

Ringarooma River Catchment Water Management Plan



February 2014

Water and Marine Resources Division
Department of Primary Industries, Parks, Water and Environment



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The Department of Primary Industries, Parks, Water and Environment (DPIPWE)

The Department of Primary Industries, Parks, Water and Environment provides leadership in the sustainable management and development of Tasmania's natural resources. The Mission of the Department is to support Tasmania's development by ensuring effective management of our natural resources.

The Water and Marine Resources Division provides a focus for water management and water development in Tasmania through a diverse range of functions, including implementing the *Water Management Act 1999* and the National Water Initiative; design of policy and regulatory frameworks to ensure sustainable use of surface water and groundwater resources; monitoring, assessment and reporting on the condition of the State's freshwater resources; and providing regulatory and policy support for water infrastructure development projects.



CONTEXT

This Water Management Plan provides the management framework for the water resources of the Ringarooma River catchment, in accordance with the objectives of the *Water Management Act 1999* and the *State Policy on Water Quality Management 1997*. This Plan is a statutory plan prepared in accordance with Part 4 of the *Water Management Act 1999*. It provides management arrangements that apply to all fresh water resources within the catchment.

The Ringarooma River catchment is located in the northeast of Tasmania and has an area of 974 km². The Ringarooma River rises on the northern slopes of Ben Nevis and Mount Maurice, and flows in a northerly direction past the towns of Branxholm, Derby, Pioneer and Gladstone, before discharging into Boobyalla Inlet and Ringarooma Bay. The Floodplain Lower Ringarooma River Ramsar Wetland site is located downstream from Gladstone.

Approximately 25% of the land across the Ringarooma River catchment has been cleared for grazing and cropping, whilst approximately 9% of the land consists of forestry plantations, most of which are located in the upper catchment.

At the time of this Plan's adoption, close to two thirds of the water authorised to be taken under water licences in the catchment is used for hydro-electric generation. Water is captured in the Cascade and Frome Dams, and, after being run through turbines, is returned to the main stem of the Ringarooma River. The remaining water taken under licence is principally used for irrigation.

There has been significant growth in extraction of water from the Ringarooma River catchment during the summer take period, with farm businesses reliant on the volume of water that has been taken historically. Much of this growth in extraction occurred before, or around, the time that the *Water Management Act 1999* commenced in 2000, a time during which Commissionial Water Rights were converted to water licences. At this time, it was not possible to verify the amount of water taken prior to licences being granted.

Processes have been undertaken in various catchments to deal with historic extraction, such as the Water Use Sustainability Project, under which the volume of water identified as being taken and used historically by licensees, through water use surveys, has provided for the granting of Surety Level 6 allocations to cover the amount of water taken over and above licensed allocations.

In the Ringarooma River catchment, the development of a water management plan was intended to deal with this issue, however, the process to develop a plan has stalled on a number of occasions, and hence the historic extraction issue has remained unresolved prior to the adoption of this Plan.

A key part of this Plan is the provision of legal entitlements to the volume of water identified as being taken and used historically in a survey undertaken in 2004. This is an outcome consistent with that intended at the commencement of the allocation process in 2004, and ensures that access to water required to support irrigation businesses is provided.

Whilst several years have passed since the 2004 survey, there is clearly a strong community expectation that the level of water extraction identified will be formalised through the granting of water allocations.

This Plan's water management provisions have been designed to ensure that the level of water allocation provided by the Plan is sustainable.

The Ringarooma River is an unregulated river system that exhibits a strong seasonal flow pattern, with highest flows occurring over the months from May to November. Whilst there are a number of on-stream and off-stream dams in the upper reaches of the catchment, together with water extraction, the flow regime remains in a relatively natural condition, providing for a healthy aquatic ecosystem.

Special values in the catchment (as identified through the Conservation of Freshwater Ecosystem Values Database) include listed threatened aquatic species (the giant freshwater crayfish and dwarf galaxiid), threatened amphibians (the green and gold frog), and threatened riparian vegetation (native gipsy wart, bristly knotweed, branching rush, erect marshflower, ribbon weed and purple loosestrife). The Floodplain Lower Ringarooma River Ramsar Wetland site has very high conservation values, whilst a number of other high conservation value wetlands are found in the lower catchment.

Groundwater and surface water resources in the catchment are highly connected and it is thought that on average, around half of all surface water flows originate from groundwater discharge, particularly during summer. Whilst the groundwater resources in the catchment are substantial, it is estimated that at the date of this Plan's adoption, the level of groundwater extraction is low, and concentrated in specific parts of the catchment.

Groundwater extraction is not currently required to be licensed, and whilst there are statutory requirements relating to matters such as well works permits and groundwater drilling licences, extraction of the groundwater resource is largely unmanaged in the catchment.

Some developed land in the central part of the catchment is supplied with water through the Winnaleah Irrigation Scheme. This water is drawn from the Cascade Dam and delivered to properties via pipeline. The Scheme was augmented in 2011-12, with additional water taken from the Frome Dam via a pipeline.

In considering the level of development and water extraction in the catchment, this Plan's objectives reflect the opportunity to preserve existing freshwater ecosystem values, while also identifying opportunities for future sustainable use and development of the catchment's water resources.

The Ringarooma River Catchment Water Management Plan strikes a balance in the management of the catchment's water resources, and in doing so ensures that the River's freshwater environmental values and its productive capacity to support a range of water uses, including stock and domestic use, town water supplies and irrigation, are preserved into the future.

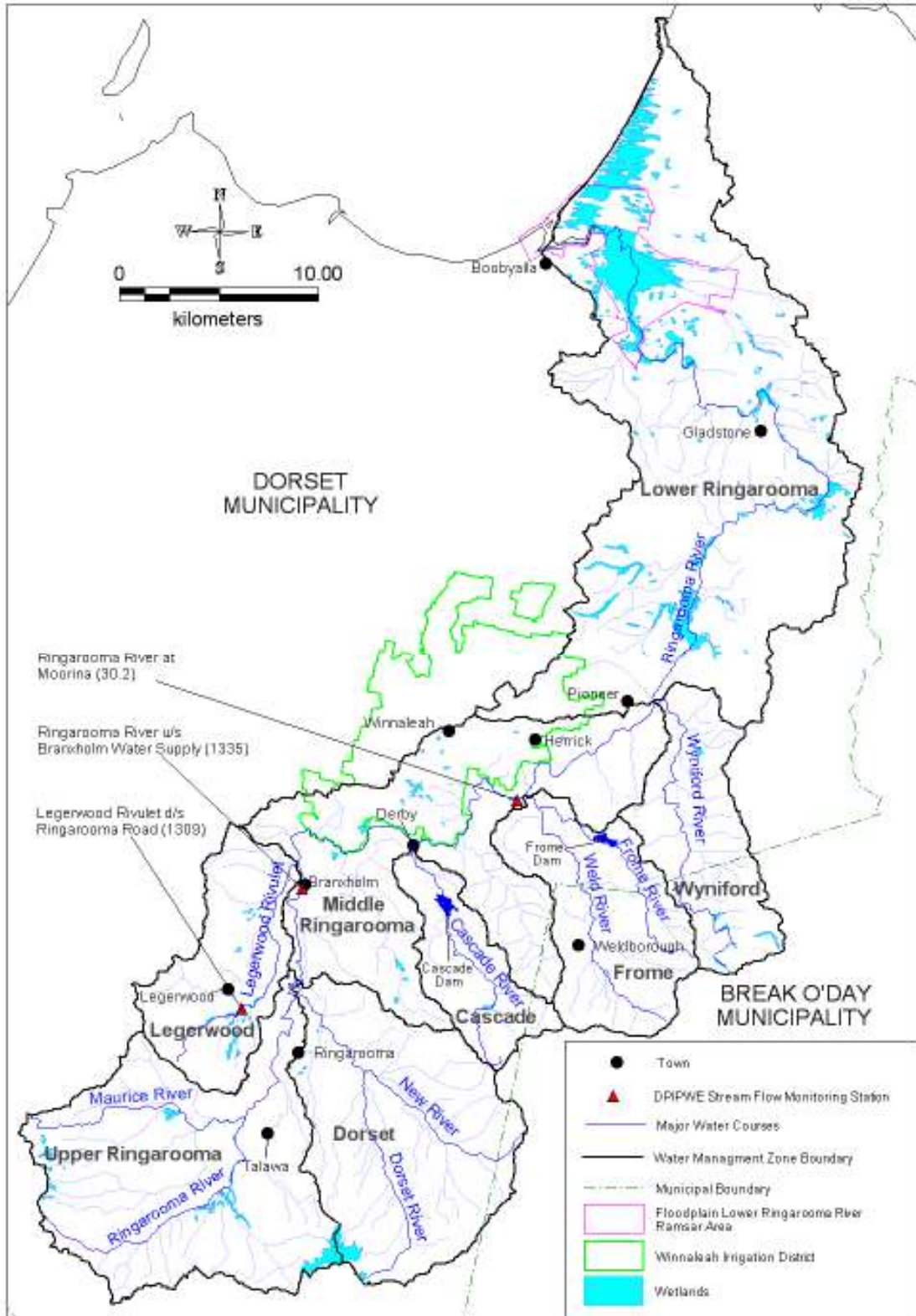


Figure 1 Map of the Ringarooma River catchment, showing surface water management zones, river names and the Winnaleah Irrigation District.

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PART 1 INTRODUCTION

1.1 Name of Plan

This Water Management Plan is titled the Ringarooma River Catchment Water Management Plan, hereafter referred to as **this Plan**.

1.2 Nature and Status of this Plan

This Plan is made under Part 4 of the *Water Management Act 1999* as amended, hereafter referred to as the Act, and is to be read as being subject to and consistent with the Act.

Nothing in this Plan absolves any person from the need to obtain any licence, permit, approval or other requirement under the Act or in any other applicable legislation.

1.3 Date of Commencement

This Plan was adopted by the Minister, under section 28 of the Act, on 2 February 2014 and took effect upon publication of a notice in the *Gazette*, under section 29 of the Act.

1.4 Review of this Plan

A review of this Plan will take place after the end of the 10th year of its adoption, unless otherwise reviewed pursuant to section 34(1A) of the Act.

1.5 Area to which this Plan Applies

This Plan applies to the Ringarooma River catchment, and small streams that flow to Boobyalla Beach, as shown in Figure 1, hereafter referred to as **this catchment**.

1.6 Water Resources to which this Plan Applies

This Plan applies to all water resources within this catchment as shown in Figure 1, including groundwater resources.

1.7 Surface Water Management Zones

Surface water resources have been divided into the following subcatchment management zones, as shown in Figure 1:

- a) the Ringarooma River and all of its tributaries that enter the Ringarooma River upstream of its confluence with the Dorset River (hereafter the **Upper Ringarooma River Management Zone**);
- b) the Dorset River and New River and all of their tributaries (hereafter the **Dorset River Management Zone**);
- c) the Legerwood Rivulet and all of its tributaries (hereafter the **Legerwood Rivulet Management Zone**);
- d) the Cascade River and all of its tributaries (hereafter the **Cascade River Management Zone**);
- e) the Frome River and Weld River and all of their tributaries (hereafter the **Frome River Management Zone**);
- f) the Ringarooma River and all of its tributaries (with the exception of Legerwood Rivulet and the Cascade and Frome Rivers) that enter the Ringarooma River downstream of its confluence with the Dorset River but upstream of its confluence with the Wyniford River (hereafter the **Middle Ringarooma River Management Zone**);

- g) the Wyniford River and all of its tributaries (hereafter the **Wyniford River Management Zone**);
- h) the Ringarooma River and all of its tributaries that enter the Ringarooma River downstream of its confluence with the Wyniford River (hereafter the **Lower Ringarooma Management Zone**).

Surface water resources within these management zones include, but are not limited to, the water resources listed in Appendix A.

1.8 Flow Measurement Reference Points

For the purposes of this Plan all surface water flow thresholds referred to relate to those as measured at the relevant stream flow gauging station located in this catchment (Appendix B).

1.9 Water Management Provisions

The water management provisions of this Plan (set out in Parts 3, 4, 5 and 6) provide a sound management system for the water resources of the Ringarooma River catchment, and a water regime that best gives effect to the objectives of this Plan.

The provisions are made in accordance with sections 14(2) and 14(3)(a), (b), (c), (d), (f) and (g) of the Act.

PART 2 VISION AND OBJECTIVES

2.1 Vision

The vision of this Plan is a sustainable, efficient and equitable management system for the water resources of the Ringarooma River catchment, which recognises and balances the needs of the environment with the water needs and aspirations of all water users and the general community.

2.2 Objectives

As required under section 14(2) of the Act, this Plan includes a set of objectives. In addition to the objectives of the Resource Management and Planning System of Tasmania and the objectives of the Act (Appendix C), the specific objectives of this Plan are listed below.

This Plan's objectives guide how freshwater resources are to be managed and allocated for consumptive and other use, and how the water needs of freshwater ecosystems are to be provided for.

