

MERSEY WATER MANAGEMENT PLAN



Mersey River downstream of Lake Parangana

Department of Primary Industries, Water *and* Environment
Water Assessment and Planning Branch
July 2005

ISBN 0 7246 669 71 X



Tasmania

DEPARTMENT of
PRIMARY INDUSTRIES,
WATER *and* ENVIRONMENT

TABLE OF CONTENTS

FOREWORD.....	1
INTERPRETATION AND STATUTORY DEFINITIONS	2
STATUTORY DEFINITIONS.....	2
GENERAL INTERPRETATION AND DEFINITIONS	3
ACRONYMS AND ABBREVIATIONS.....	4
PART 1 INTRODUCTION.....	5
1.1 NAME OF PLAN	5
1.2 NATURE AND STATUS OF THE PLAN.....	5
1.3 DATE OF COMMENCEMENT.....	5
1.4 AREA TO WHICH THE PLAN APPLIES	5
1.5 WATER RESOURCES TO WHICH THE PLAN APPLIES	5
1.6 REVIEW OF THE PLAN.....	5
1.7 PLAN ADMINISTRATION.....	5
1.8 ROLE OF CONSULTATIVE GROUP	6
PART 2 PLAN OBJECTIVES	7
PART 3 WATER MANAGEMENT PROVISIONS	8
3.1 WATER LICENSING	8
3.2 SURFACE WATER ALLOCATION	8
3.3 INSTALLATION OF WATER METERS.....	10
3.4 MANAGEMENT OF WATER STORAGES	10
3.5 RULES FOR WATER TRANSFERS.....	10
3.6 ENVIRONMENTAL FLOW RELEASE FROM LAKE PARANGANA.....	11
3.7 GROUNDWATER LICENSING AND ALLOCATION	11
3.8 GROUNDWATER MANAGEMENT IN THE MOLE CREEK KARST AREA.....	11
3.9 CEASE TO TAKE CONDITIONS.....	11

PART 4 MONITORING	12
4.1 SURFACE WATER ALLOCATIONS.....	12
4.2 INSTALLATION OF WATER METERS.....	12
4.3 METERING OF LICENSED WATER USAGE	12
4.4 MANAGEMENT OF WATER STORAGES	12
4.5 WATER TRANSFERS.....	12
4.6 RESTRICTION MANAGEMENT.....	12
4.7 STREAMFLOWS.....	12
4.8 STAGE 2 ENVIRONMENTAL MONITORING.....	13
4.9 BASELINE ENVIRONMENTAL MONITORING	14
4.10 REPORTING.....	15
4.11 FURTHER INVESTIGATIONS.....	15
PART 5 STATUTORY REQUIREMENTS and ASSESSMENTS	16
5.1 A STATEMENT OF THE OBJECTIVES OF THE PLAN, INCLUDING THE ENVIRONMENTAL OBJECTIVES – SECTION 14(2)(a).....	16
5.2 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)	17
5.3 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).....	20
5.4 AN ASSESSMENT OF LIKELY DETRIMENTAL EFFECTS OF THE PLAN ON THE QUALITY OF WATER – SECTION 14(2)(d).....	26
5.5 AN ASSESSMENT OF THE CAPACITY OF THE RELEVANT RESOURCE TO MEET THE LIKELY DEMANDS FOR WATER BY EXISTING AND FUTURE USERS – SECTION 15(a).....	27
5.6 LIKELY EFFECTS OF THE PLAN ON EXISTING AND FUTURE USERS, INCLUDING ANY EFFECT ON BUSINESSES CARRIED ON BY THOSE USERS – SECTION 15(b).	28
REFERENCES	30
APPENDICES	31
APPENDIX A - OBJECTIVES OF THE WATER MANAGEMENT ACT 1999	31
APPENDIX B – FIGURES ASSOCIATED WITH PART 5: STATUTORY REQUIREMENTS AND ASSESSMENTS	32

FOREWORD

The Mersey Water Management Plan has been prepared by the Department of Primary Industries, Water and Environment in consultation with the Mersey Catchment Water Management Planning Consultative Group.

The purpose of the Plan is to provide a framework for managing the catchment's water resources in accordance with the objectives of the Plan, the *Water Management Act 1999*, and the *State Policy on Water Quality Management 1997*.

The Plan includes objectives, water management provisions and a monitoring program covering licensing, surface water allocations, metering of water use, management of water storages, water transfers, groundwater licensing and allocation, and restriction management. The Plan also contains assessments explaining the likely effects on the environment and other water users.

The Plan recognises that community access to water information and involvement in management decisions are important to the long-term success of the planning process. Following adoption of the Plan, the locally based Mersey Water Management Planning Consultative Group will continue to work with the Department in ensuring effective management of the catchment's water resources.

A formal review of the Plan will take place ten years after its adoption by the Minister. The review will take into account any changes in water usage or environmental conditions that become apparent as a result of the annual monitoring program.

INTERPRETATION AND STATUTORY DEFINITIONS

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

Statutory Definitions

Groundwater means water occurring naturally below ground level or water pumped diverted or released into a well for storage underground.

Responsible Water Entity means a water entity responsible for the administration of a water management plan under Section 38(1) or the administration of a water district under Part 9.

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
- da) The floodplain of any such stream –
But does not include –
- e) A channel declared by the regulations to be excluded from this definition; or
- f) 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 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 pressure which is to be described in terms of the major features of its temporal variation.

Water resource means a watercourse, lake or any dispersed surface water or groundwater.

General Interpretation and Definitions

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

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

Consultative Group means the Mersey River Catchment Water Management Planning Consultative Group.

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

Direct Take means extraction of water directly from a watercourse.

Environmental Water Requirements are descriptions of the water regimes needed to sustain the ecological values of aquatic ecosystems at a low level of risk. These descriptions are developed through the application of scientific methods and techniques or through the application of local knowledge based on many years of observation.

Hydro or **Hydro Tasmania** means the Hydro Electric Corporation. Hydro Tasmania is a trading name, whilst the legal entity is the Hydro Electric Corporation.

Hydrograph means a plot of discharge or water level against time. Depending on the time scale, this shows the shape of the flood pulse in response to a heavy rainfall event (days) or shows the flow regime of a river (months to years).

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 is the process of restriction of direct takes.

Unregulated stream means one in which flow is not controlled by means of a weir, dam or similar structure.

Water Quality Objectives for a specific body of water are the most stringent set of water quality guidelines that should be met to achieve all of the protected environmental values nominated for that body of water.

Water user includes;

- 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; and
- c) the environment.

Acronyms and Abbreviations

AusRivAS means the Australian River Assessment System.

EWR means Environmental Water Requirement.

IFS means Inland Fisheries Service.

ML means megalitre (one million litres).

PEVs means Protected Environmental Values.

RMPS means the Resource Management and Planning System of Tasmania.

WQO means Water Quality Objective.

PART 1 INTRODUCTION

1.1 Name of Plan

This Water Management Plan is titled the Mersey Water Management Plan, hereafter referred to as the Plan.

1.2 Nature and status of the Plan

The Plan is to be read as being subject to the *Water Management Act 1999* hereafter referred to as 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

In accordance with Section 28 of the Act, the Minister adopted the Plan on the date specified in the certificate endorsed on the Plan.

In accordance with Section 29 of the Act, the Plan takes effect on the date that notice of its adoption is published in the Gazette.

1.4 Area to which the Plan applies

The Plan area is the Mersey River catchment below Lake Parangana, including all tributaries. The Plan area is shown in Figure 1.

1.5 Water resources to which the Plan applies

The Plan applies to the following water resources within the Plan area:

- a) water in permanent and temporary watercourses;
- b) water stored in dams; and
- c) groundwater.

1.6 Review of the Plan

A formal review of the Plan will be undertaken by the Secretary ten years after its adoption by the Minister, or at other times in accordance with Section 34 of the Act.

1.7 Plan administration

The Minister or delegate will be responsible for administration of the Plan.

Administration by the Minister applies unless there is an application by a water entity or group of landholders under Section 37 of the Act to administer all or part of the Plan and a water entity

is declared by the Minister under Section 38. The water entity then replaces the Minister as administrator of the Plan, and is subject to the requirements of the Act.

1.8 Role of Consultative Group

The Consultative Group is open to all water user interests in the catchment. During development of the Plan these interests included irrigated agriculture, industry, Hydro Tasmania, the Mersey Estuary Group, Port of Devonport Corporation, Five Rivers Waterwatch, Local Government and Forestry Tasmania.

The Consultative Group will:

- a) Be chaired by a local representative;
- b) Advise the Department on implementation of the Plan and local water management issues;
- c) Seek advice from, and report to organisations or constituencies represented by Group members on matters relating to implementation of the Plan;
- d) Participate in reviews of the Plan;
- e) Advise and provide assistance on any other matters considered by the Consultative Group as relevant to operation of the Plan.

PART 2 PLAN OBJECTIVES

In addition to the objectives of the Resource Management and Planning System (RMPS) and the objectives of the Act (Appendix A), the specific objectives of the Plan are categorised and listed below. The objectives will be met through implementation of the Plan's water management provisions and water monitoring program outlined in Parts 3 and 4 of the Plan.

Environmental

1. Maintain instream biotic communities during periods of low flow.
2. Protect existing ecological processes in the river.
3. Maintain groundwater dependent ecosystems and processes in the Mole Creek Karst Area as defined in the map of the Plan area.

Water Usage and Development

4. Protect flow quantities for stock and domestic use.
5. Provide allocations for licensed irrigation and industrial use that recognise historical use and opportunities for development.
6. Protect groundwater yields for stock, domestic and any licensed usage.

Compliance and Monitoring

7. Improve knowledge of surface water and groundwater use.
8. Improve knowledge of the catchment's water resources and aquatic environment.
9. Manage compliance with the provisions of the Plan.

PART 3 WATER MANAGEMENT PROVISIONS

The water management provisions in this part of the Plan are designed to implement the specific Plan objectives given in Part 2.

The following provisions are made in accordance with Sections 14(3)(a) and 14(3)(b) of the Act.

3.1 Water licensing

For the purposes of the Plan, water licensing will be undertaken in accordance with Part 6 of the Act and be consistent with the *State Policy on Water Quality Management 1997*.

Water licence holders in the catchment are responsible for complying with terms and conditions on water licence and dam permits.

As required by Section 36(2) of the Act, the conditions imposed on new licences will be consistent with this Plan. Existing licences will be varied to the extent necessary to achieve consistency with or implement the requirements of the Plan.

3.2 Surface water allocation

Surface water allocations determined under the Plan will take into account the likely effects on Water Quality Objectives as determined under the *State Policy on Water Quality Management 1997*.

