target pruning. The branch collar is to be located and pruned at this point. If the collar is not damaged the wound will seal quickly. This process is known as occlusion.

Due to saw mill equipment restrictions in Australia it is recommended to prune for a height that allows for at least one (1) pruned log for the market measuring 6.1 metres (Reid, 2002).

### **7.3 Which trees to prune**

Usually the following criteria are judged when thinning, these include; form, branch size, angle, trees size and spacing in that order. However new research has shown that even spacing of *Eucalyptus spp* is more critical than past experience would suggest (Reid, 2002). This information should be considered when it is time for thinning. *Eucalyptus spp* prefer an even spacing of around six (6) metres (Reid, 2002).

#### **7.4 Weed Control**

Weeds will compete aggressively with small trees particularly light hungry Eucalypts. Weed control will be essential to achieve good growth rates. For best results weed control may be required for up the first two (2) years (Hillis & Brown, 1984). It is recommended that an area of one (1) metre diameter be maintained weed free around each tree. This can be achieved chemically or manually. A pre-emergent herbicide could also be used to control the germination of weed seed. Positive aspects of this type of weed control are low labor costs, low solubility and low mammalian toxicity (Hillis & Brown 1984).

#### **7.5 Fertilizer**

The central Sydney area (which would include the site) receive high and intense rainfall in short periods. As the soil test indicated the area is high in sand. A slow release fertilizer is recommended in these situations.

A plantation at Coffs Harbour recorded it's best growth with *E. grandis* using an initial application of nitrogen and phosphorus followed by additional nitrogen applied on an annual basis (Pryor & Clarke, 1964).

Due to the small size of the site it would be possible to hand broadcast this amount of fertilizer.

## **8. Thinning**

The main aim of thinning is to select the strongest trees that have the best form and to ensure that the remaining trees have space to reach maturity. A combination of crown thinning and thinning from below should be used to ensure the even distribution of crowns through the stand for this plantation.

Listed below are some of the objectives of thinning a plantation;

- Remove trees damaged or of poor form
- Retain the vigor of the stand
- Regulate the effects of competition in the stand
- Accelerate diameter growth of the better quality boles
- Reduce the length of the rotation by increasing growth rates and achieving merchantable sizes more quickly.
- Remove suppressed trees thus reducing the risk of pathogen attack as stress and crowded trees are more likely to be affected by pests and diseases.
- Improved aesthetics

A thinning regime that would be more appropriate for this size plantation could be either;

- An early high intensity thinning to a stocking level of the final crop trees.
- Two thinning operations before final harvest.
- Very small stands can be very intensively managed where the decisions are made based on individual tree merit and thinnings are light but frequent.

The first option may be the most appropriate for this site. The benefits would be that stumps would be able to be removed (ground out) more easily than larger stumps. The thinnings would be removed from site. This early intense thinning would provide a more user friendly environment for park users enabling them to actually walk through and enjoy the 'forest'.

The trees removed in this first thinning will be too small for sale. This type of thinning is known as non-commercial thinning.

The first thinning should occur when the crown are beginning to compete with each other. These first trees thinned could be left on the ground to decompose and add organic matter to the soil although for park users it may be more appropriate to remove the waste. Manual thinning would be the most practical method of thinning for a site this size. The waste could then be chipped on site. Care must also be taken when thinning so as not to damage trees that are to be retained. Any damage to a trees protective bark can leave the tree open to attack from pest or disease.

### **8.1 Pruned Stand Certification (PSC)**

Pruned Stand Certification (PSC) is a set of procedures that provides statistical assessment data on the effectiveness of a pruning operation and a formal record of the assessment results. PSC is a nationally run system, under the auspices of Australian Forest Growers (AFG), with Private Forests Tasmania (PFT) providing expert support training in Tasmania.

The assessment is straight forward and can be carried out by the grower using a detailed manual and having attended a one (1) day training course. The measurement, once calculated, will indicate how much potential clearwood is in the stand. This information can then influence the price paid for logs by the purchaser. A fee of \$88 (inc) is charged for the certificate that is issued from an auditor.

This certification is not compulsory for this proposal although it may be a valuable item when it comes time for harvesting.

## **9. Pest and Disease**

In plantations literature would suggest that epidemic disease is more common in plantations of exotics more than plantations of native species. It is generally stressed that native species have developed in an environment that includes their pathogens, and hence during evolution the hosts have built up some resistance to the disease caused by these organisms. Unfortunately in Australia there are two major diseases that may affect this plantation.

### **9.1 *Phytophthora cinnamomi***

*Phytophthora cinnamomi* is a soil borne organism that causes root rot of a wide variety of species both native and exotic. Council records indicate that there have been no major attacks of this disease in the Cooper Park area although the disease has been found within the WMC area.

Infection often results in the death of the plant. Damage by this disease most often occurs during summer when a plant is drought stressed. The tree is unable to obtain the required water through its damaged roots and dies.

Reproduction of the disease is through swimming zoospores. These zoospores can move through water or root contact and can live on for years in dead plant tissue. A site on a slope can often be effected very rapidly as water flow will transport the zoospores rapidly over the site.

If the disease were to attack the site it is likely the spread would be moderately slow due to the plantation site being relatively level area. The effected trees could then be identified and removed. Deep root barriers (1200mm) may need to be constructed to help quarantine the diseased area.

### **9.2 *Armillaria lutebubalina***

*Armillaria lutebubalina* is a soil borne fungus that causes root rot of a wide range of plants both native and exotic. The fungus is native to Australia and causes losses in

natural ecosystems, forest plantations, fruit crops and ornamentals. The host range of the fungus is poorly defined with little information on the presence of tolerant or resistant species.

The infection occurs via infected roots coming into contact with uninfected roots. It would seem that the disease does not spread through the soil by its own devices.