2.2.1 Environmental Objectives

- a) Protect base flows to provide aquatic habitat during periods of low flow, and natural refuges for instream biotic communities during naturally dry periods.
- b) Maintain flow variability to support:
 - (i) instream, riparian and water-dependent floodplain ecosystems;
 - (ii) important ecological and geomorphic processes;
 - (iii) estuarine processes dependent on freshwater flow regimes;
 - (iv) replenishment of groundwater resources.

2.2.2 Water Usage and Development Objectives

- a) Provide for the allocation of surface water at different levels of reliability and provide a clear hierarchy of access to water for commercial use.
- b) Provide certain access to water for stock and domestic use, town water supplies and commercial use by clearly specifying the rules under which water can be taken.

PART 3 ADMINISTRATIVE PROVISIONS

3.1 Plan Administration

The Minister will be responsible for the administration and implementation of this Plan.

3.2 Water Access Entitlements, Dam and Well Works Permits

For the purposes of this Plan, water licensing and allocation and the permitting of dam and well works will be undertaken in accordance with Parts 6, 7 and 8 of the Act, and will be consistent with this Plan and with the *State Policy on Water Quality Management 1997*, or its equivalent.

3.2.1 Rights Under Part 5 of the Water Management Act

Surface water may be taken for stock and domestic purposes on riparian properties without a licence in accordance with Part 5 of the Act. The quantities of water which may be taken for stock and domestic purposes must be in accordance with the *Water Management Regulations 2009*, as amended from time to time.

An owner or occupier of land may take dispersed surface water from the land for any purpose without a licence under Part 5 of the Act, unless a water management plan provides that a licence is required.

An owner or occupier of land may also take groundwater from the land for any purpose without a licence under Part 5 of the Act, unless a water management plan provides that a licence is required, or an order has been made to appoint the area a groundwater area under section 124A of the Act, and the order also provides that groundwater may not be taken from that groundwater area without the authority of a licence.

3.2.2 Water Licences

Holders of water licences in this catchment will be responsible for complying with the terms and conditions as specified on their licences. Where necessary, existing water licences will be varied to be consistent with this Plan in accordance with section 69(2)(d) of the Act.

3.2.3 Transfers of Water Licences and Allocations

Water licences and allocations may be transferred either temporarily (limited period transfer) or permanently (absolute transfer).

For the purposes of sections 97(2)(b) and 98(1)(a) of the Act, transfers of water licences and allocations will be permitted, subject to meeting the requirements of Part 6 Division 4 of the Act. The Department will use the *Guiding Principles for Water Trading in Tasmania* (DPIWE 2004a), as amended from time to time, when assessing applications for transfers of water licences and water allocations under the Act.

3.2.4 Conveyance of Water

Water that has been taken in accordance with the Act may be conveyed via a watercourse for extraction downstream. Any conveyance of water via a watercourse will be subject to the granting of a Watercourse Authority under Part 6A of the Act, which may be subject to specific conditions.

3.2.5 Metering Requirements

The taking of water under Part 5 of the Act is not required to be metered at present. However, an Authorised Officer may, at their discretion, direct individuals to install a water meter to measure water extraction.

Commercial water users including owners of all instream dams in this catchment with a licence allowing the taking of water into the dam, will be required to install metering systems in accordance with relevant Departmental policies and standards. Water meter installations and reporting of water meter data must be undertaken and managed in accordance with the requirements of the Department.

3.2.6 Dam Works Permits

Dam works are to be undertaken only where a permit authorising those works has been issued under Part 8, Division 4 of the Act. Any works undertaken must be in accordance with the permit's terms and conditions.

A permit to construct a dam is required for all dams except those described in section 137 of the Act which include:

- a) a dam that is not on a watercourse and that holds less than one megalitre of water; or
- b) a dam constructed for the primary purpose of storing waste as defined in the Act (note that the construction of such dams may require authorisations under other legislation);
- c) a levee or bank that is constructed during a flood and removed entirely within four weeks of its construction.

In addition to a barrier across a watercourse, a 'dam' includes an excavation in a watercourse and a permanent flood levee, both of which require a permit under the Act.

3.2.7 Well Works Permits

Well works are to be undertaken only where a permit authorising those works has been issued under Part 7, Division 3 of the Act. Any works undertaken must be in accordance with the permit's terms and conditions.

3.3 Management of Connected Groundwater and Surface Water Resources

This Plan recognises the connectivity between surface water and groundwater. As at the date of this Plan's adoption, specific groundwater management action is not warranted due to the relatively low level of risk associated with limited extraction and use.

Any extraction of groundwater within this catchment must comply with relevant statutory instruments, as set out in Part 7 of the Act, and the Department's regulations and policies pertaining to groundwater abstraction, licensing and management.

The principal risks of unmanaged groundwater extraction are the potential to affect the reliability of surface water allocations, especially in summer, and impacts on water-dependent ecosystems and environmental values.

Levels of groundwater extraction will be monitored and, where necessary, management measures implemented commensurate with the level of risk posed.

PART 4 SURFACE WATER ALLOCATION

This Plan enables the allocation of water from the relevant surface water resources within specified limits, which have been set to best give effect to the objectives of the Act and the objectives of the Plan.

Allocation of surface water under this Plan takes into account the likely effects on rights under Part 5 of the Act, the relevant water access entitlements of existing users, freshwater ecosystem values identified through the Conservation of Freshwater Ecosystem Values Database, and Water Quality Objectives (where established), as determined under the *State Policy on Water Quality Management 1997* or its equivalent.

To ensure the achievement of this Plan's environmental objectives and maintain the reliability of existing water allocations, no further summer take allocations will be granted in this catchment, outside of those provided for in the process described in Part 6 of this Plan. There is, however, considerable scope for granting further winter take allocations.

The granting of new winter take allocations will be undertaken in accordance with Part 6 of the Act, and any relevant policies and guidelines in place at the relevant time. In granting a new winter take allocation, the Minister may determine that it is used only in accordance with conditions for the avoidance, minimisation or management of associated environmental risks (section 58 of the Act).

Any application for a water licence, new winter take allocation or transfer will be assessed, taking into consideration factors such as local hydrology and water availability, impacts on existing water users and freshwater ecosystem values as they relate to the proposed extraction point. The approval of new winter take allocations or transfers must also be consistent with this Plan's catchment and subcatchment allocation limits.

4.1 Surety of Allocations

Where the Minister considers it to be appropriate, a water licence may specify the surety with which a water allocation attached to that licence can be expected to be available for taking (section 56(1)(c) of the Act).

Surety levels indicate the relative priority of an entitlement to take water when supply of water is limited. Surety levels are also used to indicate the reliability of different allocation types, and are listed in descending order of priority below.

- Surety Level 1* Rights under Part 5 of the Act for the taking of water for domestic purposes, public health purposes and consumption by livestock or firefighting. Owners and occupiers of land may take dispersed surface water and groundwater from the land for any purpose. The taking of water under Part 5 of the Act does not require a water licence. In some areas, allocations have been granted under Part 6 of the Act for essential town water supplies at Surety Level 1. The volume of Surety Level 1 allocations in this catchment is 299 ML.
- Surety Level 2* Water required to sustain ecosystems dependent on the water resource.
- Surety Level 3* Water access entitlements replacing Prescriptive Rights granted under previous Acts. There are no Surety Level 3 entitlements in this catchment.
- Surety Level 4* Water access entitlements of special licensees such as Hydro Tasmania (under Part 6, Division 6 of the Act). There are no Surety Level 4 entitlements in this catchment.
- Surety Level 5* Water access entitlements under Part 6 of the Act for the taking of water for commercial purposes and non-essential town water supplies, by either direct abstraction or into storage.

Surety Level 6 Water access entitlements under Part 6 of the Act for the taking of water for commercial purposes at a lower level of reliability than Surety Level 5.

4.2 Take Period of Allocations

Under this Plan the take period for all summer take allocations (previously known as direct take allocations) is 1 December to 30 April inclusive. The take period for all winter take allocations (previously known as storage allocations) is 1 May to 30 November inclusive.

Where necessary, water licences will be varied under section 69(2)(d) of the Act if the take period specified with respect to water allocations endorsed on those licences is inconsistent with the periods specified above.

4.3 Surface Water Allocation Limits

Surface water allocation limits identify the volumes of water available for allocation in this catchment, consistent with giving effect to the objectives of this Plan.

4.3.1 Surface Water Yield

The surface water yield of this catchment for each of the summer take and winter take periods has been determined using a hydrological model, which utilises rainfall, evaporation and estimated infiltration data. Yields at different levels of reliability have been determined at the catchment and each of the subcatchment outlets over a 39 year period (1970 to 2009), and are set out in Tables 1 and 2.

The Ringarooma River catchment has a median annual yield of 392,126 ML and an average annual yield of 414,378 ML (based on data from 1970 to 2009).

Table 1 Surface water yield for the summer take period (1 December to 30 April inclusive) for the Ringarooma River catchment (at the subcatchment outlet).

Management Zone	Yield (ML)	
	80% Reliability ¹	50% Reliability (Median Yield) ²
Upper Ringarooma River	6,415	10,535
Dorset River	5,564	9,485
Legerwood Rivulet	2,329	3,532
Cascade River	1,443	2,124
Frome River	3,063	4,591
Middle Ringarooma River	24,497	36,651
Wyniford River	2,331	3,469
Lower Ringarooma River	33,842 ³	49,558 ³

¹ Yield at 80% reliability is the volume of water expected to occur 8 years in 10.

² Yield at 50% reliability is the volume of water expected to occur 5 years in 10.

³ Indicates total yield of the Ringarooma River catchment.

Table 2 Surface water yield for the winter take period (1 May to 30 November inclusive) for the Ringarooma River catchment (at the subcatchment outlet).

Management Zone	Yield (ML)	
	80% Reliability ⁴	50% Reliability (Median Yield) ⁵
Upper Ringarooma River	70,512	86,081
Dorset River	50,410	67,392
Legerwood Rivulet	20,163	26,814
Cascade River	9,975	14,080
Frome River	20,604	30,173
Middle Ringarooma River	197,509	261,850
Wyniford River	14,357	22,685
Lower Ringarooma River	239,415 ⁶	331,249 ⁶

4.3.2 Summer Take Allocations

This Plan provides a pathway to establish an allocation limit for the summer take period.

The allocation limit for the summer take period will provide for existing allocations, as at the date of this Plan's adoption, as well as an additional volume of water, up to that identified in a 2004 water use survey as being taken and used. This survey identified that approximately 13,000 ML of water was historically taken over and above existing allocations.

Initially, and where necessary, fixed-term water allocations will be provided to licensees to enable them to take water up to the volume identified in their water use survey. The process to determine and grant ongoing water allocations, to cover the historic level of water extraction up to 2004 and provide an ongoing allocation limit, is set out in Part 6 of this Plan.

Table 3 sets out existing water allocations for the summer take period in the Ringarooma River catchment, the estimated historic level of water extraction up to 2004 (as identified in the water use survey), and estimated volumes of water that will be allocated under this Plan.

In relation to a water allocation limit, once allocations have been granted as described in the process set out in Part 6 of this Plan, the total volume of water allocated will become the allocation limit for the summer take period for this catchment.

⁴ Yield at 80% reliability is the volume of water expected to occur 8 years in 10.

⁵ Yield at 50% reliability is the volume of water expected to occur 5 years in 10.

⁶ Indicates total yield of the Ringarooma River catchment.

Table 3 Water allocations for the summer take period in the Ringarooma River catchment, together with estimated allocations required to cover the historic level of water extraction up to 2004, and estimated total volumes of water that will be allocated under this Plan (figures in brackets are volumes of water allocated for non-consumptive purposes).

Management Zone	Volume (ML)		
	Existing Allocations ⁷	Estimated Water to be Allocated ⁸	Estimated Total Allocations ⁹
Upper Ringarooma River	2,693	3,772	6,465
Dorset River	811	757	1,568
Legerwood Rivulet	692	2,455	3,147
Cascade River	12,068 (10,218)	0	12,068 (10,218)
Frome River	8,689 (7,984)	0	8,689 (7,984)
Middle Ringarooma River	1,807 (834)	641	2,448 (834)
Middle Ringarooma River (Cumulative) ¹⁰	26,760 (19,036)	7,625	34,385 (19,036)
Wyniford River	5,805 (5,254)	0	5,805 (5,254)
Lower Ringarooma River	220	5,479	5,699
Lower Ringarooma River (Cumulative) ¹⁰	8,495 ¹¹	13,104 ¹²	21,599 ¹³

⁷ As at the date of this Plan's adoption.

⁸ Estimated volume of ongoing water allocations required to cover the historic level of water extraction during the summer take period, up to 2004.

⁹ Estimated total volume of water to be allocated on an ongoing basis in the summer take period under this Plan; indicative allocation limits.

¹⁰ Indicates the cumulative volume of water allocated within, and upstream of, the relevant management zone (for zones which are fed by upstream zones).

¹¹ Indicates total volume of existing summer take allocations in the Ringarooma River catchment, as at the date of this Plan's adoption. Water allocated for non-consumptive purposes (24,290 ML) is returned to the Ringarooma River in the Lower Ringarooma River Management Zone, and the total volume of existing allocations is reduced by this amount to account for its return (refer Appendix D).