3.2.1 Allocation Sureties

The sureties of water allocations in descending order of priority are listed below, for the purposes of Section 94 of the Act. Surety levels indicate the priority of rights to take water during periods of restriction management. Under these circumstances Surety 1 water rights would be the least likely to be affected.

Surety 1 Water

Water for essential town water supplies, domestic purposes, consumption by livestock or firefighting under Part 5 of the Act.

Surety 2 Water

Water required to sustain the ecosystems dependent on the water resource.

Surety 3 Water

Water allocations of licensees replacing prescriptive rights under previous Acts. There are no prescriptive rights in the catchment that would be classified as Surety 3 allocations.

Surety 4 Water

Water allocations of Special Licensees, such as the Wesley Vale Mill. Fifty percent of the Wesley Vale Mill allocation which is 45.5ML/day is available at this Surety level. This reflects their entitlement under the *Wesley Vale Pulp and Paper Industry Act 1961*.

Surety 5 Water

Allocations issued under Part 6 of the Act. These include rights to take water for irrigation and other commercial purposes, usually for direct use in the period November to April or for filling

storages in the period May to October. (Typically these allocations were converted from Commissioned Water Rights issued under the *Water Act 1957*).

Allocations to take water from the Mersey River into storages outside the Plan area during the period May to October.

Surety 6 Water

Allocations issued as a result of the water usage survey data requested by DPIWE in 2003/2004, aimed at recognising historical water use within the catchment.

Surety 7 Water

Fifty percent of the Wesley Vale Mill allocation which is 45.5ML/day.

3.2.2 Temporary Water Allocations

Temporary water allocations may be issued to take water from the water resource. Any such allocations will not exceed a 3 month time period and must comply with section 90(1) of the Act. Temporary water allocations will be issued in accordance with the Act, and will:

- be consistent with the allocation arrangements in the Plan;
- not be used to circumvent any allocation arrangements in the Plan;
- only be issued for short term needs; for example, where a new water allocation is awaiting approval and there is an urgent requirement for water.

3.2.3 Water Allocation Limits

The Plan makes the following water available for allocation, in addition to water rights in effect prior to the date of commencement of the Plan.

- (a) Water allocations issued as a result of the water usage survey undertaken by DPIWE in 2003/2004 aimed at recognising historical water use within the catchment (Surety 6 water). That is, the difference between surveyed water use and allocations prior to the date of commencement of the Plan. This includes a catchment allowance of up to 10ML/day that may be allocated between water users who did not expand their irrigation development after receiving written advice from the Department in November 1998 that no further allocations were available. This advice resulted from an agreement between the then Ministers for Primary Industry and Fisheries, Energy, and Environment and Land Management that irrigation levels be capped at the levels assessed in the 1997 water usage survey, undertaken as part of the Mersey River Experimental Study.

The catchment allowance will be apportioned following completion of the 2003/2004 water usage survey. Those seeking access to a part of the catchment allowance must be able to demonstrate that they made a valid application for a further Surety 5 allocation prior to 1 May 2003. This date was agreed to in negotiations between the Department and Mersey Catchment Water Management Planning Consultative Group during development of the Draft Mersey Water Management Plan 2004. A valid application must be in the form of a dated document specifying the additional irrigation water requirements of the applicant.

- (b) A total of 30,000ML/year for allocation at Surety 5 during the period May to October inclusive.

An explanation of the allocation limits is provided in Assessment 5.3 of the Plan.

3.3 Installation of water meters

Licensees who take water directly from any watercourse in the catchment, including dams on any watercourse, for irrigation, industrial, town water supply or any other commercial purposes will be required to install a suitable meter to measure the volume of water extracted. The provisions in Part 11 of the Act and the Department's Water Meter Standard (2004), as varied from time to time, will apply with respect to the installation of meters.

The Department may also require meters to be installed to measure water takes under Part 5 of the Act.

3.4 Management of Water Storages

3.4.1 Dam Permits

Dam works are to be undertaken in accordance with the terms and conditions on any permit issued under Part 8 of the Act and be consistent with the *State Policy on Water Quality Management 1997*.

3.4.2 Measurement of Irrigation Storage Inflows/Outflows

In order to measure inflows and outflows from a dam or series of dams, owners of irrigation dams will be required to install either V-notch weirs, water meters, data-loggers or any combination of these methods.

The requirement to install a measuring device and the type of measuring device adopted will be at the discretion of the Department and will take into consideration the hydrological characteristics of the water resource and the number and capacity of irrigation dams to be measured.

The provisions in Part 11 of the Act and the Department's Water Meter Standard (2004), as varied from time to time, will apply with respect to the installation of meters used to measure storage inflows/outflows.

3.5 Rules for water transfers

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. Each party to a water transfer must have an appropriate meter installed whenever an authorised officer considers it necessary to ensure that the terms and conditions of the transfer are complied with. The Department's 'Guiding Principles for Water Trading in Tasmania' (2004), as varied from time to time, provide further information about water transfers.

3.6 Environmental flow release from Lake Parangana

Hydro Tasmania will provide water from Lake Parangana so that the flow as measured in the Mersey at Liena gauging station will exceed the lesser of either:

- 173ML/day; or
- 8.25 times the flow as measured at the Arm River above Mersey gauging station.

3.7 Groundwater licensing and allocation

A groundwater licensing system may be implemented within the Plan area within the life of this Plan. The licensing system may provide for, but is not limited to, the allocation of water for commercial use and the establishment of conditions under which wells may be constructed.

Subject to the provisions of Part 7 of the Act, the Department will establish a Groundwater Use Register within 2 years of the commencement of the Plan. The register will contain details including, but not limited to: well type, location, depth and construction, purpose for which groundwater is used, quantity and rates of groundwater abstraction and groundwater quality.

3.8 Groundwater management in the Mole Creek Karst Area

Water development proposals within the Mole Creek Karst area as defined in Figure 1, including applications for dams, water licences and allocations and water transfers, may be required to show that they are consistent with maintaining groundwater dependent ecosystems and processes in that area. Proponents should initially seek advice from the Department's Regional Water Management Officer on the groundwater assessment requirements for their application.

3.9 Cease to Take Conditions

Surety 4 to Surety 7 water allocations may not be taken from any stream within the Plan area when the flow at the Latrobe gauging site is less than or equal to the cease to take flows given in Table 1.

Table 1 – Cease to take flows (ML/day)

Dec to May inclusive	June	July	August	September	October	November
195*	370	570	680	680	370	260

**The 'Cease to Take Flow' for December to May is equal to the Hydro release from Lake Parangana for environmental purposes, plus 22ML/day contribution from the tributaries downstream of Lake Parangana. The cease-to-take flow will typically be 195ML/day, but may be reduced when the estimated natural inflow to Lake Parangana is less than 173ML/day.*

The Department may introduce restrictions when the flow at the Latrobe gauging site is within 30ML/day of the cease to take flow, with reference to the allocation sureties in Part 3.2.1 of the Plan. Any such restrictions will apply to all catchment streams.

The Department may also impose restrictions on Surety 5 and Surety 6 water allocations when Hydro Tasmania releases water from storages in the Mersey catchment to meet the requirements of section 11 of the *Wesley Vale Pulp and Paper Industry Act 1961*.

PART 4 MONITORING

This part of the Plan describes monitoring activities that will be undertaken in support of the Plan objectives and water management provisions.

4.1 Surface water allocations

The Department will record changes in the number and total volume of licensed surface water allocations. The Department will use this information to ensure that water allocations are in accordance with the provisions in part 3.2 of this Plan.

4.2 Installation of water meters

The Department will record the number and type of water meters installed during each year of the Plan. The installation of water meters or similar devices by all water licence holders will enable the Department to meter total water usage and protect all uses of the water resource.

4.3 Metering of licensed water usage

The Department will conduct spot audits of metering activities to ensure compliance with licensed allocations.

The Department will maintain a record of water usage in the catchment.

4.4 Management of water storages

In order to measure inflows and outflows from a dam or series of dams, owners of all irrigation dams will be required to install either V-notch weirs(s), water meters, data-loggers or any combination of these methods.

4.5 Water transfers

The Department will record the number of water transfers and the total volume of approved transfers.

4.6 Restriction management

The Department will maintain records of any water restrictions and will give notice of any restrictions in the print media, as required under section 92 of the Act.

4.7 Streamflows

River levels will be continually monitored and recorded at the Department's Shale Road gauging station near Latrobe (Site No. 447) and Hydro Tasmania's gauging stations at Liena (Site No. 60) and Kimberley (Site No. 22).

The Department will develop a water balance model for the catchment that will be regularly updated to include information on water inputs (flow releases and rainfall) and outputs (licensed and indirect usage) as it becomes available. The model will facilitate forecasting of flow and yield analysis under various scenarios of water demand/usage and give an overall indication of the hydrological disturbance of the catchment.

Information relating to streamflows at Latrobe can be obtained through the 'WIRED' website (www.wired.tas.gov.au) or by contacting the Regional Water Management Officer.

4.8 Stage 2 Environmental Monitoring

DPIWE, in co-operation with Hydro Tasmania and the Inland Fisheries Service (IFS) have undertaken a comprehensive monitoring program since 1997 to assess the effectiveness of the flow release from Lake Parangana for environmental purposes. The aim of the monitoring has been to:

- Determine the nature and extent of environmental benefits in the Mersey River from the releases from Lake Parangana.
- Monitor changes in environmental condition of the Mersey River due to the releases from Lake Parangana.

The first stage of the program was undertaken from 1997 – 2002 and involved an assessment of the response of biota (algae, macroinvertebrates and fish) to environmental releases from Lake Parangana. Details of the Stage 1 Monitoring program are provided in the Mersey River Working Group's (1998) monitoring proposal.

