



DEPARTMENT *of*
PRIMARY INDUSTRIES,
WATER *and*
ENVIRONMENT

**ENVIRONMENTAL
MANAGEMENT
GOALS
for TASMANIAN
SURFACE WATERS**

GORDON RIVER SYSTEM

May 2000

Environmental Management Goals

For Tasmanian Surface Waters:

Gordon River System

This discussion paper was used as the basis for community and stakeholder participation in the process of developing environmental management objectives for the waterways that are located within the Gordon River System.

It was prepared by the Environment Division and the Land and Water Management Branch, of the Department of Primary Industries, Water and Environment and the Tasmanian Parks and Wildlife Service,

Words and expressions used in this paper have, unless the contrary intention appears, the same meaning as defined in the *State Policy on Water Quality Management 1997* and the *Environmental Management and Pollution Control Act 1994*. Ecosystem refers to physical, chemical and biological aspects of the aquatic environment.

1	INTRODUCTION	4
1.1	WHY DO WE NEED WATER REFORM?.....	4
1.2	WHAT ARE THESE REFORMS?	5
1.3	WHAT WILL COMMUNITY INPUT ACHIEVE?	5
1.4	WHAT INFORMATION DID WE RECEIVE FROM THE COMMUNITY?	5
1.5	HOW WILL YOUR INPUT BE USED?	6
2	GORDON RIVER SYSTEM OVERVIEW.....	6
2.1	CATCHMENT DESCRIPTION	6
2.2	LAND USE.....	7
2.3	WORLD HERITAGE VALUES.....	9
2.4	CHARACTERISTIC WATER QUALITY	9
2.5	AQUATIC ECOSYSTEMS.....	9
2.6	CATCHMENT ENVIRONMENTAL ISSUES	10
3	WATER QUALITY : PROTECTED ENVIRONMENTAL VALUES	12
3.1	SETTING PROTECTED ENVIRONMENTAL VALUES	12
3.2	PROTECTED ENVIRONMENTAL VALUES CATEGORIES	12
4	PEVS FOR THE GORDON RIVER CATCHMENT	14
4.1	PEV SETTING PROCESS	14
5	WATER QUANTITY : WATER FLOW MANAGEMENT VALUES	21
5.1	OVERVIEW	21
5.2	WATER QUANTITY VALUES	21
6	COMMUNITY WATER VALUES.....	23

1 INTRODUCTION

1.1 Why do we need water reform?

A good supply of fresh, clean water is an essential requirement for human life, a healthy environment and a productive economy.

We need it for drinking, for recreational activities like fishing, swimming and boating, to provide the food we eat and export, to generate clean electricity, and to support mining and other industries.

We also expect our rivers and lakes to look healthy, and provide a healthy environment for a wide range of aquatic plants and animals.

We take for granted that our use of water resources is sustainable; that our hard-working water will still be there in a healthy state to provide the same benefits for future generations.

Tasmanian rivers range from relatively short, swiftly flowing rivers fed from mountain sources to slowly flowing rivers which may be reduced to a series of pools during dry periods. Our waterways are not immune from problems, however, and many of our river systems are showing signs of stress.

River health, and the health of the economies that depend upon them, is clearly linked to the way we use the waters; the degree of regulation we impose; the quantity of water we take out; and the quality of water we return.

In response to a general recognition across the community of the importance of having clean water and appropriate

river flows, the Tasmanian Government is currently finalising a range of reforms designed to ensure that these values are protected for the future of the State.

1.2 What are these reforms?

Two major aspects of the water reforms are water quality management and water quantity management.

(a) water quality management

The *State Policy on Water Quality Management 1997* is designed to **maintain or enhance** the quality of Tasmanian surface waters. Principal objectives of the Policy include:

- Move on from reliance on ‘end of pipe’ controls to take into consideration the number of discharges into a given water body, or the sensitivity or current condition of the water body.
- Ensure that diffuse source and point source pollution does not endanger the achievement of water quality objectives, and that pollutants discharged to waterways are reduced as much as possible by the use of best practice environmental management;
- Facilitate and promote integrated catchment management.
- Focusing on overall water quality management strategies by identifying those water quality values and uses which are considered worthy of protection.

The first purpose of this discussion paper was to explain the Policy and how the environmental values will be identified and used. Local communities have a key role in identifying these values in their catchments.

(b) water quantity management

The recent introduction of the *Water Management Act 1999* to replace the *Water Act 1957* provides for:

- major changes to the institutional arrangements for water management;
- the ready transfer of water rights between different users;
- enhanced stakeholder and community input into water allocation and management; and
- a more transparent and equitable water allocation system, including formal allocation of flows to maintain a healthy river environment.

The second purpose of this discussion paper was to encourage community involvement in ensuring sustainable use of our water resources by identifying water quantity values for selected catchments. These values will of assistance to the Department in undertaking water quantity planning in your catchment.

1.3 What will community input achieve?

The objective is to identify water management goals for the catchments within the Gordon River System. These water management goals will include Protected Environmental Values (PEVs) as defined under the *State Policy on Water Quality Management* and identified water quantity values.

1.4 What information did we receive from the community?

Local communities have a valuable understanding of their regional waterways. A series of workshops and public meetings were held throughout the region where we asked questions like: What uses or values do you have for surface waters in this area that rely upon maintaining or enhancing water quality? Which of your activities rely upon maintaining or enhancing the flow

of water into catchment waterways? Are there certain places on your rivers that you traditionally use for swimming or other recreational activities? Do you fish in them? Are there specific features of your rivers and streams that are recognized scenic attractions, such as rapids or waterfalls? Do you know of rare or endangered animals or plants in, or adjacent to, specific areas of your rivers or streams? Does your river supply the local town water supply? How often do you need to draw water from local waterways, and when?

Answers to these questions were recorded as 'Community Water Values' and are summarised in Section 6.

Planning to ensure sustainable use of these waters and protection of river health requires sound knowledge of local water quality and quantity issues. Community input to this process is important. Many of the community water values and other issues that were raised at the meetings could be best managed through integrated catchment management processes.

