

Risk Assessment Form

Directorate/business unit:	Parks and City Services			Manager/supervisor:	Julie Garbode					
Employee representative/s	Joel Kelly			Date:	October 2013					
Job description:	Working out of a boat									
Identified risk(s)	Risk factor(s) What can happen and how it can happen?	Current treatment	RR with current controls in place			Can current treatment be improved Proposed control(s) to reduce risk	RR with new controls in place			Person who will ensure this happens and date to be made effective
			C	L	R		C	L	R	
Pre start visual inspection (at depot) of boat trailer before transportation.	<ul style="list-style-type: none"> Death/serious injury from incompetent use of the plant. Losses arising from failure to control the trailer. These may include impact on the towing vehicle or on other people or property in the environment. Significant business loss from injuries to worker/s and damages claim. 	<ul style="list-style-type: none"> Inspect tow ball mount. Ensure boat trailer is correctly hitched to towing vehicle. Inspect trailer tyres for wear and tear. Ensure trailer is connected to the vehicle. Check lights and indicators are working correctly. 								
Failure to correctly assess adverse environmental conditions.	<ul style="list-style-type: none"> Injury resulting from environmental / inclement conditions such as: bad weather, especially high winds and slippery surfaces; hazardous immediate surrounds. Death/serious injury from incompetent use of the plant. 	<ul style="list-style-type: none"> Workers must conduct a risk assessment of the site. Workers must use all PPE/C for the task. Workers must be familiar with the SOP 'Working out of a boat.' 							Manager / supervisor of relevant area. Worker/s.	
Working alone on-site.	<ul style="list-style-type: none"> Injury to the worker whilst working alone and unable to obtain help. Significant business loss from injuries to worker/s 	<ul style="list-style-type: none"> Operators MUST NOT work alone. Ensure that the site & task required are risk assessed and 							Manager / supervisor of relevant area.	

Risk Assessment Form

	and damages claim.	controlled. If required, documented due to increased safety risks for workers. <ul style="list-style-type: none"> • Make sure all worker/s involved in any operation on the worksite are made aware of and comply with the controls identified. 							
Fall out of the boat	<ul style="list-style-type: none"> • Death/serious injury from incompetent use of the plant. • Significant business loss from injuries to worker/s and damages claim. 	<ul style="list-style-type: none"> • Lifejacket must be worn at all times. • All staff using boat must be able to swim. • Two people to be in the boat at all times. 							
Collision with another vessel	<ul style="list-style-type: none"> • Death/serious injury from incompetent use of the plant. • Significant business loss from injuries to worker/s and damages claim. 	<ul style="list-style-type: none"> • Driver to be licensed or remain under 10 Knots. • Appropriate maritime laws to be followed • Lifejacket must be worn at all times • All staff using boat must be able to swim. • Two people to be in the boat at all times. 							
Leak / boat sinks	<ul style="list-style-type: none"> • Death/serious injury from incompetent use of the plant. • Significant business loss from injuries to worker/s and damages claim. 	<ul style="list-style-type: none"> • Lifejacket must be worn at all times. • All staff using boat must be able to swim. • Two people to be in the boat at all times. 							
Material caught in propeller, injury trying to remove.	<ul style="list-style-type: none"> • Death/Serious Injury from incompetent use of the plant. • Significant business loss from injuries to worker/s and damages claim. 	<ul style="list-style-type: none"> • Use oars to get to shoreline. • Disconnect safety switch before removing material in propeller. • Two people to be in the boat at all times. 							
Person pulled out of boat	<ul style="list-style-type: none"> • Death/serious injury from incompetent use of the 	<ul style="list-style-type: none"> • Attach lines to strong point on boat such as 							

retrieving heavy item	<ul style="list-style-type: none"> plant. Significant business loss from injuries to worker/s and damages claim. 	<ul style="list-style-type: none"> mooring line point. Lifejacket must be worn at all times. All staff using boat must be able to swim. Two people to be in the boat at all times. 							
Capsizing – Waves, windy days	<ul style="list-style-type: none"> Death/serious injury from incompetent use of the plant. Significant business loss from injuries to worker/s and damages claim. 	<ul style="list-style-type: none"> Windy conditions create waves, boat is not to be used on excessively windy or stormy days. Lifejacket must be worn at all times. All staff using boat must be able to swim. Two people to be in the boat at all times. 							
Capsizing – instability due to uneven weight distribution	<ul style="list-style-type: none"> Death/serious injury from incompetent use of the plant. Significant business loss from injuries to worker/s and damages claim. 	<ul style="list-style-type: none"> Lifejacket must be worn at all times. All staff using boat must be able to swim. 2 people to be in the boat at all times. 1 person at the front and 1 driving, always remain seated when travelling. 							
Capsizing – instability due to high speed	<ul style="list-style-type: none"> Death/serious injury from incompetent use of the plant. Significant business loss from injuries to worker/s and damages claim. 	<ul style="list-style-type: none"> Driver to be licensed or remain under 10 Knots. Appropriate maritime laws to be followed. Lifejacket must be worn at all times All staff using boat must be able to swim. Two people to be in the boat at all times. 							
Manual handling injuries	<ul style="list-style-type: none"> Significant business loss from injuries to worker/s and damages claim. 	<ul style="list-style-type: none"> Two people to be in boat at all times. Use boat engine power to edge heavy items close to shoreline then retrieve from shoreline 							

		using machinery if required.							
Fuel leak / Fire /spillage	<ul style="list-style-type: none"> • Death/serious injury from incompetent use of the plant. • Environmental damage. • Significant business loss from injuries to worker/s and damages claim. 	<ul style="list-style-type: none"> • Always check fire extinguisher is present and charged. • Always double check fuel cell before leaving shoreline, be vigilant for any fuel smells while using the boat. 							
Refilling the boat	<ul style="list-style-type: none"> • Fire resulting from the combustion of fuel and flammable materials. • Significant business loss from damage to worker/s, assets and public. 	<ul style="list-style-type: none"> • Only use safety approved fuel containers. • Only refuel the plant when the engine is shut down and in an area free of ignition sources. • Ensure fuel caps are screwed on tightly and that any fuel spillage is cleaned up. • Keep suitable firefighting equipment available (extinguisher, knapsack, spray pump, shovel). • Do not smoke while filling or operating the Plant. 							



MANDATORY FIELDS (section must be completed)



OPTIONAL FIELDS (only if issues are identified, incident / accident or new plant and equipment)

Instructions

1. Complete a new line, in the above table, for each identified hazard and conduct a risk assessment (RA).
2. Use the risk matrix below to risk rate (RR) the level of risk posed by each hazard for the following scenarios, uncontrolled (i.e. the risk the hazard presents without any controls), controlled (i.e. the risk the current controls reduce the risk level to), proposed (i.e. for unacceptable risk, the risk the proposed new control will reduce the risk level to).
3. For each scenario, indicate whether the controlled risk is Acceptable/Not acceptable.

Instructions

To establish a risk rating follow Steps 1-3:

Step 1 - Consider the *consequences* of the risk in terms of people and financial factors and select the rating (1-5).

Step 2 - Assess the *likelihood* of the risk occurring, using the information under 'Probability' and 'Historical', and select the rating (1-5).

Step 3 - Where the consequences and likelihood ratings meet, in the coloured part of the matrix, this will give you the overall risk rating of L, M, H or E.

Risk matrix									
E: Extreme risk — detailed action plan required H: High risk — needs senior management attention M: Medium risk — specify management responsibility L: Low risk — manage by routine procedures <i>Note:</i> High or Extreme risks must be reported to senior management and require detailed treatment plans to reduce the risk to Low or Medium.				Consequences					
				People	Injuries or ailments not requiring medical treatment	Minor injury or first aid treatment case	Serious injury causing hospitalisation or multiple medical treatment cases	Life threatening injury or multiple serious injuries causing hospitalisation	Death or multiple life threatening injuries
				Financial	1% of budget or <\$5K	2.5% of budget or <\$50K	> 5% of budget or <\$500K	> 10% of budget or <\$5M	>25% of budget or >\$5M
				Insignificant	Minor	Moderate	Major	Catastrophic	
					1	2	3	4	5
Likelihood	>1 in 10	Is expected to occur in most circumstances	5	Almost certain	M	H	H	E	E
	1 in 10-100	Will probably occur	4	Likely	M	M	H	H	E
	1 in 100-1,000	Might occur at some time in the future	3	Possible	L	M	M	H	E
	1 in 1,000-10,000	Could occur but doubtful	2	Unlikely	L	M	M	H	E
	1 in 10,000-100,000	May occur but only in exceptional circumstances	1	Rare	L	L	M	H	E

Source: Adapted from AS/NZS ISO 31000:2009 Risk Management, and Australian Capital Territory Insurance Authority (ACTIA) *Risk Management Toolkit*, Canberra, viewed 12 June 2012 < <http://www.treasury.act.gov.au/ACTIA/RM.htm> >.

NB: The Risk Matrix has been modified to reflect that in the context of health and safety any chance, even a rare occurrence, of a death or multiple life threatening injury is considered extreme.

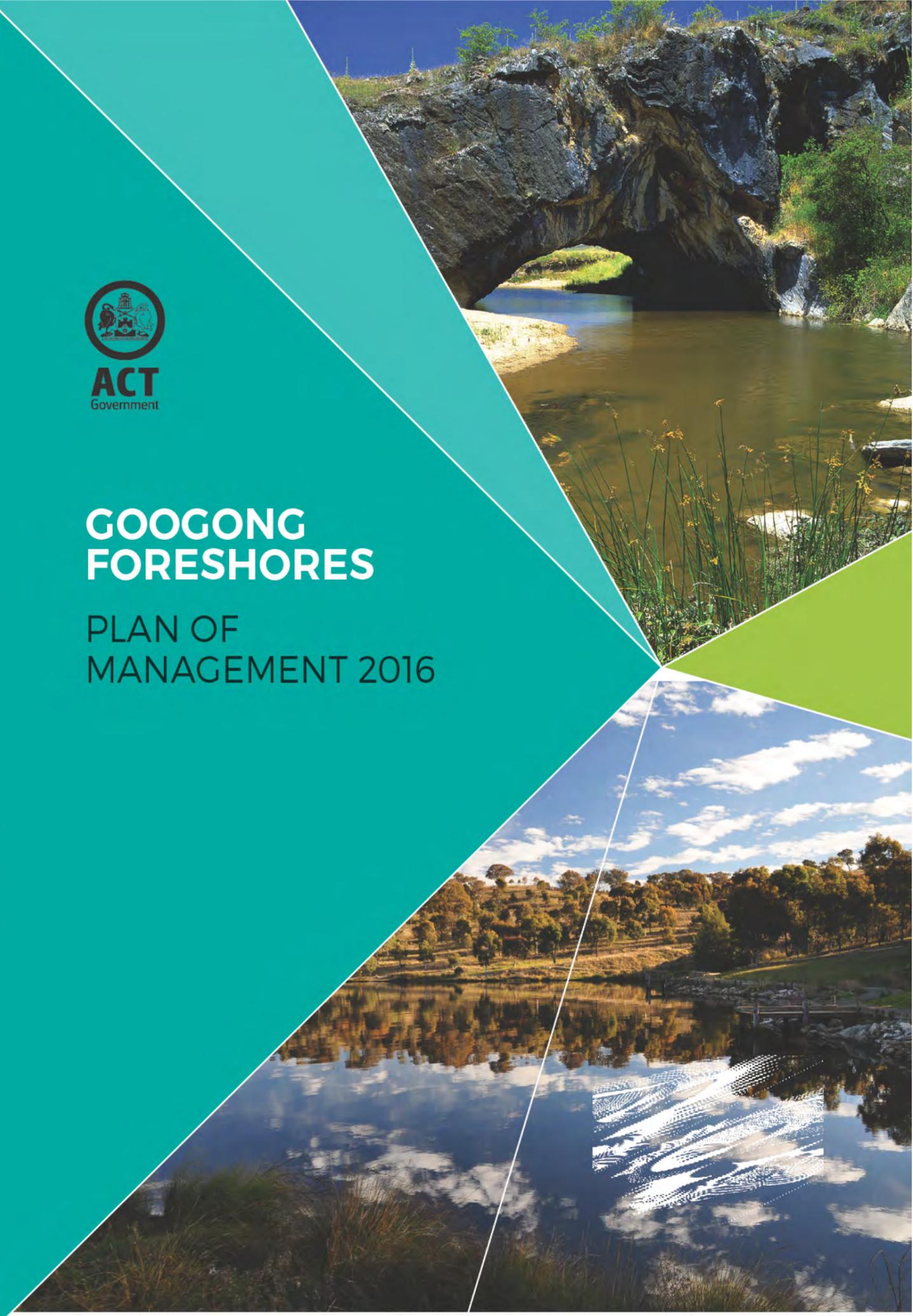


GOOGONG FORESHORES PLAN OF MANAGEMENT 2016



GOOGONG FORESHORES

PLAN OF MANAGEMENT 2016



GOOGONG FORESHORES

PLAN OF MANAGEMENT

2016

VISION

Googong Foreshores is an attractive and biologically diverse area that provides a source for high quality potable water, protects natural and cultural heritage, and is valued for its recreational opportunities.



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MINISTERIAL FOREWORD

Googong Reservoir is located on the picturesque Queanbeyan River, south-east of Canberra city. The area was acquired by the Commonwealth Government more than 40 years ago in order to provide drinking water to Canberra and Queanbeyan. The ACT Government manages the reservoir and the land surrounding it, the Googong Foreshores, on behalf of the Commonwealth with the primary objective of protecting water quality.

Woodland, open forest and grassland growing at Googong Foreshores slows overland water flow, reducing turbidity in the reservoir. The vegetation also contributes to regional biodiversity and provides habitat connectivity as part of a forested corridor extending from north-eastern ACT to the Tinderry Range. Surveys have identified a number of threatened and regionally uncommon plant and animal

species and the remnants of two threatened ecological communities: Natural Temperate Grassland and White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland.

Recreational activities at Googong Foreshores are restricted in order to protect water quality. Fishing is the most popular activity, but many people value Googong for walking, mountain bike riding, picnicking and bird watching. There are limits on these activities along the shoreline near the dam wall and water off-take tower, and body contact activities, such as swimming, are only allowed in the Queanbeyan River below the dam wall.

Prior to the construction of the reservoir, the area was used for pastoral activities from the 1870’s, and archaeological evidence indicates that the Queanbeyan River valley was an occupation site for Aboriginal people, in common with other parts of the Southern Tablelands.

Googong Foreshores has been nominated to the Commonwealth Heritage List for geodiversity, historic and Aboriginal heritage significance. The nomination includes the London Bridge Natural Arch – a beautiful limestone arch over the Burra Creek, the Googong Homestead – a rare example of an early homestead complex that contains progressive additions from about 1870 to 1950, and a diverse range of Aboriginal sites including stone artefact scatters and a scarred tree.

In 2008, the Commonwealth Government leased the Googong Foreshores area to the ACT Government for a period of 150 years. Preparation of a Land and Conservation Management Plan is a condition of the lease which this plan fulfils. In addition, the policies and actions outlined in the plan aim to protect Googong Foreshores from the potential impacts of increasing recreational use, given the growing nearby urban development.

I am confident that the Googong Foreshores Plan of Management will help protect the important natural and cultural heritage values of this lovely area.

Mr Mick Gentleman MLA

Minister for Planning and Land Management

ACKNOWLEDGEMENTS

Many people and organisations have provided advice and assistance in the preparation of this plan of management for Googong Foreshores, including those who contributed to preparation of, and made submissions on, the draft plan. Particular thanks go to staff of the ACT Government, NSW Government agencies, Icon Water Limited Corporation, NSW local government (Queanbeyan and Palerang councils), as well as to community groups, including Aboriginal community representatives.

The following particular contributions are acknowledged:

- Dr Peter Barrer (deceased), Nicki Taws, Alison Rowell, Barry Starr, David Eddy (natural environment, land use history and catchment condition)
- Dr Don Fletcher (ACT Government) (kangaroo management)
- Consultants' reports covering environmental assessment, site contamination, heritage assessment and heritage management, prepared for the Commonwealth Department of Finance and Deregulation.

The final plan was prepared by Dr Kevin Frawley in association with Conservation Planning, in the Environment Division, Environment and Planning Directorate.

PREFACE

This plan of management has been prepared by the ACT Government to guide the management of the Googong Dam Area (commonly referred to as 'Googong Foreshores' or 'the Foreshores'). The plan addresses the management of access to, and activities undertaken at the Foreshores, except those specifically associated with water supply infrastructure.

The construction of Googong Dam commenced in May 1975 and an inauguration ceremony was held on 27 March 1979 to mark the dam's completion. Since that time several operational plans have been prepared for managing the Foreshores, but there has been no comprehensive management plan. Due to the unusual legal status of the Googong Dam Area, there is no *specific* statutory requirement or basis for the preparation of a management plan. However, a management plan provides the most effective means to set out how Googong Foreshores will be managed in relation to the ACT Government's duty of environmental protection prescribed in the *Canberra Water Supply (Googong Dam) Act 1974*.

A number of factors prompted the development of a plan of management, in particular:

- the revised role of Googong Reservoir as a water storage for the ACT urban water supply
- more stringent management of the risks to potable water quality globally
- increased development pressures on land adjoining the Foreshores
- the need for a sound scientifically based approach to wildlife management and policies for the protection of the significant natural and cultural values of the area.

In 2008, as owner of the Googong Dam Area, the Commonwealth Government leased the premises (being the land and improvements) to the ACT Government for a period of 150 years. A condition of the lease is the preparation of a Land and Conservation Management Plan (see Appendix 1). It is intended that this plan of management serve that purpose.

The plan of management is based on a draft plan released for public comment in September 2007. Finalisation of the plan has involved consideration of submissions on the draft and the addition of material related to the lease of the Area by the Commonwealth to the ACT Government. Development of the plan of management involved extensive consultation with users of the Foreshores, interest groups, government agencies and Icon Water Limited (the ACT's water utility).

Management of the water supply (i.e. the conversion of raw water in the reservoir to potable water that is reticulated to Canberra and Queanbeyan) is not covered in this plan, as use of the water stored in the reservoir, the establishment and maintenance of water supply infrastructure and associated land, and the operation of Googong Dam are the responsibility of Icon Water.

The central focus of this plan of management is the management of activities in the Googong Foreshores to ensure that they do not impact adversely on the area's primary purpose of providing high quality raw water for potable water supply.

1 Introduction



1.1 GOOGONG FORESHORES

Googong Foreshores is located in NSW, to the south-east of the ACT and 13 km by road from Queanbeyan. Here, the waters of the Queanbeyan River and its tributaries are impounded by the Googong Dam to form a linear tapering reservoir. The Googong Foreshores area encompasses Googong Dam, a short section of the Queanbeyan River below the dam, the reservoir, land either side of the reservoir, and further south, land either side of the Queanbeyan River and Burra Creek (Figure 1.1). It is the land defined in the *Canberra Water Supply (Googong Dam) Act 1974* (Googong Dam Act) as the Googong Dam Area (the Area). The Commonwealth Government acquired this Area (5089 ha) from NSW in 1973 for the purpose of constructing the dam. Most of the catchment remains under the control of NSW.

The primary purpose of the reservoir is the provision of high quality raw water for the supply of potable water to the Australian Capital Territory and Queanbeyan. Other important values of the area are natural and cultural heritage, recreation, and education and research. Recreation, in particular, must be carefully managed to ensure compatibility with the main water supply purpose.

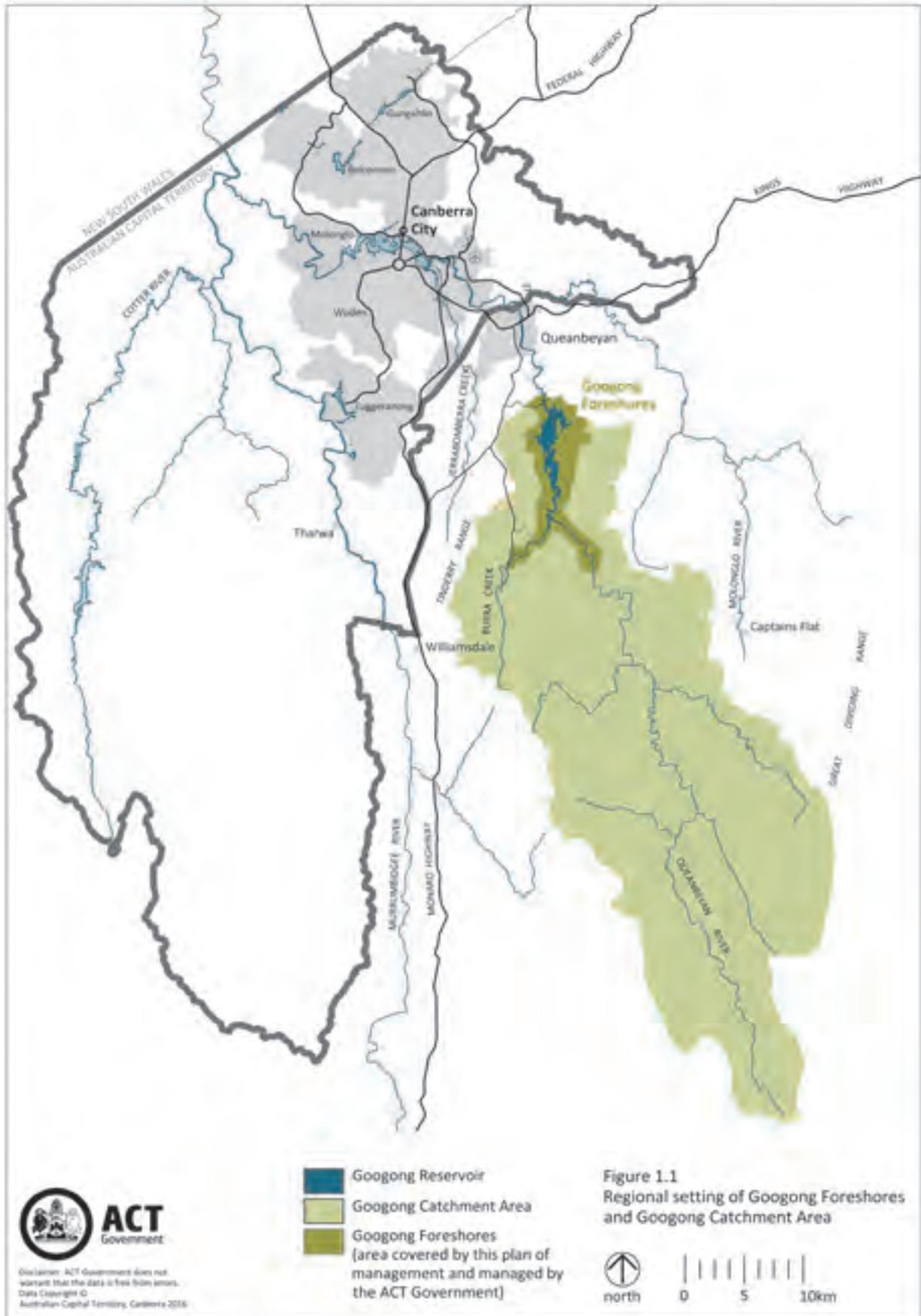
1.2 PURPOSE AND SCOPE OF THE PLAN OF MANAGEMENT

This plan of management has been prepared for the Googong Foreshores, which is managed by ACT Government agencies on behalf of the Australian Capital Territory Executive. The water supply infrastructure at Googong is owned and managed by Icon Water. The ACT Government regulates Icon Water in regard to: (a) taking water from the reservoir; and (b) the provision of environmental flow releases from the dam. Through the Commonwealth's Googong Dam Act, control over water supply and management of the Googong Dam Area (defined in s. 1.4.1) was vested in the Territory Executive, acting on behalf of the Commonwealth, following ACT self-government (*Australian Capital Territory (Self-government) Act 1988*). It should be noted that Googong Foreshores is *not* a reserve declared under legislation, nor is there a current *specific* statutory requirement or basis for the preparation of a management plan. However, a plan of management provides the most effective means to set out how the Foreshores will be managed in relation to the ACT Government's duty of environmental protection prescribed in the Googong Dam Act.

In 2008, ACT control over the Googong Dam Area was formalised in a lease between the Commonwealth and ACT governments (Googong Lease) (see s. 1.4.1). This plan of management fulfils the requirement under the lease for the preparation of a Land and Conservation Management Plan (clause 5.1(a) (ii)). Other plans required by the lease are a Dam Safety Management Plan, Protection of Critical Infrastructure Plan, and a Heritage Management Plan (clause 5.1(a)) (Commonwealth of Australia 2008). The Dam Safety Management Plan and Protection of Critical Infrastructure Plan are not part of this plan of management. A Heritage Management Plan has been prepared by the Commonwealth for Googong Foreshores (ERM Australia 2010) (see Chapter 7).

The central focus of this plan of management is the management of activities in Googong Foreshores to ensure that they do not impact adversely on the area's primary purpose of providing high quality raw water for potable water supply. The plan also aims to provide clear management directions for the area, and guidance for the responsible land management agencies within the ACT Government. The plan of management is also relevant to the activities of Icon Water, NSW Government agencies with responsibilities in the area, local government, and the community in general. Some aspects of management require more detailed prescriptions and operational procedures than can be included in a plan of management. These will be based on those currently in place or will be prepared as required.

Figure 1.1 Regional setting of Googong Foreshores and Googong Catchment area



The scope of this plan is limited to the *management* of the area contained within the Googong Dam Area (see s. 1.4.1). Consistent with the ACT Executive's functions and powers under the Googong Dam Act, it describes how the ACT Government will manage the Area, apart from the dam, treatment plant and pipeline infrastructure for which Icon Water is responsible. The plan is not a management plan for the remainder of the Googong Catchment, which is the responsibility of the NSW Government, including local government.

1.3 SIGNIFICANCE OF GOOGONG FORESHORES

Googong Foreshores is a valuable regional asset and is an example of successful multiple use management of a domestic water supply reservoir and its surrounds. The reservoir is the largest within the ACT domestic water supply system and has taken on an enhanced role in assuring the ACT urban water supply in the wake of the 2003 bushfire. The area is popular for recreation, especially fishing, as well as picnicking, bushwalking, mountain biking, canoeing, and nature-based activities, such as bird watching. The waters of the reservoir are a scenic attraction and backdrop to many recreational activities. The area contains important cultural heritage. There is evidence of Aboriginal occupation of the valley, while the London Bridge Homestead on Burra Creek dates from the 1860s. The biodiversity value (see **Glossary**) of the area has been increasingly recognised. Googong Foreshores forms part of a corridor of relatively intact native vegetation from the Tinderry Range in the south, to Greenwood Hill in the north-eastern ACT, as well as contributing to east-west links. This ecological connectivity is likely to assume increasing importance in the face of climate change. The Foreshores contains a number of threatened species and ecological communities.

1.4 LEGISLATION AND POLICY

The Googong Dam Area is land in NSW, acquired by the Commonwealth Government, and managed by the ACT Government (on behalf of the Commonwealth). In this context the application of particular legislation may be complex. This section outlines the most important legislation and its application. As this plan cannot cover all eventualities, if there is any doubt about the applicability and enforcement of legislation, legal advice should be sought.

Three levels of government are involved with the Googong Foreshores with corresponding application of legislation:

- Commonwealth
- Territory (ACT) and state (NSW)
- NSW local government (the Area is within the Palerang Council and on the western boundary, borders the Queanbeyan City Council).

As the Googong Dam Area is a Commonwealth Place in NSW, relevant Commonwealth and NSW legislation applies. The operation of the *Commonwealth Places (Application of Laws) Act 1970* and section 11 of the *Canberra Water Supply (Googong Dam) Act 1974* determine which NSW law applies to the Area. Commonwealth legislation takes precedence over all other legislation (for practical purposes mostly NSW state and local government legislation) unless the other legislation is capable of operating concurrently with Commonwealth legislation. To the extent that any other legislation that appears to apply to the Googong Dam Area is not capable of operating concurrently with Commonwealth legislation, that other legislation has no operation. ACT legislation has only minimal operation in the Googong Dam Area (see s. 1.4.4).

1.4.1 OWNERSHIP AND CONTROL

The Googong Dam Area is owned by the Commonwealth. The land was compulsorily acquired from NSW under the *Lands Acquisition Act 1989* (Cwlth). As land acquired by the Commonwealth, it remains part of NSW (unlike a 'territory' such as Jervis Bay, the ACT or the Northern Territory, which is not part of any state). NSW laws apply where they are capable of

operating concurrently with the Googong Dam Act (section 27, Googong Dam Act) and other Commonwealth law (section 109 Constitution). However, Commonwealth laws have superiority over inconsistent state laws.

NSW laws that operate in the Googong Dam Area cannot restrict or impede the ACT in carrying out its functions under the Googong Dam Act because, in attempting to do so, they would be inconsistent with that Act. The ACT Government has no general power to legislate in respect of the Googong Dam Area, and is only able to legislate in relation to the manner in which the ACT Executive exercises its powers and performs its functions and duties (section 6A, Googong Dam Act). Although the *Water Resources Act 2007* (ACT) does not operate as a law regulating the control of water in the Googong Dam Area, the Territory carries out some of its responsibilities under the Googong Dam Act in accordance with that Act, in particular, the regulation of Icon Water in taking the water and specification of environmental flow guidelines (see s. 1.4.6).

The Googong Lease (2008), between the Commonwealth of Australia and the Australian Capital Territory, is for a period of 150 years (Commonwealth of Australia 2008). The lease covers the land (including reservoir waters) and improvements (all water supply infrastructure i.e. the dam wall, spillway, water treatment plant, pipelines, and all other property including fences, plant, equipment, fixtures). The ACT Government sub-leases the water supply infrastructure to Icon Water. The Googong Lease specifically provides for the grant of such a sub-lease to Icon without prior consent of the Commonwealth. Any other sub-lease in the Area requires the prior written consent of the Commonwealth. No other sub-leases currently exist at Googong Foreshores, nor are any proposed in this plan of management.

The Googong Lease prescribes permitted use of the Googong Dam Area (Appendix 2). It also provides for the continuation of the *Queanbeyan Water Supply Agreement 2008*, which is an agreement between the Commonwealth, ACT and NSW for the supply of water to the Queanbeyan City Local Government Area.

The Googong Lease requires the ACT Government to report to the Commonwealth on:

- (i) material breaches of any legislation applying at Googong Foreshores (section. 4.8 of the lease); and
- (ii) breaches of any of the required plans under the lease (see s. 9.5 of this plan of management).

1.4.2 COMMONWEALTH LEGISLATION

Commonwealth legislation of particular relevance to the Googong Dam Area relates to the establishment of the ACT and the securing of its water supply; planning for the national capital; environmental protection, biodiversity and heritage conservation; and water management.

Seat of Government Acceptance Act 1909

The origins of the Googong Dam derive from the *Seat of Government Acceptance Act 1909*, which gives the Commonwealth paramount rights to the waters of the Queanbeyan and Molonglo rivers for all the purposes of the Australian Capital Territory. Under the Act, NSW is obligated to not pollute and to protect from pollution the waters of the Queanbeyan River for its whole course above the Territory. While the waters of these rivers have long been used for a variety of ACT purposes, the Googong Dam Act specifically addresses the use of the waters collected in the Googong Dam Area for urban water supply (see below).

Canberra Water Supply (Googong Dam) Act 1974

The Googong Dam Act is the main source of functions and powers for the Territory. The powers and functions are exercisable by the ACT Executive. However, the Act only gives some limited functions to the Executive. The Executive is to perform its functions on behalf of the Commonwealth. The powers and functions detailed below are the legislative basis upon which the Territory manages the Googong Foreshores.

The functions given by the Act are to carry out the planning and provision of a dam, pipelines and other works and facilities for:

- (a) the collection, diversion and storage of water in the Googong Dam Area;
- (b) the conveyance and supply of water from that Area for use in the Territory or in a place that is the subject of an agreement under the Act for the conveyance and supply of water;
- (c) the treatment and purification of water supplied or to be supplied from that Area; and
- (d) the prevention of the pollution of water supplied or to be supplied from that Area.

The Act also provides for works and facilities for the accommodation in the Googong Dam Area of persons employed by the Territory or by a Territory authority in connexion with the protection or regulation of that Area or with the operation and maintenance of any such dam, pipelines, works or facilities in that Area (section 4, Googong Dam Act).

Section 5 of the Googong Dam Act sets out the powers of the ACT Executive in performing its functions under section 4 of the Act. The Executive has power to do, in the Territory or elsewhere, all things necessary or convenient to be done for or in connexion with, or as incidental to, the performance of its functions under the Act. Section 5 also sets out some specific powers such as to construct works that are in the opinion of the Executive, necessary or desirable for the purpose of preventing or mitigating injurious effects of other works constructed in accordance with the Act. Other specific powers include power to enter into agreements with other persons for work to be performed in the Googong Dam Area.

The Googong Dam Act 1974 was amended in 2013 to provide the Executive, on behalf of the Commonwealth, with the functions of managing, protecting and using the water resources of the Googong Dam Area in a way that is consistent with the objects of the *Water Resources Act 2007 (ACT)*.

The Googong Dam Act (section 6) sets out the duty of the ACT Executive. That duty is to ensure that the effect on the environment of anything done or proposed to be done in the performance of its functions or the exercise of its powers under that Act is fully considered and that all reasonably practicable measures are taken for the protection of the environment.

Section 6A of the Googong Dam Act requires the ACT Executive to exercise its powers and perform its functions and duties in accordance with any conditions determined in writing by the Commonwealth Minister after consultation with the Executive and any law made by the ACT Legislative Assembly. At the time of writing this plan of management, the Commonwealth Minister had not determined any conditions and the Assembly had not passed any laws under this provision. Consideration will need to be given from time to time as to whether the Minister has determined any conditions, or the Assembly has passed any law, and action taken to ensure compliance with the condition or law.

The Googong Dam Act (section 17) also provides for the Executive to have a power to declare, by notice in the ACT Gazette, a specified area, including an area of water, to be an area to which access by the public is permitted.

In accordance with section 12 of the Act, the Commonwealth Minister has approved the supply of water from Googong Reservoir to the ACT/NSW cross border region. Relevant agreements between the Commonwealth, Australian Capital Territory and NSW are:

- ACT-NSW Regional Collaboration Memorandum of Understanding 2011
- the Queanbeyan Water Supply Agreement (2008).

Australian Capital Territory (Planning and Land Management) Act 1988

The *Australian Capital Territory (Planning and Land Management) Act 1988* established the National Capital Planning Authority (later the National Capital Authority), one of whose functions is to prepare and administer a National Capital Plan. Appendix J of the National Capital Plan contains technical and management guidelines for Lake Burley Griffin that include

operating criteria for Scrivener and Googong dams. In particular, the guideline for operating Googong Dam specifies flow releases to maintain the water level in the lake, except during periods of water restrictions in Canberra.

The Act was amended in 2013 to give responsibility to the ACT to manage national water resources within the ACT, with Lake Burley Griffin being the main body of water to be managed by the ACT. The ACT has passed complementary legislation, recognising this responsibility, which includes licensing of Commonwealth water resources within the Territory.

Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the primary Commonwealth environmental legislation. The Act provides the legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, which are defined in the Act as 'matters of national environmental significance'. The Act also prescribes more general environmental responsibilities in relation to actions undertaken in a Commonwealth Area (section 525, EPBC Act) or by Commonwealth agencies that are likely to have a significant impact on the environment (defined in section 528, EPBC Act). The Act provides for the establishment of a list of National Heritage Places (a matter of national environmental significance) and the Commonwealth Heritage List. The latter contains places in a Commonwealth Area that are assessed as being significant at a local, regional, state, national, or world level for one or more of an established set of criteria (for more detail, see Australian Heritage Council 2010). The threshold for inclusion on the Commonwealth Heritage List is local significance.

The main provisions of the EPBC Act applying to Googong Foreshores concern:

- (a) nationally threatened species and ecological communities, and listed migratory species (matters of national environmental significance);
- (b) actions undertaken in a Commonwealth Area and by Commonwealth agencies; and
- (c) establishment of the Commonwealth Heritage List.