This disease is present within the WMC area. It is easily identified in May – June by the mushrooms that it produces. Several street and park trees have been lost to this disease recently, although attacks seem random and spread out over the Municipality.

Isolation of infected areas is the most effective form of control. This can be done with the use of root barriers (at least 1.1m deep). This has been found to be effective in situations where the disease is well defined.

There have been no reported cases of this disease in or around the proposed site although this disease has been found in the eastern suburbs.

## **10. Harvesting**

Once the stand has reached its anticipated thirty (30) year cycle the trees will be required to be harvested. As the site is only one (1) hectare it is unlikely that a logging company would work on this project. Without the use of large scale harvesting equipment the harvest will most likely have to be undertaken by hand. One option would be to employ the services of a portable mill operator to mill the timber on site. Some other alternatives that might be considered are;

- University and TAFE students employed to undertake the felling.
- Private tree contractors used.
- Timber company being given a share of the timber in return for harvesting.

A stand of this size would normally be harvested within three (3) hours using mechanized harvesting equipment. If this stand was harvest in this way it would be sure to shock and raise eye brows (even the cosmetically created surprised faces of Double Bay).

A more acceptable method of harvesting may be staged felling. An option may be to divide the stand into four (4) sections and harvest each section over a four (4) year period. This will reduce the sudden visual impact that clear felling will create.

The sections would be harvested in sequence of 1-4. They have been selected in this order so that schools may commence their sporting events and training as soon as space permits.

### **10.1 Notifications**

Prior to harvesting extensive notification of the local area will be required. Residents, business, RTA, and local police should be informed of the impending works. The notice should contain background information about the project, the harvesting period and likely impacts. WMC's call centre should be instructed to give a uniform response to residents' requests that are likely to be encountered. It is most likely that complaints will arise from

noise and traffic disruption. These notifications could be done by mail out, signage and advertisements in local papers.

## **10.2 Regulations of harvesting operations.**

The harvesting of the stand shall follow the framework set out in the *Plantations and Reafforestation (Code) Regulation 2001 Part 6 Regulations of harvesting operations*. It should be noted that Clause 66 makes it an offence for an owner or manager of an authorized plantation to contravene or cause or permit the contravention of any requirement imposed by this part.

### ***Division 1 Slope limits for harvesting operations***

The slope limits mentioned in this section are not applicable to the site as the site is almost level.

### ***Division 2 Log dumps and landings***

#### **60 Location of log dumps and landings.**

The log dumps on this site will not require earthworks to be created. The log dumps will be placed away from the old dairy building located on the corner of Suttie Rd and Manning Rd (see Appendix 4).

#### **61 Control of soil erosion.**

Prior to harvesting all road drains along Suttie and Manning Roads shall have erosion control devices placed over them. These devices are to stay in place until harvesting is complete. These design and application of these devices is outside the scope of this report.

### ***Division 3 Protection of drainage features and places or sites of cultural heritage.***

#### **62 Buffer zones in which harvesting is prohibited.**

*(1) No harvesting is allowed in the zone of any wetland, river or place or relic of cultural heritage.*

*(2) Despite subclause (1), the Director General may allow one-off harvesting in any such area of timber plantation or proposed timber plantation accredited under the Timber Plantations (Harvest Guarantee) Act 1995 immediately before the repeal of that Act if such harvesting would have complied with the requirements of the law in force before that repeal.*

*63 Requirements for harvesting in the buffer zones of drainage features.*

*Section 63 concerns harvesting in buffer zones of drainage features and is not applicable to this project.*

***Division 4 Restoration of harvested area***

*64 Restoration of harvested area*

*A harvested area must be stabilized to prevent soil erosion (for example, by planting it with grass or other suitable vegetation).*

Following harvesting if the site is to be returned to its former use of a playing field then major works will be required. The site will need to be leveled with any large debris over fifty (50) millimetres removed, including stones, rubble and any vegetative matter. The site will then require rolling, top dressing and turfing. This option of reinstatement of the former sports field is likely to be expensive. A detailed site specific quote for this work is recommended to be submitted with any formal application to Council.

**10.3 Access road**

An access road for harvesting is proposed to run on a North South axis centrally on the site. The entry point for this road will be opposite No. 95 Manning Rd (See Appendix 4). Before harvesting commences it is recommended that the road has an even covering of mulch of approximately one hundred (100) millimetres spread over the surface. This mulch will help prevent soil erosion, pooling of water and compaction.

The access and egress point on Manning Road has been selected as traffic would have appropriate vision when entering or exiting the site. Manning road leading North for

approximately five hundred (500) metres eventually meets New South Head Rd in Double Bay, main artery road owned by the Roads and Traffic Authority (RTA).

#### **10.4 Log dump**

The log dump has been located centrally to the site. It has been located centrally so that there is reduced visual impact early on in the harvesting process. The location of the log dump can be found in Appendix 4.

#### **10.5 Flora & Fauna survey**

Cooper Park that lies to the South East of the site is home to much native fauna. A study that was completed in 1995 by the parks caretaker (Jeff Hill) has been attached as an appendix (Appendix 5). It is more than likely that much of this fauna will have migrated into the established plantation. Prior to harvesting a detailed fauna survey should be completed. Some of the techniques for this fauna survey may include;

- Spotlighting
- Call Playback
- Trapping
- Sonar detection
- Observation
- Reptile Survey

It may be an option that NPWS may contribute volunteers to carry out this survey or University students that may be working on a similar project.

#### **10.6 Tree retention**

An area of vegetation exists along the Manning Rd boundary (Plate 5). This strip of vegetation is mostly trees that have been planted as a buffer between the site and the houses that extend along Manning Road.