Stage 2 of this program continues the macroinvertebrate and fish monitoring components, as follows:

4.8.1 Macroinvertebrates

Quantitative sampling of macroinvertebrates with taxonomic identification will be undertaken to species level. This will involve sampling of macroinvertebrates using 1m² quadrats, or sampling areas, in summer at the following three sites:

- 1) Mersey River at C138 Road
- 2) Mersey River at Union Bridge
- 3) Mersey River upstream of Lake Rowallan (control)

Qualitative sampling of macroinvertebrates using standard AusRivAS rapid assessment protocols will continue to be undertaken in riffle habitats at the following sites in spring and autumn:

- 1) Mersey River at C138 Road
- 2) Mersey River at Union Bridge (autumn only)
- 3) Mersey River upstream of Lake Rowallan (control) - both riffle and edgewater habitats
- 4) Mersey River at Kelly's Bridge
- 5) Mersey River at Lovetts Flats
- 6) Mersey River upstream of Kimberley
- 7) Mersey River at Merseylea (autumn only)
- 8) Mersey River at Dogshead Hill
- 9) Meander River at Falls Road (control) - both riffle and edgewater habitats

4.8.2 Fish monitoring

Monitoring of fish communities will be undertaken by IFS at the following seven sites using electrofishing and analysed using catch per unit effort techniques:

- 1) Meander at Barretts Bridge (control site)
- 2) Mersey River at Pine Hut (upstream of Rowallan – control site)
- 3) Mersey River downstream of Parangana Dam
- 4) Mersey River at C138 Road
- 5) Mersey at Union Bridge
- 6) Mersey at Liena
- 7) Mersey at Mersey Lea

4.9 Baseline Environmental Monitoring

The continuation of the Stage 2 monitoring program is within an adaptive management framework. Continuation of the Stage 2 monitoring program depends on the degree of environmental benefit and condition that result from flow releases from Lake Parangana. Any decision to move from Stage 2 monitoring to baseline monitoring will be based on the level of environmental benefit as determined by statistically significant changes in the biota between monitoring years. The decision to move to the baseline program is likely if changes in biota become insignificant and the overall response to flow releases has reached a 'plateau'. In this event the Stage 2 monitoring program will cease and the Department in co-operation with Hydro Tasmania would conduct the baseline monitoring described below in sections 4.9.1 and 4.9.2.

4.9.1 River Health

River health using AusRivAS protocols will be assessed in spring and autumn at the following 5 riffle habitat sites:

- 1) Mersey River upstream of Rowallan Dam (control)
- 2) Mersey River downstream of Parangana (in co-operation with Hydro Tasmania)
- 3) Mersey at C138 Road
- 4) Mersey at Union Bridge
- 5) Mersey at Lovetts Flats

An additional site will be assessed in spring and autumn each year in riffle and edgewater habitats as part of the Department's reporting obligations under the *Tasmania Together* priority benchmark 24.7.2. This site is the Minnow River upstream of Lower Beulah.

4.9.2 Water quality

The continuous monitoring of temperature, conductivity and turbidity and monthly sampling of major nutrients will be undertaken at the Latrobe gauging site (No. 447). Spot measurements of dissolved oxygen, water temperature, turbidity, conductivity, pH and alkalinity will also be taken as part of the AusRivAS habitat assessment protocols at each qualitative monitoring site listed in Section 4.9.

Hydro Tasmania will collaborate in the monitoring program by continuing to record basic water quality parameters (electrical conductivity, water temperature, pH, dissolved oxygen and turbidity) at the Liena and Kimberley gauging stations.

4.10 Reporting

The Department will report annually on monitoring information collected under sections 4.1 to 4.7 of the Plan, and five-yearly on information collected under sections 4.8 to 4.9 of the Plan. The monitoring and reporting program occurs within an adaptive management framework. Each report will provide an assessment as to whether any environmental, economic or other reasons have occurred that may require a review of the Plan.

4.11 Further Investigations

The Department will investigate the potential for additional low-reliability 'high flow' takes from catchment streams during the period December to April. The investigation will be completed by March 2006.

PART 5 STATUTORY REQUIREMENTS AND ASSESSMENTS

5.1 A statement of the objectives of the Plan, including the environmental objectives – Section 14(2)(a)

The objectives of the Plan are as follows:

Environmental

1. Maintain instream biotic communities during periods of low flow.
2. Protect existing ecological processes in the river.
3. Maintain groundwater dependent ecosystems and processes in the Mole Creek Karst Area as defined in the map of the Plan area.

Water Usage and Development

4. Protect flow quantities for stock and domestic use.
5. Provide allocations for licensed irrigation and industrial use that recognise historical use and opportunities for development.
6. Protect groundwater yields for stock, domestic and any licensed usage.

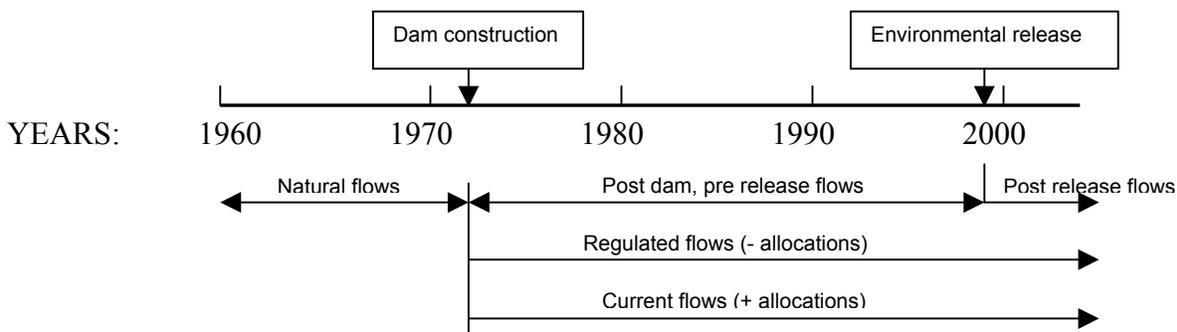
Compliance and Monitoring

7. Improve knowledge of surface water and groundwater use.
8. Improve knowledge of the catchment's water resources and aquatic environment.
9. Manage compliance with the provisions of the Plan.

5.2 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)

For the purposes of Assessments 5.2 and 5.3 the terms used to describe flows at Latrobe gauging station No. 447 in the Mersey River are detailed as follows. It should also be noted that flows are taken from the flow record period 1963 – present, and do not include abstractions, with the exception of ‘current’ flows, which include licensed abstractions.

Natural flows	Those flows that occurred in the river before the construction of the Lake Parangana dam. (ie. pre 1972)
Post dam flows	River flows since the construction of the Lake Parangana dam. (ie flows since 1972)
Post dam, pre environmental release flows	Those flows that occur in the river from 1972 to July 1999 (before the Lake Parangana dam environmental release).
Post release flows	Those flows that occur in the river after the environmental release from Lake Parangana dam. (ie. July 1999 – present)
‘Regulated’ flows (post dam, post release flows)	Those flows that occur in the river from 1972 to present.
‘Current’ flows	Those flows that occur in the river from 1972 to present after abstractions have been accounted for.



The environmental, economic and social objectives of the plan are all dependent on a water resource that has been highly modified over the last thirty years, primarily as a result of the construction of infrastructure to support generation of hydro electricity. This includes Lake Rowallan and Lake Parangana dams and the diversion tunnel to the Forth River. The water regime described below is designed to best give effect to the environmental objectives and other relevant objectives of the Plan, which include reducing the impact of hydroelectricity generation on the Mersey River. The water regime is one that allows for moderate expansion in water allocation while maintaining low risk of change to the present day environmental values of the middle and lower Mersey River and Mersey Estuary.

To summarise, assessment of the Mersey River hydrograph indicates that the middle and lower reaches of the river receive flows from the Hydro environmental release, which provide for adequate minimum flows to ensure that the Environmental Water Requirements are met throughout the year. Additional pick up from tributaries and seasonal rainfall events contribute to medium, intermediate and peak flood events that provide adequate water for maintaining groundwater processes, instream geomorphic processes, riparian vegetation, floodplain and estuarine processes. Current and historical water needs for stock and domestic use in addition to licensed irrigation and industrial use are currently being met. It has also been determined that there is scope for further development of the resource, with an additional 30,000ML total volume

in winter storage, ensuring that Plan objectives for water usage and development are being met, while still meeting the environmental objectives of the Plan.

The hydrology of the Mersey River particularly below the Lake Parangana dam has been altered significantly since the construction of the Parangana dam in the early 1970's. The mean annual discharge at the dam is now 15% of what was the natural flow as a result of a major transfer of water from the Mersey River to the Forth River. As a result of tributary inflows, the mean annual discharge now increases downstream to 52% of what was the natural flow into the estuary. The operation of the dam has affected flows by reducing flood peaks and maintaining more consistent low-moderate flows through the system.

Significant community concerns over the environmental health of the river along with an environmental flow study of the middle Mersey in 1997 (see *Mersey River Environmental Flow Study*, Davies *et. al.*, 1997) assisted in bringing about negotiation for a daily environmental release from Lake Parangana dam, equivalent to a flow of 173ML/day at Liena gauging station No.60 (see Provision 3.6). The objective of this release was to provide an optimum low flow discharge for the middle Mersey in order to increase available instream habitat for biota including fish species and macroinvertebrates. The flow change brought about an increase in baseflow for the middle Mersey but does not provide any change to the disturbance regime (ie no seasonal variation or restoration of intermediate floods) or habitat heterogeneity. This assessment supports the continuation of this release for achievement of Objectives 1, 2 and 3.

Comparison of environmental condition pre and post release provided qualitative and quantitative data for analysis in order to ascertain the degree of biotic response to the flow release. Significant increase in macroinvertebrate abundance and possible diversity was noted in addition to early signs of increased trout recruitment. It is therefore considered that the environmental release of 173ML (or equal to inflows during summer low flow periods) will provide a flow that has been shown to provide adequate instream habitat for aquatic biota under average conditions. Spill events provide higher flows downstream of the dam and these occur on average 4% of the time during summer and 23% of the time during winter seasons. The majority of spills during the summer and winter fall within the range of 86 - 2160ML with a smaller percentage occurring within the 2160 – 8640ML range.

Groundwater dependent ecosystems within the Mole Creek Karst Area (see Map in Figure 1) are dependent on middle Mersey catchment inflows, water levels, water pressure and water quality. While there is little information about the actual water requirements of the karst system, it is intended that the groundwater flows resulting from the flow regime provided by the Plan would ensure that the current status of the Mole Creek Karst Area is maintained. Provision 3.8 of the Plan also stipulates that any future water development proposals within the Mole Creek Karst Area may be required to show that they are consistent with maintaining the current status of groundwater dependent ecosystems and processes.

The lower Mersey Environmental Water Requirements (EWRs) were determined using post dam and pre-release flows as a reference flow. The middle Mersey flow release from Lake Parangana Dam will along with pick up from major and minor tributaries further downstream ensure that the EWRs for the lower Mersey are met throughout the summer and winter periods. The EWRs in themselves provide for a minimum or baseflow but do not provide for intermediate and high flow events that are necessary to ensure floodplain, riparian vegetation and instream processes including geomorphic processes are protected.

As a result of the change to the hydrology of the Mersey, for the purposes of assessments 5.2 and 5.3 a 'regulated flow' has been determined for the post dam period (1972 to present) which also includes the Lake Parangana dam release. Under these regulated conditions the flows at Latrobe gauging station indicate that on average during both the summer and winter periods after the full uptake of all current licensed water takes have occurred, there is still adequate water to provide a range of low, medium and high floods and freshes, which will protect important groundwater and instream biological, geomorphological and riparian and floodplain processes in addition to freshwater dependent estuarine processes.

