Assessment of Crown Land At Belrose, Cromer and Oxford Falls – Draft Document

Department of Lands
Land Administration & Management
Property & Spatial Information
Crown Lands NSW

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(front cover: Looking east from Morgan Road, Belrose towards Narrabeen Lakes)

Acknowledgments

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CHAPTER ONE

INTRODUCTION

The *Department of Lands* is responsible for the administration of the *Crown Lands Act, 1989* (CLA, 1989) and the *Crown Lands Regulation, 2000* (CLR, 2000) and associated management of Crown land.

Crown land is a limited and valuable public asset to the people of New South Wales. It is essential that it be wisely used and managed to bring about the optimum benefit to the state. The Crown land assessment process has been developed to ensure that this goal is achieved. The process aims to ensure that decisions on allocation and management of Crown land in NSW:

1. Are based on adequate biophysical and socio-economic information;
2. Are carried out in an open and accountable manner;
3. Result from a rigorous, objective and repeatable methodology,
4. Allow for community involvement; and
5. Are in accordance with government policy and statutory requirements.

Crown land must also be managed in accordance with the principles of Crown land management as prescribed in the CLA, 1989 and given in *Annexure A*.

A principal objective of the CLA, 1989 is to ensure that the proper assessment of Crown lands is carried out prior to land being reserved or dedicated for a public purpose or disposed of by way of sale, lease, licence or exchange. In satisfaction of this requirement assessments of Crown land are completed under the provisions of Part 3 of the CLA, 1989 and the CLR, 2000.

1.1 PUBLIC PARTICIPATION IN THE CROWN LAND ASSESSMENT PROCESS

Public participation is fundamental in facilitating effective decision-making. In order for the Department to make acceptable land management decisions, all interested parties are encouraged to provide information and comment on the draft land assessment. Accordingly, this assessment is publicly released with the following purposes in mind:

1. To gain a better understanding of the factors that affect land use and management in the locality;
2. To gain evidence as to the level of support for, or desirability of a particular use; and
3. To determine the community views on the most appropriate form of management for the land.

At the conclusion of the display period, public submissions are reviewed and any necessary amendments are made to the draft assessment prior to its adoption. The final preferred land uses are then identified and administrative actions such as land retention, reservation, transfer and disposal are initiated.

1.2 BACKGROUND TO THIS ASSESSMENT OF CROWN LAND

This assessment of Crown land has been undertaken due to the need to consider the future use and management of numerous parcels of Crown land in the Belrose, Cromer and Oxford Falls area. This assessment has also been undertaken due to approaches to the Department from Warringah Council and the National Parks Association and internal Department requests.

It is not the purpose of this assessment to evaluate the merits or details of any specific proposals. Rather it is to make an assessment of the subject land, so that decisions can be made as to the most appropriate uses of the land in the future.

This assessment is neither intended to pre-empt, nor preclude any requirement to undertake further environmental impact analysis, where required, for any future development of the subject Crown land. Any proposed developments for a particular parcel of land must be considered under the provisions of the Environmental Planning and Assessment Act, 1979.

1.3 CAUTION IN USING INFORMATION CONTAINED WITHIN THIS ASSESSMENT

The information contained in this document has been prepared for the purpose of carrying out an assessment under Part 3 of the CLA, 1989 and CLR, 2000. It is based on guidelines outlined in the *Crown Land Assessment Manual* (DLWC 1999). Therefore, caution should be used in using any information contained in this assessment for any secondary purposes. This information should not be considered a substitute for other detailed studies that may be required prior to the implementation of any land use.

CHAPTER TWO

DESCRIPTION OF LAND ASSESSMENT PROCESS

Land assessments under the CLA, 1989 involve four basic procedural steps:

1. An inventory of the natural resource attributes of the land,
2. A determination of the capability of the land to sustain various forms of land use and an assessment of the significance of the lands natural resource attributes;
3. A determination of the suitability of the land to support those land uses; and
4. Where practical, identification of preferred uses for the land and provision of recommendations and options for future management.

2.1 INVENTORY OF LAND

The land assessment study area is divided into Mapping Areas, based on attributes of the land outlined in the assessment. A natural resource inventory is prepared for each Mapping Area. The inventory provides the basic information for the land capability and significance assessment. It involves gathering information on the natural resource attributes of the land as well as the current form of land use occurring.

2.2 DETERMINATION OF LAND CAPABILITY AND SIGNIFICANCE ASSESSMENT

This involves an assessment of the potential of the land to fulfil various land uses. Land Capability refers to the ability of the land to sustain a land use without significant degradation (assuming viable management practices). Land significance refers to the significance of the inherent values of the land for a particular use.

The capability / significance rating is based on the natural resource attributes contained within the inventory and the prescribed land evaluation criteria as set out in the CLR, 2000. This step is performed using a set of tables developed by the Department for a set of “typical” forms of land use. In general the ratings are graded from “very high” to “low” (ie. 1 to 4) with “very high” indicating that land is very highly capable of that use without significant land degradation.

Crown land may be committed to virtually any use in accordance with the general set of land uses described in Section 32(2) of the CLA, 1989. The land uses include, but are not limited to; community and public purposes, environmental protection, nature and water conservation, forestry, recreation, tourism, grazing, agriculture, residential purposes, commerce, industry and mining.

2.3 DETERMINATION OF LAND SUITABILITY ASSESSMENT

Suitability assessment is an evaluation of the socially and environmentally acceptable uses of the site. This evaluation is based on a number of factors including land capability, socio-economic factors, environmental impacts, current legislation and Department of Lands and other government policy and directives. The primary objective of suitability analysis is to identify the use or range of uses that are most suitable for the land that will optimise the benefit to the people of New South Wales.

Even though a site may have a high capability for a particular use, it may not necessarily be suitable for that use. A site may be suitable for a number of different uses, some of which may be conflicting.

2.4 DETERMINATION OF PREFERRED USES AND FUTURE MANAGEMENT RECOMMENDATIONS

Where practical, a preferred use or uses for the land are identified. The preferred uses are the uses which it is envisaged the land will be put to. It is the use which optimises the benefit to the public and best accords with government policy. Decisions on the preferred land use are made on the basis of the suitability assessment.

It is generally, but not always, the use that has the highest suitability.

Recommendations may be made on the most appropriate form of administrative action for the land and any necessary land management actions that may have been identified through the land assessment process.

CHAPTER THREE

DESCRIPTION OF STUDY AND MAPPING AREAS

3.1 STUDY AREA DESCRIPTION

The study area for this assessment comprises about 469 hectares of Crown land located in the northern Sydney suburbs of Belrose, Cromer and Oxford Falls. The boundaries of the study area are shown in *Figure 1* and aerial view of the study area is given in *Figure 2*.

Land information for the study area is as follows:

Locality:	Belrose, Cromer and Oxford Falls
Parish:	Manly Cove
County:	Cumberland
Local Government Area:	Warringah
Land District:	Metropolitan

Map Sheet / Orthophoto: Hornsby 9130 – 4S and Mona Vale 9130 – 1S 1:25000 topographic maps.

Grid Reference:	Between 334800 E 6268800 N and 340300 E 6264400 N AMG
Air Photo Details:	NSW 4453 (Sydney, colour, 1998) 1:25000, run 7, numbers 93 and 94

3.2 MAPPING AREA DESCRIPTIONS

For the purpose of undertaking this assessment of Crown land the study area has been divided into six (6) Mapping Areas based on geomorphology and vegetative cover. The six Mapping Areas are described in the following sections.

3.2.1 Description of Mapping Area 1

Mapping Area 1 comprises that part of the study area with naturally vegetated ridgetops and plateaus and has an area of approximately 52.07 hectares as shown in *Figure 3*. The Mapping Area comprises the Crown land described in *Table 1*.

Table 1: Crown land included within Mapping Area 1

Lot & Deposited Plan	Status
Part Lots 201, 818, 819,825, 826, 829, 856, 1054, 1055, 1086, Lot 830, DP 752038	Reserve 100221 for public recreation and urban services (administrator appointed)
Lot 7036 DP 93795	Reserve 100221 for public recreation and urban services (administrator appointed) and Travelling Stock Reserve 1508
Part Lots 1005, 1006 DP 752038	Reserve 100221 for public recreation and urban services (administrator appointed) and Reserve 80778 for future public requirements
Pt Lot 7062 DP 93798	Reserve 89191 for public recreation (Warringah Council reserve trust manager)
Lot 6 DP 700298	Reserve 68854 for public recreation and access (Warringah Council

	Trust Manager)
Lot 964 DP 752038	Reserve 70341 for public recreation (devolved to Warringah Council)
Part Lot 7029 DP 1030769	Reserve 7514 for water (no trust)
Part Lots 160, 161, 163, 167, 171, 174 DP 752038, Part Lot 2 DP 550326	Reserve 82867 for future public requirements (no trust)
Part Lot 162 DP 752038	Reserve 83191 for future public requirements (no trust)
Part Lot 173 DP 752038	Reserve 83441 for future public requirements (no trust)
Lot 2630 DP 752038	Reserve 83616 for future public requirements (no trust)
Lot 2600 DP 752038	Reserve 81917 for future public requirements (no trust)
Lots 4 & 18 DP 807906	Reserve 82003 for future public requirements (no trust)
Lot 2458 DP 752038	Reserve 82981 for future public requirements (no trust)
Lots 939 & 2636 DP 752038	Reserve 79820 for future public requirements (no trust)
Lots 7030 & 7031 DP 93767	Reserve 83433 for future public requirements (no trust)
Lot 192 DP 752038	Reserve 84031 for future public requirements (no trust)
Lot 152 DP 752038, Unsurveyed Crown land (adjoining Forest Way)	Unreserved Crown land
Part Lots 142, 144, 146, 179, 180, 1930, 1987, 2605 DP 752038, Part Lot 97 DP 869624	Unreserved Crown land. Under Aboriginal Land Claim
Part Lot 1082 DP 752038	Unreserved Crown land and Permissive Occupancy 1986 / 88 Metropolitan for grazing
Part Lot 1084 DP 752038	Unreserved Crown land and Licence 302720 for dam and pipeline
Part Lot 2627 DP 752038	Unreserved Crown land and Licence 192632 for grazing, market garden and orchard.

3.2.2 Description of Mapping Area 2

Mapping Area 2 comprises that part of the study area with ridgetops and plateaus that have been largely cleared of natural vegetation and has an area of approximately 4.91 hectares as shown in *Figure 4*. The Mapping Area comprises the Crown land described in *Table 2*.

Table 2: Crown land included within Mapping Area 2.

Lot & Deposited Plan	Status
Part Lot 7034 DP 93795, part Lots 1008, 1009 DP 752038	Reserve 100221 for public recreation and urban services (administrator appointed)
Part Lot 146 DP 752038	Unreserved Crown land under Aboriginal Land Claim
Lot 1 DP 700298	Reserve 68854 for public recreation and access (Warringah Council Trust Manager) and Reserve 82281 for bush fire brigade purposes (Warringah Council Trust Manager)
Lot 971 DP 752038	Part Reserve 89175 for community centre (Warringah Council reserve trust

Lot & Deposited Plan	Status
	manager) and Part Reserve 85461 for ambulance station (managed by the NSW Ambulance Service)
Lot 2651 DP 752038	Unreserved Crown land and Licence 325531 for Scout activities

3.2.3 Description of Mapping Area 3

Mapping Area 3 comprises that part of the study area with naturally vegetated sideslopes and has an area of approximately 333.17 hectares as shown in *Figure 5*. The Mapping Area comprises the Crown land described in *Table 3.*

Table 3: Crown land included within Mapping Area 3.

Lot & Deposited Plan	Status
Part Lot 7034 DP 93795, Lot 816, 818, 824, 828, 856, 978, 983, 986, 987, 988, 989, 990, 991, 992, 1063, 1064, 1089, 2012, 2510, 2639, Part 89,Lot 201, 819, 825, 826, 827, 829, 830, 1008, 1009, 1054, 1055, 1086, 1088 DP 752038, Lot 2 DP 808682, Lot 2873 DP 824283	Reserve 100221 for public recreation and urban services (administrator appointed)
Part Lots 998, 1005, 1006 DP 752038	Reserve 100221 for public recreation and urban services (administrator appointed) and Reserve 80778 for future public requirements
Lot 17 DP 729342	Reserve 100221 for public recreation and urban services (administrator appointed) and Reserve 7496 for access (no trust)
Part Lot 1334 DP 752038	Reserve 100221 for public recreation and urban services (administrator appointed), Reserve 17121 for quarry and Permissive Occupancy 1952 / 199 Metropolitan for quarry
Lots 956 & part Lot 957 DP 752038	Reserve 100221 for public recreation and urban services (administrator appointed). Under Aboriginal Land Claim
Lot 985 DP 752038	Reserve 100221 for public recreation and urban services (administrator appointed) (with Enclosure Permit 40963 attached over adjoining Crown road – outside assessment area)
Part Lots 1046 and 1053 DP 752038	Reserve 100221 for public recreation and urban services (administrator appointed) and part Permissive Occupancy 1988 / 31 Metropolitan for storage
Part Lot 1047 DP 752038	Reserve 100221 for public recreation and urban services (administrator appointed), part Permissive Occupancy 1988 / 31 Metropolitan for storage and Licence 199961 for pipeline
Part Lots 95, 97, 198, 904, 1016, 1017, 1022, 1027, 1028, 1043, 1044 and Lot 1051 DP 752038, unsurveyed Crown land (adjoining Wakehurst Parkway)	Reserve 89191 for public recreation (Warringah Council reserve trust manager)
Part Lot 1015 DP 752038	Part Reserve 89191 for public recreation (Warringah Council reserve trust manager). Part unreserved Crown land.

Lot & Deposited Plan	Status
	Part Aboriginal Land Claim (unreserved section)
Part Lots 101 & 102 DP 752038	Part Reserve 89191 for public recreation (Warringah Council reserve trust manager). Part unreserved Crown land.
Lot 2867 & part Lot 2869 DP 824056, part Lot 1 DP 853151	Reserve 700030 for public recreation (Warringah Council reserve trust manager)
Part Lot 2 DP 853151	Reserve 700031 for community purposes (Warringah Council reserve trust manager)
Lot 7035 DP 93795	Reserve 7501 for public recreation (devolved to Warringah Council)
Part Lot 7029 DP 1030769	Reserve 7514 for water (no trust)
Lot 1498 DP 752038	Reserve 63710 for public recreation (devolved to Warringah Council)
Lot 15, 16, 18 & 19 DP 729342	Reserve 7496 for access (no trust)
Lot 164, part Lots 160, 161, 163, 166, 167, 171 DP 752038, part Lot 2 DP 550326	Reserve 82867 for future public requirements (no trust)
Part Lot 162 DP 752038	Reserve 83191 for future public requirements (no trust)
Lot 165 DP 752038	Reserve 83791 for future public requirements (no trust)
Lot 867, part Lots 1927, 2406, 2407 DP 752038	Reserve 70989 for future public requirements (no trust)
Lot 1004 DP 752038	Reserve 80778 for future public requirements (no trust)
Part Lot 192 DP 752038	Reserve 84031 for future public requirements (no trust)
Lot 7033 DP 93766	Reserve 84071 for future public requirements (no trust)
Lot 953 DP 752038	Reserve 86132 for future public requirements (no trust). Under Aboriginal Land Claim
Lot 120 and 121 DP 752038	Reserve 86765 for future public requirements (no trust). Under Aboriginal Land Claim
Part Lot 181 DP 752038	Reserve 82847 for future public requirements (no trust)and Licence 199849 for storage shed
Part Lot 2517 DP 752038	Reserve 82980 for future public requirements (no trust) and Licence 316041 for occupation
Part Lot 2640 DP 752038	Reserve 80778 for future public requirements (no trust) and former Special Lease 1957 / 53 Metropolitan for pig farm and poultry farm
Lot 10 DP 863387, part Lots 888, 889, Lots 895, 896 & 2633 DP 752038	Unreserved Crown land
Lots 96, 122, 141, 143,1030, 1930, 1987, 2582, part Lots 142, 144, 146, 179, 180, 2605 DP 752038, Lot 95 and part Lot 97 DP 869624	Unreserved Crown land. Under Aboriginal Land Claim
Lot 2857 DP 48272 and part Lot 117 DP 752038	Unreserved Crown land and Permissive Occupancy 1977 / 25 Metropolitan for sporting facilities

Lot & Deposited Plan	Status
Lot 153 and part Lot 109 DP 752038 and part Lot 2858 DP 48272	Unreserved Crown land and Permissive Occupancy 1977 / 25 Metropolitan for sporting facilities. Under Aboriginal Land Claim
Part Lot 1082 DP 752038	Unreserved Crown land and Permissive Occupancy 1986 / 88 Metropolitan for grazing
Part Lot 1084 DP 752038	Unreserved Crown land and Licence 302720 for dam and pipeline
Part Lot 2627 DP 752038	Unreserved Crown land and Licence 192632 for grazing, market garden and orchard.
Lot 5 DP 729342	Unreserved Crown land, formerly road, now closed.

3.2.4 Description of Mapping Area 4

Mapping Area 4 comprises that part of the study area with valley flats mostly cleared of natural vegetation and has an area of approximately 23.48 hectares as shown in *Figure 6*. The Mapping Area comprises the Crown land described in *Table 4*.

Table 4: Crown land included within Mapping Area 4.

Lot & Deposited Plan	Status
Part Lot 2639 DP 752038	Reserve 100221 for public recreation and urban services (administrator appointed)
Part Lot 1334 DP 752038	Reserve 100221 for public recreation and urban services (administrator appointed), Reserve 17121 for quarry and Permissive Occupancy 1952 / 199 Metropolitan for quarry
Part Lot 957 DP 752038	Reserve 100221 for public recreation and urban services (administrator appointed). Under Aboriginal Land Claim
Part Lots 1046 DP 752038	Reserve 100221 for public recreation and urban services (administrator appointed) and part Permissive Occupancy 1988 / 31 Metropolitan for storage
Part Lot 1047 DP 752038	Reserve 100221 for public recreation and urban services (administrator appointed), part Permissive Occupancy 1988 / 31 Metropolitan for storage and Licence 199961 for pipeline
Part Lots 1036, 1043, 1044, 1045, DP 752038	Reserve 89191 for public recreation (Warringah Council reserve trust manager)
Part Lot 2869 DP 824056 and part Lot 1 DP 853151	Reserve 700030 for public recreation (Warringah Council reserve trust manager)
Part Lot 2 DP 853151	Reserve 700031 for community purposes (Warringah Council reserve trust manager)
Part Lot 7029 DP 1030769	Reserve 7514 for water (no trust)
Part Lot 181 DP 752038	Reserve 82847 for future public requirements (no trust)and Licence 199849 for storage shed.
Part Lot 2517 DP 752038	Reserve 82980 for future public requirements (no trust) and Licence 316041

Lot & Deposited Plan	Status
	for occupation
Lot 183 DP 752038	Reserve 82982 for future public requirements (no trust), Permissive Occupancy 1974 / 25 Metropolitan for grazing (adjoining Crown road held under Permissive Occupancy 1964 / 275 Metropolitan for dam and pipeline)
Part Lot 2640 DP 752038	Reserve 80778 for future public requirements (no trust)and former Special Lease 1957 / 53 Metropolitan for pig farm and poultry farm
Part Lot 95DP 869624 and part Lot 180 DP 752038	Unreserved Crown land. Under Aboriginal Land Claim
Lot 2857 DP 48272, part Lot 117 DP 752038	Unreserved Crown land and Permissive Occupancy 1977 / 25 Metropolitan for sporting facilities
Part Lot 109 DP 752038 and part Lot 2858 DP 48272	Unreserved Crown land and Permissive Occupancy 1977 / 25 Metropolitan for sporting facilities. Under Aboriginal Land Claim

3.2.5 Description of Mapping Area 5

Mapping Area 5 comprises that part of the study area with sideslopes cleared of natural vegetation and has an area of approximately 2.54 hectares as shown in *Figure 7*. The Mapping Area comprises the Crown land described in *Table 5*.

Table 5: Crown land included within Mapping Area 5.

Lot & Deposited Plan	Status
Lots 12 and 13 DP 240763, part Lots 1927, 2406, 2407 DP 752038	Reserve 70989 for future public requirements (no trust)
Lot 1062 DP 752038	Reserve 83092 for future public requirements (no trust)and Licence 321023 for residence, buildings and environmental protection

3.2.6 Description of Mapping Area 6

Mapping Area 6 comprises that part of the study area with naturally vegetated valley floors and has an area of approximately 53.37 hectares as shown in *Figure 8.* The Mapping Area comprises the Crown land described in *Table 6.*

Table 6: Crown land included within Mapping Area 6.

Lot & Deposited Plan	Status
Part Lot 89, 201, 986, 987, 988, 989 DP 752038	Reserve 100221 for public recreation and urban services (administrator appointed)
Part Lot 998 DP 752038	Reserve 100221 for public recreation and urban services (administrator appointed) and Reserve 80778 for future public requirements
Part Lot 985 DP 752038	Reserve 100221 for public recreation and urban services (administrator appointed) and Enclosure Permit 40963
Lot 7061, part Lot 7062 DP 93798, part Lot 95, 97, 198, 904, 1016, 1017, 1022, 1027, 1028 & Lots 1021 & 1132 DP 752038,	Reserve 89191 for public recreation (Warringah Council reserve trust manager)

Lot & Deposited Plan	Status
unsurveyed Crown land (adjoining Wakehurst Parkway)	
Part Lot 1015 DP 752038	Part Reserve 89191 for public recreation (Warringah Council reserve trust manager). Part unreserved Crown land. Part Aboriginal Land Claim
Part Lots 101 & 102 and Lot 1032 DP 752038	Part Reserve 89191 for public recreation (Warringah Council reserve trust manager). Part unreserved Crown land.
Part Lot 2869 DP 824056, part Lot 1 DP 853151, Lot 2867 DP 853153	Reserve 700030 for public recreation (Warringah Council reserve trust manager)
Unsurveyed Crown land (adjoining Cromer Golf Course)	Reserve 35736 for access and public recreation (no trust) and Permissive Occupancy 1956 / 234 Metropolitan for golf course.
Lot 1498 DP 752038	Reserve 63710 for public recreation (no trust)
Lot 890 DP 752038	Reserve 70898 for future public requirements (no trust)
Part Lot 888, 889, DP 752038	Unreserved Crown land
Lot 195 DP 752038	Unreserved Crown land. Partly under Aboriginal Land Claim

Photo 1: Looking north along the Middle Creek valley. The valley bottoms are largely Crown land within Mapping Area 6.

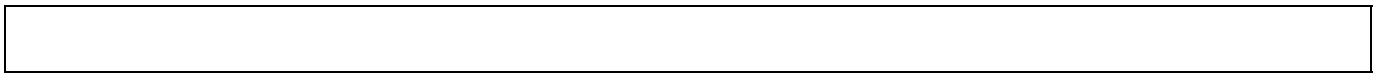

Figure 3: Boundaries of Mapping Area 1

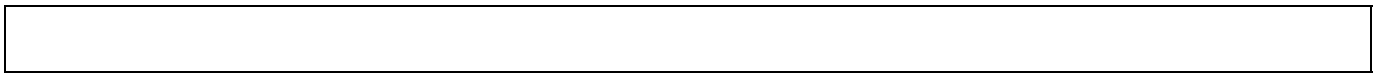

Figure 4: Boundaries of Mapping Area 2.

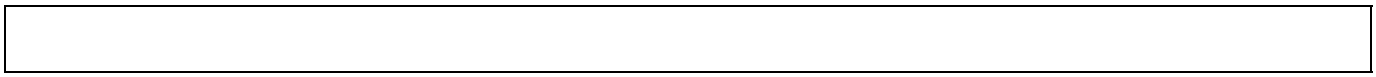

Figure 5: Boundaries of Mapping Area 3.

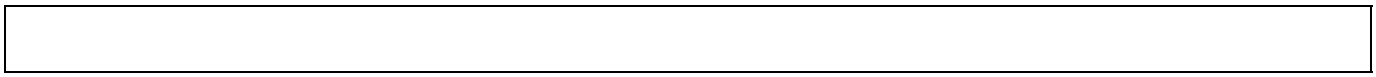

Figure 6. Boundaries of Mapping Area 4.

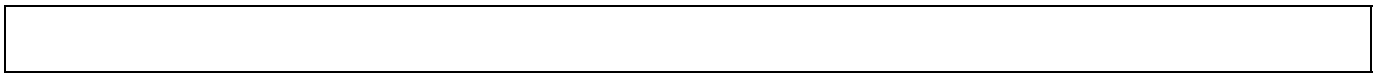

Figure 7. Boundaries of Mapping Area 5.

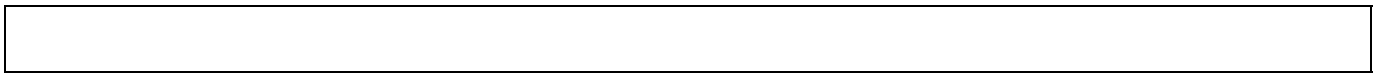

Figure 8: Boundaries of Mapping Area 6.

3.3 RELEVANT PLANNING CONTROLS, LEGISLATION AND POLICY

The following planning controls, legislation and policies are applicable to the Crown land within the Study Area.

3.3.1 Planning Controls

■ **Warringah Local Environment Plan, 2000**

The plan divides the Warringah Local Government Area into catchments, then further divides these areas into localities, rather than the traditional zonings. For each locality, a desired future character of the locality is given and development is categorised into one of three categories. Category One development is development that is generally presumed to be consistent with the desired future character of the locality. Category Two development is development that may be consistent with the desired future character of the locality. Category Three development is development that is generally presumed to be inconsistent with the desired future character of the locality (Warringah Council, 2000).

This study area falls within the Narrabeen Lagoon Catchment. The majority of the study area is located within the "Oxford Falls Valley" locality. Lots 971 and 2651 DP 752038 fronting Weardon Road Belrose are located within the "Frenchs Forest East" locality. Lots 5, 17, 18 and 19 DP 729342 and Lot 856 DP 752038 fronting Willandra Road, Cromer and Lots 12 and 13 DP 240763 fronting Maybrook Avenue, Cromer Heights are located within the "Narrabeen Lake Suburbs" locality. Lot 7061 DP 93798 fronting Wakehurst Parkway and the Unsurveyed Crown Land adjoining Cromer Golf Course are located within the "Narrabeen Lake" locality.

Table 7 describes each locality applicable to the Study Area.