For each of the above, referral to the Australian Government Environment Minister is required if proposed actions are likely to cause a significant impact on the environment. The Minister makes a decision within 20 business days whether approval is required under the EPBC Act (Australian Government DEWHA 2010a, 2010b). Australian Government agencies are required to develop a management plan for places on the Commonwealth Heritage List, for which they have responsibility. The Googong Lease (clause 4.2) specifies referral requirements to the Commonwealth Environment Minister for any proposal to use the Area for a purpose other than those specified in the lease, and with regard to any proposed action that may have an impact on the environment.

National Environment Protection Measures (Implementation) Act 1998

National Environment Protection Measures (NEPMs) outline national objectives for protecting or managing particular aspects of the environment (e.g. air quality, assessment of site contamination) and are established under the *National Environment Protection Council Act 1994*. A list of current NEPMs is at <<http://ephc.gov.au/nepms>>. NEPMs are established through the Environment Protection and Heritage Council (incorporating the National Environment Protection Council), an intergovernmental council of environment ministers. NEPMs are implemented through legislation in each of the participating jurisdictions.

State and territory laws implementing NEPMs do not apply to the activities of the Commonwealth or Commonwealth authorities. The purpose of the *National Environment Protection Measures (Implementation) Act 1998* is to give effect to NEPMs in relation to the activities of the Commonwealth or Commonwealth authorities, in both Commonwealth and other places, by applying state or territory laws, by regulations, or by environmental audits and environmental management plans. NEPMs particularly relevant to Googong Foreshores are those covering site contamination and pollution e.g. *NEPM: Assessment of Site Contamination - Dec 1999* and associated schedules.

Water Act 2007

The *Water Act 2007* (Water Act) implements key reforms for water management in Australia. The Act was amended by the *Water Amendment Act 2008* to give effect to the *Intergovernmental Agreement on Murray–Darling Basin Reform* agreed to at the July 2008 Council of Australian Governments meeting. Googong Dam, located in the upper Murrumbidgee River Catchment is part of the Murray–Darling Basin, for which the Murray–Darling Basin Authority is required to prepare and implement a strategic plan for integrated and sustainable management of the water resources. This is referred to as the Basin Plan, which includes (amongst other requirements): specification of limits on the amount of water that can be taken from basin water resources; identification of risks to basin water resources and strategies to manage risk; a water quality and salinity management plan; and determination of the critical human water needs of communities dependent on basin water resources. The Basin Plan also includes the identification of water resource plan areas (section 22, Water Act) for which water resource plans are to be prepared (section 19, Water Act). Requirements under the Act and the Basin Plan directly affect management of the water resources of the Googong Dam Area.

The Basin Plan which came into effect in November 2012 requires the ACT to prepare a water resource plan for surface water and ground water. The water resource plan includes the Queanbeyan River and the water resources of Googong Dam and related management. It also includes a water quality plan. The ACT water resource plan is to be submitted to the Murray–Darling Basin Authority in 2016 for accreditation by the Commonwealth Minister under the Water Act 2007 (Cwlth).

1.4.3 NSW LEGISLATION

All NSW legislation, unless inconsistent with Commonwealth legislation, applies to the Googong Dam Area. On a day-to-day basis, this legislation effectively provides the main legislative framework for the Area and the activities that occur there. Following the passage of the *Googong Dam Act* in 1974, NSW enacted the *Googong Dam Catchment Area Act 1975* providing for the declaration of a catchment area for the dam and for the making of regulations for catchment protection.

From the perspective of managing the Googong Foreshores (as well as the larger catchment), the most important legislation is that referring to land management, catchment management, water quality, pollution, planning, local government, threatened species and ecological communities, and fisheries and waterways. The following legislation is of particular relevance:

- *Crown Lands Act 1989*
- *Dams Safety Act 1978*
- *Environmental Planning and Assessment Act 1979*
- *Fisheries Management Act 1994*
- *Heritage Act 1977*
- *Local Government Act 1993*
- *Marine Safety Act 1998*
- *National Parks and Wildlife Act 1974*
- *Native Vegetation Act 2003*
- *Noxious Weeds Act 1993*
- *Pesticides Act 1999*
- *Protection of the Environment Operations Act 1997*
- *Public Health Act 1991*
- *Rural Fires Act 1997*

- *Rural Lands Protection Act 1998*
- *Threatened Species Conservation Act 1995*
- *Water Management Act 2000*.

The Googong Dam Area is a declared Wildlife Refuge under the *National Parks and Wildlife Service ACT 1974*. The Wildlife Refuges scheme provides support to private and public land owners and managers to protect and conserve native wildlife. The scheme is voluntary and is managed by the Office of Environment and Heritage (OEH), a division of the NSW Department of Premier and Cabinet.

While the ACT Government manages Googong Foreshores, enforcement of NSW law (e.g. legislation covering fishing and boating, environmental protection, bushfire control) is carried out by NSW Government agencies. Through their day-to-day management activities, ACT Government employees administer the provisions of relevant NSW legislation but without enforcement powers. It is likely that use pressures will increase on Googong and the day-to-day enforcement of NSW legislation may be difficult, if not impossible, if there are no persons, properly authorised to administer and seek the enforcement of that legislation, present in the Googong Dam Area. If significant offences, contrary to NSW legislation, occur regularly, arrangements will need to be made with NSW authorities for appropriate enforcement mechanisms to be instituted, such as delegations to ACT management staff (see s. 9.4).

The Googong Lease requires the ACT Government to report to the Commonwealth on any material breaches of NSW legislation applying at Googong Foreshores (section 4.8 of the lease).

1.4.4 ACT LEGISLATION

ACT legislation has a very limited application in the Googong Dam Area. This arises from a number of factors. First, the Googong Dam Area is in NSW and there is a general rule of law that the legislation of a particular jurisdiction (such as the ACT) cannot (except to a limited extent) operate in another jurisdiction. Second, NSW laws operate in the Googong Dam Area to the extent that they are capable of operating concurrently with Commonwealth laws (including the Googong Dam Act) in that Area. Third, ACT legislation has no operation to the extent that is inconsistent with Commonwealth legislation.

ACT legislation that does operate in relation to the Googong Dam Area will be legislation that is not inconsistent with Commonwealth or NSW legislation and that is, by its nature, not referable to the Googong Dam Area in a geographical sense. For example, legislation that regulates the behaviour of ACT public servants, or the procurement of goods and services or the collection of public moneys would apply, even though the public servants are carrying out duties in the Googong Dam Area, the goods and services will be provided for that Area and moneys are collected from activities carried out in the Area. However, any legislation that, by its nature, must operate within the Area itself, if it is to operate at all in relation to the Googong Dam Area, such as the *Nature Conservation Act 2014* and the *Planning and Development Act 2007*, does not have any effect in the Area.

Although ACT legislation has very limited effect in the Googong Dam Area; that is not to say that the Territory is unable to implement policies similar to the policies required under ACT law to manage the Area. However, in doing so it should be noted that such policies must not be inconsistent with any applicable legislation (NSW and Commonwealth) and that the enforcement of ACT policies against individuals will not be possible if the enforcement would seek to rely on the application of ACT legislation in the Area in circumstances in which that legislation does not apply.

1.4.5 NSW LOCAL GOVERNMENT LEGISLATION

Local government legislation relies on NSW legislation for its efficacy. To the extent that local government legislation operates in the Googong Dam Area (for example a local planning document) and is not inconsistent with Commonwealth law (including the Googong Dam Act) it will have effect. Local environment plans (LEPs) prepared by councils and established under the *Environmental Planning and Assessment Act 1979* (NSW) are relevant to the management of the Googong Dam Area. The *Queanbeyan Local Environmental Plan 2012* and *Queanbeyan Local Environmental Plan (Googong) 2009* apply to land adjoining the Area. Queanbeyan City Council has released the Queanbeyan Local Environment Plan in 2012, which is a comprehensive LEP for the whole of its Local Government Area including part of the Googong Dam Area and all of the Googong Township development area. The Palerang Council has released the Palerang Local Environmental Plan 2014 which applies to most of the Googong Dam Area.

1.4.6 POLICIES, PLANS, STRATEGIES AND GUIDELINES

Management of Googong Foreshores is framed within and influenced by a wide range of policies, plans, strategies and guidelines (Appendix 3). Many of these documents provide more detail in relation to management responsibilities outlined in this plan.

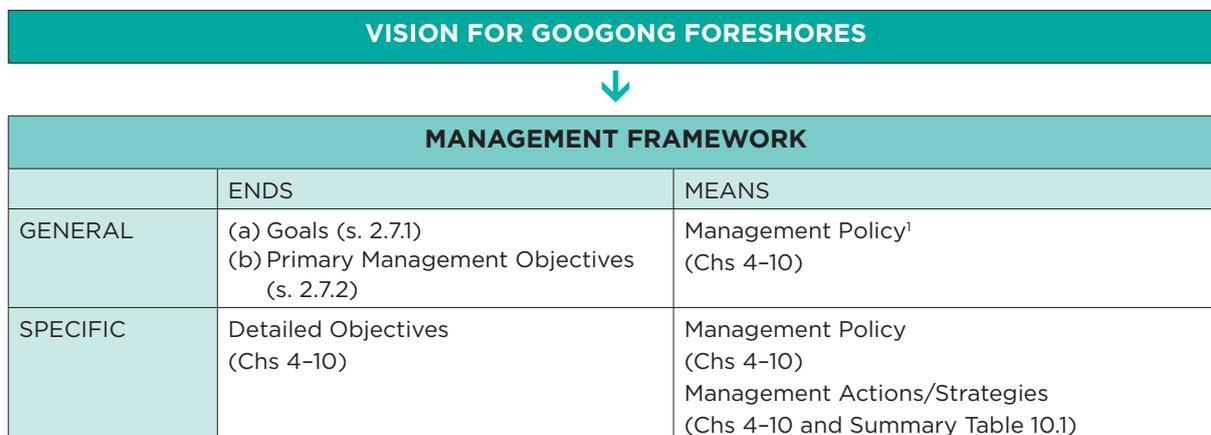
Development within the Googong Catchment, including the Foreshores, where not inconsistent with the Commonwealth's *Canberra Water Supply (Googong Dam) Act 1974*, is controlled mainly under the provisions of the *Environmental Planning and Assessment Act 1979* (NSW) and vested with local government especially in the form of Local Environmental Plans. The Queanbeyan River is part of the upper catchment of the Murrumbidgee River and therefore included in the *Murrumbidgee Catchment Action Plan*. This is a statutory document intended to provide strategic direction for future investment in natural resource management in the catchment through education, planning and partnership development (Murrumbidgee Catchment Management Authority 2009).

Some ACT frameworks are used in the management of Googong water resources and Googong Foreshores. The *ACT Environmental Flow Guidelines 2013* (ACT Government 2013) established under the *Water Resources Act 2007* (ACT) specify environmental flows in NSW immediately downstream of Googong Dam as these are under the direct control of the ACT through regulation of releases. The *Fish Stock Plan for the ACT 2015–2020* (ACT Government 2015) is a coordinated program that includes Googong Reservoir. Stocking of the reservoir is carried out by the NSW Department of Primary Industries.

A draft ACT and Region Catchment Management Strategy has been developed as a fundamental action under the ACT and Region Catchment Management Coordination Group. The Coordination Group and the Strategy is inter-jurisdictional, involving surrounding local governments, the NSW Government and the National Capital Authority. The aim is to adopt a coordinated approach to principles and actions of catchment management in the region. The strategy will set out principles for governance, the key factors that will affect the catchment over the next 30 years, and the strategies and actions that aim to optimise catchment outcomes for the Region. Impacts of actions on catchment management will be assessed. The draft Strategy was released for community consultation in April 2016 and will be supported by a draft implementation plan.

1.5 STRUCTURE OF THIS PLAN OF MANAGEMENT

The following structure has been used in preparing this plan of management:



Note: 1 Policies guide decision making and represent a management position with regard to the achievement of objectives. Policies provide a consistent basis to respond to changing circumstances and new issues.

1.6 REVIEW AND REPORTING

The Googong Foreshores Plan of Management does not have a direct statutory basis i.e. there is no legislation in the ACT that requires the preparation of such a plan. However, as outlined in s. 1.4, there is a wide range of legislation and policy that is relevant to the purpose of the plan and the legislation provides a statutory basis for the policies and actions in the plan. As noted in s. 1.2, this plan of management fulfils the requirement under the Googong Lease for the preparation of a Land and Conservation Management Plan. The plan of management is to be reviewed five yearly. Draft reviews of the plan will be referred to the Commonwealth for comment before finalisation.

The Googong Lease specifies a number of obligations on the ACT with regard to review and reporting that affect this plan of management:

- review of the terms of the lease to update references to laws and documents referred to in the lease or governmental administrative arrangements affecting the operation of the lease (five yearly) (clause 2.3(a))
- following any review, negotiation between the Commonwealth and the ACT to vary the lease to incorporate changes (clause 2.3(b))
- review and update of the Land and Conservation Management Plan (this plan of management) (five yearly) (clause 5.1(b) (ii))
- reporting to the Commonwealth of any material breach of the plan of management or other plans required under the lease (the heritage management plan is most relevant) (clause 5.1(b) (v))
- referral to the Commonwealth Environment Minister under the EPBC Act (clause 4.2)
- advice to the Commonwealth should contamination be discovered in the Googong Dam Area (clause 6.2(c) (i)).

2

Attributes, Values, Management Goals and Objectives



2.1 PHYSICAL FEATURES

When full, Googong Reservoir covers approximately 680 ha extending from the dam wall to the vicinity of Compo Canyon on the Queanbeyan River and Drawdown Crossing on Burra Creek. The reservoir is about 1.5 km wide near the dam wall and extends southward for about 11 km. The southern-most 3 km of the reservoir is narrow (250 m or less). The upstream limit of the reservoir is defined by Curleys Falls, a series of small (1 to 3 m) drops through a small rocky gorge.

A feature of the Googong Dam Area is the difference between the eastern and western sides of the reservoir. This is related to the geology of the area, which is dominated by the Queanbeyan Fault. The eastern escarpment is aligned with the fault, and rises to about 950 m ASL with steep local relief. Before being submerged, the Queanbeyan River flowed north along the base of the escarpment towards Queanbeyan after cutting westward through the Cullarin Block and joining Burra Creek. The eastern area is mostly tree-covered, with dry sclerophyll forest that is typical of shallow, rocky and infertile soils on steep hilly country in the NSW Southern Tablelands. The narrower western area rises to about 750 m ASL and has gentler local relief. This area was formerly in pastoral holdings and was extensively cleared. As well as residual paddock trees and tree plantings, there are now patches of tree regeneration comprising both dry sclerophyll forest and lowland woodland. Extensive remnants of Natural Temperate Grassland occur on this area and along Burra Creek. Natural Temperate Grassland is listed as an endangered ecological community under the EPBC Act.

2.2 INFRASTRUCTURE

2.2.1 WATER SUPPLY

Water supply infrastructure is concentrated in the north-western part of the Googong Dam Area. It includes the dam, spillway, intake tower, water treatment plant, four pumps to draw water from the dam to the treatment facility, and the bulk supply main to deliver the water to Canberra and Queanbeyan. In 2005 a bypass pipeline was constructed around the Googong water treatment plant to take water from the Cotter Catchment to the Googong Reservoir as part of the *Cotter Googong Bulk Transfer* program. One of Icon's major 'water security' projects for the ACT is the *Murrumbidgee to Googong Water Transfer*, which uses Googong Reservoir to store water pumped from the Murrumbidgee River and discharged into Burra Creek (see s. 4.2).

2.2.2 FORESHORES

Other infrastructure largely relates to the management of the Foreshores, especially the provision of recreation facilities. This includes a ranger station, car parks, picnic facilities (tables, barbecues), toilets, boat ramps and bird hides. The northern access (via Googong Dam Road) is a sealed road. The southern access (London Bridge Road) is only part-sealed. There is a network of vehicle tracks (mostly four wheel drive standard) that are used for management access, as fire trails, and for walking and mountain bike riding. These tracks are closed to public vehicle access. There are also some purpose-built walking tracks unsuitable for vehicles.

2.3 ADJACENT LAND USES

Googong Reservoir was established within a mostly pastoral landscape (sheep and cattle grazing), in which there was extensive clearing at lower elevations and in less rugged areas. The most significant land use trends in areas adjacent to Googong Foreshores have been the subdivision of former pastoral holdings for rural residential purposes and the recent establishment of nature reserves on the escarpment country. Subdivided land in the Burra Valley, south-west of the Foreshores, and extending east to Urialla (Urila) directly abuts the Googong Dam Area. Subdivision of this area for rural residential development dates from

the 1970s. A substantial urban development is under construction for 780 ha of land adjacent to the north-western boundary of the Foreshores, mainly south of the Googong Dam Road. Googong Township, comprising 5500 dwellings and a population of about 16 000 people, is being developed over 25 years (CIC Australia 2010). Construction commenced in 2011. There is no rural residential development directly bordering the rugged eastern boundary of the Googong Dam Area.

Cuumbeun Nature Reserve (709 ha in two parts) and Burra Creek Nature Reserve (270 ha) were gazetted as part of the (NSW) Southern Regional Forest Agreement in 2001. Cuumbeun Nature Reserve protects the escarpment country that continues northward from the eastern side of Googong Foreshores (NSW NPWS 2004). Burra Creek Nature Reserve protects part of the escarpment located south of the confluence of Burra Creek and the Queanbeyan River, and east of London Bridge Homestead.

Many vehicle tracks (fire trails) enter the Googong Dam Area from bordering properties. Locked gates at the boundary prevent unauthorised vehicle access.

2.4 LAND USE HISTORY

Three major periods are identifiable in the human history of the Googong area: Aboriginal occupation (possibly dating from 25 000 years before present); the European pastoral period (1820s to the present); and water supply, recreation, rural residential development, natural and cultural heritage conservation (1970s to present). Some more detailed markers for these periods are shown in Table 2.1.

Table 2.1 Googong Foreshores and surrounding areas: a landscape timeline

Time	Period/Event	Comment
Aboriginal Occupation		
C 25 000 years before present	Aboriginal occupation	The earliest known occupation site in the region is from Birrigai, ACT, dated at 21 000 years before present (Flood et al. 1987). River valleys that were not frost hollows were favoured occupation sites in the Southern Tablelands.
1820s onward	Displacement	Aboriginal people were displaced by the European pastoral economy and succumbed to disease e.g. smallpox (1830), influenza and measles (1860s) (Flood 1980; Jackson-Nakano 2001).
1975	Googong dam site archaeological survey	Field survey of the area to be inundated recorded: nine isolated finds of artefacts, two stone cairns, one campsite (Smith 1975 in Flood 1980).
2008	Googong Foreshores Aboriginal heritage assessment	Field survey recorded twelve Aboriginal sites comprising: one campsite, isolated finds, artefact scatters, one scarred tree, one stone cairn (possible burial site), one sacred site (London Bridge Natural Arch) (ERM Australia 2008a).
European Pastoral		
1821/22	European exploration of 'Limestone Plains'	In 1821 Throsby and Wild explored from Lake George, crossing the Limestone Plains to the Murrumbidgee River. In 1822 Kearns, Marsh and Packer travelled south from Lake George to the Molonglo and Queanbeyan rivers.
1820s	European pastoralism	Land was rapidly taken up for pastoralism. The Murrumbidgee River formed the local limit to settlement within the 'nineteen counties'. By the 1830s most accessible land was occupied by large pastoral holdings.
1834	Burra Valley settlement	First recorded settlement in later London Bridge Homestead area. Cattle run at 'Katy's Flat'.

Time	Period/Event	Comment
1857	London Bridge property purchased (3650 ha)	Land ownership became established in the 1850s. Holdings were gradually fenced and clearing of tree cover extended the area of (native) pastures (Duffy 1969). London Bridge property supported 4000 sheep and creek flats near the homestead were cultivated.
Late 19th century to World War II	Landscape deterioration	The pastoral landscape was seriously degraded by increased runoff following tree clearing and effects of rabbits. By the 1940s most cleared areas contained gullies, and streams show evidence of extensive bedload movement (Starr 2000). The expanding rabbit population made a serious impact by 1900, probably reaching its peak during World War II. Changes to the landscape were compounded by the effects of floods and drought.
World War II to present	Decline of pastoralism, improvement in land condition, rise of rural residential land use	<p>Profound changes occurred in the pastoral economy (Starr 2000, p. 31):</p> <ul style="list-style-type: none"> • rabbit control (introduction of <i>Myxomatosis</i> in 1951) and later sodium fluoroacetate poison ('1080') • introduction of crawler tractors allowed construction of farm dams away from water courses (stock numbers could be increased by accessing feed away from streams, riparian vegetation recovered to some extent) • use of fertilizer (especially superphosphate), mainly on native pastures with small areas of sown improved pastures and fodder crops. <p>Combined effect was improved land stability and significant increase in naturally stabilising gullies (Eyles 1977). Rural residential development greatly expanded in the 1970s, particularly in the Burra valley.</p>
1964-1988	Catchment protection	The Lake Burley Griffin Catchment Protection Scheme commenced in 1964. The Burra Creek project commenced in 1969 and the Googong Project, for the Queanbeyan River Catchment began in 1976. Work ceased in the Googong Catchment in 1988 (continuing in the Molonglo Catchment until 1998) (NSW DLWC 2000).
Water Supply and Associated Uses		
1973	Googong Dam Area acquired from NSW by the Commonwealth	Area comprises 5089 ha of 87 300 ha catchment of the Queanbeyan River. All timber below the high water level was removed prior to the completion of the dam.
1977-78	Dam completed and reservoir filled.	Dam height was later raised, based on revised rainfall data and flood estimates.
1979	Inauguration	Ceremony conducted by HRH Prince Charles on 27 March 1979
1979	Recreation use	A program of staged recreational development was commenced. Fish stocking began in 1980. Small electrically powered boats were permitted to use the reservoir in 1982 (Shorthouse 1983).
1981	Drought	Major drop in water level.
1982	London Bridge Homestead heritage listed	<i>London Bridge Homestead Group, London Bridge Road, via Queanbeyan, NSW</i> was entered on the Register of the National Estate.
1983	Wildlife Refuge	Googong Dam Area was declared a Wildlife Refuge under the <i>National Parks and Wildlife Act 1974</i> (NSW).
1987	London Bridge limestone arch heritage listed	<i>London Bridge Natural Arch, London Bridge Road, via Queanbeyan, NSW</i> was entered on the Register of the National Estate.

Time	Period/Event	Comment
1988	ACT self government	Under the <i>Canberra Water Supply (Googong Dam) Act 1974</i> (Cwlth) control over water supply and management of the Googong Dam Area was vested in the Territory Executive. ACT Government agencies manage the Foreshores. <i>Australian Capital Territory (Self-government) Act 1988</i> enacted in December 1988. First elections for the ACT Legislative Assembly held on 4 March 1989.
2002–05	Drought	Major drop in water level (below 50% capacity).
2005	Cotter Googong Bulk Transfer program	Googong Reservoir is used to store water from the Cotter Catchment.
2005	Googong New Town	A proposed urban development of 5500 dwellings bordering the north-western boundary of the Foreshores.
2008	Murrumbidgee to Googong Water Transfer	Water to be pumped from Angle Crossing on the Murrumbidgee River, piped underground and discharged into Burra Creek. Construction completed in 2012.
2008	Googong Lease	Lease between the Commonwealth of Australia and the Australian Capital Territory giving the Territory control over the Googong Dam Area for 150 years.
2009	Googong Township	Land for township rezoned to allow development to proceed (<i>Queanbeyan Local Environment Plan (Googong) 2009</i> under the <i>Environmental Planning and Assessment Act 1979</i> (NSW), 24/12/2009, 2009 No 630.)
2010	Spillway remediation	Remediation works undertaken on the Googong Dam spillway to repair eroded sections, extend the walls and improve structural integrity.
2010	Heavy rainfall in Googong catchment	Googong Reservoir fills and inflows exceed storage capacity. Flow over spillway of dam results in flooding of low lying parts of Queanbeyan city business district.
2011	Commonwealth Heritage List nomination	'Googong Foreshores Cultural and Geodiversity Heritage Areas' (Place ID 106072) covering the London Bridge Homestead group, Woolshed and Shearers' Quarters and the London Bridge Natural Arch.
2012	Queanbeyan Local Environment Plan	Comprehensive Queanbeyan Local Environment Plan released which includes the Googong Township.
2012	Murrumbidgee to Googong Water Transfer	The pipeline transfers up to 100 megalitres of water per day from the Murrumbidgee River to Googong via Burra Creek. Project completed in August 2012.
2014	Palerang Local Environmental Plan	The Palerang Local Environmental Plan applies to most of the Googong Dam Area.

2.5 GOOGONG DAM CATCHMENT

2.5.1 DESCRIPTION AND LAND USE

Googong Foreshores (5089 ha) comprises about 6 per cent of the total Queanbeyan River Catchment of 87 300 ha. The Queanbeyan River rises in the Gourock Range (east of Bredbo) at an elevation of 1370 m flowing in a northerly direction through undulating country to Boolboolma Crossing, from where it traverses hilly to mountainous terrain dominated by the Tinderry Range. The largest sub-catchment is drained by Burra Creek, which rises in the northern part of the Tinderry Range and has its confluence with the Queanbeyan River covered by the waters of Googong Reservoir. The Queanbeyan River Catchment is underlain by granitic bedrock in the upper reaches, metasediments north of Boolboolma Crossing, and granites in

the Tinderry Mountains (Michelago Sheet 8726, 1:100 000, Geological Survey of NSW). While average annual rainfall in the catchment is about 650 mm, it is highly variable and stream flows in the catchment are intermittent.

About 45 per cent of the catchment carries native forest and woodland cover while the remaining cleared and partially cleared areas are a mix of native and improved pastures. Pastoralism rather than broad scale cropping dominates rural land use, with climate being the main limiting factor for agriculture (Starr 1999). Grazing of cattle is the dominant use on the upper granite plateau with mixed sheep and cattle in the remainder. The other important land use is rural residential (see s. 2.3).

Land tenure in the catchment is a mix of Crown land, private leasehold and freehold. Lands under NSW Government control include conservation reserves (Tinderry Nature Reserve, Burra Creek Nature Reserve, Tallaganda National Park, Tallaganda State Conservation Area) and Tallaganda State Forest. About 65 per cent of the catchment is in leasehold and freehold, the latter comprising slightly less than half of all the land. Use and management of freehold land is the responsibility of landholders, but is subject to state legislative and local government planning controls.

2.5.2 MANAGEMENT

No comprehensive management plan has been prepared previously for the Foreshores though the *Googong Catchment Administration Manual* (1988) and other guidelines have been used. After the dam was constructed, an Inspector: Googong Catchment, was appointed by the (then) NSW Water Resources Commission (Starr 1999).

Outside the Googong Dam Area, management of the catchment is the responsibility of the NSW Government (see s. 1.4.1) with an important role played by local government. A wide range of legislation is applicable (see s. 1.4.3), administered by a number of government departments. Development activities are regulated through Local Environmental Plans prepared under the *Environmental Planning and Assessment Act 1979* (NSW) and Development Control Plans. Palerang Council administers the Googong Dam Area and Queanbeyan City Council administers the land on the north-western boundary of the Area. The southern part of the catchment is within the boundaries of the Cooma-Monaro Council. In terms of catchment management, application of the legislation is largely uncoordinated.

Given the increasing importance of Googong Reservoir in securing ACT and Queanbeyan water supplies, Icon Water has developed a catchment risk management plan to identify deficiencies in the management of the catchment and measures that can be taken to improve catchment management (Contos et al. 2008). This is one of the documents being used by Icon Water to understand the risks to abstraction of raw water from the reservoir.

While there is no coordinated mechanism for management of the catchment, relevant community based frameworks include:

The Upper Murrumbidgee Catchment Coordinating Committee (UMCCC): This is a community based organisation made up of agencies and groups that are responsible for natural resource management in the upper Murrumbidgee Catchment. The UMCCC operates as a regional cross border network to enhance communication between agencies and groups in NSW and the ACT, which lie wholly within the upper catchment of the Murrumbidgee River (above the Burrinjuck Dam wall).

Landcare and Parkcare: Burra Creek Landcare Group, Friends of Googong Parkcare and Queanbeyan Landcare Group are local groups affiliated with the Molonglo Catchment Group (see below). There is no Landcare group in the Queanbeyan River section of the Googong Catchment.

South East Local Land Services: Brings together natural resource management, agricultural production advice, biosecurity and emergency management into a single organisation. A draft *Local Strategic Plan: 2015-2020* has been developed identifying local priorities and determining how goals and strategies in the State Strategic Plan are best achieved.

Catchment Groups: These act as umbrella planning and coordination groups for smaller community organisations such as Landcare and Parkcare groups. Activities of the catchment groups (e.g. catchment plans and strategies) provide the basis to link with Commonwealth programs (in particular, 'Caring for our Country'). The Googong Catchment is included in the area of the Molonglo Catchment Group, formed in 2003, which has prepared a *Molonglo Catchment Strategy 2015-2030* (see <<http://molonglocatchment.com.au>>). This strategy is being implemented with the support of the ACT and Commonwealth governments.

2.6 THE VALUES OF GOOGONG FORESHORES

For most people, the significance of a place arises from a combination of many values (see **Glossary**). The identification of the values attached to a place is an essential first step in formulating management requirements and preparing a management plan. *Core values* relate to natural or cultural heritage, though the two may be inter-related, overlap and are considered inseparable by some people e.g. many Indigenous people as well non-Indigenous people with strong cultural connections to nature (Australian Heritage Commission 2002a; Worboys et al. 2005). *Derived values* (e.g. recreation, tourism, education, scientific, economic) are based on these core values (NSW NPWS 2006). A second essential step is to assess the significance of the values and the components that make up a category of values. There are various criteria that are used to assist in the assessment of significance e.g. the presence of places and objects on statutory heritage registers.

Some values are geographically based and can be assigned to a particular site (e.g. London Bridge Homestead) or a group of sites (e.g. Aboriginal sites based on artefact scatters or remnants of Natural Temperate Grassland). Others are less place-specific and may refer to a value held by the whole protected area (e.g. recreation and education opportunities). Some values may be more intangible. Social value is based on the attachment of people to places such as Googong and is often represented by the ongoing involvement with the place e.g. regularly visiting to go fishing.

Natural significance means the importance of ecosystems*, biodiversity* and geodiversity* for their existence value* or for present or future generations, in terms of their scientific, social, aesthetic and life-support value (*Australian Natural Heritage Charter*, 2nd edition (Australian Heritage Commission 2002a)).

Cultural significance means aesthetic, historic, scientific, social or spiritual value for past, present or future generations (*Australia ICOMOS Burra Charter*, 1999 (Australia ICOMOS 1999)).

*See **Glossary**.

The landscape of Googong Foreshores can be seen as having overlapping or layered values that are both natural and cultural. The natural environment of the area contains exposed relict geological features from hundreds of millions of years ago, diverse ecological communities with plants and animals that have ancient ancestry, evidence of many thousands of years of occupation by Aboriginal people, as well as more recent uses by European settlers. Many values are inter-related e.g. London Bridge Natural Arch is a significant geological feature which is also of cultural heritage significance to Aboriginal people. Some are composites of other values e.g. ecosystem services, a concept that refers to the products of natural systems that benefit people (PMSEIC 2002) (see **Glossary**). Vegetated natural environments of the Googong Catchment, for example, contribute to maintaining the quality of the water in the reservoir.

Multiple values build richness in some places, but they may also create conflicts as to which should be given priority. The decision to conserve one value may contribute to the degradation of another. Management requires explicit information about each value and its significance so that important values can be conserved and priorities determined for management effort (NSW NPWS 2006). The identification and assessment of values is not independent of the wider social setting, as is evident by the much greater prominence given to Aboriginal cultural heritage in recent times.

For Googong Foreshores the primary purpose (and value) is the provision of high quality raw water for potable water supply to the ACT and Queanbeyan. The other values of the Foreshores which are secondary to water supply are placed within an overall management framework based on multiple use. The values of the Foreshores are outlined in Table 2.2.

Table 2.2 Values of Googong Foreshores

1. Water Supply	Water storage and supply is the primary purpose of the Area. Water quality in the reservoir should be maintained at a level that is not less than the quality when the water enters the reservoir from the catchment.
2. Natural Heritage	The Area has important biodiversity, geodiversity and landscape values. Googong Foreshores forms part of a corridor of relatively intact vegetation extending from the Tinderry Range to the north-eastern ACT. The Area contains a number of threatened ecological communities and plant and animal species. London Bridge Natural Arch is a significant geological feature.
3. Cultural Heritage	Archaeological evidence indicates the Area was occupied by Aboriginal people; an 'upland campsite'. London Bridge Natural Arch is a significant cultural feature. London Bridge Homestead is a rare example of an early homestead complex that contains progressive additions over the period from about 1870 to 1950. The more recent woolshed and shearers' quarters at London Bridge car park are also links to the European pastoral period.
4. Recreation	The Area is a recreational resource of considerable value to residents of Canberra, Queanbeyan and adjacent areas. Recreational activities are restricted to those that are compatible with the Area's primary purpose of providing raw water for potable water supply. These activities include fishing, picnicking, bushwalking, mountain biking, canoeing, nature-based activities such as bird watching, and visiting cultural heritage sites. To protect water quality, specific controls and restrictions apply. The waters of the reservoir provide a scenic attraction and backdrop to recreational activities.
5. Education and Research	Googong Foreshores provides opportunities for education and research related to the other values of the Foreshores.

Management details related to the conservation of these values are discussed in Chapters 4 to 8.

The Googong Dam Area is subject to the provisions of the EPBC Act that relate to a Commonwealth Area (see s. 1.4.2). The Commonwealth has undertaken a heritage assessment (ERM Australia 2008a), specific Aboriginal Heritage Assessment (ERM Australia 2008b) and a heritage management plan (ERM Australia 2010). These heritage studies have identified the following heritage values for the Area in relation to the EPBC Act:

- *Natural heritage values* deriving from, or in relation to:
 - the diverse array of ecological communities, flora and fauna species, threatened and/or rare species and ecological communities
 - the ecological connectivity provided by the Area, in particular, the relatively undisturbed eastern foreshores
 - the recreational, scenic and aesthetic values based on the natural environment
 - the scientific value based on the ecological communities and species present in the Area (including the presence of two raptor species).
- *Geodiversity heritage values* relating to:
 - London Bridge Natural Arch, which is considered to be important as a good example of cave formation in karst and offering insight into the natural landscape development in the area. The arch also has aesthetic, educational and scientific values and has been visited by humans for thousands of years.

- *Historic heritage values* relating to:
 - the London Bridge Homestead group and outbuildings, including the Woolshed and Shearers' Quarters, as a cultural landscape valued for providing historical understanding, landscape qualities and aesthetics (vernacular farm buildings).
- *Indigenous heritage values* relating to:
 - the diverse range of known Aboriginal sites including the London Bridge Arch which has been identified as a sacred area. Googong Foreshores has potential for further archaeological and ethnographic study related to Aboriginal settlement in the area.

The heritage assessments have determined that parts of the Googong Dam Area meet the threshold for inclusion on the Commonwealth Heritage List for their cultural and geodiversity values. This has formed the basis for the nomination of the place (described as the 'Googong Foreshores Cultural and Geodiversity Heritage Areas') to the list, for subsequent determination by the Australian Heritage Council (see Australian Heritage Database: Commonwealth Heritage List/Historic/Nominated Place/Place ID 106072 <<http://www.environment.gov.au/cgi-bin/ahdb/search.pl>>).

This elaboration of heritage values related to Commonwealth requirements is complementary to the overall values framework outlined in Table 2.2 as a basis for the management of the Googong Dam Area. However, the heritage provisions of the EPBC Act do not cover the primary water supply purpose of the Area and the management responsibilities of the ACT Government. Therefore the values identified above in relation to the Act do not form a sufficient basis, by themselves, for a comprehensive management plan.

2.7 MANAGEMENT GOALS AND OBJECTIVES

2.7.1 MANAGEMENT GOALS

Related to the primary purpose of Googong Foreshores and the values in Table 2.2 the following goals are defined for the management of the Area:

- 1. Googong Reservoir supplies high quality raw water for potable water supply¹.**
- 2. Natural and cultural values at Googong Foreshores are conserved² for present and future generations.**
- 3. The residents of Canberra, Queanbeyan and the region value Googong Foreshores for its recreational, educational and research opportunities related to the natural and cultural values of the Area.**

Note: 1 Within the limitations imposed by the effects on water quality of historical land use and management, the present types of land use, and the standard of management in the larger Queanbeyan River Catchment.