In addition to analysis of the Mersey River hydrograph in order to provide for a flow regime that meets environmental objectives, the Plan also provides water use provisions to assist with meeting all objectives listed. These provisions include:

- Recognition of existing Part 5 rights.
- Recognition of historical water use (in addition to licensed allocations prior to commencement of the Plan) at Surety 6 allocations.
- A total catchment Surety 5 allocation of 39,541ML/year.
- A Surety 7 allocation of 45.5ML/day
- The adoption of summer and winter cease-to-takes on all Surety 4 to Surety 7 allocations.

In addition to these provisions, the Plan also includes the following provisions to assist in meeting the environmental and other relevant objectives of the Plan:

- The requirement for new allocations to demonstrate consideration of the effects of new allocations on water quality.
- The requirement for new allocations within the Mole Creek Karst Area to demonstrate consideration of the effects of new allocations that are not inconsistent with maintaining groundwater dependent ecosystems and processes in that area.
- Provisions relating to water trading, metering and the recording of groundwater use in the catchment and groundwater management in the Mole Creek Karst Area.

The Plan's provisions meet the water use and development objectives by providing a moderate increase in Surety 5 allocation and introducing a Surety 6 allocation, which recognises historical use. The full uptake of all proposed and existing takes represents a 5.8% reduction of the mean annual discharge at Latrobe gauging station No. 447, under regulated conditions. This water usage is based on an estimate of approximately 120ML/day of current direct and storage takes and a proposed additional volume of 30,000ML for allocation at Surety 5 during the period May to October inclusive.

The predicted impact of estimated water usage and median EWRs on the natural flow regime is presented in the monthly and daily flow hydrographs at Latrobe gauging station (see Figures 1 and 2, Appendix B). The graphs show the effects of water usage on the long-term variability of the flow regime. They indicate that with an EWR in place and allowing for current and future water usage that the resultant flow regime provided by the Plan still provides adequate low medium and high flow events that will maintain the current ecological needs and water usage and development needs of the system.

5.3 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).

The water regime that best gives effect to the environmental and other relevant objectives of the Plan is one that allows for a moderate expansion in annual water allocations while maintaining a low risk of change to the environmental values of the Mersey River and its tributaries. Such a water regime is described in this assessment.

Objective 1: Maintain instream biotic communities during periods of low flow.

The regime will provide adequate low flows throughout the mainstream channel and tributaries to maintain refuges for instream biotic communities, as explained in the following paragraphs.

Minimum Environmental Water Requirements (EWRs) have been developed for the middle reaches of the Mersey River downstream of Parangana Dam (Davies *et al*, 1997) and for the lower reaches of the Mersey River at Lovetts Flat in 2004 (see locations in Figure 1). As the Lovetts Flat site is within a few kilometres of Latrobe gauging station (No. 447), the EWRs have been used for comparison here and therefore may represent a slight underestimate of low-risk minimum flows if these flows were scaled to the gauging station site. However, the Department considers this is acceptable given the close proximity of the site to the station and lack of any further significant tributaries between these points.

The minimum EWRs of instream fauna have been assessed for the middle Mersey using flow releases that covered a range of flows that would be experienced during summer under natural conditions in average years. The post-dam, pre-release flow record was used as the reference flow for assessing the EWRs for the lower Mersey. In the lower Mersey, the minimum EWRs are obtained by determining the amount of habitat available to instream fauna under varying discharges, in both average and dry years, and the risk to the fauna of not providing flows that maintain this habitat availability. Davies *et al* (1997) provides a more detailed explanation of the methodology used to assess Environmental Water Requirements.

The median monthly flows at Lovetts Flat were used to determine the EWRs for the lower Mersey in average years. The median monthly flows are the 50th percentile, or middle value (in ML/day), occurring in any one month such that half the flow values fall below and half fall above this value. They are calculated by taking the median flow for each month of each year in the flow record. These values are then averaged for each month to give an average median monthly flow.

The 20th percentile monthly flows have been used to determine the EWRs in drier years; 20% of the monthly flows (in ML per day) fall below this value, while 80% are above it. Twentieth percentile flows have been used widely within Australia as representing river flows in dry conditions.

The flow release from Lake Parangana ensures that under all but the driest flow conditions, a minimum of 173ML/day passes down the river at Liena gauging station (No. 60). During dry conditions when inflows to Lake Parangana are below 173ML/day, the release is equal to the inflows to Parangana dam. The release ensures that low flow refuges are maintained for instream biotic communities through the middle reaches of the Mersey. This has been confirmed by quantitative and qualitative studies that showed a significant increase in macroinvertebrate abundance and possible diversity in addition to early signs of an increase in brown trout recruitment.

Comparison of the low risk EWRs with the average 50th and 20th percentile monthly flows were determined for the lower Mersey at Latrobe gauging station under regulated flow conditions (see Figures 3 and 4 in Appendix B). Figures 3 and 4 show that over the long-term, in both average and dry years, flows will be provided at a low risk of instream habitat loss, and therefore will maintain habitat and refuges for instream biotic communities.

The application of a cease-to-take rule, which is set at 195ML/day (see Provision 3.9), over the months December to May and is set at the low risk (20th percentile) EWR for the remainder months, is designed to ensure that the EWRs are maintained throughout the year, regardless of the demand. Under this scenario irrigators will not be permitted to take their allocated water when flows drop below this point, however this is likely to only occur in dry years. Based on analysis of the post dam flows (ie last 32 years of record), dry years are likely to occur once in any 2-5 years depending on the severity of the drought.

Objective 2: Protect existing ecological processes in the river.

The water regime described in Section 5.2 will protect flow regimes important for maintaining ecological processes in the river including geomorphic processes, riparian vegetation, floodplain processes and estuarine processes as illustrated in the following paragraphs.

A flow regime is described in terms of the major features of its volumetric and temporal variation, ie. the timing, duration, magnitude, frequency and predicability of different flows. It incorporates all the flow components present under average conditions (eg. base or low flows, cease-to-flow events, flushing flows and flood events), and more importantly their variability, and plays a crucial role in regulating physical and biological processes in rivers. The processes maintained by the low flow component of the flow regime have been addressed in the assessment of the previous objective; this environmental objective requires an assessment of the flush and flood components, and of the variability of the flow regime.

The average recurrence interval of floods (or peak discharges) describes the frequency in which a flood of a particular magnitude will occur. For example, under current conditions, a flood of 16,416ML will occur on average, once every 2 years in the Mersey River (as measured at Latrobe). Comparison of the average recurrence intervals under 'natural' and current conditions (including current water allocations of approximately 120ML/day) shows that the peak discharges that occur every 2, 5, 10, 20, 50 and 100 years are almost identical (see Table 1 and Figure 5 in Appendix B). The impact of the proposed winter storage allocation of 30,000ML total volume was analysed against an average year winter hydrograph (see Figure 6, Appendix B). Figure 6 clearly shows that if the total 30,000ML volume was allocated out, at Latrobe the resultant hydrograph indicates that the magnitude of the floods are only reduced on average by 11%. This indicates that the existing and proposed water use has a negligible effect on floods occurring on an annual time scale.

To compare the flow regime on a within-year time scale, hydrographs of the flow regime under regulated and current conditions (including existing water allocations) were compared for the Mersey River at Latrobe gauging station in a dry year, a wet year and an average year (see Figures 7 to 9 in Appendix B). These figures show a very slight reduction in the magnitude of peak discharges in dry years under current conditions, but no effect on the timing, frequency, duration or predictability of these flows in dry years. This slight reduction in peak magnitude is most notable over the summer months, when the majority of direct takes are licensed to occur. Figures 7 to 9 (in Appendix B) clearly show no effect on the timing, frequency, magnitude,

duration or predictability of within-year peaks in either wet or average years. Therefore, the analysis indicates a negligible long-term effect of proposed water use on the current flow regime; the major features of the flow regime and its variability will be protected for geomorphic, riparian vegetation and floodplain processes.

The Mersey Estuary has been classified as a severely degraded Class E estuary of low conservation significance, relative to all other Tasmanian estuaries (see *A Classification of Tasmanian Estuaries and Assessment of their Conservation Significance using Ecological and Physical Attributes, Population and Land Use*, Edgar *et al.*, 1999). Nevertheless, it is understood that catchment industries and property owners have in recent years undertaken actions to improve the condition of the river and estuary. These include strategies by the Port of Devonport Authority to control oil spills and restrict dredging in areas contaminated by heavy metals, as well as restoration of riparian vegetation and effluent control (Peter Gibson, pers. comm.). The estuary contains a working port that accommodates industry and tourism and associated shipping cargo, freight and passenger movements. In order to maintain the port facilities and the draft requirements of large vessels and the trend for even larger vessels to make use of the port, a regular planned dredging programme is undertaken every three to five years. This involves dredging of silt and sand from the bar at the river mouth and shingle and mud in the ship turning basin and at various locations within the port.

Protected Environmental Values for the Mersey Estuary relating to the protection of aquatic ecosystems have been formally set by the Board of Environmental Management and Pollution Control. These provide for the protection of a modified (not pristine) ecosystem from which edible fish and crustacea, but not shellfish are harvested. Other estuarine values identified by the Mersey catchment community at a workshop in 1999 to determine water quality and quantity values include provision of estuarine habitat for whitebait (various Galaxiid species and *Lovettia sealii*), birds and estuarine mud crabs. The Mersey River catchment community also identified improving estuarine water quality to allow consumption of shellfish as an important value.

While the specific freshwater flow requirements for estuarine processes are not yet well understood, it is likely these processes will also be dependent on all the flow components of a natural flow regime and their respective variability. The flow regime in the middle reaches of the Mersey River has been highly altered since the construction of the Lake Parangana dam. However at Latrobe and where river flows enter the estuary, the components of the flow regime are largely preserved under current operations (as illustrated in the assessments for Objectives 1 and 2). It is therefore considered that flow requirements for estuarine processes will be met under the Plan.

Objective 3: Maintain groundwater dependent ecosystems and processes in the Mole Creek Karst Area as defined in the map of the Plan area.

The water regime described in Section 5.2 will maintain groundwater dependent ecosystems and processes in the Mole Creek Karst Area as illustrated in the following paragraphs.

The importance of the Mole Creek Karst Area is highlighted by the inclusion of specific sites from this area being listed in the National Estate Register, World Heritage Area listings, State Reserves, and listing in the DPIWE Conservation of Freshwater Ecosystem Values (CFEV) register. Three cave species listed under Tasmania's *Threatened Species Protection Act 1995*, including *Hickmanoxyomma gibbergunyar* (harvestman - similar to a spider), *Pseudotyranochthonius typhlus* (cave false scorpion) and *Tasmanotrechus cockerilli* (Cockerills cave beetle), are found to inhabit some of the caves in the area.