Table 7: Locality Descriptions within Warringah LEP 2000

Locality	Desired Future Character	Category Development	General Maximum Housing Density
Oxford Falls Valley	the present character of the Oxford Falls Valley locality will remain unchanged except in circumstances specifically addressed as follows. Future development will be limited to new houses conforming to the housing density standards set out below and low intensity, low impact uses. There will be no new development on ridetops or in places that will disrupt the skyline when viewed from Narrabeen Lagoon and the Wakehurst Parkway. The natural landscape including landforms and vegetation will be protected and, where possible, enhanced…A dense bushland buffer will be retained or established along Forest Way and Wakehurst Parkway." (Warringah Council 2000, p. 181).	Category One – none Category Two – agriculture, housing, housing for older people or people with disabilities and other buildings, works, places or land uses that are not prohibited or in Category 1 or 3	1 dwelling per 20 ha of site area
Frenchs Forest East	"the Frenchs Forest East locality will remain characterised by detached style housing in landscaped settings interspersed by a range of complementary and	Category One – housing except in local retail centres and various uses only in	1 dwelling per 600 m^2

Locality	Desired Future Character	Category Development	General Maximum Housing Density
	compatible uses. Future development will maintain the visual pattern and predominant scale of existing detached houses in the locality. …The relationship of the locality with the surrounding bushland will be reinforced by protecting and enhancing the spread of indigenous tree canopy and preserving natural landscape including rock outcrops, remnant bushland and natural watercourses."(Warringah Council 2000, p. 173)	centres and various uses only in local retail centres (the subject Crown land within this locality is not in a retail centre). Category Two – child care centres, community facilities, further education, health consulting rooms, hospitals, housing for older people or people with disabilities, places of worship, primary schools, veterinary hospitals and other buildings, works, places or land uses that are not prohibited or in Category 1 or 3.	
Narrabeen Lake Suburbs	"the Narrabeen Lakes Suburbs will remain characterised by detached style housing in landscaped settings interspersed by a range of complementary and compatible uses which are compatible with the residential nature of the locality. …Future development will maintain the visual pattern and predominant scale of existing detached housing in the locality. … The spread of indigenous tree canopy will be enhanced wherever possible and the natural landscape, such as rock outcrops, remnant bushland and natural watercourses will be preserved" (Warringah Council 2000, p. 212)	Category One - housing and recreation facilities except in local retail centres. Category Two - child care centres, community facilities, further education, health consulting rooms, hospitals, housing for older people or people with disabilities, places of worship, primary schools, veterinary hospitals and other buildings, works, places or land uses that are not prohibited or in Category 1 or 3.	
Narrabeen Lake	"the Narrabeen Lake locality will be preserved in its natural state surrounded by areas of open space which complement the lake. Maintenance dredging and minor low intensity structures, such as viewing and fishing platforms constructed of sensitive materials and colours, may occur within the locality. In addition, the foreshore areas comprising community land within the locality may be developed only in a manner that is consistent with the relevant community land plan of management. Apart from the development described above,	Category One – none Category Two – development that is consistent with an adopted plan of management applying to the land (Warringah Council, 2000).	

Locality	Desired Future Character	Category Development	General Maximum Housing Density
	development will not occur within this locality." (Warringah Council 2000, p. 232)		

Numerous Lots of Crown land have been further classified concerning existing and future open space requirements. Lot 7035 DP 93795, Lot 7175 DP 93796, Lots 7061 and 7062 DP 93798, Lot 2 DP 550326, Lots 1 and 6 DP 700298, Lots 15, 16, 17, 18 and 19 DP 729342, Lots 95, 97, 98, 101, 102, 186, 195, 198, 895, 896, 904, 964, 1015, 1016, 1017, 1021, 1022, 1023, 1026, 1027, 1028, 1029, 1030, 1032, 1034, 1036, 1037, 1043, 1044, 1045, 1051, 1132, 1334 and 1498 DP 752038, Lots 2860, 2867, 2869 DP 824056, Lots 1 and 2 DP 853151 and the unsurveyed Crown land have been classified as "Public Open Space". Lots 888 and 889 DP 752038 have been classified as "Regional Open Space Reservation". The majority of Lot 856 DP 752038 has been classified as "Open Space Reservation".

All of the study area, accept Lot 2788 DP 45719, Lot 7034 DP 93795, Lot 7061 DP 93798, Lots 12 and 13 DP 240763, Lot 6 DP 700298, Lots 15, 16, 17 and 18 DP 729342, Lots 171, 816, 856, 939, 971, 2012, 2458, 2630, 2636 and 2651 DP 752038, Lot 4 DP 807906 and Lot 2873 DP 824283, has an environmental protection classification over it. This requires that a more rigorous assessment be undertaken during any consideration of develops in this area.

3.3.2 Legislation, Government Policies and Guidelines Relevant to the Study Area

■ Crown Lands Act, 1989

This Act and its Regulation (2000) are the principle legislation in the management of Crown lands.

The objectives of the CLA, 1989 are "to ensure that Crown land is managed for the benefit of the people of New South Wales and in particular to provide for:

a) A proper assessment of Crown land;
b) The management of Crown land having regard to the principles of Crown land management contained in this Act;
c) The proper development and conservation of Crown land having regard to those principles;
d) The regulation of the conditions under which Crown land is permitted to be occupied, used, sold, leased, licensed, or otherwise dealt with;
e) The reservation or dedication of Crown land for public purposes and the management and use of the reserved or dedicated land; and
f) The collection, recording and dissemination of information in relation to Crown land"(NSW Government, p. 5, 1989).

The principles of Crown land management, as stated in the CLA, 1989, are outlined in *Annexure A* of this report.

The Minister may reserve or dedicate Crown land for any public purpose, or, may on behalf of the Crown, sell, lease, exchange or otherwise dispose of or deal with Crown land or grant easements, rights-of-way, licences or permits in respect of Crown land. However, the Minister may not exercise these powers unless satisfied that the land has been assessed in accordance with the provisions of the CLA, 1989. Assessments of Crown land are

completed under the provisions of Part 3 of the CLA, 1989 and the CLR, 2000 in satisfaction of this requirement.

■ Departmental Conservation Policy

Except in relation to the purchase of land held under lease under Schedule 7 to the Crown Lands (Continued Tenures) Act 1989, Crown land will be maintained in Crown ownership where it comprises:

(a) Land required as access to and fronting inland watercourse, lakes, water storages, lagoons and tidal waters;

(b) Land required for –

(i) Scenic and catchment area protection;

(ii) Preservation of the habitat of native fauna;

(iii) Preservation of native flora;

(iv) Soil conservation purposes;

(c) Land required for recreation;

(d) Land required for revegetation

Crown land will not be disposed of by way of sale if it meets any of the above-mentioned requirements nor will it be allocated by way of lease or license where these requirements will be adversely affected.

■ Threatened Species Conservation Act, 1995

The Act provides for the protection of native plants and animals identified as threatened in NSW. Under the Act "threatened species" includes "endangered species", "vulnerable species" and "species presumed extinct". Native plants and animals listed under the Act are included in one of these categories. The Act also allows for the listing and protection of "endangered populations" of any plant or animal and of "endangered ecological communities". The Act requires the production of recovery plans for all threatened species.

Rare or Threatened Australian Plants, otherwise known as ROTAP (Briggs and Leigh, 1996) was a book published in 1996 that gave a list of native Australian plants considered to be rare or threatened. Some flora species may be listed under both the TSA, 1995 and in ROTAP.

Section *4.4* identifies the threatened species and populations and ROTAP species that have previously been found within the vicinity of the study area or could frequent the study based on their habitat and geographic range.

■ Native Vegetation Conservation Act, 1997

The Act relates to the conservation and sustainable management of native vegetation and the clearing of land. "The objectives of the act are:

a) To provide for the conservation and management of native vegetation on a regional basis, and
b) To encourage and promote native vegetation management in the social, economic and environmental interests of the State, and
c) To protect native vegetation of high conservation value, and
d) To improve the condition of existing native vegetation, and
e) To encourage the revegetation of land, and the rehabilitation of land, with appropriate native vegetation, and
f) To prevent the inappropriate clearing of vegetation, and
g) To promote the significance of vegetation,

In accordance with the principles of ecologically sustainable development" (NSW Government, 1997).

The Act contains provisions relating to State Protected Lands, which were formerly contained in the *Soil Conservation Act*. These provisions serve to protect trees and shrubs on lands that have been mapped as steeply sloping (over 18°), within 20 metres of specified watercourses, or are environmental sensitive (DLWC, 2000).

The study area does not contained mapped State Protected Land.

■ State Rivers and Estuary Policy

The objective of the policy is "to manage the rivers, estuaries and adjacent wetlands of NSW in ways which:

- Slow, halt or reverse the overall rate of degradation in their systems;
- Ensure the long-term sustainability of their essential biophysical functions, and
- Maintain the beneficial use of these resources." (NSW Government, 1992).

The policy contains a set of management principles to achieve the objective of the policy. The policy also contains several sub-polices including the State Wetlands Policy.

Recommendations of this assessment and future use and management of the study area and its watercourses and wetlands would need to be consistent with this policy.

■ NSW Wetlands Management Policy

This policy has the goal of providing for ecologically sustainable use, management and conservation of wetlands in NSW for the benefit of present and future generations. It encourages land use and management practices that maintain or rehabilitate wetland habitats. Several wetlands are located within the Study Area. Principles of the policy relevant to the study are that new developments will require allowance for suitable water distribution to and from wetlands and water entering natural wetlands will be of sufficient quality so as not to degrade the wetlands (NSW DLWC 1996).

■ Warringah Non-Urban Land Study

In 1998 PPK Environment and Infrastructure, on behalf of Warringah Council, undertook a study of non-urban land in Warringah Local Government Area, of which the Study Area forms part. The study was undertaken "to guide existing and future uses of Warringah's non-urban land" (PPK 1998, p 5). In 2000 and 2001 Council considered further supplementary reports to the study and in June 2001 Council resolved not to proceed with any rezoning of non-urban land recommend in the report for the present time, due to numerous constraining factors.

■ Sydney Regional Coastal Management Strategy

The strategy covers the Sydney coastal region defined as the local government areas of the Sydney Coastal Councils Group and adjacent marine waters. The purpose of the strategy is to provide stakeholders with an action-orientated, strategic framework to focus and guide planning and management practices (Sydney Coastal Council Inc, 1998). The strategy sets out strategic actions designed to achieve a set of outcomes and address the key regional issues of water cycle management, nature conservation, public access, role of government, climate change and cultural heritage.

The whole of the study this study area is within the region covered by the strategy. Where possible, recommendations of this assessment will be consistent with this Strategy.

■ NSW Biodiversity Strategy

The goal of this strategy is to protect the native biological diversity of NSW and maintain ecological processes and systems. It aims to ensure the survival and evolutionary development of all species, populations and communities of plants and animals. It recognises that protecting biodiversity requires management of the

threatening processes, addressing the causes of biological diversity loss and the establishment of a comprehensive, adequate and representative reserve system (NSW NPWS 1999). Recommendations of this assessment and future use and management of the study will, where possible, be consistent with this strategy.

■ National Strategy for Ecologically Sustainable Development (ESD)

The strategy defines ESD as "using, conserving and enhancing the community's resources so that ecological processes on which life depends, are maintained, and the total quality of life, now and in the future, can be increased" (Commonwealth Government 1992).

The core objectives of the strategy are:

- "To enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations,
- To provide for equity within and between generations, and
- To protect biological diversity and maintain essential ecological processes and life-support systems" (Commonwealth Government, 1992).

The guiding principles of the strategy are:

- "Decision making processes should effectively integrate both long and short-term economic, environmental, social and equity considerations,
- Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation,
- The global dimension of environmental impacts of actions and policies should be recognised and considered,
- The need to develop a strong, growing and diversified economy which can enhance the capacity for environmental protection should be recognised,
- The need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised,
- The cost effective and flexible policy instruments should be adopted, such as improved valuation, pricing and incentive mechanisms, and
- Decisions and actions should provide for broad community involvement on issues which affect them" (Commonwealth Government, 1992).

Recommendations of this assessment and future use and management of the study will, where appropriate, be consistent with the overall goal of the strategy.

CHAPTER FOUR

NATURAL RESOURCE INVENTORY

This chapter sets out an inventory of the natural resources of the Crown land within each of the six Mapping Areas. This information was gathered from field investigations and from existing data sources where credited.

4.1 LANDFORM

The landform of the six mapping areas is described in *Table 8* below.

Table 8: Landform components of Mapping Areas.

Mapping Area	Landform Features	Landform Elements	Aspect	Topographic Change in Elevation
1	Hillslope	Level (0-2%) to moderately inclined (10-20%) plateau, hillcrest and upper sides slopes	Varies	20 metres
2	Hillslope	Level (0-2%) to very gentle inclined (2-5%) plateau and hillcrest	Varies	Less than 10 metres
3	Hillslope and stream	Gently inclined (5-10%) to steep (33-50%) upper sideslope, sideslope, benches (of 1 to 10 metres), stream channel and drainage depression	Varies	80 metres
4	Hillslope, waterbody and artificial surface	Level (0-2%) to moderately inclined (10-20%) sideslope, swamp and artificial valley flat (former quarry)	Varies	30 metres
5	Hillslope	Gently inclined (5-10%) to moderately steep (20-33%) sideslope and upper sideslope	Varies	30 metres
6	Plain and stream	Level (0-2%) to very gentle inclined (2-5%) flood plain, stream bank and stream channel	Varies	10 metres

4.2 FLORA

■ Mapping Area 1

Smith and Smith (2002) have undertaken detailed mapping of the native vegetation of the Warringah Local Government Area. They classify the vegetation of Mapping Area 1 as Silvertop Ash-Brown Stringybark Forest, Bloodwood-Scribbly Gum Woodland, Peppermint-Angophora Forest, Sandstone Heath and a small area of Angophora Woodland and of Yellow-top Ash Mallee. Descriptions of the vegetation communities are set out in *Table 14*.

Smith and Smith (2002) note the significance of Silvertop Ash-Brown Stringybark Forest as being the typical form of the Duffys Forest Community which is listed as an endangered ecological community under the Threatened Species Conservation Act, 1995.

Photo 2: Peppermint Angophora Forest within Mapping Area 1.

Degradation of native vegetation has occurred within Mapping Area 1 to the extent outlined in *Table 9.*

Table 9: Degradation of native vegetation within Mapping Area 1.

Lot & Deposited Plan	Degradation
Lot 162 DP 752038	Clearing of native vegetation on southern boundary extending from adjoining freehold property.
Lot 163 DP 752038	Clearing of understorey vegetation and replacement with exotic grasses extending from freehold property to south
Unsurveyed Crown land (adjoining Forest Way)	1 *Lantana camara* (Lantana) plant
Lot 174 DP 752038	Unauthorised circuit vehicle track and another vehicle track
Lot 4 DP 807906	Extensive *Lantana camara* (Lantana) and *Ageratina adenophora* (Crofton Weed). Some clearing of vegetation to form a grass area extending from the adjoining freehold lands exists on the northern and western boundaries. *Cinnamomum camphora* (Camphor laurel) trees appear to have been planted along the western boundary
Lot 2458 DP 752038	A large area of weed growth, including *Lantana camara* (Lantana) and *Ageratina adenophora* (Crofton Weed) exists downslope of a freehold property on the western boundary. Some planting of exotic species has occurred on the street frontage to Lot as part of the entrance to the adjoining retirement village.
Lot 6 DP 700298	Horse riding trail extends across the Crown land from a property to the west. Clearing approximately 60 metres wide has recently occurred along the western boundary.
Lot 7036 DP 93795	Proliferation of unauthorised trails used by walkers / trail bikes / mountain bikes.
Lot 97 DP 869624	Areas of *Lantana camara* (Lantana) growth adjacent to Weardon Road. Dumping of garden refuse, rubble, rubbish, leading to weed plumes below of *Lantana camara* (Lantana) and *Cortaderia selloana* (Pampas grass). Unauthorised removal of tree possible to preserve view.
Lot 856 DP 752038	Numerous walking tracks. Some rubbish dumping. Powerline easement.
Lot 1082 DP 752038	Some native vegetation cleared in centre of Lot

Lot & Deposited Plan	Degradation
Lot 1084 DP 752038	Small clearing
Lot 2627 DP 752038	Some native vegetation cleared.
Lot 192 DP 752038	Trail bike trails extend from adjoining Aboriginal Land Council land onto Crown land.

■ Mapping Area 2

The native vegetation within Mapping Area 2 has largely been removed as a result of past land use of this mapping area. Exotic grasses and weeds are now present.

Within Lot 971 a linear strip of native vegetation exists, albeit highly disturbed. The vegetation has the structural formation of woodland. Upperstorey species include *Allocasuarina littoris, A. torulosa, Corymbia gummifera, C. maculata, Eucalyptus pilularis ssp. pilularis,* and *E. haemastoma.* The remainder of the lot is vegetated with a patchy grass cover of Kikuyu and a couple of isolated trees.

Within Lots 1008 and 1009 within the former quarry, bush regeneration activities, involving the planting of native plants, has been occurring.

Photo 3: Bush regeneration within the former quarry within Lots 1008 and 1009.

■ Mapping Area 3

Smith and Smith (2002) have undertaken detailed mapping of the native vegetation of the Warringah Local Government Area. They classify the vegetation of Mapping Area 3 as Silvertop Ash-Brown Stringybark Forest, Bloodwood-Scribbly Gum Woodland, Peppermint-Angophora Forest, Sandstone Heath, Sandstone Swamp, Angophora Woodland and Yellow-top Ash Mallee. Descriptions of the vegetation communities are set out in *Table 14.*

Smith and Smith (2002) note the significance of Silvertop Ash-Brown Stringybark Forest as being the typical form of the Duffys Forest Community which is listed as an endangered ecological community under the Threatened Species Conservation Act, 1995.

Photo 4: Silvertop Ash-Brown Stringybark Forest within Lot 2605 within Mapping Area 3

Photo 5: Bloodwood - Scribbly Gum Woodland and Sandstone Heath in the upper reaches of Wheeler Creek within Mapping Area 3.

Degradation of the native vegetation has occurred within Mapping Area 3 to the extent outlined in *Table 10.*

Table 10: Degradation of native vegetation within Mapping Area 3.

Lot & Deposited Plan	Degradation
Lot 953 DP 752038	Weed growth – *Lantana camara* (Lantana) and *Ageratina adenophora* (Crofton Weed), *Cortaderia selloana* (Pampas grass)- and rubbish dumping (about 1 %). Small clearing beside road (about 1%)
Lots 160 to 167 DP 752038	Area of past disturbance within Lots 165 and 167 – *Ageratina adenophora* (Crofton Weed). Couple of places *Lantana camara* (Lantana) growth along fire trial
Lots 2600 and 2630 DP 752038	Weed growth – *Lantana camara* (Lantana), *Ageratina adenophora* (Crofton Weed), *Erythrina X sykesii* (Coral Tree) and *Rubus frutocosus* (Blackberry) – in patches (about 2 %)
Lot 1064 DP 752038	Horse arena illegally constructed in middle of Lot
Lot 6 DP 700298	Horse riding trail crosses land.
Lot 120 and 121 DP 752038	Survey line recently cleared

Lot & Deposited Plan	Degradation
Lot 978 DP 752038 and Lot 2 DP 808682	Large area has been in cleared to allow sewering of a new subdivision. This area has been mulched. Activities to control *Cortaderia selloana* (Pampas grass) has occurred.
Lot 2 DP 808682 and Lot 991 DP 752038	*Lantana camara* (Lantana) growth along Lords Street and Weardon road. Some dumping of garden refuse.
Lot 153 DP 752038, Lot 2858 DP 48272	Fire trail cuts across lots. Some minor tracks used by mountain bikes.
Lot 856 DP 752038	Area of land with mown grass understorey on western side.
Lot 867 DP 752038	*Nephrolepis cordifolia* (Fishbone Fern) behind houses on eastern side
Various Lots on the west and east sides of Wakehurst Parkway	Extensive weed growth in bushland adjoining road. In some areas, weeds completely dominant understorey. Species include– *Lantana camara* (Lantana), *Ageratina adenophora* (Crofton Weed), *Erythrina X sykesii* (Coral Tree), *Ligustum sinense* (Small-Leaved Privet), *Delairea odorata*, syn. *Senecio mikaniodes* (Cape Ivy), *Cardiospermum grandiflorum* (Balloon Vine), *Ipomoea indica* (Blue Morning Glory) and *Ricinus communis* (Castor Oil Plant). Also some rubbish dumping, particularly building waste.
Lots 89 & 201 DP 752038	Minor weed growth along Morgan Road
Lot 956 & 957 DP 752038	Some weed growth along road reserve frontage – *Lantana camara* (Lantana) and *Cortaderia selloana* (Pampas grass)
Lot 988 DP 752038	Extensive area cleared of native vegetation and landscaped extending from adjoining freehold property.
Lot 7034 DP 752038	Proliferation of mountain bike / trail bike trails extending from adjoining freehold land onto Crown land.
Lot 2873 DP 824283	Weed infested drainage line – – *Lantana camara* (Lantana), *Ligustrum lucidum* (Broad-leaved Privet), *Alocasia macrorrhizos* (Elephant's Ears). Tree dieback – appears to be due to excess nutrients in drainage line
Lot 1005 DP752038	Some disturbance to understorey due to dumping of materials extending from Lot 1062 held under tenure.
Lot 1006 DP 752038	Understorey largely removed due to unauthorised grazing.
Lots 824, 825, 828, 829, 830 DP 752038	Fire trail crosses Lots.
Lots 2867 & 2869 DP 853153	Small area of weeds – *Cortadera selloana* (Pampas Grass), *Ligustrum sinense* (Small-leaf Privet) and *Lantana camara* (Lantana)
Lots 17, 18 & 19 DP 729342 & Lot 5 DP729342	Piles of spoil, mulch and log stumps dumped on land. Some dumping of garden refuse by adjoining retirement village. – *Lantana camara* (Lantana) and *Cortaderia selloana* (Pampas grass). Native vegetation was previously removed from the former Crown road. This area is now grassed.

Photo 6:Yellow-top Ash Mallee in the foreground with Sandstone Heath within Mapping Area 3

■ Mapping Area 4

The native vegetation with Mapping area 4 has largely been removed as a result of past land uses of this mapping area or has been highly disturbed by land use activities. Exotic grasses and weeds now replace native ground covers.

Smith and Smith (2002) have undertaken detailed mapping of the native vegetation of the Warringah Local Government Area. They note that within Lot 109 there is an occurrence of Freshwater Lagoon Swamp and in Lots 1045 and 1046 there are small remnants of Bloodwood-Scribbly Gum Woodland and Sandstone Heath. Descriptions of the vegetation communities are set out in *Table 14.*

The remaining vegetation within Mapping Area 4 is as described in *Table 11* below.

Table 11: Remaining vegetation within Mapping Area 4

Lot Number	Description of Vegetation
Lots 2867, 117, 109 and 7029	Highly disturbed native vegetation communities and a levelled grassed open space that was part of a former quarry. Rehabilitation of some previously disturbed areas has occurred as part of the use of the land by the Warringah Radio Control Society. One area remains cleared as a carpark. Continuing disturbance to some native vegetation is occurring due to a proliferation of tracks used by trail and mountain bikes in this area.
Lots 180, 181, 2517 and 183	Largely cleared and grassed with exotic species as part of their use under tenure. Isolated remnant native trees and shrubs remain.
Lot 957	Highly disturbed by an encroachment from the adjoining freehold land.
Lots 1044, 1045, 1046, 1047 and 1053 DP 752038	Sections of native vegetation have been completely removed by both authorised and unauthorised land use of the Crown land. Other areas have been highly disturbed by directed land use or from nutrient runoff from land use on the adjoining freehold land.
Lot 1334	Large area of native vegetation has been removed due to the use of this area as a quarry. Native vegetation surrounding this area has been highly disturbed due to past quarrying activities and runoff from the quarry site. Weeds are present in both the cleared and highly disturbed areas and include *Bambusa sp.* (Bamboo), *Cortaderia selloana* (Pampas grass), *Ricinus communis* (Castor Oil Plant), *Cotoneaster sp.* (Cotoneaster), *Lantana camara* (Lantana), *Ligustrum lucidum* (Large-leaf privet)

Lot Number	Description of Vegetation
	Ipomoea indica, (Blue Morning Glory) and *Cinnamomum camphora* (Camphor Laurel). An area of previously disturbed bushland adjacent to the road frontage of this lot has had bush regeneration activities occur on the land.
Lot 2640	Sections of native vegetation have been removed and replaced by exotic grass due to use of the land for grazing. Other areas of native vegetation have had only the understorey largely removed.
Lot 2639	All native vegetation has been removed, due to the unauthorised creation of grazing paddocks and the construction of 2 dams in conjunction with the tenure held over Lot 2640.
Lots 2869, 1 and 2	Most native vegetation have been removed and replaced with grassed areas, landscaped garden beds and paths.

■ Mapping Area 5

The native vegetation with Mapping Area 5 has largely been removed as a result of past land uses of this mapping area or has been highly disturbed by land use activities. Exotic grasses and weeds now replace native ground covers.

Smith and Smith (2002) have undertaken detailed mapping of the native vegetation of the Warringah Local Government Area. They note that within Lot 1062 there is a small area of Bloodwood Scribbly Gum Woodland. Descriptions of the vegetation communities are set out in *Table 14.*

The remaining vegetation within Mapping Area 4 is as described in *Table 12* below.

Photo7: Tree dieback within Lot 12 within Mapping Area 5

Table 12: Remaining vegetation within Mapping Area 5.

Lot Number	Description of Vegetation
Lot 1062	Large areas of native vegetation have been completely been removed due to past land uses. These areas are now overgrown with exotic grasses and weeds including *Ageratina adenphora* (Crofton Weed), C*irsium vulgare* (Black Thistle) and *Cortaderia selloana* (Pampas grass). Some surrounding bushland have been disturbed due to the dumping of general rubbish and building waste.
Lots 12 and 13	Scattered native overstorey trees remain. The native understorey has been removed and replaced by mown grasses.
Lots 2406,	Native vegetation would appear to have been completely replaced by weeds such as *Lantana camara*

Lot Number	Description of Vegetation
2407 and 1927	(Lantana) and *Senna X floribunda* (Cassia). Some dieback is occurring further downslope. This appears to be from excess nutrients in runoff and the dumping of garden refuse from adjoining freehold properties. One property may also encroach onto this area.

■ Mapping Area 6

Photo 8: Swamp Oak Forest within Lot 7061 within Mapping Area 6 adjoining Narrabeen Lagoon.

Smith and Smith (2002) have undertaken detailed mapping of the native vegetation of the Warringah Local Government Areas. They classify the vegetation of Mapping Area 6 as Bloodwood Scribbly Gum Woodland Peppermint Angophora Forest, Sandstone Swamp, Yellow-top Ash Mallee, Swamp Oak Forest, Coachwood Rainforest, Bangalay Alluvial Forest, Water Fern Swamp and Palm Woodland. Descriptions of the vegetation communities are set out in *Table 14.*

Photo 9: Water Fern Swamp within Mapping Area 6 adjacent to Wakehurst Parkway

Smith and Smith (2002) note the significance of Bangalay Alluvial Forest as "a form of the Sydney Coastal Estuary Swamp Forest Complex, which is listed as an endangered ecological community" (Smith and Smith 2002, p. 24) under the Threatened Species Conservation Act, 1995.