1.5 How will your input be used?

2 GORDON RIVER SYSTEM OVERVIEW

2.1 Catchment description

The natural catchment area of the Gordon River system covers approximately 4974 km² (and another 261 km² by diversion of the Huon headwaters) and consists of three major river catchments¹. These are:

Information from you on values particularly relating to water quality assisted the Board of Environmental Management and Pollution Control, the Tasmanian Parks and Wildlife Service and Local Government (Derwent Valley, West Coast and Central Highland Councils) to finalise the range of Protected Environmental Values for the surface waters of the Gordon River System. These values will be shown in management plans for the region. Further details of what this means are given in section 3 below.

Information from you on water quantity values will be utilised along with advice from stakeholders and the wider public to better plan the water resources of your catchment. Water management planning will be closely linked with overall catchment management planning to put water resource management on a sustainable footing for the State. Water management planning will be undertaken on a priority basis, with stressed rivers in the State being targeted initially.

- the Gordon River above and below Lake Gordon and the Gordon–Pedder impoundment;
- the Franklin River; and
- the Denison River.

Landforms of the region reflect the effects of past climatic conditions – weathering (including solution of limestone within the karst system), rainfall and glaciation. This has produced long, parallel ridges up to 1500 metres high separated by broad valleys running roughly north to south,

¹ Unless otherwise cited, information within Sections 2.1 and 2.2 derived from P. Waterman & A. Waterman. *South West Tasmania Resources Survey. Working Paper No.6. The Freshwater Systems of South West Tasmania.*

with streams occasionally cutting deep gorges through these ridges.

The region is characterised by a combination of high annual rainfall and low evaporation. Rainfall events generated by the prevailing westerly winds are typically of low intensity and long duration producing high surface runoff. Occasional high intensity rainfall events and snowfall also contribute to runoff. Generally rainfall is evenly distributed throughout the year with an increase from west to east across the region from 1500 mm to 3000 mm.

The geology in the region is generally characterised by large areas of Precambrian quartzites and phyllites, overlain by Ordovician and Devonian limestones, and sandstones and siltstones. The vegetation is generally wet sclerophyll forest, rainforest, buttongrass moor and wet scrub.

Although it is the third largest river system in the state behind the South Esk and Derwent Rivers, it has by far the greatest yield. Mean annual yield of whole system (inc. the Huon River diversion) is $9022 \times 10^6 \text{m}^3$. The average flow is 285 cubic metres per second making it the fourth largest river (by discharge) in Australia.

Table 1: Catchment Area & Flow ²

Catchment	Area (km)	Av. Flow m ³ /s
Gordon R. above dam	2014	101
Gordon R. below dam	933	51

² B. Watson 1978. *Hydrology of the Gordon River Basin*. HEC Lower Gordon River Scientific Survey.

Denison R.	670	36
Franklin R.	1590	98

The two large impounded lakes – Gordon and Pedder – developed to generate hydroelectric power, dominate water resources within the region. The Gordon Dam has a significant impact on the Gordon River due to a modified flow regime. The region features high mountain lakes with significant water quality and stratification characteristics and unique meromictic (permanently stratified) lakes located in the lower Gordon catchment.

2.2 Land use

Three local government municipalities - Derwent, West Coast and Central Highland Councils – have areas of the Gordon River catchment within their boundaries. The catchment area is primarily Tasmanian Wilderness World Heritage Area and includes the Franklin-Gordon Wild Rivers National Park, parts of the South-West National Park and the South-West Conservation Area.

The region includes a number of ‘reserve classes’ that are managed under the *National Parks and Wildlife Act, 1970*, the *Forestry Act, 1920* or the *Crown Lands Act, 1976*. Each of these Acts has defined management objectives for each reserve class for which it is responsible. In all of the reserve classes ‘preservation of water quality’ is a stated management objective.

Conservation Areas have multiple use objectives meaning that in addition to the conservation objectives, activities such as mineral exploration and mining can occur. To the east of Lake Gordon is the Adamsfield Conservation Area

which is the only area within the World Heritage Area where exploration and mining can occur. Gold and osmoridium have been found in this area, but there is no mineral exploration at present. A commissional water right exists for the taking of spring derived mineral water within the Adamsfield Conservation Area, however, this is not operational at present. Two small areas on the western boundary of the Gordon Catchment are designated as part of the South West Conservation Area. The area located south of Lake Burbury will, however, become part of the West Coast Regional Reserve under the Regional Forest Agreement.

Any mineral exploration or quarrying activities approved within conservation areas will be expected to operate in accordance with the provisions of the *Mineral Exploration Code of Practice* and the *Quarry Code of Practice*. Prior to approval, new industrial developments will need to demonstrate the use of accepted modern technology and best practice environmental management, including waste reduction, reuse and recycling, to ensure that impacts on water quality are minimised. In high rainfall regions where wastewater discharge may be unavoidable, the Board of Environmental Management and Pollution Control would consider the setting of a mixing zone in accordance with the requirements of Clause 20 of the *State Policy on Water Quality Management 1997*. Emission limits into the mixing zone must ensure the achievement of the water quality objectives that support the PEVs for the receiving waters at or beyond the edge of the mixing zone.

Areas of State Forest on the south-east shores of Lake Gordon are allocated for timber harvesting. Three Forest Reserves containing old-growth communities of *Eucalyptus nitida* and

E. obliqua within this area are not available for wood production – Stringybark (35 ha), Mt Wedge (12 ha) and Boyd (10 ha). Under Schedule 3 of the *Forestry Act, 1920* - as amended under the *Regional Forest Agreement (Land Classification) Act (No. 45 of 1998)* - one of the management objectives for Forest Reserves is ‘preservation of water quality’.

HEC land includes Lake Gordon, Strathgordon and some land near the Scotts Peak Dam, Edgar Dam and McPartlans Canal. Roads and infrastructure associated with the Gordon and Scotts Peak dams have impacted on wilderness values in the upper Gordon Catchment. The Lyell Highway traverses the headwaters of the Franklin River catchment.