¹² Indicates total volume of water allocations required to cover the historic level of water extraction during the summer take period, up to 2004, in the Ringarooma River catchment.

¹³ Indicates maximum volume of water to be allocated in the summer take period in, and indicative allocation limit for, the Ringarooma River catchment. Water allocated for non-consumptive purposes (24,290 ML) is returned to the Ringarooma River in the Lower Ringarooma River Management Zone, and the volume of estimated total allocations is reduced by this amount to account for its return.

4.3.3 Winter Take Allocations

Allocation limits for the winter take period are set out in Table 4 (refer Part 8.2.1 of this Plan for an explanation of how these limits were derived). In this catchment, the total volume of water available as winter take allocations, at a level of reliability of 50% to 80% is 80,734 ML (62,367 ML at Surety Level 5 and 18,367 ML at Surety Level 6)¹⁴.

To account for climate change, allocation of water during the winter take period under this Plan will be reviewed in the event that the total volume of water allocated reaches 86% of the allocation limit for this catchment (refer Part 8.2.2 of this Plan).

The volume of existing winter take allocations in this catchment is 24,954 ML (21,286 ML at Surety Level 5 and 3,668 ML at Surety Level 6 as at the date of this Plan's adoption). On this basis, there is considerable scope for the granting of new winter take allocations (42,468 ML at Surety Level 5 and 15,357 ML at Surety Level 6).

Notwithstanding the relatively large volume of water available for further allocation during the winter take period in this catchment, it is evident that the surface water resources of the Cascade River, Frome River and Wyniford River Water Management Zones are fully allocated.

4.4 Opportunistic Access to Water

In addition to allocations granted at the various levels of surety, this Plan also provides licensees with opportunistic access to take very low reliability water, under section 90 of the Act. Under this access arrangement, water can only be taken when the relevant flow threshold is reached and notice has been provided (refer Part 5.2 of this Plan).

4.5 Authorisation to Take Water Under Section 90 of the Act

In addition to opportunistic access to water as provided for under Parts 4.4 and 5.2 of this Plan, permission may be given, in other circumstances, to a person to take water from a water resource for a period of up to six months, or to a class of persons to take water from a water resource in a particular way, in accordance with section 90 of the Act.

Permission will only be granted where the taking of water:

- (a) is consistent with this Plan;
- (b) does not adversely affect the taking of water by other persons with a right to take water from the water resource; and
- (c) does not cause material environmental harm or serious environmental harm.

4.6 Non-Consumptive Water Allocations

A large amount of water is allocated in this catchment for non-consumptive purposes (refer Appendix D). Licences endorsed with non-consumptive allocations will be varied under section 69(2)(d) of the Act to include conditions relating to the return of water to the river system (including location of return and volume returned), and to specify that a non-consumptive allocation, or part of a non-consumptive allocation, is not transferrable where a transfer would result in a change in purpose.

¹⁴ Reliability indicates the likelihood of the total volume specified being available during the winter take period. It should be noted that whilst the specified *volume* is likely to be available at a level of reliability of 50% to 80% over the take period, daily flow conditions and the application of access rules (cease to take and licence conditions) may limit the extent to which water is accessible on a daily basis.

Table 4 Allocation limits for the winter take period in the Ringarooma River catchment, indicating the volume of water available for allocation at the subcatchment and catchment outlets (figures in brackets are volumes of water allocated for non-consumptive purposes)¹⁵.

Management Zone	Surety Level	Volume (ML)			
		Allocation Limit (Reliability) ¹⁶		Existing Allocations ¹⁷	Available for Allocation ¹⁷
		80%	50%		
Upper Ringarooma River	5	20,275	-	11,488	8,787
	6	-	3,114	18	3,096
Dorset River	5	13,239	-	469	12,770
	6	-	3,396	450	2,946
Legerwood Rivulet	5	5,602	-	1,752	3,850
	6	-	1,330	227	1,103
Cascade River	5	2,237	-	15,932 (14,482)	0
	6	-	821	2,000	0
Frome River	5	5,679	-	11,515 (10,143)	0
	6	-	1,914	1,173 (1,173)	0 ¹⁸
Middle Ringarooma River	5	-	-	1,548 (1,182)	-
	6	-	-	153	-
Middle Ringarooma River (Cumulative) ¹⁹	5	54,251	-	42,704 (25,807)	11,547
	6	-	13,870	4,021 (1,173)	9,849
Wyniford River	5	3,660	-	7,958 (6,449)	0
	6	-	1,666	997 (997)	0 ¹⁸
Lower Ringarooma River	5	-	-	3,240	-
	6	-	-	820	-
Lower Ringarooma River (Cumulative) ¹⁹	5	62,367 ²⁰	-	21,286 ²¹	41,081 ²²
	6	-	18,367 ²⁰	3,668 ²¹	14,699 ²²

¹⁵ Water availability at a local scale is dependent on location in the catchment.

¹⁶ Whilst these allocation limits allow water to be allocated up to the relevant volume within an individual management zone, the sum total of allocations across these zones must be within the allocation limit for the Ringarooma River catchment (80,734 ML).

¹⁷ As at the date of this Plan's adoption.

¹⁸ Whilst no water has been allocated at Surety Level 6 in the Frome and Wyniford River Management Zones, there is no additional water available for allocation as the volume of Surety Level 5 allocations exceeds the allocation limit for these zones.

¹⁹ Indicates the cumulative allocation limit, and cumulative volume of water allocated within, and upstream of, the relevant management zone (for zones which are fed by upstream zones).

²⁰ Indicates total volume of water available for allocation in the winter take period in the Ringarooma River catchment.

²¹ Indicates total volume of existing winter take allocations in the Ringarooma River catchment, as at the date of this Plan's adoption. Water allocated for non-consumptive purposes (34,426 ML) is returned to the Ringarooma River in the Lower Ringarooma River Management Zone, and the total volume of existing allocations is reduced by this amount to account for its return (refer Appendix D).

²² Indicates total volume of water available for additional allocation in the winter take period in the Ringarooma River catchment, as at the date of this Plan's adoption.

PART 5 SURFACE WATER ACCESS RULES

5.1 Restriction Management

In accordance with Part 6, Division 3 of the Act, the taking of water from a watercourse in this catchment will be restricted or prohibited in the event of there being inadequate water. In such instances, the restriction or prohibition of the taking of water will be undertaken in observance of the surety level of water allocations, in accordance with section 94 of the Act.

In this catchment, the restriction or prohibition of the taking of water from a watercourse will be undertaken through the administration of a cease to take provision, and an associated staged management regime.

5.1.1 Cease to Take Provision

The cease to take provision ensures the preservation of base flows up to a minimum level for environmental purposes and the provision of domestic and stock watering supplies. This is achieved by setting a flow threshold, such that when river flow drops to this threshold, the taking of water from a watercourse by licence holders is prohibited (with the exception of licence holders with Surety Level 1 allocations). It should be noted that during extended dry periods, stream flows may naturally fall below the cease to take threshold.

In this catchment, subject to Part 5.1.3 of this Plan, the taking of water from a watercourse, other than for stock and domestic purposes through rights under Part 5 of the Act, and under Surety Level 1 allocations, will not be permitted when the measured flow drops to the thresholds set out in Table 5.

Table 5 Monthly cease to take thresholds (ML/day) for the Ringarooma River catchment, as measured at the stream flow gauging station on the Ringarooma River upstream of the Moorina Road bridge (Site No. 30.2).

	January	February	March	April	May	June
Cease to Take Threshold (ML/Day)	60 ²³	60 ²³	40	62	109	267
	July	August	September	October	November	December
Cease to Take Threshold (ML/Day)	400 ^{23, 24}	400 ²³	400 ²³	297	152	77

²³ The cease to take flow threshold for January and February under this Plan is 60 ML/day, and in July, August and September it is 400 ML/day. Scientifically recommended flow thresholds are 62 ML/day for January, 59 ML/day for February, 350-400 ML/day for July, 389 ML/day for August and 410 ML/day for September. The thresholds of 60 ML/day (January and February) and 400 ML/day (July, August and September) have been used to simplify the management regime under this Plan.

²⁴ The scientifically recommended flow threshold for July is 526 ML/day, based on monthly flow data. Due to some very large average monthly flows, the July value corresponds to an 85th percentile exceedance flow (based on a daily time step), compared with a 99-95th percentile exceedance flow for all other months. Consequently, to overcome a statistical issue, the 97th to 94th percentile exceedance flows (based on a daily time step) have been used, equating to 350 to 400 ML/day.

Whenever the cease to take provision is in effect (1 May to 30 November inclusive), owners of an instream dam are required to ensure that its outlet is operated to pass all inflow entering the storage. If the outlet is unable to pass all flows entering the storage then it must be operated at maximum capacity until such time as inflows and outflows are equal, or the cease to take provision no longer applies.

5.1.2 Water Sharing Arrangements and Implementation of Restrictions

In this catchment, water sharing and restriction management during the summer take period will be undertaken in accordance with a staged management regime (Table 6).

Whenever flow drops to within 25 ML/day of the cease to take threshold, an Authorised Officer will notify holders of water licences that water sharing arrangements should be implemented (Stage 1).

Whenever flow drops to within 15 ML/day of the cease to take threshold, an Authorised Officer will undertake active management with water licence holders, as necessary, to implement water sharing arrangements (Stage 2). This may include issuing directions to water licence holders to take action in relation to the taking of water to support water sharing arrangements.

The aim of water sharing arrangements is to provide a flexible approach that maximises the opportunity to take water as it becomes limited, and in such a way as to delay the implementation of restrictions for as long as possible. It is intended that these arrangements will largely be implemented through the agreement of licensees working together, with support provided by an Authorised Officer.

Whenever flow drops to the cease to take threshold, an Authorised Officer will implement restriction procedures (refer Part 5.1.3 and Schedule 1 of this Plan).

Table 6 Water sharing and restriction stages for the taking of water during the summer take period in the Ringarooma River catchment, as measured at the stream flow gauging station on the Ringarooma River upstream of the Moorina Road bridge (Site No. 30.2).

	Stage 1	Stage 2	Stage 3²⁵	Lower Bound²⁶
December	102	92	77	62
January	85	75	60	45
February	85	75	60	45
March	65	55	40	40 ²⁷
April	87	77	62	47

Stage 1 Notification that water sharing arrangements should be implemented.

Stage 2 Active management by an Authorised Officer with water licence holders, as necessary, to implement water sharing arrangements.

Stage 3 Commencement of a cease to take period and implementation of restriction procedures.

²⁵ Cease to take flow thresholds.

²⁶ Lower bound means the absolute minimum level of flow at which restrictions on the taking of water are to be implemented.

²⁷ There is no lower bound in effect for March given the cease to take threshold is 40 ML/day.

To support the implementation of these arrangements, a review will be undertaken at the end of each irrigation season where they have been utilised to assess their effectiveness, and identify whether improvements can be made.

The Department will also support licensees to establish water user groups to provide advice on implementing this Plan, in particular, low flow and restriction management, and reviewing of these arrangements. It is envisaged that these groups would also set out agreements on the sharing of water at times when it becomes limited.

5.1.3 Restriction Procedures

Restrictions on the taking of water have effect only where a notice has been issued under section 92 of the Act. Schedule 1 of this Plan sets out procedures relating to the implementation of restrictions and the issuing of notices.

An Authorised Officer has some flexibility on the implementation of restrictions. For example, the issuing of a notice under section 92 of the Act, prohibiting the taking of water, may be withheld if, at the time river flow drops to the cease to take threshold, significant rainfall is forecast in the immediate future (refer Schedule 1 of this Plan).

Notwithstanding the cease to take provision and staged management regime, an Authorised Officer may, in accordance with Part 6, Division 3 of the Act, apply restrictions on, or prohibit the taking of water from, any watercourse in this catchment at any time, if the rate at which water is taken is such that any of the following circumstances occur:

- a) the quantity of water available can no longer meet demand;
- b) the quality of water is adversely affected, or is likely to be adversely affected;
- c) another watercourse that depends on water from the first-mentioned watercourse is seriously affected.

Restrictions on the taking of water may also be applied if the rate at which, or the manner in which, water is taken from a water resource is causing, or is likely to cause, damage to ecosystems that depend on water from the water resource.

5.2 Rules for Opportunistic Access to Water

Under this Plan, licensees will be permitted to take water from a watercourse during periods of very high flow once the specific threshold flow has been reached and notification has been provided by an Authorised Officer. All water taken under opportunistic access must be metered.

The threshold flow for opportunistic access to water is 2,400 ML/day, as measured at the stream flow gauging station on the Ringarooma River upstream of the Moorina Road bridge.

Once this threshold flow has been reached, authorisation will be provided to licensees to take water under section 90 of the Act. Licensees will be able to take water until flow falls below 2,400 ML/day.

Flow in the Ringarooma River at the stream flow gauging station upstream of the Moorina Road bridge has exceeded 2,400 ML/day for approximately 5% of the time, or approximately 19 days per year, since 1978. For guidance, the annual volume of water potentially available, based on the historic record between 1978 and 2009, is set out in Table 7.