Smith and Smith (2002) note the significance of Water Fern Swamp as "a form of the Sydney Coastal Estuary Swamp Forest Complex, which is listed as an endangered ecological community" (Smith and Smith 2002, p. 24) under the Threatened Species Conservation Act, 1995.

Photo 10: Palm Woodland within Mapping Area 6 adjoining Middle Creek

Smith and Smith (2002) note the significance of Palm Woodland also as "a form of the Sydney Coastal Estuary Swamp Forest Complex, which is listed as an endangered ecological community" (Smith and Smith 2002, p. 24) under the Threatened Species Conservation Act, 1995. They also note that stands of vegetation dominated by *Livistona australis* are rare in the Sydney region and that there appear to be no such stands in either Ku-ring-gai chase or Garigal National Parks (Smith and Smith, 2002).

Degradation of the native vegetation has occurred within Mapping Area 6 to the extent outlined in *Table 13.*

Table 13: Degradation of native vegetation within Mapping Area 6.

Lot & Deposited Plan	Degradation
Unsurveyed Crown land (adjacent to Cromer Golf Course)	Sections of cleared native vegetation to form part of golf course. Large amounts of weed growth along banks of creek – *Lantana camara* (Lantana) and *Senna X floribunda* (Cassia). Track for golf carts partial traverse land.
Various Lots on the west and east sides of Wakehurst Parkway	Extensive weed growth in bushland adjoining road. In some areas, weeds completely dominant understorey. Species include *Lantana camara* (Lantana), *Ageratina adenophora* (Crofton Weed), *Erythrina X sykesii* (Coral Tree), *Ligustum sinense* (Small-Leaved Privet), *Delairea odorata*, syn. *Senecio mikaniodes* (Cape Ivy), *Cardiospermum grandiflorum* (Balloon Vine), *Ipomoea indica* (Blue Morning Glory) and *Ricinus communis* (Castor Oil Plant).. Also some rubbish dumping, particularly building waste.
Lots 985 to 989 DP 752038	Highly disturbed native vegetation, understorey completely dominated by weeds adjacent to creekline, including *Bambusa spp.* (Bamboo) and *Lantana camara* (Lantana).
Lot 1132 DP 752038	Area of weed growth beside creek. Various species
Lots 195 & 198 DP	Small area cleared of native vegetation beside road. Some dumping along road verges

Lot & Deposited Plan	Degradation
752038	leading to growth of various weed species.

Table 14: Vegetation Communities as described by Smith and Smith (2002)

Community Name	Description
Silvertop Ash-Brown Stringybark Forest	"Open-forest or woodland, typically the former, with a mixed and varying tree species composition. The main tree species are *Angophora costata* (Sydney Red Gum), *Corymbia gummifera* (Red Bloodwood), *Eucalyptus capitellata* (Brown Stringybark) and *E. sieberi* (Silvertop Ash)"(Smith and Smith 2002, p. 11). Smith and Smith (2002) describe the habitat for this community as "associated with shale lenses in Hawkesbury Sandstone, usually where these form ridgetop cappings over the sandstone"(Smith and Smith 2002, p 11).
Bloodwood-Scribbly Gum Woodland	"Typically woodland, but varies in structure from low open-woodland to open-forest. The most common tree species are *Corymbia gummifera* (Red Bloodwood), *Eucalyptus haemastoma* (Broad-leaved Scribbly Gum), *E. oblonga* (Sandstone Stringybark) and *E. sieberi* (Silvertop Ash) (Smith and Smith 2002, p. 15). The habitat of this community is "plateaus, ridges and exposed slopes on Hawkesbury Sandstone, with frequent sandstone outcrops" (Smith and Smith 2002, p15).
Peppermint-Angophora Forest	"Open-forest, sometimes woodland, in which the main tree species are *Angophora costata* (Sydney Red Gum), *Corymbia gummifera* (Red Bloodwood), *Eucalyptus piperita* (Sydney Peppermint) and *E. sieberi* (Silvertop Ash) (Smith and Smith 2002, p. 13). They find the habitat of this community as "gullies and sheltered slopes on Hawkesbury Sandstone, with frequent sandstone outcrops" (Smith and Smith 2002, p. 14).
Sandstone Heath	Varying "in height and density from open-heath to closed scrub. Common shrub species are *Allocasuarina distyla, Angophora hispida, Banksia ericifolia, B. oblongifolia, Bauera rubioides, Darwinia fascicularis, Dillwynia floribunda, Epacris pulchella, Grevillea speciosa, Hakea, teretifolia, Hemigenia purpurea, Kunzea capitata, Leptospermum squarrosum, L. trinervium, Leucopogon microphyllus* and *Platysace linearifolia*" (Smith and Smith 2002, p. 19). The habitat of the community is described as "shallow soils on exposed ridges and upper slopes on Hawkesbury Sandstone, often where there are extensive rock outcrops" (Smith and Smith 2002, p. 20).
Freshwater Lagoon Swamp	"Dense stands of reeds, sedges and other wetland plants. Species in the community include *Baumea articulata, B. juncea, Centella cordifolia, Eleocharis sphacelata, Eriocaulon scariosum, Goodenia paniculata, Juncus planifolius, J. usitatus, Ludwigia peploides, Persicaria strigosa, Philydrum lanuginosum, Schoenoplectus validus, Schoenis brevifolius, Typha domingensis and T. orentalis.* (Smith and Smith 2002 p. 26). They note that Freshwater Lagoon Swamp "occurs in shallow waters and margins of freshwater lagoons and similar water bodies. In the Warringah area, it is restricted to artificial water bodies" (Smith and Smith 2002, p. 26). Only two occurrences of Freshwater Lagoon Swamp are mapped by Smith and Smith (2002), one being Manly Reservoir (outside the study area) and the other being the lagoon swamp in Lot 109. Smith and Smith note the significance of the community is that "although it occurs on artificial water bodies in Warringah area, the process of colonisation of such habitats by native wetland vegetation is a natural one." (Smith and Smith

Community Name	Description
	2002).
Swamp Oak Forest	"Open-forest dominated by *Casuarina glauca* (Swamp Oak)" (Smith and Smith, 2002, p. 8) with the main stand occurring around Narrabeen Lagoon. Swamp Oak Forest occurs on "swampy, saline, alluvial soils around the margins of estuaries and coastal lagoons, on slightly higher, drier ground than Mangrove Forest and Saltmarsh" (Smith and Smith 2002, p. 8).
Coachwood Rainforest	"Closed-forest in which the most common trees are *Acmena smithii* (Lillypilly), *Allocasuarina torulosa* (Forest Oak), *Ceratopetalum apetalum* (Coachwood) and *Pittosporum undulatum* (Pittoporum). The habitat of the community is described as developing "in sheltered sites well protected from fires and with moist, fertile soils. Occurs on both Hawkesbury Sandstone and alluvium" (Smith and Smith 2002, p. 14).
Bangalay Alluvial Forest	"Open-forest or tall open-forest in which *Eucalyptus botryoides* (Bangalay) is the dominant species. *Eucalyptus saligna* (Sydney Blue Gum) is a sub-dominant along Middle Creek… Other, less common, tree species include *Allocasuarina torulosa, Casuarina glauca* and *Livistona australis*" (Smith and Smith 2002, p. 24). The habitat of the community is described as "alluvial flats along creeks draining to Narrabeen Lagoon: (Smith and Smith 2002, p. 24).
Water Fern Swamp	"Dense swamp vegetation in which the water ferns, *Blechnum camfieldii* and *B. indicum,* are usually a major component. Other common species in the community are *Baumea rubignosa, Hypolepis muelleri, Isachne globosa, Persicara strigosa, Phragmites australis* and *Typha orientalis"* (Smith and Smith 2002, p. 25). The community "occurs in the wettest sites on the alluvial soils along Middle Creek and Deep Creek" (Smith and Smith 2002, p. 25).
Palm Woodland	"Woodland dominated by *Livistona australis* (Cabbage-tree Palm)…*Glochidion ferdinandi* (Cheese Tree) is a common canopy and understorey species" (Smith and Smith 2002, p. 25). The habitat of the community is described as "swampy alluvial soils on creeks draining to Narrabeen Lagoon" occurring on "wetter soils than Bangalay Alluvial Forest, but drier soils than Water Fern Swamp" (Smith and Smith 2002, p. 25).

4.3 FAUNA

Information derived from the Atlas of New South Wales Wildlife (NPWS, 2000) was used to identify which species of fauna have been recorded as occurring within a 5 km radius of the study area, including within the study area. This information is set out in *Appendix B.*

There were no specific signs of fauna within Mapping Areas 2, 4, 5 and 6.

■ Mapping Area 1

Numerous animal paths, animal resting-places and unidentified droppings were noted within various parts of Mapping Area 1 during fieldwork as part of this assessment.

Photo 11: Animal resting-place within Mapping Area 1

■ Mapping Area 3

Numerous animals' paths, animal resting places and unidentified droppings were noted within various parts of Mapping Area 3 during fieldwork as part of this assessment.

In addition the following species were sited within Mapping Area 3 during fieldwork as part of this assessment: *Wallabia bicolor* (Swamp Wallaby) and *Physignathus lesuerii ssp. lesueurii* (Eastern Water Dragon). A rabbit was observed within Lot 856.

The Sydney Branch of the National Parks Association (NPA) undertook biodiversity surveys of the catchment of Wheeler Creek (a proportion of the catchment is on Crown land which is mostly within Mapping Area 3) in March and September 2001. These surveys found the following mammals:

Antechinus stuartii stuartii (Brown Antechinus), *Perameles nasuta* (Long-nosed Bandicoot), *Pseudocheirus peregrinus* (Ringtail Possum), *Pteropus poliocephalus* (Grey-headed Fruit-bat), *Rattus fuscipes assimilis* (South Bush Rat), *Tadarida australis* (White-striped Mastiff Bat), *Trichosurus vulpecula* (Brushtail Possum), *Wallabia bicolor* (Swamp Wallaby) as well as evidence of feral dogs and foxes.

The follow reptiles were found by the biodiversity survey:

Cryptoblephonus vingatus (Fence Skink), *Ctenotus treniolatus* (Coppertail), *Egenia cunninghami* (Cunningham's Skink), *Lampropholis delicata* (Delicate Garden Skink), *Cocophis squamutosis* (Golden Crown Skink), *Odedura lesueurii* (Lesueur's Gecko), *Phyllunus platunus* (Leaf-tailed Gecko), *Physignathus leseurii* (Water Dragon), *Underwoodicovers milii* (Thick-tailed Gecko) and *Varanus rosenbergi* (Heath Monitor).

In addition the following species were found within Wheeler Creek:

Euastacus australasiansis (Crayfish) in the headwaters of Wheeler Creek (on Crown land) and in lower reaches of the creek the native fish species *Galaxias maculatus, Gobiomorphus australis* and *Hypseliotris compressa* , the introduced fish species *Gambusia hobrooki* and *Anguilla australis* (Shortfinned Eel) were recorded.

The biodiversity survey also included birds and invertebrates, which have not been listed in this assessment report.

Photo 12: Physignathus lesuerii ssp. lesueurii (Eastern Water Dragon) within Mapping Area 3

4.4 THREATENED SPECIES AND POPULATIONS

Section *3.3.2* provided a brief summary of the *Threatened Species Conservation Act, 1995* (TSCA, 1995) and ROTAP.

Information derived from the Atlas of New South Wales Wildlife (NPWS, 2000) was used to identify which vulnerable (Schedule 2 of the TSCA, 1995) or endangered (Schedule 1 of the TSCA, 1995) fauna and flora or ROTAP flora have been recorded as occurring within or in a 2.5 km radius of the study area (and therefore likely to be found within the study area). This information is set out in *Appendix C.* In summary 16 species of vulnerable fauna, 3 species of vulnerable flora, 3 species of endangered fauna, 2 species of endangered flora and 17 species of ROTAP listed flora were recorded.

In addition a search of threatened species databases (DLWC, 2003 & NPWS, 2000_2) indicates that several other vulnerable or endangered fauna or flora species could frequent or be found within the study area based on their habitat and geographic range. This information is also set out in *Appendix C*. No attempt to positively identify any threatened species within the study area was made during this land assessment.

No threatened species were specifically identified within Mapping Areas 2, 4 and 5.

■ Mapping Area 1

Vegetation mapping undertaken by Smith and Smith (2002) indicate that Silvertop Ash-Brown Stringybark Forest occurs within Mapping Area 1. Smith and Smith (2002) note the significance of this community as being the typical form of the Duffys Forest Ecological Community an Endangered Ecological Community listed under the TSA, 1995.

Approximately 20 plants of *Grevillea caleyi* were found, regenerating after a recent fire, within Lots 4 and 18 DP 807906. *Grevillia caleyi* is listed as an Endangered Species under the TSA, 1995.

The Vulnerable Species (under the TSA, 1995) *Tetratheca glandulosa* has previously been recorded within Lot 2630 DP 752038 and Lot 179 DP 752038.

Photo 13: Grevillea caleyi plant in Lots 4 and 18.

■ Mapping Area 3

Vegetation mapping undertaken by Smith and Smith (2002) indicate that Silvertop Ash-Brown Stringybark Forest occurs in Mapping Area 3. Smith and Smith (2002) note the significance of this community as being the typical form of the Duffys Forest Ecological Community an Endangered Ecological Community listed under the Threatened Species Conservation Act, 1995.

Within Lot 161, one *Varanus rosenbergi* (Rosenbergs Goanna / Heath Monitor), a Vulnerable Species under the TSCA, 1995 and a flock of *Calyptorhynchus lathami* (Glossy Black-Cockatoo) also Vulnerable Species under the TSCA, 1995, was sited during field investigations as part of this assessment.

The Vulnerable Species *Pseudophyrne australis* (Red-crowned Toadlet) has previously been recorded within Lot 164 DP 752038. The ROTAP species *Genoplesium baueri* has previously been recorded within Lot 7062 DP 93798. The ROTAP listed species *Boronia fraseri* has been previously recorded with Lot 1046 DP 752038.

The Sydney Branch of the National Parks Association (NPA) undertook biodiversity surveys of the catchment of Wheeler Creek (a proportion of the catchment is on Crown land which is mostly within Mapping Area 3) in March and September 2001. These surveys found the threatened species set out as follows:

Vulnerable Species of fauna: *Ninox strenua* (Powerful Owl).

Vulnerable Species of flora: *Eucalyptus camfieldii* (Heart-leaved Stringy Bark) *Pimelia curviflora var. curviflora*, *Tetratheca glandulosa*

Endangered Species of flora: *Persoonia hirsuta.*

■ Mapping Area 6

Vegetation mapping undertaken by Smith and Smith (2002) indicate that Bangalay Alluvial Forest, Water Fern Swamp and Palm Woodland all occur within Mapping Area 6. Smith and Smith (2002) note the significance of these communities as all being forms of the Sydney Coastal Estuary Swamp Forest Complex, an Endangered Ecological Community listed under the TSCA, 1995.

4.5 SIGNIFICANT ECOLOGICAL FEATURES

No significant ecological features were found within Mapping Areas 1, 2 and 5.

■ Mapping Area 3

Smith and Smith (2002) have undertaken detailed mapping of the native vegetation of the Warringah Local Government Areas. Sections of Mapping Area 3 have been classified as Sandstone Swamp. Smith and Smith (2002) note that these occur as either valley swamps or as hanging swamps.

The NSW Wetlands Policy Action Plan notes that wetlands are among the most valuable and productive ecosystems on earth and support high levels of biological diversity (DLWC, 1998).

■ Mapping Area 4

Smith and Smith (2002) note the occurrence of a freshwater swamp lagoon within Lot 109. This artificial waterbody was created as part of the former quarrying activities in this area. Smith and Smith note the significance of the community is that "although it occurs on artificial water bodies in the Warringah area, the process of colonisation of such habitats by native wetland vegetation is a natural one" (Smith and Smith 2002).

Photo 14: Freshwater Swamp Lagoon within Lot 109.

■ Mapping Area 6

Smith and Smith (2002) have undertaken detailed mapping of the native vegetation of the Warringah Local Government Areas. Sections of Mapping Area 6 have been classified as Sandstone Swamp, Water Fern Swamp, Bangalay Alluvial Forest and Coachwood Rainforest

Smith and Smith (2002) note Sandstone Swamp occurs as either valley swamps or as hanging swamps.

Smith and Smith (2002) note that Bangalay Alluvial Forest, Water Fern Swamp and Palm Woodland as being forms "of the Sydney Coastal Estuary Swamp Forest Complex, which is listed as an Endangered Ecological Community" (Smith and Smith 2002, p. 24) under the TSCA, 1995.

Smith and Smith (2002) note that Palm Woodland is rare in the Sydney Region and is not found within the surrounding National Parks.

The NSW Wetlands Policy Action Plan notes that wetlands are among the most valuable and productive ecosystems on earth and support high levels of biological diversity (DLWC, 1998).

Smith and Smith (2002) note that "rainforest is a distinctive vegetation type that is relatively uncommon around Sydney" (Smith and Smith 2002, p. 14).

4.6 FIRE HAZARD

Bush Fire hazard is an important consideration for determining the capability of the site and adjacent sites for development purposes.

The Warringah Pittwater Bush Fire Management Committee (WPBFMC) has prepared a Bush Fire Risk Management Plan (WPBFMC, 2000) for the Warringah and Pittwater Local Government Areas, including the study area. This plan has determined the bush fire hazard and bush fire risk for these areas.

Bush fire hazard is defined as the potential severity of the fire. The plan determined the bush fire hazard by combining information about the type of vegetation and its response to fire, slope and the likely weather conditions on days when major bush fires are likely to start and spread rapidly (WPBFMC 2000).

"Bush fire risk is defined as the chance of a bush fire igniting, spreading and causing damage to assets of value to the community" (WPBFMC 2000, p. 29). The plan determined the bush fire risk to community and environmental assets by assessing how well the different types of assets in the Committee Area were likely to withstand and recover from the level of bush fire threat expected. The bush fire risk was placed into one of five bush fire classes – extreme, major, moderate, minor or insignificant (WPBFMC 2000).

The bushfire hazard and risk for the six Mapping Areas are set out in *Table 15* below.

Table 15: Bushfire Classification of Mapping Areas.

Mapping Area	Part of Mapping Area	Bush Fire Hazard	Environmental Risk	Community Risk
1	Whole	High	Major	Insignificant or moderate. Small areas along the bushland / urban interface on Crown land - major
2	Lot 1 DP 700298	Cleared (urban)	Insignificant	Major
	Part Lot 146 DP 752038	High	Major	Moderate
	Lots 971 and 2651 DP 752038	Cleared (urban),	Insignificant	Minor
	Part Lots 1008 and 1009 DP 752038,	Cleared (non-forest)	Insignificant	Major
	Lot 7034 DP 93795	Cleared (non-forest)	Insignificant	Insignificant
3	Whole	High	Major	Insignificant or moderate Small areas along the bushland / urban interface on Crown land - major
4	Whole	High	Major	Insignificant or moderate Small areas along the bushland / urban interface on Crown land - major
5	Whole	High	Major	Insignificant or moderate Small areas along the bushland / urban interface on Crown land - major
6	Whole	High	Major	Insignificant or moderate

Mapping Area	Part of Mapping Area	Bush Fire Hazard	Environmental Risk	Community Risk
				Small areas along the bushland / urban interface on Crown land - major

4.7 SOILS

4.7.1 Classification

A soil landscape represents the grouping together of areas with similar soil and landscape characteristics.

It should be noted that soil landscape mapping is undertaken at a scale of 1:25000, therefore the exact boundaries of the soil landscapes within the study area and their occurrence within mapping areas should be considered a guide only.

■ Mapping Area 1

Information derived from the *Soil Landscapes of the Sydney 1:100000 Sheet* (Chapman and Murphy, 1989) indicates that Mapping Area 1 includes the Hawkesbury, Gymea, Somersby, Lambert, Hornsby and Disturbed soil landscapes as shown in *Figure 9.*

The dominant soil materials, soils in terms of Great Soil Group and geomorphic location of the soils within each soil landscape are set out in *Table 16* based on Chapman and Murphy, 1989.

■ Mapping Area 2

Information derived from the *Soil Landscapes of the Sydney 1:100000 Sheet* (Chapman and Murphy, 1989) indicates that Mapping Area 2 includes the Gymea, Somersby, Lambert and Disturbed soil landscapes as shown in *Figure 10*.

The dominant soil materials, soils in terms of Great Soil Group and geomorphic location of the soils within each soil landscape are set out in *Table 16* based on Chapman and Murphy, 1989.

■ Mapping Area 3

Information derived from the *Soil Landscapes of the Sydney 1:100000 Sheet* (Chapman and Murphy, 1989) indicates that Mapping Area 3 includes the Hawkesbury, Gymea, Lambert, Oxford Falls, Deep Creek and Disturbed soil landscapes as shown in *Figure 11*.

The dominant soil materials, soils in terms of Great Soil Group and geomorphic location of the soils within each soil landscape are set out in *Table 16* based on Chapman and Murphy, 1989.

■ Mapping Area 4

Information derived from the *Soil Landscapes of the Sydney 1:100000 Sheet* (Chapman and Murphy, 1989) indicates that Mapping Area 4 includes the Hawkesbury, Lambert and Oxford Falls soil landscapes as shown in *Figure 12.*

The dominant soil materials, soils in terms of Great Soil Group and geomorphic location of the soils within each soil landscape are set out in *Table 16* based on Chapman and Murphy, 1989.

■ Mapping Area 5

Information derived from the *Soil Landscapes of the Sydney 1:100000 Sheet* (Chapman and Murphy, 1989) indicates that Mapping Area 5 includes the Hawkesbury and Lambert soil landscapes as shown in *Figure 13.*

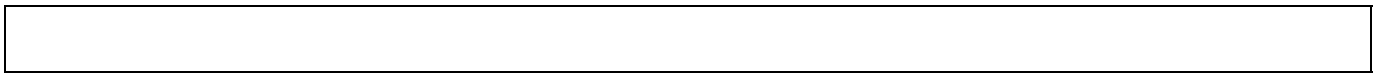

Figure 9: Soil Landscapes of Mapping Area 1.

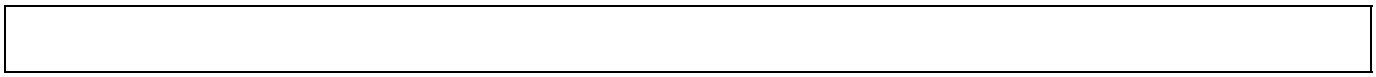

Figure 10: Soil Landscapes of Mapping Area 2.

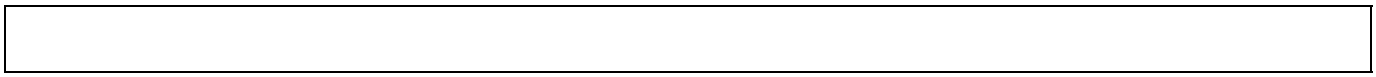

Figure 11: Soil Landscapes of Mapping Area 3.

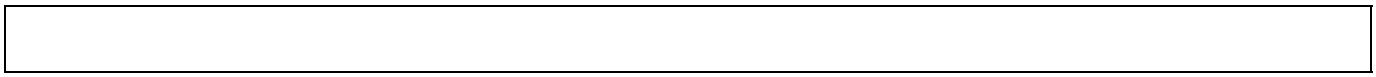

Figure 12: Soil Landscapes of Mapping Area 4.

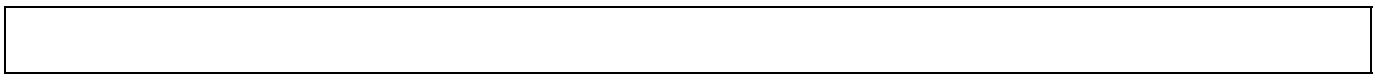

Figure 13: Soil Landscapes within Mapping Area 5.

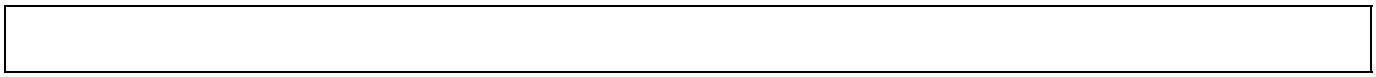

Figure 14: Soil Landscapes of Mapping Area 6.

The dominant soil materials, soils in terms of Great Soil Group and geomorphic location of the soils within each soil landscape are set out in *Table 16* based on Chapman and Murphy, 1989.

■ Mapping Area 6

Information derived from the *Soil Landscapes of the Sydney 1:100000 Sheet* (Chapman and Murphy, 1989) indicates that Mapping Area 6 includes the Hawkesbury, Hornsby, Oxford Falls, Deep Creek and Disturbed soil landscapes as shown in *Figure 14*.

The dominant soil materials, soils in terms of Great Soil Group and geomorphic location of the soils within each soil landscape are set out in *Table 16* based on Chapman and Murphy, 1989.

Table 16: Description of soil landscapes and soils.

Soil Landscape	Dominant Soil Materials (location)	Soils - Great Soil Group (location)
Hawkesbury	Loose, coarse quartz sand (topsoil – A1 horizon). Earthy, yellowish-brown sandy clay loam (subsoil associated with sandstone bedrock– B or C horizons). Pale, strongly pedal light clay (subsoil derived from shale lenses – B or C horizons).	Shallow (>50 cm), discontinuous Lithosols / Siliceous Sands (rock outcrops). Earthy Sands, Yellow Earths and some Yellow Podzolic Soils (inside of benches and along joints and fractures). Localised Yellow and Red Podzolic Soils (Associated with shale lenses). Siliceous Sands and Secondary Yellow Earths (along drainage lines).
Gymea	Loose, coarse sandy loam (topsoil – A1 horizon). Earthy, yellowish-brown clayey sand (subsoil over sandstone bedrock – B horizon). Earthy to weakly pedal, yellowish-brown sandy clay loam (subsoil on coarse sandstone - B or C horizon). Moderately to strongly pedal, yellowish-brown clay (subsoil on shale bedrock – B or C horizon).	Shallow to moderately deep (30 - 100 cm) Yellow Earths and Earthy Sands (crests and inside of benches). Shallow (<20 cm) Siliceous Sands (leading edges of benches). Localised Gleyed Podzolic Soils and Yellow Podzolic Soils (shale lenses). Shallow to moderately deep (<100 cm) Siliceous Sands and Leached Sands (along drainage lines).
Somersby	Loose dark brown sandy loam (topsoil – A1 horizon). Earthy, bright-brown sandy clay (subsoil – B horizon). Hardsetting, cemented ironstone gravel Pallid grey sandy clay (deep subsoil). Earthy, brownish-yellow light sands clay loam (deep subsoil overlying bedrock – B3 or C horizon). Earthy, brownish-yellow light sandy clay loam (subsoil – B horizon). Pallid, light yellow sandy loam (subsoil in wet areas – B or C horizon).	Moderately deep to deep (100 – 300 cm) Red Earths and Yellow Earths (overlying laterite gravels and clays on crests and upper slopes). Yellow Earths and Earthy Sands (mid slopes). Grey Earths, Leaches Sands and Siliceous Sands (lower slopes and drainage lines). Gleyed Podzolic Soils (low lying poorly drained area).