A parcel of land (Ballawinne) on the Maxwell River, which is a tributary of the middle Gordon River, and an area around Kuti Kina Cave on the lower Franklin are vested in the Aboriginal Land Council of Tasmania.

Strathgordon is the only population centre of the area with a motel and some houses and a population that ranges seasonally from 20-30 people. Little of the infrastructure associated with the dam construction now remains. A small sewage treatment facility (settlement tanks and stone trickling filter) services a dozen houses at Strathgordon and discharges into Lake Pedder. Two septic systems also operate at the Gordon Power Station, one discharging into the dam tailrace and the other into Lake Gordon. Town water supply is taken from a small storage dam behind Strathgordon village.

Existing activities in the region include hydro-electric power generation, tourism, fishing, rafting, caving, boat

cruises, bush-walking, scientific research and forestry.

2.3 World Heritage Values

The World Heritage listing of a large portion of the Gordon River Catchment is recognition of the unique natural and cultural values of the region. These features and other special values - recreational, economic, scientific, educational and inspirational - are identified in the Tasmanian Wilderness World Heritage Area Management Plan³. These values are briefly detailed below.

The region is characterised by outstanding landform features; a profusion of threatened, rare and endemic plants within a mosaic of plant communities; a unique assemblage of wildlife; and pristine catchments largely free of human impacts. The Gordon River Catchment also contains significant cultural sites, both in terms of Aboriginal habitation and more recent activities since European settlement. The wide range of recreational opportunities within the region is also seen to have economic importance as a basis for sustainable nature-based tourism.

2.4 Characteristic water quality

Lakes Gordon and Pedder are modified ecosystems that impact to some degree on the physical and chemical characteristics of the Gordon River, both through flow regulation and physico-chemical changes in water quality while in storage. Water quality of other tributaries of the Gordon below the dam would be expected to be free of

major human impacts due to the relative inaccessibility of the area.

The permanent, fast flowing rivers of the South West have faunal communities and species differing from those found in lakes or slower moving rivers in other parts of the state.

Geology has some effect on water quality with limestone and/or dolomites in most catchments contributing calcium and magnesium bicarbonates. As regional limestone sequences are of marine origin, sodium and chloride are also well represented. The marine origin of rainfall is also evident in the dominance of sodium and chloride in some waters. Generally though, surface waters have low levels of solutes.

Vegetation also has a substantial impact on water quality with organic material leaching from extensive peat areas producing the characteristic tannin or tea stained waters of the South West. The organic soils also inhibit erosion and sediment loads are generally low.

Much of the vegetation and aquatic fauna is adapted to low nutrient conditions. Waters are relatively acidic, often below a pH of 6.5. The pH of lakes also appears to increase with depth. Generally, turbidity (water clarity) and conductivity (dissolved ions) are low.

2.5 Aquatic Ecosystems

In many areas of the catchment the system is largely free of human influence. Natural processes and evolutionary adaptation occur in a relatively natural state. Freshwater fauna has high levels of endemism and provides living evidence of past continental changes.

³ *Tasmanian Wilderness WHA Management Plan 1999*. Tasmanian Parks & Wildlife Service.

A number of threatened species occur in the area. Several threatened species - swamp galaxias (*Galaxias parvus*), Hickmans mountain pygmy shrimp (*Allanaspides hickmani*) and several caddisflies - occur around the margins of Lake Pedder. Captive breeding and/or translocation to other water bodies are the basis of recovery plans for the Pedder galaxias (*Galaxias pedderensis*) and the swamp galaxias. The Strathgordon Water Supply Dam is to be an important location for the Pedder galaxias, as is Lake Pedder (supposed to be present in the Bonnet Bay tributaries of Lake Pedder). Preventing redfin perch entering Lake Pedder from Lake Gordon via McPartlans Canal is an important management objective, as this species can further threaten the status of the Pedder galaxias and the swamp galaxias.

The Australian grayling (*Prototroctes maraena*) occurs in the lower reaches of the Gordon River and is listed as 'vulnerable' on the *Tasmanian Threatened Species Act 1995* and the *Commonwealth Endangered Species Protection Act*. Their preferred habitat is deep, slow flowing pools.

The Lake Pedder earthworm (*Diporochaeta pedderensis*) has not been seen since the flooding of the original Lake Pedder despite several searches organised by the Parks and Wildlife Service. There are also several hydrbiid species of freshwater snails and several species of caddisfly which are listed as rare within the catchment.

2.6 Catchment environmental issues

As stream conditions are determined both by in-stream activities and surrounding land-use activities,

waterways act as a touchstone of catchment health. Healthy waterways are indicative of sustainably managed catchments.

There are a number of environmental issues relating to the rivers, lakes and wetlands of the Gordon River System. The recently released *Tasmanian Wilderness World Heritage Area Management Plan*⁴ raises a number of issues related to regional water quality.

- Cool regional climate provides suitable conditions for water borne pathogens such as Giardia (present in the faeces of domestic and native animal species).
- Even in areas of high wilderness quality, water doesn't necessarily meet the national drinking water quality guidelines due to bacterial contamination from native animals.
- Human waste potentially a problem in terms threatening water quality.
- High levels of mercury, often exceeding the level considered safe for human consumption, have been recorded in eels, trout and redfin perch in Lake Gordon and in trout in the Gordon River downstream of Lake Gordon. Studies suggest these may be the result of the bioaccumulation of naturally high background levels of mercury in the catchment.
- Development of roads, mines and quarries may result in pollution of waterways because of sediment run-off or other pollutant inputs.

⁴ *Tasmanian Wilderness WHA Management Plan 1999*. Tasmanian Parks & Wildlife Service. p.111

- Boating on rivers and lakes may create waste disposal problems with also possibility of fuel spills.
- Bank erosion impacts from motorised boating on the lower Gordon River.