The information set out in Table 7 is based on flows at the stream flow gauging station on the Ringarooma River upstream of the Moorina Road bridge. This gives an appraisal of the annual volumes of water potentially available on a whole-of-catchment scale. Consideration needs to be given to the availability of this water at any specific location, particularly if access is sought from tributary flows.

Table 7 Volumes of water potentially available under opportunistic access in the Ringarooma River catchment.

	Estimated Annual Volume of Water Potentially Available (ML) ²⁸	Estimated Daily Volume of Water Potentially Available (ML) ²⁹	Likely Availability of Opportunistic Access (days/year) ³⁰
80% of years	4,621	838	7
60% of years	13,465	1,182	11
50% of years	15,363	1,602	13
20% of years	43,638	2,103	19
10% of years	47,134	2,492	22

It should be noted that the information set out in Table 7 is for guidance purposes only, and that in some years there may be very little or no water available under opportunistic access. Between 1978 and 2009, the average volume of water that would have been available is estimated to be 24,487 ML per annum.

5.3 Management of Inflows and Outflows from Dams

Notwithstanding the other provisions of this Plan, owners of instream dams must comply with any specific licence conditions in regard to the passing of inflows.

²⁸ Estimated annual volume of water available above the threshold (based on the level of daily flow exceeded 5% of the time at Moorina).

²⁹ Estimated daily volume of water available above the threshold (based on the level of daily flow exceeded 5% of the time at Moorina).

³⁰ Estimated number of days on which flow exceeds 2,400 ML/day at Moorina.

PART 6 WATER ALLOCATION DURING THE SUMMER TAKE PERIOD

This Plan provides a pathway to provide for allocation of water during the summer take period, which recognises the historic level of water extraction (up to 2004) in this catchment, and ensures that the water needs of the environment are properly considered.

This Plan does this through the following mechanisms:

- (a) provision of fixed-term water allocations at Surety Level 6;
- (b) a transition period during which ongoing allocations are to be determined;
- (c) provision of an ongoing allocation limit;
- (d) robust water access rules;
- (e) adaptive management.

These mechanisms will be used together to provide legal entitlements to water to cover the historic level of water extraction identified in the 2004 water use survey, ensure the ongoing sustainability of that level of extraction, and preserve the hierarchy of water allocations.

6.1 Water Allocation

6.1.1 Water Allocations at Surety Level 6

This Plan will provide a five-year transition period (from the date that this Plan takes effect) during which a fixed-term water allocation will be provided to licensees, where necessary, to enable them to continue to take water up to the volume identified in their 2004 water use survey. The fixed-term allocation will cover only the volume of water identified in the 2004 survey that is taken over and above licensed allocations.

In order to secure allocations on an ongoing basis (post the five year transition period), licensees will be required to fit meters and establish a record of extraction. As a minimum, two years of meter data will be required before an ongoing allocation will be granted.

At the end of the transition period, ongoing allocations at Surety Level 6 will be granted according to meter records, covering the volume of water that is taken over and above licensed allocations, and not in excess of the volume identified in individual 2004 water use surveys. Hence, ongoing allocations at Surety Level 6 with a maximum volume of 13,104 ML will be granted.

In the event that meter records indicate that less than 13,104 ML is taken, and hence a lower volume is allocated at Surety Level 6, the difference will not then be available for general allocation.

6.1.2 Water Allocation Limit

This Plan will provide an allocation limit for the summer take period that enables historic water extraction, up to the level identified in the 2004 water use survey and verified through meter records, to be formally recognised. This provides an outcome consistent with that intended at the commencement of the allocation process in 2004.

Following the end of the transition period and the granting of ongoing allocations at Surety Level 6, the allocation limit for the summer take period will be set on an ongoing basis. The total volume of water allocated will become the allocation limit for this catchment. Having determined the allocation limit in accordance with Part 6 of this Plan, the Minister will then publish a notice in the *Gazette* to that effect, and amend the Plan under section 34(5)(b) of the Act by including a Schedule showing the allocation limit and volumes of water allocated in each management zone.

6.2 Water Access Rules

This Plan provides robust water access rules, as set out in Part 5 of the Plan, to manage the taking of water on a daily basis during the summer take period. The cease to take provision under this Plan adopts the scientifically recommended monthly flow thresholds for restriction management, as well as the scientifically recommended flow threshold for opportunistic access to water. Furthermore, this Plan provides a staged management regime to ensure a fair and orderly transition from no restrictions, through water sharing arrangements to full restrictions, depending on flow conditions.

These rules will assist in mitigating any impacts on river environmental values as well as ensuring that the reliability of higher surety entitlements is fully protected.

6.3 Meters

Under this Plan, meters will be required to establish a record of extraction and enable the granting of ongoing water allocations at Surety Level 6 during the summer take period.

A minimum of two years of meter data will be required prior to the granting of ongoing allocations.

6.4 Adaptive Management

An adaptive management approach will be employed under this Plan to ensure the sustainability of the level of water extraction provided for.

The monitoring of various river health parameters will enable two key outcomes:

- (a) confirmation that the taking of water is not harming the environment prior to granting ongoing water allocations at Surety Level 6;
- (b) in the event that significant deterioration in river health or adverse impacts on environmental values, attributable to water extraction, are detected, this Plan will be reviewed.

6.4.1 Monitoring

A monitoring plan will be developed and implemented during the transition period. This monitoring will be focused specifically on determining whether there has been a decline in the health of the river during the transition period, attributable to water extraction.

Whilst the monitoring plan will relate to the broader monitoring focusing on the effectiveness of the provisions of this Plan in achieving its objectives, it should be recognised separately and as applicable only during the transition period.

6.5 Implementation

The process to assess meter records and determine ongoing allocations will be provided under a Ministerial Policy, to be developed in consultation with licence holders in the area of this Plan.

The Policy will consider the following:

- (a) use of maximum and/or average volumes of water taken as the basis for determining ongoing allocations;
- (b) establishment of a threshold, such that if reached, the full 2004 survey volume will be recognised (for example, if 80% of a survey volume is recorded by a meter as being taken, the full survey volume will be recognised);
- (c) provisions for accounting for rainfall and cropping areas/crop types;
- (d) provisions for dealing with transfers (land and water) that have occurred since 2004.

Once the Policy has been developed, the Minister will publish a notice in the *Gazette* to that effect.

PART 7 MONITORING AND REPORTING

Information relating to the effectiveness of this Plan's water management provisions in achieving its environmental, and water usage and development objectives, will be collected and reported.

The basis of measuring this Plan's effectiveness in achieving its objectives will be to analyse stream flow gauging and water extraction and management information to determine whether this Plan's provisions were properly implemented in a reporting period, and if as a result of implementing those provisions, the intended water regime and specific river flow conditions were achieved with respect to environmental and water access outcomes.

7.1 Monitoring

7.1.1 Stream Flow Monitoring

River height and stream flow will be recorded at the stream flow gauging stations located within this catchment (refer Appendix B). These data will be made available on the Department's Water Information System Tasmania (WIST) website.

7.1.2 Groundwater Monitoring

Groundwater levels will be recorded at the groundwater monitoring bores located within this catchment (refer Appendix B). These data will be made available on the Department's WIST website.

7.1.3 Surface Water Allocations

Changes to the number and total volume of licensed surface water allocations will be recorded. This information will be used to ensure that the total volume of water allocated in this catchment is not in excess of the limits in Part 4 of this Plan. Water licence information is available on the Department's WIST website.

7.1.4 Installation of Water Meters

Records of water meters installed in this catchment will be maintained.

7.1.5 Water Extraction

Licensees will be required to record and report water meter data in accordance with the requirements of the Department.

7.1.6 Transfers of Water Licences and Allocations

Transfers of water licences and allocations in this catchment and any water conveyed under a Watercourse Authority will be recorded.

7.1.7 Restriction Management

The Department will maintain records of, and monitor compliance with, any water restrictions within this catchment.

7.1.8 River Health and Environmental Monitoring

Additional surveillance monitoring information relating to the environment may be drawn upon, where appropriate, to determine the effectiveness of the provisions of this Plan in achieving its objectives. It should be noted that the collection and reporting of this type of information will be dependent on Departmental resources and programs as they are implemented from time to time.

Where available, this type of information will provide an overall appraisal of the condition of this catchment's water resources and freshwater ecosystems. Any trends in this information will provide an indication of the sum total of all management actions in this catchment, and hence the information is limited in the extent to which it can be used to directly assess the performance of this Plan.

Under various programs, information may be collected relating to biological health, water quality and in-stream habitat condition at selected sites in this catchment.

7.2 Reporting

The Department will report annually on the effectiveness of this Plan's water management provisions in achieving its environmental and water usage and development objectives.

PART 8 STATUTORY REQUIREMENTS UNDER SECTIONS 14 AND 15 OF THE *WATER MANAGEMENT ACT 1999*

Part 8 of this Plan provides details of the statutory requirements, as set out under Part 4 of the Act, that need to be addressed during the development of this Plan.

A Statement of the Objectives of the Plan, Including the Environmental Objectives (section 14(2)(a) of the Act) is provided in Part 2 of this Plan.

8.1 A Description of the Water Regime that Best Gives Effect to the Environmental Objectives and Other Relevant Objectives of the Plan (Section 14(2)(b))

The water regime that best gives effect to the environmental and other relevant objectives of this Plan is one that represents an appropriate balance between providing water to maintain environmental values and providing water for commercial purposes.

Based on the premise that the natural flow regime provides the best guide to the flow requirements of the entire aquatic ecosystem, the water regime that best gives effect to the environmental objectives is one in which the key components of the natural flow regime are maintained. For the Ringarooma River, the key components of the natural flow regime that are relevant to identified freshwater ecosystem values, and the freshwater ecosystem more broadly include:

- a) base flows that sustain ecosystem health and populations of aquatic biota, and provide refuge during periods of low flow;
- b) moderate flows (freshes) and high flows that provide reproductive cues and dispersal mechanisms for some biota, and are important for transporting material (organic matter, sediments and nutrients) downstream as well as maintaining geomorphic processes that shape the river channel;
- c) flood flows that support riparian zones, floodplains and wetlands, maintain connectivity and exchange of resources between the river and its floodplain and recharge local groundwater aquifers;
- d) the natural pattern of flow variability, including seasonal distribution, frequency and duration of flows, and rates of rise and fall;
- e) groundwater flows and levels critical to surface water flow;
- f) freshwater inputs to support estuarine processes and habitats.

Broadly, the flow regime of the Ringarooma River retains the key characteristics of the natural flow regime. As a result, this regime provides the overall water needed to give effect to the environmental objectives of this Plan.

Notwithstanding this, as a key objective of this Plan is to provide secure and certain access to water for commercial purposes, the water regime provided by this Plan, whilst retaining much of the natural pattern of flow variability, is one in which there is some modification of natural flows reflecting the extraction of water.

8.2 An Assessment of the Ability of that Water Regime to Achieve the Environmental Objectives and Other Relevant Objectives of the Plan (Section 14(2)(c))

Under this Plan, the management of water resources in the Ringarooma River catchment provides:

- a) secure access to water for stock and domestic and town water supplies;
- b) a flow regime that meets the needs of aquatic ecosystems and maintains identified freshwater ecosystem values;
- c) secure and certain access to water for irrigation and other commercial purposes.

These outcomes are achieved through the provision of a water regime that best gives effect to this Plan's environmental, and water usage and development objectives.

This Plan includes management provisions that ensure a water regime that is able to meet its objectives. The main provisions of this Plan are linked to either the allocation of water, or the access rules that govern the taking of allocated water on a daily basis.

8.2.1 Environmental Objectives

- a) *Protect base flows to provide aquatic habitat during periods of low flow, and natural refuges for instream biotic communities during naturally dry periods.*
- b) *Maintain flow variability to support:*
 - (i) *instream, riparian and water-dependent floodplain ecosystems;*
 - (ii) *important ecological and geomorphic processes;*
 - (iii) *estuarine processes dependent on freshwater flow regimes;*
 - (iv) *replenishment of groundwater resources.*

A key consideration in managing the water resources of the Ringarooma River catchment is the provision of a water regime that meets the needs of its freshwater ecosystems.

In general, unregulated rivers and streams in Tasmania are managed to provide a flow regime that meets the needs of the entire aquatic ecosystem, rather than discrete elements of the ecosystem such as a particular fish species. The natural flow regime is taken as the best guide to the flow requirements of the entire aquatic ecosystem, and hence the management of flow is based on maintaining or mimicking key components of the natural flow regime.

The Tasmanian Environmental Flows Framework (TEFF), the main premise of which is that the ecology of a river system (and the environmental values it contains) has evolved in response to the pattern of the natural flow regime, provides a 'holistic' approach to assessing the environmental water requirements of rivers in Tasmania (DPIPWE 2010a; refer Appendix E). This framework underpins the scientific assessments of environmental water requirements used in the development of this Plan.