**Plate 7:** Border of trees that follows the Manning Road Boundary. P.Vezgoff.

Some of these species include; Kaffer plum (*Harpephyllum caffrum*), Swamp Mahogany (*Eucalyptus robusta*), Sydney Blue Gum (*Eucalyptus saligna*), Broad-leafed Paperbark (*Melaleuca quinquenervia*), Moreton Bay Fig tree (*Ficus macrophylla*). The trees will be required to be marked so that they are highly visible before harvesting commences. These trees should be marked on the Easterly side of the trunks or have hazard tape tied to them for easy identification.

## **11. Community involvement and consultation**

### **11.1 Community consultation**

If WMC was to commence with this proposal it would be required to place the development application on public display. Currently this period for notification is two (2) weeks.

Notification should also be undertaken prior to planting, thinning and harvesting.

The notification process at Council would entail an advertisement in the local newspaper (Wentworth Courier), a letterbox delivery, and notification to the Councilors.

### **11.2 Potential problem issues**

One of the issues with a plantation forest is dealing the site following harvesting. One important issue that must be agreed early on in the consultation process is the treatment of the site following harvesting, to replant or to not replant. From a financial view it would be more economical to restart the stand again for another thirty (30) year block. This would mean minimal stump disturbance and a matter of ripping the soil and replanting. Consideration should be given to reinstating the site to its original state of a playing field. The cost of stump removal along with surface leveling and removal of all debris could be quite considerable. It is recommended that costings are assembled for this action to allow rate payers, Council and Councilors to assess all options and agree on informed decisions.

Another potential problem that will be encountered when harvesting is due is that local residents may not wish for the forest to be harvested (Forest NSW, personal communication with Mike Freeman). This issue is becoming common with local residents recruiting the help of local ministers, media and councils to prevent these type of forest projects being harvested. Even with an authorized plantation agreement in place this seems to be no guarantee that harvesting in thirty (30) years is a fait du compli.

Clearly in thirty (30) years time there are going to be many changes in Councilors, General Managers and possible Local Government boundary changes. It may need to be agreed that that the outcome following harvesting is not required to be discussed until five (5) years before harvesting is due although it should be considered that the forest may never be harvested.

### **11.3 Sponsorship**

With this proposal comes the opportunity for sponsorship. A selected company may be able to cover the set up and maintenance costs in return for signage rights promoting the project. This funding could also contribute to the loss of fees that would occur due to the loss of a sports field within the Municipality. It would be beneficial if the sponsorship covered the life of the project being thirty (30) years.

### **11.4 Naming of the forest**

One option to help increase of the marketing and exposure of this forest sink project would be to hold a naming competition for school age children. This could gain wide coverage through print and television media. The winner may even become ‘The face of the forest’!

### **11.5 Signage**

Signage would be required at certain points around the site. This signage would include a brief outline of the project its aims and objectives. It may also include a WEB address that would serve to guide people to more detailed information about the project.

### **11.6 Workshops**

To help inform and educate the public workshops could be held throughout the year. These workshops could vary in complexity of information so that school groups from Kindergarten through to University classes as well as local residents could gain an understanding on forest sinks, timber and harvesting.

### **11.7 School visits**

The location of the site is close to many schools in the Eastern suburbs of Sydney. Site visits would encourage children to see, smell, hear and feel the forest. Children could then possibly talk their parents into visiting the site.

## **12. Conclusion**

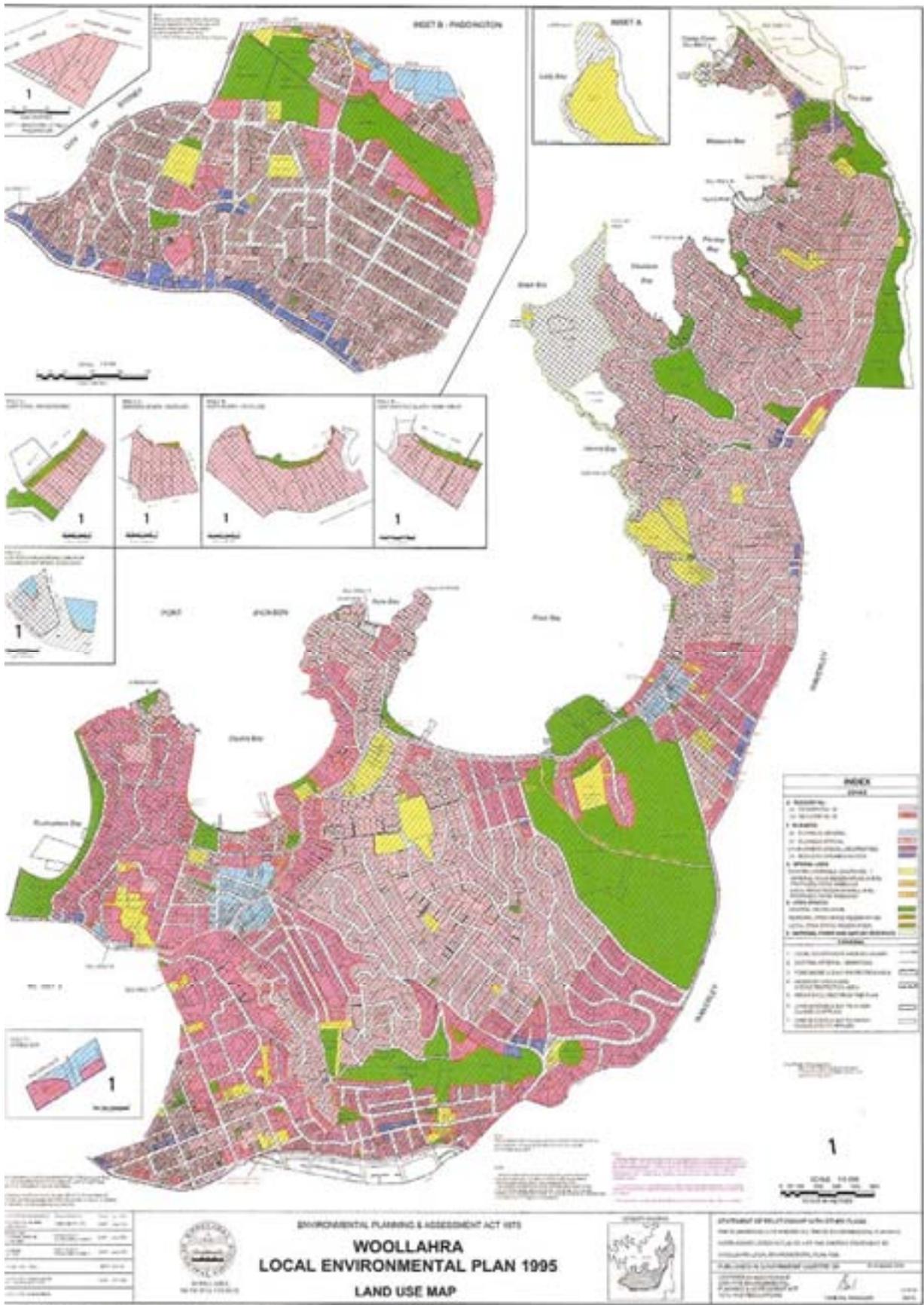
Whilst creating this proposal it has been most encouraging to receive positive and encouraging feed back from those that I have sought advice from.