Soil Landscape	Dominant Soil Materials (location)	Soils - Great Soil Group (location)
	Friable sandstone (deeply weathered parent material – C horizon).	
Lambert	Loose, stony, yellowish-brown sandy loam (topsoil – A1 horizon). Earthy, yellow-brown, light sandy clay loam (subsoil – B horizon or occasionally A2 horizon). Blackish-brown, loose sandy loam (topsoil – A1 horizon). Angular blocky "puggy" clay (deep subsoil on shale lenses – B horizon). Earthy, mottled, pale clayey sands (subsoil in wet areas – B or C horizon). Friable sandstone (deeply weathered parent material in joint lines and beneath perched water tables – C horizon).	Shallow (<50 cm) discontinuous Earthy Sands and Yellow Earths (crests and inside of benches). Shallow (<20 cm) Siliceous Sands / Lithosols (leading edges). Shallow to moderately deep (<150 cm) Leached Sands, Grey Earths and Gleyed Podzolic Soils (poorly drained areas). Localised Yellow Podzolic Soils (associated with shale lenses).
Hornsby	Black, organic sandy loam (topsoil – A1 horizon). Hardsetting, dark brown sandy clay loam (A2 horizon). Strongly pedal, brown light clay (subsoil over volcanic breccia – B horizon). Earthy, brown sandy loam (subsoil over sandstone colluvium – B horizon). Earthy, reddish-brown, sandy clay (subsoil on sandstone colluvium (B-C horizon). Weathered volcanic breccia (weathering product of volcanic breccia parent material).	Deep (150-300 cm) Yellow Podzolic Soils (upper and midslopes). Yellow-brown Earths and Red Podzolic Soils (sandstone colluvium). Yellow Podzolic Soils (volcanic breccia). Deep (>200 cm) Structured Loams (drainage lines).
Disturbed	Loose black sandy loam (topsoil – A1 horizon). Compacted mottled clay (impermeable isolating cap over potentially hazardous buried materials). Variable transported "fill". Dark dredged muds and sands (subsoil).	
Oxford Falls	Dark brown, loose loamy sand (topsoil – A1 horizon) Black organic loam (topsoil in waterlogged areas – A horizon) Bleached loose sandy loam (A2 horizon) Earthy yellowish-brown clayey sand (subsoil – B horizon) Friable sandstone (deeply weathered soft friable sandstone)	Moderately deep to deep (50 - >150 cm) Earthy Sands, Yellow Earths and Siliceous Sands (slopes) Deep (>200 cm) Leached Sands, Podzols and Grey Earths (valley floors)
Deep Creek	Black friable silt loam (topsoil – A1 horizon)	Deep (>200 cm) Podzols (well drained

Soil Landscape	Dominant Soil Materials (location)	Soils - Great Soil Group (location)
	Loose grey-black loamy sand (topsoil A1 horizon) Mottled, loose, greyish-yellow-brown sand (subsoil – A2, B or D horizon) Soft sandy organic pan (deep subsoil – B horizon) Soft sandy iron pan (deep subsoil – B horizon)	terraces) Siliceous Sands (current floodplain) Humus Podzols (low lying areas)

4.7.2 Soil Erodibility

Soil erodibility is defined as the susceptibility of a soil to the detachment and transport of soil particles by erosive agents during wind or water erosion (Houghton and Charman, 1986 in Charman and Murphy 2000, p. 206).

Information derived from the *Soil Landscapes of the Sydney 1:100000 Sheet* (Chapman and Murphy, 1989) was used to determine the likely soil erodibilities for the dominant soil materials of the soil landscapes occurring within the Study Area. This information was used to determine the likely soil erodibilities for each Mapping Area as set out in *Table 17* below.

Table 17: Likely Soil Erodibility of Mapping Areas.

Mapping Area	Soil Erodibility
1	Generally very low to moderate. Could range to high within Gymea Soil Landscape and to extreme within Disturbed Soil Landscape
2	Generally very low to moderate. Could range to high within the Gymea Soil Landscape and to extreme within the Disturbed Soil Landscape.
3	Generally very low to moderate. Could range to high within the Gymea Soil Landscape and to extreme within the Disturbed Soil Landscape.
4	Very low to moderate
5	Low to moderate
6	Generally very low to moderate. Could range to extreme within the Disturbed Soil Landscape.

4.7.3 Soil Erosion Hazard

Soil erosion hazard is a measure of the degree to which the soils within a parcel of land are susceptible to erosion. This measure is determined by a combination of factors including soil erodibility, land use, land management practices, climate, landform and vegetation cover (Houghton and Charman, 1986 in Gray and Smith, 1998, p.29).

Information derived from the *Soil Landscapes of the Sydney 1:100000 Sheet* (Chapman and Murphy, 1989) indicates the soil erosion hazards for the soil landscapes occurring within the mapping area. This information was used to determine the likely soil erosion hazard for the Mapping Areas as set out in *Table 18* below.

Table 18: Soil Erosion Hazard of Mapping Areas.

Mapping Area	Soil Erosion Hazard Non-concentrated Flows	Soil Erosion Hazard Concentrated Flows
1	Low to extreme	Low to extreme

Mapping Area	Soil Erosion Hazard Non-concentrated Flows	Soil Erosion Hazard Concentrated Flows
2	Low to very high	High to extreme
3	Low to very high	Very high to extreme
4	High to very high	Very high to extreme
5	Very high	Extreme
6	Low to extreme	Low to extreme

4.7.4 Existing Erosion

There is no apparent indications of existing erosion within Mapping Areas 5 and 6.

■ Mapping Area 1

Within Lot 6 there is a small area of rill erosion from runoff from Sydney Water water supply storage tanks on the adjoining land.

Within Lots 152, 153 and 2858 there is some rill erosion on sloping sections of the fire / access trail within this area.

Within Lot 192 there is minor rill erosion on numerous tracks that extend from the adjoining freehold land which are used by trail / mountain bikes.

Within Lot 7036 a proliferation of unauthorised trails extend from the adjoining freehold land onto the Crown land. These trails have a large amount of sheet and rill erosion from heavy use by trail and mountain bikes.

■ Mapping Area 2

Within Lot 971 there is minor sheet erosion on areas of exposed lateric soil within the former quarry that have not revegetated.

Within Lot 146 there is minor sheet erosion and potential for extensive sheet and rill erosion within the unauthorised horse arena, which extends from the adjoining Crown land. The area is completely unvegetated and adjoins steeply sloping land.

Within Lot 7034 sheet and rill erosion is occurring due to the numerous unauthorised trails used by mountain / trail bikes within this area of former quarry.

■ Mapping Area 3

Within Lot 1064 an unauthorised horse arena has been constructed in the middle of bushland. Minor sheet erosion has occurred due to the arena being completely unvegetated. Rill erosion has occurred on the access track to the horse arena within Lot 1064.

Some rill erosion has occurred on the sloping sections of the fire / access trail, which crosses Lots 153 and 2858.

Numerous tracks extend from the adjoining freehold land onto Lot 192. The use of these trails by trail / mountain bikes is causing rill erosion.

Within Lot 7034 a proliferation of trails extend from the adjoining freehold land onto the Crown land. These trails have a large amount of sheet and rill erosion from heavy use by trail and mountain bikes.

Rill erosion has occurred on the fire / access trail that crosses Lots 985, 986 and 987.

Within Lots 1047 and 7035 a cleared building site has extended onto these two Lots. Sheet and rill erosion is occurring due to a lack of vegetative cover.

■ **Mapping Area 4**

Within Lots 2857, 2858, 109 and 7029 there is some rill erosion of sloping sections of the access roads within this area. In addition heavy use of the trails within Lots 109 and 7029 by trail / mountain bikes is causing more severe rill erosion and rapid deterioration of the walking / access tracks in this area.

Within Lots 1045, 1046 and 1047 there is sheet erosion due to the removal of vegetation and the use of the land as part of a building waste recycling business partially authorised under tenure from the Department.

Within Lot1334 sheet and rill erosion has occurred within the former quarry due to unvegetated fill and quarried material.

4.7.5 Soil Depth

Soil depth can affect the capability of an area for a wide range of land uses.

Information derived from the *Soil Landscapes of the Sydney 1:100000 Sheet* (Chapman and Murphy, 1989) was used to determine the likely soil depth, depending on topographic location, within each mapping area as set out in *Table 19* below.

Table 19: Soil Depth of Mapping Areas.

Mapping Area	Soil Depth Classification	Actual Soil Depth (centimetres)
1	Shallow to deep	Less than 20 to 300
2	Shallow to deep	Less than 20 to 300
3	Shallow to deep	Less than 20 to greater than 200
4	Shallow to deep	Less than 20 to greater than 200
5	Shallow to moderately deep	Less than 20 to less than 150
6	Shallow to deep	Less than 50 to greater than 200

4.7.6 Salinity

Salinity is caused by the accumulation of soluble salts in soil, mainly sodium chloride, often as a result of rising ground waters but sometimes due to natural processes such as marine water influence.

Evidence of salinity within each mapping area is set out in *Table 20* below.

Table 20: Evidence of salinity within Mapping Areas.

Mapping Area	Evidence of Salinity
1	No evidence of salinity observed, however Chapman and Murphy (1989) note that saline soils can occur within the Disturbed Soil Landscape.
2	No evidence of salinity observed, however Chapman and Murphy (1989) note that saline soils can occur within the Disturbed Soil Landscape.
3	No evidence of salinity observed, however Chapman and Murphy (1989) note that localised occurrences of salinity occur within the Deep Creek soil landscape and that saline soils can occur within the Disturbed Soil Landscape.
4	None
5	None
6	No evidence of salinity observed, however Chapman and Murphy (1989) note that localised occurrences of

Mapping Area	Evidence of Salinity
	salinity occur within the Deep Creek soil landscape and that saline soils can occur within the Disturbed Soil Landscape.

4.7.7 Acid Sulfate Soil

Acid Sulfate Soil (ASS) is the common name given to soils containing iron or their oxidation products. They occur in low lying coastal areas and are formed from estuary muds laid down over the past 6000 years and since covered by soil and water. Whilst the soil remains waterlogged they do not cause a problem and are known as potential ASS. These soils can be a problem if they come into contact with oxygen through such activities as excavation and drainage. Oxygen reacts with iron sulfide to produce sulfuric acid, which can have a harmful effect on the environment (ASSMAC, undated, Sammut, 1996, Naylor et.al, 1998).

The former Department of Land and Water Conservation produced maps to show the probability of finding ASS layers, the approximate depth of the ASS and the environmental risk if ASS are disturbed.

Information derived from the *Hornsby / Mona Vale* Acid Sulphate Soil Risk Map indicates that acid sulphate soils are not known or expected to occur within Mapping Areas 1, 2, 3, 4 and 5. This means land management activities are not likely to be affected by acid sulphate soil materials within these Mapping Areas.

Information derived from the *Hornsby / Mona Vale* Acid Sulphate Soil Risk Map indicates that there is a high probability of occurrence of acid sulphate soil materials within the soil profile of a large part of Mapping Area 6. The depth to acid sulphate soil materials varies from between 1 and 3 metres to within 1 metre of the ground surface.

4.7.8 Soil Contamination

There was no evidence of soil contamination within the mapping area.

■ Mapping Area 1

There was no evidence of soil contamination within the mapping area. However soil contamination may occur within Lots 152, 179, 161 and 167 due to the importation of soil materials (of unknown origin) to regrade the fire trail / access road which partially adjoins / partially cuts through these Lots.

■ Mapping Area 2

There was no evidence of soil contamination within the mapping area. However soil contamination may occur within Lots 1008 and 1009 due to the importation of fill (of unknown origin) to fill the former quarry within these lots.

■ Mapping Area 3

There was no evidence of soil contamination within the mapping area. However soil contamination may occur within Lots 153, 179, 2517, 7033 and 167 due to the importation of soil materials (of unknown origin) to regrade the fire trail / access road which partially adjoins / partially cuts through these Lots.

Soil contamination may also occur within part Lot 1053 due to the unauthorised encroachment of recycled building waste material onto the Crown land from a building waste recycling business on the adjoining freehold land.

■ **Mapping Area 4**

There was no evidence of soil contamination within the mapping area. However soil contamination may occur within Lots 2857 and 1334 and part Lots 109 and 117 due to the importation of fill material (of unknown origin) within the two former quarries within these Lots.

Soil contamination may also occur within part Lots 1044, 1045, 1046 and 1047 due in part to the possible importation of fill onto lot1046 and 1047 in conjunction with there use for storage, authorised under tenure, and due to the unauthorised encroachment of recycled building waste material onto the Crown land from a building waste recycling business on the adjoining freehold land.

■ **Mapping Area 6**

There was no evidence of soil contamination within the mapping area. However soil contamination may occur within the unsurveyed Crown land adjoining Cromer Golf Course and within Lot 7061 due to these areas being previously reclaimed from Narrabeen Lagoon by the importation of fill of unknown origin.

4.7.9 Other Soil Constraints

Other soil constraints are any other soil properties that may act as constraints to active land use of the study area. The degree of severity of soil limitations will vary with site conditions and the proposed landuse (Chapman and Murphy 1989).

Information derived from the *Soil Landscapes of the Sydney 1:100000 Sheet* (Chapman and Murphy, 1989) indicates the soil constraints that could occur within each mapping area as set out in *Table 21* below. The actual soil constraints present at a particular site will vary across each mapping area dependant on the dominant soil materials present at a particular site.

Table 21: Soil Constraints that could occur within Mapping Areas.

Mapping Area	Soil Constraints
1	Low and high permeability, low available water capacity, stoniness, high organic matter, very low to low fertility, strongly to extremely acid, high to very high aluminium toxicity, low wet strength, hardsetting to extremely hardsetting surface and high shrink-swell. In addition the following additional soil constraints could occur in the Disturbed Soil Landscape: Unconsolidated materials, highly toxic (localised), alkaline to moderately alkaline, saline and sodic.
2	Low and high permeability, low available water capacity, stoniness, very low to low fertility, strongly to very strongly acid, high to very high aluminium toxicity, low wet strength, hardsetting to extremely hardsetting surface and high organic matter (localised). In addition the following additional soil constraints could occur in the Disturbed Soil Landscape: Highly permeable, unconsolidated materials, highly toxic (localised), alkaline to moderately alkaline, saline, and sodic.
3	Low or High permeability, low available water capacity, stoniness, high organic matter, very low to low fertility, strongly to extremely acid, high to very high aluminium toxicity, low wet strength, hardsetting to extremely hardsetting surface and salinity (localised). In addition the following additional soil constraints could occur in the Disturbed Soil Landscape: Unconsolidated materials, highly toxic (localised), alkaline to moderately alkaline, saline and sodic.
4	Low or high permeability, low available water capacity, stoniness, high organic matter, very low to low fertility, strongly to extremely acid, high to very high aluminium toxicity and low wet strength.

Mapping Area	Soil Constraints
5	Low or high permeability, low available water capacity, stoniness, high organic matter, very low to low fertility, strongly to extremely acid, high to very high aluminium toxicity and low wet strength.
6	Low or high permeability, low available water capacity, stoniness, high organic matter, very low to low fertility, strongly to extremely acid, high to very high aluminium toxicity, low wet strength, hardsetting, high shrink-swell and salinity (localised). In addition the following additional soil constraints could occur in the Disturbed Soil Landscape: Unconsolidated materials, highly toxic (localised), alkaline to moderately alkaline, saline and sodic.

4.8 GEOLOGY

4.8.1 Rock Type

Information derived from the *Sydney 1:100000 Geological Map* (NSW Dept Mineral Resource, 1983) indicates the bedrock underlying each of the Mapping Areas as set out in *Table 22* below.

Table 22: Geology underlying Mapping Areas

Mapping Area	Geology
1	Triassic Hawkesbury Sandstone (medium to coarse-grained quartz sandstone with very minor shale and laminite lenses) Several basalt sedimentary dykes
2	Triassic Wianamatta Group, Liverpool Sub-group shale (shale and laminite with some sandstone beds) Triassic Hawkesbury Sandstone. (medium to coarse-grained quartz sandstone with very minor shale and laminite lenses)
3	Triassic Hawkesbury Sandstone (medium to coarse-grained quartz sandstone with very minor shale and laminite lenses) Several basalt sedimentary dykes
4	Triassic Hawkesbury Sandstone (medium to coarse-grained quartz sandstone with very minor shale and laminite lenses)
5	A small area of Quaternary coastal sands, alluvium and associated sediments (silty to peaty quartz sand, silt and clay with ferriginous and humic cementation in places and commonly shell layers) Underlying the remainder of the Mapping Area is Triassic Hawkesbury Sandstone (medium to coarse-grained quartz sandstone with very minor shale and laminite lenses)
6	A very small area of Post Triassic Basalt, Dolerite and Volcanic Breccia (volcanic breccia with varying amounts of sedimentary breccia and basalt) The remainder of the Mapping Area is comprised of Triassic Hawkesbury Sandstone (medium to coarse-grained quartz sandstone with very minor shale and laminite lenses)

4.8.2 Geological Resources

The NSW Department of Mineral Resources has advised that the study area is wholly within Petroleum Exploration Licence 5 (Act 1991).

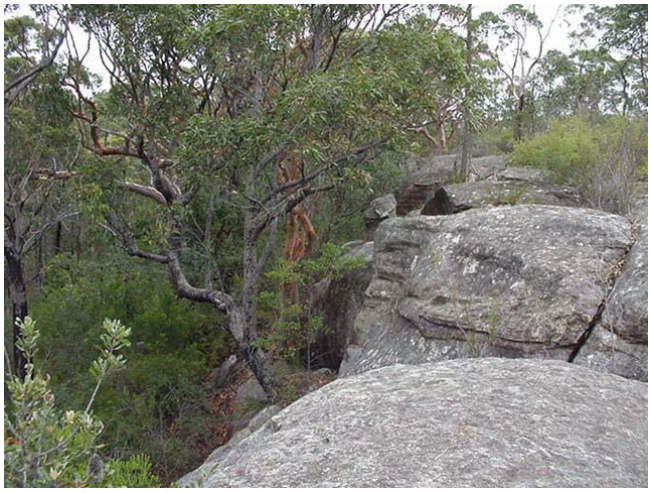

Photo 15: Rock outcrops within Mapping Area 1 just off Forest Way, Belrose.

4.8.3 Rock Outcrop

The proportion of rock outcrop can affect the capability of the land for urban development, rural, recreational and forestry uses. Rock outcropping is estimated on a percentage basis as set out in *Table 23* below.

Table 23: Proportion of rock outcropping within Mapping Areas

Mapping Area	Average percentage proportion of rock outcropping
1	Less than 2% to greater than 30%
2	Nil to 2 - 10%
3	10 to 20 % to greater than 30%
4	Nil to less than 2% and in other parts is greater than 30%
5	20 to 30%
6	Nil to greater than 30% (where bedrock is exposed along watercourses)

4.8.4 Geo-hazard

Geo-hazards are here defined as hazards associated with broad-scale rock and earth masses. Such hazards may pose a major threat to any development or other active land use.

Information derived from the *Soil Landscapes of the Sydney 1:100000 Sheet* (Chapman and Murphy, 1989) was used to determine the geo-hazards that could occur within each mapping area as set out in *Table 24* below.

Table 24: Geo-hazards that could occur within Mapping Areas.

Mapping Area	Possible Geo-hazards
1	Mass movement hazard (within the Hawkesbury Soil Landscape). Localised mass movement hazard (within the Hornsby Soil Landscape).

Mapping Area	Possible Geo-hazards
	Mass movement hazard in steep locations (within the Disturbed Soil Landscape). Possible mass movement and landfilled site hazard (within part of Lots 1054, 1055, 1082, 1084, 1088 and 2627 within former quarry).
2	Mass movement hazard in steep locations (within the Disturbed Soil Landscape). Possible mass movement and landfilled site hazard (within part of Lots 1008 and 1009 and within Lot 7034 within two former quarries).
3	Mass movement hazard (within the Hawkesbury Soil Landscape). Mass movement hazard in steep locations (within the Disturbed Soil Landscape). Possible mass movement and landfilled site hazard (within part Lot 7034 within former quarry).
4	Mass movement hazard (within the Hawkesbury Soil Landscape). Possible mass movement and landfilled site hazard (within Lot 1334 within former quarry, within part of Lot 1036 where levelling of adjoining land has extended onto Lot 1036 and within part of Lots 1045, 1046 and 1047 where levelling and also possible land filling of the Crown land has occurred).
5	Mass movement hazard (within the Hawkesbury Soil Landscape).
6	Mass movement hazard (within the Hawkesbury Soil Landscape). Localised mass movement hazard (within the Hornsby Soil Landscape). Mass movement hazard in steep locations (within the Disturbed Soil Landscape). Possible landfilled and reclaimed land hazards (within the unsurveyed Crown land adjoining Cromer Golf Course and Lot 7061 where reclamation from Narrabeen Lagoon occurred).

4.9 HYDROLOGY

4.9.1 Water Feature

Table 25 below sets out the water features that occur within each mapping area.

Table 25: Water features that occur within Mapping Areas.

Mapping Area	Water Features Present
1	Unsurveyed Crown land adjacent to Forest Way - artificially formed (by past excavation) intermittent creek. Lot 2630 - intermittent creek. Adjacent to Lot 6 - Sydney Water drinking water supply reservoir, comprising 2 above ground tanks.
2	Lot 1009 - artificially created wetland within the rehabilitated former quarry.
3	Numerous intermittent and perennial creeks and hanging swamps are found within or adjoin the land within this study area.
4	Lot 109 - two artificially created freshwater swamps. These were formed as part of the past quarrying operations in this area. Lots 109, 117, 2857 and 7029 - intermittent creek, which has had its channel substantial modified and its course altered due to past quarrying operations in this area. The creek has been partially piped and partially

Mapping Area	Water Features Present
	lined with geotextile mesh. Lot 957 - intermittent creek. Lot 2869 - artificially created drainage line, created by the construction of a road embankment adjoining this Lot. Lot 2640 - adjoins an intermittent creek and contains a small farm dam, authorised under tenure from the Department. Lot 2639 - Two small unauthorised farm dams have been constructed
5	No water features present
6	Unsurveyed Crown land adjoining Cromer Golf Course - perennial creek. This creek also has a weir across it to allow pumping of water to irrigate the golf course. Also adjoins Narrabeen Lakes. Numerous other lots contain or adjoin intermittent / perennial creeks. Lot 7061 - adjoins Narrabeen Lake. Lot 2869 - artificially created drainage line, created by the construction of a road embankment adjoining this Lot. Lot 1028 and 904 - area of hanging swamp.

Photo 16: South Creek adjoining Cromer Golf Course

4.9.2 Catchment

All six Mapping Areas lie within the overall catchment of Narrabeen Lakes. The individual catchments for each mapping area are outline in *Table 26* below.

Table 26: Catchments within Mapping Areas.

Mapping Area	Catchment
1	Drains into Deep, Snake Oxford, Middle and Wheeler Creeks, which flow into Narrabeen Lakes via Deep, Middle and South Creeks

Mapping Area	Catchment
2	Drains into Oxford Creek, then into Middle Creek, which then flows into Narrabeen Lakes.
3	Drains into Deep, Snake, Oxford, Middle and Wheeler Creeks. Deep, Middle and South Creeks then drain into Narrabeen Lakes.
4	Drains into Deep, Snake, Oxford and Middle Creeks. Deep and Middle Creeks then flow into Narrabeen Lakes.
5	Drains into Oxford, Middle and Wheeler Creeks. Middle and South Creeks then flow into Narrabeen Lakes.
6	Drains into Snake, Oxford, Middle and South Creek. Middle and South Creeks flow into Narrabeen Lakes.

4.9.3 Flooding

Incidence of flooding can depend on numerous interrelated factors and can vary greatly between rainfall events. An indication here that flooding might or might not occur in a particular area within this assessment is based on observations of the proximity of a water feature, the type of water feature it is and the site's topographic location. This information is for the purposes of this assessment only and not for any secondary purpose. It should be noted that no flood studies were undertaken or referred to as part of this assessment.

There would appear to be no flooding hazard within Mapping Areas 1, 2 and 5 as they are located on higher ground in the catchment and there is no major watercourse in the vicinity of the Mapping Area.

■ Mapping Areas 3 and 4

Riverine flooding could occur within Mapping Areas 3 and 4 associated with the intermittent / perennial creek lines within and adjacent to this mapping area.

■ Mapping Area 6

Riverine, flash flooding could occur within Mapping Area 6 associated with the intermittent / perennial streams within and adjacent to this mapping area, particularly the lower reaches of the major creeks of Middle and South Creeks which occur within this Mapping Area.

Coastal flooding could occur within this mapping area associated with the coastal lake (Narrabeen Lakes) adjacent to this Mapping Area.

4.9.4 Site Drainage

The apparent site drainage classification for each mapping area is set out in *Table 27* below.

Table 27: Site Drainage for Mapping Areas

Mapping Area	Site Drainage
1	Very good
2	Very good
3	Very good for most Mapping Area 3. Very poor in the area of Sandstone Swamp
4	Very good
5	Very good

Mapping Area	Site Drainage
6	Very good for parts of Mapping Area. However site drainage appears to be very poor within the Sandstone Swamp, Swamp Oak Forest and Water Fern Swamp, and moderate to good in the Coachwood Rainforest, Palm Woodland and Bangalay Alluvial Forest.

4.9.5 Other Hydrological Issues

The Warringah Creek Management Strategy was prepared by Montgomery Watson Harza (2002) on behalf of Warringah Council with the aim of developing an understanding of creeks and their associated habitat, reviewing existing and future development pressures, provide Council with the information and recommendations necessary to enable long-term creek management strategies and polices to be implemented and finally to establish and evaluate management options (Montgomery Watson Harza 2002). The strategy classified Warringah's creeks into three groups on the basis of current ecological values and catchment land uses:

- **"Group A**: very high ecological value; with less than 10% connected impervious area (Wheeler, Deep, Curl Curl [Creeks]);
- **Group B**: some degradation in the upper catchments, but high ecological value downstream; generally 10-15% connected impervious area (Snake, Oxford, Duffys, Kierans, Bare [Creeks]);
- **Group C**: generally of low to moderate ecological value with moderate to highly developed catchments - 15-50% connected impervious area (Bantry Bay, Carroll, Frenchs, Middle, South, Manly, Dee Why, Greendale, Brookvale, Burnt Bridge [Creeks])." (Montgomery Watson Harza 2002, p. 20).