Whilst broadly aiming to meet the flow requirements of the entire ecosystem, flow management and assessment of environmental water requirements is also undertaken utilising information on specific freshwater ecosystem values, and integrating the flow requirements of these values within the broader ecosystem context.

The priority freshwater ecosystem values in the Ringarooma River catchment, as identified through the Conservation of Freshwater Ecosystem Values Database and field surveys, consist of fish assemblages, various riparian plant assemblages, and vulnerable, rare or endangered plant and animal species (DPIWE 2004b). In particular, there is a cluster of significant values associated with the Floodplain Lower Ringarooma River Ramsar Wetland

site. Within this area there are numerous ecosystem values that make this site important. They include rare and threatened species of aquatic fauna such as the Australian grayling (*Prototroctes maraena*), dwarf galaxias (*Galaxiella pusilla*) and green and gold frog (*Litoria raniformis*); and freshwater-dependent flora such as purple loosestrife (*Lythrum salicaria*), erect marshflower (*Villarsia exaltata*) and bristly knotweed (*Persicaria subsessili*). The wetland area also provides important habitat for water birds.

In addition to the Floodplain Lower Ringarooma River Ramsar Wetland site, there are a number of other important wetlands located on the lower Ringarooma River floodplain. The River also drains into the Boobyalla Inlet, which is part of the Floodplain Lower Ringarooma River Ramsar Wetland site, and the importance of the flow regime in regard to the estuary has been considered.

Currently, the flow regime in the Ringarooma River catchment is close to natural. The focus of this Plan in maintaining freshwater ecosystem values is therefore on preserving the key characteristics of the natural flow regime into the future. The flow regime provided under this Plan is one in which the overall natural character of the seasonal distribution, duration, magnitude, and frequency of different flows will be retained. By retaining this natural pattern of variability, the flow regime will continue to play its role in regulating the physical and biological processes in the Ringarooma River, and hence broadly meet the water needs of freshwater ecosystem values at a low level of risk.

The management provisions in this Plan have been formulated on the basis of identifying which particular flow components are likely to be at risk, in terms of their capacity to support particular hydrological or ecological functions, through water extraction (DPIW 2008), and providing measures to ensure that these key components of the natural flow regime are maintained into the future within the scope of water development possible under this Plan.

Surface water allocation limits and access rules are the key measures utilised by this Plan to provide a water regime that gives effect to its environmental objectives.

Water Allocation Limits

Limiting the volume of water available for allocation to a particular level is an effective measure in ensuring that the water regime provided under this Plan retains the broad hydrological characteristics necessary to give effect to the Plan's environmental objectives. Generally, the approach used to determine the allocation limit for a river system is based on assessing the volume of water available at particular levels of reliability, taking into account environmental water needs.

Summer Take Period

An allocation limit for the summer take period would normally be determined on the basis of the volume of water available at a certain level of reliability, taking into account environmental water needs. Typically, a "rule of thumb" approach is used which aims to retain 80% of the median annual discharge. In establishing a sustainable balance for the Ringarooma River catchment, the determination of an allocation limit for the summer take period has departed from retention of 80% of the median annual discharge, based on specific circumstances of the water resource for which this Plan has been prepared, and its objectives.

In this instance, due to historic extraction of water from the Ringarooma River catchment, and with a large volume of water taken without proper legal entitlements in place, a different approach is being taken to provide an appropriate balance between consumptive water needs and environmental water needs. In this regard, the context is very important; the historic level of water extraction up to 2004 has been ongoing for a significant period of time, and there does not appear to be any evidence of a decline in the health of the Ringarooma River attributable to this level of water extraction.

Hence, this Plan sets out a pathway to establish an allocation limit for the summer take period, which will provide for existing allocations, as well as an additional volume of water to cover the historic level of water extraction up to 2004. A survey of water use across the Ringarooma River catchment, undertaken in 2004, identified that approximately 13,000 ML of water was historically taken over and above existing allocations.

The allocation limit under this Plan will provide for a volume of water, up to that identified in the 2004 water use survey as being taken and used, to be allocated on an ongoing basis, subject to meter records. The maximum volume of water that will be allocated in the summer take period is 21,599 ML. This volume represents 44% of the median yield for the summer take period (49,558 ML based on data from 1970 to 2009).

Notwithstanding that this is a relatively higher level of water allocation, the maximum volume of water that could be allocated under this Plan on an annual basis is 102,333 ML (21,599 ML in the summer take period and 80,734 ML in the winter take period). This volume represents 26% of the median annual discharge of the Ringarooma River (392,126 ML based on data from 1970 to 2009), and hence a minimum of 74% of the River's median annual discharge will be retained.

It must be emphasised that the level of water extraction provided for by this Plan in the summer take period reflects the historic level of water extraction up to 2004. Hence, the overall volume of water taken has been ongoing for a significant period of time, and there is no evidence that the health of the Ringarooma River is in decline as a result. Under this Plan, scientifically derived cease to take thresholds are provided (discussed further below), together with an adaptive management approach (refer Part 6 of this Plan). These measures will ensure that the taking of water in the summer take period continues to be sustainable.

Winter Take Period

For the winter take period, the approach to determining allocation limits is one in which water for the environment and stock and domestic use is "quarantined" from allocation. For this catchment, the allocation limit for surface water has been calculated using the following:

Winter take period: Surety Level 5 allocation limit = (A – B)

Surety Level 6 allocation limit = (C - A) x 0.2³¹

where:

A = yield at 80% reliability (based on historical flow and modelled data for the winter take period between 1970 and 2007);

B = the volume of water deemed necessary for stock and domestic use and for the basic ecological functions of the freshwater environment;

C = yield at 50% reliability (based on historical flow and modelled data for the winter take period between 1970 and 2007).

The method to calculate the volume of water deemed necessary for the environment and stock and domestic purposes (and hence that is not to be allocated) is twofold. Firstly, the volume of water deemed necessary for the environment and stock and domestic purposes is derived by adding the 20th percentile yield for each of the months in the winter take period (B in the equation set out above). Secondly, an 80% proportion of the volume of water derived by subtracting the yield at 80% reliability (A in the equation set out above) from the yield at 50% reliability (C in the equation set out above) is retained for the environment (hence, a 20% proportion of this volume is available for allocation). This is based on aiming

³¹ Limiting allocation to a 20% proportion of the yield is considered to provide a conservative "rule of thumb" approach.

to retain 80% of the median annual discharge, which is considered to be a reasonable “rule of thumb” that aims to meet the water needs of river ecosystems.

This Plan provides an overall water allocation limit for this catchment of 80,734 ML during the winter take period (62,367 ML at Surety Level 5 and 18,367 ML at Surety Level 6). This limit represents a relatively small proportion of the median yield of this catchment for the winter take period (24% of 331,249 ML, based on data from 1970 to 2009).

Water Regime

The water regime provided under this Plan retains much of the variability of the natural flow regime, and hence gives effect to the environmental objectives of this Plan. By specifying allocation limits that preserve a minimum of 74% of the median annual flow in the river system, and access rules that provide for the day to day management of water extractions, this Plan ensures that water extraction does not remove important parts of the flow regime.

As the overall allocation limits preserve the bulk of the river system’s median annual discharge, the general pattern and distribution of flows will largely be unimpacted. Whilst there will be some modification to the flow regime due to water extraction, this should be limited to specific classes of flows, such as those immediately above the cease to take thresholds during the summer take period.

Freshes and flows up to bank-full are important for an array of reasons, including their ability to distribute sediment, nutrients and organic material within the river channel, scour material built up during periods of low flow and maintain habitat, provide a dispersal mechanism for biota, and integrate material as food sources by inundating instream benches. These flows will largely be preserved into the future.

A significant characteristic of the Ringarooma River’s flow regime that supports its ecosystem values, and in particular the floodplain-wetland complex, is the occurrence of seasonal flooding that inundates the floodplain, replenishing the wetland systems and stimulating seasonal cycles in productivity.

With respect to flood flows, there is unlikely to be any significant impact on the magnitude and duration of floods, and rates of change of flow at these times due to water extraction. By preserving these features of the flow regime, all of the ecosystem processes they support (for example cues for fish migration, watering of riparian and floodplain flora, exchange of material between the river and its floodplain and geomorphological processes) should be maintained.

Bank-full and overbank flow events are also the main means by which sediment is transported through the river system and the geomorphic character of the river is maintained. The water regime provided by this Plan ensures that important sediment transport processes will continue into the future, maintaining the geomorphic character of the river and floodplain.

As one component of its environmental flow assessment, the Department undertook studies to examine the hydrology of the river and floodplain-wetland system, including the Floodplain Lower Ringarooma River Ramsar Wetland site (DPIW 2008). This work, which collected data on variations in surface water and groundwater levels in and around the floodplain wetland complex, showed that in some areas there is an intimate connection between the lower Ringarooma River and nearby wetlands, while in other parts of the floodplain, wetlands are more heavily reliant on local groundwater levels. The retention of flood events in the Ringarooma River will ensure ongoing, periodic floodplain inundation, and recharge of groundwater systems.

The water regime provided by this Plan is one in which the connectivity between surface water and groundwater is recognised. By retaining the key characteristics of the natural flow regime, particularly flood events, groundwater flows and levels critical to surface water flows should be maintained within the natural bounds of variability.

Any extraction of groundwater within this catchment must comply with relevant statutory instruments and the Department's regulations and policies pertaining to groundwater abstraction, licensing and management. At the date of this Plan's adoption, groundwater extraction is not considered to be significant enough to warrant the implementation of licensing. However, this may be reviewed over time should there be significant growth in the extraction of groundwater in this catchment.

Water Access Rules

Whilst a water allocation limit is an effective measure in preserving the overall hydrological character of a river system, daily access rules ensure that the effect of water extraction on any particular aspect of the flow regime is not harmful to the environment. Together with allocation limits, these rules ensure that key components of the flow regime are maintained to provide environmental and other public benefit outcomes.

Additionally, these access rules ensure that the rights of water users with higher surety water allocations are not impinged and that the taking of water is managed on an orderly and equitable basis.

The main water access provisions under this Plan, in relation to its environmental objectives, are the cease to take provision, and rules for taking water under opportunistic access.

These rules focus on the management of access to different parts of the flow regime (low flows and floods) to ensure a water regime that best meets the environmental objectives of this Plan.

The main impact of water extraction on Tasmanian river systems that are largely unregulated is on the low flow component of the flow regime, particularly during the summer take period as this is usually the time at which consumptive demands for water are highest. This impact can be a result of either direct extraction of water from a river for application to a crop, or the capture of stream flow in an instream dam.

In the Ringarooma River catchment, the greatest risk of departure from the natural flow regime is posed by the extraction of water during the summer take period. Hence, the cease to take provision mitigates the level of risk associated with extraction of water from low flows (refer Part 5.1 of this Plan).

This provision ensures the preservation of natural base flows by setting a flow threshold, such that, when stream flow drops to this threshold, and subject to the Restriction Procedures set out in Part 5.1.3 and Schedule 1 of this Plan, water extraction for commercial purposes is prohibited and instream dams are required to pass all inflows.

Application of this measure ensures that there is sufficient base flow to sustain ecosystem health and populations of aquatic biota, and that the frequency and duration of low, very low and cease to flow conditions are not artificially increased by water extraction to a level detrimental to the river ecosystem. Furthermore, this measure also ensures that water is available for stock and domestic purposes and essential town water supply (subject to natural flow conditions). It should be emphasised that under very dry conditions, stream flows may naturally fall below the cease to take threshold, and in some instances, streams may cease to flow altogether.

The cease to take thresholds set out in Part 5.1 of this Plan were derived through scientific assessment of the minimum flow requirements of aquatic ecosystems in the Ringarooma River catchment (DPIW 2008). These assessments determined, for each month, the daily flows required to maintain the median (or 50th percentile) available habitat.

Available habitat is a function of area inundated, flow velocity and substrate, and this can be determined for any level of flow. When the available habitat is calculated on a daily basis, for a given month, and then these calculations organised from smallest to largest, the median available habitat is the middle calculation. Accordingly, the level of flow that provides the

median available habitat in a month is then taken as the cease to take threshold for that month.

As the cease to take thresholds are specified on a monthly basis, the natural flow variability of the Ringarooma River's flow regime has been integrated in the calculation of the median available habitat for each month.

Base flows up to the cease to take thresholds are also considered sufficient to maintain an appropriate degree of connection between pools and wetted habitat in riffle areas.

As noted above, the implementation of restrictions is subject to the Restriction Procedures set out in Part 5.1.3 and Schedule 1 of this Plan. Whenever flow falls to the cease to take threshold, these procedures enable an Authorised Officer to defer a notice of restriction under section 92 of the Act, subject to specific criteria (Schedule 1).

This approach enables the scientifically recommended cease to take thresholds to be observed, while also providing flexibility in the implementation of restrictions taking into account social and economic factors. It also gives licensees the opportunity to manage their extraction and share water in the most efficient and effective manner at times when it becomes limited.

Whilst the implementation of restrictions may be deferred under this approach, a lower bound, or absolute minimum level of flow protection is provided. This level of protection is 15 ML below the cease to take threshold in each of the months during the summer take period, with the exception of March, where the cease to take threshold is also the absolute minimum level of low at which restrictions on the taking of water are to be implemented.