This project of creating a forest sink over thirty (30) years followed by harvesting would be a first for any Local Council within the Sydney metropolitan area. It would be exciting to think that other Councils may follow Woollahra's lead.

A thirty (30) year project is long term by anyone's standard and many changes may occur during this period. Council Boundary's change, Councilors change, DCP's change and Governments change. To initiate this project would require the convincing of many people within Woollahra Council and also the residents of Woollahra. This may present the largest challenge of this project but what also should be considered is the effect that this project will have on the community over a (30) year period. Families, school children, and Universities would be able to partake in the creation of a plantation forest that could involve and educate, over thirty (30) years, possibly thousands of people.

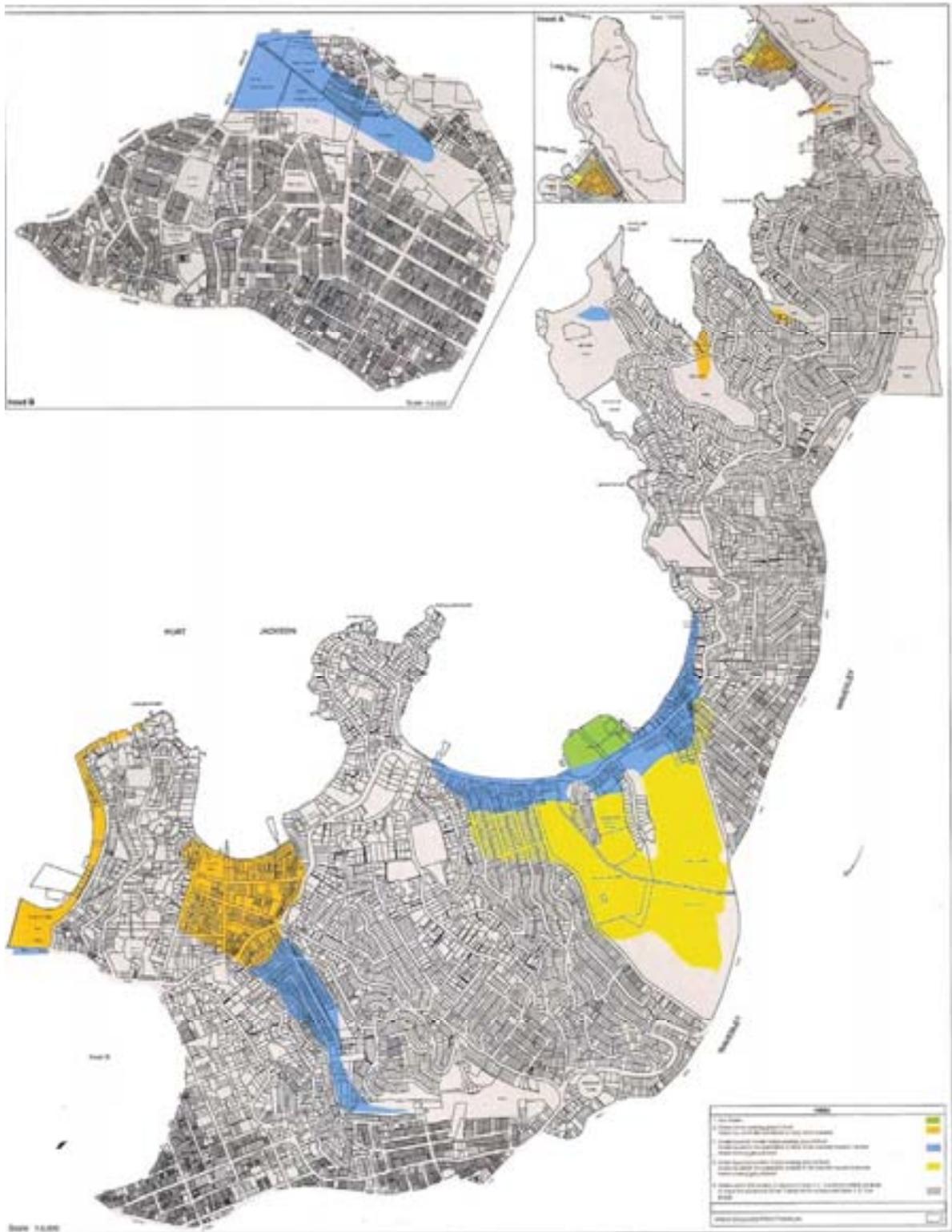
## **Appendix 1**

### **Woollahra Land Use Map**



## **Appendix 2**

### **Woollahra Acid Sulfate Soils Map**

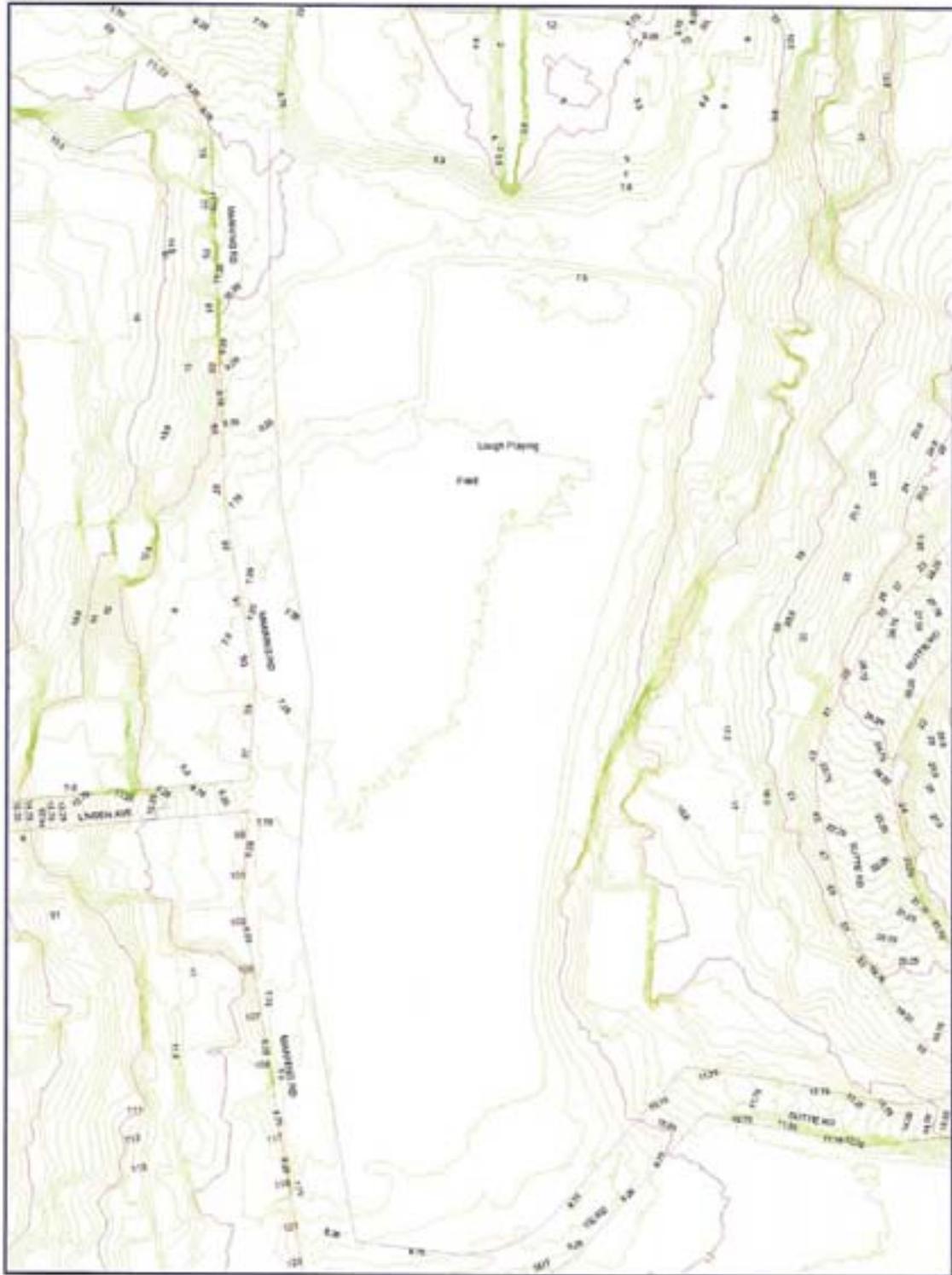