The Gordon River catchment is presently used for the generation of hydro-electricity. A range of environmental effects may be evident due to the presence of large water storages and regulation of downstream flows. Potential issues that may affect World Heritage and other natural and cultural values include..

- Dams acting as barriers to migration of aquatic and riparian species.
- Physico-chemical changes in the waters of large storages (e.g. dissolved oxygen and temperature) and in water discharged from impoundments.
- Possible impacts on aesthetics, shoreline erosion and habitat due to variations in lake levels.
- Possible impacts on biota and landforms (including karst systems) due to changed flow patterns downstream of dams and the power-station.
- River regulation impacts on meromictic lakes.
- Possible links between varied discharge and bank erosion.

The connection of Tasmania to the mainland electricity grid via the Basslink cable is likely to result in changes to the Hydro's system operations, possibly affecting the larger power stations of the Gordon and Poatina. Major studies are envisaged to address possible environmental effects

within the Gordon River. The studies are:

- Prediction and monitoring of the effects of changed power station operation through an improved understanding of river hydrology.
- Study of possible erosion issues within the Gordon River.
- Study of relationship between salt-wedge intrusion into meromictic lakes and operations of the Gordon Power Station.
- In-stream fauna studies and prediction of habitat availability under different flow regimes.

The State Government has announced there will be an environmental impact assessment process to assess the potential affects of Basslink operations upon the Gordon River.

Other possible environmental issues for the region's waterways include..

- Threatened species protection.
- Control of introduced animals and plants.
- Erosion through forestry activities and associated loss of, or stress to, aquatic and riparian habitats.
- Lack of comprehensive water quality data in the catchment.
- Management of Aboriginal and European cultural heritage sites along waterways in the catchment.

3 WATER QUALITY : PROTECTED ENVIRONMENTAL VALUES

3.1 Setting Protected Environmental Values

The first step in the implementation of the *State Policy on Water Quality Management 1997* is the identification of **Protected Environmental Values (PEVs)** of the surface waters in your region. **PEVs are the values or uses of the water body for which it is determined that any given area of that water body should be protected.** These values and uses should be clearly in evidence at the time of the implementation of the Policy.

The Policy specifies a range of PEVs which may be applied to a given water body. More than one PEV may be applied to a water body. The PEVs are:

- A. Protection of Aquatic Ecosystems
- B. Recreational Water Quality and aesthetics
- C. Raw Water for Drinking Water Supply
- D. Agricultural Water Use
- E. Industrial Water Supply

These values are described in more detail in Section 3.2.

The Board of Environmental Management and Pollution Control will then specify a range of pollutant limits called Water Quality Objectives. These will be designed to ensure the quality of water in that water body is maintained at a level which will allow the chosen values to be protected.

The Policy then sets out a range of strategies which are aimed at ensuring

that waste water discharges from point sources (such as industrial or sewage treatment plant discharges) and diffuse sources (such as runoff from highways, urban areas, farms, forest harvesting etc.) will not endanger the achievement of the Water Quality Objectives.

The Board and local planning authorities will use these strategies in land use planning and approvals processes, and in ongoing regulation, to ensure that the PEVs for a given water body are maintained or enhanced over time.

3.2 Protected Environmental Values categories

The Policy lists a range of PEVs which are used to describe the identified values and uses of a given water body. These are:

A: Protection of Aquatic Ecosystems

- (i) Pristine or near pristine ecosystems;
- (ii) Modified (not pristine) ecosystems:
 - (a) from which edible fish, crustacea and shellfish are harvested, or
 - (b) from which edible fish, crustacea and shellfish are not harvested.

What does pristine mean?

"Pristine" means waters not subject to human interference through discharges or other activities within the catchment (Australian Water Quality Guidelines 1992).

B: Recreational Water Quality & Aesthetics

- (i) Primary contact
- (ii) Secondary contact
- (iii) Aesthetics

‘Primary contact’ means recreation involving bodily immersion / submersion where there is direct contact with water, & includes swimming, diving, surfing, water skiing.

‘Secondary contact’ means activities where there is some direct water contact, but it is unlikely that water will be swallowed (e.g. paddling, boating, and fishing).

‘Aesthetics’ means visual appearance of the water (water clarity), being free from oil, grease, floating debris, unnatural colour, odour, algal blooms etc.

C: Raw Water for Drinking Supply

- (i) Subject to coarse screening only;
- (ii) Subject to coarse screening and disinfection.

This PEV applies to water used as the intake source for **public use** (town water supply, in other words) and to registered private water supplies.

It does not apply to the taking of water from surface waters by individuals for private use for the purposes of drinking etc.

The Director of Public Health recommends that raw water from any surface waterbody should be boiled before use.

D: Agricultural Water Uses

- (i) Irrigation
- (ii) Stock watering

E: Industrial Water Supply

The actual industry type must be specified in order to identify appropriate guidelines.

4 PEVs FOR THE GORDON RIVER CATCHMENT

4.1 PEV Setting Process

The Board of Environmental Management and Pollution Control and the Tasmanian Parks and Wildlife Service suggested, as a starting point, a range of draft water quality PEVs suitable for surface waters (rivers, lakes and streams) of the Gordon River catchment having regard to the World Heritage and other natural and cultural values of the region.

These proposed PEVs provided the basis for discussion with regional stakeholders and interest groups at a community values workshop in Strahan (21st September 1999) and Hobart (24th September 1999). The workshops covered both water quality and quantity issues in the region (refer Section 6). Outcomes from this workshop were used to further develop PEVs for the Gordon River System (Table 2) and community water quantity values.

The general public were also invited via advertisements in the three major Tasmanian daily newspapers to comment on proposed PEVs in public forums at Strahan (11th October, 1999) and Hobart (12th October 1999) or during a subsequent submission period.

The PEVs detailed below have now been endorsed by the Board of Environmental Management and Pollution Control and the relevant planning authorities for the Gordon River System (Director of Parks and the Derwent Valley Council).

The PEVs chosen from the Policy are those values and uses that are currently in evidence and apply only for surface waters within the Gordon River catchment.