The Mole Creek Karst Area is dependent on freshwater inflows, groundwater levels and pressure, and water quality. Changes to surface flows and water quality can effect groundwater flows and dissolution of the bedrock. However there have not been any studies to date that are able to define the environmental water requirements necessary to ensure the health and process components of the Mole Creek Karst groundwater dependent ecosystem. Similarly there are no known freshwater requirements for the threatened species listed within the karst cave system.

The current status of the karst system indicates that there have been no significant detrimental effects from water use to date. Therefore groundwater flows occurring from the surface flow regime defined under Section 5.2 of this Plan, are not considered to place any further impact on the groundwater dependent ecosystem and processes of the karst area. Any proposed future development of the water resource within the defined Mole Creek Karst Area (Figure 1) may be required by Provision 3.8 of the Plan to consider the proposal's potential impacts on the groundwater dependent ecosystems and processes in the area.

Objective 4: Protect flow quantities for stock and domestic use.

Provision 3.2 of the Plan defines stock and domestic use as a 'Surety 1' allocation. Stock and domestic use therefore has the highest priority during any periods of restriction management.

Any new allocations in the Mersey Catchment will be at a lower surety than that applying to stock and domestic use. The water allocation limits in Provision 3.2 and cease-to-take conditions in Provision 3.9 will ensure that further allocations and water usage do not reduce the reliability of flows for both current and future stock and domestic use.

Objective 5: Provide allocations for licensed irrigation and industrial use that recognise historical use and opportunities for development.

Until the Plan is amended, no further Surety 6 allocations for direct irrigation or industrial use will be granted, other than those ratified following the water usage survey (refer to Provision 3.2).

Direct usage for irrigation and industry (Sureties 5 and 6) will be limited to the maximum usage that applied prior to the adoption of this Plan, plus an additional amount of approximately 10ML/day to support water license applications made prior to 1 May 2003. This will ensure there is no significant expansion of direct usage from catchment streams during the main irrigation season (November to April), thereby protecting flows for existing and future licensed irrigation and industrial use.

The Plan also establishes a sustainable allocation limit of 30,000ML for any additional allocations during the period May to October.

Objective 6: Protect groundwater yields for stock, domestic and any licensed usage.

Groundwater usage is likely to be a small proportion of the total water use in the catchment and a small, yet significant proportion of the total groundwater resource. The probability of obtaining useful quantities of groundwater at a particular location is dependent on factors such as local rock types, landforms and streamflows.

The main groundwater quantity management issue in the catchment, particularly in the Mole Creek Karst Area (Figure 1) is the potential for unsustainable abstraction from bores or from streams that are hydrologically connected to bores. This can result in reduced bore yields and or stream flows, and may cause widespread and long-term declines in water resource availability.

The Plan includes provisions to manage this issue and protect groundwater resources for current and future users.

Provision 3.2 of the Plan places limits on the further allocation of surface water at the Surety 6 level, thereby capping direct abstraction at close to the pre-Plan levels.

Provision 3.2 of the Plan also establishes a sustainable allocation limit of 30,000ML for any additional allocations during the period May to October. These provisions are supported by Provisions 3.3, 3.4 and 3.9 of the Plan which provide for metering of surface water usage and restriction management during periods of low flow. The effect of these provisions will be to minimise the effects of water usage on streamflows and any bores that are hydrologically connected to streams.

Provision 3.7 provides for a groundwater licensing and allocation system throughout the Plan area. The licensing and allocation system may focus on high-yielding commercial bores, but may also be applied to stock and domestic bores if required. Groundwater will only be allocated on a sustainable basis, while also taking into account the requirements of water users and suitable bore construction standards. This will prevent uncontrolled expansion of groundwater use.

Provision 3.8 protects the ecological and hydrological significance of the Mole Creek Karst Area by stipulating that water development proposals in that area may be required to show that they are consistent with maintaining groundwater dependent ecosystems and processes.

Objective 7: Improve knowledge of surface water and groundwater use.

The monitoring and reporting provisions in Part 4 of the Plan will improve knowledge of licensed surface water and groundwater use. The Department will record changes in the number and total volume of licensed surface water allocations (refer to Part 4.1), and record licensed surface water usage through the use of meters (refer to Parts 4.2 and 4.3).

The Department will also establish a Groundwater Use Register within 2 years of the commencement of the Plan. The register will contain details including, but not limited to: well type, location, depth and construction, purpose for which groundwater is used, quantity and rates of groundwater abstraction and groundwater quality (refer to Provision 3.7).

Objective 8: Improve knowledge of the catchment's water resources and aquatic environment.

The Department will co-ordinate a comprehensive monitoring program covering water management activities, streamflows, macroinvertebrate and fish sampling, and river health to improve knowledge of the catchment's water resources and aquatic environment (refer to Part 4 of the Plan. The monitoring will be reported annually on the Department's website.

Objective 9: Manage compliance with the provisions of the Plan.

Management of compliance with the Plan's provisions will include operation of the restriction management protocol, metering of licensed water use, reporting as specified under section 4.10 of the Plan, and routine checks conducted by the Department's authorised officers.

5.4 An assessment of likely detrimental effects of the Plan on the quality of water – Section 14(2)(d).

Protected Environmental Values (PEVs) for surface waters have previously been established for the Mersey catchment (Department of Primary Industries, Water and Environment, 2001). In accordance with the *State Policy on Water Quality Management 1997*, these values form the basis for water quality management in that existing uses and values are recognised and supported. Water Quality Objectives (WQOs) to support the PEVs have not yet been established.

The Plan implements management provisions (Part 3 of the Plan) to maintain current environmental values within the Mersey catchment. It is therefore consistent with the objectives of the *State Policy on Water Quality Management 1997*.

In addition, the Plan adopts a precautionary approach to water development in the catchment by maintaining the existing Hydro Tasmania release for environmental purposes from Lake Parangana. The release is sufficient to maintain a flow of 173ML/day at the Liena gauging site, unless the natural inflow to the Lake drops below this figure. Under these circumstances the release may be reduced proportionately.

The risk to water quality during very low flows is mitigated by the environmental flow release, implementation of cease to take flows and placing limits on direct and storage takes from catchment streams, as described below.

Water users below Lake Parangana will indirectly contribute an additional 22ML/day to the environmental flow release. This will be achieved by the application of a 'cease to take' flow at the Latrobe gauging site. The cease to take flow from December to May will be the release from Lake Parangana plus 22ML/day. If the flow at Latrobe drops to this level, there will be a total ban on Surety 5 and 6 licensed takes. The ban will apply across all catchment streams. Partial restrictions will be implemented as required to seek to maintain flows above this level. During the rest of the year (June to November), the cease to take flows will be equivalent to the 20th percentile monthly flows (refer to Provision 3.9 of the Plan).

The Plan further commits the Department to restricting usage in any catchment stream if it considers that water quality may be adversely affected.

Water use in the form of direct usage from catchment streams during the main irrigation season is also pegged at close to 2003/2004 levels to support existing irrigation development. The conditions most likely to lead to a reduction in water quality, for example low-flow events, will therefore not occur with any greater frequency under the proposed management regime.

In providing a flow regime for the maintenance of current ecological processes, implementing a 'cease to take' rule and limiting direct and storage takes from catchment streams (refer to Assessment 5.3), the Plan provides for the maintenance of physical and chemical processes currently operating within the catchment. In this context it is considered that the Plan will not prejudice the achievement of future Water Quality Objectives established to protect surface water PEVs for the Mersey catchment and will therefore not have any detrimental effects on catchment water quality.

5.5 An assessment of the capacity of the relevant resource to meet the likely demands for water by existing and future users – Section 15(a).

The capacity of the resource to meet likely demands for water by existing and future users has been addressed in Section 5.3 in the assessments of Plan Objectives 4, 5 and 6. The Plan is assessed to protect environmental flows, to protect water for existing and future stock and domestic demands, and to provide water for existing and future irrigation and industrial use (refer to Section 5.3 for details).

5.6 Likely effects of the Plan on existing and future users, including any effect on businesses carried on by those users – Section 15(b).

The main users of water in the catchment are:

- Hydro Tasmania, for hydro-electric power generation in the Mersey and Forth catchments,
- agricultural enterprises, using water for stock, domestic and irrigation purposes,
- industrial users including the Wesley Vale Paper Mill; and
- recreational users, who use the water for fishing, swimming, passive recreation associated with riverine habitats and landscapes, and other related ecotourism pursuits.

Hydro Tasmania

Hydro Tasmania stores water for power generation in the upper part of the catchment, in Lakes McKenzie, Rowallan and Parangana. Much of this water is diverted through to the Forth catchment.

The Plan only applies to management of water resources below Lake Parangana. In this context the Plan recognises that Hydro Tasmania will continue to release water from Lake Parangana for environmental purposes. The release will be sufficient to maintain a flow of 173 ML/day at the Liena gauging site, unless lake inflows are assessed to be less than 173ML/day, in which case the release will be reduced accordingly.

Agricultural enterprises and industrial use

The principal requirement for agricultural enterprises is to have access to sufficient quantities of water at a high level of reliability. The likely reliability of direct usage for agricultural and industrial enterprises is qualitatively illustrated in Figures 10 to 12 in Appendix B. The figures compare post - release ‘summer’ (November to April) flows at the Latrobe gauging site for 2000/2001, 2002/2003 and 2003/2004, with the relevant ‘cease to take’ flow provisions described in Provision 3.9 of the Plan. For the purposes of this analysis the period November to April inclusive is considered to be the most significant part of each irrigation season.

Hydro Tasmania started releasing water for environmental purposes from Lake Parangana in 1999. Figures 10 to 12 cover 3 of the subsequent years. The year 2001/2002 has not been used in this analysis because the flow records were altered by a shutdown of the Lake Parangana outlet to allow installation of a power generator.

Each figure shows the flow that reached the bottom of the catchment after all stock, domestic, irrigation and industrial requirements were met. During the period of analysis the estimated *peak* daily requirement of water drawn directly from catchment streams was approximately 110ML/day. The information source for this estimate is a water usage survey undertaken by the Department in 1998/99. Catchment water usage following the survey is believed to have been similar.

The Plan provides for peak irrigation and industrial usage to increase by up to 35ML/day. This includes the unused portion of the Surety 4 Wesley Vale Mill allocation (~25ML/day), plus an additional 10ML/day to account for license applications made prior to 1 May 2003, where these applications have not led to actual irrigation development on the properties concerned (refer to Provision 3.2). The dashed line in Figures 10 to 12 illustrates the likely effect that this additional usage would have had in each of the three years analysed.