2 See **Glossary**: Conservation.

2.7.2 MANAGEMENT OBJECTIVES

Related to the above goals and the values in Table 2.2, a small number of primary objectives can be identified for the management of Googong Foreshores. More specific management objectives are included in Chapters 4 to 10.

Water Storage and Supply

- Water stored in Googong Reservoir is of the highest quality* and is not adversely affected by activities occurring in Googong Foreshores.

*within the limitations imposed by wider catchment conditions

Natural Heritage

- The biodiversity, geodiversity and landscape values of Googong Foreshores are conserved.
- Ecosystems are managed so that they continue to function and evolve naturally and the integrity of landscapes and scenery is protected.

Cultural Heritage

- Cultural heritage within Googong Foreshores is identified, conserved, and where appropriate, interpreted and promoted to retain and foster community associations and an appreciation of the past.

Recreation

- Googong Foreshores provides a variety of recreational opportunities that are consistent with the protection of the water supply catchment, reservoir water quality, and natural and cultural heritage values.

Education and Research

- Opportunities are provided for the community to acquire knowledge of the values of Googong Foreshores and to understand its primary water supply purpose.
- Research is undertaken at Googong Foreshores that contributes to management of the Area and the conservation of its values.

Community Involvement

- Community partnerships are formed that effectively contribute to the management of Googong Foreshores and protection of the values of the Area.

2.8 MANAGEMENT PRINCIPLES

The management objectives, policies and actions contained in this plan of management are based upon the following principles:

Precautionary principle: Planning and management decisions need to be made in line with the precautionary approach. 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.

Limits of acceptable disturbance: All human activities and uses of the Foreshores will result in some degree of impact. Such disturbances will be managed within physical impact thresholds. Inconsequential or trivial impacts will be separated from those that are serious, irreversible, cumulative, or have a high degree of connectivity to the reservoir.

Adaptive/experimental management: Research, monitoring, new knowledge and the outcomes of performance evaluation should continually inform management, with policies adjusted accordingly.

Best practice: Knowledge, skills and management practices are continually improved by keeping up-to-date with new technology and ideas.

Education and environmental stewardship: Education is essential to promote an understanding and appreciation of the Area's values and to encourage individuals to take personal responsibility for protecting those values. Interpretation is an important educational activity.

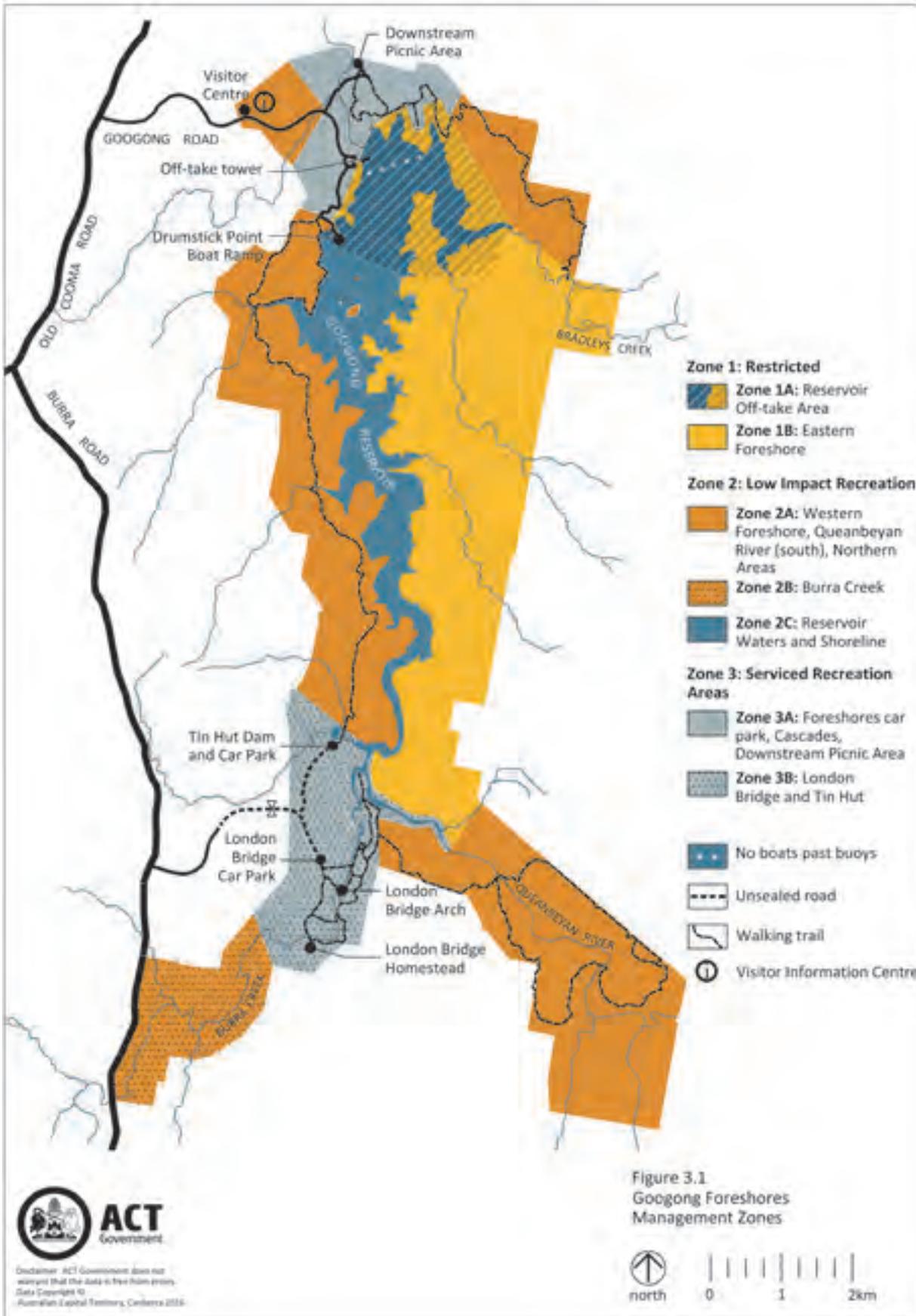
Transparency and accountability: Decision-making processes and the performance of land managers and other authorities should be open to public scrutiny.

3

Management Zones



Figure 3.1 Googong Foreshores management zones



3.1 PURPOSE OF ZONING

This chapter defines three management zones for Googong Foreshores:

- Zone 1: Restricted
- Zone 2: Low Impact Recreation
- Zone 3: Serviced Recreation Areas.

Broadly this zoning represents a gradation from management giving priority to protecting reservoir water quality (Zone 1) to varying levels of multiple use (Zones 2 and 3).

Zoning is a system of defining areas within a place based on the values that management aims to protect and the types of activities that will be permitted. It is a means of expressing management priorities for particular areas related to management goals and objectives. Zoning categories and the boundaries of management zones are determined by the spatial arrangement of key values. The main purpose of zoning is to specify the appropriate levels and forms of use and access (particularly for recreation), related to the values, and associated facilities and management requirements (NSW NPWS 2006).

Management zones at Googong Foreshores take into account the primary management objectives outlined in s. 2.7.2. Other related considerations are:

- the suitability of areas for particular activities
- the avoidance of conflict between users with different interests
- the need for specific protection measures for natural and cultural heritage (e.g. for habitat of threatened species and for cultural heritage sites)
- the difficulty of access to some areas (for both routine and emergency purposes)
- the high cost of installing and maintaining facilities in some areas.

Restrictions on the types of boats allowed on Googong Reservoir are outlined in s. 5.4.1.

3.2 MANAGEMENT ZONES

Three management zones have been defined for Googong Foreshores (Figure 3.1):

ZONE 1: RESTRICTED

This zone includes the Reservoir Off-take Area and the Eastern Foreshores. High priority is given to protecting water quality near the off-take and special restrictions apply to boating and shoreline access in this area.

Zone 1A: Reservoir Off-take Area

Description: This area includes the dam wall and off-take tower and extends 1500 m upstream including the adjacent shoreline. These areas are shown on the *Googong Foreshores: Map and Guide* which is made available to visitors to the Foreshores.

Characteristics: The area is also referred to as the Water Off-take Protection Zone. No public access is permitted along the shoreline areas to prevent the risk of pollution to water flowing into the reservoir in close proximity to the off-take. Boat access is allowed to the area, but fishing from or landing on the shore is not permitted. Boat access is prohibited near the dam wall and spillway (north of a line drawn from the dam lookout to the point west of Borrow Pit Bay and shown by a line of marker buoys). This protects users from any physical hazard near the off-take tower and spillway.

On the western shoreline, this zone includes Drumstick Point (boat ramps) and extends north to the dam wall, Saddle Dam and Borrow Pit. On the eastern shoreline, the zone extends south from Borrow Pit Bay, around Bradleys Inlet (outlets of Bradleys Creek and Smiths Creek) and includes the peninsula around Feagans Trig.

The following restrictions apply to watercraft landing:

- west side of reservoir: not permitted on shoreline north of the car park allocated for people with disabilities on Drumstick Point (except at the nearby boat ramp)
- east side of reservoir: not permitted on shoreline north of an alignment with Long Neck Island.

Zone 1B: Eastern Foreshores

Description: This area extends from the southern edge of Bradleys Inlet to Compo Canyon on the Queanbeyan River arm of the reservoir and includes the land from the water's edge to the eastern boundary of Googong Foreshores.

Characteristics: The area is steep, rugged and is mostly covered by dry sclerophyll forest. The southern part of the Eastern Foreshores has gentler local relief. Other than by water, the area is difficult to access. A number of vehicle tracks (fire trails) enter from private property on the eastern boundary. This zone has significant biodiversity values, including threatened species habitat, and is an important component of regional ecological connectivity.

ZONE 2: LOW IMPACT RECREATION

This zone comprises six separate areas that span the length of Googong Foreshores. While catchment protection remains the highest priority overall, these areas support low-key land and water based recreational activities.

Zone 2A: Western Foreshores, Queanbeyan River (south) and Northern Areas

Description: The Western Foreshores area extends from Drumstick Point to Tin Hut Inlet (including the shoreline), but does not include Tin Hut Dam. The Queanbeyan River arm includes land either side of the Queanbeyan River above the reservoir. The two northern areas are in the vicinity of the Ranger Station on Googong Dam Road and near the north-eastern boundary of the Googong Foreshores. Long Neck, Rabbit and Low Islands are included in Zone 2A.

Characteristics: The Western Foreshores is former pastoral country, comprising grassland and varying levels of tree cover. Access for management purposes is along a north-south vehicle track. Land along the Queanbeyan River arm is hilly, tree covered, and includes partly cleared areas at lower elevations near the eastern boundary of Googong Foreshores. Land in Zone 2A in the north-east is between Zone 1A and the Foreshores boundary and is a steep, forested area. The other northern area is forest and grassland near the Ranger Station and immediately south of the Water Treatment Plant. Important biodiversity values include remnant vegetation and habitat for threatened species.

Zone 2B: Burra Creek

Description: This area is land either side of Burra Creek, south of London Bridge Homestead.

Characteristics: Cleared former pastoral country with some patches of tree cover. Access is by a vehicle track south of the homestead or off Burra Road, which forms the south-west boundary of Googong Foreshores. Recreation is not encouraged in this area.

Zone 2C: Reservoir Waters and Shoreline

Description: This includes all reservoir waters south of Zone 1A.

Characteristics: The reservoir comprises open waters in the northern sections with an indented shoreline narrowing considerably to the south. The reservoir is popular for fishing and is maintained as a mixed fishery with stocking of native and alien species.

ZONE 3: SERVICED RECREATION AREAS

This zone comprises two areas, in the north and south of the Foreshores respectively. These areas support more intensive recreation and the southern area has significant cultural heritage values.

Zone 3A: Foreshores Car Park, Cascades, Downstream Picnic Area

Description: This area extends from the Foreshores Car Park (Drumstick Point) northward and easterly to Borrow Pit Bay outside of Zone 1A. It includes the Queanbeyan River below (north of) the dam wall and is therefore not part of the reservoir catchment.

Characteristics: Most of the area is highly modified former pastoral country. As well as water supply infrastructure, the area contains sealed road access, car parks, picnic areas, swimming areas, barbecue facilities, toilets, lookouts and walking tracks. In general, recreational activities in this area do not have the potential to impact directly on the reservoir water quality.

Zone 3B: London Bridge and Tin Hut

Description: This area extends from Tin Hut Dam to London Bridge Homestead and includes submerged sections of Burra Creek and the Queanbeyan River.

Characteristics: The area is mostly highly modified former pastoral country. It is accessed from Burra Road by sealed and unsealed roads to car parks at Tin Hut and London Bridge Woolshed. In the Tin Hut area there is a shelter, toilets, barbecue facilities, bird hides (Tin Hut Dam) and a walking track to Tin Hut Inlet. At the woolshed there are barbecues, picnic facilities and toilets. From this car park there are vehicle trails used for management purposes, as well as for walking and mountain bike riding. There are also some tracks for walkers only. London Bridge Homestead is accessible by foot or bicycle along a fire trail from the car park. Zone 3B contains the most important cultural heritage sites (both Aboriginal and European) in the Foreshores.

4

Water Resources



4.1 WATER STORAGE AND SUPPLY: PRIMARY MANAGEMENT OBJECTIVE

- **Water stored in Googong Reservoir is of the highest quality* and is not adversely affected by activities occurring in Googong Foreshores.**

*within the limitations imposed by wider catchment conditions

Water quality in the reservoir should be maintained to at least the same level as when it enters the storage, and preferably improved, where this is feasible.

4.2 IMPORTANCE OF GOOGONG WATER SUPPLY

Water for Canberra and Queanbeyan is supplied from the Cotter, Murrumbidgee and Googong catchments. The three Cotter storages (Corin, Bendora and the Cotter Dam) have a combined storage capacity of 160 gegalitres (GL) while Googong Reservoir has the capacity to store almost 122 GL (121 500 million litres). The Googong Catchment is about twice the size of the Cotter Catchment, but typically receives less rainfall and provides a lower yield of water than the Cotter Catchment. Prior to the 2003 bushfire, the need to treat Googong water, the lower level of its clear water storage tank, and distance from Canberra meant that it was more difficult and expensive to distribute than Cotter Catchment water treated at Mt Stromlo. For these reasons, though Googong Reservoir is an integral part of the Canberra water supply network, Cotter Catchment generally had been the first choice source. Before the 2003 fire, Googong supplied on average about 16 per cent of Canberra's water supply needs, being drawn upon primarily during the peak summer period and in time of drought.

The importance of the Googong supply was evident following the January 2003 bushfire in the ACT when Cotter water was rendered unusable for a period of time due to high levels of turbidity. The Mt Stromlo Water Treatment Plant was substantially upgraded to enable water from the bushfire affected Cotter Catchment to be effectively treated. Water is now drawn from the Cotter Reservoir and the Murrumbidgee River for treatment at Mt Stromlo as a drought contingency response. These measures have increased the cost of treating Cotter Catchment water.

Following the effects on water supply of the 2003 bushfire and examination of future water supply options for the ACT and Queanbeyan, the use of existing infrastructure to increase available supply was evaluated and the *Cotter Googong Bulk Transfer* program developed. The large storage capacity at Googong Reservoir has a key role in this scheme, which commenced in late 2005. The process involves diverting a proportion of the 'spills' from the Bendora and Cotter dams via the gravity main to Mount Stromlo Water Treatment Plant. After meeting urban demand, the surplus water is transferred to Googong Reservoir using the existing supply network and a bypass pipeline around the Googong Water Treatment Plant (ACTEW 2005).

The volume of water stored in Googong Reservoir may also be augmented by the *Murrumbidgee to Googong Water Transfer*. This process involves pumping water from the Murrumbidgee River near Angle Crossing (close to the southern border of the ACT), transferring it through an underground pipeline, and discharging it into Burra Creek upstream of Googong Reservoir. This process has the potential to provide up to an additional 100 ML/day of water into Googong Reservoir for potable water use, significantly enhancing the large storage value of the reservoir.

Average rainfall in the Googong Catchment is about 650 mm, but is highly variable and stream flows in the catchment are intermittent. Flows into the reservoir declined during the period 1994–2005. This could be due to an increase in the number of farm dams in the catchment (AGRECON 2005 in Contos et al. 2008) and/or other factors such as a decrease in average rainfall, a decrease in the number of run-off generating events, and an increase in river and groundwater abstractions (Falkland 2006 in Contos et al. 2008). Various studies of stream flows

in NSW indicate that climate change is likely to further reduce future flows, with subsequent consequences for storages and supply (Contos et al. 2008). The risk of bushfire is also likely to increase (CSIRO 2006 in Contos et al. 2008) resulting in poor water quality following the event and reduced yields over time as regrowth vegetation uses more water. Management of Googong Foreshores has little effect on catchment yield, but through maintaining local catchment conditions and managing fire regimes, can make an important contribution to reservoir water quality that is potentially affected by the impacts of climate change.

With regard to the development of Googong Township, adjacent to the north-western boundary of the Foreshores (see s. 2.3), the *Queanbeyan Local Environmental Plan (Googong) 2009* includes legal measures incorporated into the design of the development aimed at avoiding any significant impact on the Foreshores from the changed land use (see s. 5.4 regarding recreational impacts). These are a 50 m buffer zone along the eastern boundary of the township bordering Googong Foreshores and a development control (which sets specific criteria) for any dwellings within 150 m of the buffer zone, to protect the waters of the reservoir. A small area within the Googong Township boundary is within the Googong reservoir catchment. This area is zoned for Environmental Conservation under the Local Environmental Plan and is to become an open space area in the township development.

4.3 MANAGEMENT OF WATER SUPPLY

As noted in s. 1.2, water supply infrastructure and the use of water stored in Googong Reservoir are managed by Icon Water. This includes responsibility for the provision and maintenance of water supply and storage infrastructure, dam safety, water distribution network, reservoir drawdown, treatment for drinking purposes, and monitoring of water quality. Icon Water does not have regulatory powers to control land use in the catchment.

The role of the ACT Government, in relation to the ACT Executive's duty of environmental protection under the Googong Dam Act, is to manage activities in Googong Foreshores to ensure that they do not impact adversely on the Area's primary purpose of providing raw water for potable water supply. The ACT Government also regulates the taking of water and the provision of environmental flows from the dam.

4.4 WATER QUALITY

The importance of active catchment management as a first stage in the barriers to protect raw water sources from contamination is given prominence in the *National Water Quality Management Strategy* (ANZECC/ARMCANZ 2000a). The water quality in Googong Reservoir is relatively high (ACT Government 2014). However, maintenance of this condition is uncertain given the lack of coordinated management of the wider catchment (see s. 2.5). As noted in s. 2.5.2. Icon Water has adopted an approach of ongoing catchment surveillance to understand the risks to the water supply. While the ability to influence the quality of the water flowing into the Googong Dam Area is limited, the large capacity of the reservoir and its use in the past as mainly the second choice supply has resulted in a long retention time for inflowing water that is significant for die-off of micro-organisms (see s. 4.4.2). A risk management framework for managing water quality impacts at the Foreshores is contained in Appendix 4.

4.4.1 WATER QUALITY STANDARDS AND GUIDELINES

Under the *National Water Quality Management Strategy* (ANZECC/ARMCANZ 2000a), guidelines have been developed to cover issues across the whole of the water cycle and are updated as required. Of particular relevance to Googong Reservoir are the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC/ARMCANZ 2000b) and the *Australian Drinking Water Guidelines* (NHMRC 2011). These guidelines are not mandatory but set a framework or parameters for specification of guidelines or standards (see **Glossary**) at the state, territory or regional level.

4.4.2 FACTORS AFFECTING WATER QUALITY

Given the water quality benefit of retention of water in Googong Reservoir before its use in water supply; direct contamination in Googong Foreshores, especially in the downstream section near the off-take, may pose a more serious threat than similar contamination higher in the catchment. There is, therefore, a need to manage activities and catchment condition in the Foreshores so as to minimise the risk of adverse effects on water quality. Although pathogens may be effectively inactivated in reservoirs, making them excellent barriers to contamination, storage time is a key factor and inactivation rates are measured in days to weeks (Water Futures/CRCWQT 2004).

Contaminants of most concern in water supply catchments are:

- a) micro-organisms (in particular organisms that are pathogenic or harmful to humans) (see s. 4.4.3)
- b) suspended material (soil and organic debris) (see s. 4.4.4)
- c) excess nutrients (in particular phosphorus and nitrogen) (see s. 4.4.5)
- d) chemicals (including pesticides, herbicides, hydrocarbons) (see s. 4.4.6).

4.4.3 MICRO-ORGANISMS

The most common and widespread health risk associated with drinking water is contamination, either directly or indirectly, by human or animal excreta and the micro-organisms contained in faeces (NHMRC 2011). Micro-organisms (bacteria, viruses, protozoa and helminths) are found in most aquatic environments and some are pathogenic (disease causing) or otherwise harmful to humans. It is not feasible to regularly monitor water bodies for all potential pathogens, and therefore an indicator measure (faecal coliforms) has been developed to use as a guideline. The presence of faecal coliforms in a water sample may be an indication that human or animal faeces have contaminated the water and that harmful, less easily detectable pathogens such as *Cryptosporidium* or *Giardia* may be present (ACT Government 2008). Conventional water treatment reduces, but does not completely eliminate pathogen contamination. *Cryptosporidium*, for example, is resistant to disinfection by chlorine and a proportion of *Cryptosporidium* oocysts are able to pass through filters (Water Futures/CRCWQT 2004).

The first barrier to the entry and transmission of pathogens to the water supply system is to protect the catchment from contamination by human and animal faeces. While human access to reservoirs used for drinking water supply potentially increases the risk of microbial contamination, there is some difficulty in attributing cause and effect, and in particular, linking an aspect of access with the magnitude of an effect (Water Futures/CRCWQT 2004). There is no evidence to date of the managed recreational activities at Googong Foreshores (in particular, water based ones) having a detrimental effect on the microbiological aspect of water quality. It is important, however, to remain vigilant in ensuring that recreational activities continue to be compatible with the primary purpose of supplying high quality raw water.

Pathogen contamination remains a risk to Googong water, with a limited study by Hanigan (2002) indicating the middle and northern parts of the catchment (outside the Foreshores) as primary source areas. On-site sewage systems and septic systems located in the catchment are potential sources of pathogens and nutrients. Local government has the primary environmental and public health responsibilities in relation to these systems under the provisions of the *Local Government Act 1993* (NSW) and, in particular, Clause 29 of the *Local Government (General) Regulation 2005* (NSW).

MICROBIOLOGICAL WATER QUALITY

Objective

- **Water in Googong Reservoir conforms to applicable microbiological standards and guidelines for raw water¹ quality within the framework of the National Water Quality Management Strategy.**

Note: 1 Water held in the reservoir prior to its treatment for domestic water supply.

Policies

- As part of catchment-wide source water protection, control of the potential for contamination of Googong Reservoir by harmful micro-organisms will be given high priority in managing Googong Foreshores. Particular attention will be given to toilet facilities, human access and recreation, stock grazing, and grazing by native and feral animals.

(a) Toilet Facilities

Within Googong Foreshores, toilet facilities comprise:

- nine septic tanks (London Bridge Woolshed toilet block, Chelsea Homestead, rangers' dwellings (one tank serving two houses), Ranger Station/Visitor Centre, ACT Parks and Conservation Service (PCS) staff workshop/recreation room, downstream picnic area near the dam wall, dam wall lookout, water treatment plant site, pump station)
- portable toilet (London Bridge Homestead), replacing a disused long-drop toilet
- pump-out toilet (Tin Hut)
- a waterless composting toilet at the Foreshores Car Park (near the boat ramps).

In addition there are five sites where there may have been septic tanks:

- three former dwellings south of Chelsea Homestead (south-western part of the Foreshores near Burra Road)
- a former dwelling at Tin Hut
- a former homestead now underwater (between the dam lookout and Drumstick Point) (GHD 2007).

With regard to the latter group, it is not known if the septic tanks were backfilled when the houses were buried. There has been no testing to assess the presence of soil or groundwater contamination related to either the operational facilities or from the possible septic tank sites.

Both the present toilet facilities and possible former septic tank sites are considered to represent minor potential point sources for human pathogens and excess nutrients entering the groundwater or potentially reaching the reservoir (GHD 2007). There is a low concentration of these facilities in the Foreshores compared to the adjacent rural sub-divisions of Burra and Urialla. The ACT Government has installed a pump-out toilet with concrete holding tank at Tin Hut and this is probably the most desirable approach for toilet facilities in the area, especially those that are close to the water or to drainage lines. As part of the Googong Lease negotiations, the ACT Government and Icon Water have undertaken to investigate the risks to reservoir water quality from these installations and buried former homesteads.

Actions

- Investigate the septic tanks in Googong Foreshores to determine whether these represent a significant risk to human health and the environment (ACT Government and Icon Water).
- Evaluate the costs and benefits of a staged replacement of septic tanks with concrete tanks that are periodically pumped out, with the contents processed through an off-site sewage facility.

(b) Recreation

Recreational use of water supply catchments and reservoirs has the potential to impact adversely on microbiological water quality and for this reason access is generally prohibited or restricted. This consideration has guided the controlled development of recreational opportunities at Googong Foreshores since 1979. Recreational activities and policies are outlined in Chapter 5.

Actions

Manage recreational use of Googong Foreshores to minimise impact on microbiological water quality, in particular by:

- prohibiting body contact recreation in the reservoir (swimming, windsurfing, water skiing)
- prohibiting other recreational activity that has the potential to adversely affect water quality (Table 5.1)
- providing advisory signs for recreational users on the importance of avoiding body contact with reservoir water and the need for good hygiene
- providing adequate toilet facilities that are regularly monitored and maintained
- prohibiting pets and horse riding
- involving community groups in management activities in the Foreshores aimed at protection of water quality.

(c) Stock Grazing

Domestic animals play a role as reservoirs of pathogens potentially transmissible to humans (O'Neill 1985, pp. 45–46), and faecal contamination from sheep and cattle is potentially a high risk to water quality. In addition, where stock have direct access to streams they cause significant damage to riparian zones (ACT Government 2007a). *Cryptosporidium* is an example of a micro-organism carried by cattle. Contamination is a greater risk from cattle under two years old as they are more likely to scour than mature cattle. Grazing is generally not permitted in the Foreshores, but has been used occasionally for fire fuel reduction and related asset protection in grassland areas (mainly in the Burra Creek area and near the former London Bridge Homestead) and for weed control, in selected areas away from the reservoir shoreline. Grazing is particularly useful to reduce grass cover prior to the spraying of St John's wort. This grazing is permitted in the form of a short term permissive occupancy granted to a local landholder. While grazing is the main land use in the larger catchment, the shorter retention time for inflows to the reservoir from the Foreshores has a potentially greater impact, particularly at times when Googong water is being used. Much of Googong Foreshores is surrounded by pastoral land from which there is incursion of sheep and cattle inside the boundary fence.

In light of its potential to impact on microbiological water quality, stock grazing at Googong Foreshores will only be allowed when and where there is no feasible alternative management option or it is the best option in relation to other management tasks such as fire fuel reduction, asset protection or weed management. Any grazing will be short term and managed (e.g. stocking rates, areas permitted) so that it does not deleteriously impact on vegetation of high conservation value such as threatened ecological communities and their component species (see s. 6.4.3). Grazing will be carried out in accordance with the *Regional Fire Management Plan 2009-2019 Googong Map Sheet* (ACT Government 2009) (see s. 9.1) and with the notification and approval of Icon Water. Calves will not be allowed in the area.

Actions

Manage stock grazing at Googong Foreshores to minimise impact on microbiological water quality, in particular by:

- restricting use of stock grazing to the minimum necessary for fire fuel reduction in grassland, for asset protection, and for weed control, and to areas outside an appropriate buffer from the reservoir
- requiring stock to be more than two years old
- exclusion of stock from ephemeral and permanent streams and drainage lines by fencing and the provision of off-stream watering
- removal of stock as soon as fire fuel reduction, asset protection or weed management objectives have been achieved
- ensuring vegetation cover is not compromised by stock grazing
- maintaining boundary fencing of the Foreshores to prevent stock access from neighbouring properties
- liaison with properties bordering the Foreshores for removal of stray stock.

(d) Grazing by native and feral animals

Feral animals may also be reservoirs of pathogens potentially transmissible to humans (O'Neill 1985, pp. 45–46). Faecal contamination from kangaroos and other native animals presents a lower risk to humans because humans are well separated from these animals in an evolutionary sense. As well as direct water quality effects, management of the numbers of native and feral animals is important in terms of grazing pressure and loss of ground cover. Consequent increased runoff and erosion increases the opportunity for transport of micro-organisms to the reservoir.

Actions

Control populations of native and feral animals at Googong Foreshores to minimise direct and indirect impacts on microbiological water quality, by:

- managing kangaroo densities (see s. 6.7)
- undertaking feral animal control using the most effective current approaches that are also suitable for use in a water catchment.

4.4.4 TURBIDITY AND SUSPENDED SOLIDS

Early concerns about the catchment were focused on erosion and potential sedimentation of Googong Reservoir. Reviews by Starr (1999, 2000) concluded that the catchment was, in general, in a much-improved state compared with the post World War II period. Erosion problem areas in both the Burra Creek and Queanbeyan River catchments were treated under the Lake Burley Griffin Catchment Protection Scheme (Table 2.1) (NSW DLWC 2000). An investigation of sedimentation in the reservoir in 1990, concluded that the volume of sediment was 175 500 cubic metres (0.14 per cent of the storage) (Starr 1999). This is a low rate, comparable to other catchments in the Southern Tablelands. An analysis by Starr (2000) of drainage networks in the catchment since 1944 concluded that many have progressed from erosional systems with high transport efficiency to depositional systems that may filter much of the water flowing through the catchment, which is typical of much of the upper Murrumbidgee Catchment (Starr et al. 1999). The other notable changes have been extensive natural regeneration of tree cover and overall reduction in stocking rates (Starr et al. 1999). High sediment loads occur in Burra Creek, related to the high-energy flows and active erosion of a major alluvial in-fill valley in the creek. Management of the Tinderry Nature Reserve aims to minimise such flows through retention of native vegetation along the creek, an appropriate fire regime and sediment control measures for works (NSW NPWS 1998).

A range of activities has the potential to initiate soil erosion in the catchment. Activities include public and private roadworks, other earthworks on rural properties (including rural residential), forestry operations, overgrazing and riparian grazing. Erosion and removal of burnt material following bushfires in the catchment have the potential to cause serious impacts on reservoir water quality (see s. 9.1).

Turbidity measures the amount of suspended material in water but also includes colouration (e.g. from tannin). Suspended solids comprise organic and inorganic particles of varying sizes, ranging from fine clay soil particles (common in the Canberra region) to coarse plant materials such as leaves. Elevated turbidity levels commonly occur after storm events. In water bodies they can also be due to re-suspension of sediments from shallow areas in windy conditions or result from mechanical disturbance, such as from wash and propellers of powerboats. Turbidity can also derive from roads and stream crossings. Turbidity is an important public health consideration as bacteria and pollutants are often attached to the surface of suspended material.

Minimising ground disturbance, maintaining vegetation especially ground cover, slowing overland flow, restricting activity in erosion-prone areas, and filtering runoff from bare areas (vehicle and walking tracks) all contribute to reducing turbidity. The *ACT Natural Resource Management Plan 2004* set a ground cover target of 90 per cent for 12 months of the year on land classes IV to VI (grazing or mainly grazing land) as a target to minimise exposure of such lands in the Murrumbidgee Catchment to water and wind erosion (ACT NRM Board 2004). This provides a useful measure for the non-forested areas of the Googong Foreshores, except in areas of skeletal soils and bedrock exposure.

TURBIDITY AND SUSPENDED SOLIDS

Objective

- **Water in Googong Reservoir conforms to applicable turbidity standards and guidelines within the framework of the National Water Quality Management Strategy.**

Policies

- Control of the potential for contamination of Googong Reservoir by soil erosion and transport of materials will be given high priority in managing Googong Foreshores.

Actions

- Manage stock grazing and populations of native and feral animals to limit loss of ground cover and soil disturbance, and consequent erosion and transport of material to the reservoir.
- Restrict recreational activities in the steep Eastern Foreshores area (Zone 1B) and areas with low vegetation cover to limit erosion potential (see Chapter 5).
- Undertake stabilisation and erosion control measures in areas of the Foreshores that show evidence of erosion developing.
- Where feasible, direct and filter runoff from bare areas (e.g. vehicle and walking tracks) to detain sediments that might otherwise flow to the reservoir.
- Aim to maintain 90 per cent ground cover for 12 months of the year in non-forested areas of the Foreshores (excluding areas of skeletal soils and bedrock exposure).

4.4.5 EXCESS NUTRIENTS (PHOSPHORUS AND NITROGEN)

Nutrients are a natural component of all water bodies, but increases in their supply often have undesirable effects, including the eutrophication of aquatic ecosystems (ACT Government 2008). Eutrophication is the presence of an abnormally high quantity of plant nutrients. This can lead to excess algal growth including algal blooms that have recreational, ecological and public health implications. Cyanobacteria (blue-green algae) are of particular concern as they can produce toxins that are poisonous to people and animals. Blue-green algae counts typically increase during the summer period at Googong with significant 'blooms' a regular feature (Contos et al. 2008). This may necessitate extra measures in the water treatment process or suspension of the use of the water if counts are too high.

The sources of nitrogen and phosphorus to water bodies are broadly similar, deriving from:

- soils in the catchment
- wastewater and sewage discharges such as septic tank leakage (especially nitrogen)
- fertilisers
- waterbird and other defecation
- releases from lake sediments if oxygen becomes depleted in overlying waters (in these circumstances nitrogen is released as ammonia).

Phosphorus is an essential nutrient in aquatic ecosystems, but high concentrations (especially filterable phosphorus) can result in algal blooms and consequent serious water quality problems. In the ACT region, phosphorus is the nutrient that commonly determines the amount of algae that can occur (described as a 'limiting factor') (ACT Government 2008). The Googong Catchment does not contain major point sources of phosphorus (e.g. sewage treatment plants or intensive agriculture) and similar to the rest of the upper Murrumbidgee Catchment, phosphorus most likely comes from subsoil material derived from channel erosion (Starr 1999). Inputs to the reservoir are therefore directly related to catchment condition and management.

Nitrogen is not generally a limiting factor in algal growth in the ACT region as blue-green algae are able to fix atmospheric nitrogen. Nitrogen is non-toxic to organisms. For this reason priority is given to minimising the input of phosphorus to waterways with nitrogen reduction a second priority (ACT Government 2008).

In the Googong Catchment, as well as eroded subsoil material, the other important potential source of nutrients is from rural residential development in the Burra and Urialla areas. Within Googong Foreshores, control of soil erosion and management of potential point sources of nutrients (e.g. toilets at picnic areas) will limit nutrient transport to the reservoir.

EXCESS NUTRIENTS

Objective

- **Nutrient levels in Googong Reservoir are maintained below levels that result in nuisance or toxic algal growth and conform to applicable nutrient standards or guidelines within the framework of the National Water Quality Management Strategy.**

Policies

- Control of the potential for contamination of Googong Reservoir by excessive nutrient inputs will be given high priority in managing Googong Foreshores.

Actions

- Manage stock grazing and populations of native and feral animals to limit erosion and transport of nutrients (soil phosphorus and nutrients in faecal material) to Googong Reservoir.
- Document and investigate instances of excessive algal growth in the reservoir, with the aim of identifying nutrient sources. If there is evidence of sources within the Foreshores, undertake remedial action where this can be defined and is practicable. For nutrients suspected to have originated outside of the Foreshores, liaise with Icon Water, NSW Government agencies and local government regarding potential sources and corrective measures.
- Monitor and maintain toilet facilities in the Foreshores to ensure that there is no leakage of nutrients to the catchment.
- Prohibit horse riding and bringing domestic pets (dogs, cats) to the Foreshores (Table 5.1).