PROTECTED ENVIRONMENTAL VALUES

for surface waters of the Gordon River Catchment

The PEVs for the surface waters of the Gordon River Catchment are described in Table 2 under land use categories. The PEVs apply to all surface waters within each land tenure category, other than⁵:

- privately owned waters that are not accessible to the public and are not connected to, or flow directly into, waters that are accessible to the public; or
- waters in any tank, pipe or cistern.

“Privately owned waters” means any surface waters confined within the boundary of privately owned land and which do not flow into, or do not communicate with:

(a) the sea or arm or creek of the sea;

(b) a source of supply for a water district or irrigation water district;

(c) any river, stream, watercourse, lake, pond or marsh.

Management of all surface waters within the catchment shall focus on the achievement of water quality objectives.

The water quality objectives will be determined by the Board of Environmental Management and Pollution Control in accordance with the *State Policy on Water Quality Management 1997*.

Achievement of these water quality objectives will maintain or enhance the water quality of those surface waters to ensure the protection of all of the following values and uses applying to each land use category. These values and uses are derived from the formal PEVs listed in Clause 7 of the Policy.

In general, diffuse source pollution can be managed to protect the PEVs by compliance with approved codes of practice, or by development and implementation of best practice environmental management guidelines where codes are not available.

In general, point source pollution should be managed to protect the PEVs by implementation of best practice environmental management, and by compliance with emission limits set by the regulatory authority. This may also require the setting of a mixing zone by the Board of Environmental Management and Pollution Control. For specific details refer to Part 4 of the *State Policy on Water Quality*.

⁵ State Policy on Water Quality Management 1997

Protected Environmental Values reflect current values and uses of a water body but do not necessarily imply that the existing water quality will support these values and uses.

Table 2: Protected Environmental Values for Gordon River Catchment

Gordon River Catchment <u>above</u> Lake Gordon	
<p>For all surface waters within Franklin-Gordon Wild Rivers National Park</p> <p>(managed under the <i>National Parks and Wildlife Act 1970</i>)</p> <p>In addition: for surface waters on freehold land 'Gordonvale' within World Heritage Area.</p>	<p>A: Protection of Aquatic Ecosystems</p> <p>(i) Protection of pristine or nearly pristine ecosystems from which edible fish are harvested and having regard for the management objectives of the World Heritage Area Management Plan.</p> <p>B: Recreational Water Quality and Aesthetics</p> <p>(i) Primary contact water quality</p> <p>(ii) Secondary contact water quality</p> <p>(iii) Aesthetic water quality</p> <p>C: Raw Water for Drinking Water Supply (Strathgordon supply only) *</p> <p>(ii) Subject to coarse screening plus disinfection</p> <p>E: Industrial Water Supply (Hydro-Electric Power Generation)</p> <p>That is, as a minimum, the water quality shall be managed to provide water of a physical and chemical nature to support a pristine or near pristine aquatic ecosystem from which edible fish are harvested and is not subject to significant human interference through discharge or catchment activities; that is acceptable for a town drinking water supply (Strathgordon only)* ; that allows people to safely engage in recreational activities such as swimming, rafting and fishing in aesthetically pleasing waters; and is suitable for use following impoundment in the Gordon Power Scheme.</p> <p>* Raw Water for Drinking Water Supply PEV only applies to surface waters of small un-named catchment at Strathgordon providing town water supply</p>
<p>For all surface waters within Adamsfield Conservation Area</p> <p>(managed under the <i>National Parks and Wildlife Act 1970</i>)</p> <p>In addition: water supply for bottling of spring water near un-named tributary of Adams River.</p>	<p>A: Protection of Aquatic Ecosystems</p> <p>(i) Protection of pristine or nearly pristine ecosystems from which edible fish are harvested and having regard for the management objectives for conservation areas outlined in Schedule 4 of the <i>National Parks and Wildlife Act, 1970</i> and for the management objectives of the World Heritage Area Management Plan.</p> <p>B: Recreational Water Quality and Aesthetics</p> <p>(i) Primary contact water quality</p> <p>(ii) Secondary contact water quality</p> <p>(iii) Aesthetic water quality</p> <p>E: Industrial Water Supply (Hydro-Electric Power Generation, Bottled Spring Water)</p> <p>That is, as a minimum, the water quality shall be managed to provide water of a physical and chemical nature to support a pristine or near pristine aquatic ecosystem from which edible fish are harvested; that allows people to safely engage in primary and secondary contact recreational activities such as swimming, rafting and fishing in aesthetically pleasing waters; and is suitable for use following impoundment in the Gordon Power Scheme and for bottling of spring water where</p>

	<p>commissional water right allows.</p>
<p>For all surface waters on Hydro land</p>	<p>A: Protection of Aquatic Ecosystems</p> <p>(ii) Protection of modified (not pristine) ecosystems from which edible fish are harvested</p> <p>B: Recreational Water Quality and Aesthetics</p> <p>(i) Primary contact water quality (where primary contact recreation permitted)</p> <p>(ii) Secondary contact water quality (where secondary contact recreation permitted)</p> <p>(iii) Aesthetic water quality</p> <p>C: Raw Water for Drinking Water Supply (Strathgordon supply only) *</p> <p>(ii) Subject to coarse screening plus disinfection</p> <p>E: Industrial Water Supply (Hydro-Electric Power Generation)</p> <p>That is, as a minimum, the water quality shall be managed to provide water of a physical and chemical nature to support a healthy, but modified aquatic ecosystem from which edible fish are harvested; that is acceptable for a town drinking water supply (Strathgordon only) *; and which will allow people to safely engage in primary and secondary contact recreation activities such as swimming, paddling or fishing (where Hydro operations permit) in aesthetically pleasing waters; and is suitable for use (following impoundment) in the Gordon Power Scheme.</p> <p>* Raw Water for Drinking Water Supply PEV only applies to surface waters of small un-named catchment at Strathgordon providing town water supply</p>