The figures also show the 'cease to take' flow that would have applied during each irrigation season. The cease to take flow is the flow released from Lake Parangana for environmental purposes, plus 22ML/day contribution from the lower catchment. Figures 10 to 12 show that the recorded flows at Latrobe over the three year period remained above the Plan's cease to take flow levels, indicating that there would not have been any restrictions if the Plan had been in effect during that time.

The dashed line in Figures 10 and 11 drops below the cease to take flow levels for about one to two weeks during each February/March period. In other words, there would have been some level of restriction put in place at these times if there had been an additional 35ML/day used, as provided for under the Plan. It would therefore have been necessary to restrict usage by between 10ML/day (Feb/Mar 2001) and 30ML/day (Feb/Mar 2003) in order to keep flows at Latrobe above the cease to take flows. *Under these hypothetical conditions*, it is likely that daily irrigation usage would have been restricted by between 10% and 30% for a period of up to 2 weeks.

It must be emphasised that the irrigation season with the most significant potential restrictions (2002/2003) was one of the driest on record. It is therefore reasonable to assume that the level of direct usage provided for under the Plan will not significantly effect the high reliability that agricultural and industrial water users currently enjoy.

Transfers of water allocations to highest value uses are also facilitated through the transfer provisions in Provision 3.5.

In summary, the Plan provides sufficient water to meet current and future water needs, through provisions that manage direct usage, takes into storage, and groundwater use. The Plan recognises that summer allocations are close to capacity, but that there is a considerable quantity of winter and flood water available for allocation. The Plan supports the maintenance and development of water-dependent businesses and will therefore have a beneficial effect on the catchment's economy.

Recreational users

The Plan will also have a positive impact on recreational and ecotourism usage. Recreational pursuits are more predominant in the lower part of the catchment and generally rely on the presence of water in the system, particularly over summer. Minimum environmental flows will be maintained at a low level of risk to instream biotic communities (as addressed in Section 5.3, Objective 1), and will thereby be maintained for recreational pursuits.

Ecotourism interests rely on healthy riverine landscapes and karst groundwater dependent ecosystems, and so rely on peak flow events to maintain groundwater, geomorphic and riparian vegetation processes, as well as minimum flows. In other words, these users rely on the range and variability of flows, or the flow regime, which is also provided under the Plan (addressed in Section 5.3, Objectives 2 and 3). Therefore it is considered that as the Plan meets the environmental objectives, it also meets the needs of recreational and ecotourism users and their businesses.

REFERENCES

Davies et al., (1997). *Mersey River Environmental Flow Study: Report to the Hydro-Electric Corporation Tasmania for the Mersey River Study Committee.*

Department of Primary Industries, Water and Environment (2001). *Environmental Management Goals for Tasmanian Surface Waters, Mersey River Catchment.*

Department of Primary Industries, Water and Environment (2004). *Guiding Principles for Water Trading in Tasmania.* Water Resources Policy #2003/2, Water Resources Division.

Department of Primary Industries, Water and Environment (2004). *Water Meter Standard June 2004.*

Edgar et al. (1999). A Classification of Tasmanian Estuaries and Assessment of their Conservation Significance using Ecological and Physical Attributes, Population and Land Use.

Government of Tasmania (1961). *Wesley Vale Pulp and Paper Industry Act.*

Government of Tasmania (1995). *Threatened Species Protection Act.*

Government of Tasmania (1997). *State Policy on Water Quality Management 1997.*

Government of Tasmania (1999). *Water Management Act 1999.*

Mersey River Working Group (1998). *Proposal for Monitoring Flow Releases, Mersey River.* Internal Scoping Document, Hydro Tasmania, 17pp.

APPENDICES

APPENDIX A - OBJECTIVES OF THE WATER MANAGEMENT ACT 1999

The purpose of the Plan is to provide a framework for managing the water resources of the Mersey River Catchment in accordance with the objectives of the Act.

The objectives of the Act are 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 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.

It is the obligation of the Minister, the Secretary, a water entity and any other person on whom a function is imposed or a power is conferred under the Act to perform the function or exercise the power in such a manner as to further the objectives of the Act and of the Resource Management and Planning System of Tasmania.

APPENDIX B – FIGURES ASSOCIATED WITH PART 5: STATUTORY REQUIREMENTS AND ASSESSMENTS

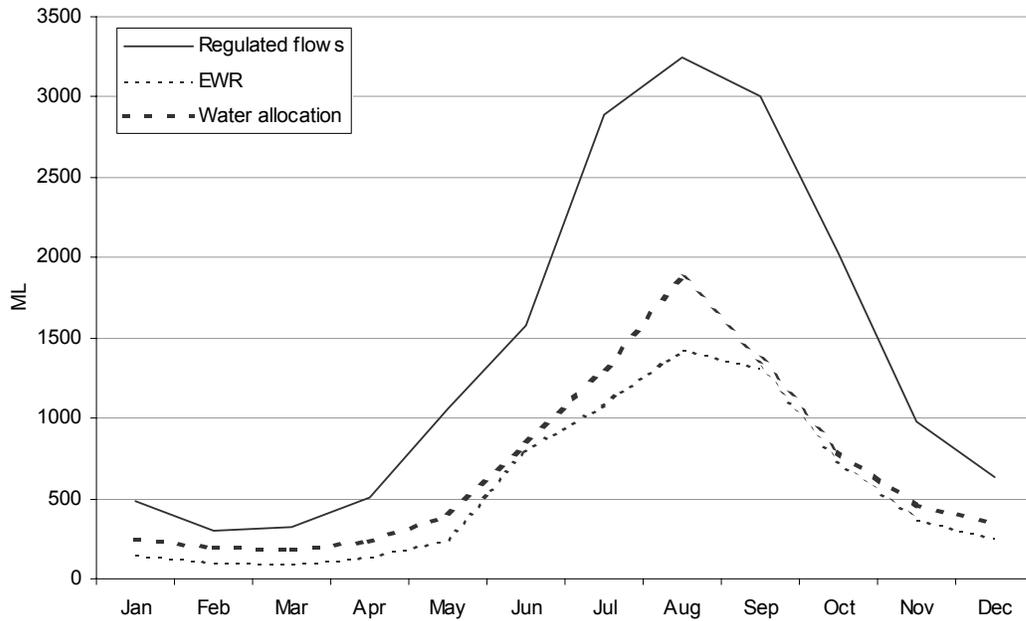


Figure 1. Mean monthly flows (ML/day) for the post dam years of record and low risk EWR boundary with added proposed water allocations in the Mersey River at Latrobe gauging station.

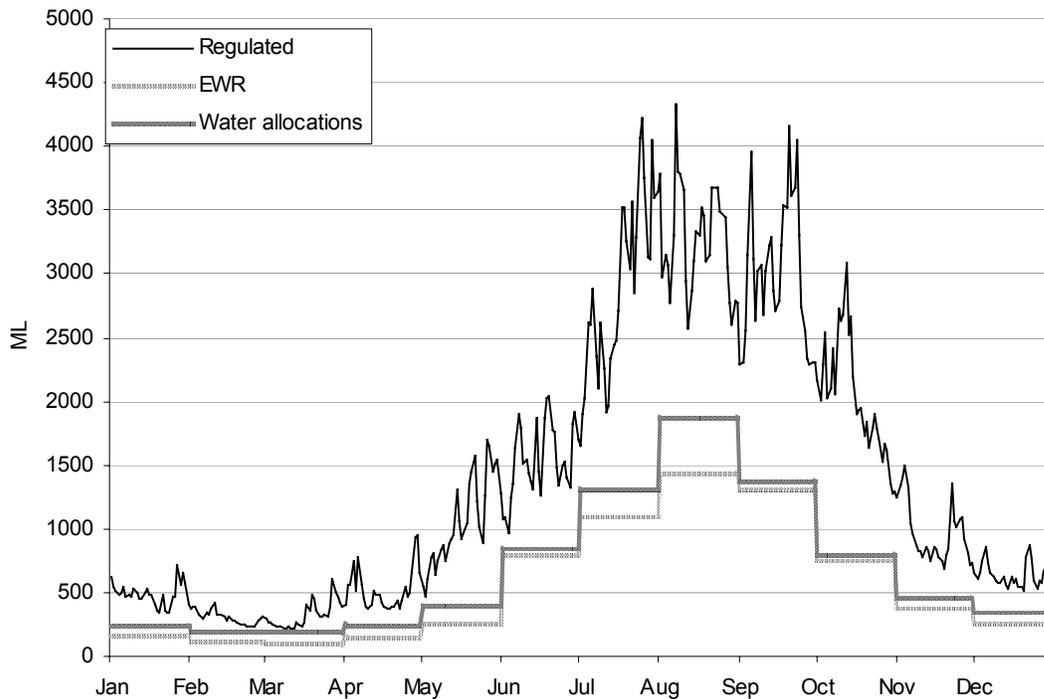


Figure 2. Daily hydrograph in ML, showing low risk EWR boundary with added proposed water allocations in the Mersey River at Latrobe gauging station.

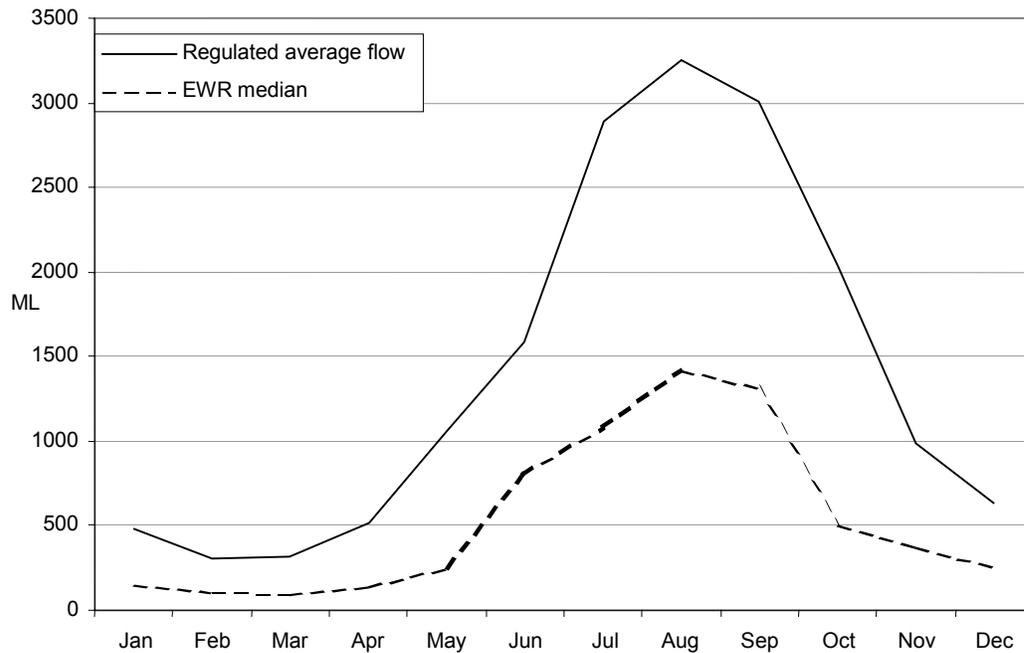


Figure 3. Average regulated flows and median EWRs in ML/day in the Mersey River at Latrobe gauging station.