<p>Scale 1:5,000</p>			<p><b>ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979</b>  <b>WOOLLAHRA LOCAL ENVIRONMENTAL PLAN 1985</b>  <b>(AMENDMENT NO 28) - Acid Sulfate Soils Planning Map</b></p>	<p><b>GOVERNMENT OF NEW SOUTH WALES</b>          Planning Department          100 Macquarie Street          Sydney, New South Wales 2000          Telephone: (02) 9226 2000          Facsimile: (02) 9226 2001          Website: www.planning.nsw.gov.au</p>
<p><b>PREPARED BY</b> Mike Dennis  <b>DATE</b> 10 March 2005  <b>APPROVED BY</b> 20/5  <b>DATE</b> 10 March 2005  <b>PLANNING OFFICER</b> George Lockett  <b>DATE</b> 24 November 2005</p>	<p><b>LEGISLATION</b> 1969-0 (Amendment 28)  <b>DATE</b> 28 March 2005  <b>ENVIRONMENTAL PLANNING ACT 1979</b>  <b>DATE</b> 6 June 1979</p>	<p><b>GOVERNMENT OF NEW SOUTH WALES</b>          Planning Department          100 Macquarie Street          Sydney, New South Wales 2000          Telephone: (02) 9226 2000          Facsimile: (02) 9226 2001          Website: www.planning.nsw.gov.au</p>		

**Appendix 3**  
**Contour Map of site**



## Contour map of Lough Playing Fields



## **Appendix 4**

### **Access Roads and Log dump area**



# Access roads and log dump area

Red: Access road Green: Log dump area



14/09/2006

paah

Date of Aerial Photography: June 2005

Photography by  
**HATCH**  
Copyright © 2006 Hatch Associates Pty Limited  
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## **Appendix 5**