4.4.6 CHEMICALS AND HAZARDOUS MATERIALS

A wide range of chemicals can be present in raw water and may be naturally occurring (e.g. mineral salts) or derive from use of chemicals in the catchment. Pesticides, herbicides and hydrocarbons are the main products considered here as these chemicals are the ones most likely to present a risk to water quality in Googong Reservoir. Potentially hazardous materials include asbestos building materials, synthetic mineral fibres and polychlorinated biphenyls (PCBs) (GHD 2007).

Pesticides and herbicides

For the purposes of the *Australian Drinking Water Guidelines* (NHMRC 2011), pesticides and herbicides are grouped with other agricultural chemicals as 'pesticides'. Pesticides are an example of contaminants that can be introduced to a water storage by improper use, accidental spillage in a catchment area, or by an intentional act to sabotage the water supply. They can be difficult, if not impossible, to remove by practicable water treatment processes. The Guidelines set out the method for control of pesticide use through a national scheme of registration, and recommend that their use in water or water catchments be authorised only when necessary. Pesticides not authorised for such use should not be present in drinking water. Use, handling, transport and storage of pesticides in Googong Foreshores should be related strictly to standards or guidelines and relevant legislation. Their use is mainly for control of plant and animal pests and for use in water treatment.

Given the level of settlement in the Googong Catchment, there is potential for contamination by agricultural chemicals. However, the types of land uses in the catchment and the low level, dispersed use of chemicals lessen the risk of contamination. One concern is the presence on rural properties of agricultural chemicals now banned from use. At the local government level, collection programs are undertaken for these chemicals with NSW State Government support (e.g. 'Household Hazardous Waste Collection' by Palerang Council). There is a national 'drumMUSTER' program for used chemical containers (see <<http://www.drummuster.com.au>>) and 'ChemClear®' program for agricultural and veterinary chemicals (see <<http://www.chemclear.com.au>>).

Hydrocarbons

Potential entry of hydrocarbons (in particular fuels and oils) to Googong Reservoir is mainly related to the use of internal combustion engines in the area. This potential is limited by the prohibition on public use of petroleum-fuelled powerboats. There is also only a small road network and this limits the potential for these materials to enter the reservoir from the use of motor vehicles.

Hazardous Materials

Hazardous materials are known to be present in some of the buildings at Googong Foreshores and asbestos may be present at sites where buildings were buried.

The potential for chemical contamination and the presence of hazardous materials in Googong Foreshores was included in studies undertaken prior to the signing of the Googong Lease (GHD 2007, 2008). As part of the Googong Lease negotiations, the ACT Government and Icon Water undertook to implement recommendations deriving from these investigations.

CHEMICALS AND HAZARDOUS MATERIALS

Objectives

- **Chemicals and hazardous materials at Googong Foreshores are managed so that they present minimal risks to reservoir water quality and human health.**
- **Chemicals present in Googong Reservoir are in concentrations below applicable raw water standards or guidelines within the framework of the National Water Quality Management Strategy.**

Policies

- Chemical use within Googong Foreshores will be kept to the minimum necessary to undertake management functions.
- Control of the potential for chemical contamination of Googong Reservoir will be given high priority in managing Googong Foreshores.
- Icon Water will be advised of any chemical spills, including hydrocarbons in car park areas.

Actions

- As far as practicable, only use chemicals outside an appropriate buffer distance from the reservoir and away from catchment drainage lines. Use of chemicals for weed control in riparian and shoreline areas (e.g. blackberry control) will be carried out at times when water is not being extracted from the reservoir.
- Minimise chemical usage by application of Integrated Pest Management techniques, and select chemicals and application methods that will have least environmental impact, including impact on reservoir water.
- Use only chemicals that have been approved for use in water catchments.
- Establish protocols for advising Icon Water when pesticides are in use, as well as reporting protocols for accidental spills.
- Manage the use, handling, transport and storage of chemicals in accordance with industry best practice, relevant NSW legislation, and ACT Government procedures and protocols.
- Ensure that all Googong staff are trained in the safe use of chemicals, including emergency management procedures.
- Maintain Material Safety Data Sheets for all stored chemicals, which are available to all relevant personnel.
- Identify, remove or replace any scheduled ozone depleting substances held at the Foreshores.
- Ranger Station – other areas (ACT Government):
 - Undertake an audit and prepare a hazardous substances register for dangerous goods and hazardous building materials.
- London Bridge Woolshed – sheep dip (ACT Government):
 - Manage the sheep dip area to minimise exposure of visitors to the arsenic contaminated soils.
 - Prior to any redevelopment or disturbance at the site, undertake further investigation to assess the extent and degree of contamination, to guide the management of any contaminated soils that would be disturbed by the development.
- Buried Former Homesteads (ACT Government):
 - Prepare a site management plan to manage areas that may contain buried former homesteads at the southern end of the Foreshores, including homesteads at London Bridge and Tin Hut, and other demolished buildings along the Burra Road.
 - Ensure these areas are investigated prior to any excavation or other earth-moving activities.

5 Recreation



5.1 RECREATION: PRIMARY MANAGEMENT OBJECTIVE

- **Googong Foreshores provides a variety of recreational opportunities that are consistent with the protection of the water supply catchment, reservoir water quality, and natural and cultural heritage values.**

5.2 RECREATIONAL USE OF WATER SUPPLY STORAGEES

Recreational use of water supply catchments and reservoirs is generally prohibited or restricted in Australia as it potentially impacts on water quality. The most effective means of assuring drinking water quality and protection of public health is through adoption of a preventive management approach that encompasses all steps in water production from the catchment to the consumer. The key aspect of this approach is the establishment of measures to prevent contamination of water in the form of multiple barriers. These barriers may be grouped into those that operate prior to extraction of the water (catchment management and source water protection, detention in protected reservoirs or storages) and those in place from the point of extraction (extraction management, treatment, distribution). The strength of this approach is that a failure of one barrier may be compensated by the effective operation of the remaining barriers (NHMRC 2011, Chapter 3).

The focus of preventive measures depends upon the characteristics of the source water. For those Australian urban areas where water is sourced primarily from protected upland catchments (e.g. Melbourne, Sydney) the emphasis is on maintaining prevention of contamination at the source. In contrast, this is not possible for Adelaide, which draws water from multiple use catchments and the Murray River, and therefore must heavily weight barriers towards water treatment.

In the ACT, the Cotter Catchment has a relatively high level of protection due to its largely undisturbed character. The potential for water supply from the Queanbeyan River Catchment was recognised in choosing the site of the national capital (e.g. granting of paramount water rights to the Commonwealth) and under the Seat of Government Act, NSW is obligated to protect the waters from pollution. As discussed in Chapter 2, Googong Reservoir is established in a catchment that is adversely affected by a range of rural land uses and is under pressure for the expansion of rural residential development (Contos et al. 2008). From its inception, weighting had to be given to treatment of the water. More recently, urban development (Googong Township) has been approved, adjacent to the boundary of the Foreshores (see s. 2.3). The land involved is mostly outside the catchment of the reservoir; however, there are potentially significant impacts of such a development through increased recreational and access pressures. A number of measures are to be put in place by the Googong Township Pty Ltd aimed at avoiding such impacts on the Foreshores (see s. 4.2 and s. 5.4). These measures are detailed in a Googong Foreshores Interface Management Strategy.

An important aspect of the first set of barriers (catchment management, source protection and reservoir detention) is control of access and activities that potentially threaten water quality. Catchments may be completely closed with no human or livestock access (e.g. forested catchments of Melbourne Water) or allow some controlled public access (e.g. Cotter Catchment where permitted access is defined in a management plan (ACT Government 2010b)). Reflecting its particular circumstances (see s. 5.3), the level of recreational access at Googong Foreshores is greater than that found in comparable Australian metropolitan catchments and storages, with only Brisbane permitting similar levels of access (Water Futures/CRCWQT 2004).

Recreational access to catchments can be a contentious issue, and where permitted, involves trade-offs between public amenity and public safety (contamination of the water supply) and requires an appropriate risk management strategy (Appendix 4). The types of recreational activities, their permitted locations, numbers of people involved and the provision of facilities need to be considered. Such recreational planning means that some activities will be allowed, others prohibited and all will be subject to restrictions. An important aspect of managing recreational use in a water supply catchment is making users aware of that primary purpose and the need to adjust their behaviour accordingly.

5.3 DEVELOPMENT OF RECREATIONAL POLICIES FOR GOOGONG FORESHORES

At the time the Googong Dam was being constructed in 1977, government agencies involved with the project formulated a program for the development of recreation in Googong Foreshores including the waters of the reservoir. It was decided to develop and manage the Area for multiple-use, based around the primary water supply purpose (Department of the Capital Territory 1979). This decision was influenced by the need to treat the water before supply due to the occupied catchment, overseas trends in use of water supply reservoirs, and an expected increase in water based recreational demand. Recreational activities would be limited, phased in over time and evaluated, and management zones established.

The Foreshores was opened to visitors in 1979 commencing a six-stage program. In 1980 hand launched, non-powered boats were permitted on the reservoir and vehicle access was opened to the southern foreshores (Woolshed area). In 1982 small electric powered boats were permitted on the reservoir. From 1980 a fish stocking program was undertaken (Shorthouse 1983). The directions outlined in the Department of Capital Territory Report in 1979 and the subsequent staged introduction of recreational activities provided an enduring basis for management of recreation in the Foreshores over the following two decades.

Current management of recreational use at Googong Foreshores, in order to protect reservoir water quality, is influenced by a number of factors that are still evolving, namely:

- the enhanced role of Googong Reservoir for the ACT and Queanbeyan water supply
- more stringent management of the risks to potable water supply (a global trend)
- intensification of residential settlement in close proximity to the Foreshores, in particular, the adjacent Googong Township development
- pressures that climate change may place on the management of water resources in the region.

The established pattern and level of recreational use are considered sustainable as there is no evidence of significant environmental impact from these activities at present. To ensure that recreational activities continue to be managed at a sustainable level, the ACT Government will incorporate the principles defined in s. 2.8 into management of the Foreshores. The basis of such management is sound planning, regular monitoring, provision of educational material, limitations on access, and regulation of activities where necessary. It is a condition of the Googong Lease (Clause 4.1(e)) that the Foreshores must only be used for the existing type of recreational use occurring in the Area at the time of the signing of the lease (Commonwealth of Australia 2008). This plan of management aims to maintain the established types and patterns of recreational use at Googong Foreshores (see s. 5.4.1), but recognises that recreational pressures are likely to increase, related to regional population growth and developments on the boundary of the Foreshores. Recreational infrastructure is shown in Figure 5.1. Facilities are limited and support the existing types and patterns of recreational use.

5.4 RECREATIONAL USE

Although the primary function of Googong Foreshores is urban water supply, the Area has developed into a recreational resource of considerable value to the residents of Canberra, Queanbeyan and adjacent areas. It is intended that recreational use of Googong Foreshores remains low-key with a matching level of facilities. Fishing is the most popular activity and swimming (below the dam), walking, mountain bike riding, picnicking and nature based activities such as bird watching are also popular. In the southern section of the Foreshores, London Bridge Natural Arch (limestone formation) and London Bridge Homestead attract many visitors. Visitor numbers to the Foreshores have been recorded by automatic road sensor since 1992, averaging 53 000 annually. Lowest numbers (23 000) were in the drought conditions of 2003, when boat access was limited. The highest visitor numbers were in 1996, with 72 000 recorded. Visitor numbers are likely to increase as nearby residential developments proceed.

As well as the constraints imposed by existing recreational policies and associated access and infrastructure, the potential for recreation is partly determined by the local environment. The eastern part of the Foreshores area is steep, rugged and relatively inaccessible country. The waters of the reservoir are extremely cold in winter, fogs are common and the prevailing winds are from the north-west and therefore towards the inaccessible eastern shores.

An important aspect of the development of recreational use of Googong Foreshores has been the acceptance by visitors of limitations on the types of activities allowed, restrictions on access to some areas, the provision of relatively low-key recreational facilities, and the opening of the Area for day use only. Opening hours are extended during the daylight-saving period in summer. Opening hours for the reserve will be dependent on available resources to adequately monitor and regulate recreational use. When the gates are closed, members of the public are not permitted into the reserve, even on foot.

Incidences of unauthorised access (outside opening hours) currently occur at Googong Foreshores and there could be an increase in this problem from the growing urban development on the boundary. Should such access, and inappropriate activities, put at risk the protection of reservoir water quality, water supply infrastructure and management assets, it may be necessary to enhance protection measures and/or adopt more restrictive access policies, as apply in other water supply catchments.

In relation to the requirements of the Commonwealth lease and to provide the basis for future management of the Foreshores, it is important that a recreational study be undertaken involving survey, monitoring and reporting. This would result in a better understanding of the recreational use of the Foreshores and changes in that use over time. Such a study would go beyond a simple estimation of the number of visitors, to include the origins of visitors, places visited in the Foreshores, frequency of visits, activities undertaken, use of facilities, understanding of the requirements regarding maintenance of water quality, and participation in particular activities (e.g. open days at heritage sites). Surveys could include attitudinal and behavioural aspects, which could also be used to guide management. Such a study would need to be undertaken over a number of years to take account of development occurring in the region, and be scientifically and statistically robust. The initial time frame would be the five year life of this plan of management. An initial funding contribution for the recreational study has been provided by Googong Township Pty Ltd (developers of the Googong Township).

RECREATIONAL USE

Objectives

- **Googong Foreshores is used for recreational activities that: (a) do not conflict with the primary water supply purpose of the Area, and (b) are compatible with the conservation of the natural and cultural values of the Area.**
- **Visitor access and facilities are provided that support appropriate recreational activities and enhance visitor experiences, consistent with the protection of water quality and the other values of Googong Foreshores.**

Policies

- A study of recreational use of Googong Foreshores will be designed and undertaken, initially over the term of this plan of management.
- The progress of this study will be reported annually, with a five year report to assist with the review of this plan of management.
- A steering committee will be formed to commission and oversee the study, including representatives from the Commonwealth Government, ACT Government, Icon Water, Queanbeyan City Council, Googong Township Pty Ltd, and the Molonglo Catchment Group (or one of its member organisations in the Googong catchment).

Actions

- Design and undertake a study of recreational use of Googong Foreshores, initially over the term of this plan of management.
- Establish a steering committee to commission and oversee the Googong Foreshores recreational use study.
- Use the results of the study to review the recreational policies in this plan of management, including controls on access and provision of recreational facilities, when the plan is reviewed after five years.
- Report the results of the recreational use study to the Commonwealth Government, in relation to the provisions of the Googong Lease.

5.4.1 RECREATIONAL ACTIVITIES

The main recreational activities occurring at Googong Foreshores are discussed briefly below. Policies for specific recreational activities, permitted activities in management zones defined for the Foreshores, and prohibited activities are shown in Table 5.1.

Policies

- Recreational use of Googong Foreshores will be managed so that the primary purpose of water supply is not adversely affected by recreational activities. This will involve prohibition of certain activities and strict controls over others.
- Recreational use of Googong Foreshores will be managed so that the natural and cultural heritage values are conserved.
- Management of Googong Foreshores will seek to maintain the established types and patterns of recreational use.

a) Fishing

Fishing is the most popular recreational activity at Googong Foreshores, evident by the drop in visitor numbers in the drought period 2002–2005 when the (low) water level was inaccessible from the boat ramp. Only non-motorised boats or those with electric motors are allowed on the reservoir.

Historically, the Queanbeyan River supported good numbers of cod and perch (Lintermans 2002) and prior to the construction of Googong Dam, was a popular trout fishery. Macquarie Perch (*Macquaria australasica*) were still present in the river at that time. Googong Reservoir has been managed as a mixed fishery with stocking of native and alien species. Stocking commenced in 1980 with Rainbow Trout (*Oncorhynchus mykiss*) and Brown Trout (*Salmo trutta*) (ACT Parks and Conservation Service 1988). Rainbow Trout have been regularly stocked since that time; however, the stocking of Brown Trout was discontinued in 1997 due to concern for conservation of threatened native fish species (NSW Fisheries 2003). Native fish stocked are Murray Cod (*Maccullochella peelii peelii*), Golden Perch (*Macquaria ambigua*) and Silver Perch (*Bidyanus bidyanus*). The alien Redfin Perch (*Perca fluviatilis*) is present in the reservoir and is sought by anglers. Though there have been some captures and unconfirmed sightings, Carp (*Cyprinus carpio*) have not yet established in the reservoir (Lintermans 2002).

The Googong fishery is jointly managed by the NSW Department of Primary Industries and the ACT Government, with the NSW Government providing fish stocks. Fish stocking activities (species and numbers stocked) are guided by the *Fish Stock Plan for the ACT 2015-2020* (ACT Government 2015). NSW fisheries legislation applies to the Area and fishers require a NSW fishing licence. The waters within Googong Foreshores are declared 'trout waters' and the reservoir is open to fishing all year round. River sections and tributaries outside of the reservoir waters are subject to a closed season from the end of the long weekend in June to the beginning of the long weekend in October. A closed season for Murray Cod applies from 1 September to 30 November inclusive. Macquarie Perch (see s. 6.5) are totally protected and must not be taken. Information on fishing regulations is provided in publicity brochures and on signs at Googong Foreshores.

b) Boating

Conventional powerboats (i.e. those using petroleum fuels) are prohibited on Googong Reservoir. The only exceptions to this are boats used for: (a) management purposes; (b) water supply management (e.g. water quality monitoring); and (c) emergency purposes such as rescue. Such craft should be maintained to a high standard and use motors with the lowest possible hydrocarbon input to the waterway. The prohibition on recreational use of petroleum-fuelled powerboats is based on the potential risk to water quality in the reservoir. Conventional water treatment plants, such as the one at Googong, are not capable of removing hydrocarbons. In addition, conventional powerboats have a much greater capacity to create turbidity through wash and propeller agitation.

Boats with electric motors and non-motorised craft such as rowing boats, sailing boats, canoes and kayaks are permitted on the reservoir. Windsurfers, surf skis and other water craft such as stand up paddle boards, are not permitted given the high level of body contact with the water by users of these craft.

It is common for boats using electric motors on Googong Reservoir to have been designed mainly for use with petrol engines (usually outboard motors). Many have fuel lines and fixed fuel tanks or containers. In some instances fuel motors may be cumbersome to remove. While still requiring that an electric motor be used, these boats will be allowed on the reservoir with such fittings, provided that boat operators ensure that the fittings are secure and do not leak fuel into reservoir waters. Random inspections will be undertaken of such craft.

Most boat use is for fishing but there is a low level of other use e.g. recreational canoeing and kayaking. The only public boat ramp at the Foreshores is at Drumstick Point, which accesses the open northern waters of the reservoir. Boats can be launched near Tin Hut Car Park in the southern section of the Foreshores, but must be carried or wheeled by hand 300 m to the water's edge. A number of factors limit non-powered boat use, in particular, lack of easy access to the more protected southern section of the reservoir, prevailing wind conditions, and cold water (winter and spring) that can make conditions unsafe. There is no water rescue patrol or service; though a conventional powerboat is maintained for management and emergency purposes. NSW Maritime boating regulations apply to reservoir waters and the

Googong reservoir falls under the classification of alpine waters for which special conditions apply. In addition, a permit issued by the ACT Government is required to operate a boat on Googong Reservoir.

c) Walking

There are no data on use of the Foreshores for walking, which is a popular activity in the area. A number of short and long walks have been developed, some of which lead to particular attractions. These are shown in the *Googong Foreshores: Map and Guide*.

d) Bike Riding

Cycling at Googong Foreshores is restricted to formed roads and vehicle tracks. Two tracks are particularly suitable for mountain bike riding: the Western Foreshores track from the Foreshores Car Park to Tin Hut Car Park; and the Queanbeyan River Loop, in the south-eastern part of the Foreshores.

e) Picnicking

This is a popular activity at Googong Foreshores and may be associated with other activities such as swimming at the Cascades, walking to London Bridge Arch or viewing the dam and waters from the northern lookouts. Picnic and gas barbecue facilities have been provided at the Downstream Picnic Area and Foreshores Car Park in the northern section of the Foreshores, and at London Bridge Woolshed and Tin Hut in the south.

f) Bird watching (and similar nature based activities)

Googong Foreshores provides a range of habitats for birds including waterbirds and raptors and bird watching is an attraction of the area. Three bird hides are located at Tin Hut Dam.

g) Visiting Natural and Cultural Heritage Sites

The limestone formation of London Bridge Arch, reached by a short walk from London Bridge Car Park, is a particular attraction in the southern section of the Foreshores. London Bridge Homestead is reached by a longer walk. The homestead is surrounded by a security fence but is open to the public on regular open days. Near the London Bridge Car Park, the woolshed (with evidence of a lever wool press), the more recent shearers' quarters and remnant large woodland trees provide an attractive picnic area.

h) Swimming

Swimming is a popular activity in the Queanbeyan River downstream of the dam wall especially at the Cascades. Swimming is not permitted in the reservoir.

Table 5.1 Policies for recreational activities and permitted activities in Googong Foreshores management zones (refer to map 3.1)

Recreational Activity and Policy	Zone 1 Restricted	Zone 2 Low Impact Recreation	Zone 3 Serviced Recreation Areas
Permitted Activities			
Fishing Fishing will be permitted and appropriate (limited) facilities provided. NSW fishing regulations apply to the Foreshores.	Zone 1A: Yes from boats; no fishing from shore; boats must not enter the area between the line of marker buoys and dam wall Zone 1B: Yes	Zone 2A: Yes Zone 2B: Not encouraged Zone 2C: Yes	Zone 3A: Yes Zone 3B: Yes

Recreational Activity and Policy	Zone 1 Restricted	Zone 2 Low Impact Recreation	Zone 3 Serviced Recreation Areas
<p>Boating</p> <p>Public use of conventional powerboats (i.e. those using petroleum fuels) is not permitted on Googong Reservoir.</p> <p>Non-powered boats and boats with electric motors will be permitted on the reservoir, subject to the regulations of NSW Maritime. A permit issued by the ACT Government is required to operate a powered boat on Googong Reservoir.</p> <p>(Conventional powerboats are used for management, water supply and emergency purposes.)</p>	<p>Zone 1A: Yes; no landing on shore; boats must not enter the area between the line of marker buoys and dam wall</p> <p>Zone 1B: N/A</p>	<p>Zone 2A: N/A</p> <p>Zone 2B: N/A</p> <p>Zone 2C: Yes</p>	<p>Zone 3A: N/A</p> <p>Zone 3B: Yes</p>
<p>Walking</p> <p>Walking will be encouraged on designated walking tracks, formed vehicle roads and tracks, and appropriate facilities provided.</p>	<p>Zone 1A: No</p> <p>Zone 1B: Not encouraged, no facilities or information</p>	<p>Zone 2A: Yes</p> <p>Zone 2B: Not encouraged, no facilities or information</p> <p>Zone 2C: N/A</p>	<p>Zone 3A: Yes</p> <p>Zone 3B: Yes</p>
<p>Bike Riding</p> <p>Bike riding will be permitted on formed vehicle roads or tracks.</p>	<p>Zone 1A: No</p> <p>Zone 1B: Not encouraged, no facilities or information</p>	<p>Zone 2A: Yes</p> <p>Zone 2B: Not encouraged, no facilities or information</p> <p>Zone 2C: N/A</p>	<p>Zone 3A: Yes on sealed access roads</p> <p>Zone 3B: Yes</p>
<p>Picnicking</p> <p>Picnicking is encouraged where appropriate facilities are provided. Rubbish bins are not provided and signs request visitors to take their rubbish with them. Lighting fires is prohibited (see s. 5.4.4.).</p>	<p>Zone 1A: No</p> <p>Zone 1B: Not encouraged, no facilities or information</p>	<p>Zone 2A: Not encouraged, no facilities or information</p> <p>Zone 2B: Not encouraged, no facilities or information</p> <p>Zone 2C: N/A</p>	<p>Zone 3A: Yes</p> <p>Zone 3B: Yes</p>
<p>Bird Watching (and similar nature based activities)</p> <p>Bird watching (and similar nature based activities) will be encouraged and supported.</p>	<p>Zone 1A: Yes; no landing on shore; boats must not enter the area between the line of marker buoys and dam wall</p> <p>Zone 1B: Not encouraged, no facilities or information</p>	<p>Zone 2A: Yes</p> <p>Zone 2B: Not encouraged, no facilities or information</p> <p>Zone 2C: Yes</p>	<p>Zone 3A: Yes</p> <p>Zone 3B: Yes</p>

Recreational Activity and Policy	Zone 1 Restricted	Zone 2 Low Impact Recreation	Zone 3 Serviced Recreation Areas
<p>Visiting Natural and Cultural Heritage Sites</p> <p>Visiting natural and cultural heritage sites will be encouraged and appropriate facilities and interpretative information provided (including requirements for protection of the sites). Access to particular Aboriginal heritage sites may be restricted or not promoted due to their cultural sensitivity.</p>	<p>Zone 1A: N/A Zone 1B: N/A</p>	<p>Zone 2A: N/A Zone 2B: N/A Zone 2C: N/A</p>	<p>Zone 3A: N/A Zone 3B: Yes</p>
<p>Swimming</p> <p>Swimming will be permitted only in the Queanbeyan River downstream of the dam wall with appropriate warning signs as to the changing conditions due to possible fluctuations in temperature and flow.</p>	<p>Zone 1A: No Zone 1B: No</p>	<p>Zone 2A: No Zone 2B: No Zone 2C: No</p>	<p>Zone 3A: Yes Zone 3B: No</p>
Prohibited Activities			
<p>Camping</p> <p>Prohibited because of potential to adversely affect water quality. As part of securing the water storage, Googong Foreshores is closed at night.</p>	No	No	No
<p>Boating (petroleum-fuel powered boats)</p> <p>Prohibited because of potential to adversely impact on water quality e.g. hydrocarbons, turbidity derived from wash and propeller action.</p> <p>(Prohibition does not apply to boats used for management, water supply and emergency purposes.)</p>	No	No	No
<p>Trail Bike Riding and Off-road Vehicle Use</p> <p>Prohibited because of potential to adversely affect water quality. Maintenance of boundary fencing is important.</p>	No	No	No
<p>Horse Riding</p> <p>Prohibited because of potential to adversely affect water quality and natural heritage values and to conflict with other activities.</p>	No	No	No
<p>Bringing Pets (dogs, cats)</p> <p>Prohibited because of potential to adversely affect water quality and natural heritage values and to conflict with other activities. Guide dogs are permitted.</p>	No	No	No
<p>Windsurfing, Surf Ski Use, Paddle boarding and similar watercraft activities</p> <p>Prohibited because of potential to adversely affect water quality through body contact.</p>	No	No	No

Recreational Activity and Policy	Zone 1 Restricted	Zone 2 Low Impact Recreation	Zone 3 Serviced Recreation Areas
<p>Water Skiing, Wakeboarding</p> <p>Not applicable due to prohibition on recreational use of conventional powerboats, as well as prohibition on body contact recreation in the waters of the reservoir.</p>	No	No	No
Events and Groups: Permit Requirements			
<p>Events</p> <p>Small, low-key events only, may be permitted subject to consultation with Icon Water (if water quality implications need to be ascertained*). These will require the written approval of the manager of Googong Foreshores, which may contain specific conditions. Approval will only be given if the event accords with the management objectives; does not have the potential to adversely affect water quality or impact on other values; and where event organisers have agreed to conditions proposed by management. Large events will not be permitted.</p> <p>* An example would be a fishing competition on the reservoir. Consultation would not be required for ranger guided activities such as an open day at London Bridge Homestead.</p>	No	<p>Zone 2A: Yes Zone 2B: No Zone 2C: Yes, permit required from NSW Maritime</p>	Yes
<p>Commercial Guided Activities</p> <p>May be permitted, subject to consultation with Icon Water (if water quality implications need to be ascertained), and with written approval of the manager of Googong Foreshores. Approval may contain specific conditions. Approval will only be given if the activity accords with management objectives and policies; does not have the potential to adversely affect water quality; or impact on other values. Approval will be in accordance with current policies for commercial operators in areas managed by the ACT Government.</p>	No	Yes, subject to approval	Yes, subject to approval
<p>Non-commercial Groups</p> <p>No permit required. Any activity needs to accord with the management objectives for the Foreshores and it should not have the potential to adversely affect water quality or impact on other values.</p> <p>For large groups, the manager of Googong Foreshores should be advised and Icon Water consulted (if water quality implications need to be ascertained).</p> <p>Access for groups to the London Bridge Homestead can be arranged through the Ranger Station at the northern entrance.</p>	No	Yes	Yes

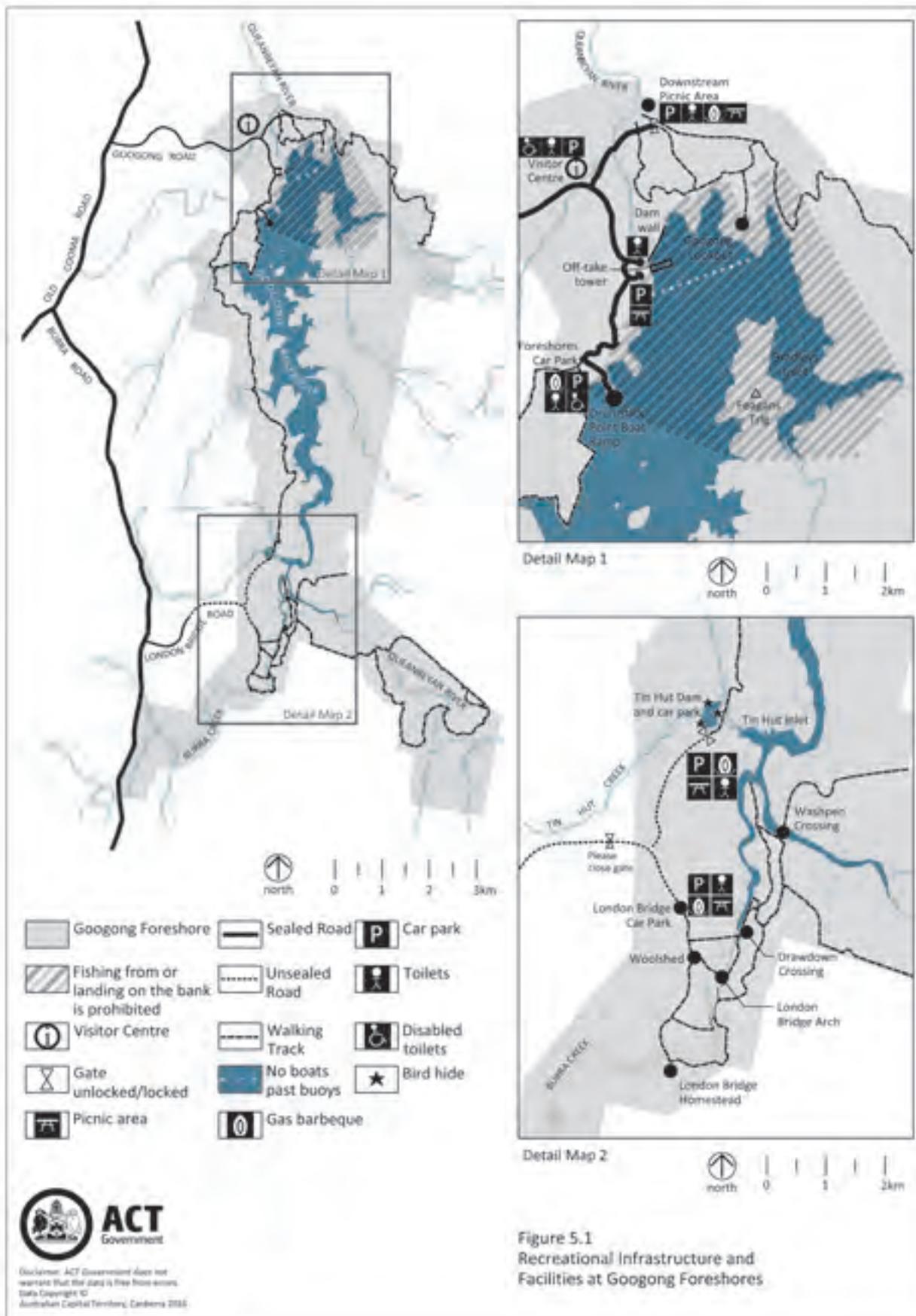
Recreational Activity and Policy	Zone 1 Restricted	Zone 2 Low Impact Recreation	Zone 3 Served Recreation Areas
<p>Educational Tours and Activities</p> <p>No permit required. Encouraged, provided that the activity accords with the management objectives and policies, does not have the potential to adversely affect water quality, or impact on other values. The manager of Googong Foreshores should be advised and Icon Water consulted if it is proposed to include the water supply function in the tour.</p>	No	Yes	Yes

In relation to the policies detailed in Table 5.1, management actions where required are outlined in Table 5.2.

Table 5.2 Management actions related to policies for recreational activities at Googong Foreshores

Activity	Actions
Permitted Activities	
Fishing	<ul style="list-style-type: none"> (a) Provide information in brochures and signs on requirements for fishing (including permitted bait, bag limits, closed seasons, threatened species, permitted boats and gear, safety information and emergency contacts). Advise that NSW fishing regulations apply. (b) Maintain the fish stocking program in conjunction with the NSW Department of Primary Industries. (c) Undertake inspections to ensure that fishers comply with the NSW fishing regulations.
Boating	<ul style="list-style-type: none"> (a) Provide information in brochures, signs and at the Ranger Station on requirements for boating and boating safety (noting that the waters can be dangerous and that there is no patrol but an emergency rescue service is provided). (b) Provide information in brochures and signs on restrictions applying to Zone 1A. (c) Advise boat users that NSW Maritime boating regulations apply and a permit issued by the ACT Government is required to operate a powered boat on Googong Reservoir. (d) Maintain the prohibition on the use of conventional powerboats on Googong Reservoir (except those used for management, water supply, or emergency purposes). (e) Ensure that the car park allocated for people with disabilities near the Drumstick Point boat ramp can accommodate vehicles and trailers in accordance with Australian Standards. (f) Maintain the current boat access arrangements (main ramp at Drumstick Point, hand launching at end of access path from Tin Hut Car Park). (Boating is normally permitted at all times when the Reserve is open, see s. 5.4). (g) Provide information on avoiding the transfer of aquatic weed species from other waterways to the reservoir. (h) Maintain toilet facilities near the boat ramp.
Walking	<ul style="list-style-type: none"> (a) Provide information in brochures and signs on walking opportunities and information regarding hazards to water quality from not using toilet facilities.
Cycling	<ul style="list-style-type: none"> (a) Provide information in brochures and signs on cycling opportunities. (b) Advise that cycling is permitted on roads and vehicle tracks (fire trails) but is not permitted on foot tracks.

Figure 5.1 Recreational infrastructure and facilities at Googong Foreshores



Activity	Actions
Picnicking	<ul style="list-style-type: none"> (a) Provide information in brochures and signs on availability of picnic and barbecue facilities. (b) Advise that the lighting of fires is prohibited. (c) Advise that portable gas barbecues cannot be used when the fire danger rating is Very High or above. (d) Do not provide rubbish bins. Maintain signs indicating that no bins are provided and visitors are to take their rubbish home. (e) Maintain toilet facilities at high use picnic areas.
Bird Watching (and similar nature based activities)	<ul style="list-style-type: none"> (a) Provide information as appropriate in brochures and signs on bird watching and similar nature based activities. (b) Maintain the facilities and information at Tin Hut Dam for birdwatching.
Visiting Natural and Cultural Heritage Sites	<ul style="list-style-type: none"> (a) Provide information in brochures and signs on natural and cultural heritage sites including requirements for their protection. Inform visitors that the area is a Wildlife Refuge under NSW legislation and that some sites are nominated to, or placed on the Commonwealth Heritage List and protected under the provisions of the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cwlth). (b) Maintain security fencing around London Bridge Homestead and continue regular public open days. (c) Restrict or do not promote access to particular Aboriginal heritage sites if this is required due to their cultural sensitivity and/or vulnerability to accidental or deliberate damage.
Swimming	<ul style="list-style-type: none"> (a) Provide information in brochures and signs on the permitted location for swimming (Queanbeyan River, downstream of the dam wall), and prohibition on swimming elsewhere in Googong Foreshores. (b) Install a warning sign that jumping and diving from rocks at the Cascades is not permitted, and advising of the hazards of changing water temperatures and flow conditions.
Prohibited Activities	
Listed in Table 5.1	(a) Provide information in brochures and signs on activities that are prohibited. Provide explanation as appropriate.