Montgomery Watson Harza (2002) note that "this classification shows that just three major creeks (Deep, Wheeler and Curl Curl) are mostly unaffected by development and protection of their catchments is critical. These 'Group A' creeks are of high landscape and ecological value and will degrade quickly if even minor changes occur (such as weed growth, vegetation clearing or urban development).

Several creeks (such as Kierans and Snake) have development in the upper reaches, but are important because they flow into National Parks or reserves and sensitive estuarine waters (Group B). Most of these are highly modified in the urban and rural areas, but are in good condition in the National Parks. There is some evidence to suggest that this group of creeks is at the point where any increase in flows or pollutants from the catchment could result in significant deterioration in the National Park sections" (Montgomery Watson Harza, $2002_{2,}$, p.6).

They find that "a high priority for Warringah should be protecting and managing those creeks which are of high value (Groups A and B)" (Montgomery Watson Harza, 2002, p.41).

■ Mapping Area 1

The catchments of Wheeler and Deep Creeks (Group A), Snake and Oxford Creeks (Group B) and Middle and South Creeks (Group C) are all partially located within Mapping Area 1. Also, upper reaches of Snake Creek are located within Mapping Area 1.

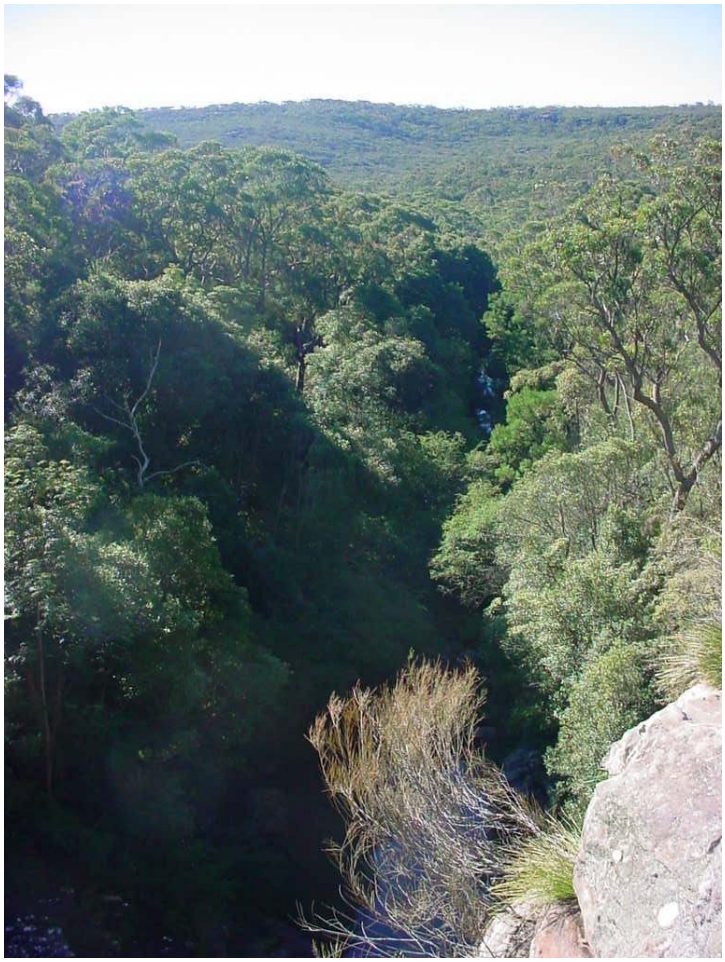

Photo 17: Oxford Creek just below Oxford Falls within Mapping Area 3.

■ Mapping Area 2

The catchments of Oxford Creek (Group B) and Middle Creek (Group C) are partially located within Mapping Area 2.

■ Mapping Area 3

The catchments of Wheeler and Deep Creeks (Group A), Snake and Oxford Creeks (Group B) and Middle and South Creeks (Group C) are all partially located within this mapping area. Also upper reaches of Deep, Oxford and Wheeler Creeks and middle reaches of Snake and Middle Creeks are located within Mapping Area 3.

■ Mapping Area 4

The catchments of Wheeler and Deep Creeks (Group A), Snake and Oxford Creeks (Group B) and Middle Creek (Group C) are all partially located within this mapping area. Also upper reaches of Deep and Oxford Creeks and lower reaches of Snake Creek are located within Mapping Area 4.

■ Mapping Area 5

The catchments of Wheeler Creek (Group A), Oxford Creek (Group B) and Middle and South Creeks (Group C) are all partially located within Mapping Area 5.

■ Mapping Area 6

The catchments of Wheeler Creek (Group A), Snake and Oxford Creeks (Group B) and Middle and South Creeks (Group C) are all partially located within this mapping area. Also upper and lower reaches of Oxford Creek, lower reaches of Snake Creek, middle and lower reaches of Middle Creek and lower reaches of South Creeks are located within Mapping Area 6.

4.10 VISUAL QUALITY

Photo 18: View from Mapping Area 1 looking east down Middle Creek's valley with Narrabeen Lakes and the ocean in the distance.

Visual quality assessment is important for protecting significant landscapes and can also be important in identifying areas suitable for visual improvement. The assessment scheme used involves the assessment of two aspects: the visual variety of each site, called *relative scenic quality* and the sensitivity or concerns and interests the public would place on the visual amenity of a site, called *landscape sensitivity*.

The *relative scenic quality* and *landscape sensitivity* of each mapping has been determined as set out in *Table 28.*

Table 28: Visual quality assessment of Mapping Areas.

Mapping Area	Relative Scenic Quality	Factors Used To Determine	Landscape Sensitivity	Factors Used To Determine
1	High	Elevated lands with distant views over diverse vegetation patterns and landforms, mosaics of natural and rural landscapes and Narrabeen Lakes and the ocean.	Moderate to High	Location partial in the foreground of a major travel route and partially in the background of a major travel route.
2	Low	Largely cleared of natural vegetation and lacking topographic relief	Moderate to High	Location varying from the foreground of a minor to secondary travel route to the foreground of a major travel route.
3	High	Sloping topography (sometimes steeply sloping), naturally vegetated	Moderate to High	Located in the foreground or background of major travel routes.

Mapping Area	Relative Scenic Quality	Factors Used To Determine	Landscape Sensitivity	Factors Used To Determine
		landscape, broken by sandstone outcrops and benches, diverse vegetation patterns and distant views across naturally vegetated hills and valleys.		
4	Low	Lack of natural vegetation, lack of topographic relief and largely highly modified or disturbed nature.	Low	Located in the background of minor travel routes or routes not readily accessible to the general public.
5	Low	Lack of natural vegetation and limited topographic relief	Moderate	Located partially in the background of a major travel route.
6	High	Water edges and water bodies, natural vegetation and diverse vegetation patterns.	High	Located in the foreground of a major travel route and in the foreground of high use visitor areas (Narrabeen Sports Academy, Cromer Golf Course and Narrabeen Lakes).

Photo 19: Distant views within Mapping Area 3 at Belrose looking east.

PRESENT AND PREVIOUS LAND USE

This chapter sets out the apparent present and previous land use of each of the six Mapping Areas.

5.1 MAPPING AREA 1

Section 3.2.1 Description Of Mapping Area 1 lists the tenures administered by the Department of Lands which are currently held for various purposes within the study area.

The natural vegetation within this mapping area would serve a catchment protection function by providing vegetation values to catchment protection. The natural vegetation would also serve a nature conservation function by providing natural habitat, threatened species habitat and a wildlife corridor.

Passive recreational use of this mapping area may occur.

Four Aboriginal rock-engraving sites are located within this mapping area.

Photo 20: Aboriginal rock engravings on land adjoining Mapping Area 1.

The "Indigenous Place, Cromer Heights NSW" is listed on the register of the national estate. The exact location of the site is not known, but may include Aboriginal rock engraving sites within this study area.

The "Deep and Middle Creeks Area, Narrabeen NSW" has been proposed for listing on the Register of the National Estate. A final determination is yet to be made by the Australian Heritage Commission. This area is partially within the study area.

The "Narrabeen Lagoon Catchment, Narrabeen NSW" has been proposed for listing on the Register of the National Estate. A final determination is yet to be made by the Australian Heritage Commission. The study area is wholly within the catchment of Narrabeen Lagoon.

The "Belrose Grevillea Caleyi Site, Belrose NSW" has been proposed for listing on the Register of the National Estate. A final determination is yet to be made by the Australian Heritage Commission. The exact location of this site is not known. It may include Crown land within Mapping Area 1 (Lots 4 and 18 DP 807906) which has a number of individual *Grevillea Caleyi* plants.

In addition *Table 29* below sets out the land uses of specific parts of Mapping Area 1 that occur or have occurred.

Table 29: Land use of Mapping Area 1.

Lot & Deposited Plan	Land Use
Unsurveyed Crown land adjacent to Forest Way	Past excavation
Lot 174 DP 752038	Unauthorised encroachment by neighbour – storage of materials, vehicles, rubbish dumping, vehicle tracks
Lot 964 DP 752038	Telecommunication tower, 132kv power transmission line. Some rubbish dumping around tower site
Lot 2636 DP 752038	BBQ and compost bin located on land. Dumping of garden refuse by adjoining landowner.
Lot 4 DP 807906	Dumping of garden refuse and some rubbish. Dumped signs from Wesley Centre across road. 8 metre wide grassed area cleared on western boundary and maintained. Row of camphor laurels planted. Unauthorised encroachment by property to north - fence line adjusted and Crown land enclosed in adjoining freehold property.
Lot 171 DP 752038	Cable TV cable cuts through Lot.
Lot 6 DP700298	Recent unauthorised clearing of vegetation on western boundary with a bulldozer. Horse riding track extends from an adjoining property to the west across Lot 6.
Lot 97 DP 869624	Dumping of garden refuse and rubbish. Tree removal possibly to preserve views of adjacent houses.
Lots 162 & 163 DP 752038	Unauthorised clearing of native vegetation extending from adjoining freehold properties.
Lot 1082 DP 752038	Tenure held for the purpose of grazing. Shed constructed. Used as a weekender. No grazing – inconsistent with authorised use under tenure.
Lot 1084 DP 752038	Tenure held for dam and pipeline. Dam no longer used. Storage and grazing of 1 goat in a small clearing – inconsistent with authorised use under tenure.
Lot 2627 DP 752038	Tenure held for grazing and market garden. Not used for this purpose. Old shack type weekender on land. No power connected. Water tanks rusted out. Broken fibro dumped around land – inconsistent with authorised use under tenure.
Lots 152 and 179 DP 752038	Occasional use for filming along Slippery Dip fire trail. Some disturbance to native vegetation as a result. Fire / access trail cuts through parts of Lots. Used by horse riders and trail and mountain bike riders.
Lot 856 DP 752038	Power line crosses lot. Access track under power line. Numerous other walking tracks. Some rubbish dumping. Informal lookout with distant views to ocean.
Lot 192 DP 752038	Trails extending into lot used by walkers, trail and mountain bikes and horse riders
Lot 7036 DP 93795 and Lots 825, 829, & 830 DP 752038	Trails extending into lots used by walkers, trail and mountain bikes

5.2 MAPPING AREA 2

Section 3.2.2 Description Of Mapping Area 2 lists the tenures administered by the Department of Lands which are currently held for various purposes within the study area.

The “Deep and Middle Creeks Area, Narrabeen NSW” has been proposed for listing on the Register of the National Estate. A final determination is yet to be made by the Australian Heritage Commission. This area is partially within the study area.

The “Narrabeen Lagoon Catchment, Narrabeen NSW” has been proposed for listing on the Register of the National Estate. A final determination is yet to be made by the Australian Heritage Commission. The study area is wholly within the catchment of Narrabeen Lagoon.

Table 30 below sets out the land uses of specific parts of Mapping Area 2 that occur or have occurred.

Table 30: Land use within Mapping Area 2.

Lot & Deposited Plan	Land Use
Lot 971 DP 752038	On part of Lot 971 an ambulance station has been constructed. On part of Lot 971 is a former quarry used by Council to stockpile materials (mulch, soil) – inconsistent with reserve purpose. There is no community centre in existence within the area reserved for community centre.
Lot 2651 DP 752038	Tenure for Scout activities. 1st Belrose Scout Group hall and detached garage constructed on land.
Lot 1008 & 1009 DP 752038	Former sandstone quarry. Regeneration of native plants carried out within area.
Lot 1 DP 700298	Partially has the Belrose Rural Fire Brigade building and carpark located on it and partially used by Warringah Council as a storage depot. Use as a storage depot - inconsistent with reserve purpose.
Lot 7034 DP 93795	Numerous tracks / trails used by mountain / trail bikes within former quarry which is largely located on freehold land.
Lot 146 DP 752038	Unauthorised horse arena extends from adjoining freehold land onto Crown land. Vegetation removed. Substantial earthworks to create level arena.

Photo 21: A section of track used by mountain and trail bikes within Lot 7034 within Mapping Area 2.

5.3 MAPPING AREA 3

Section 3.2.3 Description Of Mapping Area 3 lists the tenures administered by the Department of Lands which are currently held for various purposes within the study area.

The natural vegetation within this mapping area would serve a catchment protection function by providing vegetation values to catchment protection. The natural vegetation would also serve a nature conservation function by providing natural habitat, threatened species habitat and a wildlife corridor.

The wetlands and riparian lands within this mapping area would serve a catchment protection function.

Passive recreational use of this mapping area occurs.

1 Aboriginal open camp site, 3 Aboriginal shelter cave sites and 6 Aboriginal rock engraving sites are located within this mapping area.

The area surrounding Oxford Falls waterfall (within Lot 1043 DP 75208 within Mapping Area 3) has been listed on the State Heritage Inventory as the "Oxfords Falls Heritage Conservation Area" and is considered to have major local significance. The listing was as a result of the site receiving heritage listing under Warringah Council's Local Environment Plan in December 2000.

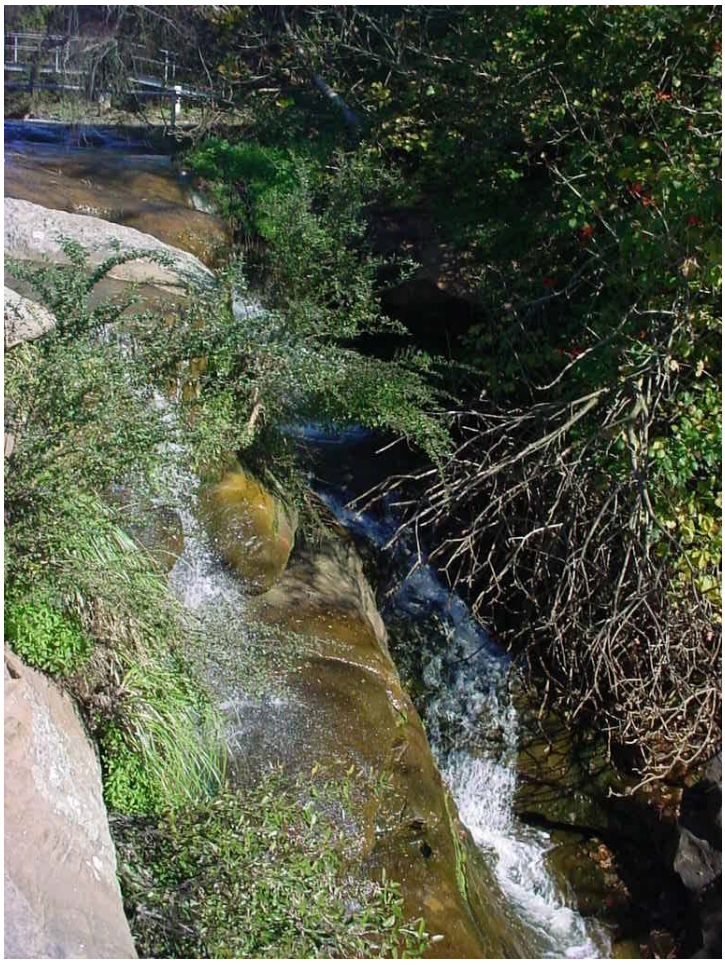

Photo 22: Upper part of Oxford Falls within Lot 1043 within Mapping Area 3.

The "Indigenous Place, Cromer Heights NSW" is listed on the register of the national estate. The exact location of the site is not known, but may include Aboriginal sites within this study area.

The “Deep and Middle Creeks Area, Narrabeen NSW” has been proposed for listing on the Register of the National Estate. A final determination is yet to be made by the Australian Heritage Commission. This area is partially within the study area.

The “Narrabeen Lagoon Catchment, Narrabeen NSW” has been proposed for listing on the Register of the National Estate. A final determination is yet to be made by the Australian Heritage Commission. The study area is wholly within the catchment of Narrabeen Lagoon.

In addition *Table 31* sets out the land uses of specific parts of Mapping Area 3 that occur or have occurred.

Table 31: Land use of Crown land within Mapping Area 3.

Lot & Deposited Plan	Land Use
Lots 161, 165 & 166 DP 752038	Past possible agricultural / grazing use in one area – remains of old tractor, barb wire fence and foot track.
Lots 161, 164, 165 & 166 DP 752038	Fire trail crosses Lots – “Five Mile Creek Trail”. Passive recreational use of trail – walkers and cyclists
Lot 953 DP 752038	Past rubbish dumping adjacent to access road.
Lot 17, 18 & 19 DP 729342 & Lot 5 DP 729342	Former small quarry area. Piles of spoil, logs and mulch dumped on the land. Sediment fence erected round spoil pile. Some dumping of garden refuse from adjoining retirement village. Lot 5 is a former road, now closed, and is grassed.
Lots 15 DP 729342	Powerline cuts through Lot
Lot 2600 DP 752038	On the eastern boundary an area has been filled and levelled to create a fire break (unauthorised) from the adjoining freehold property. Dumping of garden refuse and other materials. Trailer stored on land. A row of exotic pine trees has been planted.
Lot 1064 DP 752038	Unauthorised horse arena has been constructed in the middle of the bush – native vegetation cleared and the land levelled. Trail leads from Spicer Road to arena. Sign warns people to “keep out”
Lot 2639 DP 752038	Unauthorised use of the land for grazing of cattle extends from a tenure on the adjoining Crown land. Grazing paddocks and two dams.
Lot 1006 DP 752038	Unauthorised use of the land for grazing of cattle extends from a tenure on the adjoining Crown land.
Lot 6 DP 700298	Horse riding trail extends from freehold property across Crown land
Lot 171 DP 752038	Five Mile Creek fire trail crosses Lot. Substantial fire-break with adjoining freehold property on western boundary constructed. Unauthorised filling, up to 5 metres deep to create elevated road along fire break. Road / break extends onto adjoining Crown road. A cable TV cable crosses the front of the Lot.
Lots 120 & 121 DP 752038	Overgrown access track. Past dumping of cars, building waste and other rubbish.
Lot 978 DP 752038	Sewer for new subdivision recently placed across Lot. Large area cleared of vegetation for this work. Area now mulched. Earthworks for new subdivision may extend onto Crown land - unauthorised. Land surface reformed, native vegetation removed and area mulched.
Lots 978 DP 752038 & Lot 2 DP 808682	Walking track crosses Lots.

Lot & Deposited Plan	Land Use
Lot 991 DP 752038, Lot 2 DP 808682	Dumping of garden refuse and rubbish along road frontage.
Lot 998 DP 752038	Unauthorised small encroachment from adjoining freehold rural property. Part of a dam and some disturbance to vegetation.
Lot 97 DP 869624	132kv power transmission line
Lot 95 DP 869624	Fire trail crosses land.
Lot 1082 DP 752038	Tenure held for the purpose of grazing. No actual grazing. Within Mapping Area 3 land not used.
Lot 1084 DP 752038	Tenure held for dam and pipeline. Dam no longer used. Within Mapping Area 3 land not used
Lot 2627 DP 752038	Tenure held for grazing and market garden. Within Mapping Area 3 land not used.
Lot 867 DP 752038	Children's tree house found on land
Lot 856 DP 752038	Unauthorised shed. Trailer stored.
Lot 201 DP 752038	Public road cuts through Lot.
Lot 2633 DP 752038	Trail used by horse riders.
Lots 89, 195, 198 & 201 DP 752038	Rubbish dumping adjacent to road
Lot 7034 DP 93795	Part of past quarry. Proliferation of mountain / trail bike trails extending onto this land.
Lots 824, 825, 828 & 830 DP 752038	Power line crosses land. Also associated access road. Used by trail and mountain bikes, walkers and horse riders. Past dumping of cars off trail.
Various Lots along Wakehurst Parkway, particularly at "pull in bays"	Rubbish dumping
Lot 1015, 1029 & 1030 DP 752038	Trail / track crosses Lots. Used by walkers, horse-riders, mountain / trail bike riders. Access from adjoining Crown land off Oxford Falls Road partially blocked by logs.
Lot 1034 DP 752038	Rubbish dumping along fire trail crossing this Lot. Trail also used by horse-riders, mountain / trail bikes.
Lot 1043 DP 752038	Oxford Falls waterfall within this lot. Passive recreational use. Walking tracks along cliff top and to the base of the falls.
Lots 985, 986 & 987 DP 752038	Fire trail crosses these lots
Lot 983 DP 752038	Rubbish and vehicle dumping
Lot 988 DP 752038	Unauthorised substantial encroachment onto Lot from adjoining freehold property – part of a dam and landscaped gardens.
Lots 987, 988 & 989 DP 752038	132kv transmission line crosses Lots.
Lot 181 DP 752038	An unauthorised dam appears to have been constructed in the bush by artificially enlarging a natural water hole or hanging swamp.

Lot & Deposited Plan	Land Use
Lots 1046 and 1047 DP 752038	Held under tenures for storage and pipeline. No use with Mapping Area 3. Encroachments onto other Crown land (see below and under Mapping Area 4) – inconsistent with authorised use under tenure.
Lot 1053 DP 752038	Unauthorised encroachment of building material recycling business onto land from adjoining freehold land. Overstorey vegetation largely cleared. (see above)
Lot 1334 DP 752038	Held under tenure for the purpose of quarry. Bush regeneration activities have been occurring around former quarry within Mapping Area 3. No quarrying activities have occurred within Mapping Area 3.

Photo 23:Unauthorised horse arena within Lot 1064 within Mapping Area 3.

5.4 MAPPING AREA 4

Section 3.2.4 Description Of Mapping Area 4 lists the tenures administered by the Department of Lands which are currently held for various purposes within the study area.

The former Oxford Falls Public School building (now used as a community meeting room / centre) within Lot 2 DP 853151 within Mapping Area 4 is listed on the State Heritage Inventory and is considered to have major local significance. The listing was as a result of the site receiving heritage listing under Warringah Council Local Environment Plan in December 2000.

Photo 24: The former Oxford Falls Public School building within Lot 2.

The "Deep and Middle Creeks Area, Narrabeen NSW" has been proposed for listing on the Register of the National Estate. A final determination is yet to be made by the Australian Heritage Commission. This area is partially within the study area.

The "Narrabeen Lagoon Catchment, Narrabeen NSW" has been proposed for listing on the Register of the National Estate. A final determination is yet to be made by the Australian Heritage Commission. The study area is wholly within the catchment of Narrabeen Lagoon.

In addition *Table 32* below sets out the land uses of specific parts of Mapping Area 4 that occur or have occurred.

Table 32: Land use within Mapping Area 4.

Lot & Deposited Plan	Land Use
Lot 181 DP 752038	Held under tenure for the purpose of storage shed. A large dam, 3 horse enclosures with shelter sheds, a horse arena and a storage shed are all located on the land – inconsistent with authorised use under tenure. In addition an adjoining Crown road has also be enclosed within the property without approval and a "private driveway" sign erected.
Lot 180 DP 752038	Unauthorised encroachment from adjoining Crown land held under tenure. Some vegetation cleared to increase grass area.
Lot 2517 DP 752038	Held under tenure for the purpose of occupation. Old disused sheds & enclosures, a dam, 2 large sheds and recently constructed vine trellis are located on the land – inconsistent with authorised use under tenure. Unauthorised clearing of vegetation extends onto the adjoining Crown land (Lot 181).
Lot 183 DP 752038	Held under tenure for farm and grazing. Used only for grazing 3 to 4 horses. Rubbish / materials scattered around the place. The fence between Lot 183 and Lot 2517 is missing so horses are also accessing Lot 2517 to graze. Sign on the property suggests use of the land for agistment – inconsistent with authorised use under tenure. Area of possible past sand extraction. Tenure held over adjoining Crown road for the purpose of dam and pipeline. Dam is online of a tributary of Oxford Creek.

Lot & Deposited Plan	Land Use
Lots 2857 & 2858 DP 48272, Lots 109 & 117 DP 752038, Lot 7029 DP 1030769	Held under tenure (except Lot 7029) for the purpose of sporting facilities. Formerly a quarry now partially filled, levelled and grassed and used by a radio control aircraft club. Structures present include a carpark, 2 shelter sheds and 2 portable toilets. Substantial use of the pedestrian / vehicle trails surrounding the grassed airfield is being made by mountain and trail bikes. Unauthorised use of these trails by a cycling club for organised mountain bike events is occurring. Unauthorised depositing of fill has occurred in this area.
Lot 2639 DP 752038	Unauthorised use of this lot for grazing extending from adjoining Crown land held under tenure. Structures include 2 dams and fenced paddocks, as well as access road to Lot 2640 (adjoining).
Lot 2640 DP 752038	Held under tenure for pig and poultry farm. About 25 cattle grazed on the land. Structures include three large sheds (one storing a large boat currently being restored by a third party), one former shed now converted into a residence and one brick and tile home, and several small grazing paddocks. All stock are hand fed. Unauthorised filling has occurred on adjoining Crown road reserve using imported material – all inconsistent with authorised use under tenure. The adjoining Crown road is held under enclosure permit, even though it is not enclosed within a property and the road is used for accessing another freehold property.
Lot 95 DP 869624	Substantial unauthorised encroachment by adjoining freehold property onto Crown land. Most natural vegetation cleared. Area possible used for grazing.
Lots 1036 DP 752038	Filling and levelling of the adjoining freehold land has extended onto Crown land creating a grassed open area. Dumping of garden refuse is occurring at the edge of the fill. Access across Lot to fire trail on adjoining Crown land. Trail used by horse riders and trail / mountain bikes. Owner of adjoining freehold has erected chain across access and sign stating “private property”.
Lot 1043 DP 752038	Formerly used for grazing. Overgrown fenced paddock, and dilapidated shed.
Lots 1044 to 1047 DP 752038	Lots 1046 & 1047 held under tenure for storage and tenure for pipeline. Within Lots 1046 and 1047 section where vegetation has been completely removed and fenced with sediment fencing. 2 dams , skip bins and piles of bulldozed vegetation. Some unauthorised filling of this area may have occurred. Over 15 emus are kept within a fenced enclosure within this area. Within Lot 1045 a spoil pile has encroached from the adjoining freehold land. Further disturbance to the native vegetation has occurred in Lots 1044, 1045 & 1046, possible from runoff from the adjoining freehold land, on which is a building materials recycling business - – all inconsistent with authorised use under tenure..
Lot 957 DP 752038	Unauthorised encroachment from adjoining overseas telecommunication facility. Clearing of native vegetation.
Part Lots 1 and 2 DP 853151 and part Lot 2869 DP 824056	Developed as passive recreation area – “Peace Park”. Includes landscaping, public toilets, war memorial, walking track and former Oxford Falls Public School building (school use from 1930 to 1986) now used as a community meeting room / centre.
Lot 1334 DP 752038	Former quarry. Held under tenure for quarry. Possible partially filled. Large amounts of concrete waste / rubble in batters to quarry and along artificial drainage lines along sealed access road to quarry. Quarry now used to store concrete drainage pipes, road base materials, excavated asphalt and sandstone blocks by Council – inconsistent with authorised use under

Lot & Deposited Plan	Land Use
	tenure.