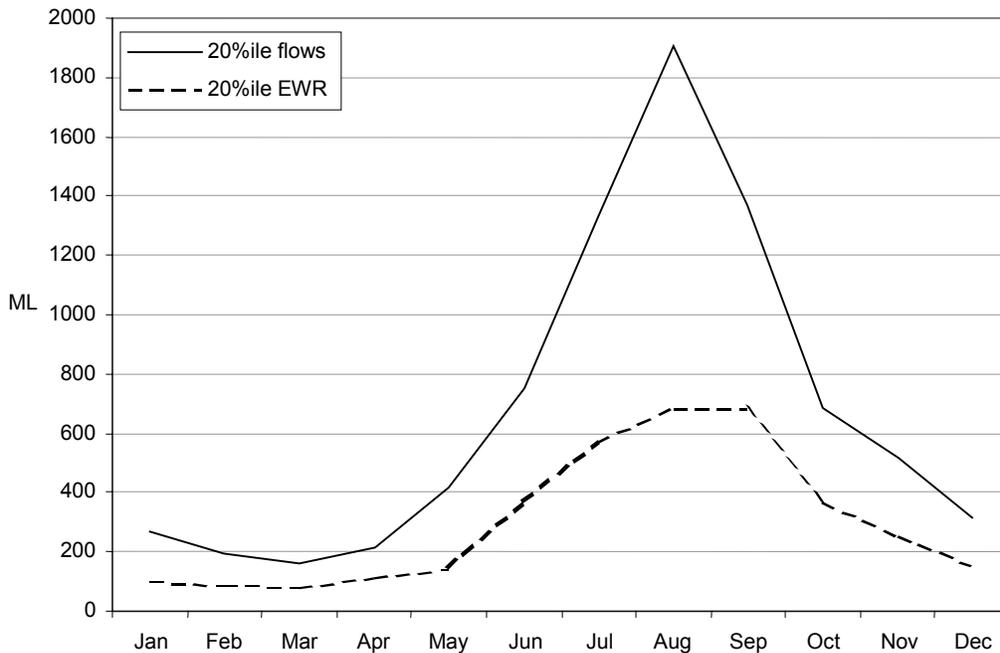


Figure 4. 20th percentile regulated flows and 20th percentile EWRs in ML/day in the Mersey River at Latrobe gauging station.

Table 1: Average recurrence of peak discharges (in ML) in Mersey River at Latrobe gauging station under regulated and current conditions.

Average recurrence	<i>Regulated</i>	<i>Current</i>
1 in 2 yrs	16430	16415
1 in 5 yrs	25238	25225
1 in 10 yrs	30419	30407
1 in 20 yrs	34858	34844
1 in 50 yrs	39899	39882
1 in 100 yrs	43219	43198

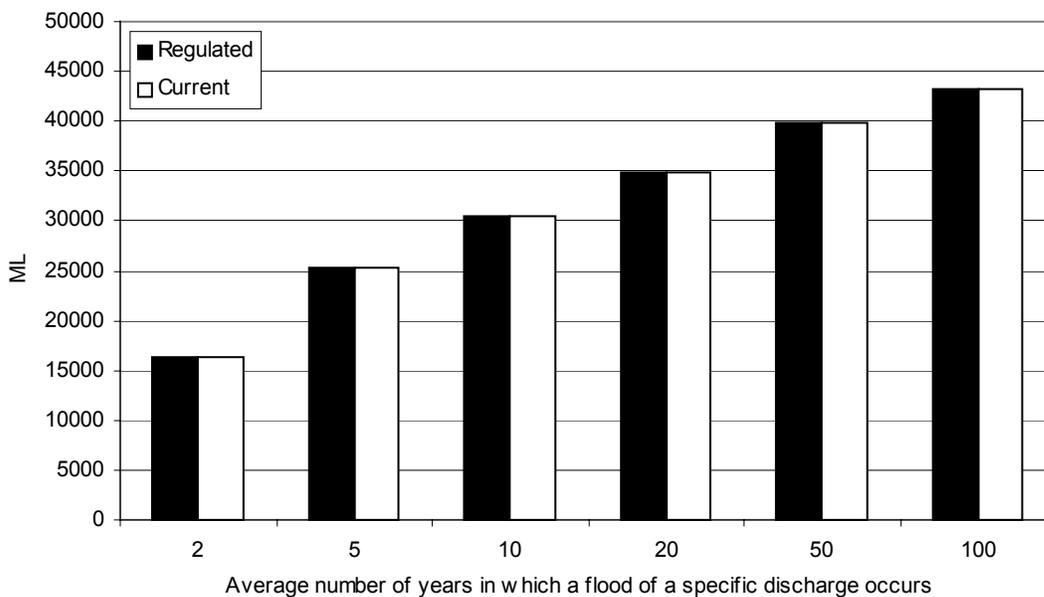


Figure 5. Average recurrence of flood peaks (in ML) in the Mersey River at Latrobe gauging station under regulated and current conditions.

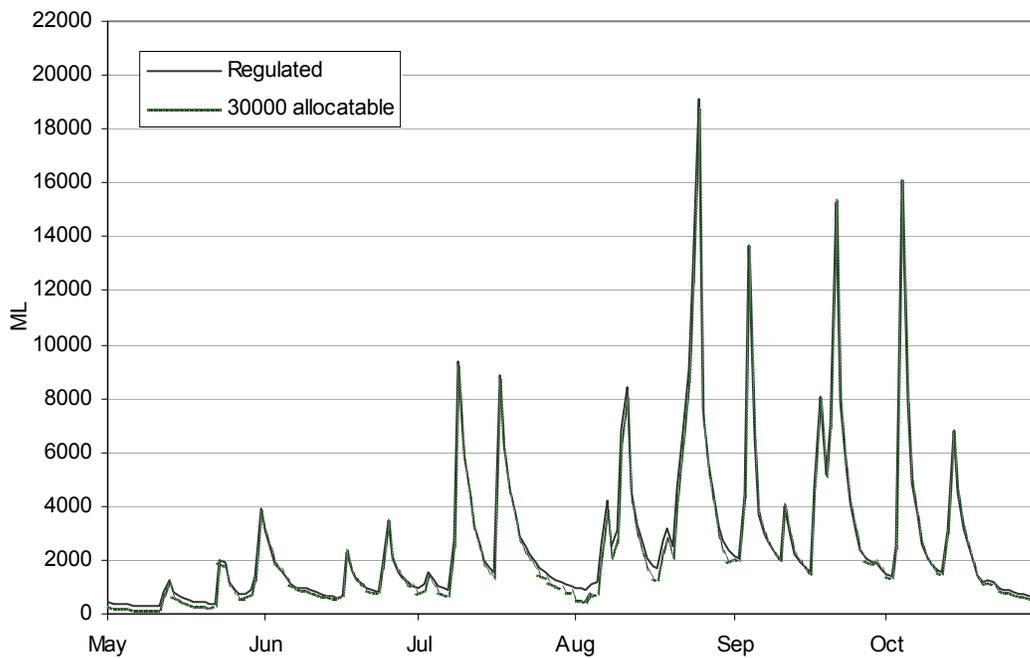


Figure 6. Winter hydrograph in ML/day for the Mersey River at Latrobe gauging station and proposed winter storage allocations (30,000ML volume) if fully allocated.

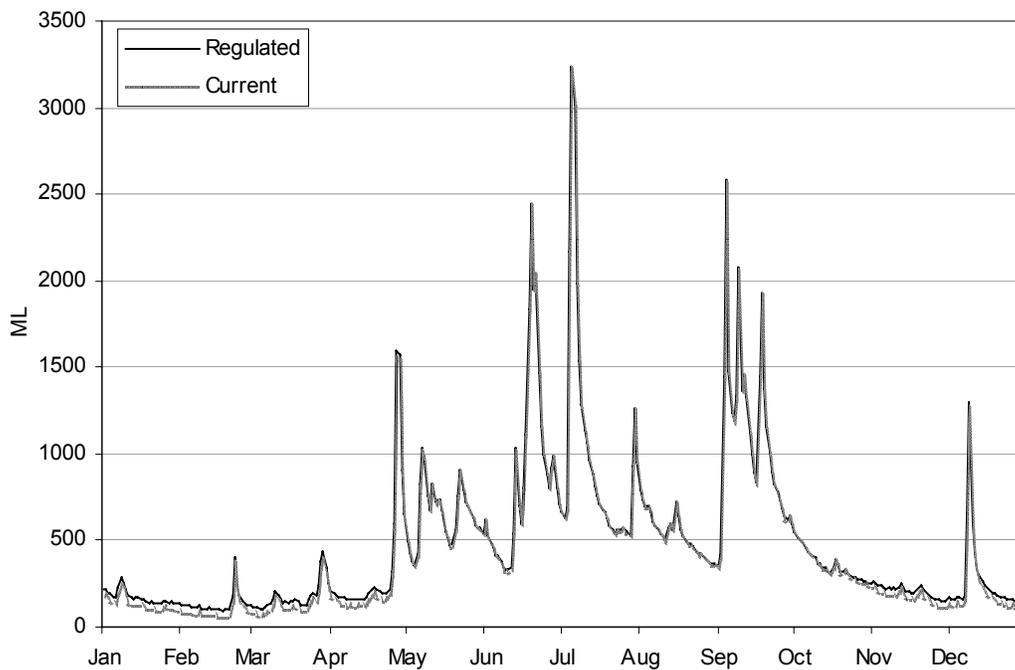


Figure 7. Flow regime (in ML/day) in the Mersey River at Latrobe gauging station under regulated and current conditions in an average dry year.