5.4.2 RECREATIONAL FACILITIES

Recreational facilities at Googong Foreshores have been developed progressively since the Area was opened for recreation. Facilities are suited to low-key day use and the most developed facilities are located below the dam wall (Zone 3A) or away from the reservoir shoreline (Zone 3B). The main facilities are roads and vehicle tracks, car parks, walking tracks, picnic and barbecue areas, a sealed boat ramp (Drumstick Point), toilets, information signs, bird hides and screens, lookouts and the Ranger Station (see Figure 5.1). Rubbish bins are not provided at Googong Foreshores and signs advise visitors to take their rubbish with them when they leave.

This type and level of facilities is appropriate to the objectives for recreational use of the Googong Foreshores and expansion of the facilities is not proposed, except to improve functioning, performance or safety.

Policies

- Visitor facilities will be provided that are appropriate to the management of Googong Foreshores for low-key day use recreation.
- Visitor facilities will be provided that support permitted recreational activities and enhance visitor experiences.
- Visitor facilities will be designed and maintained to minimise impacts on reservoir water quality and other values of Googong Foreshores.
- Any proposal to expand visitor facilities and infrastructure will be referred to the Commonwealth Government, in relation to the requirements of the Googong Lease.

Actions

- Assess the likely impact on water quality in Googong Reservoir arising from upgrades or changes to existing facilities.
- Maintain all visitor facilities to a high standard, including visitor information.
- Provide appropriate access and facilities for visitors with disabilities (this may not be practicable in all areas).

5.4.3 RECREATIONAL IMPACTS

All visits to Googong Foreshores potentially have an impact. An important role of management is to assist visitors in making that impact negligible. Impacts may be physical (e.g. contamination of the reservoir water, disturbance to wildlife, removal of items from cultural heritage places) and/or social (effects on the enjoyment of other visitors). Visitor behaviour and purpose, numbers, frequency of use, and site characteristics are factors that influence impacts and the necessary management approaches. For Googong Foreshores a key consideration is the understanding by visitors of the primary water supply purpose of the Area and how certain activities and behaviour might compromise the maintenance of water quality. The Googong Township Pty Ltd has made a commitment to undertake an education program for incoming residents of Googong Township to educate them about the biodiversity values of Googong Foreshores and the presence in the township area and the Foreshores of 'matters of national environmental significance' (EPBC Act (Cwlth), see s. 1.4.2 and Chapter 6). Related to this, it is also desirable that residents are made aware of the primary water supply role of Googong Reservoir and the importance of maintaining water quality.

The increased importance of the Googong water supply and future pressures from urban growth (see s. 5.3) will require increased focus on monitoring and managing recreational impacts. Recreational policies at Googong to date have excluded many activities and facilities that typically require major management input, such as built accommodation, camping areas, four-wheel drive touring, overnight bushwalking and camping, and active and high impact recreational activities (e.g. power boating, scenic driving).

Policies

- Threats to reservoir water quality and the conservation of natural and cultural values will be key considerations in evaluating recreational impacts.
- Recreation management in the Foreshores will be informed by monitoring (see s. 5.4).
- Advice will be provided to the Googong Township Pty Ltd and to residents of Googong Township in relation to maintaining water quality in Googong Reservoir and protecting the natural and cultural values of the Area.
- The Foreshores will be maintained as a day use area with the two existing access points closed by locked gates at night.

Actions

- Manage recreational activities to minimise (a) the risk of body contact with reservoir water (see s. 5.4.1 and s. 5.4.2) and (b) the potential for erosion and transport of sediments to the reservoir.
- Provide information about appropriate behaviour (including good hygiene practices) to protect water quality.
- Manage recreational activities to minimise impact on natural and cultural values by controlling access, educating visitors, providing protection measures, and monitoring.
- Liaise with the Googong Township Pty Ltd and provide advice to residents of Googong Township in relation to maintaining water quality in Googong Reservoir and protecting the natural and cultural values of the Area, in particular, with regard to appropriate recreational activity in the Foreshores.

5.4.4 VISITOR SAFETY

There is some level of risk associated with all recreational activities. Risk is not an absolute in itself, as the competency of those undertaking the activity is a significant factor in mitigating the risk. Outdoor pursuits sometimes require critical judgements to be made, which are based on a combination of skills, knowledge and experience. The duty of Googong management is to identify foreseeable risks and take reasonable steps to reduce them, particularly for people who may not be capable of recognising the risk or the magnitude of the risk. However, managers cannot take complete responsibility for the safety of those who visit Googong.

The most significant risks at Googong Foreshores are those associated with boating, in particular, drowning and hypothermia (potentially in association with one another). There are also risks associated with swimming in the Queanbeyan River below the dam wall, in particular, injury or drowning related to jumping or diving from rocks at the Cascades, being swept downstream during high flows, and hypothermia due to cold water temperatures.

The hazards of boating on Googong Reservoir have been noted in s. 5.4.1(b) and the required management actions in Table 5.2. This may be particularly important to: (a) boat users who are unfamiliar with the area and weather conditions, (b) those venturing onto the water in winter and spring, and (c) those using a boat with no mechanical power source (e.g. canoe or kayak). It is important that boat users plan for the worst conditions and are properly equipped as there is no water rescue patrol or service. Information on boating safety is provided in the *Googong Foreshores: Map and Guide* and signs.

Policies

- Information will be provided to visitors to Googong Foreshores on the more significant risks associated with their visit. Particular attention will be given to boating safety.

Actions

- Provide information in brochures, signs and at the Ranger Station on boating safety (repeat of Action in Table 5.2).
- Install a warning sign that jumping and diving from rocks at the Cascades is discouraged, and the hazards of changes in flow (repeat of Action in Table 5.2).
- Maintain the prohibition on lighting fires and use of portable barbecues when the fire danger rating is Very High or above, and closure of the Foreshores on total fire ban days (see s. 9.1.3).
- Provide appropriate advice (e.g. warning signs) if undertaking pest animal baiting or other activities using chemicals.
- Provide contact/emergency contact phone numbers on signs and other information material.

5.5 TOURISM

Tourism refers to visits to Googong Foreshores by people from other parts of Australia or other countries that is of a social, cultural or recreational nature. This is different from local or regional recreational use. While Googong Foreshores might be included in the range of attractions to visitors to the ACT and region, the Area will not be specifically marketed as a tourist destination. This is in keeping with the Area's primary purpose, the low-key nature of recreation activities undertaken there, and the management policy of maintaining recreational use of the Foreshores at the established types and patterns of use.

Policies

- Specific programs to promote Googong Foreshores for tourism and to increase visitor numbers will not be undertaken, in accordance with the primary water supply purpose, conditions of the Googong Lease, and the low-key nature of recreational activities in the Area.

6

Natural Values



6.1 NATURAL VALUES: PRIMARY MANAGEMENT OBJECTIVES

- **The biodiversity, geodiversity and landscape values of Googong Foreshores are conserved.**
- **Ecosystems are managed so that they continue to function and evolve naturally and the integrity of landscapes and scenery is protected.**

6.2 BIODIVERSITY AND GEODIVERSITY

6.2.1 BIODIVERSITY

Googong Foreshores contains an extensive area of intact forest and woodland, a diversity of habitats, threatened plant and animal species, and distinctive geological and geomorphological features. There are about 3000 ha of relatively intact open forest and woodland, mainly along the eastern escarpment, and about 1500 ha of partly cleared former grazing land, in which regeneration is occurring, to the west of the reservoir. Vegetation west and south of the reservoir has been the most disturbed, having been used for sheep grazing over the period 1857 to 1973. During this period the original tree cover was extensively cleared. Much of the floristic diversity of the eastern escarpment appears to be associated with the riverine and riparian habitats of gullies, creeks and rivers, and with the understorey of the higher slopes. The Foreshores contains remnants of two threatened ecological communities (Natural Temperate Grassland and White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland) and a number of threatened and regionally uncommon plant and animal species (Table 6.2). Vegetation survey and mapping has been undertaken in the Foreshores, but is incomplete. For sound long term management of vegetation and habitat, comprehensive vegetation survey and mapping should be undertaken as the basis for a vegetation management plan for the Foreshores (see s. 6.4.3).

As part of establishing baseline conditions for the Googong Lease, the Commonwealth prepared assessments of biodiversity (GHD 2007) and natural heritage values (ERM Australia 2008b) at the Foreshores in relation to the EPBC Act. The information available on flora and fauna when these reports were prepared was insufficient to determine whether the natural heritage values of the Area would satisfy the criteria for listing on the Commonwealth Heritage List. In 2009, a survey and assessment of the location, condition and status of areas identified as potential Natural Temperate Grassland and White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland was undertaken (Eddy 2009). This survey concluded that a large proportion of the target area meets at least the minimum criteria for listing under the EPBC Act as one of these threatened communities.

The following summary statement of natural heritage values is provided in the *Googong Foreshores Heritage Management Plan* (ERM Australia 2010: Section 10.2.1):

Googong Foreshores contains a diverse array of ecological communities and associated flora and fauna, including a significant number of threatened and/or rare species and endangered ecological communities (EECs). The presence of rare and threatened flora and fauna in the study area indicates the area has value in supporting populations and habitat for species threatened with extinction. The presence of two EECs; Natural Temperate Grassland and Yellow Box – Red Gum Grassy Woodland, indicate these areas have high natural integrity and may be considered to have principal characteristics of a class of Australia’s natural environments.

The relatively undisturbed eastern foreshores provides a large area of contiguous dry sclerophyll forest, connecting similar vegetation from the Tinderry Range (south of Googong) through to the north-eastern parts of the ACT. The western foreshores of the reserve contribute to the diversity of habitats for native flora and fauna within Googong Foreshores. The lowland woodland and grassland communities that dominate the western foreshores support a variety of grassland and woodland specialist species and contrast with the dense sclerophyll forest of the steep eastern slopes.

The reserve is a resource that is valued by residents of the ACT, Queanbeyan and surrounding region, for its recreational and aesthetic values. The scenic values of the area provide a backdrop to recreational activities, including bushwalking, mountain bike riding, fishing and bird watching. The expanse of the dam itself provides scenic views from numerous look-outs. The creeks and riverine environments across Googong Foreshores contribute to the aesthetic values of the area.

The scientific value of the area may be considered significant due to the potential information that could be gained regarding the ecology of rare and threatened species. New information on rare or threatened species may contribute to ensuring that appropriate protection or management is provided for rare or threatened species, for example, the inclusion of rare species within future conservation strategies.

Googong Foreshores provides habitat for several raptorial species, which have been studied since at least 1985. The overlapping territory and nest sites of two species at Googong Foreshores, the Wedge-tailed eagle and the White-bellied Sea-Eagle, have contributed to the scientific understanding of competition between different raptors. The active territories of raptors have the potential to continue providing information to the scientific community.

6.2.2 GEODIVERSITY

The Queanbeyan Fault, which extends for about 50 km from Michelago to Sutton, dominates the geology of the Googong Foreshores. At the Foreshores, the escarpment of the fault, rising to 950 m ASL, defines the edge of the Cullarin Block (horst). The latter is comprised of folded sandstone and shale. West of the fault, limestone lenses are a feature of the geology. A significant geomorphological feature known as London Bridge Natural Arch is located on a meander cut-off on Burra Creek. This is a natural arch in limestone containing fossils of brachiopods, corals, crinoids and trilobites. Several small caves and shafts also occur in the limestone. Other geological features of note are Cascades Gorge on the Queanbeyan River below the dam wall, and rock exposures in the Queanbeyan River below Galignite Crossing, in the south-eastern part of the Foreshores. At the Cascades large boulders and rock faces of weathered granite are exposed, forming several large pools. Below Galignite Crossing greywacke is exposed in the river bed and walls forming several small rapids and waterfalls (ERM Australia 2008b).

London Bridge Natural Arch has long been recognised for its representation of cave formation in karst, its Pleistocene mammal deposits and its related aesthetic, educational and scientific values. It also has Indigenous heritage values (see s. 2.6). The arch is included in the Commonwealth Heritage List nomination 'Googong Foreshores Cultural and Geodiversity Heritage Areas' (see s. 2.6).

The arch was also included on the Register of the National Estate (RNE) (Place ID 1182) which the Commonwealth Government has now phased out as a statutory list. The RNE is maintained on a non-statutory basis as a publicly available archive and educational resource.

<<http://www.environment.gov.au/heritage/places/rne/index.html>> (see **Glossary** for origins of the register and the phasing out of its statutory basis by 2012).

The following statement of significance for geodiversity heritage values was prepared by ERM Australia (2010: Section 10.2.2):

London Bridge Natural Arch is important as a good example of cave formation due to karst and offers insight into the natural landscape development in the area. The London Bridge area is a good representation of the development of caves and an arch as a meander cut off, and the eventual abandonment of the meander channel. The caves contain rich Pleistocene deposits of small mammals, and Pleistocene bone breccia of large mammals is embedded in flowstone on the floor of the two main caves.

The arch is a large attractive natural bridge, of aesthetic value. The karst features displayed at London Bridge, its close proximity to Canberra, and the cave deposits containing Pleistocene mammal fossils, make the area an important teaching and research site.

The arch has also been a long term attraction to humans, who have viewed and appreciated the arch's natural aesthetic qualities. Europeans have visited the arch since the mid-19th century, whilst Aboriginal people have visited for thousands of years.

Soils in the Foreshores derive from the geology and vary from shallow skeletal soils to relatively deep podzols. The most common soil type is a skeletal sandy loam that has little or no profile development. These low nutrient soils occur on most land east of the fault and are the main soil type on sloping land in the western foreshores area. The western area contains deeper soil profiles than the eastern area but they are still shallow and skeletal. Deeper soils are found in the Burra Creek valley.

6.2.3 NATURAL HERITAGE VALUES: MANAGEMENT OBJECTIVES, POLICIES AND ACTIONS

The *Googong Foreshores: Heritage Management Plan* (ERM Australia 2010) sets out general policies for conservation of natural heritage values (biodiversity and geodiversity); detailed management guidelines; a management action plan; and a maintenance schedule. The heritage management plan gives particular attention to the management of: (a) dry sclerophyll forest of the eastern foreshores; (b) remnants of the endangered ecological communities of Natural Temperate Grassland and Yellow Box – Red Gum Grassy Woodland (threatened ecological communities under the EPBC Act); and c) disturbed areas. The following general statements of policy and management actions derive from the *Googong Foreshores: Heritage Management Plan*. Specific policies and actions related to the items contained in the Heritage Management Plan are included in this Googong Foreshores Plan of Management in the sections shown under 'Actions' below.

NATURAL HERITAGE

Objective

- **The natural heritage values of Googong Foreshores are conserved.**

Policies

- Management of natural heritage will be carried out taking into account the *Googong Foreshores: Heritage Assessment* (ERM Australia 2008b) and in accordance with the policies, guidelines and associated action plan and schedules for conservation of natural heritage in the *Googong Foreshores: Heritage Management Plan* (ERM Australia 2010).

Actions

- Implement the natural heritage management strategies in the *Googong Foreshores: Heritage Management Plan*. These strategies provide a five-year and ongoing management program including (sections refer to this Googong Foreshores Plan of Management):
 - cooperation with adjacent land managers to achieve consistent and complementary land management (s. 6.3)
 - weed management (s. 6.6.1)
 - pest animal management (s. 6.6.2)
 - kangaroo management (s. 6.7)
 - bushfire management (s. 9.1)
 - conservation of ecological communities, flora and fauna (s. 6.4, s. 6.5)
 - maintenance of catchment vegetation cover (s. 4.4.4)
 - control of recreational use (s. 5.4).

6.3 HABITATS AND REGIONAL SIGNIFICANCE

The diversity of habitats at Googong Foreshores reflects its geology and geomorphology, soils, vegetation, land use history, the presence of the reservoir, and inflowing streams. Habitats include steep and rocky slopes with open forest and woodland cover, rocky gullies, regenerating woodlands following clearing and fire, riparian areas including creek and river flats, and open grassland areas. Habitats at Googong Foreshores are significant as part of a corridor of mostly intact native vegetation encompassing the Tinderry Range, Googong Foreshores, the escarpment east of Queanbeyan, Kowen, and the north-eastern part of the ACT. The conservation value of this corridor has been recognised in the declaration of reserves (Tinderry, Burra Creek, Cuumbeun and Goorooyaroo Nature Reserves (NSW), and Molonglo Gorge Reserve, Goorooyaroo, Mulligans Flat and Little Mulligans Nature Reserves (ACT)). The Foreshores also contributes to east-west connectivity. Habitat connectivity is an important consideration in planning for the effects of climate change.

The considerable uncertainties regarding the dimensions of climate change and local effects mean that a precise management response is not possible. However, available knowledge about climate change should be incorporated into the assessment of the effects of management actions, monitoring of high risk species and ecological communities, and evaluating ways in which the effects might be minimised.

HABITATS AND ECOLOGICAL CONNECTIVITY

Objective

- **The diversity of habitats at Googong Foreshores makes a significant contribution to regional ecological connectivity, in particular, along the escarpment of the Queanbeyan Fault.**

Policies

- Ecological communities, wildlife habitats and ecological connectivity at Googong Foreshores will be protected, maintained and improved by appropriate management and rehabilitation activities.

Actions

- Communicate to relevant private and government organisations the importance of Googong Foreshores to regional ecological connectivity, in relation to environmental planning, development control and specific development proposals adjacent to the Foreshores.
- Work with the NSW Office of Environment and Heritage and other NSW government agencies to achieve consistent and complementary management of adjoining or nearby natural areas.
- Identify threats to habitat and connectivity in Googong Foreshores and take actions to control, reduce or eliminate threats.
- Identify opportunities to improve habitat and connectivity in the management of Googong Foreshores and, where practicable, undertake appropriate management actions.

6.4 FLORA

Googong Foreshores is located in the South Eastern Highlands Region as defined in the *Interim Biogeographic Regionalisation for Australia* (IBRA version 6.1 (DEWHA 2009)). At the time of European settlement, three characteristic vegetation communities in the Southern Tablelands part of this bioregion were:

- Extensive areas of native tussock grasslands at lower elevations (included in *Temperate Montane Grasslands* (Keith 2004, pp. 108-109));
- Grassy woodlands on plains, low hills and foothills (included in *Southern Tableland Grassy Woodlands* (Keith 2004, pp. 92-93));
- Dry open forests that occupied slightly higher areas, stony ridges and rugged ranges (included in *Southern Tableland Dry Sclerophyll Forests* (Keith 2004, pp. 164-165)).

Grassy woodlands and open forests were probably the main vegetation communities at Googong Foreshores. Grassland may have occupied some of the lower elevation 'frost hollow' areas, for example along Burra Creek (Field 1825 in Starr 2000). The grasslands and grassy woodlands of the Southern Tablelands were severely impacted by the European pastoral economy, associated urban and infrastructure development, changed fire regimes, and over time, invasion by weeds (ACT Government 2004; 2005). Many dry forest areas of the Southern Tablelands have also been wholly or partly cleared for rough grazing despite the poverty of their soils (Keith 2004). They have also been affected by timber cutting, and more recently by activities such as off-road vehicle use.

6.4.1 GOOGONG FORESHORES VEGETATION

Mapping and recording of vegetation at Googong Foreshores was undertaken in the 1990s by P. Barrer, who also carried out ecological surveys along the escarpment of the Queanbeyan Fault (Barrer 1993, 1997). Vegetation mapping, focused on tree and shrub cover, was also carried out by N. Taws in the 1990s. From this work, a digital vegetation map was produced at the level of vegetation communities, except for grassland which was undifferentiated as to whether it was natural grassland, secondary grassland (following tree removal), or primarily exotic grassland. Eddy (2009) identified substantial areas of Natural Temperate Grassland and areas of grassy woodland, mostly of high conservation value. A species list for the Foreshores is also included in Starr (2000).

Woodlands and open forest are the most common vegetation formations in Googong Foreshores, covering about 60 per cent of the Area. Grasslands comprise about 25 per cent, mainly in the western area and along Burra Creek. Three tree-dominated vegetation alliances have been described for the Foreshores (Costin 1954; Taws n.d.):

- *Eucalyptus macrorhyncha* – *E. rossii* (Red Stringybark – Scribbly Gum) dry sclerophyll open forest/woodland
- *E. melliodora* – *E. blakelyi* (Yellow Box – Blakely's Red Gum) grassy woodland
- *E. pauciflora* – *E. stellulata* (Snow Gum – Black Sallee) grassy woodland.

These alliances are included within the more general vegetation 'classes' defined by Keith (2004).

Though the extent is unknown, it is likely that land west of Googong Reservoir contained woodland and open forest at the time of European settlement and much of this was cleared during the pastoral period. Based on the Southern Tablelands generally (Keith 2004), there is sufficient evidence to suggest that there was a different pattern of vegetation communities either side of the Queanbeyan Fault, in relation to the proportions of woodland and open forest. Since 1982, significant planting (estimated at 40 000 trees and shrubs) has been undertaken in the western area to complement natural regeneration. While the survival rate of plantings has been low, the remaining plantings will result in some of the landscape changing from mainly grassland to an open woodland character.

a) Dry Sclerophyll Open Forest and Woodland

This alliance is found mostly in the more rugged escarpment country east of the reservoir but also occurs on shallow soils in steep areas in the western area. On the Southern Tablelands these dry sclerophyll forest and woodland communities have often been disturbed in the past by varying levels of clearing, ringbarking, timber-getting or fire. There is evidence for this at Googong by the presence of many trees in what appear to be younger age classes, as well as dense stands of eucalypt saplings. Starr (2000) observed that the main means of land clearing prior to World War II was ringbarking and that much of this was unsuccessful. Ringbarked areas commonly reverted to forest, closely resembling adjacent communities where there was no evidence of ringbarking. Both *E. macrorhyncha* and *E. rossii* form coppice regrowth after they have been cut for firewood or other uses.

b) Yellow Box – Blakely’s Red Gum Grassy Woodland

At Googong Foreshores, this characteristic lowland woodland alliance is represented, in particular, by a Yellow Box (*E. melliodora*) – Apple Box (*E. bridgesiana*) association. Blakely’s Red Gum (*E. blakelyi*) does not occur in the area (Eddy 2009). White Box (*E. albens*), which is included in the EPBC listed community, does not occur in the area. This woodland occurs on soils of volcanic origin to the west of the reservoir, where, following clearing, it has been replaced by secondary grassland. It also occurs in gullies in the eastern part of the Foreshores and on some soils associated with granite. Along Burra Creek the most common species remaining from the former tree associations is Apple Box, which was not favoured for building or firewood. The community also occurs north of the dam wall. The majority of the woodland area surveyed by Eddy (2009) was assessed as meeting the EPBC criteria for inclusion in the White Box – Yellow Box – Red Gum Grassy Woodland and Derived Native Grassland ecological community (see s. 6.4.2).

c) Snow Gum – Black Sallee Grassy Woodland

This alliance occurs in areas of cold air drainage and in broader valleys along the Queanbeyan River and Burra Creek.

d) Grassland

Like the woodland, grassland in the area has been disturbed to varying degrees by past land uses. Nevertheless, the majority of grassland area surveyed by Eddy (2009) has sufficient floristic value to be described as Natural Temperate Grassland under the EPBC Act. Many of the polygons surveyed by Eddy have high floristic scores. Some of this grassland may be secondary grassland, as noted above under Yellow Box – Blakely’s Red Gum Grassy Woodland. There is still a high level of occurrence of the naturally dominant Kangaroo Grass (*Themeda australis* syn. *T. triandra*), which is less tolerant of grazing pressure than other native grasses. Kangaroo Grass was the dominant or co-dominant grass species in two-thirds of the survey plots. Wallaby grasses (*Austrodanthonia* spp.) were dominant in other plots and commonly the co-dominant with Kangaroo Grass. The grassland areas also contain many other native grass and non-grass plant species, as well as a wide range of weed species.

e) Shrubland and Riparian Communities

Many shrubland areas (comprising Burgan (*Kunzea ericoides*) and tea-tree (*Leptospermum* spp.)) are considered to be secondary communities following disturbance to the tree cover. Riparian vegetation includes cumbungi (*Typha* spp.), Common Reed (*Phragmites australis*), sedges and rushes. Stands of *Acacia* spp. have become established around the edges of the reservoir.

f) Threats to Grassland and Grassy Woodland

Eddy (2009) identified the following threats to the grasslands and grassy woodlands of the Foreshores:

- *Grazing pressure:* Grassy vegetation was grazed very short by kangaroos. This grazing pressure is higher than what would be desirable for the long term conservation of the natural temperate grassland.
- *Weeds:* There is a wide range of common and widely distributed weeds of the Southern Tablelands at the Foreshores. Several significant weed species (Great Mullein (*Verbascum thapsus*), St John’s Wort (*Hypericum perforatum*) and Horehound (*Marrubium vulgare*)) occur in large numbers over extensive areas.
- *Feral pigs:* Feral pig populations appear to be associated with Great Mullein in low lying areas. Feral pig activity may assist in the spread of this weed.
- *Tree planting:* Many of the natural temperate grassland areas surveyed contain tree plantings which will affect the natural integrity of the grasslands over time.

The main vegetation communities occurring in different parts of the Foreshores are listed in Table 6.1.

Table 6.1 Vegetation communities at Googong Foreshores

Location/Management Zones	Vegetation Communities
Western Foreshores: Zones 3A, 2A.	<ul style="list-style-type: none"> • Grassland including Natural Temperate Grassland • <i>E. rossii</i> - <i>E. polyanthemos</i> - <i>E. nortonii</i> open forest/woodland • <i>E. bridgesiana</i> - <i>E. melliodora</i> woodland • <i>E. bridgesiana</i> woodland
Eastern Foreshores: Zones 1A, 1B, 2A.	<ul style="list-style-type: none"> • <i>E. rossii</i> - <i>E. polyanthemos</i> - <i>E. nortonii</i> open forest/woodland • Open forest/woodland communities involving varying associations of the following species: <i>E. macrorhyncha</i> - <i>E.rossii</i> - <i>E. polyanthemos</i> - <i>E. mannifera</i> - <i>E. nortonii</i> - <i>E. dives</i> • <i>E. bridgesiana</i> - <i>E. melliodora</i> woodland
Burra Creek: Zones 3B, 2B.	<ul style="list-style-type: none"> • Grassland including Natural Temperate Grassland • <i>E. bridgesiana</i> - <i>E. melliodora</i> woodland • <i>E. bridgesiana</i> - <i>E. dives</i> woodland • <i>E. pauciflora</i> - <i>E. stellulata</i> woodland
Queanbeyan River: Zone 2A.	<ul style="list-style-type: none"> • <i>E. mannifera</i> - <i>E. rossii</i> open forest/woodland • <i>E. pauciflora</i> - <i>E. bridgesiana</i> woodland • <i>E. pauciflora</i> - <i>E. stellulata</i> woodland • Open forest/woodland communities involving varying associations of the following species: <i>E. bridgesiana</i> - <i>E. rossii</i> - <i>E. polyanthemos</i> - <i>E. melliodora</i> - <i>E. nortonii</i> - <i>E. dives</i>

6.4.2 THREATENED ECOLOGICAL COMMUNITIES, THREATENED AND UNCOMMON PLANT SPECIES

Ecological communities and plant species occurring at Googong Foreshores that are listed as threatened under Commonwealth, NSW, and ACT legislation are shown in Table 6.2.

Table 6.2 Ecological communities and plant species at Googong Foreshores listed as threatened under Commonwealth, NSW and ACT legislation.

Ecological Community/ Plant Species	Common Name	Cwlth	NSW	ACT
Ecological Communities				
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland ¹		CE	E	E
Natural Temperate Grassland of the Southern Tablelands of NSW and the ACT		E	-	E
Plant Species				
<i>Rutidosia leptorrhynchoides</i>	Button Wrinklewort	E	E	E
<i>Swainsona sericea</i>	Silky Swainson-pea	-	V	-
<i>Pomaderris pallida</i>	Pale Pomaderris	V	V	-
<i>Dillwynia glaucula</i>	Michelago Parrot-pea	-	E	-
<i>Leucochrysum albicans</i> var <i>tricolor</i>	Hoary Sunray	E	V	-

Note: 1 White box (*E. albens*) and Blakely's Red Gum (*E. blakelyi*) do not occur at Googong Foreshores.

Legislation:

CE: Critically Endangered; **E:** Endangered; **V:** Vulnerable

Commonwealth: *Environment Protection and Biodiversity Conservation Act 1999*

NSW: *Threatened Species Conservation Act 1995*

ACT: *Nature Conservation Act 2014*

Plant species recorded from Googong Foreshores that are regionally uncommon include:

- *Olearia rosmarinifolia* (Rosemary-leaved Olearia)
- *Solenogyne dominii* (Solenogyne)
- *Lepidium pseudotasmanicum* (Peppercress)
- *Rorippa laciniata* (Watercress)
- *Einadia hastata* (Saloop/Berry Saltbush)
- *Bossiaea prostata* (Creeping Bossiaea)
- *Desmodium brachypodum* (Large Tick-trefoil)
- *Discaria pubescens* (Australian Anchor Plant)
- *Microseris lanceolata* (Murnong/Yam Daisy)
- *Cullen tenax* (Emu-foot Cullen)
- *Asperula ambleia* (Stiff Woodruff)
- *Muehlenbeckia axillaris*.

Further survey, especially of ground cover, may reveal the presence of other threatened or uncommon species, or new occurrences of such species. Some threatened species that have been recorded in the region have the potential to occur in the Foreshores based on similarity of habitat.

6.4.3 MANAGEMENT OBJECTIVES, POLICY AND ACTIONS

FLORA

Objectives

- **Vegetation communities at Googong Foreshores are identified, protected and conserved.**
- **Populations of threatened and uncommon plant species are conserved in perpetuity.**
- **Degraded vegetation communities are rehabilitated where this is practicable.**

Policies

- Management of vegetation at Googong Foreshores will be based on comprehensive survey, monitoring, mapping and preparation of a vegetation management plan.
- Management of vegetation communities at Googong Foreshores will aim to retain or recover (where practicable) the natural integrity¹ of those communities.
- Special attention will be given to the management of threatened ecological communities and populations of threatened and uncommon species.

Actions

- Prepare and maintain (through survey, monitoring and mapping) a comprehensive inventory and classification of vegetation communities and component species at Googong Foreshores.
- Undertake appropriate management to ensure that ecological communities and populations of threatened and uncommon plant species are conserved and protected from threatening activities (e.g. tree planting in natural temperate grasslands) or accidental damage.
- Prepare a vegetation management plan with detailed management guidelines, as required, for vegetation communities and component species, in particular threatened and uncommon species.
- As part of the vegetation management plan, review existing plantings and forward programs for tree planting to ensure that there are no adverse impacts on natural temperate grassland areas of high conservation value.
- Ensure that any short-term stock grazing (for fire fuel reduction, asset protection, weed control) is managed (e.g. stocking rates, areas permitted) so that it does not deleteriously impact on vegetation of high conservation value such as threatened ecological communities and their component species.
- Where practicable, undertake rehabilitation² activities for particular vegetation communities or areas of the Foreshores.
- Provide interpretive material on Foreshores vegetation for visitors.

Notes: 1 Natural integrity, see **Glossary**.

2 At Googong Foreshores, rehabilitation (see **Glossary**) may serve a number of purposes including protection of water quality, conservation of threatened or uncommon plant species, and maintenance of faunal habitat.

6.5 FAUNA

The diversity of habitat at Googong Foreshores, the relatively intact vegetation east of the reservoir, and the connectivity to native vegetation to the north and south along the escarpment of the Queanbeyan Fault are important for fauna at a regional level. Like the adjacent or nearby NSW nature reserves (see s. 6.3), Googong Foreshores retains remnant native vegetation within a highly disturbed landscape that is subject to ongoing development pressures. The fauna of the Foreshores has not been thoroughly surveyed. However, existing surveys and those at several points along the escarpment north of the Tinderry Nature Reserve

give an indication of the faunal importance of the area. Species numbers in the escarpment surveys include 25 native mammals, more than 100 birds, 28 reptiles, 11 frogs and at least three native fish.

The presence of Googong Reservoir, backed up waters in the Queanbeyan River and Burra Creek, Tin Hut Dam and other nearby farm dams contributes to the diversity of the Foreshores habitat reflected in the large number of bird species (165) recorded from the Foreshores. These include waterbirds, birds of prey, and forest and woodland species. Of particular note is habitat for the Hooded Robin (*Melanodryas cucullata*) an ACT threatened species (Table 6.3), which is known to be declining in woodlands around the urban fringes of the ACT. This species prefers more open woodland, with trees and perching sites, open grassy areas for foraging, and patches of thicker vegetation nearby, suitable for nesting sites. A database of birds recorded from Googong Foreshores compiled by the Canberra Ornithologists Group (COG) and other records contain a number of threatened and migratory bird species including: Varied Sitella (*Daphoenositta chrysoptera*), White-winged Triller (*Lalage sueurii*), Little Eagle (*Hieraaetus morphnoides*), and Latham's Snipe (*Gallinago hardwickii*) (Table 6.3). The area contains a breeding territory and home range of one White-bellied Sea Eagle (*Haliaeetus leucogaster*). Wedge-tailed Eagles (*Aquila audax*) are also resident in the area (ERM Australia 2008b; PCL 2008). A bird list brochure has been prepared for the Foreshores, which includes summary information on habitat, abundance and resident status for species recorded from 1995 to 2008 (PCL 2008).

Nine species of bats have been recorded including the Eastern False Pipistrelle (*Falsistrellus tasmaniensis*), listed as 'vulnerable' in NSW. The Common Bentwing-bat (*Miniopterus schreibersii*) can be found in the Icon Water tunnel.

The Eastern Grey Kangaroo (*Macropus giganteus*), Common Wombat (*Vombatus ursinus*), and Common Brushtail Possum (*Trichosurus vulpecula*) are widespread. The Swamp Wallaby (*Wallabia bicolor*) is mainly present on the eastern area although one or two individuals survive in uncleared remnants on the western area. The Common Wallaroo (*Macropus robustus robustus*) has been recorded from the area but is not common. There is evidence (V-shaped notches in the bark of feed trees) of the presence of the sparsely distributed Yellow-bellied Glider (*Petaurus australis*) in the Bradleys Creek area. Scribbly Gum (*Eucalyptus rossii*) is one of the glider's preferred sap-feeding trees and these are common in the eastern area. Koalas (*Phascolarctos cinereus*) are reported to move through the southern part of the area (ERM Australia 2008b). Platypus (*Ornithorhynchus anatinus*) occur in the Queanbeyan River upstream of the reservoir and in the upper reaches of the reservoir itself.

The Foreshores contains much habitat suitable for reptiles and many species have been recorded from the area. The threatened Rosenberg's Monitor (*Varanus rosenbergi*) and Pink-tailed Worm Lizard (*Aprasia parapulchella*) occur there as well as the nocturnal Black-headed Snake (*Suta spectabilis*).

There is a high diversity of amphibians across the study area, suggesting the presence of healthy aquatic ecosystems. Two threatened frog species have previously been recorded: the Green and Gold Bell Frog (*Litoria aurea*) and the Alpine Tree Frog (*Litoria verreauxii alpine*) (ERM Australia 2008b). However, it is not known if these species still occur in the area.

There is a population of the threatened Macquarie Perch (*Macquaria australasica*) in the Queanbeyan River above Googong Reservoir, derived from 57 adult fish translocated from the reservoir in 1980 (Lintermans 2006). The waters of the reservoir flooded all the spawning sites in that section of the river (ACT Government 2007a). The threatened Murray Cod and Silver Perch are also present as a result of the recreational fish stocking program.

There have been no formal invertebrate surveys in the Foreshores. The threatened Golden Sun Moth (*Synemon plana*) has been recorded outside the north-western boundary of the Foreshores and Key's Matchstick Grasshopper (*Keyacris scurra*), a species known to have declined (ACT Government 2005), occurs near the Queanbeyan River upstream of the reservoir.

6.5.1 THREATENED AND UNCOMMON FAUNA

Animal species occurring at Googong Foreshores that are listed as threatened under Commonwealth, NSW and ACT legislation are shown in Table 6.3.