<p>For all surface waters within State Forest</p> <p><i>(managed under the Forestry Act 1920)</i></p>	<p>A: Protection of Aquatic Ecosystems</p> <p>(ii) Protection of modified (not pristine) ecosystems from which edible fish are harvested</p> <p>B: Recreational Water Quality and Aesthetics</p> <p>(i) Primary contact water quality</p> <p>(ii) Secondary contact water quality</p> <p>(iii) Aesthetic water quality</p> <p>E: Industrial Water Supply (Hydro-Electric Power Generation)</p> <p>That is, as a minimum, the water quality shall be managed to provide water of a physical and chemical nature to support a modified, but healthy aquatic ecosystem (recognising the designation of the area for multiple use forestry activities) from which edible fish are harvested; that allows people to safely engage in primary and secondary contact recreational activities such as swimming, rafting and fishing in aesthetically pleasing waters; and is suitable for use following impoundment in the Gordon Power Scheme.</p>
<p>For all surface waters flowing through Forest Reserves from state forest</p> <p><i>(managed under the Forestry Act 1920)</i></p>	<p>A: Protection of Aquatic Ecosystems</p> <p>(ii) Protection of modified (not pristine) ecosystems from which edible fish are harvested, and having regard to the management objectives for Forest Reserves outlined in Schedule 3 of the <i>Forestry Act, 1920</i></p> <p>B: Recreational Water Quality and Aesthetics</p> <p>(i) Primary contact water quality</p> <p>(ii) Secondary contact water quality</p> <p>(iii) Aesthetic water quality</p> <p>E: Industrial Water Supply (Hydro-Electric Power Generation)</p> <p>That is, as a minimum, the water quality shall be managed to provide water of a physical and chemical nature to support a modified, but healthy aquatic ecosystem from which edible fish are harvested; that allows people to safely engage in primary and secondary contact recreational activities such as swimming, rafting and fishing in aesthetically pleasing waters; and is suitable for use (following impoundment) in the Gordon Power Scheme.</p>
<p>For all surface waters within Forest Reserves having their headwaters within the Reserve</p> <p><i>(managed under the Forestry Act 1920)</i></p>	<p>A: Protection of Aquatic Ecosystems</p> <p>(i) Protection of pristine/near pristine ecosystems from which edible fish are harvested, and having regard to the management objectives for Forest Reserves outlined in Schedule 3 of the <i>Forestry Act, 1920</i></p> <p>B: Recreational Water Quality & Aesthetics</p> <p>(i) Primary contact water quality</p> <p>(ii) Secondary contact water quality</p> <p>(iii) Aesthetic water quality</p> <p>E: Industrial Water Supply (Hydro-Electric Power Generation)</p> <p>That is, as a minimum, the water quality shall be managed to provide water of a</p>

	<p>physical and chemical nature to support a pristine or near pristine aquatic ecosystem from which edible fish are harvested; which will allow people to safely engage in primary and secondary contact recreational activities such as swimming, rafting and fishing in aesthetically pleasing waters; and is suitable for use (following impoundment) in the Gordon Power Scheme.</p>
The Lakes	
Lake Gordon & Lake Pedder	<p>A: Protection of Aquatic Ecosystems</p> <p>(ii) Protection of modified (not pristine) ecosystems from which edible fish (other than eels) are taken and having regard for the management objectives of the World Heritage Area Management Plan in Lake Pedder</p> <p>B: Recreational Water Quality and Aesthetics</p> <p>(i) Primary contact water quality</p> <p>(ii) Secondary contact water quality</p> <p>(iii) Aesthetic water quality</p> <p>E: Industrial Water Supply (Hydro-Electric Power Generation)</p> <p>That is, as a minimum, the water quality shall be managed to provide water of a physical and chemical nature to support a modified, but healthy aquatic ecosystem from which edible fish are taken (nb. mercury concentrations detected in eels, larger trout and redfin perch in Lake Gordon exceeding levels considered safe for human consumption may be due to bioaccumulation of naturally high background levels of mercury); with waters of sufficient quality to support recreational activities such as swimming, boating and fishing in aesthetically pleasing waters; and for use in the Gordon Power Scheme.</p>
Waters <u>below</u> Lake Gordon	
Gordon River below dam	<p>A: Protection of Aquatic Ecosystems</p> <p>(ii) Protection of modified (not pristine) ecosystems from which edible fish are taken and having regard for the management objectives of the World Heritage Area Management Plan.</p> <p>B: Recreational Water Quality and Aesthetics</p> <p>(i) Primary contact water quality (where primary contact recreation permitted)</p> <p>(ii) Secondary contact water quality</p> <p>(iii) Aesthetic water quality</p> <p>That is, as a minimum, the water quality shall be managed to provide water of a physical and chemical nature to support a modified, but healthy aquatic ecosystem from which edible fish are taken (nb. mercury concentrations detected in larger trout exceeding levels considered safe for human consumption may be due to bioaccumulation of naturally high background levels of mercury). Though subject to some human interference through a modified discharge regime, waters are of sufficient quality to support fishing and recreational activities with a high likelihood of bodily immersion such as rafting (where Hydro operations permit) in aesthetically pleasing waters.</p>