Whilst this Plan provides this approach, it must be recognised that the lower bound flow thresholds provide a significantly lower percentile of habitat availability than the cease to take thresholds. These lower bound flow thresholds represent extreme low flow conditions, providing 20th percentile or less habitat availability. For this reason, the cease to take threshold of 40 ML/day in March, which is a 95th percentile exceedance flow, is also the lower bound threshold for that month (as opposed to 25 ML/day).

In regard to flood flows, this Plan provides opportunistic access to flows exceeding 2,400 ML/day (as measured at the Moorina stream flow gauging station - refer Part 5.2 of this Plan). Flows of this magnitude correspond to the 5% exceedance flow (the level of flow exceeded 5% of the time), which is approximately 4,000 ML/day at Bells Bridge (in the lower catchment), and inundate large parts of the floodplain and its wetland systems.

This access is provided on the basis of scientific assessment of the high flow requirements of aquatic ecosystems in the Ringarooma River catchment. The opportunistic access rules will ensure that water taken from flood flows will not have a significant impact on the duration of environmentally important floods, or the rates of change in water levels during these events.

The management of inflows to, and outflows from, instream dams is also an important aspect in limiting the impact of water extraction on the hydrology of the river system. Passing flows below the cease to take threshold, as well as passing flows outside the winter take period, are effective management mechanisms, and where appropriate, additional measures will be provided through conditions on water licenses.

8.2.2 Water Usage and Development Objectives

- a) *Provide for the allocation of surface water at different levels of reliability and provide a clear hierarchy of access to water for commercial use.*

As discussed under Parts 4 and 8.2.1 of this Plan, in establishing a water regime that best gives effect to its objectives, the Plan provides water allocation limits for this catchment.

In relation to a water allocation limit for the summer take period, once ongoing allocations have been granted as described in the process set out in Part 6 of this Plan, the total volume of water allocated on an ongoing basis will become the allocation limit for the summer take period for this catchment. This limit will then reflect historic water extraction, up to the level identified in the 2004 water use survey and verified by meter records.

There is no scope for additional allocations during the summer take period, outside of the process set out in Part 6 of this Plan. Nevertheless, this Plan provides certainty to licensees as it provides for the historic level of water extraction up to 2004.

In the winter take period, the volume of water allocated as at the date of this Plan's adoption is 24,954 ML. Whilst the volume allocated in the Cascade, Frome and Wyniford River Management Zones exceeds the relevant limits, the overall volume of water allocated in this catchment is well below the overall allocation limit for the winter take period.

The water regime provided by this Plan presents considerable scope for the granting of new allocations during the winter take period, with a total volume of 55,780 ML of water available (41,081 ML at Surety Level 5 and 14,699 ML at Surety Level 6). Most significantly, these allocations are available at relatively high levels of reliability, a point that should not be under-emphasised given the risks posed to the reliability of summer take allocations due to the effects of drought and climate change.

To account for climate change, allocation of water during the winter take period under this Plan will be reviewed in the event that the total volume of water allocated reaches 86% of the allocation limit for this catchment. This provision is based on the results of the CSIRO Tasmanian Sustainable Yields project (Ling *et. al.* 2009), which indicate that run off from the Ringarooma River catchment is likely to decrease by 14% under the dry climate scenario (out to 2030).

By determining the volume of water available for allocation, this Plan provides water users with certainty, as the reliability of their allocations will not be eroded by continuing allocation. Additionally, certainty is provided by identifying how much water may be available for further allocation during the winter take period, and the level of reliability of that water.

It should be noted that whilst the allocation limits provided in this Plan identify the volumes of water that are available at different levels of reliability, any application for a new water allocation will be assessed in the context of existing water development in this catchment, taking into consideration factors such as local hydrology and water availability, and impacts on existing water users and the environment.

Under this Plan, a clear hierarchy of access is provided through different allocation surety levels. Water allocations during both the summer and winter take periods are at Surety Levels 5 and 6. This Plan sets out clear rules around which water can be taken under allocations at each surety level, ensuring orderly and equitable access to water for licence holders.

b) Provide certain access to water for stock and domestic use, town water supplies and commercial use by clearly specifying the rules under which water can be taken.

In establishing a water regime that best gives effect to its objectives, this Plan provides certain access to water for stock and domestic use, essential town water supplies and commercial use by clearly specifying the rules under which water can be taken.

Together, the application of surface water allocation limits and the cease to take provision ensure that water required to meet stock and domestic needs and essential town supplies is not allocated to other uses, and that natural base flows are maintained up to a sufficient level to meet these essential water needs.

It must be emphasised that in the event of extended dry periods, naturally occurring very low flow and cease to flow events may limit the availability of surface water for stock and domestic purposes.

The allocation limits and access rules specified within this Plan provide certainty of access to water for irrigation and other commercial purposes. Within the water regime provided under this Plan, water available for extraction at different levels of reliability is clearly specified, and the flow thresholds at which restrictions on the taking of water will be applied are set out.

The water restriction provisions of this Plan also provide some flexibility in implementation (as discussed above) and the establishment of water sharing arrangements between licensees provides scope for maximising the amount of water that may be able to be taken at times when it becomes limited. The aim of water sharing arrangements is to provide a flexible approach that maximises the opportunity to take water as it becomes limited, and in such a way as to delay the implementation of restrictions for as long as possible. It is intended that these arrangements will largely be implemented through the agreement of licensees working together, with support provided by an Authorised Officer.

As water becomes limited, notification will be given by an Authorised Officer to implement water sharing arrangements, and then active management will be undertaken as necessary, in partnership with licensees, to implement water sharing arrangements. This will enable licensees to potentially prolong the time before flows drop to the cease to take threshold.

Schedule 1 of this Plan sets out the criteria for any deferment of restrictions once a cease to take period commences. Whilst any deferment will be a decision of an Authorised Officer, the criteria provide clear guidance in relation to the making of that decision.

8.3 An Assessment of Likely Detrimental Effects of the Plan on the Quality of Water (Section 14(2)(d))

Under the *State Policy on Water Quality Management 1997*, Protected Environmental Values (PEVs) for surface waters have been identified for the Ringarooma River catchment (DPIWE 2005). PEVs are values or uses of the environment for which it has been determined that a given area of the environment should be protected, and form the basis of water quality management.

Water Quality Objectives (WQOs) for a specific body of water are the most stringent set of water quality guidelines which should be met to achieve all of the protected environmental values nominated for that body of water. As yet, WQOs have not been set for the Ringarooma River catchment.

This Plan is largely consistent with the *State Policy on Water Quality Management 1997*, in that it is not likely to prevent the achievement of the PEVs nominated for the Ringarooma River catchment, and nor is it likely to prevent the achievement of WQOs once they are established.

In providing a water regime that retains the key characteristics of the natural flow regime, and which will maintain key ecological and geomorphological processes, this Plan broadly provides for the maintenance of physical and chemical processes currently operating within the river system. In this context, it is unlikely that this Plan will prejudice the achievement of future WQOs associated with the protection of identified PEVs for the Ringarooma River catchment.

It is considered that the flow conditions that are most likely to lead to a reduction in water quality, for example, very low flow or cease to flow events, are not likely to occur with any greater frequency or duration as a result of the water regime provided by this Plan.

It is therefore concluded that this Plan is not likely to have any significant detrimental effects on water quality.

8.4 An Assessment of the Capacity of the Relevant Resources to Meet the Likely Demands for Water by Existing and Future Users (Section 15(a))

Under this Plan, the demand for water for stock and domestic purposes and town water supplies should be met within the capacity of the resource, notwithstanding naturally dry periods potentially limiting this supply at certain times.

In the Ringarooma River catchment, 299 ML of water is allocated at Surety Level 1 for essential town water supplies. This is an insignificant volume in comparison to this catchment's median annual yield, and hence it is likely that this water would be available most, if not all of the time, notwithstanding that limitations on water supply may occur during extreme dry periods.

In providing for allocations during the summer take period to cover the historic level of water extraction up to 2004, this Plan ensures that licensees will be able to take water on which their business have become dependent.

As discussed under Part 8.2.2 of this Plan, there is significant scope for the granting of new allocations, at relatively high levels of reliability, during the winter take period. High flows may also provide significant volumes of water, which may be taken under opportunistic access.

An assessment based on Land Capability Classes 1 to 5 within the Ringarooma River catchment indicates a potential maximum irrigation water demand of 71,027 ML annually, assuming an application rate of 2.5 ML per hectare per year. This indicates that there is scope to develop more land within this catchment, given that only 46,553 ML³² of water is allocated at the date of this Plan's adoption.

³² Includes 21,599 ML of water as allocated in the summer take period, which covers the historic level of water extraction up to 2004.

8.5 Likely Effects of the Plan on Existing and Future Users, Including Any Effects on Businesses Carried on by those Users (Section 15(b))

In considering the likely effects of this Plan on existing and future users, including any effects on businesses carried on by those users, it is important first to set the context for these considerations. This Plan sets out a management framework for the water resources of the Ringarooma River catchment, and hence any effects of the Plan must be considered strictly in relation to changes in access to water under this Plan, both in terms of the volume of water available and the way that water may be taken.

It must be emphasised that the benefits of this Plan extend to increased certainty and security for water dependent businesses, and the application of a fair and equitable framework to share the Ringarooma River catchment's water resources.

This Plan provides benefits by establishing limits for allocation at different levels of reliability; establishing a clear hierarchy of access to water for commercial and other uses; specifying access rules that ensure the taking of water is conducted in an orderly fashion; and providing for the opportunistic harvesting of water.

One of the key components of this Plan is the provision of water allocations in the summer take period to cover the historic level of water extraction up to 2004. This is a very significant, positive effect of this Plan for licensees. Granting of legal entitlements to the volume of water identified as being taken and used historically will provide certainty and security to farmers and other water users.

Notwithstanding the clear benefits of this Plan to water users, the Plan does introduce some changes to the rules under which water may be accessed. The introduction of a cease to take provision will mean that restrictions will be applied as specified in this Plan. Analysis of stream flow data in past years indicate that there is likely to be little effect on the taking of water under Surety Level 5 allocations during the summer take period.

Stream flow gauging information, as measured at Moorina, for the period 1978-2010 is shown at Appendix F. Flows dropped to the cease to take threshold in only five years over that period. It must be emphasised that the majority of water is taken above the stream flow gauging station, hence the records indicate that if water sharing arrangements had been implemented to share the water under Surety Level 6 allocations (had they been in place at the time), cease to take conditions would have been avoided in all years³³.

Overall, for the period 1978-2010, flows exceeded the monthly cease to take thresholds for the summer take period greater than 95% of the time, with the exception of February where flows exceeded the cease to take threshold 91% of the time.

Whilst the cease to take thresholds are higher than restriction arrangements in place prior to this Plan, stream gauging data indicate that flow is likely to fall to the cease to take thresholds on only very infrequent occasions. There will have to be sharing of water at times, during which the taking of water under Surety Level 6 allocations (which are provided under the draft Plan in recognition of historic water extraction) will have to be limited on a daily basis to ensure that flows remain above the cease to take thresholds. However, this impact should be able to be mitigated by efficient sharing arrangements including scheduling and other measures.

Over the 2000-01 to 2009-10 period, stream gauging data indicate that water sharing among holders of Surety Level 6 allocations (had they been in place at the time) would have been required for an extended period during the 2006-07 irrigation season. In 2002-03, water sharing would have been required for a briefer period, in the order of three to four weeks,

³³ Surety Level 6 allocations will be granted to cover the historic level of water extraction up to 2004, so whilst these allocations weren't in place at the time, historic taking of water was occurring.

whilst in 2008-09 a short period of sharing would have been required. Flows during 2006-07, 2008-09 and 2002-03 were the lowest, second lowest and fifth lowest since 1978.

With water sharing arrangements in place, at no time during this period, including during the severe drought conditions of 2007 and 2008, would any restrictions have been applied on the taking of water under Surety Level 5 allocations.

It is also important to recognise that the staged management regime is an essential element in preserving the hierarchy of water allocations. Critically, the taking of water under Surety Level 6 allocations will have no effect on the taking of water under Surety Level 5 allocations, and hence investments underpinned by Surety Level 5 allocations will not be eroded.

Notwithstanding that the taking of water under Surety Level 6 allocations may be limited on some occasions under water sharing arrangements, it must be recognised that with the granting of legal entitlements to the taking of this water, there comes the requirement to properly manage access.

The restriction procedures provided by this Plan (Part 5.1.3 and Schedule 1) enable the deferment of restrictions based on certain criteria, such as crop vulnerability factors, antecedent conditions including river flow and recent rainfall, whether any significant rainfall is forecast for the area, and the volume of water being taken and the demand for water. Based on a consideration of these matters, restrictions may be deferred by an Authorised Officer if they would otherwise have a severe impact on licensees relying on taking water.