It is possible that other species listed as threatened under one or more of the Acts referred to in Table 6.3 are present at Googong Foreshores based on unconfirmed sightings or presence of suitable habitat. These include:

- *Litoria aurea* (Green and Golden Bell Frog)
- *Litoria verreauxii alpine* (Alpine Tree Frog)
- *Dasyurus maculatus* (Spotted-tailed Quoll)
- *Phascogale tapoatafa* (Brush-tailed Phascogale)
- *Pseudomys fumeus* (Smoky Mouse).

Table 6.3 Animal species at Googong Foreshores listed as threatened under Commonwealth, NSW and ACT legislation or protected under Migratory Bird Agreements

Animal Species	Common Name		Cwlth	NSW	ACT
Birds¹		Status²			
<i>Stagonopleura guttata</i>	Diamond Firetail	(U R)	-	V	-
<i>Chthonicola sagittata</i>	Speckled Warbler	(U R)	-	V	-
<i>Climacteris picumnus</i>	Brown Treecreeper	(V R)	-	V	V
<i>Melanodryas cucullata</i>	Hooded Robin	(U R)	-	V	V
<i>Lalage sueurii</i>	White-winged Triller	(V Mi)	-	-	V
<i>Gallinago hardwickii</i>	Latham's Snipe	(V Mi)	MBA ³	-	-
<i>Ardea alba</i>	Great Egret	(V N)	MBA ³	-	-
<i>Ardea ibis</i>	Cattle Egret	(U N)	MBA ³	-	-
Mammals					
<i>Petaurus australis</i> ⁴	Yellow-bellied Glider		-	V	-
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle		-	V	-
<i>Phascolarctos cinereus</i>	Koala		-	V	-
Fish					
<i>Macquaria australasica</i>	Macquarie Perch		E	V	E
<i>Maccullocheela peelii peelii</i>	Murray Cod		V	-	-
<i>Bidyanus bidyanus</i>	Silver Perch		- ⁵	V ⁶	E
Reptiles					
<i>Aprasia parapulchella</i>	Pink-tailed Worm Lizard		V	V	V
<i>Varanus rosenbergi</i>	Rosenberg's Monitor		-	V	-

Notes: 1 Bird names from Barrett et al. (2003).

- 2 Status refers to a) Abundance (C = Common; U = Uncommon; V = Rare); and
b) Resident Status (B = Breeding resident; R = Resident all year; Mi = Migrant; N = Nomadic/occasional visitor) (PCL 2008).

3 MBA = migratory bird agreements. These are the *Migratory Bird Agreement between Japan and Australia* (JAMBA), the *Migratory Bird Agreement between the People's Republic of China and Australia* (CAMBA), and the *Migratory Bird Agreement between the Republic of Korea and Australia* (ROKAMBA). Migratory species listed under these agreements are listed also under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Under this Act migratory species are a matter of National Environmental Significance (see <<http://www.environment.gov.au/epbc/protect/migratory.html>>).

4 Tree scar evidence only.

5 Silver Perch have been nominated for listing as Endangered under the EPBC Act.

6 Silver Perch are protected in NSW except for 18 listed stocked impoundments including Googong Reservoir.

Legislation:

E: Endangered. **V:** Vulnerable.

Commonwealth: *Environment Protection and Biodiversity Conservation Act 1999*

NSW: *Threatened Species Conservation Act 1995, Fisheries Management Act 1994*

ACT: *Nature Conservation Act 1980*

6.5.2 MANAGEMENT OBJECTIVES, POLICY AND ACTIONS

FAUNA

Objectives

- **Populations of native fauna species are maintained by protecting and improving habitat and managing key threats.**
- **Populations of threatened and uncommon animal species are conserved in secure habitat.**

Policies

- Management of Googong Foreshores will aim to:
 - improve the knowledge of native fauna in the area
 - protect and conserve habitats
 - minimise and, where possible, eliminate threats to native fauna
 - encourage the recovery of animal populations that have been negatively impacted in the past.
- Special attention will be given to the management of populations of threatened and uncommon species and their habitats.

Actions

- Prepare a comprehensive inventory of the fauna of Googong Foreshores.
- Manage the habitat of threatened and uncommon animal species to protect them from threatening activities or accidental damage.
- Where practicable, undertake habitat rehabilitation activities to improve the status, distribution and abundance of threatened animal populations.
- Prepare management guidelines for species that are declared threatened or are of conservation concern, in accordance with recovery plans and other relevant material.
- Encourage and support survey, monitoring and research into animal species and populations.
- Undertake feral animal control (see s. 6.6).
- Provide interpretive material on Foreshores fauna for visitors.

6.6 PEST PLANTS AND PEST ANIMALS

Introduced plants and animals can become environmental pests if they establish and thrive in the wild at the expense of ecological processes and native populations, or some other valued attribute such as access, visual amenity or productive capacity. Native species can also flourish to excess in response to changes in land use or other significant environmental events that result in more favourable environmental conditions for that species.

Introduced plants and animals are now part of most 'natural environments' influencing the ecosystems in which they live. A strategic approach to managing pest species involves determining priorities based on the damage that particular species cause. Whilst eradication of an established pest may be desirable, this is rarely feasible except at a local scale. Even then, continuing vigilance with an adequate response capacity is essential.

The management of pest plants and animals and the damage they cause is a particular challenge for land managers. Associated costs are substantial and usually ongoing, therefore an efficient and effective management program is required that is part of a coordinated strategy if enduring cost-effective benefits are to be achieved. While the management of pest plants and

animals is a routine land management responsibility, sometimes broader or statutory control measures also need to be accommodated, such as the *Noxious Weeds Act 1993* (NSW) for Googong Foreshores.

6.6.1 PEST PLANTS

The presence of weed species at Googong Foreshores largely reflects the past pastoral uses of some of the area and clearing of the tree cover. Weeds are particularly prevalent in the grassland and grassy woodland areas. Weed species include: St John's Wort (*Hypericum perforatum*), Great Mullein (*Verbascum thapsus*), Serrated Tussock (*Nassella trichotoma*), African Lovegrass (*Eragrostis curvula*), Blackberry (*Rubus fruticosus* agg.), willows (*Salix* spp.), clovers (*Trifolium* spp.), Phalaris (*Phalaris aquatica*), Briar Rose (*Rosa rubiginosa*), Horehound (*Marrubium vulgare*), Hawthorn (*Crataegus monogyna*) and many herbaceous species found in grazing country including other introduced grasses, flatweeds, thistles and mulleins. There is the potential for the introduction of aquatic weeds to the reservoir, but this has not been an issue to date. Eddy (2009) reported that some of these weed species (Great Mullein, St John's Wort, Horehound) occur in much higher densities and populations at Googong Foreshores than in most other parts of the Southern Tablelands. This is possibly related to differences in the type and intensity of herbivore grazing.

The NSW Office of Environment and Heritage has identified St John's Wort as a high priority for weed control in Cuumbeun Nature Reserve, to the north of Googong Foreshores. Some of the weed species found at Googong Foreshores are declared 'noxious weeds' in NSW, 'pest plants' under ACT legislation, and are included in the list of Weeds of National Significance (WONS) (see Table 6.4). An active weed management program is undertaken across the Foreshores. Large scale control programs have been undertaken for St John's Wort.

Table 6.4 Declared weed species at Googong Foreshores (Adapted from ERM Australia (2008b))

Declaration				
Common Name	Scientific Name	ACT ¹	NSW ²	Cwlth ³
St John's Wort	<i>Hypericum perforatum</i>	Must be contained	Class 3	-
Serrated Tussock	<i>Nassella trichotoma</i>	Must be contained	Class 4	WONS
Patterson's Curse	<i>Echium plantagineum</i>	Must be contained	Class 4	-
African Lovegrass	<i>Eragrostis curvula</i>	Must be contained	Class 4	-
All Blackberry except permitted cultivars	All <i>Rubus fruticosus</i> (aggregate) except for permitted cultivars	Must be contained	Class 4	WONS
All willows except permitted species	All <i>Salix</i> spp. except for permitted species	Must be suppressed	Class 5	WONS
Sweet Briar	<i>Rosa rubiginosa</i>	Must be suppressed	-	-
Hawthorn	<i>Crataegus monogyna</i>	Must be contained	-	-
Horehound	<i>Marrubium vulgare</i>	-	Class 4	-
Scotch Thistle	<i>Onopordum acanthium</i>	Must be contained	Class 4	-
Saffron Thistle	<i>Carthamus lanatus</i>	Must be contained	-	-
Slender Thistle	<i>Cardus pycnocephalus</i>	Must be contained	-	-
Slender Thistle	<i>Cardus tenuiflorus</i>	Must be contained	-	-

Notes: 1 ACT: *Pest Plants and Animals (Pest Plants) Declaration 2005 (No 1)* under the *Pest Plants and Animals Act 2005*.

2 NSW: *Noxious Weeds Act 1993. Special Supplement*, August 2006 (Weed Control Order No. 20). Class 3 = Regionally controlled weeds; Class 4 = Locally controlled weeds; Class 5 = Restricted plants.

3 Cwlth: *Weeds of National Significance (WONS)* (Australian Weeds Committee 1999) (<<http://www.weeds.org.au/natsig.htm>>). See also *Weeds of National Significance. Update 2008* (<http://www.weeds.org.au/docs/WONS_update_2008.pdf>).

The conservation of threatened animal species may require weed control and vegetation manipulation to retain or rehabilitate suitable habitat. In this regard, the growth of the native shrub, Burgan (*Kunzea ericoides*), may need to be controlled to retain open habitat for the threatened Pink-tailed Worm Lizard (*Aprasia parapulchella*). In highly disturbed areas, some woody weed species may be important for habitat and it may be appropriate that a replacement program using desirable species, staged over time, accompany removal.

PEST PLANTS

Objective

- **The damaging impacts of pest plants on the values of Googong Foreshores are minimised through strategic and effective management programs.**

Policies

- An integrated program of pest plant management will be undertaken at Googong Foreshores based on weed control priorities, co-operation with adjacent land managers, and evaluation of the effectiveness of previous programs.
- Weed control programs will comply with legislative and policy requirements for the safe and appropriate use of chemicals.
- The effects on habitat and reservoir water quality and water treatment capability will be considered in pest plant control programs. Removal and replacement may be staged over time to maintain habitat continuity.

Actions

- Design and undertake management programs for pest plants in accordance with relevant legislation and strategies, weed control priorities, and in co-operation with adjacent land managers.
- Undertake coordinated control of St John's Wort with the NSW Office of Environment and Heritage.
- Maintain and/or instigate hygiene measures to minimise the introduction and spread of weed species in management of the Foreshores. Measures include:
 - washing vehicles and machinery
 - minimising soil disturbance
 - avoiding the import of material (e.g. soil, mulch) that is likely to contain weed seeds
 - educating visitors about the potential to import and spread weed species, including aquatic weeds.

6.6.2 PEST ANIMALS

Pest animals can have significant harmful impacts on biodiversity, habitat, water quality, recreational and scenic quality, and productivity of adjacent rural lands. They can also contribute to the spread of pest plants and pathogens. The main vertebrate pest species occurring in Googong Foreshores are the European Rabbit (*Oryctolagus cuniculus*), European Red Fox (*Vulpes vulpes*), Pig (*Sus scrofa*), Goat (*Capra hircus*) and Fallow Deer (*Dama dama*). These are subject to an integrated feral animal control program. Feral cats are also probably present in the Foreshores. As noted in s. 5.4.1(a), carp have not yet established in the reservoir, but Eastern Gambusia (*Gambusia holbrooki*) and Redfin Perch (*Perca fluviatilis*) are found there. The approaches outlined in the *ACT Pest Animal Management Strategy 2012 - 2022* (ACT Government 2012), are appropriate for application in the Foreshores, even though the formal jurisdiction of the document is the ACT.

PEST ANIMALS**Objective**

- **The damaging impacts of pest animals on the values of Googong Foreshores are minimised through strategic and effective management programs.**

Policies

- A program of pest animal management will be undertaken at Googong Foreshores based on pest animal control priorities, co-operation with adjacent land managers, and evaluation of the effectiveness of previous programs.

Actions

- Design and undertake management programs for pest animals in accordance with relevant legislation and strategies, pest animal control priorities, and in co-operation with adjacent land managers.
- Continue the successful rabbit control program to reduce grazing pressure to acceptable levels.

6.7 KANGAROOS

Open grassy environments at Googong Foreshores provide ideal kangaroo habitat and high densities have been recorded. Management of kangaroos at the Foreshores is included in the *ACT Kangaroo Management Plan* (ACT Government 2010a), which should be consulted if more detail is required.

6.7.1 MAINTAINING GROUND COVER

As discussed in Chapter 4, maintenance of catchment condition in Googong Foreshores is a crucial management consideration. Central to this is the vegetation cover. The main concern regionally is whether ground cover falls below 70 per cent, a minimum acceptable threshold set by the Murrumbidgee Catchment Management Board (2003), recommended by McIvor (2002a, 2002b), and supported by studies such as that of Jefferies (1999) which showed a sharp increase in the rate of water erosion about this level. Ideally, given the proximity of Googong Foreshores to the reservoir, it is desirable to maintain cover above this level.

The parts of Googong Foreshores of most management concern are the grassland areas west and south-west of the reservoir. Particularly important is the northern part of this area, opposite the main basin of the reservoir. Pollutant material such as sediment or bacteria from this area has the potential to be rapidly transferred to the reservoir. Material introduced further upstream in the catchment has greater opportunity to settle out, or decompose. Ground cover in the grassy areas fluctuates according to the interaction of seasonal conditions and herbivore grazing pressure (primarily kangaroos and rabbits). Management of herbage mass (see **Glossary**) in relation to fire risk is also important in these areas and grazing is the main influence on this.

Rainfall at Queanbeyan (>130 year record) has a coefficient of variation between years of 27 percent. For that reason grassland biomass fluctuates strongly between years. Compared to grass, kangaroo populations are slower to grow, and to die back, and kangaroo density at Googong Foreshores is much less variable. Thus the grazing pressure exerted by the kangaroos will vary considerably. When there is a strong spurt of pasture growth the grassland will be under-grazed, and when the pasture is dying back, it will be over-grazed. When the pasture is eaten to a low level in dry years, there is a reduction of groundcover and increased risk of erosion.

The potential for contamination of the reservoir was demonstrated by an extreme storm in March 2003. Occurring during a drought, it resulted in large volumes of grass litter, kangaroo faecal material and soil moving into Googong Reservoir from the well eaten down grassland on the western foreshore. While such extreme storm events are likely to increase the risk of algae outbreaks, such as the one recorded the following summer, fortunately they are also uncommon. As well as nutrients, which may lead to algal blooms, faecal material can also be associated with parasites. Kangaroos carry a large number of endoparasites incapable of harming humans. Eastern Grey Kangaroos can also carry the human pathogen *Cryptosporidium*. However, research in the Warragamba Catchment of the Sydney Catchment Authority has shown that kangaroos do not carry *Cryptosporidium* types that have caused a water-borne outbreak of disease (SCA and NSW Dept of Education and Training 2009).

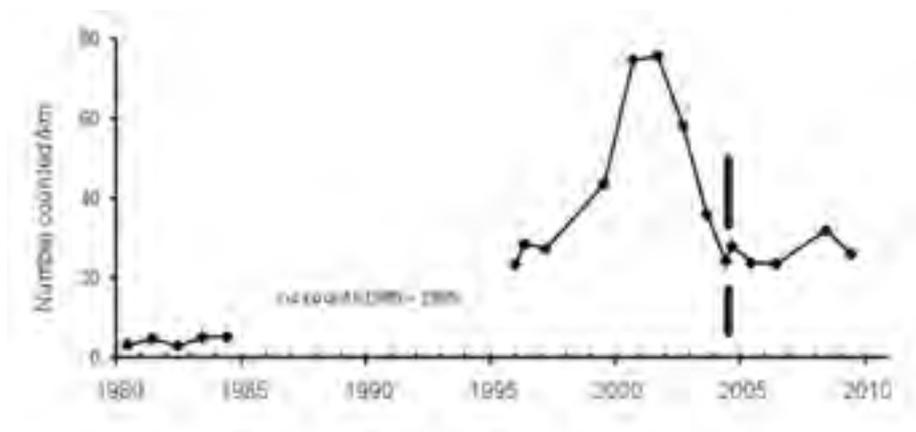
6.7.2 KANGAROO POPULATION SIZE

The overwhelming majority of kangaroos at Googong Foreshores are Eastern Grey Kangaroos (*Macropus giganteus*) (Muranyi 2000). Spotlight counts of the kangaroo population were undertaken in the early 1980s, ceased for a ten year period (1985-1995), and recommenced in 1996 (Figure 6.1). The density index shown in Figure 6.1 tracks relative change but is incapable of providing absolute density e.g. number per hectare. Since 1996 estimation methods have been used at Googong that allow the calculation of absolute density (Table 6.5).

The mean density of kangaroos in 2002 (when the population had reached its peak) was 5.01 kangaroos per hectare (501 per km²), based on nocturnal line transect estimates (Fletcher 2006). These densities are much higher than in surrounding rural land in NSW where densities (estimated by helicopter line transect) in 2003 and 2006 were 0.12 and 0.14 kangaroos per hectare (12 and 14 per km²) respectively (Cairns 2004, 2007).

The pattern of growth of the kangaroo population at Googong Foreshores (Figure 6.1) conforms to a typical herbivore ‘irruption’ described in the ecological literature (Caughley 1976; Forsyth and Caley 2006; Leopold 1943). It is one of a number of irruptions that have occurred in the ACT and region over the past two decades. At Googong, the kangaroo population appears to have risen slowly at first, then increased exponentially, overshot its food supply (coincident with the drought conditions of 2002-2003), and collapsed. The time around the peak and ensuing collapse is a time of extreme pressure on the vegetation and therefore increased exposure of bare ground and likelihood of erosion in rainfall events.

Figure 6.1 Eastern Grey Kangaroo ‘herbivore irruption’ at Googong Foreshores



Note: The graph shows the kangaroo population increase until 2001-2002 then a steep decline due to starvation, reaching approximately its current level in 2004. The decrease was genuinely due to starvation, not the culling of 800 kangaroos in July 2004 (marked by vertical bar) which was too late and too few to affect the ecological process.

As shown in Figure 6.1, after 2002 in developing drought conditions, the population ‘crashed’ and the extreme storm in March 2003 resulted in erosion of the grazed areas and temporary pollution of the reservoir (see s. 6.7.1). Following the January 2003 bushfire in the ACT, there was concern about water supplies and in 2004, amid concern for catchment condition, a cull of 800 kangaroos was undertaken at Googong Foreshores. The aim of this was to lessen grazing pressure, such that if the drought broke, herbage mass and groundcover would be restored to a threshold level likely to prevent erosion. However, the population was already in a severe decrease phase following the irruption and would have declined regardless of whether or not a cull was undertaken.

Table 6.5 Kangaroo densities at Googong Foreshores since 1996

Date	Method used ¹	Kangaroo density (EGK/ha)	Standard error	Number of kangaroos	Source
June 1996	Distance sampling	2.00	0.54	900	Muranyi 2000
Aug 1999	Distance sampling	3.60	0.97	1620	Muranyi 2000
Aug 2001	Sweep count	3.80	NA	1710	Fletcher 2006
2001–02 ²	Distance sampling	4.38	1.21	1972	Fletcher 2006
2002–03 ²	Distance sampling	5.01	1.47	2253	Fletcher 2006
Sep 2009	Pellet counts	2.15	0.08	1415	ACT Government
June 2011	Pellet counts	2.92	0.33	1920	ACT Government

Notes: 1 See *Estimating kangaroo density* in **Glossary** for description of methods

2 Mean of six bimonthly surveys.

6.7.3 MANAGING THE KANGAROO POPULATION

The main issues regarding management of the kangaroo population at Googong are:

Reduction of herbage: Grazing by kangaroos at Googong Foreshores potentially performs a valuable role in fire fuel hazard reduction. The ability to manage this through changing seasonal conditions is difficult, as herbage reduction may be insufficient in good seasons and excessive in dry periods and in winter.

Kangaroo population growth: Due to the management regime at Googong Foreshores (equivalent to a reserve), the kangaroo population is not subject to either the rural culling or commercial harvesting that occurs in surrounding NSW, nor is there significant predation. In these circumstances population increase to ‘ecological carrying capacity’ (see **Glossary**) is highly probable, and this is associated with reduced herbage mass and possible loss of soil in drought periods. It is not appropriate to allow the kangaroo population to remain indefinitely at ecological carrying capacity, given the need to protect both the water catchment and the condition of native grassy ecosystems.

Catchment protection: Given the primary purpose of Googong Reservoir and its increased importance to security of the Canberra and Queanbeyan water supply, the maintenance of catchment condition is a key management task. Controlling total grazing pressure so as to maintain adequate ground cover that can resist erosion, slow overland flow and filter sediments and organic material is essential. However, there is not a simple relationship between kangaroo density and catchment stability. No management solution, even a complete removal of all grazing animals, would entirely eliminate the risk of erosion in an extreme drought but reduced grazing pressure will maintain ground cover in most conditions.

Threatened species and ecological communities: Overgrazing by kangaroos can have deleterious impacts on grassy ecosystems and limit woodland regeneration. Eddy (2009) noted that ‘it seems probable that the current kangaroo population and grazing pressure is significantly higher than the natural level, and higher than would be desirable in the long term’.

Kangaroo population management: A long term, proactive approach is needed to manage kangaroos at Googong Foreshores, rather than actions such as responding to the onset of dry weather conditions by starting to remove kangaroos. To reduce the likelihood of erosion and damage to grassy ecosystems, kangaroo density should be maintained at a level that accords with other land management objectives. Examination of the pastures at Googong Foreshores, including a study of kangaroo and pasture dynamics (Fletcher 2006), indicates the pasture is of similar food value to that in ACT lowland grassy ecosystems. The most desirable option for kangaroo populations in native grasslands, of maintaining *grassland conservation densities* (see below), would also maintain suitable catchment conditions at Googong.

Recent research on a range of sites and pasture types (natural and exotic) in the ACT and at Googong Foreshores (Fletcher 2006), as well as mathematical modelling, suggest that a *significant increase in herbage mass is associated with kangaroo densities that are in the range of approximately 0.6 to 1.5 per hectare in grassland areas*. This estimate is regarded as an initial approximation that requires further refinement. However, it accords with observations of the deleterious impacts of kangaroos on lowland native grasslands in the ACT when their densities are higher. While recognising the need for further research to better estimate appropriate densities, the term *grassland conservation densities* is used in the *ACT Kangaroo Management Plan* to refer to densities that:

- relate to the management objectives for the land
- maintain suitable habitat for other grassland flora and fauna species (in particular, threatened species)
- recognise a kangaroo density of less than 1.5 per hectare as a likely requirement in order to maintain the natural integrity of lowland grassy ecosystems.

Animal welfare is an important consideration for every program involving the manipulation of animal populations. Any kangaroo management undertaken at Googong will comply with the relevant animal welfare codes of practice prevailing at the time, as outlined in the *ACT Kangaroo Management Plan*.

Relevant NSW legislation also needs to be considered as all kangaroo species are designated as ‘protected fauna’ in NSW under *the National Parks and Wildlife Act 1974*. However, the *National Parks and Wildlife Act 1974* and the *National Parks and Wildlife Regulation 2002* make provisions for the licensing of a range of activities, including harming fauna for a specified purpose. When undertaking kangaroo management activities at Googong Foreshores, the ACT will need to ensure compliance with this legislation.

A reduction in food availability via reforestation of formerly cleared land could make some contribution to managing kangaroo populations by reducing the extent of pasture. However, it is important that such planting is not undertaken in areas of Natural Temperate Grassland (see s. 6.4).

6.7.4 MANAGEMENT OBJECTIVES, POLICY AND ACTIONS

KANGAROOS

Objective

- **The kangaroo population at Googong Foreshores is managed so that grassy ecosystems are conserved and water catchment conditions are maintained or improved.**

Policies

- Kangaroos will be managed as an integral part of the fauna of Googong Foreshores and the grassy ecosystems of the Area in particular.
- Kangaroo management will be based on the objectives and policies outlined in the *ACT Kangaroo Management Plan* (KMP), in particular, those for kangaroo welfare (KMP Section 4.4), managing kangaroo densities (KMP Section 4.6), lowland native grassy ecosystem areas (KMP Section 5.3.1), and Googong Foreshores (KMP Section 5.6).
- Management of kangaroo grazing will be undertaken in the context of total herbivore grazing pressure, considering in particular, the contribution by rabbits.
- Googong Foreshores will be included in long term monitoring of lowland grassy ecosystems that includes the interaction between the vegetation and large/medium herbivores (domestic stock, kangaroos and rabbits).
- Kangaroo populations will be managed with the aim of achieving grassland conservation densities.
- Kangaroo management will comply with relevant NSW legislation (for example, firearm licensing, animal welfare, harming protected fauna) and the relevant NSW codes of practice (see s. 9.3.7).
- A long-term program of increasing the tree and shrub cover in previously cleared areas will be evaluated and undertaken where practicable, aimed at reducing suitable kangaroo habitat, as well as providing direct catchment protection benefits. Tree planting will not be undertaken in areas of Natural Temperate Grassland. This will be considered as part of the vegetation management plan (Section 6.4.3).

Actions

- Continue and develop, as required, a scientifically based monitoring program for herbivores (focused on kangaroos and rabbits) and lowland grassy ecosystems with appropriate analysis and recording of results.
- Take a proactive approach to kangaroo management, so that densities do not increase in favourable seasons to levels that are unsustainable and impact on catchment and grassy ecosystem condition.
- Manage the kangaroo population with the aim of achieving grassland conservation densities, which on current knowledge are densities of less than 1.5 kangaroos per hectare in grassy ecosystems.
- As part of the vegetation management plan for Googong Foreshores, evaluate, and if desirable and feasible, undertake programs to increase tree and shrub cover, where this does not impact on areas of Natural Temperate Grassland.

7

Cultural Heritage



7.1 CULTURAL HERITAGE: PRIMARY MANAGEMENT OBJECTIVE

- **Cultural heritage within Googong Foreshores is identified, conserved, and where appropriate, interpreted and promoted to retain and foster community associations and an appreciation of the past.**

Cultural heritage value and *cultural significance* are defined and discussed in s. 2.6.

7.2 CULTURAL HERITAGE AT GOOGONG FORESHORES

Current recognition of cultural heritage at Googong Foreshores relates to prior Aboriginal occupation, the geological feature of London Bridge Natural Arch, and the representation of the early European pastoral period in London Bridge Homestead. Over time, other significant associations with Googong Foreshores may develop and become recognised.

As part of establishing baseline conditions for the Googong Lease, the Commonwealth has prepared a background assessment of heritage values: *Googong Foreshore: Heritage Assessment* (ERM Australia 2008b) and *Googong Foreshores: Aboriginal Heritage Assessment* (ERM Australia 2008a). The Commonwealth has also prepared a *Googong Foreshores: Heritage Management Plan* (ERM Australia 2010), which considers heritage values and management in four categories: natural, geodiversity, historic, and Indigenous (Aboriginal). These three documents provide the basis for heritage management at Googong Foreshores and are referred to in more detail below.

Natural and geodiversity heritage values are referred to in s. 2.6 and s. 6.2 of this Googong Foreshores Plan of Management.

7.2.1 LEGISLATIVE FRAMEWORK

As noted in s. 1.4, as Googong Foreshores is a Commonwealth Place in NSW, Commonwealth legislation takes precedence over all other legislation unless the other legislation is capable of operating concurrently with Commonwealth legislation. Legislation applicable to heritage management (both natural and cultural) at the Foreshores is outlined in Table 7.1. ACT heritage legislation does not apply in the Foreshores.

7.2.2 NON-STATUTORY CONSIDERATIONS

Guidance for the conservation and management of places of cultural significance (cultural heritage places) is provided by the Australian ICOMOS (International Council on Monuments and Sites) Charter for the conservation of places of cultural significance (the Burra Charter). The charter sets a standard of practice for those who provide advice, make decisions about or undertake works to places of cultural significance including owners, managers and custodians. The charter is revised from time to time and only the latest version is the approved Burra Charter (<<http://icomos.org/australia/burra.html>>).

More detailed guidelines for the conservation and management of cultural heritage places are contained in: *Protecting Local Heritage Places: A guide for local communities* (Australian Heritage Commission 2000) and *Ask First: A guide to respecting Indigenous heritage places and values* (Australian Heritage Commission 2002b).

Table 7.1 Heritage legislation applicable to Googong Foreshores

Legislation	Main provisions
Commonwealth	
<i>Environment Protection and Biodiversity Conservation Act 1999</i>	Provisions relating to Googong Foreshores are: <ul style="list-style-type: none"> • Matters of National Environmental Significance. • Activities involving a Commonwealth Area or undertaken by Commonwealth agencies with potential to have a significant impact on the environment. • Minimisation of adverse impacts on heritage values of a place on the Commonwealth Heritage List. • Ongoing protection of heritage values of a place included on the Commonwealth Heritage List in the event of sale or transfer. (see also s. 1.4.2 of this plan of management)
<i>Aboriginal and Torres Strait Islander Heritage Protection Act 1984</i>	Act protects areas/objects of significance to Aboriginal people, which are under threat of destruction. Act must be invoked by Aboriginal or Torres Strait Islander people.
State	
<i>Heritage Act 1977</i>	Act protects the natural and cultural heritage of NSW with emphasis on non-Indigenous cultural heritage.
<i>National Parks and Wildlife Act 1974</i>	Primary legislation regulating protection of Aboriginal heritage (Aboriginal objects and places).
<i>Environmental Planning and Assessment Act 1979</i>	Act requires that impacts on Indigenous and non-Indigenous heritage are considered in land use planning.

7.2.3 RECOGNISED HERITAGE PLACES AT GOOGONG FORESHORES

London Bridge Natural Arch and the London Bridge Homestead, described as the ‘Googong Foreshores Cultural and Geodiversity Heritage Areas’, have been nominated for the Commonwealth Heritage List (Place ID 106072) (see s. 2.6, s. 6.2.2). Both places were included on the Register of the National Estate (London Bridge Natural Arch (Place ID 1182) and the London Bridge Homestead Group (Place ID 1174)) which the Commonwealth Government has now phased out as a statutory list (see **Glossary**). No places at Googong Foreshores are currently listed under NSW heritage legislation (see <<http://www.heritage.nsw.gov.au>>).

London Bridge Natural Arch has both natural values (see s. 6.2.2) and elements of all the values that make up cultural significance (see s. 7.1), including significant Aboriginal values (see s. 7.3). The feature has long attracted interest since first being described by explorer Mark Currie, who was directed there by an Aboriginal guide. Currie described it as ‘a natural bridge of one perfect Saxon arch, under which the water passed’ (Department of Territory and Municipal Services 2009). The arch features widely in tourism information about the region.

London Bridge Homestead Group incorporates the homestead and associated buildings dating from the 1860s, and the woolshed and shearers’ quarters further north, built in the 1930s.

7.3 ABORIGINAL CULTURAL HERITAGE

Three Aboriginal tribal groups have been recorded for the tableland and mountain region of south-eastern NSW and the ACT, in which Googong Foreshores is situated. These groups are the Ngunnawal, Ngarigo and Walgalu. The Googong area was occupied by a large linguistic and socially defined group called the Ngunnawal, as identified and mapped in the ethno-historical records. As well as being the 'Country' of the Ngunnawal, the ACT region was also a gathering place for a number of other language groups that made seasonal visits to the area. Much has been written on the annual harvesting of Bogong moths in the Brindabella and nearby ranges by groups from as far away as the Shoalhaven River. These seasonal gatherings, which were probably for purposes of trade, exchange of knowledge, intermarriage and ceremony, highlight the complexity of Aboriginal society and political organisation prior to European settlement.

The dislocation of Aboriginal people from their lands following the effects of European settlement means that there has not been a continuous physical connection of Aboriginal people with the Googong area. By the 1870s, the disintegration of the Aboriginal groups that formerly occupied or visited the tablelands and mountains was virtually complete (Meyers 2010). Ngunnawal people did not continue to live in the Googong area. However, spiritual connection with the landscapes and environment of the region ('Country') remained and this has found recent, renewed expression.

As noted in s. 2.4 and Table 2.1, archaeological evidence suggests that in common with elsewhere on the Southern Tablelands, the Queanbeyan River valley at Googong Foreshores was an occupation site for Aboriginal people. Evidence of campsites and the Aboriginal economy in the river valley have been lost under the reservoir waters and sediments, in floods, and due to erosion of soil horizons in the reservoir (ERM Australia 2008a). The more sheltered river valleys that were not frost hollows provided year-round occupation sites. River valleys and associated lowland grasslands and woodlands provided mammals, reptiles, ducks and other birds, plant foods and a seasonal abundance of fish (Flood 1980, pp. 61–82, 97–100). Aboriginal camps in the Googong area have been dated to be at least 800 years old, though occupation was likely to have been much longer (Table 2.1).

Three documented archaeological surveys have been undertaken at Googong Foreshores. Isolated artefacts, two stone cairns and one campsite were recorded in the area to be flooded by the dam (Smith 1975 in Flood 1980). An archaeological survey and specific investigations of the London Bridge Natural Arch area were undertaken by Boot and Cooke (1990) in preparing a conservation management plan for the area. The most recent survey was based on a representative sample of likely locations for Aboriginal sites in the Foreshores (ERM Australia 2008a). Transects were conducted in the north-eastern, north-western and south-western areas. This survey recorded twelve sites, all on the western foreshores. The majority of these were new sites. None of the previously recorded sites could be located, and most had been inundated by flood waters. The sites comprised: one campsite (exposed by low reservoir water level); three isolated finds; five artefact scatters; a scarred tree (Yellow Box) with the size of the scar suggesting use for a canoe; a low stone cairn (possible burial site); and the sacred site of London Bridge Natural Arch. The study area appears to contain a balanced and diverse range of landforms, features, food sources and water that could have been utilised by large numbers of Aboriginal peoples over the Holocene period (last 10 000 years) and presents significant opportunities for future archaeological work (ERM Australia 2008a).

The following statement of significance for Indigenous (Aboriginal) Heritage Values is based on that prepared by ERM Australia (2010: section 10.2.4):

Googong Foreshores contains a diverse range of known Aboriginal sites including stone artefact scatters, a scarred tree, cairns (with potential burials), campsites and a sacred site associated with known ceremonial activities. Googong Foreshores has zones with high and moderate potential to yield further sites. All recorded Aboriginal sites are contained within a cultural landscape, where their location suggests deliberate selection and use of particular landforms.

The London Bridge Arch has been identified as a sacred area, connected to the use of Googong Foreshores as a possible 'staging zone'. It has been suggested that Aboriginal people waited within the habitable confines of Googong Foreshores, on the lower slopes and rises, prior to moving into the ACT's Brindabella Mountains for ceremonial purposes via the Arch and ridgeline system to the south-west of the Foreshores boundary.

The ability of the land within Googong Foreshores to support a large number of Aboriginal people for an extended period of time is demonstrated through the rich and diverse ecology of the area. The hypothesis of intensive use of this area is also supported by the extent, variety and quantity of archaeological material observed within Aboriginal sites.

Future archaeological and ethnographic study of Aboriginal sites at Googong Foreshores has the potential to further the knowledge relating to Aboriginal economy (subsistence and trade), demography (population number and movement) and society (inter-tribal relationship and ceremonial activities) across the ACT/Queanbeyan area and could present new information with regard to the recorded ceremonial sites and activity in the ACT's high country.

The *Googong Foreshores: Heritage Management Plan* (ERM Australia 2010) sets out general policies for conservation of Aboriginal heritage values; detailed management guidelines; a management action plan; and a maintenance schedule.

7.3.1 MANAGEMENT OBJECTIVES, POLICIES AND ACTIONS

The effects of the European pastoral economy and the filling of Googong Reservoir are assumed to have removed much of the evidence of previous Aboriginal occupation of the Googong Foreshores area. However, the evidence that remains and knowledge of regional Aboriginal economy, demography and society suggest that the area has been important to Aboriginal people over a long period of time. There are opportunities to integrate recognition of Aboriginal cultural heritage into the management of the Foreshores, involving consultation with local Aboriginal communities. Information and interpretative material on the Foreshores can play an important role in this. The bases for management of Aboriginal cultural heritage at Googong Foreshores are the heritage assessments and heritage management plan referred to in s. 7.3 as well as continuing consultation with local Aboriginal communities.