### **Cooper Park Fauna Survey**

<b>COMMON NAME</b>	<b>SCIENTIFIC NAME</b>
Crimson Rosella	<i>Platycercus elegans</i>
Eastern Rosella	<i>Platycercus eximius</i>
Galah	<i>Cacatua roseicapilla</i>
King Parrot	<i>Alisterus scapularis</i>
Port Lincoln Parrot/Mallee Ringneck - escapee	<i>Platycercus /Barnardius zonarius</i>
Rainbow Lorrieket	<i>Trichoglossus haematodus</i>
Red Rumped Parrot - inland invader	<i>Psephotus haematonotus</i>
Scaley-breasted Lorrieket	<i>Trichoglossus chlorolepidotus</i>
Sulphur Crested Cockatoo	<i>Cacatua galerita</i>
Goshawk	<i>Accipiter sp.</i>
Peregrine Falcon	<i>Falco perigrinus</i>
Tawny Frogmouth	<i>Podargus strigoides</i>
<b>COMMON NAME</b>	<b>SCIENTIFIC NAME</b>
*House Sparrow	<i>Passer domesticus</i>
Brown Thornbill	<i>Acanthiza pusilla</i>
Eastern Spinebill	<i>Acanthorhynchus tenuirostris</i>
Grey Fantail	<i>Rhipidora fuliginosa</i>
New Holland Honeyeater	<i>Phylidonyris novaehollandiae</i>
Red-browed Firetail/Finch	<i>Aegintha temporalis</i>
Silvereye	<i>Zosterops lateralis</i>
Spine-tailed Swift/Whitehroated Needletail	<i>Hirundapus caudacutus</i>
Spotted Pardalote	<i>Pardalotus punctatus</i>
Superb Blue Wren	<i>Malarus cyaneus</i>
Welcome Swallow	<i>Hirundo neoxena</i>
White-plumed Honeyeater	<i>Lichenostomus penicillatus</i>
Willy Wagtail	<i>Rhipidora leucophrys</i>
<b>COMMON NAME</b>	<b>SCIENTIFIC NAME</b>
* Common Starling	<i>Sturnus vulgaris</i>
*Domestic Pigeon	<i>Columba livia</i>

*Indian Myna	<i>Acridotheres tristis</i>
*Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>
*Spotted Turtle-Dove	<i>Streptopelia chinensis</i>
Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>
Common Koel	<i>Eudynamis scolopacea</i>
Dollarbird	<i>Eurystomus orientalis</i>
Figbird	<i>Sphecotheres viridis</i>
Grey Shrike Thrush	<i>Colluricincla boweri</i>
Magpie-Lark/Pee Wee	<i>Grallina cyanoleuca</i>
Noisy miner	<i>Manorina melanocephala</i>
Red Wattlebird	<i>Anthochaera carunculata</i>
<b>COMMON NAME</b>	<b>SCIENTIFIC NAME</b>
Spangled Drongo	<i>Dicrurus megarhynchus</i>
Australian Magpie	<i>Gymnorhina tibicen (race dorsalis)</i>
Australian Raven	<i>Corvis coronoides</i>
Grey Butcherbird	<i>Cracticus torquatus</i>
Pied Butcherbird	<i>Cracticus nigrogularis</i>
Pied Currawong	<i>Streptera graculina</i>
<b>COMMON NAME</b>	<b>SCIENTIFIC NAME</b>
Pacific Black Duck	<i>Anas superciliosa</i>
Sacred Ibis	<i>Threskiornis aethiopica</i>
Sacred Kingfisher	<i>Halcyon sancta</i>
White-faced Heron	<i>Ardea novaehollandiae</i>

<b>COMMON NAME</b>	<b>SCIENTIFIC NAME</b>
Brush Tail Possum	<i>Trichosurus vulpecula</i>
Ring Tail Possum	<i>Pseudocheirus peregrinus</i>
Placentals	
Bush Rat	<i>Rattus fuscipes</i>
Grey-headed Flying Fox	<i>Pteropus poliocephalus</i>
Black Rat	<i>Rattus rattus</i>
Brown Rat	<i>Rattus norvegicus</i>
Feral/domestic Cat	<i>Felis catus</i>
Feral/domestic Dog	<i>Canis domesticus ?</i>

House Mouse	<i>Mus musculus</i>
(Agamidae)	
Eastern Water Dragon	<i>Physignathus leseurii</i>
(Gekkonidae)	
Southern leaf-tailed Gecko	<i>Phyllurus platurus</i>
(Scincidae)	
Copper - tailed skink	<i>Ctenotus taenoides</i>
Eastern Blue - tongued lizard	<i>Tiliqua scindoides</i>
Eastern Water Skink	<i>Eulamprus quoyii</i>
Saproscincus	<i>Saproscincus sp.</i>
	<i>Saiphos equalis</i>
COMMON NAME	SCIENTIFIC NAME
Three-toed skink	
Swamp /Marsh Snake	<i>Hemiaspis signata</i>
Long - necked Tortoise	<i>Chelodina longicollis</i>
Eel	
Brown - Striped Marsh Frog	<i>Limnodynastes peronii</i>
Common Eastern Froglet	<i>Crinia signifera</i>
Dwarf Green Tree Frog	<i>Litoria fallax</i>
Tusked Frog	<i>Adelotus brevis</i>
ARTHROPODS	
ACARINA (Mites)	
Predatory Mites	
Red Spider Mite	
Two Spotted mite	
AMPHIPODA	
Springtails	
ARANEAE	
Sydney Funnel Web	<i>Atrex robustus</i>
Stick Spiders	
St. Andrews Cross	<i>Argiope antheraea</i>
Red Back Spider	<i>Latrodectus hasselti</i>
Leaf-curling Spider	<i>Phonognatha sp.</i>
Jumping Spiders	<i>(Salticidae) Oxyopes sp.</i>
Huntsmen	<i>Isopoda sp.</i>
Green Flower Spiders	<i>(Thomisidae)</i>
Garden Orb Weaving Spider	<i>Eriophora sp.</i>
COMMON NAME	SCIENTIFIC NAME