It should be emphasised that the cease to take provision and the application of a staged management regime applies only to water licence holders taking water. These provisions will have no effect on the taking of water from surface water resources under Part 5 of the Act for stock and domestic purposes, nor on the taking of water for essential town water supplies under Surety Level 1 allocations.

PART 9 INTERPRETATION AND DEFINITIONS

Words used in this Plan have their ordinary meanings as defined in the Macquarie Dictionary unless otherwise defined in the Plan or the *Water Management Act 1999*. A reference in this Plan to any legislation is to be taken as a reference to such legislation as it may be amended from time to time.

9.1 Statutory Definitions

Authorised Officer means an Authorised Officer appointed under section 237.

dam means a permanent or temporary barrier or structure that stores, holds back or impedes the flow of water and includes –

- a) any spillway or similar works for passing water around or over the barrier or structure; and
- b) a pipe or other works for passing water through or over the barrier or structure; and
- c) water stored or held back by the barrier or structure and the area covered by that water; and
- d) an artificial depression or hole excavated in a watercourse that holds water or impedes the flow of water; and
- e) an artificial levee or bank that holds back or diverts water in a watercourse –

but does not include –

- a) associated works and canals used in, or in relation to, the generation of electricity; or
- b) a tank or reservoir unless –
- c) the storage of water involves flooding natural ground; or
- d) the tank or reservoir is on a watercourse; or
- e) roads, buildings and other ancillary works that are not part of the dam.

dam works means any works for the construction, erection, enlargement, modification, repair or removal of a dam, or for the conversion of land to a dam, to which Part 8 or Part 8A applies or any work on any such dam which may significantly increase the dam's safety risk.

dispersed surface water means –

- a) water flowing over land otherwise than in a watercourse –
 - (i) after having fallen as rain or hail or having precipitated in any other manner; or
 - (ii) after rising to the surface naturally from underground; or
- b) water as mentioned in paragraph (a) that has been collected in a dam or reservoir.

domestic purpose means personal use for drinking, cooking and washing but does not include taking water to be used in carrying on a business unless it is for the personal use of persons employed in the business.

environmental objectives means the objectives of a water management plan proposed to further the provisions of section 6(1)(c).

environment means components of the earth, including –

- a) land, air and water; and
- b) any organic matter and inorganic matter and any living organism; and
- c) human-made or modified structures and areas –
- d) and includes interacting natural ecosystems that include components referred to in (a) and (b).

groundwater means –

- a) water occurring naturally below ground level; or
- b) water pumped, diverted or released into a well for storage underground.

groundwater area means an area of land that is appointed as a groundwater area by an order made by the Minister under section 124A.

licence means a licence granted and in force under Part 6.

meter means an instrument that measures and records a flow or level of water and includes any ancillary device attached to or incorporated in the instrument.

permit means a permit granted and in force under Division 4 of Part 8.

regulations means regulations made and in force under this Act.

Secretary means the Secretary of the Department.

stock watering means the provision of water for drinking by livestock and for normal husbandry practices associated with the keeping of livestock, but does not include the provision of water for livestock or animals subject to intensive farming.

surety means the actual or relative probability with which a water allocation is expected to be available in any year having regard to the natural variability of the supply of water.

taking, in the case of water from a water resource, includes –

- a) taking water by pumping or syphoning the water; and
- b) stopping, impeding or diverting the flow of water over land (whether in a watercourse or not) for the purpose of collecting or storing the water; and
- c) diverting the flow of water in a watercourse from the watercourse; and
- d) releasing water from a lake; and
- e) permitting water to flow under natural pressure from a well, unless the water is flowing from a natural opening in the ground that gives access to groundwater; and
- f) permitting stock to drink from a watercourse, a natural or artificial lake, a dam or reservoir.

water allocation means a quantity of water that a licensee is entitled to take and use under a licence.

watercourse means a river, creek or other natural stream of water (whether modified or not) flowing in a defined channel, or between banks, notwithstanding that the flow may be intermittent or seasonal or the banks not clearly or sharply defined, and includes –

- a) a dam that collects water flowing in any such stream; and
- b) a lake through which water flows; and
- c) a channel into which the water of any such stream has been diverted; and
- d) part of any such stream; and
- e) the floodplain of any such stream –

but does not include –

- a) a channel declared by the regulations to be excluded from this definition; or
- b) a drain or drainage depression in the contours on the land which only serves to relieve upper land of excess water in times of major precipitation.

water management plan means a water management plan in force under Part 4 and includes an interim water management plan under section 31.

water regime means –

- a) in respect of a watercourse, the pattern of flow in the watercourse, which is to be described in terms of the major features of its volumetric and temporal variation and which, in the case of a lake, is to include the fluctuation in the water level of the lake; or
- b) in respect of groundwater, the pattern of flow or fluctuation in the level of groundwater or pressure which is to be described in terms of the major features of its temporal variation.

water resource means –

- a) a watercourse, lake or any dispersed surface water or groundwater; or
- b) a tidal area that a declaration under section 5A relates to.

well means –

- a) an opening in the ground below the surface of the earth excavated or used for the taking of groundwater; or
- b) a natural opening in the ground that gives access to groundwater; or
- c) any other excavation as may be provided by the regulations;

well works means an excavation undertaken to give access to groundwater, any other works undertaken to repair or modify the structure of a well or any works undertaken to plug, backfill, seal or decommission a well.

9.2 General Definitions

abstraction means the taking of water from a water resource.

Act means the *Water Management Act 1999* as amended or, if that Act is repealed, any Act enacted in substitution for that Act.

allocation limit means the volume of water that can be allocated at a level of reliability taking into consideration environmental water requirements, rights under Part 5 of the Act and existing allocations.

aquifer means porous and fractured sediments and rocks that can store and yield groundwater.

catchment means the drainage area within which water will naturally flow towards a watercourse and includes the watercourse.

Department means the Department of Primary Industries, Parks, Water and Environment (DPIPWE).

ML means megalitre (one million litres).

Protected Environmental Values means the value or use for which it has been determined that a given area of the environment should be protected. There can, and often will be, more than one protected environmental value for a given area. A list of potential protected environmental values is given in clause 7.1 of the *State Policy on Water Quality Management 1997*.

restriction management means the process by which the taking of water, when in limited supply, is reduced in accordance with section 94 of the Act.

reliability means the likelihood of the total volume specified on a water allocation being available in the relevant take period (i.e. reliability of 80% indicates the total volume is likely to be available 8 years in 10).

stream flow gauging station means the Department's flow measuring device located at a particular reference point.

summer take allocation means a quantity of water that a licensee is authorised to take from a watercourse under a licence, between 1 December and 30 April inclusive (in the Ringarooma River catchment). Water has traditionally been taken under these allocations for direct application during the irrigation season, and hence these allocations were previously known as direct take allocations.

surface water means the surface water from all sources within the catchment, either as dispersed surface water or as occurs in a watercourse.

take period means the period between the start date and end date specified on a licence for the taking of a water allocation.

water access entitlement means an entitlement to take water, which has been established through a water licence and any water allocations endorsed on that licence.

water user means:

- a) any person who has a right or authorisation to take water under the Act; or
- b) any other person who uses the water resource for recreation or any other purpose.

winter take allocation means a quantity of water that a licensee is authorised to take from a watercourse under a licence, between 1 May and 30 November inclusive (in the Ringarooma River catchment). Water has traditionally been taken under these allocations to fill storages, for later use during the irrigation season, and hence these allocations were previously known as storage allocations.

PART 10 REFERENCES AND FURTHER INFORMATION

Departmental reports and other supporting information can be found via the Department's website (www.dpipwe.tas.gov.au).

DPIPWE (2010a). *Tasmanian Environmental Flows (TEFlows) Project Technical Report*. Water Assessment Aquatic Ecology Report Series, Report No. WA 09/10. Water and Marine Resources Division. Department of Primary Industries, Parks, Water and Environment, Hobart, Tasmania.

DPIPWE (2010b). *Surface Water Hydrology of the Ringarooma River Catchment*. Water Assessment Hydrology Report Series, Report No. WA 10/11. Water and Marine Resources Division, Department of Primary Industries, Parks, Water and Environment, Hobart, Tasmania.

DPIPWE (2010c). *River Health of the Ringarooma River Catchment*. Water Assessment Water Monitoring Report Series, (Internal Reference No. WA 10/07.) Water Assessment Branch, Department of Primary Industries, Parks, Water and Environment, Hobart, Tasmania.

DPIPWE (2010d). *Water Quality Assessment for the Ringarooma Catchment*. Water Assessment Water Quality Report Series, Report No. WA 10/06. Water and Marine Resources Division. Department of Primary Industries, Parks, Water and Environment, Hobart, Tasmania.

DPIPWE (2011a). *Water Management Report for the Ringarooma River Catchment Water Management Plan*. Water Management Planning Report Series, Report No. WMP 11/02. Water and Marine Resources Division, Department of Primary Industries, Parks, Water and Environment, Hobart, Tasmania.

DPIPWE (2011b). *Groundwater Report for the Ringarooma River Catchment Water Management Plan*. Water Management Planning Report Series, Report No. WMP 11/01. Water and Marine Resources Division, Department of Primary Industries, Park, Water and Environment, Hobart, Tasmania.

DPIPWE (2011c). *Ringarooma River Catchment Stage II Hydrology Report*. Water Assessment Hydrology Report Series, Report No. WA 11/03. Water and Marine Resources Division. Department of Primary Industries, Parks, Water and Environment, Hobart, Tasmania.

DPIW (2008). *Environmental Flows for the Ringarooma River Water Management Plan*. Technical Report No. WA 08/02. Water Assessment Branch, Department of Primary Industries and Water, Hobart, Tasmania.

DPIWE (2004a). *Guiding Principles for Water Trading in Tasmania*. Policy 2003/2.

DPIWE (2004b). *Freshwater Values Assessment of the Ringarooma River Catchment*. Conservation of Freshwater Ecosystem Values Project, Department of Primary Industries, Water and Environment, Hobart, Tasmania.

DPIWE (2005). *Environmental Management Goals for Tasmanian Surface Waters*. Dorset and Break O'Day Municipal Areas. Final Paper November 2005.

Ling F.L.N., Gupta V., Willis M., Bennett J.C., Robinson K.A., Paudel K., Post D.A. and Marvanek S. (2009) *River Modelling for Tasmania. Volume 3: the Pipers-Ringarooma Region*. A report to the Australian Government from the CSIRO Tasmania Sustainable Yields Project, CSIRO Water for a Healthy Country Flagship, Australia.

SCHEDULE 1 IMPLEMENTATION OF RESTRICTIONS ON THE TAKING OF WATER

Objective

These procedures have been developed to inform decision-making in the implementation of restrictions on the taking of water (prohibiting the taking of water by holders of water allocations under Part 6 of the *Water Management Act 1999*).

The main objective of these procedures is to provide a consistent, outcome-focussed approach to restriction management. The key outcome sought by this approach is to manage the taking of water such that river flows remain above established cease to take thresholds, unless flows decline to or below that level naturally.

In seeking this outcome, these procedures recognises that restrictions on the taking of water may not necessarily be implemented even though a cease to take threshold has been reached.

Definitions

Cease to take period means the period during which river flow falls to, or below, and remains at, or below, an established cease to take threshold.

Lower bound means the absolute minimum level of flow at which restrictions on the taking of water are to be implemented.

Cease to Take Period

1. Whenever river flow drops to the cease to take threshold, a “cease to take period” will commence.
2. A cease to take period will prevail until such time as:
 - (i) river flow climbs above the cease to take threshold for an extended period, where no notice of restriction (prohibiting the taking of water by holders of water allocations) has been issued under section 92 of the Act; or
 - (ii) a notice is issued under section 94 of the Act, revoking a notice of restriction (prohibiting the taking of water by holders of water allocations) issued under section 92 of the Act.

Implementation of Restrictions

3. At the start of a cease to take period, an Authorised Officer will determine the need for implementing a restriction on the taking of water (prohibiting the taking of water by holders of water allocations).
4. Before issuing a restriction notice under section 92 of the Act, an Authorised Officer will consider the following:
 - (i) antecedent conditions including river flow and recent rainfall;
 - (ii) whether any significant rainfall is forecast for the area;
 - (iii) the volume of water being taken and the demand for water;
 - (iv) crop vulnerability factors;
 - (v) whether a change in the cease to take threshold is imminent (for example, a reduction in the threshold at the end of the month).