Photo 25: Warringah Radio Control Society flying field within Mapping Area 4

5.5 MAPPING AREA 5

Section 3.2.5 Description Of Mapping Area 5 lists the tenure administered by the Department of Lands, which is currently held within the study area.

The "Deep and Middle Creeks Area, Narrabeen NSW" has been proposed for listing on the Register of the National Estate. A final determination is yet to be made by the Australian Heritage Commission. This area is partially within the study area.

The "Narrabeen Lagoon Catchment, Narrabeen NSW" has been proposed for listing on the Register of the National Estate. A final determination is yet to be made by the Australian Heritage Commission. The study area is wholly within the catchment of Narrabeen Lagoon.

In addition *Table 33* below sets out the land uses of specific parts of Mapping Area 5 that occur or have occurred.

Table 33: Land use within Mapping Area 5.

Lot & Deposited Plan	Land Use
Lots 2406 & 2407 DP 752038 & Lot 1927 DP 752038	Stormwater and swimming pool overflow from adjoining freehold properties empties on land. Dumping of garden refuse. Unauthorised encroachment by at least one property onto Crown land.
Lots 12 and 13 DP 240763	Blocks kept mown by neighbour. Possible used for passive recreation. Used to access side gate of adjoining townhouses.
Lot 1062 DP 752038	Held under tenure for residence, buildings and environment protection. A house, several sheds and an animal enclosure are constructed on the land. The house appears to have been recently extended. A large proportion of the Lot has been cleared of naturally vegetation and appeared to have previously been used for keeping animals, landscaping and agriculture, but was now overgrown with long grass and weeds. A road with turning circle at the end (now overgrown) had previously been constructed across the land using demolition waste. Some

Lot & Deposited Plan	Land Use
	rubbish dumping (old cars, fibro, etc) had occurred and extended onto the adjoining Crown road and Crown land.

Photo 26: An overgrown section of Lot 1062 within Mapping Area 5.

5.6 MAPPING AREA 6

Section 3.2.6 Description Of Mapping Area 6 lists the tenures administered by the Department of Lands which are currently held for various purposes within the study area.

The natural vegetation within this mapping area would serve a catchment protection function by providing vegetation values to catchment protection. The natural vegetation would also serve a nature conservation function by providing natural habitat, threatened species habitat and a wildlife corridor.

The wetlands and riparian lands within this mapping area would serve a catchment protection function.

Passive recreational use of this mapping area may occur.

The “Deep and Middle Creeks Area, Narrabeen NSW” has been proposed for listing on the Register of the National Estate. A final determination is yet to be made by the Australian Heritage Commission. This area is partially within the study area.

The “Narrabeen Lagoon Catchment, Narrabeen NSW” has been proposed for listing on the Register of the National Estate. A final determination is yet to be made by the Australian Heritage Commission. The study area is wholly within the catchment of Narrabeen Lagoon.

In addition *Table 34* below sets out the land uses of specific parts of Mapping Area 6 that occur or have occurred.

Photo 27: Picnic / passive recreation area within Lot 7061 within Mapping Area 6

Table 34: Land use of Lots or parts of Lots within Mapping Area 6.

Lot & Deposited Plan	Land Use
Unsurveyed Crown land adjoining Cromer Golf Course.	Area partially previously reclaimed from Narrabeen Lakes. Held under tenure for golf course. Used as part of the golf course as fairways, greens and access paths between holes. Also a pumping station is located on the land to pump water from the adjoining Creek. Possible passive recreational use to walk along creek edge to lake.
Lot 198 DP 752038	Picnic / passive recreation area at waterfall. Unsealed carpark. Old fire places.
Lots 198 & 1498 DP 752038	Public road cuts through Lots. Actual road reserve to north.
Lots 195 & 198 DP 752038	Rubbish dumping along Kellys Way adjoining road.
Lot 1132 DP 752038	Track crosses Lot. Provides access to adjoining Crown land. Used by walkers / horse-riders, mountain / trail bikes. Access off Oxford Falls Road partially blocked by logs.
Lot 7061 DP 93798	Area previously reclaimed from Narrabeen Lakes. Developed as recreation area – picnic tables, BBQ's, toilets, carpark and boat launching ramp.
Lots 888 & 889 DP 752038 and unsurveyed Crown land adjoining Wakehurst Parkway (east side)	Rubbish dumping occurring along Wakehurst Parkway. Gas pipe line crosses land.
Lot 97 DP 752038	Gas main valve site on land.
Lots 101 DP 752038 and unsurveyed Crown land adjoining Wakehurst Parkway (west side)	Two access roads. Rubbish dumping occurring down access roads and beside main road.
Lots 985 to 989 DP	Access track across land from overseas telecommunication facility.

Lot & Deposited Plan	Land Use
752038	

Photo 28: Picnic / passive recreation area within Lot 198 at a waterfall on Snake Creek

LAND CAPABILITY AND SIGNIFICANCE ASSESSMENT

The process of capability and significance assessment was discussed in *Section 2.2*. The capability and significance of the six mapping areas have been determined as set out in *Tables 35* to *40* below using the Department's analysis tables.

Table 35: Capability and Significance determined for Mapping Area 1.

Land Use	Capability / Significance	Land Attributes Used to Determine Capability / Significance
Catchment & Natural Resource Protection	High to very high	Possibility of high to extreme erosion hazard, mass movement potential, partially adjoins an existing national park, high scenic quality and moderate to high landscape sensitivity, high vegetation values to catchment
Nature Conservation	Very high	Area contains at least 2 threatened species, area contains and endangered ecological community, area forms part of an important regional wildlife corridor.
Heritage Protection	Very high	Area possible contains 1 site list on the register of the national estate and 1 site proposed to be listed. Area included in 2 sites proposed to be listed on the Register Of The National Estate. Area contains four Aboriginal sites.
Forestry	Very low (capability) Very low (productivity)	Soil erosion hazard possible ranging to extreme, percentage of rock outcrop ranging to greater than 30%, moderate to very high soil constraints, vegetation only ranging from heath to woodland to forest, parcels of land less than 50 hectares.
Urban Development	Very low to low	Soil erosion hazard possible ranging to extreme, low to moderate mass movement potential, moderate potential soil constraints (low and high permeability, stoniness, high organic matter, very low to low fertility, low wet strength and high shrink-swell.) soil depth ranging to less than 20 cm, percentage of rock outcrop ranging to greater than 30 %, high bushfire hazard.
Outdoor recreation	Low	Slope ranging to 10-20%, soil erosion hazard possible ranging to extreme, percentage of rock outcropping ranging to greater than 30%.
Agriculture	Low to very low	Soil erosion hazard possible ranging to extreme, soil depth ranging to less than 20cm, percentage of rock outcropping ranging to greater than 20%, high soil constraints (low and high permeability, low available water capacity, stoniness, very low to low fertility, strongly to extremely acid, high to very high aluminium toxicity and hardsetting to extremely hardsetting surface.
Mining and Extraction	Low	Low potential for deposit.

Table 36: Capability and Significance determined for Mapping Area 2

Land Use	Capability / Significance	Land Attributes Used to Determine Capability / Significance
Catchment & Natural Resource Protection	Low to high	Soil erosion hazard could range from low to very high (for non-concentrated flows – most likely as mapping area is on ridgetops / plateaus), low vegetation values to catchment, low scenic values
Nature Conservation	Low	Low percentage of native vegetation occurring in the mapping area compared to regional clearing, low core habitat, high degree of disturbance, low vegetation diversity
Heritage Protection	Very high	Area contained within 2 sites proposed to be listed on the Register Of The National Estate
Forestry	Low to moderate (capability) Very low (productivity)	Soil erosion hazard could range from low to very high, possible moderate soil constraints (Low and high permeability, low available water capacity, stoniness, very low to low fertility, strongly to very strongly acid, high to very high aluminium toxicity, and hardsetting to extremely hardsetting surface)
Urban Development	Low	Soil erosion hazard could range from low to very high, possible very slight soil contamination, soil depth ranges from greater than 1.5 metres to less than 0.2 metres
Outdoor recreation	Low to moderate	Soil erosion hazard could range from low to very high, possible slight soil contamination, high soil constraints (Low and high permeability, low available water capacity, stoniness, very low to low fertility, strongly to very strongly acid, high to very high aluminium toxicity, low wet strength, hardsetting to extremely hardsetting surface and high organic matter (localised).)
Agriculture	Very low to low	Soil erosion hazard could range from low to very high, soil depth ranges from less than 0.2 metres to greater than 1.5 metres, high soil constraints (Low and high permeability, low available water capacity, stoniness, very low to low fertility, strongly to very strongly acid, high to very high aluminium toxicity and hard setting to extremely hardsetting.)
Mining and Extraction	Low	Low potential for deposit

Table 37: Capability and Significance determined for Mapping Area 3

Land Use	Capability / Significance	Land Attributes Used to Determine Capability / Significance
Catchment & Natural Resource Protection	Very high	Possibility of soil erosion hazard ranging to extreme, area contains wetlands, area contains riparian lands, area partially adjoins existing national park, very high vegetation values to catchment, high scenic quality

Land Use	Capability / Significance	Land Attributes Used to Determine Capability / Significance
Nature Conservation	Very high	Area contains at least 8 threatened species, area contains an endangered ecological community, area forms part of an important regional wildlife corridor, area contains habitat of known high biological productivity
Heritage Protection	Very high	Area possible contains 1 site listed on the Register of the National Estate, area contains 2 sites proposed to be listed on the Register Of The National Estate, area contains 10 Aboriginal sites, area contains one site listed on the State Heritage Register of major local significance.
Forestry	Very low (capability) Low (productivity)	Soil erosion hazard could range from low to extreme, percentage of rock outcrop ranges from 10 – 20% to greater than 30%, drainage ranges from very good to poor, vegetation only ranges from heath to forest, size of contiguous parcels is between 50 & 100 hectares.
Urban Development	Very low to low	Slope ranges from 5% - 10% to greater than 33%, soil erosion hazard could range from low to extreme, drainage is very poor in places, soil depth could range from greater than 1.5 metres to less than 0.2 metres., percentage of rock outcrop could range from 10-20% to greater than 30%, high bushfire hazard
Outdoor recreation	Low	Slope ranges from 5-10% to greater than 20%, soil erosion hazard could range from low to extreme, drainage varies between very good to very poor, high soil constraints (Low or High permeability, low available water capacity, stoniness, high organic matter, very low to low fertility, strongly to extremely acid, high to very high aluminium toxicity, low wet strength, hardsetting to extremely hardsetting surface and salinity (localised)) and percentage of rock outcrop varies from 10-20% to greater than 30%
Agriculture	Very low to low	Slope ranges from 2-10% to greater 33%, soil erosion hazard could range from low to extreme, soil depth ranges from greater than 1.5 metres to less than 0.2 metres, drainage varies between very good to very poor, high soil constraints (Low or High permeability, low available water capacity, stoniness, very low to low fertility, strongly to extremely acid, high to very high aluminium toxicity, hardsetting to extremely hardsetting surface and salinity (localised))
Mining and Extraction	Low	Low potential for a deposit

Table 38: Capability and Significance determined for Mapping Area 4

Land Use	Capability / Significance	Land Attributes Used to Determine Capability / Significance
Catchment & Natural Resource	Very high	Possible extreme soil erosion hazard, area contains wetlands, area is in part higher in the catchment than a national park

Land Use	Capability / Significance	Land Attributes Used to Determine Capability / Significance
Protection		
Nature Conservation	High	Area is known to have a moderate probability of containing 1 or more threatened species, area contains a moderately significant remnant of a poorly reserved vegetation community (freshwater swamp lagoon), area contains habitat of known high biological productivity (wetland – freshwater swamp lagoon)
Heritage Protection	Very High	Area is contained within 2 sites proposed to be listed on the Register Of The National Estate, area contains 1 site listed on the State Heritage Inventory of major local significance
Forestry	Low (capability) Very low (productivity)	High to extreme soil erosion hazard, percentage of rock outcropping ranging from 0-2% to greater than 30%, vegetation only ranging from heath to woodland, parcels of land less than 50 ha in size
Urban Development	Low	Soil erosion hazard ranges from high to extreme, low to moderate mass movement hazard, possibility of very slight to moderate soil contamination, soil depth range from greater than 1.5 metres to less than 0.2 metres, high bush fire hazard.
Outdoor recreation	Low	Slope ranges from 0-2% to 10-20%, soil erosion hazard could range from high to extreme, possibility of very slight to moderate soil contamination, high soil constraints (low or high permeability, stoniness, high organic matter and low wet strength), percentage of rock outcropping ranges from less than 2% to greater than 30%.
Agriculture	Very low to low	Soil erosion hazard could range from high to extreme, soil depth ranges from greater than 1.5 metres to less than 0.2 metres, percentage of rock outcropping ranges from 0-2% to greater than 20%, high soil constraints (low or high permeability, low available water capacity, stoniness, very low to low fertility, strongly to extremely acid and high to very high aluminium toxicity).
Mining and Extraction	Low	Low potential for deposit

Table 39: Capability and Significance determined for Mapping Area 5

Land Use	Capability / Significance	Land Attributes Used to Determine Capability / Significance
Catchment & Natural Resource Protection	Very high	Very high to extreme soil erosion hazard.
Nature Conservation	High	Area is known to have a moderate probability of containing 1 or more threatened species

Land Use	Capability / Significance	Land Attributes Used to Determine Capability / Significance
Heritage Protection	Very high	Area is contained within 2 sites proposed to be listed on the Register Of The National Estate
Forestry	Very low to low (capability) Very low (productivity)	Very high to extreme soil erosion hazard, percentage of rock outcropping 20-30%, vegetation woodland to isolated trees, less than 50 hectare individual parcels
Urban Development	Very low to low	Slope ranges from 5-10% to 20-33%, possible very high to extreme soil erosion hazard, soil depth ranging from 1.0-1.5 metres to less than 0.2 metres, percentage of rock outcropping 20-30%, high bush fire hazard
Outdoor recreation	Very low to low	Slope ranging from 5-10% to greater than 20%, possible very high to extreme soil erosion hazard, high soil constraint (low or high permeability, low available water capacity, stoniness, high organic matter, very low to low fertility, strongly to extremely acid, high to very high aluminium toxicity and low wet strength), percentage of rock outcropping 20-30%
Agriculture	Very low to low	Slope ranging from 2-10% to 20-33%, possible very high to extreme soil erosion hazard, soil depth ranging from 1.0-1.5 metres to less than 0.2 metres, percentage of rock outcropping greater than 20%, high soil constraints (low or high permeability, low available water capacity, stoniness, very low to low fertility, strongly to extremely acid and high to very high aluminium toxicity)
Mining and Extraction	Low	Low potential for deposits

Table 40: Capability and Significance determined for Mapping Area 6

Land Use	Capability / Significance	Land Attributes Used to Determine Capability / Significance
Catchment & Natural Resource Protection	Very high	Possibility of soil erosion hazard ranging to extreme, area contains wetlands, area contains riparian lands, area partially contains foreshore of coastal lakes, area in a highly sensitive location relative to an area of high nature conservation value (Narrabeen Lakes), very high vegetation values to catchment (undisturbed vegetation effecting water quality and stability of coastal lake and tributaries), high probability of the occurrence of acid sulfate soils, high scenic quality and landscape sensitivity
Nature Conservation	Very high	Area is known to have a high probability of containing 1 or more threatened species, area contains an endangered ecological community, area contains a significant remnant of a poorly conserved community, area forms an important regional wildlife corridor, area contains habitat of known high biological diversity.
Heritage	Very high	Area is contained within 2 sites proposed to be listed on the Register Of The National

Land Use	Capability / Significance	Land Attributes Used to Determine Capability / Significance
Protection		Estate
Forestry	Very low (capability) Very low (productivity)	Soil erosion hazard could range from low to extreme, percentage of rock outcropping ranges from 0-2% to greater than 30%, drainage ranges from very good to very poor, vegetation only ranges from fern swamp to forest, individual parcels of lands less than 50 hectares
Urban Development	Very low	Soil erosion hazard could possible range from low to extreme, drainage ranges from very good to very poor, flood susceptibility ranges from low to moderate, percentage of rock outcropping ranges from less than 2% to greater than 30%
Outdoor recreation	Low	Soil erosion hazard could range from low to extreme, drainage could range from very good to very poor, soil contamination could range from very slight to moderate, high soil constraints (low or high permeability, low available water capacity, stoniness, high organic matter, very low to low fertility, strongly to extremely acid, high to very high aluminium toxicity, low wet strength, hardsetting, high shrink-swell and salinity (localised)), percentage of rock outcropping ranges from less than 2% to greater than 30%
Agriculture	Moderate to very low	Soil erosion hazard could range from low to extreme, drainage ranges from very good to very poor, percentage of rock outcropping ranges from 0-2% to greater than 30%, moderate to high soil constraints (low or high permeability, low available water capacity, stoniness, very low to low fertility, strongly to extremely acid, high to very high aluminium toxicity, hardsetting and salinity (localised).
Mining and Extraction	Low	Low potential for deposit

LAND SUITABILITY ASSESSMENT

The process of suitability assessment was discussed in *Section 2.3*. The most suitable uses of the six Mapping Areas have been determined as set out in *Tables 41* to *47* below using the Department's guidelines.

Table 41: Suitability determined for Mapping Area 1

Land Use	Suitability	Land Attributes Used to Determine Suitability
Environmental Protection (includes Catchment & Natural Resource Protection, Nature Conservation & Heritage Protection)	Yes	High to very high catchment protection significance, very high nature conservation & heritage significance, public demand for conservation of area, area has low capability / significance for more intensive landuse, area partially has environment protection classification and partial public open space designation, partially adjoins existing National Park, environmental protection of part of area in accordance with specific legislation (TSCA), recognised conservation body has expressed support for the area's protection (NPWS, NPA)
Forestry	No	Very low forestry capability and productivity, State Forests of NSW have not expressed interest in the land, land is not in close proximity to an existing state forest
Urban Development	No	Low to very low urban development capability, high to very high catchment & natural resource protection significance, very high nature conservation & heritage significance, not appropriate zoning (no new ridgetop develop), inadequate infrastructure issues with area, adjacent lands have high bushfire hazard.
Recreation	Yes (natural)	Low recreation capability, site has significant natural qualities, site has low capability for intensive land uses, adjoining land uses are compatible (partially adjoins national park & other natural vegetated Crown land).
Agriculture	No	Low to very low agricultural capability, high to very high catchment & natural resource protection significance, very high nature conservation & heritage significance, no significant return from agricultural use of the land, no demand for agricultural use
Mining and Extraction	No	Low mineral / extraction resource potential, low potential for resource of high economic value, high to very high catchment & natural resource protection significance, very high nature conservation & heritage significance, site inappropriately zoned, incompatible with adjoining land uses.

Table 42: Suitability determined for Mapping Area 2

Land Use	Suitability	Land Attributes Used to Determine Suitability
Environmental Protection (includes Catchment & Natural Resource Protection, Nature Conservation & Heritage Protection)	Yes (low suitability)	Low to high catchment & natural resource protection significance, low nature conservation significance, very high heritage significance, area partially has environmental protection classification
Forestry	No	Low to moderate forestry capability and very low productivity, State Forest have not expressed interest in the land, land is not in the vicinity of existing state forests
Urban Development	Yes - rural residential / low density (subject to addressing environment, infrastructure & partial bushfire constraints)	Low urban development capability, low to high catchment & natural resource protection significance, low nature conservation significance, very high heritage significance, demand for urban development, locality statement (zoning) appropriate subject to density and environmental protection classification requirements, some infrastructure constraints (large scale developments only)
Recreation	Yes – semi-natural (subject to addressing environmental constraints)	Low to moderate outdoor recreation suitability, low to high catchment protection significance, low nature conservation significance, very high heritage significance, possible future projected demand, good accessibility, partially zoned for open space
Agriculture	No	Low agriculture capability, low to high catchment & natural resource protection significance, very high heritage significance, no significant economic return, no demand for agricultural use, small Lot sizes only.
Mining and Extraction	No	Low mineral / extraction resource potential, low potential for resource of high economic value, low to high catchment & natural resource protection significance, very high heritage significance, site inappropriately zoned, incompatible with adjoining land uses.

Table 43: Suitability determined for Mapping Area 3

Land Use	Suitability	Land Attributes Used to Determine Suitability
Environmental Protection (includes Catchment & Natural Resource Protection, Nature Conservation & Heritage Protection)	Yes	Very high catchment & natural resources protection, nature conservation & heritage protection significance, public demand for environmental protection of most of area, low capability / significance for more intensive uses, area mostly has environmental protection classification, area partially adjoins an existing National Park, environmental protection of part of the area is consistent with State legislation, recognised conservation body has expressed support for

Land Use	Suitability	Land Attributes Used to Determine Suitability
		most of the area's protection.
Forestry	No	Very low forestry capability & low productivity, State Forest have not expressed interest in the land, land is not in the vicinity of existing state forests
Urban Development	No	Low to very low urban development capability, very high catchment & natural resource protection, nature conservation & heritage significance, partially not consistent with locality statements for area, inadequate infrastructure issues with area, adjacent lands have high bushfire hazard.
Recreation	Yes (natural)	Low outdoor recreation capability, site has significant natural qualities & attractions, site has low capability for more intensive land uses, site is of large extent, adjoining land uses are compatible, partially zoned for public recreation, partially already reserve for public recreation.
Agriculture	No	Very low to low agricultural capability, very high catchment & natural resources protection, nature conservation & heritage protection significance, no significant economic return from agricultural activities, no demand for agricultural use of the land.
Mining and Extraction	No	Low mineral / extraction resource potential, low potential for resource of high economic value, very high catchment & natural resource protection, nature conservation & heritage significance, site inappropriately zoned.

Table 44: Suitability determined for Mapping Area 4

Land Use	Suitability	Land Attributes Used to Determine Suitability
Environmental Protection (includes Catchment & Natural Resource Protection, Nature Conservation & Heritage Protection)	Yes	Very high catchment and natural resource protection & heritage significance, high nature conservation significance, public demand for environmental protection of part of area, low capability / significance for more intensive land uses, recognised conservation body have expressed support for part of the area's protection
Forestry	No	Low forestry capability & very low productivity, State Forest have not expressed interest in the land, land is not in the vicinity of existing state forests
Urban Development	Yes, for part of mapping area only- rural residential / low density (subject to addressing environment, infrastructure & bushfire	Low urban development capability, very high catchment and natural resource protection & heritage significance, high nature conservation significance, rural development consistent with locality statement (zoning) subject to environmental protection classification, some infrastructure issues, partially adjoins lands having high fire danger.

Land Use	Suitability	Land Attributes Used to Determine Suitability
	constraints)	
Recreation	Yes - semi-natural (subject to addressing environmental constraints), natural	Low outdoor recreation capability, very high catchment and natural resource protection & heritage significance, high nature conservation significance, good site accessibility, could act as a buffer zone between in compatibly land uses, partially already used as a semi-natural recreation area, partially zoned for public open space
Agriculture	No	Low to very low agricultural capability, very high catchment and natural resource protection & heritage significance, high nature conservation significance, no significant economic return from agricultural activities.
Mining and Extraction	No	Low mineral / extraction resource potential, low potential for resource of high economic value, very high catchment and natural resource protection & heritage significance, high nature conservation significance, site inappropriately zoned.

Table 45: Suitability determined for Mapping Area 5

Land Use	Suitability	Land Attributes Used to Determine Suitability
Environmental Protection (includes Catchment & Natural Resource Protection, Nature Conservation & Heritage Protection)	Yes (low suitability)	Very high catchment & natural resource protection & heritage significance, high nature conservation significance, area has low capability for more intensive land uses, area has environmental protection classification
Forestry	No	Very low to low forestry capability & very low productivity, State Forest have not expressed interest in the land, land is not in the vicinity of existing state forests
Urban Development	Yes, for part of mapping area only- rural residential / low density (subject to addressing environment, infrastructure & bushfire constraints)	Very low to low urban development capability, very high catchment and natural resource protection & heritage significance, high nature conservation significance, rural development consistent with locality statement (zoning) subject to environmental protection classification, some infrastructure issues, adjoins lands having high fire danger.
Recreation	Yes – semi-natural - low suitability (subject to addressing environmental constraints	Low to very low outdoor recreation suitability, very high catchment and natural resource & heritage protection significance, high nature conservation significance, good site accessibility, compatible with adjoining land uses.

Land Use	Suitability	Land Attributes Used to Determine Suitability
Agriculture	No	Low to very low agricultural capability, very high catchment and natural resource protection & heritage significance, high nature conservation significance, no significant economic return from agricultural activities.
Mining and Extraction	No	Low mineral / extraction resource potential, low potential for resource of high economic value, very high catchment and natural resource protection & heritage significance, high nature conservation significance, site inappropriately zoned.