ARANEAE	
Daddy Long-legs	<i>Pholcus phalangiodes</i>
Bird Dropping Spiders	<i>Celaenia excavata</i>
BLATTODEA	
Cockroaches	
CHILOPODEA	
Centipedes	
COLEOPTERA (Beetles)	
28 Spotted Lady bird	( <i>Coccinellidae</i> )
Black Beetles	<i>Sericesthis geninata</i>
Christmas Beetles	<i>Anoplogathus sp.</i>
Click Beetles	( <i>Elateridae</i> )
Longicorn Beetles	( <i>Cerambycidae</i> )
Orange Ladybird	( <i>Coccinellidae</i> )
Weevils	( <i>Curculionidae</i> )
Yellow Ladybird	( <i>Coccinellidae</i> )
COLLEMBOLA	
Springtails	
<b>DIPLOPODA</b>	
Millepedes	
DIPTERA	
Blow Fly	
Crane Fly	
Greenbottle Fly	
Horse Fly	
House Fly	
Hover Fly	
Mosquitoes	
Sand Fly	
HEMIPTERA	
Homoptera	
Aphids	
Cicadas	
Leaf Hoppers	
Lerps	
Psyllids	
Heteroptera	
Assassin Bug	
Bronze Orange Bug	

Crusader Bug	
Harlequin Bug	
Spined Citrus Bug	
COMMON NAME	SCIENTIFIC NAME
HYMENOPTERA	
Bees	
*Honey Bees – introduced	
Bumble Bees	
Native Bees	
Wasps	
*European Wasp	
Native Wasps	
Ants	
ISOPODA	
Slaters	
LEPIDOPTERA	
Aust. Painted Lady	<i>Vanessa kershawi</i>
Aust. Privet Hawk	<i>Psilogamma menephron</i>
Blue Triangle	<i>Graphium sarpedon</i>
Bogong Moth	<i>Agrostis infusa</i>
Cabbage White	<i>Pieris rapae</i>
Common Grass Blue	<i>Zizina labradus</i>
Cup Moth	<i>Doratifera sp.</i>
Dinghy Swallowtail	<i>Papilio anactus</i>
Large Citrus- Orchard Butterfly	<i>Papilio aegaeus aegaeus</i>
Northern Jezebel	<i>Delias argenthona</i>
Oleandar/Common Aust. Crow	<i>Euploea core corinna</i>
Palm Dart	
Saunders Case Moth	<i>Oiketicus elongatus</i>
Skipper	
Vine moth	
Wanderer/ Monarch Butterfly	<i>Danus plexippus</i>
MANTODEA	
Praying Mantis	
NEUROPTERA	
Lacewings - Ant lions	
ORTHOPTERA	
Crickets	
Grasshoppers	

Katydid	
Locust	
PHASMIDA	
Stick insects	
THYSANOPTERA	
Thrips	

## **Appendix 6**

### **Soils Classification Table**

## THE SOIL TEXTURE CLASS TABLE (after Northcote, 1979)

A texture assessment of soil will provide the relative proportions of sand, silt and clay.

Texture Class	Coherence	Bolus Characteristics	Ribbon Length	Other Remarks
Sand	Nil to slight	Sandy to touch	Cannot be moulded	Single sand grains adhere to fingers
Loamy sand	Slight	Sandy to touch	About 5 mm	Fingers discoloured with dark organic stain
Clayey sand	Slight	Sticky when wet; sandy to touch	5-15 mm	Many sand grains stick to fingers; fingers discoloured with clay stain
Sandy Loam	Slight	Sandy to touch	15-25 mm	Medium sand grains (dominant size) readily visible
Light sandy clay loam	Strong	Sandy to touch	20-25 mm	Medium sand grains (dominant size) readily visible
Loam		Spongy and smooth to touch; no obvious sandiness or silkiness	About 25 mm	Greasy to touch if large quantity of organic matter present
Silt loam		Very smooth or silky to touch	About 25 mm	
Sandy clay loam	Strong	Sandy to touch	25-40 mm	Medium size grains visible in a finer matrix
Clay loam	Strong	Plastic and smooth to touch	40-50 mm	
Silty clay loam	Strong	Smooth, plastic to silky to touch	40-50 mm	
Sandy clay	Strong	Plastic to touch; fine to medium sand seen, felt or heard in clayey matrix	50-75 mm	
Silty clay	Strong	Plastic, smooth and silky to touch	50-75 mm	
Light clay	Strong	Plastic and smooth to touch	50-75 mm	Slight resistance to shearing between thumb and finger
Light medium clay	Strong	Plastic and smooth to touch	About 75 mm	Slightly greater resistance to shearing than light clay
Medium clay	Strong	Plastic and smooth to touch; handles like plasticine	Greater than 75 mm	Moulded into rods without fracture; moderate shearing resistance
Medium heavy clay	Strong	Smooth and plastic to touch; handles like plasticine	Greater than 75 mm	Moulded into rods without fracture; firm shearing resistance
Heavy clay	Strong	Smooth and plastic to touch; handles like stiff plasticine	Greater than 75 mm	Moulded into rods without fracture; very firm resistance to shearing

## **Appendix 7**

### **WMC DCP Section 3 (Complying development)**

### 3. Complying development

#### 3.1 What is complying development?

Complying development is local development (that requires consent) which is defined by predetermined development standards. Complying development may be carried out following the issuing of a complying development certificate. Table 2 of this plan specifies the types of development identified as complying development in Woollabra Municipality. Table 2 specifies complying development by its type, the land on which it can occur and the criteria which must be satisfied when the development is carried out.