5. Whilst an Authorised Officer, with the cooperation of water licence holders, is able to achieve a reduction in water extraction sufficient to maintain river flow at the cease to take level, the Authorised Officer may withhold the issuing of a restriction notice under section 92 of the Act.
6. Where river flow has exceeded the cease to take threshold for the relevant month, an Authorised Officer may withhold the issuing of a restriction notice under section 92 of the Act until such time as river flow falls to the lower bound for that month.
7. Where recent rainfall indicates that river flow will increase back above the cease to take threshold within 72 hours of a cease to take period commencing, an Authorised Officer may withhold the issuing of a restriction notice under section 92 of the Act.
8. Where a rainfall forecast, issued by the Bureau of Meteorology, indicates significant rainfall within 72 hours of a cease to take period commencing, an Authorised Officer may withhold the issuing of a restriction notice under section 92 of the Act.
9. Where the volume of water taken reduces the flow below the cease to take threshold by an amount equal to or less than 10% of the threshold flow, an Authorised Officer may withhold the issuing of a restriction notice under section 92 of the Act.
10. Where a restriction on the taking of water is likely to result in significant crop damage or failure and there are no alternative supplies of water available, an Authorised Officer may withhold the issuing of a restriction notice under section 92 of the Act.
11. Where a cease to take period commences less than 72 hours prior to a reduction in the cease to take threshold, and the lower cease to take threshold is less than the observed flow, an Authorised Officer may withhold the issuing of a restriction notice under section 92 of the Act.
12. Where an Authorised Officer withholds the issuing of a restriction notice for any of the circumstances set out above, the Authorised Officer is to work with water licence holders to minimise the impact of the taking of water on river flow during the relevant period.
13. An Authorised Officer may only withhold the issuing of a restriction notice under section 92 of the Act as long as river flow remains above the relevant monthly lower bound.

Lifting of Restrictions

14. A notice is to be issued under section 94 of the Act, revoking a notice of restriction (prohibiting the taking of water by holders of water allocations) issued under section 92 of the Act, at the earliest possible opportunity.
15. In considering when to issue a notice under section 94 of the Act, an Authorised Officer will consider the following:
 - (i) whether any significant rainfall is forecast for the area;
 - (ii) the likely demand for water;
 - (iii) the extent to which river flow is likely to increase above the cease to take threshold;
 - (iv) the duration with which river flow is likely to increase above the cease to take threshold;
 - (v) whether a change in the cease to take threshold is imminent (for example, an increase in the threshold at the end of the month);
 - (vi) crop vulnerability factors.

16. Where a restriction is in force and river flow clearly exceeds the cease to take threshold, an Authorised Officer will issue a notice under section 94 of the Act.
17. Where an increase in river flow above the cease to take threshold is likely to be relatively small (in comparison to the likely demand for water) or short-lived, and a restriction on the taking of water is in force, an Authorised Officer may withhold the issuing of a notice under section 94 of the Act.
18. Where river flow increases to the cease to take threshold within 72 hours of an increase in the threshold, such that the higher threshold flow is likely to be more than the observed flow, and a restriction on the taking of water is in force, an Authorised Officer may withhold the issuing of a notice under section 94 of the Act.
19. Where a restriction is in force and a rainfall forecast, issued by the Bureau of Meteorology, indicates significant rainfall within 72 hours that is likely to increase river flows above the cease to take threshold, an Authorised Officer may issue a notice under section 94 of the Act subject to the flow level being above, and remaining above, the lower bound.
20. Where river flow is above the lower bound for a relevant month but remains below the cease to take threshold, and further prolonging of a restriction on the taking of water which is in force is likely to result in significant crop damage or failure and there are no alternative supplies of water available, an Authorised Officer may issue a notice under section 94 of the Act.

Other Considerations

21. In other circumstances, an Authorised Officer may withhold the issuing of a restriction notice under section 92 of the Act, or issue a notice under section 94 of the Act where authorised by the Secretary.

Documentation of Decision

22. Any decision to issue a notice of restriction (prohibiting the taking of water by holders of water allocations) under section 92 of the Act, or withhold the issuing of a notice, must be documented.
23. Any decision to issue a notice under section 94 of the Act, revoking a notice of restriction (prohibiting the taking of water by holders of water allocations) issued under section 92 of the Act, or withhold the issuing of a notice under section 94, must be documented.
24. Documentation must include the following:
 - (i) the name of the decision maker and the date of the decision;
 - (ii) the authority of the decision-maker;
 - (iii) a description of the decision;
 - (iv) the basis for the decision, referenced against section 91 of the Act and these procedures;
 - (v) any supporting information (stream gauge information, weather forecasts etc.);
 - (vi) a description of the action taken in regard to the decision.

APPENDICES

Appendix A Named Surface Water Resources in the Area of the Ringarooma River Catchment Water Management Plan

Management Zone	Named Surface Water Resource		
Upper Ringarooma River	Coghlands Creek	Curries Brook	Dunns Creek
	Federal Creek	Jetsons Creek	Maurice River
	North View Creek	Nuggety Creek	Ringarooma River
	Sarah Ann Creek	South Maurice River	Stockyard Creek
	Tom Thumb Creek		
Dorset River	Alberton Creek	Banks Creek	Cook Creek
	Crown Prince Creek	Deep Creek	Dorset River
	Dunstans Creek	Esk Creek	Garden Creek
	Laura Creek	Mathews Creek	Mineral Banks Creek
	New River	Sawpit Creek	Vineys Creek
	Wilson Creek		
Legerwood Rivulet	Diprose Creek	Fenckers Creek	Frenchs Creek
	Legerwood Rivulet	Rigneys Creek	Saddle Creek
	Taylors Creek		
Cascade River	Ah Foo Creek	Blue Stocking Creek	Cascade River
	Dawn Of Hope Creek	East Cascade River	East Creek
	Firth Creek	Jessup Creek	Moon Creek
	Rattle Creek	Roopers Creek	Tin Pot Creek
Frome River	Cemetery Creek	Child Creek	Frome River
	Gardners Creek	Halfway Creek	Little Rio Grande Creek
	P B Creek	Rio Grande Creek	Rock Creek
	Santa Fe Creek	Spinel Creek	Stony Creek
	Tallewang Creek	Weld River	Wickborg Creek
Middle Ringarooma River	Argyle Creek	Baker Creek	Black Rivulet
	Blackboy Creek	Black Jack Creek	Boulder Creek
	Chinamans Creek	Davids Creek	Doolan Creek
	Farrelly Creek	Fiddler Creek	Fossil Creek
	Garry Creek	Gladstone Creek	Guiding Star Creek
	Greenstone Creek	Harper Creek	Hawkers Creek
	Hope Creek	John Dunn Creek	Krushka Creek
	Laffer Creek	Lohrey Creek	Main Creek
	Maggs Creek	Mara Creek	Nelson Creek

Management Zone	Named Surface Water Resource		
Middle Ringarooma River	New Find Creek	OK Creek	Pimlico Creek
	Poverty Creek	Red Hills Creek	Ringarooma River
	Snapper Creek	Surrey Lagoon	Union Jack Creek
	Valley Creek	Wheel Creek	Wintle Creek
Wyniford River	Cotton Creek	Crowther Creek	Cross Creek
	Full Moon Creek	Gang Forward Creek	Little Cotton Creek
	MacMichael Creek	Masher Creek	Rocky Creek
	Royston Creek	Sir Garnet Creek	Southern Cross Creek
	Sun Creek	Wyniford River	
Lower Ringarooma River	ABC Creek	Ah Kaw Creek	Amber Creek
	Athambra Creek	Big Valley Creek	Black Creek
	Black Duck Lagoon	Blackwood Creek	Blue Lake
	Blueys Lagoon	Bowlers Lagoon	Bradshaws Creek
	Chung Creek	Clifton Creek	Coarse Gold Creek
	Corduroy Creek	Drydew Creek	Dry Gut Creek
	Echo Creek	Enterprise Creek	Fly By Night Creek
	Fosters Marshes	Fowlhouse Marsh	Galloway Creek
	Gibton Creek	Gilham Creek	Gincase Creek
	Glifton Creek	Hardwickes Creek	Hardwickes Lagoon
	Jewells Creek	Johnson Creek	Kennetts Creek
	Lark Creek	McGregor Lagoon	Marsh Creek
	Mount Cameron Creek	Native Lass Creek	New Haven Creek
	Peacock Creek	Pig and Whistle Creek	Pykes Creek
	Racecourse Creek	Ringarooma River	Ruby Creek
	Sapphire Creek	Scrubby Creek	Sextus Creek
	Shantys Creek	Shantys Lagoon	Slip Creek
	Snake Creek	Star of Hope Creek	Swain Creek
	Tamar Creek	Tent Marsh	The Chimneys
	Waites Lagoon		

Appendix B Flow Measurement Reference Points

For the purpose of this Plan all flows referred to relate to those as measured at the relevant stream flow gauging station located in the Ringarooma River catchment, as set out in the following table.

Water Resource	Stream Flow Gauging Station	Station Number	Easting	Northing
Ringarooma River	Ringarooma River upstream of the Branxholm water supply	1335	561606	5441829
Ringarooma River	Ringarooma River upstream of Moorina Bridge	30.2	572767	5446837
Legerwood Rivulet	Legerwood Rivulet downstream of Ringarooma Road	1309	558939	5436325

The stream flow gauging station on the Ringarooma River at Moorina is used as the primary flow reference point, due to the comparatively stable flow and long term record available at that site.

Two groundwater monitoring bores are located in the Ringarooma River catchment:

- (a) Branxholm groundwater bore (easting 559923.713; northing 5443210.852);
- (b) Winnaleah groundwater bore (easting 568064.73; northing 5448047.656).

Appendix C Objectives of the Resource Planning and Management System of Tasmania and the *Water Management Act 1999*

Resource Management and Planning System of Tasmania

The objectives of the Resource Management and Planning System of Tasmania are:

- a) to promote the sustainable development of natural and physical resources and the maintenance of ecological processes and genetic diversity; and
- b) to provide for the fair, orderly and sustainable use and development of air, land and water; and
- c) to encourage public involvement in resource management and planning; and
- d) to facilitate economic development in accordance with the objectives specified in paragraphs (a), (b) and (c); and
- e) to promote the sharing of responsibility for resource management and planning between the different spheres of Government, the community and industry in Tasmania.

Water Management Act 1999

The objectives of the *Water Management Act 1999* are to further the objectives of the resource management and planning system of Tasmania as specified in Schedule 1 and in particular to provide for the use and management of the freshwater resources of Tasmania having regard to the need to:

- a) promote sustainable use and facilitate economic development of water resources; and
- b) recognise and foster the significant social and economic benefits resulting from the sustainable use and development of water resources for the generation of hydro-electricity and for the supply of water for human consumption and commercial activities dependent on water; and
- c) maintain ecological processes and genetic diversity for aquatic and riparian ecosystems; and
- d) provide for the fair, orderly and efficient allocation of water resources to meet the community's needs; and
- e) increase the community's understanding of aquatic ecosystems and the need to use and manage water in a sustainable and cost-efficient manner; and
- f) encourage community involvement in water resource management.

Appendix D Non-Consumptive Water Allocations in the Ringarooma River Catchment

The management of water in the Ringarooma River system is complicated by the development of hydro-electric generation infrastructure. Close to two thirds of the water allocated in this catchment at the date of this Plan's adoption is taken for hydro-electric generation purposes. Water is taken from the Cascade, Frome and Wyniford Rivers, and after passing through hydro-electric turbines, is returned via pipelines and channels to the main stem of the Ringarooma River, primarily in the Lower Ringarooma River Management Zone. Some water is returned to the Middle Ringarooma River Management Zone, however, as it is returned relatively close to the end of the management zone (and hence is not practicably available for extraction in that zone), it is treated for the purposes of water allocation as being returned to the Lower Ringarooma River Management Zone.

With regard to water allocation, the volume of water allocated for non-consumptive purposes in the Middle Ringarooma River and Wyniford River Management Zones is subtracted from the Lower Ringarooma River Management Zone cumulative total, such that the cumulative volume of water allocations in the Lower Ringarooma River Management Zone comprises water allocated for consumptive purposes only (refer Tables 3 and 4). This reflects that water allocated for non-consumptive purposes upstream returns to the Ringarooma River, and hence may potentially be allocated in the Lower Ringarooma River Management Zone.

Appendix E Holistic Assessment of Environmental Water Requirements

The Tasmanian Environmental Flows Framework (TEFF) provides a 'holistic' approach to assessing the environmental water requirements of rivers in Tasmania (DPIPWE 2010a).

The main premise of this framework is that the ecology of a river system (and the environmental values it contains) has evolved in response to the pattern of the natural flow regime. Therefore, to preserve the freshwater-dependent values of that system, the pattern of the natural flow regime should be retained as far as possible.

One of the important strengths of the TEFF is its non-prescriptive nature, providing flexibility to tailor environmental flows assessments to locations within specific catchments. This is a particular advantage in Tasmania which has many small catchments that have different issues regarding water extraction and flow management (i.e. rivers with regulated and unregulated flow regimes), and highly catchment- and even site-specific conservation values.

The environmental flow provisions in this Plan have largely been adopted from an environmental flows assessment which employed the TEFF (DPIW 2008). This assessment was supported by a series of studies which examined the present condition of the river and gathered together information about unique components of the aquatic and riparian ecosystems in this catchment. These studies comprised a review of the freshwater-dependant environmental values within the catchment (DPIWE 2004b), an assessment of hydrology (DPIPWE 2010b) and water use (DPIPWE 2011a), a landscape-scale assessment of river health (DPIPWE 2010c) and a review of water quality in the catchment (DPIPWE 2010d).

Appendix F Stream Flow Gauging Data for the Ringarooma River Upstream of Moorina Road Bridge, During the Summer Take Period.