Table 46 Suitability determined for Mapping Area 6

Land Use	Suitability	Land Attributes Used to Determine Suitability
Environmental Protection (includes Catchment & Natural Resource Protection, Nature Conservation & Heritage Protection)	Yes	Very high catchment and natural resources protection, nature conservation & heritage protection significance, public demand for environmental protection of most of area, low capability / significance for more intensive uses, area has environmental protection classification, area partially adjoins an existing National Park, environmental protection of part of the area is consistent with State legislation, recognised conservation body has expressed support for most of the area's protection.
Forestry	No	Very low forestry capability & productivity, State Forest have not expressed interest in the land, land is not in the vicinity of existing state forests
Urban Development	No	Very low urban development capability, very high catchment and natural resources protection, nature conservation & heritage protection significance, not consistent with locality statement for most of the area (a dense bushland buffer will be retained or established along Forest Way and Wakehurst Parkway), some infrastructure limitations, majority of adjacent lands have high fire danger, development could result in the impedance of access to public recreation areas (lake foreshore, major creeks)
Recreation	Yes – natural, semi-natural (semi-natural subject to environmental constraints)	Low outdoor recreation capability, very high catchment and natural resources protection, nature conservation & heritage protection significance, mostly zoned for public recreation, significant natural attractions within and adjacent to area, adjoining uses are compatible, site has low capability for more intensive uses, parts of area already used for semi-natural and natural recreation.
Agriculture	No	Low to moderate agricultural capability, very high catchment and natural resources protection, nature conservation & heritage protection significance, no significant economic return from agricultural activities,

Land Use	Suitability	Land Attributes Used to Determine Suitability
		no demand for agricultural use of the area
Mining and Extraction	No	Low mineral / extraction resource potential, low potential for resource of high economic value, very high catchment & natural resource protection, nature conservation & heritage significance, site inappropriately zoned.

CHAPTER EIGHT

DISCUSSION OF ISSUES AND CONCLUSIONS

8.1 MAPPING AREA 1

Environmental Protection and recreation - natural - have been identified in the land assessment as suitable uses for Mapping Area 1.

8.1.1 Preferred Use

Mapping Area 1 falls within the Oxford Falls Valley locality or the Narrabeen Lake Suburbs locality of the Warringah Local Environment Plan 2000. The above two suitable uses are consistent with these locality statements. In addition Lot 6 DP 700298, Lot 2 DP 550326, Lot 964 DP 752038 and Lot 7062 DP 93798 have been classified as public open space. The majority of Lot 856 DP 752038 has an Open Space Reservation over it. Again this is consistent with the two suitable uses identified above.

The Sydney Coastal Management Strategy (Sydney Coastal Council Inc, 1998) includes the strategic action to "conserve, maintain and enhance local and regional public open space areas, networks and wildlife / vegetation corridors and, where possible, use to conserve natural habitats and environments, while continuing to allow for appropriate public access" (Sydney Coastal Council Inc 1998, p. 45). The two suitable uses identified above are consistent with this strategy.

The National Parks and Wildlife Service have advised that most of Mapping Area 1 was included in a 1991 proposed addition to Garigal National Park.. This addition did not proceed due to objections from the then Department of Lands, due to the development potential of the land. This land assessment has not identified urban development as a suitable use for Mapping Area 1. In addition, a small area of Mapping Area 1 is currently being pursued as an addition to Garigal National Park by the National Parks and Wildlife Service.

Parts of Mapping Area 1 at Cromer have been proposed as a Nature Reserve by the National Parks Association. This proposal is also consistent with the two suitable uses identified in the assessment.

Warringah Council has proposed that parts of Mapping Area 1 are reserved for public recreation and environmental protection. This proposal would also be consistent with the two suitable uses identified above.

Montgomery Watson Harza (2002) in their study of the creeks of the Warringah area found that Wheeler and Deep Creeks, found within this Mapping Area, had very high ecological value, that their catchments were mostly unaffected by urban development and that protection of their catchments was critical. They found that Snake and Oxford Creeks (Snake Creek is found within Mapping Area 1 and Mapping Area 1 is within the catchment of Oxford Creek) had high ecological value downstream and were important because they flow into National Parks or reserves and sensitive estuarine waters. The protection of the Crown land within these Creek's catchments would be consistent with the two suitable uses identified above.

It should be noted that part of Lots 142, 144, 146, 179, 180, 1930, 1987, 2605 DP 752038 and Part Lot 97 DP 869624 are currently under Aboriginal Land Claim. Only limited actions can proceed with regard to these Lots until the land claim is determined.

Given the issues discussed above the preferred uses for Mapping Area 1 is recommended as environmental protection and recreation (natural).

8.1.2 Land Administrative and Management Matters

This assessment has identified several land administrative and management matters that the Department of Lands will need to consider and prioritise when undertaking future management and dealings with the Crown land contained within Mapping Area 1. These matters include:

1. Future reservation and management of the Mapping Area;
2. The appropriateness of the current purpose of several reservations;
3. Threatened species found within the Mapping Area;
4. Unauthorised use of parts of the Mapping Area as set out in *Table 29* ;
5. The management of existing trails;
6. Existing tenures within this Mapping Area;
7. Filming within the Mapping Area;
8. Weed growth as set out in *Table 9*.

The addressing of these matters will depend on budgetary and operational constraints on the Department of Lands.

8.2 MAPPING AREA 2

Environmental protection (low suitability), urban development – rural residential, low density (subject to addressing environment, infrastructure & partial bushfire constraints) and recreation – semi-natural (subject to addressing environmental constraints) have been identified in the land assessment as suitable uses for this mapping area.

8.2.1 Preferred Use

Mapping Area 2 falls within the Oxford Falls locality or the Frenchs Forest East locality of the Warringah Local Environment Plan 2000. The three suitable uses identified for this Mapping Area would be consistent with these locality statements for this area.

The suitability for environmental protection reflects the fact that the soil erosion hazard could range to very high and that the land is within two large areas proposed to be listed on the Register of the National Estate. The actual soil erosion hazard within any part of Mapping Area 2 will depend on site specific factors and the land use proposed for the land.

Urban Development was found to have only suitability for low impact development and is subject to environmental, infrastructure and bushfire constraints. The environmental constraints will again depend on the site specific soil erosion hazard and soil depth. The importance of these factors will depend on the land use proposed. Infrastructure constraints for this area relate to transport and employment and are only really applicable if a large-scale development were proposed. Bushfire hazard is only applicable to Lots 1, 146, 1008 and 1009. The remainder of the Mapping Area is rated as being cleared and of a minor or insignificant risk.

Similarly to urban development, the environmental constraints on semi-natural recreation will depend on site specifics and the type of land use proposed. Therefore the most suitable uses for this mapping area will vary between the Lots and are discussed as follows.

■ Lot 971

Within that part of Lot 971 reserved for community centre, there is no community centre in existence. The land adjoins Council land used as a playing field. The Crown land appears to have previously been used to quarry a small amount of material. It now appears to be used by Council to stockpile materials such as mulch and soil. this use is inconsistent with the reserve purpose of *community purposes* and is inconsistent with the suitable uses identified in *Chapter 7*. This lot is not constrained by bushfire hazard or risk. The Department would need to seek the advice of Warringah Council if there is likely to be a need for community purposes for this land. Given the location of the lot, the current reserve purpose, and the disturbed nature of the land the recommended preferred use is urban development (community purposes) (if required) or urban development (low impact) consistent with the LEP locality or semi-natural recreation.

Within that part of Lot 971 reserved for ambulance-station an ambulance station is in existence. This use is consistent with the urban development suitable use identified above and there would appear no reason why this use should not continue. Therefore urban development (community purposes) is recommended as the preferred use for this land.

Photo 29: Area of Lot 971 reserved for community centre. The ambulance station is in the background.

■ Lot 2651

Lot 2651 is held under tenure for the purpose of Scout activities. The land is a normal urban size block with a Scout Hall constructed on the land. This use is consistent with the urban development suitable use identified above and there would appear no reason why this use should not continue. Therefore urban development - rural residential / low density (subject to addressing environment, infrastructure constraints) is recommended as the preferred use for this land.

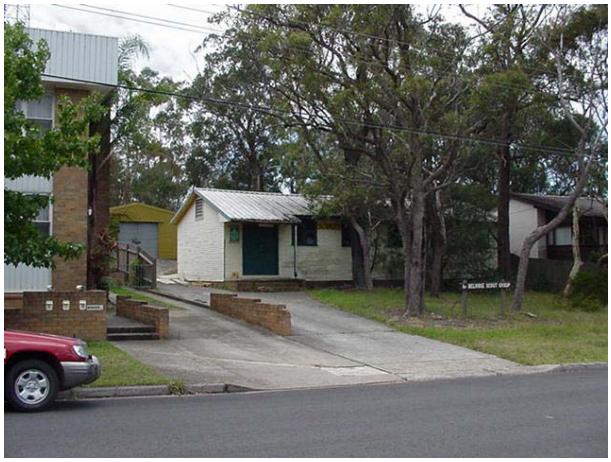

Photo 30: Scout hall within Lot 2651.

■ Lot 1

Lot 1 currently has two reservations over it. One for public recreation and access and one for bush fire brigade purposes. The land currently has a bush fire brigade building constructed on it (Belrose) and associated carpark. However a small area of land at the rear of the building is currently being used by Council as a storage depot. The use of the land by the bushfire brigade is consistent with one of the reservations and the urban development suitable use identified for this Mapping Area and therefore should continue. The use of the land by Warringah Council as a storage depot is inconsistent with the reserve purposes and is considered inappropriate. It is recommended the preferred use for this mapping area be urban development (community purposes).

■ Lot 146

Within Lot 146 an unauthorised horse arena has been constructed partially on freehold land and partially on Crown land. Extensive excavation has occurred on Crown land to create a level arena. The arena is completely unvegetated and located above steeply sloping naturally vegetated Crown land, of high environmental value. There is a high risk of soil erosion from the arena onto the adjoining Crown land. The surrounding Crown land (within Mapping Areas 1 and 3) is natural vegetated and has preferred uses of environmental protection and recreation (natural). A high bush fire hazard would preclude urban development for rural or low impact use as a preferred use of this land. Given that the arena is half or Crown land and half or freehold land, recreation (semi-natural) is also not possible. The arena either requires removal or authorisation under tenure from the Department. Therefore the preferred use for Lot 146 within Mapping Area 2 is environmental protection or recreation – semi-natural (subject to addressing environmental constraints).

■ Lots 1008 and 1009

Those parts of Lots 1008 and 1009 within Mapping Area 2 were previously a quarry, which has been filled and revegetated. Landcom had previously acquired this and adjoining land for an urban subdivision, which has now been built. Lots 1008 and 1009 were included in land return to Crown land as residue from that subdivision. Given that Lots 1008 and 1009 were residue from the subdivision and that they are filled land, it can be assumed that they are unsuitable for urban development. The land also has a major community risk for bushfire. As such urban development can be excluded as a preferred use.

Due to the previously disturbed nature of the land, it could be used for semi-natural recreation, particularly given it location adjacent to a new residential subdivision. The remaining parts of Lots 1008 and 1009 (within

Mapping Area 3) have a preferred use of environmental protection and recreation (natural). If the vegetation in Mapping Area 2 were allowed to continue to regenerate this area would also be suitable for environmental protection. Mapping Area 2 is also located above Mapping Area 3 so any land use in this area will have a direct impact on the adjoining Crown land. As such the preferred uses of the Lots 1008 and 1009 within Mapping Area 2 is recommended as environmental protection and / or recreation (natural or semi-natural).

■ **Lot 7034**

Lack of services excludes urban development from being a preferred use for Lot 7034. Given the land's lack of formal road access, this would also exclude semi-natural recreation as a preferred use. The land adjoins (and is higher in the catchment) than Crown land with a preferred use of environmental protection and recreation (natural). The National Parks Association has proposed that Lot 7034 and the adjoining lands are protected as a nature reserve. Similarly Warringah Council has requested that Lot 7034 and the surrounding Crown land is reserved for environmental protection. As such the preferred use for this mapping area is recommended as environmental protection.

8.2.2 Land Administrative and Management Matters

This assessment has identified several land administrative and management matters that the Department of Lands will need to consider and prioritise when undertaking future management and dealings with the Crown land contained within Mapping Area 2. These matters include:

1. The appropriateness of the current purpose of several reservations;
2. The management of existing trails.

The addressing of these matters will depend on budgetary and operational constraints on the Department of Lands.

8.3 MAPPING AREA 3

Environmental protection and recreation (natural) have been identified in the land assessment as suitable uses for Mapping Area 3.

8.3.1 Preferred Use

Mapping Area 3 falls within the Oxford Falls Valley locality or the Narrabeen Lake Suburbs locality of the Warringah Local Environment Plan 2000. The above two suitable uses are consistent with these locality statements.

In addition Lot 7035 DP 93795, 7175 DP 93796, Lot 7062 DP 93798, Lot 2 DP 550326, Lots 1 and 6 DP 700298, Lots 15, 16, 17, 18 and 19 DP 729342, Lots 95, 97, 98, 101, 102, 186, 895, 896, 904, 1015, 1016, 1017, 1022, 1023, 1026, 1027, 1028, 1029 1030, 1032, 1034, 1036, 1037, 1043, 1045, 1051 and 1334 DP 752038, Lots 2867, 2869 DP 824056 have been classified as "Public Open Space". Lots 888 and 889 DP 752038 have been classified as "Regional Open Space Reservation". Lot 856 DP 752038 has been partially classified as "Open Space Reservation". These classifications are consistent with the two suitable uses identified above.

The Sydney Coastal Management Strategy (Sydney Coastal Council Inc, 1998) includes the strategic action to "conserve, maintain and enhance local and regional public open space areas, networks and wildlife / vegetation corridors and, where possible, use to conserve natural habitats and environments, while continuing to allow for appropriate public access" (Sydney Coastal Council Inc 1998, p. 45) and the strategic action to "protect wetland

and lagoon vegetation" (Sydney Coastal Council Inc 1998, p. 47). The two suitable uses identified above are consist with this strategy.

The National Parks and Wildlife Service have advised that about half of Mapping Area 3 was include in a 1991 proposed addition to Garigal National Park. This addition did not proceed due to objections from the then Department of Lands, due to development potential of the land. This land assessment has not identified urban development as a suitable use for Mapping Area 3. In addition a small area of Mapping Area 3 is currently being pursued as an addition to Garigal National Park by the National Parks and Wildlife Service. The two suitable uses identified above would be consistent with the addition of Crown land to the existing National Park.

Additional parts of Mapping Area 3 at Cromer have been proposed as a Nature Reserve by the National Parks Association. The two suitable uses identified in the assessment are consistent with this proposal.

Warringah Council has proposed that parts of Mapping Area 3 are reserved for public recreation and environmental protection. The two suitable uses identified above are consistent with this proposal.

Montgomery Watson Harza (2002_2) in their study of the creeks of the Warringah area found that Wheeler and Deep Creeks, found within this Mapping Area, had very high ecological value, that their catchments were mostly unaffected by urban development and that protection of their catchments was critical. They found that Snake and Oxford Creeks (partially within Mapping Area 3 and Mapping Area 3 is partially within the catchment of these Creeks) had high ecological value downstream and were important because they flow into National Parks or reserves and sensitive estuarine waters. The two suitable uses identified above are consistent with the protection of the Crown land within these Creeks catchment.

It should be noted that Lot 96, 120, 121, 122, 141, 143, 953, 956 1030, 1930, 1987, 2582 and part Lots 142, 144, 146, 179, 180, 957, 1015 and 2605 DP 752038 and Lot 95 and part Lot 97 DP 869624 are currently under Aboriginal Land Claim. Only limited actions can proceed with regard to these Lots until the land claim is determined.

Given the issues discussed above the preferred uses for Mapping Area 3 are recommended as environmental protection and recreation (natural).

8.3.2 Land Administrative and Management Matters

This assessment has identified several land administrative and management matters that the Department of Lands will need to consider and prioritise when undertaking future management and dealings with the Crown land contained within Mapping Area 3. These matters include:

1. Future reservation and management of the Mapping Area.
2. The appropriateness of the current purpose of several reservations;
3. Unauthorised use of parts of the Mapping Area as outlined in *Table 31*;
4. The management of existing trails;
5. Existing tenures within this Mapping Area;
6. Weed growth as outlined in *Table 10*.
7. The alignment of a public road.

The addressing of these matters will depend on budgetary and operational constraints on the Department of Lands.

8.4 MAPPING AREA 4

Environmental protection, urban development (for part of mapping area only- rural residential / low density - subject to addressing environment, infrastructure & bushfire constraints) and recreation - semi-natural (subject to addressing environmental constraints) / natural have been identified in the land assessment as suitable uses for this mapping area.

8.4.1 Preferred Use

All of Mapping Area 4 falls within the Oxford Falls Valley locality of the Warringah Local Environment Plan 2000. The above three suitable uses, environmental protection, urban development and recreation, are consistent with this locality statement. In addition Lots 1036, 1043, 1044, 1045, 1334 DP 752038, Lot 2 DP 853151 and Lots 2867 and 2869 DP 824056 have been classified as "Public Open Space". The locality statement also includes the objective that "the natural landscape including landforms and vegetation will be protected and, where possible, enhanced…A dense bushland buffer will be retained or established along Forest Way and Wakehurst Parkway." (Warringah Council 2000, p. 181). Those Lots within Mapping Area 4 classified as Public Open Space are located adjacent to Wakehurst Parkway, so this objective would apply to these lots.

Warringah Council has also proposed that numerous blocks of Crown land, including Lots 957, 1044, 1045, 1046, 1047, 1334 DP 752038, Lot 2 DP 853151 and Lots 2867 and 2869 DP 824056 within Mapping Area 4 are reserved for public recreation and environmental protection. The environmental protection and recreation suitable uses identified above would be consistent with this proposal.

The Sydney Coastal Management Strategy (Sydney Coastal Council Inc, 1998) includes the strategic action to "conserve, maintain and enhance local and regional public open space areas, networks and wildlife / vegetation corridors and, where possible, use to conserve natural habitats and environments, while continuing to allow for appropriate public access" (Sydney Coastal Council Inc 1998, p. 45) and the strategic action to "protect wetland and lagoon vegetation" (Sydney Coastal Council Inc 1998, p. 47). The environmental protection and recreation suitable uses identified above would be consistent with the strategy.

The National Parks and Wildlife Service have advised that parts of Mapping Area 4 (Lots 180, 181, 183, 1036, 1043, 1044, 1045, 1046 & 2517 DP 752038) were include in a 1991 proposed addition to Garigal National Park. This addition did not proceed due to objections from the then Department of Lands, due to development potential of the land. As well a small area of Mapping Area 4 is currently being pursued as an addition to Garigal National Park by the National Parks and Wildlife Service. This includes Lots 2857 and 2858 DP 48272, Lots 109, 117 DP 752038 and Lot 7029 DP 1030769. The environmental protection and recreation (natural) suitable uses identified above would be consistent with this proposal.

Parts of Mapping Area 4 (Lots 1047 and 1334 DP 752038) at Cromer have been proposed as a Nature Reserve by the National Parks Association. The environmental protection and recreation (natural) suitable uses identified above would be consistent with this proposal.

Montgomery Watson Harza (2002_2) in their study of the creeks of the Warringah area found that Wheeler and Deep Creeks, found within this Mapping Area, had very high ecological value, that their catchments were mostly unaffected by urban development and that protection of their catchments was critical. They found that Snake and Oxford Creeks (partially within Mapping Area 4 and Mapping Area 4 is partially within the catchment of these Creeks) had high ecological value downstream and were important because they flow into National Parks or reserves and sensitive estuarine waters. The environmental protection and recreation (natural) uses identified above would be consistent with the protection of the Crown land within these Creek's catchments.

Council's classification of Lots 1036 and 1043 to 1047 DP 752038 as public open space, the objectives of this locality and the proposals of Warringah Council, National Parks and Wildlife Service and National Parks Association for most these Lots are not consistent with a preferred use of urban development.

Lot 2 DP 853151 contains the former Oxfords Falls Public School building, listed on the State Heritage Inventory and along with Lot 1 DP 853151 and 2869 DP 824056 within Mapping Area 4 have been developed as a passive recreation area as "Peace Park". This use and classification is not consistent with a preferred use of urban development.

The classification of these Lots, locality objectives, The Sydney Coastal Management Strategy, Warringah Council, National Parks and Wildlife Service and National Parks Association proposals and findings of Montgomery Watson Harza are consistent with the suitable uses of environmental protection and recreation (natural) for most of this area. As such the preferred use for Lots 1036 and 1043 to 1047 DP 752038 is recommended as environmental protection and recreation (natural). The preferred use for Lots 1 and 2 DP 853151 and Lot 2869 DP 824056 is recommended as environmental protection and recreation (semi-natural).

Lot 1334 DP 752038 within Mapping Area 4 contains a former quarry, which has been partially filled and is currently used by Warringah Council to store construction materials. This use is inconsistent with the purpose of the current tenure over the land held by Warringah Council for quarry. The land and its surrounds have a high bushfire hazard. The land was included in both Warringah Council's and the National Parks Association proposals for this area. These factors are consistent with the suitable uses of environmental protection and recreation (semi-natural and natural), but not urban development. As such the preferred use of Lot 1334 DP 752038 within Mapping Area 4 is environmental protection and / or recreation (semi-natural -subject to addressing environmental constraints - and / or natural) subject to Warringah Council fully rehabilitating and restoring the site. These preferred uses are consistent with the locality statement for this area.

Photo 31:The former quarry now used to store construction materials within Lot 1334.

Lots 180, 181, 183 and 2517 DP 752038 all adjoin and are largely cleared of natural vegetation within Mapping Area 4. They are largely currently held under three different tenures for storage shed, occupation and farm and grazing. Subject to addressing environmental, infrastructure and bushfire hazard constraints, there would appear no reason why urban development (rural residential / low density) and recreation (semi natural) as well as environmental protection and recreation (natural) can not be preferred uses for this area. All these uses are consistent with the locality statement and objectives for this area and consistent with adjoining rural residential properties. As such the preferred use of Lots 180, 181, 183 and 2517 DP 752038 within Mapping Area 4 is recommended as environmental protection, urban development (rural residential / low density -subject to

addressing environment, infrastructure & bushfire constraints and the density requirements of Warringah LEP 2000) and / or recreation (semi-natural -subject to addressing environmental constraints- and / or natural).

Lots 2857 and 2858 DP 48272 and Lots 109 and 117 DP 752038 comprise a former quarry now used as an semi-natural recreation area by Warringah Radio Control Society as a flying field for radio controlled aircraft. Lot 7029 DP 1030769 is a reserve for water adjoining these Lots. Lot 109 contains an artificially created freshwater swamp lagoon, which is significant due to its limited occurrence in the Warringah area. The land surrounding the airfield has been used by Manly Warringah Cycle club on an informal basis to stage mountain bike events. The National Parks and Wildlife Service advise all of these lots are part of an addition to Garigal National Park that is currently pending. The current use of those parts of Lots 2857 and 2858 DP 48272, Lots 109, 117 DP 752038 within Mapping Area 4 by Warringah Radio Control Society would be consistent with the suitable use of semi-natural recreation, so long as environmental constraints on this area can addressed and strictly managed. The uncontrolled use of and access to this area for large mountain bike events is not conducive to addressing environmental constraints on this land. Land degradation has occurred by the uncontrolled creation of tracks and their subsequent erosion from overuse and lack of proper construction or maintenance. In addition this area is surrounded by land of environmental significance. The addition of the land to Garigal National Park would be consistent with the suitable uses of environmental protection and natural recreation identified in this assessment. Given the lack of infrastructure, isolation from existing urban areas, unformed access to this area along a fire trail and high fire hazard for this land, this is not consistent with the suitable use of urban development. As such the preferred use for Lots 2857 and 2858 DP 48272 and Lots 109 and 117 DP 752038 is recommended as environmental protection with recreation (natural). Recreation (semi-natural) is only an additional preferred use if the land is not required as an addition to the existing national park and environmental constraints on this land can be addressed and strictly managed. Given the purpose of the reservation of Lot 7029 and disturbance to natural vegetation in this area being limited to an informal and unauthorised land use, the preferred use for Lot 7029 is recommended as environmental protection and recreation (natural).

The only part of Lot 957 DP 752038 within Mapping Area 4 is a small corner, partially cleared of natural vegetation due to an unauthorised encroachment from the adjoining overseas communication facility. The land would not appear necessary for the facilities use. There is no formed access to this area. The land is surrounded by land with a high bushfire hazard. The whole of Lot 957 was proposed to be reserved for environmental protection by Warringah Council and this assessment found a preferred use of environmental protection and recreation (natural) for the remainder of Lot 957 with Mapping Area 3. As such the preferred use of Lot 957 DP 752038 within Mapping Area 4 is recommended as environmental protection and recreation (natural).

Similarly Lot 95 DP 869624 within Mapping Area 4 is a small area, partially cleared of natural vegetation due to an unauthorised encroachment from the adjoining freehold land. There is no formal access to this area. Again the land is surrounded by land with a high bushfire hazard. This assessment found a preferred use of environmental protection and recreation (natural) for the remainder of Lot 95 within Mapping 3. As such the preferred use of Lot 95 DP 869624 within Mapping Area 4 is environmental protection and recreation (natural).

Within Lot 2640 DP 752038 improvements include numerous structures including a house and a shed converted to accommodation. The surrounding Crown land has a high fire danger, which would normally constrain the area from having a preferred use for urban development. However a residence is already in existence within Lot 2640. Some native vegetation has been removed. As such all of the suitable uses could be applied to this area. Therefore the preferred use of Lot 2640 within Mapping Area 4 is recommended as environmental protection, urban development (rural residential / low density - subject to addressing environment, infrastructure & bushfire constraints) and / or recreation (semi- natural - subject to addressing environmental constraints - and / or natural).

Lot 2639 DP 752038 within Mapping Area 4 is currently reserved for public recreation and urban services. The Lot has a substantial encroachment from the adjoining Crown land held under tenure. All native vegetation has been removed and improvements on the land include two dams, fenced paddocks and an access road providing access to Lot 2640. Given the current condition of this land any of the suitable uses could be applied subject to addressing the constraints of urban development (rural residential, low impact) and recreation (semi-natural). The future use of this land may be required as part of the future use of the adjoining Lot 2640. As such the preferred is recommended to be the same as Lot 2640.

Photo 32: Improvements with Lot 2640, held under tenure and extending onto the adjoining Crown. Bushland in the background is within Mapping Areas 1 and 3.

It should be noted that part Lots 109 and 957 DP 752038, part Lot 95 DP 869624 and part Lot 2858 DP 48272 are currently under Aboriginal Land Claim. Only limited actions can proceed with regard to these lots until the land claim is determined.

Given the issues discussed above the preferred uses for Mapping Area 4 should be as outlined above for each lot.

8.4.2 Land Administrative and Management Matters

This assessment has identified several land administrative and management matters that the Department of Lands will need to consider and prioritise when undertaking future management and dealings with the Crown land contained within Mapping Area 4. These matters include:

1. Future reservation and management of the Mapping Area;
2. The appropriateness of the current purpose of several reservations;
3. Unauthorised use of parts of the Mapping Area as outlined in *Table 32*;
4. Existing tenures within this Mapping Area;
5. Weed growth as outline in *Table 11*.