ABORIGINAL CULTURAL HERITAGE

Objective

- **Aboriginal cultural heritage values are recognised, identified, protected, incorporated into the management of the Foreshores and interpreted, where appropriate, taking account of cultural sensitivity and ongoing connection of Aboriginal people to their Country.**

Policies

- Management of Aboriginal cultural heritage will take account of the *Googong Foreshores: Heritage Assessment* (ERM Australia 2008b), the *Googong Foreshores: Aboriginal Heritage Assessment* (ERM Australia 2008a), and accord with the policies, guidelines and associated action plan and schedules for conservation of Aboriginal cultural heritage in the *Googong Foreshores: Heritage Management Plan* (ERM Australia 2010).
- Management of Aboriginal cultural heritage will be carried out in accordance with the requirements of Commonwealth and NSW legislation.
- Aboriginal sites and objects (as defined under Commonwealth and NSW legislation) will be protected.
- Management of London Bridge Natural Arch will give recognition to its significant Aboriginal heritage values.
- Aboriginal cultural heritage values at Googong Foreshores will be interpreted in a way that promotes community understanding and appreciation of those values and recognition of the connection of Aboriginal people to their Country.

Actions

- Implement the Aboriginal heritage management strategies in the *Googong Foreshores: Heritage Management Plan*. These strategies provide a five-year and ongoing management program including:
 - formal recognition of Aboriginal heritage values and Aboriginal heritage sites
 - involvement of the local Aboriginal community in decisions involving their heritage sites
 - a recording system for Aboriginal heritage sites and management of sensitive information
 - monitoring of Aboriginal heritage sites
 - management of potential impacts on Aboriginal heritage sites
 - salvage and/or excavation and radiocarbon dating of sites exposed by low reservoir water levels
 - management of unforeseen discoveries including the procedures to be followed should previously unknown Aboriginal artefacts be discovered in the course of works at Googong Foreshores.

7.4 EUROPEAN CULTURAL HERITAGE

London Bridge Homestead group and the associated 1930s woolshed and shearers' quarters are the main focus of European cultural heritage management at the Foreshores. As noted in s. 7.2.3, London Bridge Natural Arch also has European cultural heritage values.

London Bridge Homestead is located in the Burra Valley in the south-western part of the Foreshores. The area was first settled by Europeans in 1834 with the first purchase in 1857. In subsequent years, the holding was expanded to reach its largest size (4047 ha) in about 1900. It was known by various names, all including reference to London Bridge. The property converted from cattle to mainly sheep grazing in the latter part of the 19th century with over 7000 sheep being recorded in 1901. It was one of the largest holdings in the district. The present woolshed and shearers' quarters were constructed in the 1930s, replacing a former woolshed adjacent to the homestead. The Commonwealth resumed the property in 1973, and the former owner leased a section of the property back from the Commonwealth (ERM Australia 2008b; Freeman Collett and Partners Pty Ltd 1995).

The collection of buildings now present at the homestead comprises at least five architectural styles and different building materials, commencing with a stone cottage constructed in 1860 from material quarried from a nearby hill. Significant remains of a woolshed and some slab-walled outbuildings exist. The relic of a lever arm woolpress is extremely rare. A Hawthorn (*Crataegus monogyna*) hedge is present on three sides of the homestead. The homestead is clearly visible from outside a security fence and is open to the public on regular open days. Many of the outbuildings are outside the fence. The Commonwealth Heritage List nomination (see above) includes both the homestead group and the later woolshed and shearers' quarters to the north. The latter now form part of a picnic area and commencing point for the walk to the natural arch and the homestead group.

The following statement of significance for Historic (European) Heritage Values has been prepared by ERM Australia (2010: s. 10.2.3):

The London Bridge Homestead group and outbuildings survive as the focus of a large, mid nineteenth century marginal pastoral holding. The groups of buildings and the range of buildings and materials indicate the social and economic changes that have taken place over a period of one hundred years. The Woolshed and Shearers' Quarters provide an insight into the 1930s period of wool production management of the property, and reflect the importance of this industry to the local economy during this period.

The London Bridge Homestead group is a rare example of a group of buildings in Australia which illustrate the range and sequence of regional vernacular construction techniques as a complete homestead precinct. The Homestead group also has research potential to provide further insight into the pastoral settlement of the region.

The Homestead group and ancillary buildings are an excellent example of a group of vernacular buildings that has developed in response to land use and user requirements. The buildings demonstrate a variety of construction types, sophistication and materials and illustrate the suitability of those materials in a rural setting. The London Bridge Woolshed and Shearers' Quarters are intact and strong representatives of their type of pastoral building dating from the 1930s, in excellent condition.

The London Bridge Homestead group displays aesthetic qualities stemming from pastoral activity and the need for self sufficiency in a remote rural area. The Homestead group and its setting have picturesque qualities, with the simplicity of the buildings contrasted with the sweeping views of the surrounding hills. The cultural landscape is valued by community groups for its ability to convey both landscape qualities and the aesthetics of nineteenth century and twentieth century vernacular farm buildings.

A conservation strategy for the homestead group was prepared in 1995 (Freeman Collett and Partners Pty Ltd 1995) and extensive conservation work was carried out on the homestead complex, mainly in the 1990s. The *Googong Foreshores: Heritage Management Plan* (HMP) (ERM Australia 2010) sets out general policies for conservation of historic heritage values; detailed management guidelines; a management action plan; and a maintenance schedule.

7.4.1 MANAGEMENT OBJECTIVES, POLICIES AND ACTIONS

London Bridge Homestead, Woolshed and Shearers’ Quarters (London Bridge Homestead Group) and the adjacent London Bridge Natural Arch, are significant elements of European cultural heritage at the Foreshores and in a regional context. The woolshed and shearers’ quarters at the London Bridge car park provide a tangible link to the area’s rural past and complement the picnic area. The homestead can only be reached along a 3.4 km return walking track (management trail). These features, including the picnic area near the woolshed, are popular recreational destinations at the Foreshores. This is facilitated by information and interpretative material, signs and regular ‘open days’ for the homestead. The bases for management of European heritage at Googong Foreshores are the heritage assessments and heritage management plan referred to in s. 7.4.

EUROPEAN CULTURAL HERITAGE
<p>Objective</p> <ul style="list-style-type: none"> • European cultural heritage values are conserved and interpreted to visitors to Googong Foreshores.
<p>Policies</p> <ul style="list-style-type: none"> • European cultural heritage will be identified, conserved and interpreted for its educational value and to foster historical understanding. • Management of European cultural heritage will take account of the <i>Googong Foreshores: Heritage Assessment</i> (ERM Australia 2008b) and accord with the policies, guidelines and associated action plan and schedules for conservation of European cultural heritage in the <i>Googong Foreshores: Heritage Management Plan</i> (ERM Australia 2010). • Management of European cultural heritage will be carried out in accordance with the requirements of Commonwealth and NSW legislation.
<p>Actions</p> <ul style="list-style-type: none"> • Implement the European heritage management strategies in the <i>Googong Foreshores: Heritage Management Plan</i> including a five-year and ongoing restoration and maintenance schedule for the London Bridge Homestead group. • Ensure that all works proposed for Googong Foreshores fulfil legislative requirements related to heritage protection. • Maintain the practice of having ‘open days’ for London Bridge Homestead, subject to the consideration of public safety and requirements for the conservation of the physical fabric of the place.



8.1 EDUCATION AND RESEARCH: PRIMARY MANAGEMENT OBJECTIVES

- **Opportunities are provided for the community to acquire knowledge of the values of Googong Foreshores and to understand its primary water supply purpose.**
- **Research is undertaken at Googong Foreshores that contributes to management of the Area and the conservation of its values.**

8.2 EDUCATION AND RESEARCH OPPORTUNITIES

At Googong Foreshores, the diversity of landscapes and ecological communities, geological features, water supply infrastructure, and Aboriginal and European cultural heritage offer opportunities for formal and informal education and research projects. These opportunities are enhanced by the location of the Foreshores close to Canberra and Queanbeyan.

Nature study and visiting natural and cultural heritage sites at the Foreshores are encouraged, combining recreational and educational activities (see s. 5.4). Information is provided, for example, in the *Googong Foreshores: Map and Guide*, the *Googong Foreshores: Bird List 2008* (PCL 2008), and at Googong Homestead on regular 'open days'.

The Foreshores is recognised as a place of scientific value (ERM Australia 2008a), referring to the Area's known or potential ability to reveal further information. There are opportunities to carry out research at the Foreshores that supports management. The location also provides a protected environment for carrying out more fundamental research. An example of this is the study of raptors and their interactions in the Area over more than two decades (Olsen et al. 1998; Olsen et al. 2006).

Policies

- Educational activities will be encouraged at Googong Foreshores that:
 - enhance knowledge and understanding of the Area's water supply purpose, and natural and cultural heritage values
 - conform to the same objectives and policies as defined for recreational use (see s. 5.4).
- Survey, monitoring and research will be encouraged at Googong Foreshores, particularly related to water supply, catchment management, natural and cultural heritage, and protected area management.

Actions

- Provide interpretive and educational materials to support educational activities at the Foreshores, including materials that:
 - assist in an understanding of water supply issues (e.g. water quality)
 - support nature study
 - assist in interpreting European and Aboriginal cultural heritage.
- Encourage survey, monitoring and research activities at the Foreshores, particularly related to water supply, catchment management, natural and cultural heritage, and protected area management.
- Maintain a repository of educational materials and information relating to the Foreshores, including the results of research projects.

9

Environmental Planning, Protection and Management



Chapters 4 to 8 have outlined management of Googong Foreshores to conserve the values identified in s. 2.6. Chapter 9 considers a number of other management issues and requirements. These also support the conservation of Foreshore values to varying degrees. While the chapter focuses on the responsibilities of the managing agency, the concept of environmental stewardship applies to all those individuals and organisations that have an involvement with Googong Foreshores.

9.1 FIRE MANAGEMENT

Fire management is important in water supply catchments in relation to protection of water quality and catchment yields. Loss of vegetation cover can result in accelerated erosion with ash and sediment inputs causing elevated turbidity levels in reservoir waters. Vegetation regrowth following fire may result in reduced water yields for a period of time in the catchment. At Googong Foreshores, as well as protection of water quality, other considerations in fire management are biodiversity conservation, heritage protection, safety of staff and visitors, asset protection, and impacts on neighbouring land holders.

9.1.1 FIRE HISTORY

Fires in 1985 burnt almost all of Googong Foreshores except for the area south of the junction of Burra Creek and the Queanbeyan River. Smaller prescribed burns have been undertaken at various times. The largest of these were along the Queanbeyan River in the southern section of the Foreshores in 1986 and 1987. Prescribed burns were undertaken in 2011, 2012 and 2014.

9.1.2 LEGISLATIVE BASIS FOR FIRE MANAGEMENT

In NSW, the control of bushfires is granted to authorised persons under the *Rural Fires Act 1997*. The Act gives powers to the NSW Rural Fire Service (RFS) to coordinate fighting of bushfires, undertake bushfire prevention activities, and to protect property and the environment. Landholders are also responsible for the control of bushfires in NSW. For Googong Foreshores, this responsibility rests with the ACT Government. The ACT Emergency Services Authority and the ACT Rural Fire Service have no direct involvement in, or jurisdiction over, bushfire control at Googong Foreshores. The *Strategic Bushfire Management Plan for the ACT* (ACT ESA 2014) has no jurisdiction at Googong Foreshores, so a specific plan for the Foreshores has been developed— *Regional Fire Management Plan 2009-2019 Googong Map Sheet* (ACT Government 2009). This plan has been prepared under NSW legislation.

9.1.3 FIRE MANAGEMENT ARRANGEMENTS

Fire planning and response for the Googong Foreshores is carried out in association with the NSW Rural Fire Service. Googong Foreshores is in the Southern Ranges Fire Weather Region and Lake George RFS Fire Control Zone which is based from Queanbeyan. If a total fire ban is called in the Southern Ranges Fire Weather Region or the ACT, Googong Foreshores is closed. The Foreshores lies within the Burra Bush Fire Brigade District of Palerang Shire and, in general, staff and fire equipment from Googong Foreshores form part of the Burra Brigade. Googong Foreshores observes the NSW Bushfire Season, which may differ to that prescribed for the ACT.

Operational details for bushfire management at Googong Foreshores (in particular the arrangements with the Burra Brigade) are set out in the annual Fire Action Plan, or its successor, prepared by the Territory and Municipal Services Directorate (TAMS). This covers arrangements for fire readiness and response. Fire prevention standards such as those for fuel and access management are detailed in the *Regional Fire Management Plan 2009-2019 Googong Map Sheet*. The activities planned to be undertaken each year to achieve these standards are detailed in the Bushfire Operational Plan prepared by TAMS for lands that it manages. Bushfire Operations Plans are a requirement under the *Strategic Bushfire*

Management Plan for the ACT for managers of land in the ACT. Googong Foreshores is included in the Bushfire Operational Plan as part of the overall fire management responsibility of the ACT Government, rather than being a requirement under the *Strategic Bushfire Management Plan for the ACT*. Googong Foreshores contains a network of mapped fire trails, which NSW Rural Fire service units are able to access through perimeter gates. Keys to the gates are held also by NSW Police and the Urban Fire Brigade (Queanbeyan).

9.1.4 KEY BUSHFIRE MANAGEMENT CONCEPTS

The following concepts underpin the strategies in the *Regional Fire Management Plan 2009-2019 Googong Map Sheet*:

- Widespread wildfire, and especially high intensity wildfire, would have significant impact on the water quality and long term water yield of Googong Dam. The risk of this occurring in the life time of the dam is very high. Minimising this risk is critically important, especially given the enhanced role of Googong Reservoir in ensuring water security for the ACT and Queanbeyan.
- Strategies to reduce the impacts on water supply and quality should also improve life and property protection and conserve biodiversity.
- At Googong Foreshores the spatial pattern of burning is more important than the frequency of burning. Long fire intervals are necessary for maximising protection of ground cover within the water catchment and for biodiversity conservation.
- Strategic use of prescribed fire may not stop wildfires, especially under extreme weather conditions. It will increase the probability of wildfire control, especially under non-extreme weather conditions. Prescribed fire will reduce fire intensity and the consequential post-fire water quality effects of some wildfires.
- Fire regimes for biodiversity conservation may be provided by wildfire or prescribed fire, or a combination of both.
- Protection of built assets is best achieved immediately adjoining the asset.
- Rapid fire detection and response is required to reduce risk of widespread high fire intensity.
- An effective network of access trails is required for minimising fire size and intensity and fire fighter safety.
- Cooperative arrangements with neighbours and fire authorities are fundamental to effective risk reduction.

9.1.5 KEY FEATURES OF THE REGIONAL FIRE MANAGEMENT PLAN - GOOGONG

The *Regional Fire Management Plan 2009-2019 Googong Map Sheet* addresses life and property protection, water quality, and biodiversity conservation within Googong Foreshores. With regard to protection of water quality, a mosaic pattern of prescribed burning strategically located within the catchment is considered the most appropriate long term strategy. In addition, a Water Quality Protection Zone (WQPZ) consisting of a vegetated filter strip of at least 200 m from the high water mark is to be maintained around the reservoir and 50 m either side of main watercourses (which are mapped in the plan). The plan requires that the approval of Icon Water be obtained prior to the use of backburning, wetting agents, foaming agents, retardant or earth moving machinery within the Water Quality Protection Zone. The plan requires that Icon Water be advised when fire retardant foams and wetting agents are used anywhere in the Foreshores.

9.1.6 MANAGEMENT OBJECTIVES, POLICIES AND ACTIONS

FIRE MANAGEMENT

Objective

- **Fire is managed at Googong Foreshores so that water quality, biodiversity, built assets (water resource infrastructure, cultural heritage places, recreational and management facilities), life and property are protected both within the Foreshores and on neighbouring land.**

Policies

- Bushfire management at Googong Foreshores will be undertaken in accordance with the *Regional Fire Management Plan 2009-2019 Googong Map Sheet* (ACT Government 2009).
- ACT agencies responsible for the management of Googong Foreshores will collaborate with the NSW Rural Fire Service for bushfire readiness and response in the Googong Foreshores area.
- Details of the agreed arrangements for bushfire readiness and response will be outlined in the annual Fire Action Plan, or its successor, prepared by the Territory and Municipal Services Directorate.
- Bushfire prevention activities (fuel and access management) for Googong Foreshores will be outlined in the annual Bushfire Operational Plan prepared by the Territory and Municipal Services Directorate for all land that it manages.

Actions

- Liaise with the NSW Rural Fire Service to establish agreed arrangements for bushfire readiness and response in the Googong Foreshores area.
- Include arrangements for bushfire readiness and response in the annual Fire Action Plan, or its successor, prepared by the Territory and Municipal Services Directorate.
- Undertake the Works Program specified in the Regional Fire Management Plan - Googong.
- Maintain the existing restrictions on lighting of fires in the Foreshores and closure on total fire ban days.
- Notify Icon Water of planned fuel reduction burns so that specific water sampling may be undertaken to enhance understanding of the effects of fire on reservoir water quality.
- Ensure that protection of natural and cultural heritage is included in planning for bushfire management at Googong Foreshores.
- Assess the conservation requirements of the twelve Aboriginal cultural heritage sites at Googong Foreshores recorded by ERM Australia (2008a) (see s. 7.3), in relation to bushfires and bushfire management. Include, where necessary, consideration of these sites in the Regional Fire Management Plan - Googong.

9.2 ENVIRONMENTAL IMPACT ASSESSMENT

In an area such as Googong Foreshores, with management akin to a reserve, it is appropriate that all works and significant policy decisions be subject to environmental assessment whether or not it is a legislative requirement. It is preferable that environmental considerations be part of the early stages of project formulation (an environmental planning approach). It is also advantageous to address a number of planned projects collectively in order to determine cumulative impacts. Indirect and offsite impacts should also be considered. It is important to assess potential impacts as rigorously as knowledge and techniques allow to separate those that are trivial, limited or inconsequential from those that are serious, irreversible and cumulative.

The primary legislation applicable to the Googong Dam Area in relation to environmental impact assessment is the *Environment Protection and Biodiversity Conservation Act 1999*. Under the EPBC Act, approval is required for actions that are likely to have a significant impact on:

- a matter of national environmental significance
- the environment of a Commonwealth Area (even if undertaken outside the Commonwealth Area)
- the environment anywhere in the world (if the action is undertaken by the Commonwealth).

Matters of national environmental significance currently applicable to Googong Foreshores are:

- threatened species and ecological communities listed under the Act
- migratory species protected under international agreements.

'Action' is defined broadly in the EPBC Act and includes: a project, a development, an undertaking, an activity or series of activities, or an alteration of any of these things. The EPBC Act uses a key threshold, that of likely 'significant impact' on listed matters of national environmental significance, to determine whether an action falls into the category of a 'controlled action'. Controlled actions require assessment and approval under the Act (section 75(2), EPBC Act).

A 'significant impact' is defined in the significant impact guidelines (Australian Government DEWHA 2010a, 2010b) namely:

A 'significant impact' is an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts.

The Googong Lease (clause 4.2) specifies that the ACT will refer to the Commonwealth Environment Minister under the EPBC Act:

- a) any request for a Commonwealth approval for the use of the Googong Dam Area for a purpose, other than the purposes specified in clause 4.1 of the lease (these uses being the collection, diversion, storage, conveyance, treatment and purification of water; the prevention of pollution of the water; and the existing type of recreational use at the date of the signing of the lease); and
- b) any proposed action in relation to the lease, including any enlargement, expansion or intensification of a Permitted Use, which may have an impact on the environment,

other than a proposed action under a Permitted Use not referred to in paragraph (b) (Commonwealth of Australia 2008).

Requirements for environmental impact assessment for works or developments on land in NSW are contained in the *Environmental Planning and Assessment Act 1979* (NSW) and local environmental plans. Works include projects associated with capital works, grants funding, community projects and urgent works. No major works are currently proposed at Googong Foreshores. It is the ACT Government's practice to conduct an environmental impact evaluation of proposed works to identify if there is a need for fuller environmental assessment as required by relevant legislation.

Note: No approvals are required under NSW law if the works are required for water supply purposes because such works are empowered under the Googong Dam Act, which is Commonwealth legislation and takes effect in precedence to NSW law. Should any works be proposed at Googong Foreshores that are not currently a Permitted Use and/or are likely to have a significant environmental impact, then legal advice should be sought as to the requirements for approval under the Commonwealth or NSW legislation.

9.2.1 CARRYING OUT WORKS

The Googong Lease (Section 8) provides for the ACT Government to carry out works at Googong Foreshores at its cost and in accordance with any environmental approvals and the Googong Dam Act. The ACT must, at the Commonwealth's request, provide confirmation that the necessary approvals are in place to undertake such work. Subject to clause 4.2 of the lease (see s. 9.2 above), the Commonwealth authorises the ACT to sign and lodge any application for a development or environmental approval for any work (within the scope of the Permitted Uses (clause 4.1 of the lease)) to be undertaken at the Foreshores that would otherwise be required to be signed by the Commonwealth.

Work is defined in the lease (clause 8.1) to cover a wide range of architectural and engineering works including, but not limited to: construction of new buildings and refurbishment of existing ones; landscaping and earthworks; clearing of land; and demolition or destruction of improvements.

9.2.2 MANAGEMENT OBJECTIVES, POLICIES AND ACTIONS

ENVIRONMENTAL IMPACT ASSESSMENT

Objective

- **Assessment of potential environmental impact is conducted for all proposed works and developments in accordance with the requirements of the Googong Lease and applicable legislation, in particular the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth).**

Policies

- All proposed works and developments at Googong Foreshores will be assessed for their potential impact on the values of the Foreshores as defined in this plan of management.
- All proposed works and developments will be assessed in accordance with the requirements of the Googong Lease and applicable legislation.
- Icon Water will be consulted if there are potential reservoir water quality implications associated with any proposed works and developments, or if water quality implications need to be ascertained.

Actions

- Incorporate environmental considerations into the early stages of project formulation.
- Undertake assessment of the potential environmental impact of proposed works and developments in the Foreshores, including in relation to the EPBC Act.
- Carry out works in accordance with the requirements of the Googong Lease.
- Should any works be proposed at Googong Foreshore that are not currently a Permitted Use in the Googong Lease and/or are likely to have a significant environmental impact, seek legal advice as to the requirements for approval under Commonwealth or NSW legislation.

9.3 MANAGEMENT OPERATIONS

Maintenance of environmental quality, resource and energy conservation, public health and safety, and control of activities that have the potential to impact on the values of Googong Foreshores and on visitors are important considerations and functions for management.

Objective

- **Systems for operational management are designed and developed to best-practice standards to maintain the environmental quality of Googong Foreshores and to ensure the health and safety of visitors.**

9.3.1 ENVIRONMENTAL POLICIES

A range of government environmental policies and strategies (Appendix 3) potentially apply to the management of Googong Foreshores and where relevant, these will be used to guide management decisions.

9.3.2 WATER AND ENERGY USE

Management of Googong Foreshores will aim to minimise greenhouse gas emissions, energy and water use in accordance with ACT Government policies and programs (ACT Government 2014, 2007b). Water and energy efficiency principles and technologies will be applied to the design and development of new buildings, park infrastructure, landscaping, and retrofitting of buildings, using energy and water rating schemes where feasible. The use of renewable energy sources for infrastructure will be evaluated.

9.3.3 WASTE MANAGEMENT

Since the opening of Googong Foreshores for recreation in the early 1980s, it has been policy not to supply rubbish bins. Visitors are advised of this in signs and information material. This policy will be continued (see Table 5.2).

9.3.4 CHEMICALS AND HAZARDOUS MATERIALS

The use of chemicals and hazardous materials at the Foreshores is considered in s. 4.4.6.

9.3.5 FEES AND CHARGES

There is no entry fee to Googong Foreshores and no change to this policy is proposed. The ACT Government does not have a licensing and fees system for commercial tour operators at present. Should such a system be established in the future, its applicability to Googong Foreshores will be considered in relation to all the areas managed by the ACT Government and the pattern of commercial use. Any commercial tour operation would need to be assessed in terms of the recreational policies in this plan (Ch. 5) and the provisions of the Googong Lease that limit recreational use to the existing type present at the time of the signing of the lease (clause 4.1). A fee may be charged for ranger guided interpretation activities at the Foreshores.

9.3.6 CONCESSIONS AND COMMERCIAL ACTIVITIES

A concession is a right granted by way of a lease, licence or permit for occupation or use of part of an area to provide facilities or services (e.g. food vending) or to undertake particular commercial activities (e.g. film-making, guided fishing). There is little interest in, or need for, concessions at recreational access points in Googong Foreshores and the establishment of concessions will not be implemented. Occasional and temporary commercial activities may be allowed provided that:

- proposals are consistent with the current management requirements and do not adversely impact on Foreshores values
- such activities do not conflict with other Foreshores users
- organisers are prepared to pay a fee for the use of the area, if fees apply
- the activity is carried out in accordance with relevant legislation and government policies.

9.3.7 FIREARMS AND CODES OF PRACTICE

Recreational use of firearms is not permitted at Googong Foreshores. Management staff or contractors occasionally use firearms for the control of pest animals and for kangaroo culling. It is management policy that the use of firearms at Googong Foreshores is prohibited except for management purposes. Use of firearms for these purposes will be in accordance with relevant legislation (the *Firearms Act 1996* (NSW)) and government policy (including codes of practice). With regard to kangaroos, NSW uses the national codes of practice for humane shooting, namely:

- *National Code of Practice for the Humane Shooting of Kangaroos and Wallabies for Commercial Purposes* (NRMMC 2008a)
- *National Code of Practice for the Humane Shooting of Kangaroos and Wallabies for Non-commercial Purposes* (NRMMC 2008b).

9.3.8 RESOURCE EXTRACTION

Resource extraction at Googong Foreshores will be limited to small-scale use of local materials where use of external materials is impracticable or undesirable (e.g. use of local soil or gravel material for benching walking tracks). The following activities are prohibited:

- timber cutting and firewood removal
- taking rocks, gravel or soil
- excavation for archaeological research (except with a licence under the *National Parks and Wildlife Act 1974*)
- taking, killing, picking, defacing or otherwise disturbing natural or cultural features except:
 - taking fish from the reservoir in accordance with NSW fishing regulations
 - by Aboriginal people for cultural purposes (if agreed protocols are established)
 - for authorised purposes under NSW legislation (e.g. for research)
- beekeeping.

9.3.9 DOMESTIC ANIMALS

Domestic animals are not allowed in Googong Foreshores, except for guide dogs (see Table 5.1).

9.3.10 TRAINING EXERCISES

Australian, NSW and ACT Government agencies (e.g. emergency services authorities, Australian Defence Force, Australian Federal Police) may, from time to time, use the Foreshores for training purposes. Such activities should only be undertaken when they do not impact in any significant way on the values of the Foreshores as defined in this plan of management. Arrangements need to be made for such activities with the ACT Government managers of the Foreshores and Icon Water. A protocol may be the appropriate way to establish an ongoing arrangement between the ACT Government/Icon Water and an agency that seeks to use the Foreshores on a regular basis e.g. annually or more frequently.

9.4 DELEGATIONS

As outlined in s. 1.4.3, ACT Government employees who manage Googong Foreshores administer the provisions of relevant NSW legislation but without enforcement powers. Enforcement of NSW legislation can only be carried out by NSW authorities. It is likely that use pressures will increase at Googong and it may become desirable or necessary that ACT staff are properly authorised to enforce some NSW laws.

Policies

- The legal means to enforce NSW legislation at Googong Foreshores, such as delegations to ACT management staff, will be investigated should this be warranted.
- Use the register of breaches of NSW legislation as a basis to monitor the need for such delegations (see s. 9.5 below).

9.5 REPORTING ON BREACHES OF LEGISLATION AND PLANS

The Googong Lease requires the ACT Government to report to the Commonwealth on:

- material breaches of any legislation applying at Googong Foreshores (section 4.8 of the lease); and
- breaches of any of the required plans under the Lease (section 5.1 (v) of the lease).

As noted in s. 1.4.4, ACT legislation has very limited application in the Googong Dam Area, therefore, material breaches of legislation will mainly involve Commonwealth and NSW legislation. In practice, it is NSW law that is most likely to be broken.

Policies

- A register will be established at Googong Foreshores to record material breaches of any legislation or plans applicable at the Foreshores and the actions taken in regard to those breaches.

Actions

- Establish a register at Googong Foreshores Ranger Station to record material breaches of any legislation or plans applicable at the Foreshores and the actions taken in regard to those breaches.
- Based on the register, the relevant manager will report to the Commonwealth annually on material breaches of legislation or plans applicable at Googong Foreshores.
- Prepare a consolidated report on breaches of legislation and plans after five years to assist with the review of this plan of management.

10 Implementation



10.1 IMPLEMENTATION

Management policies and actions outlined in this plan of management provide the basis for its implementation; primary responsibility for which rests with ACT Government managers. Icon Water is responsible for two actions in s. 4.4.6 (see also Table 10.1). The plan has also identified where consultation is required with Icon Water and NSW agencies e.g. NSW Department of Primary Industries, NSW Rural Fire Service. Table 10.1 contains the actions listed in Chapters 4 to 10 of the plan to which priorities have been attached.

10.2 COMMUNITY INVOLVEMENT

The primary purpose of the Googong Dam Area is to provide high quality raw water for potable water supply. Local community groups are welcome to participate in the management of the Area, but their role will be different from catchments where rural and other landholders are the main occupants of the catchment. Catchment groups potentially play a significant role in the management of the larger Googong Catchment outside the Foreshores. Other roles for community groups are: (a) the provision of information that can be used in interpretive material e.g. the assistance of the Canberra Ornithologists Group and Friends of Googong in preparing the Googong Bird List; and (b) the carrying out of on-ground conservation activities such as track maintenance, weed removal and bush regeneration projects.

A range of community groups are involved with catchment protection and other environmental management activities in the upper Murrumbidgee River Catchment (see s. 2.5.2). Catchment groups supported by state and territory governments provide the means to link with national funding programs. The Molonglo Catchment Group is the umbrella planning and coordination body for the Googong Catchment supporting local groups: the Burra Creek Landcare Group, Friends of Googong Parkcare, Queanbeyan Landcare Group (see <<http://molonglocatchment.com.au>>).

10.2.1 MANAGEMENT OBJECTIVES, POLICIES AND ACTIONS

COMMUNITY INVOLVEMENT
<p>Objective</p> <ul style="list-style-type: none"> • Community groups participate in the conservation of the values of Googong Foreshores.
<p>Policies</p> <ul style="list-style-type: none"> • Community involvement in the conservation of the values of Googong Foreshores will be encouraged.
<p>Actions</p> <ul style="list-style-type: none"> • Identify opportunities for, and encourage community involvement in the conservation of the values of Googong Foreshores.

Table 10.1 Management actions and priorities

Notes for the following table:

Priority High, Medium, Low are used in two ways in this table:

Category 1. For some actions, it indicates the priority that should be given to *undertaking and completing* the action (for example, a High priority action of this type should be undertaken early in the life of the management plan);

Category 2. For many actions it indicates the priority that should be given to an action *that will remain current across the life of the plan* (in the context of all management activities). These are shown as **Ongoing (O)**.

Time scales for actions – as a guide the following time scales are appropriate for actions in Category 1:

High (H): Undertaken/completed within one/two years of completion of this plan.

Medium (M): Undertaken/completed within three/four years of completion of this plan.

Low (L): Undertaken/completed more than five years after completion of this plan.