<p>Tributaries of Gordon River within Franklin-Gordon Wild Rivers National Park</p> <p>(managed under the <i>National Parks and Wildlife Act 1970</i>)</p>	<p>A: Protection of Aquatic Ecosystems</p> <p>(i) Protection of pristine or nearly pristine ecosystems from which edible fish are harvested and having regard for the management objectives of the World Heritage Area Management Plan.</p> <p>B: Recreational Water Quality and Aesthetics</p> <p>(i) Primary contact water quality</p> <p>(ii) Secondary contact water quality</p> <p>(iii) Aesthetic water quality</p> <p>That is, as a minimum, the water quality shall be managed to provide water of a physical and chemical nature to support a pristine or near pristine aquatic ecosystem from which edible fish are harvested and is not subject to significant human interference through discharge or catchment activities; and allows people to safely engage in recreational activities such as swimming, rafting and fishing in aesthetically pleasing waters.</p>
<p>Meromictic Lakes</p>	<p>A: Protection of Aquatic Ecosystems</p> <p>(ii) Protection of modified (not pristine) ecosystems having regard to the water quality characteristics of meromictic systems and for the management objectives of the World Heritage Area Management Plan.</p> <p>That is, as a minimum, the water quality shall be managed to provide water of a physical and chemical nature to support waterbodies subject to some human interference through a modified discharge regime, but valued for those water quality characteristics arising within a permanently stratified ecosystem.</p>
<p>For all surface waters within the South-West Conservation Area</p> <p>(managed under the <i>National Parks and Wildlife Act 1970</i>)</p>	<p>A: Protection of Aquatic Ecosystems</p> <p>(i) Protection of pristine or nearly pristine ecosystems from which edible fish are harvested; and having regard for the management objectives for conservation areas outlined in Schedule 4 of the <i>National Parks and Wildlife Act, 1970</i></p> <p>B: Recreational Water Quality and Aesthetics</p> <p>(i) Primary contact water quality</p> <p>(ii) Secondary contact water quality</p> <p>(iii) Aesthetic water quality</p> <p>That is, as a minimum, the water quality shall be managed to provide water of a physical and chemical nature to support a pristine or near pristine aquatic ecosystem from which edible fish are harvested; that allows people to safely engage in primary and secondary contact recreational activities such as swimming, rafting and fishing in aesthetically pleasing waters.</p>

5 WATER QUANTITY : WATER FLOW MANAGEMENT VALUES

5.1 Overview

While water quality is a very important part of any water management regime, the issue of how much water a river or stream carries, and how that flow is managed, is of equal importance. Water quality and quantity are closely linked.

The State Government proposes to re-organise the way water flow in our rivers and streams is managed, and one of the key understandings is that there needs to be a specific allocation of water for the river or stream itself. This is necessary not only to protect the aquatic life of the river, but also to maintain basic "river health". If there is insufficient flow at crucial times of the year, the overall quality of the remaining water may be badly affected. This will very likely have a negative effect on human uses of the water, as well as on the environment.

In some instances there may be competing uses for the available resource, and that there may need to be trade-offs to ensure a balanced sharing arrangement between human uses and the needs of the river environment.

The allocation of water for the environment must be based on scientific information, and also on legitimate community values and uses. This community values information was collected as part of the community consultation process.

5.2 Water quantity values

Five broad categories of water quantity values have been identified, and as with the water quality PEVs, it is likely that most rivers will attract more than one value/use category. The categories are:

- Ecosystem values;
- Physical landscape values.
- Consumptive and non-consumptive use values;
- Recreation values;
- Aesthetic landscape values;

Your advice will provide input into a broader process aimed at gathering water management values from stakeholders, community groups and government agencies. This information will be utilised when water management planning for your catchment is undertaken. This planning will be undertaken on a priority basis, with the most stressed rivers in the State being targeted initially.

An appraisal of water quantity values will be undertaken in order to develop water management goals for the catchment. This will be undertaken during the water management planning process.

An explanation of the water quantity value categories and examples of specific values are given below:

Ecosystem values: The term is used to identify those values which are to be protected and / or enhanced in the current state of aquatic and adjacent land ecosystems. Specific water values associated with the ecosystem value category may be:

- protection of an endangered species (plant or animal);
- protection or improvement in native fish populations;
- protection of riverine vegetation;
- provision of adequate water for stream habitat for flora and fauna;
- provision of water for wetland and/or estuary ecosystems.

Physical Landscape values: These values are closely related to the physical nature of the catchment. This includes the nature and constitution of channels, the frequency of floods and droughts, soil and rock types, and vegetation coverage. These values are also closely associated with ecosystem function, and may overlap with the protection of ecosystem values. Specific water values associated with physical landscape values may include:

- provision of variable flows;
- prevention of erosion;
- protection or improvement of riparian zone.

Consumptive and non-consumptive use values: These are related to the current and potential human uses of water bodies. Consumptive use refers to the extraction of water from the water body, with no return of it to the waterbody. Examples may include:

- provision of water for irrigation;
- provision of water for town supply;
- provision of water for industry.

Non-consumptive use refers to extraction or use of water, where the water is eventually returned to the river. Examples may include:

- use of water for hydro-electricity generation;
- use of water for fish farming.

Recreational values: These include the range of direct human uses of water bodies for purposes such as kayaking, canoeing, sailing, swimming, fishing etc. This type of value is difficult to quantify, but is an essential part of our way of life in Tasmania. Water quality issues are also important, especially where primary contact occurs (swimming for example), or where the recreational activity relies on a base of good quality water, such as a

recreational fishery. Examples may include:

- maintenance or improvement of the quantity (and quality) of water for recreational fishery (trout, blackfish etc);
- provision of sufficient water for whitewater rafting;
- provision of sufficient water (of adequate quality) for swimming.

Aesthetic Landscape values: These values relate to human appreciation of water and adjacent environments. It is often extremely difficult to address these types of values, or work out the flow requirements to ensure their protection. They are, however, legitimate values which must be acknowledged in any good management process. Examples may include:

- maintenance or improvement of flow through gorges or over waterfalls;
- protection of scenic features in a river.

Many of the community water values detailed in Section 6 are related to water quantity issues. These values will provide the basis for future water management planning processes in the Gordon River system.

6 Community Water Values

The following community water values were obtained from regional stakeholder workshops and public forums held at Strahan and Hobart.