The addressing of these matters will depend on budgetary and operational constraints on the Department of Lands.

8.5 MAPPING AREA 5

Environmental protection (low suitability), urban development (for part of mapping area only) - rural residential / low density (subject to addressing environment, infrastructure & bushfire constraints) and / or recreation - semi-

natural (low suitability - subject to addressing environmental constraints) have been identified in the land assessment as suitable uses for this mapping area.

8.5.1 Preferred Use

Mapping Area 5 falls within the Oxford Falls Valley locality or the Narrabeen Lake Suburbs locality of the Warringah Local Environment Plan 2000. The three suitable uses identified above are all consistent with these locality statements.

Warringah Council has proposed that numerous blocks of Crown land, including Lots 1927, 2406 and 2407 DP 752038 within Mapping Area 5 are reserved for public recreation and environmental protection.

Lots 12 and 13 DP 240763 are suburban size blocks of land, largely cleared of native vegetation. They are adjoined either side by existing urban residences (town houses and detached housing). To the rear is Crown land. The adjoining Crown land has a high fire danger. However bushfire hazard reduction measures would already need to be in place for these lots due to surrounding existing residences. Any development of this area could be considered to be infill development. As such urban development consistent with the locality statement for this area (ie. low-density development) could be considered, subject to addressing the constraints of this land. As such the preferred use for Lots 12 and 13 DP 240763 is recommended as environmental protection and / or urban development (rural residential / low density - subject to addressing environment, infrastructure & bushfire constraints) or recreation (semi-natural - low suitability -subject to addressing environmental constraints).

Part Lots 1927, 2406 and 2407 DP 752038 are located at the rear of existing residences, on moderately steep land. The land and the surrounding Crown land have a high bushfire hazard. As such urban development would not be a preferred use. The preferred use for part Lots 1927, 2406 and 2407 DP 752038 is recommended as environmental protection and / or recreation (semi-natural - subject to addressing environmental constraints).

Lot 1062 DP 752038 has been used for rural residential use under a Licence from the Department for the purpose of residence, buildings and environmental protection. The lot contains a house, several sheds and an animal enclosure. The land contains an area of natural bushland, but largely has been cleared of native vegetation for past agricultural and animal keeping use. The surrounding Crown land has a high fire danger, which would normally constrain the area from having a preferred use for urban development. However a residence is already in existence. As such all three suitable uses could equally be applied to this land. Therefore the preferred use of Lot 1062 DP 752038 is recommended as environmental protection, urban development - rural residential / low density (subject to addressing environment, infrastructure & bushfire constraints) and / or recreation -semi-natural (subject to addressing environmental constraints).

Given the issues discussed above the preferred uses for Mapping Area 5 is recommended as outlined above for each lot.

8.5.2 Land Administrative and Management Matters

This assessment has identified several land administrative and management matters that the Department of Lands will need to consider and prioritise when undertaking future management and dealings with the Crown land contained within Mapping Area 4. These matters include:

1. Future reservation and management of the Mapping Area;
2. Unauthorised use of parts of the Mapping Area as outlined in *Table 33*;
3. Existing tenure within this Mapping Area;
4. Weed growth as outlined in *Table 12*.

The addressing of these matters will depend on budgetary and operational constraints on the Department of Lands.

8.6 MAPPING AREA 6

Environmental protection and recreation -semi-natural (subject to environmental constraints) and / or natural have been identified in the land assessment as suitable uses for this mapping area.

8.6.1 Preferred Use

Mapping Area 6 falls within the Oxford Falls Valley locality or the Narrabeen Lake locality of the Warringah Local Environment Plan 2000. The above suitable uses are consistent with these locality statements.

In addition part Lots 95, 97, 101, 102, 195, 904, 1016, 1017, 1027, 1028 DP 752038, Lots 198, 1021, 1132, 1498 DP 752038, 7061 and 7062 DP 93798, unsurveyed Crown land (adjoining Wakehurst Parkway and adjoining Cromer Golf Course) have been classified as "Public Open Space". Lots 888, 889 and 890 DP 752038 have been classified as "Regional Open Space Reservation". The two suitable uses identified above are consistent with these classifications.

Photo 33: Crown land adjoining Wakehurst Parkway within Mapping Area 6 classified as Public Open Space.

The Sydney Coastal Management Strategy (Sydney Coastal Council Inc, 1998) includes the strategic action to "conserve, maintain and enhance local and regional public open space areas, networks and wildlife / vegetation corridors and, where possible, use to conserve natural habitats and environments, while continuing to allow for appropriate public access" (Sydney Coastal Council Inc 1998, p. 45) and the strategic action to "protect wetland and lagoon vegetation" (Sydney Coastal Council Inc 1998, p. 47). The two suitable uses identified above are consistent with this strategy.

The National Parks and Wildlife Service have advised that most of Mapping Area 6 was include in a 1991 proposed addition to Garigal National Park. This addition did not proceed due to objections from the then Department of Lands, due to development potential of the land. This land assessment has not identified urban development as a suitable use for Mapping Area 6. The suitable uses identified in this assessment would be consistent with this proposal.

Warringah Council has proposed that parts of Mapping Area 6 are reserved for public recreation and environmental protection. The two suitable uses identified above would be consistent with this proposal.

Montgomery Watson Harza (2002_2) in their study of the creeks of the Warringah area found that Wheeler Creek, found within this Mapping Area, had very high ecological value, that its catchment was mostly unaffected by urban development and that protection of its catchments was critical. They found that Snake and Oxford Creeks, found within this Mapping Area, had high ecological value downstream and were important because they flow into National Parks or reserves and sensitive estuarine waters. The two suitable uses identified above would be consistent with the protection of the Crown land within these Creek's catchments.

Smith and Smith (2002) have found that parts of Mapping Area 6 have been classified as Water Fern Swamp, Bangalay Alluvial Forest and Palm Woodland. Smith and Smith (2002) note that Water Fern Swamp, Bangalay Alluvial Forest, and Palm Woodland as being forms "of the Sydney Coastal Estuary Swamp Forest Complex, which is listed as an endangered ecological community" (Smith and Smith 2002, p. 24) under the Threatened Species Conservation Act, 1995. Smith and Smith (2002) note that Palm Woodland is rare in the Sydney Region and is not found within the surrounding National Parks. The suitable uses of environmental protection and recreation – natural found in this land assessment for this mapping area are consistent with protecting these endangered ecological communities, but would largely be inconsistent with semi-natural recreation. Therefore generally recreation (semi-natural) should not be a preferred use for Mapping Area 6.

It is recommended that in addition to environmental protection and recreation (natural) as preferred uses for Mapping Area 6, recreation (semi-natural) should also be a preferred use, but be restricted to only those parts of the Mapping Area where:

a) Semi-natural recreation currently occurs (Lot 7061 and the Unsurveyed Crown adjoining Cromer Golf Course) or where,

b) Subject to addressing environmental constraints, there is an essential need for semi-recreation facilities at that location, eg, walking track, picnic ground, formal lookout.

It should be noted that part of Lots 195 and 1015 DP 752038 are currently under Aboriginal Land Claim. Only limited actions can proceed with regard to these lots until the land claim is determined.

Given the issues discussed above the preferred uses for Mapping Area 6 is recommended as environmental protection, recreation - natural and recreational-semi-natural (only in the circumstances outlined above).

8.6.2 Land Administrative and Management Matters

This assessment has identified several land administrative and management matters that the Department of Lands will need to consider and prioritise when undertaking future management and dealings with the Crown land contained within Mapping Area 6. These matters include:

1. Future reservation and management of the Mapping Area;
2. The purposes of existing reservations;
3. Unauthorised use of parts of the Mapping Area as outlined in *Table 34*;
4. Weed growth as outlined in *Table 13*;
5. The alignment of a public road.

The addressing of these matters will depend on budgetary and operational constraints on the Department of Lands.

CHAPTER NINE

PREFERRED LAND USE RECOMMENDATIONS

The following recommendations are made for the six mapping areas the subject of this assessment:

9.1 MAPPING AREA 1

1. In line with the determined land capability, significance and suitability ratings set out in *Tables 35* and *41* and all issues discussed in *Section 8.1.1* above, it is recommended that Mapping Area 1 be identified as having a preferred use of environmental protection and recreation (natural).
2. Land administrative and management matters identified in this assessment for Mapping Area 1 are considered and prioritised when undertaking future management and dealings with this Crown land subject to budgetary and operational constraints on the Department of Lands.

9.2 MAPPING AREA 2

1. In line with the determined land capability, significance and suitability ratings set out in *Tables 36* and *42* and all issues discussed in *Section 8.2.1* above, it is recommended that Mapping Area 2 be identified as having a preferred use of:
   a) Urban development (community purposes) (if required) or urban development (low impact) consistent with the LEP locality or semi-natural recreation for that part of Lot 971 currently reserve for community purposes;
   b) Urban development (community purposes) for that part of Lot 971 currently reserve for ambulance station;
   c) Urban development - rural residential / low density (subject to addressing environment, infrastructure constraints) for Lot 2650;
   d) Urban development (community purposes) for Lot 1;
   e) Environmental protection or recreation – semi-natural (subject to addressing environmental constraints) for Lot 146;
   f) Environmental protection and / or recreation (natural or semi-natural) for Lots 1008 and 1009;
   g) Environmental protection for Lot 7034.
2. Land administrative and management matters identified in this assessment for Mapping Area 2 are considered and prioritised when undertaking future management and dealings with this Crown land subject to budgetary and operational constraints on the Department of Lands.

9.3 MAPPING AREA 3

1. In line with the determined land capability, significance and suitability ratings set out in *Tables 37* and *43* and all issues discussed in *Section 8.3.1* above, it is recommended that Mapping Area 3 be identified as having a preferred use of environmental protection and recreation (natural).
2. Land administrative and management matters identified in this assessment for Mapping Area 1 are considered and prioritised when undertaking future management and dealings with this Crown land subject to budgetary and operational constraints on the Department of Lands.

9.4 MAPPING AREA 4

1. In line with the determined land capability, significance and suitability ratings set out in *Tables 38* and *44* and all issues discussed in *Section 8.4.1* above, it is recommended that this mapping area be identified as having a preferred use of:
   a) Environmental protection and recreation (natural) for part Lots 957, 1036, 1043, 1044, 1045, 1046 and 1047 DP 752038, part Lot 95 DP 869624 and part Lot 7029 DP 1030769;
   b) Environmental protection and recreation (semi-natural) for parts Lot 1 and Lot 2 DP 853151 and part Lot 2869 DP 824056;
   c) Environmental protection and / or recreation (semi-natural - subject to addressing environmental constraints - and / or natural) for part Lot 1334 DP 752038;
   d) Environmental protection, urban development (rural residential / low density - subject to addressing environment, infrastructure & bushfire constraints and the density requirements of Warringah LEP 2000) and / or recreation (semi-natural - subject to addressing environmental constraints - and / or natural) for part Lots 180, 181, 2517, 2639 and 2640 and Lot 183 DP 752038;
   e) Environmental protection with recreation (natural) or recreation (semi-natural - only if the land is not required as a national park and environmental constraints on this land can be addressed and strictly managed).
2. Land administrative and management matters identified in this assessment for Mapping Area 1 are considered and prioritised when undertaking future management and dealings with this Crown land subject to budgetary and operational constraints on the Department of Lands.

9.5 MAPPING AREA 5

1. In line with the determined land capability, significance and suitability ratings set out in *Tables 39* and *45* and all issues discussed in *Section 8.5.1* above, it is recommended that Mapping Area 5 be identified as having a preferred use of:
   a) Environmental protection, urban development - rural residential / low density (subject to addressing environment, infrastructure & bushfire constraints) and / or recreation - semi-natural (subject to addressing environmental constraints) for Lots 12 and 13 DP 240763 and Lot 1062 DP 752038;
   b) Environmental protection and / or recreation - semi-natural (subject to addressing environmental constraints) for part Lots 1927, 2406 and 2407 DP 752038.
2. Land administrative and management matters identified in this assessment for Mapping Area 1 are considered and prioritised when undertaking future management and dealings with this Crown land subject to budgetary and operational constraints on the Department of Lands.

9.6 MAPPING AREA 6

1. In line with the determined land capability, significance and suitability ratings set out in *Tables 30* and *31* and all issues discussed in *Section 9.6* above, it is recommended that Mapping Area 6 be identified as having a preferred use of:
   a) Environmental protection and recreation - natural for the whole of the mapping area;
   b) Recreation - semi-natural only those parts of the Mapping Area where:
      i) Semi-natural / recreation currently occurs (Lot 7061 and the Unsurveyed Crown adjoining Cromer Golf Course) or where;

ii) Subject to addressing environmental constraints, there is an essential need for semi-recreation facilities at that location;

2. Land administrative and management matters identified in this assessment for Mapping Area 1 are considered and prioritised when undertaking future management and dealings with this Crown land subject to budgetary and operational constraints on the Department of Lands.

CHAPTER TEN

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APPENDIX A

LAND ASSESSMENT POLICY FRAMEWORK

(A) REQUIREMENTS OF THE CROWN LANDS ACT, 1989 FOR LAND ALLOCATION

The Crown Lands Act, 1989 stipulates that all suitable and preferred uses shall have regard to:

1. The inventory of the attributes of the land;
2. The capability of the land;
3. The principles of Crown land management and any other policies which have been approved by the Minister;
4. The views of other government authorities.

(B) PRINCIPLES OF CROWN LAND MANAGEMENT

The principles of Crown land management listed within the Crown lands Act 1989, Clause 11 are as follows:

1. That environmental protection principles be observed in relation to the management and administration of Crown land;
2. That the natural resources of Crown land (including water, soil, flora, fauna and scenic quality) be conserved wherever possible;
3. That public use and enjoyment of appropriate Crown land be encouraged;
4. That, where appropriate; multiple use of Crown land be encouraged;
5. 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;
6. 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.

For the purposes of Crown Land Assessment, environmental protection principles include:

1. Land use and management should not lead to significant, degradation of the soil resources, or loss of local biodiversity.
2. Land should be used and managed so that it does not cause significant off-site environmental impact.
3. Environmentally sensitive and significant lands should be used and managed so that the sensitive lands are not degraded and the environmentally significant features are protected.
4. Land considered to be of high agricultural quality should be managed so that agricultural production is maintained.

APPENDIX B

FAUNA

Table 47: Fauna previously recorded in the vicinity of the study area.

(Information derived from the Atlas of New South Wales Wildlife (NPWS, 2000))

Class	Scientific Name	Common Name	Scientific Name	Common Name
Amphibians	*Crinia signifera*	Common Eastern Froglet	*Litoria freycineti*	Freycinet's Frog
	Limnodynastes peronii	Brown-striped Frog	*Litoria phyllochroa*	Leaf Green Tree Frog
	Litoria dentata	Bleating Tree Frog		
Mammals	*Antechinus stuartii*	Brown Antechinus	*Pseudocheirus peregrinus*	Common Ringtail Possum
	Antechinus swainsonii	Dusky Antechinus	*Pteropus poliocephalus*	Grey-headed Flying-fox
	Chalinolobus gouldii	Gould's Wattled Bat	*Rattus fuscipes*	Bush Rat
	Chalinolobus morio	Chocolate Wattled Bat	*Rattus lutreolus*	Swamp Rat
	Macropus giganteus	Eastern Grey Kangaroo	*Tachyglossus aculeatus*	Short-beaked Echidna
	Mormopterus loriae	Little Freetail Bat	*Trichosurus vulpecula*	Common Brushtail Possum
	Perameles nasuta	Long-nosed Bandicoot	*Vespadelus vulturnus*	Little Forest Eptesicus
	Petaurus breviceps	Sugar Glider	*Wallabia bicolor*	Swamp Wallaby
Birds	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill	*Glossopsitta pusilla*	Little Lorikeet
	Acanthiza lineata	Striated Thornbill	*Ixobrychus minutus*	Little Bittern
	Acanthiza pusilla	Brown Thornbill	*Megalurus timoriensis*	Tawny Grassbird
	Acanthorhynchus tenuirostris	Eastern Spinebill	*Meliphaga lewinii*	Lewin's Honeyeater
	Acrocephalus stentoreus	Clamorous Reed-Warbler	*Melithreptus brevirostris*	Brown-headed Honeyeater
	Anthochaera carunculata	Red Wattlebird	*Menura novaehollandiae*	Superb Lyrebird
	Anthochaera chrysoptera	Little Wattlebird	*Monarcha melanopsis*	Black-faced Monarch
	Artamus cyanopterus	Dusky Woodswallow	*Myiagra cyanoleuca*	Satin Flycatcher

	Artamus superciliosus	White-browed Woodswallow	*Myiagra rubecula*	Leaden Flycatcher
	Cinclorhamphus mathewsi	Rufous Songlark	*Neochmia temporalis*	Red-browed Finch
	Colluricincla harmonica	Grey Shrike-thrush	*Origma solitaria*	Rockwarbler
	Coracina novaehollandiae	Black-faced Cuckoo-shrike	*Pachycephala pectoralis*	Golden Whistler
	Corvus coronoides	Australian Raven	*Pachycephala rufiventris*	Rufous Whistler
	Cracticus torquatus	Grey Butcherbird	*Pardalotus punctatus*	Spotted Pardalote
	Dicrurus bracteatus	Spangled Drongo	*Petroica multicolor*	Scarlet Robin
	Eopsaltria australis	Eastern Yellow Robin	*Petroica rosea*	Rose Robin
	Gerygone olivacea	White-throated Gerygone	*Phylidonyris melanops*	Tawny-crowned Honeyeater
	Gymnorhina tibicen	Australian Magpie	*Phylidonyris nigra*	White-cheeked Honeyeater
	Hirundo neoxena	Welcome Swallow	*Phylidonyris novaehollandiae*	New Holland Honeyeater
	Hylacola pyrrhopygia	Chestnut-rumped Heathwren	*Psophodes olivaceus*	Eastern Whipbird
	Lalage leucomela	Varied Triller	*Rhipidura fuliginosa*	Grey Fantail
	Lichenostomus chrysops	Yellow-faced Honeyeater	*Rhipidura rufifrons*	Rufous Fantail
	Lichenostomus fuscus	Fuscous Honeyeater	*Sericornis frontalis*	White-browed Scrubwren
	Malurus cyaneus	Superb Fairy-wren	*Sericornis magnirostris*	Large-billed Scrubwren
	Manorina melanocephala	Noisy Miner	*Strepera graculina*	Pied Currawong
	Accipiter cirrhocephalus	Collared Sparrowhawk	*Zoothera dauma*	Unidentified Ground Thrus
	Accipiter fasciatus	Brown Goshawk	*Zosterops lateralis*	Silvereye
	Alisterus scapularis	Australian King-Parrot	*Lopholaimus antarcticus*	Topknot Pigeon
	Anas rhynchotis	Australasian Shoveler	*Macropygia amboinensis*	Brown Cuckoo-Dove
	Anas superciliosa	Pacific Black Duck	*Milvus migrans*	Black Kite
	Apus pacificus	Fork-tailed Swift	*Ninox novaeseelandiae*	Southern Boobook
	Aquila audax	Wedge-tailed Eagle	*Nycticorax caledonicus*	Nankeen Night Heron
	Aviceda subcristata	Pacific Baza	*Ocyphaps lophotes*	Crested Pigeon
	Butorides striatus	Striated Heron	*Pelecanus conspicillatus*	Australian Pelican

	Cacatua galerita	Sulphur-crested Cockatoo	*Phalacrocorax carbo*	Great Cormorant
	Cacatua roseicapilla	Galah	*Phalacrocorax sulcirostris*	Little Black Cormorant
	Cacatua sanguinea	Little Corella	*Phalacrocorax varius*	Pied Cormorant
	Cacatua tenuirostris	Long-billed Corella	*Phaps elegans*	Brush Bronzewing
	Cacomantis flabelliformis	Fan-tailed Cuckoo	*Platycercus elegans*	Crimson Rosella
	Callocephalon fimbriatum	Gang-gang Cockatoo	*Platycercus eximius*	Eastern Rosella
	Calyptorhynchus funereus	Yellow-tailed Black-Coc	*Podargus strigoides*	Tawny Frogmouth
	Centropus phasianinus	Pheasant Coucal	*Poliocephalus poliocephalus*	Hoary-headed Grebe
	Columba leucomela	White-headed Pigeon	*Porzana pusilla*	Baillon's Crake
	Coturnix ypsilophora	Brown Quail	*Pterodroma lessonii*	White-headed Petrel
	Cygnus atratus	Black Swan	*Rallus pectoralis*	Lewin's Rail
	Dacelo novaeguineae	Laughing Kookaburra	*Recurvirostra novaehollandiae*	Red-necked Avocet
	Egretta novaehollandiae	White-faced Heron	*Sterna caspia*	Caspian Tern
	Eudynamys scolopacea	Common Koel	*Tadorna tadornoides*	Australian Shelduck
	Eurystomus orientalis	Dollarbird	*Todiramphus sanctus*	Sacred Kingfisher
	Falco cenchroides	Nankeen Kestrel	*Trichoglossus haematodus*	Rainbow Lorikeet
	Falco peregrinus	Peregrine Falcon	*Turnix pyrrhothorax*	Red-chested Button-quail
	Gallirallus philippensis	Buff-banded Rail	*Vanellus miles*	Masked Lapwing
	Glossopsitta concinna	Musk Lorikeet		
Reptiles	*Amphibolurus muricatus*	Jacky Lizard	*Lampropholis guichenoti*	Garden Skink
	Astrotia stokesii		*Morelia spilota*	Carpet or Diamond Python
	Bassiana platynota	Red-throated Skink	*Phyllurus platurus*	Southern Leaf-tailed Gecko
	Cacophis squamulosus	Golden Crowned Snake	*Physignathus lesueurii*	Eastern Water Dragon
	Ctenotus taeniolatus	Copper-tailed Skink	*Pseudechis porphyriacus*	Red-bellied Black Snake
	Demansia psammophis	Yellow-faced Whip Snake	*Pygopus lepidopodus*	Common Scaly-foot
	Dendrelaphis punctulata	Green Tree Snake	*Ramphotyphlops nigrescens*	
	Diplodactylus vittatus	Stone Gecko	*Saiphos equalis*	Three-toed Skink

	Disteira kingii		*Saproscincus mustelinus*	Weasel Skink
	Eulamprus quoyii	Eastern Water Skink	*Tiliqua scincoides*	Eastern Blue-tongued Lizard
	Furina diadema	Red-naped Snake	*Underwoodisaurus milii*	Thick-tailed Gecko
	Hemiaspis signata	Black-bellied Swamp Snake	*Varanus varius*	Lace Monitor
	Lampropholis delicata	Grass Skink	*Vermicella annulata*	Bandy Bandy

APPENDIX C

THREATENED FLORA AND FAUNA

Table 48: Threatened flora and fauna previously recorded in the vicinity of the study.

(Information derived from the Atlas of New South Wales Wildlife (NPWS, 2000))

Category	Scientific Name	Common Name	Scientific Name	Common Name
Vulnerable species of fauna	*Botaurus poiciloptilus*	Australasian Bittern	*Ninox strenua*	Powerful Owl
	Calyptorhynchus lathami	Glossy Black-Cockatoo	*Pandion haliaetus*	Osprey
	Dasyurus maculatus	Tiger Quoll	*Phascolarctos cinereus*	Koala
	Diomedea melanophrys	Black-browed Albatross	*Pseudophryne australis*	Red-crowned Toadlet
	Falsistrellus tasmaniensis	Great Pipistrelle	*Ptilinopus magnificus*	Wompoo Fruit-Dove
	Heleioporus australiacus	Giant Burrowing Frog	*Ptilinopus superbus*	Superb Fruit-Dove
	Ixobrychus flavicollis	Black Bittern	*Scoteanax rueppellii*	Greater Broad-nosed Bat
	Miniopterus schreibersii	Common Bent-wing Bat	*Varanus rosenbergi*	Heath Monitor
Vulnerable species of flora	*Eucalyptus camfieldii*	Hear-leaved Stringybark	*Tetratheca glandulosa*	
	Melaleuca deanei			
Endangered species of fauna	*Esacus neglectus*	Beach Stone-curlew	*Xanthomyza phrygia*	Regent Honeyeater
	Isoodon obesulus	Southern Brown Bandicoot		
Endangered species of flora	*Acacia bynoeana*		*Grevillea caleyi*	
ROTAP flora	*Acacia bynoeana*		*Gonocarpus salsoloides*	
	Angophora crassifolia		*Grevillea caleyi*	
	Boronia fraseri		*Hibbertia nitida*	
	Corybas undulatus	Tailed Helmet Orchid	*Lomandra brevis*	
	Darwinia diminuta		*Lomandra fluviatilis*	
	Darwinia procera		*Melaleuca deanei*	
	Eucalyptus camfieldii	Hear-leaved Stringybark	*Rulingia hermanniifolia*	

	Eucalyptus luehmanniana	Yellow-top Ash	*Tetratheca glandulosa*	
	Genoplesium baueri			

Table 49: Additional threatened fauna and flora that may be found within the study area.

(Information derived from threatened species databases (DLWC, 2003 & NPWS, 2000_2)).

Category	Scientific Name	Common Name	Scientific Name	Common Name
Vulnerable species of fauna	*Aepyprymnus rufescens*	Rufous Bettong	*Melanodryas cucullata*	Hooded Robin (south-eastern form)
	Charadrius leschenaulti	Greater Sand-plover	*Myotis adversus*	Large-footed Mouse-eared Bat
	Haematopus longirostris	Pied Oystercatcher	*Ninox connivens*	Barking Owl
	Hoplocephalus bitorquatus	Pale-headed Snake	*Petaurus australis*	Yellow-bellied Glider
	Limicola falcinellus	Broad-billed Sandpiper	*Petroica rodingaster*	Pink Robin
	Lophoictinia isura	Square-tailed Kit	*Petropus policephalus*	Grey-headed Flying-fox
Vulnerable species of flora	*Crptostylis hunteriana*	Leafless Tongue Orchid	*Leptospermum deanei*	
	Epacris purpurascens var. purpurascens		*Pterostylis nigricans*	
	Kunzea rupestris	Rock Kunzea	*Pimelea curviflora var. curviflora*	
	Lasiopetalum joyceae		*Wilsonia backhousei*	
Endangered species of fauna	*Burhinus grallarius*	Bush Stone-curlew	*Hoplocephalus bungaroides*	Broad-headed Snake
	Ephippiorhynchus asiaticus	Black-necked Stork	*Litoria aurea*	Green and Golden Bell
			Petalura gigantea	Giant Dragonfly
Endangered species of flora	*Haloragodendron lucasii*		*Microtis angusii*	Onion Orchid
	Dendrobium melaleucaphilum	Broad-lipped Tree Orchid	*Persoonia hirsuta*	