Chapter/ Section	Actions	Priority
Chapter 4	Water Resources	
Micro-organisms s. 4.4.3	<p>(a) Toilet Facilities</p> <ul style="list-style-type: none"> • Investigate the septic tanks in Googong Foreshores to determine whether these represent a significant risk to human health and the environment (ACT Government and Icon Water). • Evaluate the costs and benefits of a staged replacement of septic tanks with concrete tanks that are periodically pumped out, with the contents processed through an off-site sewage facility. <p>(b) Recreation</p> <p>Manage recreational use of Googong Foreshores to minimise impact on microbiological water quality, in particular by:</p> <ul style="list-style-type: none"> • prohibiting body contact recreation in the reservoir (swimming, windsurfing, water skiing) • prohibiting other recreational activity that has the potential to adversely affect water quality (Table 5.1) • providing advisory signs for recreational users on the importance of avoiding body contact with reservoir water and the need for good hygiene • providing adequate toilet facilities that are regularly monitored and maintained • prohibiting pets and horse riding • involving community groups in management activities in the Foreshores aimed at protection of water quality. <p>(c) Stock Grazing</p> <p>Manage stock grazing at Googong Foreshores to minimise impact on microbiological water quality, in particular by:</p> <ul style="list-style-type: none"> • restricting use of stock grazing to the minimum necessary for fire fuel reduction in grassland, for asset protection, and for weed control and to areas outside an appropriate buffer from the reservoir • requiring stock to be more than two years old • exclusion of stock from ephemeral and permanent streams and drainage lines by fencing and the provision of off-stream watering • removal of stock as soon as fire fuel reduction, asset protection, or weed management objectives have been achieved • ensuring vegetation cover is not compromised by stock grazing • maintaining boundary fencing of the Foreshores to prevent stock access from neighbouring properties • liaison with properties bordering the Foreshores for removal of stray stock. <p>(d) Grazing by Native and Feral Animals</p> <p>Control populations of native and feral animals at Googong Foreshores to minimise direct and indirect impacts on microbiological water quality, by:</p> <ul style="list-style-type: none"> • managing kangaroo densities (see s. 6.7) • undertaking feral animal control using the most effective current approaches that are also suitable for use in a water catchment. 	<p>H</p> <p>M</p> <p>HO</p> <p>HO</p> <p>HO</p>

Chapter/ Section	Actions	Priority
Turbidity and Suspended Solids s. 4.4.4	<ul style="list-style-type: none"> • Manage stock grazing and populations of native and feral animals to limit loss of ground cover and soil disturbance, and consequent erosion and transport of material to the reservoir. 	HO
	<ul style="list-style-type: none"> • Restrict recreational activities in the steep Eastern Foreshores area (Zone 1B) and areas with low vegetation cover to limit erosion potential (see Chapter 5). 	MO
	<ul style="list-style-type: none"> • Undertake stabilisation and erosion control measures in areas of the Foreshores that show evidence of erosion developing. 	MO
	<ul style="list-style-type: none"> • Where feasible, direct and filter runoff from bare areas (e.g. vehicle and walking tracks) to detain sediments that might otherwise flow to the reservoir. 	MO
	<ul style="list-style-type: none"> • Aim to maintain 90 per cent ground cover for 12 months of the year in non-forested areas of the Foreshores (excluding areas of skeletal soils and bedrock exposure). 	HO
Excess Nutrients (Phosphorus and Nitrogen) s. 4.4.5	<ul style="list-style-type: none"> • Manage stock grazing and populations of native and feral animals to limit erosion and transport of nutrients (soil phosphorus and nutrients in faecal material) to Googong Reservoir. 	HO
	<ul style="list-style-type: none"> • Document and investigate instances of excessive algal growth in the reservoir, with the aim of identifying nutrient sources. If there is evidence of sources within the Foreshores, undertake remedial action where this can be defined and is practicable. For nutrients suspected to have originated outside of the Foreshores, liaise with Icon Water, NSW Government agencies and local government regarding potential sources and corrective measures. 	MO
	<ul style="list-style-type: none"> • Monitor and maintain toilet facilities in the Foreshores to ensure that there is no leakage of nutrients to the catchment. 	HO
	<ul style="list-style-type: none"> • Prohibit horse riding and bringing domestic pets (dogs, cats) to the Foreshores (Table 5.1). 	HO
Chemicals and Hazardous Materials s. 4.4.6	<ul style="list-style-type: none"> • As far as practicable, only use chemicals outside an appropriate buffer distance from the reservoir and away from catchment drainage lines. Use of chemicals for weed control in riparian and shoreline areas (e.g. blackberry control) will be carried out at times when water is not being extracted from the reservoir. 	HO
	<ul style="list-style-type: none"> • Minimise chemical usage by application of Integrated Pest Management techniques, and select chemicals and application methods that will have least environmental impact, including impact on reservoir water. 	HO
	<ul style="list-style-type: none"> • Use only chemicals that have been approved for use in water catchments. 	HO
	<ul style="list-style-type: none"> • Establish protocols for advising Icon Water when pesticides are in use, as well as reporting protocols for accidental spills. 	HO
	<ul style="list-style-type: none"> • Manage the use, handling, transport and storage of chemicals in accordance with industry best practice, relevant NSW legislation, and ACT Government procedures and protocols. 	HO
	<ul style="list-style-type: none"> • Ensure that all Googong staff are trained in the safe use of chemicals, including emergency management procedures. 	HO
	<ul style="list-style-type: none"> • Maintain Material Safety Data Sheets for all stored chemicals, which are available to all relevant personnel. 	HO

Chapter/ Section	Actions	Priority
	<ul style="list-style-type: none"> • Identify, remove or replace any scheduled ozone depleting substances held at the Foreshores. • Ranger Station - other areas (ACT Government): <ul style="list-style-type: none"> - Undertake an audit and prepare a hazardous substances register for dangerous goods and hazardous building materials. • London Bridge Woolshed - sheep dip (ACT Government): <ul style="list-style-type: none"> - Manage the sheep dip area to minimise exposure of visitors to the arsenic contaminated soils. - Prior to any redevelopment or disturbance at the site, undertake further investigation to assess the extent and degree of contamination, to guide the management of any contaminated soils that would be disturbed by the development. • Buried Former Homesteads (ACT Government): <ul style="list-style-type: none"> - Prepare a site management plan to manage areas that may contain buried former homesteads at the southern end of the Foreshores, including homesteads at London Bridge and Tin Hut, and other demolished buildings along the Burra Road. - Ensure these areas are investigated prior to any excavation or other earth-moving activities. 	<p>H</p> <p>MO</p> <p>M</p>

Chapter/ Section	Actions	Priority
Chapter 5	Recreation	
Recreational Use s. 5.4	<ul style="list-style-type: none"> • Design and undertake a study of recreational use of Googong Foreshores, initially over the term of this plan of management. • Establish a steering committee to commission and oversee the Googong Foreshores recreational use study. • Use the results of the study to review the recreational policies in this plan of management, including controls on access and provision of recreational facilities, when the plan is reviewed after five years. • Report the results of the recreational use study to the Commonwealth Government, in relation to the provisions of the Googong Lease. 	H H M H
Recreational Activities s. 5.4.1	See Table 5.2. The actions/strategies in Table 5.2 are ongoing and mostly already established (and are of Low to Medium priority). Information requirements for fishing, and boating safety are ongoing but High priority. A warning sign for the Cascades included in this table is also listed under the actions for s. 5.4.4.	
Recreational Facilities s. 5.4.2	<ul style="list-style-type: none"> • Assess the likely impact on water quality in Googong Reservoir arising from upgrades or changes to existing facilities. • Maintain all visitor facilities to a high standard, including visitor information. • Provide appropriate access and facilities for visitors with disabilities (this may not be practicable in all areas). 	HO HO MO
Recreational Impacts s. 5.4.3	<ul style="list-style-type: none"> • Manage recreational activities to minimise: (a) the risk of body contact with reservoir water (see s. 5.4.1 and s. 5.4.2 above) and (b) the potential for erosion and transport of sediments to the reservoir. • Provide information about appropriate behaviour (including good hygiene practices) to protect water quality. • Manage recreational activities to minimise impact on natural and cultural values by controlling access, educating visitors, providing protection measures, and monitoring. • Liaise with the Googong Township Pty Ltd and provide advice to residents of Googong Township in relation to maintaining water quality in Googong reservoir and protecting the natural and cultural values of the Area, in particular, with regard to appropriate recreational activity in the Foreshores. 	HO MO MO HO
Visitor Safety s. 5.4.4	<ul style="list-style-type: none"> • Provide information in brochures, signs and at the Ranger Station on boating safety (repeat of Action in Table 5.2). • Install a warning sign that jumping and diving from rocks at the Cascades is discouraged, and the hazards of changes in flow (repeat of Action in Table 5.2). • Maintain the prohibition on lighting fires and use of portable barbecues when the fire danger rating is Very High or above, and closure of the Foreshores on total fire ban days (see s. 9.1.3). • Provide appropriate advice (e.g. warning signs) if undertaking pest animal baiting or other activities using chemicals. • Provide contact/emergency contact phone numbers on signs and other information material. 	HO H HO HO HO

Chapter/ Section	Actions	Priority
Chapter 6	Natural Heritage	
Biodiversity and Geodiversity s. 6.2	<ul style="list-style-type: none"> • Implement the natural heritage management strategies in the <i>Googong Foreshores: Heritage Management Plan</i>. These strategies provide a five-year and ongoing management program including (sections refer to this plan of management): <ul style="list-style-type: none"> - cooperation with adjacent land managers to achieve consistent and complementary land management (s. 6.3) - weed management (s. 6.6.1) - pest animal management (s. 6.6.2) - kangaroo management (s. 6.7) - bushfire management (s. 9.1) - conservation of ecological communities, flora and fauna (s. 6.4, s. 6.5) - maintenance of catchment vegetation cover (s. 4.4.4) - control of recreational use (s. 5.4). 	For priority, see actions in indicated sections.
Habitats and Regional Significance s. 6.3	<ul style="list-style-type: none"> • Communicate to relevant private and government organisations the importance of Googong Foreshores to regional ecological connectivity, in relation to environmental planning, development control and specific development proposals adjacent to the Foreshores. • Work with the NSW Office of Environment and Heritage and other NSW government agencies to achieve consistent and complementary management of adjoining or nearby natural areas. • Identify threats to habitat and connectivity in Googong Foreshores and take actions to control, reduce or eliminate threats. • Identify opportunities to improve habitat and connectivity in the management of Googong Foreshores and, where practicable, undertake appropriate management actions. 	MO MO MO MO
Flora s. 6.4.3	<ul style="list-style-type: none"> • Prepare and maintain (through survey, monitoring and mapping) a comprehensive inventory and classification of vegetation communities and component species at Googong Foreshores. • Undertake appropriate management to ensure that ecological communities and populations of threatened and uncommon plant species are conserved and protected from threatening activities (e.g. tree planting in natural temperate grasslands) or accidental damage. • Prepare a vegetation management plan with detailed management guidelines, as required, for vegetation communities and component species, in particular threatened and uncommon species. • As part of the vegetation management plan, review existing plantings and forward programs for tree planting to ensure that there are no adverse impacts on natural temperate grassland areas of high conservation value. • Ensure that any short-term stock grazing (for fire fuel reduction, asset protection, weed control) is managed (e.g. stocking rates, areas permitted) so that it does not deleteriously impact on vegetation of high conservation value such as threatened ecological communities and their component species. • Where practicable, undertake rehabilitation activities for particular vegetation communities or areas of the Foreshores. • Provide interpretive material on Foreshores vegetation for visitors. 	MO HO H H MO MO MO

Chapter/ Section	Actions	Priority
Fauna s. 6.5.2	• Prepare a comprehensive inventory of the fauna of Googong Foreshores.	MO
	• Manage the habitat of threatened and uncommon animal species to protect them from threatening activities or accidental damage.	HO
	• Where practicable, undertake habitat rehabilitation activities to improve the status, distribution and abundance of threatened animal populations.	MO
	• Prepare management guidelines for species that are declared threatened or are of conservation concern, in accordance with recovery plans and other relevant material.	MO
	• Encourage and support survey, monitoring and research into animal species and populations.	MO
	• Undertake feral animal control (see s. 6.6).	HO
	• Provide interpretive material on Foreshores fauna for visitors.	MO
Pest Plants s. 6.6.1	• Design and undertake management programs for pest plants in accordance with relevant legislation and strategies, weed control priorities, and in co-operation with adjacent land managers.	HO
	• Undertake coordinated control of St John's Wort with the NSW Office of Environment, Climate Change and Water.	MO
	• Maintain and/or instigate hygiene measures to minimise the introduction and spread of weed species in management of the Foreshores. Measures include:	HO
	<ul style="list-style-type: none"> - washing vehicles and machinery - minimising soil disturbance - avoiding the import of material (e.g. soil, mulch) that is likely to contain weed seeds - educating visitors about the potential to import and spread weed species, including aquatic weeds. 	
Pest Animals s. 6.6.2	• Design and undertake management programs for pest animals in accordance with relevant legislation and strategies, pest animal control priorities, and in co-operation with adjacent land managers.	HO
	• Continue the successful rabbit control program to reduce grazing pressure to acceptable levels.	HO
Kangaroos s. 6.7.4	• Continue and develop, as required, a scientifically based monitoring program for herbivores (focused on kangaroos and rabbits) and lowland grassy ecosystems with appropriate analysis and recording of results.	HO
	• Take a proactive approach to kangaroo management, so that densities do not increase in favourable seasons to levels that are unsustainable and impact on catchment and grassy ecosystem condition.	MO
	• Manage the kangaroo population with the aim of achieving grassland conservation densities, which on current knowledge are densities of less than 1.5 kangaroos per hectare in grassy ecosystems.	HO
	• As part of the vegetation management plan for Googong Foreshores, evaluate, and if desirable and feasible, undertake programs to increase tree and shrub cover, where this does not impact on areas of Natural Temperate Grassland.	LO

Chapter/ Section	Actions	Priority
Chapter 7 Cultural Heritage		
Aboriginal Cultural Heritage s. 7.3.1	<ul style="list-style-type: none"> • Implement the Aboriginal heritage management strategies in the <i>Googong Foreshores: Heritage Management Plan</i>. These strategies provide a five-year and ongoing management program including: <ul style="list-style-type: none"> - formal recognition of Aboriginal heritage values and Aboriginal heritage sites - involvement of the local Aboriginal community in decisions involving their heritage sites - a recording system for Aboriginal heritage sites and management of sensitive information - monitoring of Aboriginal heritage sites - management of potential impacts on Aboriginal heritage sites - salvage and/or excavation and radiocarbon dating of sites exposed by low reservoir water levels - management of unforeseen discoveries including the procedures to be followed should previously unknown Aboriginal artefacts be discovered in the course of works at Googong Foreshores. 	MO-HO
European Cultural Heritage s. 7.4.1	<ul style="list-style-type: none"> • Implement the European heritage strategies in the <i>Googong Foreshores: Heritage Management Plan</i> including a five-year and ongoing restoration and maintenance schedule for the London Bridge Homestead group. • Ensure that all works proposed for Googong Foreshores fulfil legislative requirements related to heritage protection. • Maintain the practice of having 'open days' for London Bridge Homestead, subject to the consideration of public safety and requirements for the conservation of the physical fabric of the place. 	MO-HO
Chapter 8 Education and Research		
Education and Research Opportunities s. 8.2	<ul style="list-style-type: none"> • Provide interpretive and educational materials to support educational activities at the Foreshores, including materials that: <ul style="list-style-type: none"> - assist in an understanding of water supply issues (e.g. water quality) - support nature study - assist in interpreting European and Aboriginal cultural heritage. • Encourage survey, monitoring and research activities at the Foreshores, particularly related to water supply, catchment management, natural and cultural heritage, and protected area management. • Maintain a repository of educational materials and information relating to the Foreshores, including the results of research projects. 	MO MO MO
Chapter 9 Environmental Planning, Protection and Management		
Fire Management s. 9.1.6	<ul style="list-style-type: none"> • Liaise with the NSW Rural Fire Service to establish agreed arrangements for bushfire readiness and response in the Googong Foreshores area. • Include arrangements for bushfire readiness and response in the annual Fire Action Plan, or it's successor, prepared by the Territory and Municipal Services Directorate. • Undertake the Works Program specified in the Regional Fire Management Plan - Googong. • Maintain the existing restrictions on lighting of fires in the Foreshores and closure on total fire ban days. • Notify Icon Water of planned fuel reduction burns so that specific water sampling may be undertaken to enhance understanding of the effects of fire on reservoir water quality. • Ensure that protection of natural and cultural heritage is included in planning for bushfire management at Googong Foreshores. • Assess the conservation requirements of the twelve Aboriginal cultural heritage sites at Googong Foreshores recorded by ERM Australia (2008a) (see s. 7.3), in relation to bushfires and bushfire management. Include, where necessary, consideration of these sites in the Regional Fire Management Plan - Googong. 	H HO HO HO MO HO H

Chapter/ Section	Actions	Priority
Environmental Impact Assessment s. 9.2	<ul style="list-style-type: none"> • Incorporate environmental considerations into the early stages of project formulation. 	HO
	<ul style="list-style-type: none"> • Undertake assessment of the potential environmental impact of proposed works and developments in the Foreshores, including in relation to the EPBC Act. 	HO
	<ul style="list-style-type: none"> • Carry out works in accordance with the requirements of the Googong Lease. 	HO
	<ul style="list-style-type: none"> • Should any works be proposed at Googong Foreshore that are not currently a Permitted Use in the Googong Lease and/or are likely to have a significant environmental impact, seek legal advice as to the requirements for approval under Commonwealth or NSW legislation. 	HO
Reporting on Breaches of Legislation and Plans s. 9.5	<ul style="list-style-type: none"> • Establish a register at Googong Foreshores Ranger Station to record material breaches of any legislation or plans applicable at the Foreshores and the actions taken in regard to those breaches. 	H
	<ul style="list-style-type: none"> • Based on the register, the relevant manager will report to the Commonwealth annually on material breaches of legislation or plans applicable at Googong Foreshores. 	HO
	<ul style="list-style-type: none"> • Prepare a consolidated report on breaches of legislation and plans after five years to assist with the review of this plan of management. 	M
Chapter 10	Implementation	
Community Involvement s. 10.2.1	<ul style="list-style-type: none"> • Identify opportunities for, and encourage community involvement in the conservation of the values of Googong Foreshores. 	MO

Appendices



APPENDIX 1

LAND AND CONSERVATION MANAGEMENT PLAN

Section 5.2 of the Lease between The Commonwealth of Australia and The Australian Capital Territory (2008)

The Land and Conservation Management Plan must include the measures to apply during the Term for the protection, management, maintenance, refurbishment and repair of the Premises in relation to the following matters, including such measures consistent with applicable NSW and Commonwealth laws, and which are sufficient to satisfy the Commonwealth's obligations as landowner in respect of the Premises under the Commonwealth Environment and Heritage Legislation:

- land use in relation to the dam, water supply, buildings, fencing, plant, equipment and storage, and the activities of other Territory agencies on the Premises
- the prevention of pollution on the Land, and the management of water quality
- land conservation and erosion management
- contamination and management of hazardous materials, including a site hazardous materials register covering all buildings occupied by, and dangerous goods stored by the ACT, an ACT Entity and any sub-lessee of the ACT or a contractor of any of those persons
- environmentally sustainable development of the Land, including energy efficiency, water efficiency and waste minimisation
- recreational use
- control, monitoring and management of native plants and animals (including threatened species, ecological communities and biodiversity) and over abundant species, noxious weeds, and feral animals
- fire risk and mitigation strategies.

APPENDIX 2

PERMITTED USE OF THE GOOGONG DAM AREA

Section 4.1 of the Lease between the Commonwealth of Australia and the Australian Capital Territory (2008)

During the Term the Premises must only be used for any of:

- the collection, diversion and storage of water on the Land
- the conveyance and supply of water from the Land for the use in the Australian Capital Territory or in a place that is the subject of an agreement under subsection 12(2) of the Googong Dam Act for the conveyance and supply of water
- the treatment and purification of water supplied or to be supplied from the Land
- the prevention of the pollution of water supplied or to be supplied from the Land
- the existing type of recreational use occurring on the Land as at the Commencing Date
- any other purpose approved in writing by the Commonwealth, such approval not to be unreasonably withheld or delayed.

APPENDIX 3

SELECTED POLICIES, PLANS, STRATEGIES AND GUIDELINES RELEVANT TO THE MANAGEMENT OF THE GOOGONG FORESHORES

(Note: Many of these documents (especially guidelines) are subject to periodic revision and the latest version should be sought. ACT Government publications may be accessed through the ACT Government entry portal <www.act.gov.au> and environmental publications and information through <www.environment.act.gov.au> and <www.tams.act.gov.au>.)

Commonwealth

- *Australia's Biodiversity Conservation Strategy 2010-2030* (Commonwealth of Australia 2010) <<http://www.environment.gov.au/biodiversity/publications/strategy-2010-30/pubs/biodiversity-strategy-2010.pdf>>
- *The National Strategy for Ecologically Sustainable Development* (Commonwealth of Australia 1992)
- *Australia's Native Vegetation Framework* (COAG 2012)
- *Australian Weeds Strategy* <<http://www.weeds.org.au/aws.htm>>
- *Caring for our Country* <<http://www.nrm.gov.au>>
- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC/ARMCANZ 2000) <http://www.mincos.gov.au/publications/australian_and_new_zealand_guidelines_for_fresh_and_marine_water_quality>
- Recovery plans for species and ecological communities listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999*
- National Environment Protection Measures (NEPMs) <<http://www.ephc.gov.au/nepms>>
- *Australian Natural Heritage Charter for the conservation of places of natural heritage significance*. 2nd Edition (Australian Heritage Commission 2002)
- *Protecting Local Heritage Places: A guide for local communities* (Australian Heritage Commission 2000)
- *Ask First: A guide to respecting Indigenous heritage places and values* (Australian Heritage Commission 2002)

New South Wales

- *NSW Biodiversity Strategy* (NSW National Parks and Wildlife Service 1999)
- *Murrumbidgee Catchment Action Plan* (Murrumbidgee Catchment Management Authority) <<http://murrumbidgee.cma.nsw.gov.au/catchment-action-plan/4-catchment-action-plan.html>>
- *Biodiversity Planning Guide for NSW Local Government. Edition 1* (NSW National Parks and Wildlife Service 2001) <<http://www.environment.gov.au/biodiversity/toolbox/templates/nsw-bio-plan-guide.html>>
- *NSW Water Quality and River Flow Objectives – helping to consider community values for water quality in decision making* <<http://www.environment.nsw.gov.au/ieo/>>
- *Planning Framework for Natural Ecosystems of the ACT and NSW Southern Tablelands* (Fallding 2002)
- Recovery plans for species and ecological communities listed as threatened under NSW threatened species legislation (see s. 1.4.3)

Local Government

- *Palerang Local Environmental Plan 2014* < <http://www.palerang.nsw.gov.au> >
- *Queanbeyan Local Environmental Plan 2012 and Queanbeyan Local Environmental Plan (Googong) 2009* (Queanbeyan City Council. See <<http://www.qcc.nsw.gov.au>>)

ACT

- *Environmental Flow Guidelines 2013* (ACT Government 2013) (Specify environmental flows immediately downstream of Googong Dam)
- *Fish Stock Plan for the Australian Capital Territory 2015-2020* (ACT Government 2015) (Includes stocking of Googong Reservoir)
- *ACT Water Strategy 2014-44: Striking the Balance* (ACT Government 2014)
- *Draft ACT and Region Catchment Management Strategy* (and final Strategy when complete) (ACT Government 2016)
- *ACT and Sub-Region Planning Strategy* (ACT and Sub-Region Planning Committee 1998)
- *Woodlands for Wildlife: ACT Lowland Woodland Conservation Strategy* (ACT Government 2004)
- *A Vision Splendid of the Grassy Plains Extended: ACT Lowland Native Grassland Conservation Strategy* (ACT Government 2005)
- *Regional Fire Management Plan 2009-2019 Googong Map Sheet* (ACT Government 2009)
- *Ribbons of Life: ACT Aquatic Species and Riparian Zone Conservation Strategy* (ACT Government 2007)
- *Weathering the Change - The ACT Climate Change Strategy 2007-2025* (ACT Government 2007)
- *AP2 - A New Climate Change Strategy and Action Plan for the ACT* (ACT Government 2012)
- *ACT Kangaroo Management Plan* (ACT Government 2010)

Non-government

- *Australia ICOMOS Burra Charter, 1999* (Australia ICOMOS) <<http://www.icomos.org/australia/>>
- *2011 Australian Drinking Water Guidelines* (NHMRC) <<http://www.nhmrc.gov.au/guidelines-publications/eh52>>

APPENDIX 4A

RISK MANAGEMENT FRAMEWORK FOR MANAGING WATER QUALITY IMPACTS WITHIN GOOGONG FORESHORES

Risk 1	Direct microbiological contamination of reservoir from human sources
Cause	Human activities in or adjacent to the reservoir water body (e.g. through swimming, boating, fishing)
Risk level	Very High
Critical limit (for water safety)	Pathogens/microbial indicators in reservoir are maintained below raw water standards
Management targets	Manage recreation to ensure no body contact with reservoir water occurs, therefore minimising impact of humans on microbiological water quality
Controls	<ul style="list-style-type: none"> Prohibit body contact recreation in reservoir e.g. swimming, wind surfing Prevent body contact from boating activities Implement recreation policy through active education and signs
Monitoring	Assess illegal swimming/ entering water during boating activity frequency/ numbers
Verification	Verification with Icon Water water quality data and exceedance reporting
Corrective Actions (If monitoring shows controls are not managing risk)	<ul style="list-style-type: none"> Additional toilets Monitor boating numbers Limit increased boating or increase supervision of increased boating Implement boating permit system Restrict boating to southern end of reservoir (greatest distance from water intake) Initiate procedures to identify foreshore versus catchment sources of pathogens Review and/or increase monitoring and enforcement of compliance of permitted activities in zones 1a, 1b, 2a, 2c
Relates to section in the plan of management	<ul style="list-style-type: none"> Chapter 4 Water Resources Chapter 5 Recreation

Risk 2	Direct microbiological contamination of reservoir from stock
Cause	Faeces from stock enter water body
Risk level	High
Critical limit (for water safety)	Pathogens / microbial indicators in reservoir are maintained below raw water standards
Management targets	Manage stock grazing to minimise impact on microbiological water quality
Controls	<ul style="list-style-type: none"> • Limit stock numbers in foreshore area to minimal level required for weed control and fuel reduction • Manage fences to prevent wandering stock • Limit access of inappropriate stock age classes • Restrict use of stock grazing for fuel / weed reduction to areas outside acceptable buffer from reservoir
Monitoring	<ul style="list-style-type: none"> • Monitor ground cover in areas where stock are used for fuel reduction • Regularly check fences • Undertake event based monitoring
Verification	Verification with Icon Water water quality data and exceedance reporting
Corrective Actions (If monitoring shows controls are not managing risk)	<ul style="list-style-type: none"> • Assess grazing management regime • Find alternative methods of fuel and weed management
Relates to section in the plan of management	<ul style="list-style-type: none"> • Chapter 4 Water Resources • Chapter 6 Natural Values
Risk 3	Indirect microbiological contamination of reservoir from human sources e.g. toilets, organic litter, fishing bait
Cause	Activities in Foreshores, particularly in areas where there are no toilet and waste facilities (Note: rubbish bins are not provided)
Risk level	High
Critical limit (for water safety)	Pathogens / microbial indicators in reservoir are maintained below raw water standards
Management targets	Manage recreational activities and facilities to minimise impact of humans on microbiological water quality
Controls	<ul style="list-style-type: none"> • Regular monitoring, maintenance and checking of toilet facilities • Education of public, particularly fishers • Effective waste and litter management program • Signs advising that no rubbish bins are provided and visitors are to take rubbish with them when they leave
Monitoring	<ul style="list-style-type: none"> • Visual assessment of litter • Operational condition of toilet facilities • Visual signs of open defecation • Microbial indicators through water quality monitoring program
Verification	Verification with Icon Water water quality data and exceedance reporting
Corrective Actions (If monitoring shows controls are not managing risk)	<ul style="list-style-type: none"> • Consider limiting walks to short circuits that can be undertaken within a few hours • Reassess education program • Initiate procedures to identify foreshore versus catchment sources of pathogens • Review signs regarding rubbish removal • Review other sources of human waste generation such as open defecation, public toilet facilities distribution and operational condition
Relates to section in the plan of management	<ul style="list-style-type: none"> • Chapter 4 Water Resources • Chapter 5 Recreation

Risk 4	Turbidity and nutrient levels reaching potentially unsafe levels or exceeding treatment capability
Cause	Recreational activities (e.g. walking, bicycling) leading to increased erosion
Risk level	Low
Critical limit (for water safety)	Suspended solids, turbidity and nutrient levels in reservoir are maintained below raw water standards
Management targets	Manage recreational impacts to achieve a nil impact on reservoir water quality
Controls	<ul style="list-style-type: none"> • Encourage active recreation only in the western part of the Foreshores area • Minimise erosion potential from walking and other tracks by appropriate maintenance • Maintain appropriate signs and education program • Restrict activity in erosion prone areas
Monitoring	<ul style="list-style-type: none"> • Regular assessment of erosion caused by recreational activities (visual) • Visitor use assessment
Verification	Verification with Icon Water water quality data and exceedance reporting
Corrective Actions (If monitoring shows controls are not managing risk)	<ul style="list-style-type: none"> • Restrict recreational access/use resulting in erosion • Close/realign/harden recreational access where significant erosion is occurring • Reassess education program • Initiate procedures to identify foreshore versus catchment sources of turbidity
Relates to section in the plan of management	<ul style="list-style-type: none"> • Chapter 4 Water Resources • Chapter 5 Recreation
Risk 5	Turbidity and nutrient levels reaching potentially unsafe levels or exceeding treatment capability
Cause	High wildlife or pest numbers reducing ground cover and exacerbating erosion
Risk level	High
Critical limit (for water safety)	Turbidity measure (NTU) of 5 or less
Management targets	Manage impacts of wildlife to minimise impact on reservoir water quality
Controls	<ul style="list-style-type: none"> • Proactive management of kangaroo densities • Control rabbit populations • Aim to maintain grassland biomass at levels that ensure a variable structure and at least 90 per cent ground cover
Monitoring	<ul style="list-style-type: none"> • Monitoring of biomass and total herbivore grazing pressure • Monitoring of kangaroo and rabbit densities
Verification	Verification with Icon Water water quality data and exceedance reporting
Corrective Actions (If monitoring shows controls are not managing risk)	<ul style="list-style-type: none"> • Evaluate long-term vegetation strategies aimed at reducing suitable kangaroo habitat • Review herbivore management programs
Relates to section in the plan of management	<ul style="list-style-type: none"> • Chapter 4 Water Resources • Chapter 6 Natural Values

Risk 6	Spills or illegal discharges of hazardous chemicals entering reservoir
Cause	Accidental or intentional misuse of hazardous chemicals
Risk level	Moderate
Critical limit (for water safety)	Concentrations of hazardous chemicals in reservoir are maintained below raw water standards
Management targets	<ul style="list-style-type: none"> • Manage chemical use and storage to achieve nil impact on reservoir water quality • Manage illegal or accidental discharges to reservoir according to best practice principles
Controls	<ul style="list-style-type: none"> • Use of approved water catchment chemicals • No use of chemicals within appropriate buffer distance from reservoir • Manage use, handling, transport and storage of chemicals in Foreshores area in accordance with industry best practice, NSW legislation, ACT procedures and protocols • Appropriate training and education of staff and contractors • No petroleum powered boats permitted in reservoir except as required for management, water supply, emergency purposes • Manage illegal entry and security risks
Monitoring	<ul style="list-style-type: none"> • Regular checks of chemical storage facilities • Staff training reviews • Emergency management plan • Local community reporting and vigilance
Verification	Verification with Icon Water water quality data and exceedance reporting
Corrective Actions (If monitoring shows controls are not managing risk)	<ul style="list-style-type: none"> • Reassess methods for use, handling, transport and storage of chemicals • Reassess emergency management plan • Conduct a risk assessment for each aerial application of pesticide
Relates to section in the plan of management	<ul style="list-style-type: none"> • Chapter 4 Water Resources

APPENDIX 4B

USING THE RISK MANAGEMENT FRAMEWORK

The **Risk** is the risk to water quality for domestic purposes, and that licence conditions to meet public health and amenity are unable to be met through existing water treatment processes. The **Cause** is the potential cause of the risk occurring. **Risk Level** is determined by consideration of the severity of the consequence and the likelihood of the risk occurring. **Critical Limits** are the levels at which further action must be taken and are based on the requirements for water quality for domestic purposes as outlined in the ACT Environment Protection Regulation 2005 and Icon Water standards for treatment of raw water. These are monitored by Icon Water as part of their business of providing potable water.

The **Management Targets** are the targets that the ACT Government will meet that should have a positive influence on meeting the **Water Quality Objectives**. There needs to be a strong feedback link between information on how well specifications under the **Critical Limits** are being met and the **Management Targets** (described below). **Controls** are the actions that are to be undertaken to achieve the **Management Targets**. **Monitoring** should assess how well **Management Targets** are being met.

Meeting **Management Targets** is the responsibility of the ACT Government and there are **Critical Limits** that should not be exceeded for purposes of safe water supply. Icon Water carries out extensive monitoring of parameters related to these **Critical Limits**. **Verification** provides the feedback loop between **Critical Limits** and **Management Targets**.

Verification is necessary to ensure that **Management Targets** are contributing towards keeping water quality parameters within **Critical Limits**, and that management targets continue to be appropriate for meeting the requirements of the **Critical Limits**. Where there is evidence that this is not the case, the approach must be redefined and **Corrective Actions** may be utilised.

Exceedance reporting will be the main mechanism employed in verification. It is proposed that Icon Water will advise ACT Government staff if any significant trends become apparent in monitoring of parameters related to the **Critical Limits** or if any other significant issues arise. The relationship between management targets and critical limits should be assessed based on this information. This means that as well as monitoring if the **Management Targets** are being met, it is necessary for the ACT Government to assess whether the management targets are addressing requirements for **Critical Limits** (noting, however, that the Googong Foreshores represent only 6 per cent of the catchment area).

ABBREVIATIONS AND GLOSSARY

ABBREVIATIONS

GL = gigalitre (1 000 000 000 litres or 1000 megalitres)

GLOSSARY

Biodiversity

Biodiversity (biological diversity) is the variability among living organisms from all sources (including terrestrial, aquatic, marine and other ecosystems and the ecological complexes of which they are part), at all levels of organisation, including genetic diversity, species diversity and ecosystem diversity (Commonwealth of Australia 2010).

Connectivity

Habitat *connectivity* is the degree to which an organism can move around the landscape due to the presence of suitable habitat. For fauna, connectivity has been defined as the 'degree to which the landscape facilitates or impedes movement among patches' (Bennett 1999).

Conservation

The following are definitions for *conservation* as applied to natural heritage and cultural heritage:

Natural Heritage: Conservation means all the processes and actions of looking after a place so as to retain its natural significance and always includes protection, maintenance and monitoring. It may also involve actions to repair degradation and includes conserving natural processes of change (*Australian Natural Heritage Charter*, 2nd edition (Australian Heritage Commission 2002)). Conservation, as applied to species and ecological communities, refers to all the processes and actions aimed at the maintenance of those entities in perpetuity. This is also expressed as the 'conservation of biological diversity'.

Cultural Heritage: Conservation means all the processes of looking after a place so as to retain its cultural significance. Cultural significance means aesthetic, scientific, social or spiritual value for past, present or future generations (*Australia ICOMOS Burra Charter*, 1999 (Australia ICOMOS 1999)). Conservation may also be applied to specific objects.

Ecosystem

An *ecosystem* is a dynamic complex of organisms and their environment, interacting as a functional unit (Australian Heritage Commission 2002).

Ecosystem services

The concept of *ecosystem services* refers to the 'products of natural systems that benefit people'. These products include goods (e.g. timber), ecological processes (e.g. pollination, storage and release of water), and those that are life fulfilling (e.g. recreation). Few ecosystem services have been valued economically and most are unrecognised and under-priced (PMSEIC 2002).

Ecological carrying capacity

Carrying capacity is defined as the number or weight of animals of a single or mixed population that can be supported permanently on a given area (Sharkey 1970 in Krebs 2001). *Ecological carrying capacity* is the point that will eventually be reached by a herbivore population that is not culled or harvested and is not limited by predation. All other carrying capacities have fewer herbivores and more vegetation. Ecological carrying capacity represents a natural accommodation between the growth rates of the vegetation and the herbivores. It is a long-term mean observed density of animals left to themselves i.e. it is a self-regulating system

(Shepherd and Caughley 1987). It is unlikely to be a desirable state in an area where there are other management objectives such as protection of grassland reptiles that depend on grassland tussock structure or maintenance of ground cover for catchment protection. More detailed explanation is contained in the *ACT Kangaroo Management Plan* (ACT Government 2010a).

Estimating kangaroo density

Ecologists have used six main methods to estimate kangaroo density. Three of these have been used at Googong Foreshores:

Sweep Counts, also known as *Drive Counts* involve a group of people walking in an organised way through the kangaroos so that all animals are recorded once. Repeats are advisable to test the results of sweep counts.

Distance Sampling refers to a group of methods, of which only the linear subset (or *Line Transect Method*) is applied to kangaroos. Line transect is probably the most widely used method in the world for estimating abundance of wildlife. For kangaroos, the observer travels along a transect line in a helicopter, off-road vehicle, or on foot, and records the distance from the point of observation to each group of kangaroos with a laser rangefinder, and their angular displacement from the line with a compass or compass rose, enabling their perpendicular *distance* (displacement) from the transect to be estimated. The key step in Distance Sampling is to fit a *detection function* to the observed displacements, and use the fitted detection function to estimate the proportion of objects missed by the survey. Thus, the absolute abundance of the population (animals seen plus unseen) can be estimated. *Walked line transect* surveys have had extensive use in the ACT, carried out through the daylight hours.

Pellet Counts involve counting the density of kangaroo faecal pellets on an unknown site and comparing it with the pellet density on a similar site where kangaroo density is known. For full information, refer to Appendix 1 of the ACT Kangaroo Management Plan.

Existence value

Existence value means that living organisms, earth processes and ecosystems may have value beyond the social, economic or cultural values held by humans (Australian Heritage Commission 2002).

Geodiversity

Geodiversity is the natural range (diversity) of geological (bedrock), geomorphological (landform) and soil features, assemblages, systems and processes (Australian Heritage Commission 2002).

Guideline / Standard

A *guideline* is a numerical concentration or narrative statement recommended in order to support or maintain a designated water use. A *standard* is a guideline established under legislation and therefore enforceable.

Herbage mass

Herbage mass is the above-ground component of a pasture, including both dead and living plant parts.

Natural integrity

Natural integrity is the degree to which a place or ecosystem retains its natural biodiversity and geodiversity and other natural processes and characteristics (Australian Heritage Commission 2002).

Potable water

Potable water is water that is fit or suitable for drinking. Guidelines for the quality of drinking water are set out in the *Australian Drinking Water Guidelines* (NHMRC 2011).

Register of the National Estate

The Register of the National Estate (RNE) was originally established under the *Australian Heritage Commission Act 1975* (Cwlth) and more than 13 000 places were added to the register. In 2004 the Australian Heritage Council became responsible for maintaining the register under the *Australian Heritage Council Act 2003* (AHC Act). On 1 January 2004 a new national heritage system was established under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). From 19 February 2007, the RNE was 'frozen' meaning that no new places could be added or existing places removed. From February 2012 all references to the register have been removed from the AHC Act and EPBC Act. This transition period allowed time to transfer places to other local, state, territory and Australian Government registers. The RNE is maintained on a non-statutory basis as a publicly available archive and educational resource. More information can be obtained at <<http://www.environment.gov.au/heritage/places/rne/index.html>>.

Rehabilitation

Rehabilitation refers to the improvement in condition of land and/or ecological communities and their component species following degrading disturbance. Rehabilitation may involve regeneration, restoration or reinstatement representing progressively **greater degrees of human intervention**.

These terms are defined in the *Australian Natural Heritage Charter* (Australian Heritage Commission 2002).

- *Regeneration* means the natural recovery of natural integrity following disturbance or degradation.
- *Restoration* means returning existing habitats to a known past state or to an approximation of the natural condition by repairing degradation, by removing introduced species or by reinstatement.
- *Reinstatement* means to introduce to a place one or more species or elements of habitat or geodiversity that are known to have existed there naturally at a previous time, but that can no longer be found at that place.

Threatened

An umbrella term for various categories of risk of premature extinction.

Values

A *value* is a property or characteristic of something which makes it esteemed, desirable or useful. A value expresses worth, merit or importance. In land management, values are characterised as natural (deriving from the natural environment i.e. from landforms, geology, soils, vegetation, flora and fauna, hydrology, waterways) or cultural (deriving from human use and/or settlement).

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