If you obtain a complying development certificate, you do not have to go through the development application process. However, because complying development is local development as defined by the Environmental Planning and Assessment Act 1979, a development application may be lodged for that development as an alternative way of obtaining consent. If you wish to carry out development that is not listed in Table 2, or you do not meet the complying development criteria, then you must obtain development consent from Council by lodging a development application.

The complying development certificate must be issued by either the Council or an accredited certifier before development commences. An accredited certifier is a person who is accredited by an accreditation body which is a professional association authorised for accreditation purposes by the Minister for Infrastructure, Planning and Natural Resources. The Environmental Planning and Assessment Act 1979 and the Environmental Planning and Assessment Regulation 2000 provide for matters such as the establishment of accreditation bodies, their authorisation, creation of registers of accredited certifiers, auditing and complaints procedures involving certifiers and liability and insurance issues.

Complying development certificates may be issued either unconditionally or subject to conditions (refer to Schedule 1).

**Note:**

Section 76A (6) of the *Environmental Planning and Assessment Act 1979* specifies that the complying development provisions under a LEP and the associated provisions of a development control plan can not be made to apply to development or land in the following circumstances:

- a) if the development is State significant development (as defined in section 76A (7) of the *Environmental Planning and Assessment Act 1979*); or
- b) if the development is designated development; or
- c) if the development is development for which a development consent cannot be granted except with the concurrence of a person other than:
  - i) the Council; or
  - ii) the Director-General of National Parks and Wildlife for circumstances specified in section 79B(3) of the *Environmental Planning and Assessment Act 1979*; or
- d) if the land is critical habitat; or
- e) if the land is partly or wholly a wilderness area within the meaning of the *Wilderness Act 1987*; or
- f) if the land comprises an item of the environmental heritage:
  - i) that is subject to an interim heritage order under the *Heritage Act 1977* or that is listed on the State Heritage Register under that Act; or
  - ii) that is identified as such an item in an environmental planning instrument; or
- g) if there is on the land an item of the environmental heritage:
  - i) that is subject to an interim heritage order under the *Heritage Act 1977* or that is listed on the State Heritage Register under that Act; or
  - ii) that is identified as such an item in an environmental planning instrument; or
- h) if land is identified in the relevant LEP as an environmentally sensitive area.

The complying development provisions will cease to apply to land or development if the development or land becomes development or land to which the circumstances in (a) to (h) applies.

### 3.2 General development criteria for complying development

The complying development types listed in Table 2 may be carried out on the land identified in that Table subject to a complying development certificate being issued, the development satisfying the complying development criteria set out in Table 2, and the following general development criteria:

- it is otherwise permissible under the relevant environmental planning instrument which applies to the land; and
- the development does not require development consent under the provisions of clause 25D-Development on land identified on Acid Sulphate Soils Planning Map in Woollahra LEP 1995.
- it complies with any other development standards specified for development in any environmental planning instrument applying to the land on which the development is proposed to be carried out (except for the maximum height for dwelling-houses, in which case the standard in this Plan prevails); and
- it does not contravene any condition of a development consent applying to the land; and
- it complies with any "deemed-to-satisfy" provisions of the Building Code of Australia relevant to the development; and
- it complies with Woollahra Municipal Council's Code for Building Sites (1991); and
- it will not require the removal, lopping or the cutting of roots greater than the specified diameter of a tree protected by Council's Tree Preservation Order (TPO). Where complying development involves work which will require the removal, lopping or the cutting of roots of a tree protected by the Tree Preservation Order a complying development certificate must not be issued unless approval for the necessary tree removal, lopping or root cutting has been granted; and
- it will not restrict any vehicular or pedestrian access to or from the site; and
- it is located clear of any sewer main or stormwater main by a minimum distance of 1 metre from the main centre line or the equivalent invert depth of the main, whatever is the greater; and
- it will not encroach on any easements; and
- it will not restrict any vehicular or pedestrian access to or from the site; and
- a certificate of compliance has been obtained for the development, if required, by Sydney Water; and
- no environmental planning instrument applying to the land on which the development is proposed to be carried out states that the adequacy of an acid sulphate soils management plan of the proposed development must be considered before consent can be granted to the development; and
- it will not be located on land that is identified by Council or in any environmental planning instrument or development control plan as bushfire prone, flood liable or contaminated land, or land subject to subsidence, slip or erosion; and
- it will not be located on land that is a site that has previously been used:
  - as a service station,
  - for mining or an extractive industry, or
  - for waste storage or waste treatment, or
  - for the manufacture of chemicals, asbestos or asbestos products,

and a notice of completion or remediation work for the proposed use has not been given to the Council in accordance with State Environmental Planning Policy No.55 - Remediation of Land.

Note:

The TPO was adopted on 17 November 1998 and is in the following terms:  
THAT pursuant to clause 6 of the Woollahra LEP 1995, clause 34 of Woollahra LEP No.24 and clause 31 of Woollahra LEP No.27, it is hereby resolved that a general Tree Preservation Order be placed on all trees in the Municipality of Woollahra with a spread of branches greater than three (3) metres and also on all trees, irrespective of the spread of branches, with a height greater than five (5) metres. This Order prohibits the ringbarking, cutting down, topping, lopping, pruning, removing, injuring or wilful destruction of such trees except with the written consent of the Council.

The TPO does not apply to rubber trees (*Ficus elastica*), large-leaved privet trees (*Ligustrum liliicum* and cvs), small-leaved privet trees (*Ligustrum sinense* and cvs) and bamboo (*Bambusa* spp).  
For Council owned or managed land the TPO does not apply to Tree of Heaven (*Ailanthus altissima*), Cotoneaster (*Cotoneaster* sp), Coral trees (*Erythrina* sp), Hackberry (*Celtis occidentalis*) and African Olives (*Olea africana*).

Note:

The Building Code of Australia contains national performance standards for building construction, safety and amenity.

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