Table 3: Community water values for the Gordon River Catchment

Water Value Categories	Nominated Water Values
Ecosystem values	<ul style="list-style-type: none"> • Maintain ‘natural’ state of waterways with range of water quality characteristics representative of the region: <i>The Gordon River below the impoundments should be managed to maintain water quality characteristics (temperature, dissolved oxygen, suspended solids) at levels as close to natural as possible.</i> • ‘Intrinsic’ aquatic ecosystem values. • Lower Gordon – maintain native riverbank vegetation (particularly Huon Pine): <i>Changed flows may undercut river banks and destroy vegetation.</i> • Value riparian/riverbank vegetation as fish habitat. • Lower Gordon wildlife: <i>including occasional seals & dolphins</i> • Key freshwater animals: <i>platypus, freshwater crayfish</i> • Lower Gordon birdlife: <i>sea eagles, swans, azure kingfisher & occasional penguin.</i> • Maintaining water quality near roads: <i>Avoid possible effects of bridge maintenance (sandblasting, paint in streams) and road maintenance (pesticide spraying, sediment disturbance) on water quality in local waterways. Lyell Highway, Clear Hill & Adamsfield.</i> • Rare and threatened flora over the whole area: <i>Including native fish Galaxias pedderensis, G. parvus</i> • Waterways maintained free of exotic animals and plants: <i>inc. blackberries.</i> • Redfin free status of Lake Pedder: <i>Flow velocity barrier at McPartlans Canal preventing their spread from Lake Gordon to Lake Pedder.</i> • Pristine aquatic ecosystems in region have value as pristine ‘reference sites’ for comparative scientific study with other areas.

<p>Physical landscape values</p>	<ul style="list-style-type: none"> • Integrity of stream bank is important in Middle & Lower Gordon: <i>to avoid soil loss and turbid/dirty water and to maintain native riverbank vegetation (Huon Pine). In the Lower Gordon there are formal licence restrictions for commercial operators and voluntary code for private users to reduce wake.</i> • Wet & dry caves on lower Gordon & Maxwell waterways and Vale of Rassellas: <i>changes in flow regime may have quality and quantity effects.</i> • Maintain as far as practical non-eroded foreshores on lakes Gordon & Pedder. • Quartz beaches which have been formed at lakes Pedder (primarily) & Gordon. • A flow regime which minimises negative downstream effects: <i>Natural flow regime is maintained above dams and on tributaries of the Gordon. Impoundments reducing sediment load may affect downstream bank rejuvenation on Gordon River. Potential erosion issues may also arise from compounding effects of flooding and dam release.</i> • Maintaining meromictic lakes: <i>Lake Fidler permanently stratified, others are modified.</i> • Maintaining “natural” dynamics of salt wedge intrusion at Gordon mouth. • Maintaining “natural” bar dynamics at the mouth of the river.
----------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

<p>Recreational values</p>	<ul style="list-style-type: none"> • Fishing: <i>Lower Gordon, range 10 km upstream. 'wild' rainbow trout. Lakes & lower Gordon & Lake Pedder: brown and rainbow trout & eels. Problems with mercury accumulation in eels and larger trout, probably naturally occurring.</i> • Waterways used for access to mountain ranges on non-roaded side of Pedder and Gordon • Sailing on lower Gordon: <i>Both organised events (Abel Tasman Event 2-yearly circumnavigation) and individual cruising yachts.</i> • Sea-plane landing sites: <i>Upstream of Sir John Falls, downstream of Horseshoe Bend, or at Limekiln Reach if other 2 sites not usable. Possible problems for landing in flood coincide with dam release.</i> • Commercial cruise operations: <i>Maintain large boat access at mouth of Gordon. While bar not problem at present, bar dynamics may need investigation. Subject to operating licence conditions and codes of practice for boat wake.</i> • Recreational motor boating: <i>Same area as cruise boats & some up to Angel Cliffs. Also Lake Gordon and Lake Pedder. Voluntary code of practice for private users.</i> • Sightseeing – commercial and private boats • Commercial rafting: <i>(5/7/10 day trip, Collingwood or Mt McCall entry. Only 5% of total go to Heritage Landing, rest get picked up at Sir Johns Falls). Licence conditions and code of practice exists for operators in terms of carrying out waste and washing protocols.</i> • Private rafting: <i>most on the Franklin & lower Gordon Rivers. Clean water near road at Collingwood Bridge is important for users. Minimal number of private rafters.</i> • Swimming: <i>where rafting, and at Lakes Gordon and Pedder</i> • Canoeing and kayaking: <i>Lake Gordon and Lake Pedder and some rivers.</i> • Sea kayaking: <i>from harbour upstream to Sir John Falls.</i> • Camping • Drinking water for bushwalkers: <i>Dir. Public Health advises all water to be boiled prior to individual consumption.</i> • Passive recreation / tourist viewing
----------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

<p>Consumptive or non-consumptive values</p>	<ul style="list-style-type: none"> • Water for generation of hydro electricity: <i>Possible value added should it be perceived to be a renewable source and minimal contribution to 'greenhouse'</i> • Effects of Gordon water on Macquarie Harbour fish farms: <i>Effects unknown, water should be of good quality, however. Mercury dynamics may require investigation.</i> • Drinking water: <i>Strathgordon town supply, Wedge River NP&WS camp</i> • Lake Gordon boom storage of Huon Pine and licenced salvage on lake. • Possibility of commercial bottling of water within Adamsfield Conservation Area. • Licenced Huon Pine salvage on Macquarie Harbour outside of mouth of Gordon River: <i>Timber washed down the Gordon during flood.</i> • Extracted for sewage treatment use at Teds Beach at Lake Pedder • Fire control: <i>Active extraction and use of water (and passive value of waterways as firebreaks).</i>
<p>Aesthetic landscape values</p>	<ul style="list-style-type: none"> • Water over Sir John Falls (tributary unaffected by human influence): <i>floatplane destination</i> • Maintain soil and vegetation integrity of riverbank: <i>avoid unnatural bank erosion.</i> • 'Cleanliness' of waters is a marketing tool, and has a commercial value.
<p>Other issues</p>	<ul style="list-style-type: none"> • Rise and fall of storages results in accumulation of vegetative debris on foreshore resulting in fire hazard. • Aboriginal heritage associated with waterways • Cultural heritage Adamsfield mining site: <i>still has water quality impacts.</i> • Lake Pedder has value as political 'icon'.