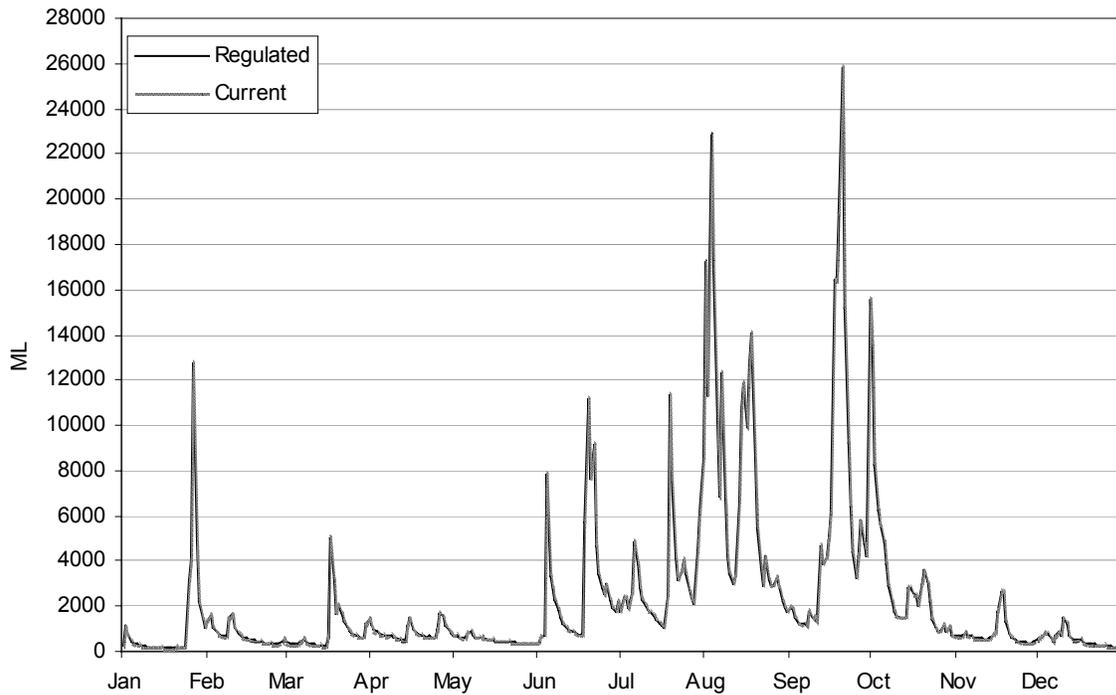


Figure 8. Flow regime (in ML per day) in the Mersey River at Latrobe gauging station under regulated and current conditions in an average wet year.

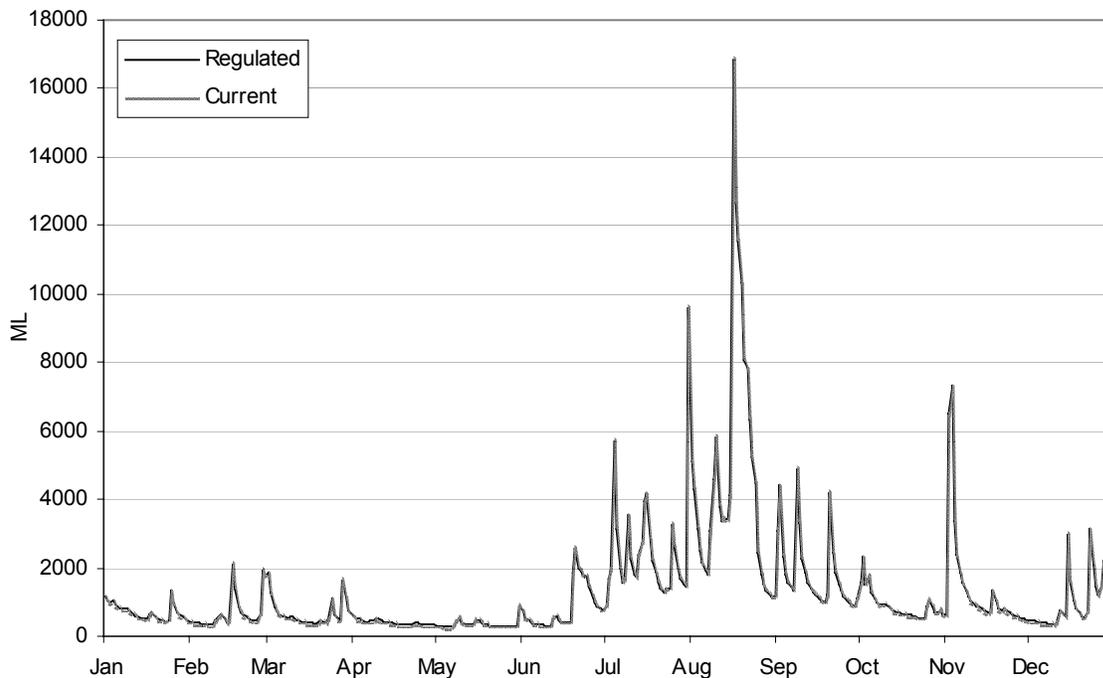


Figure 9. Flow regime (in ML per day) in the Mersey River at Latrobe gauging station under regulated and current conditions in an average year.

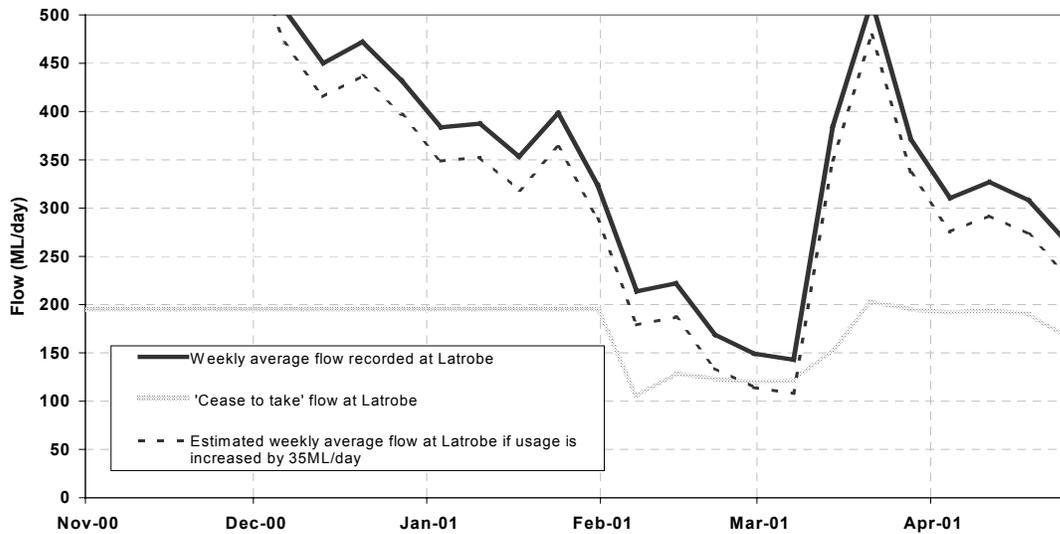


Figure 10. Post - release flows at the Latrobe gauging site (Nov 2000 to April 2001) and cease to take flows under the Plan

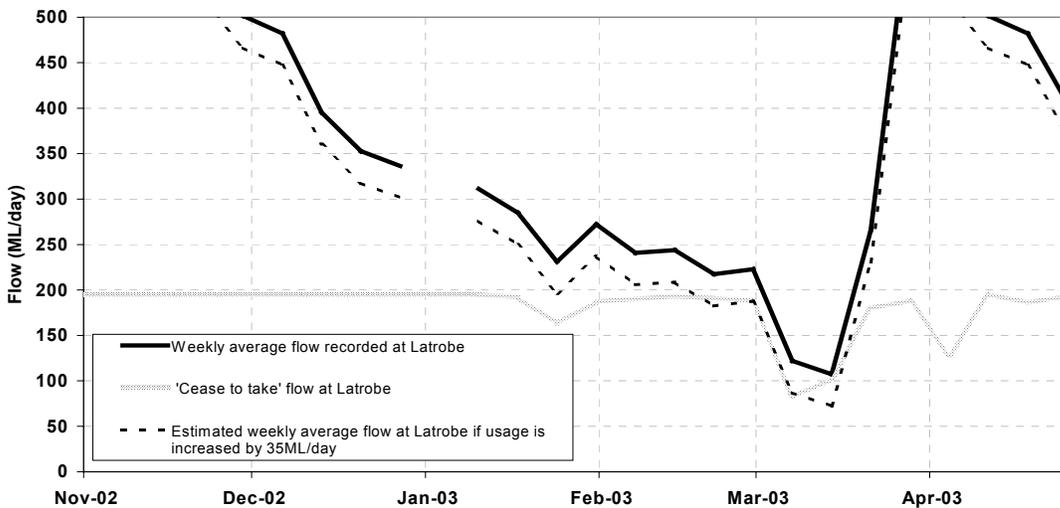


Figure 11. Post - release flows at the Latrobe gauging site (Nov 2002 to April 2003) and cease to take flows under the Plan

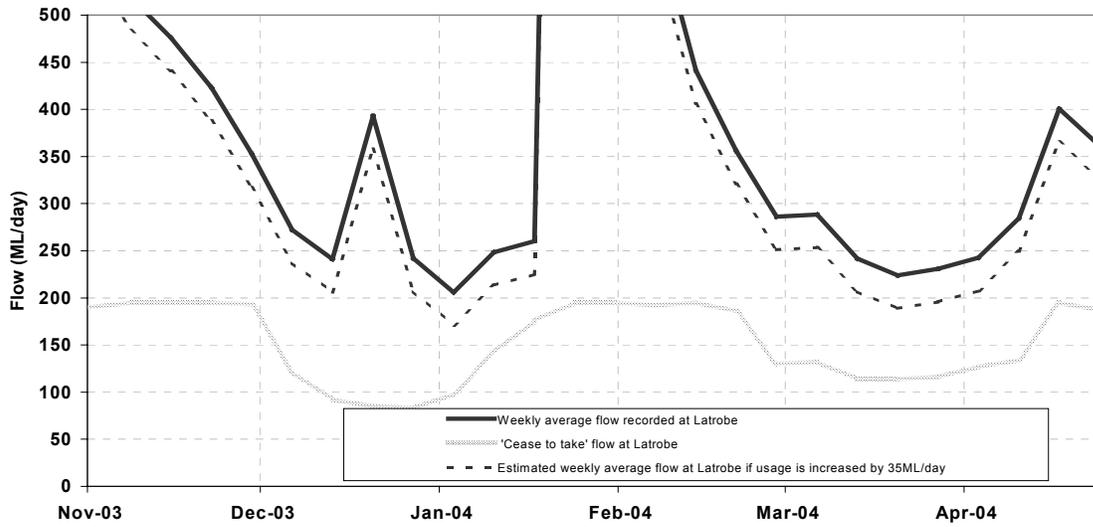


Figure 12. Post - release flows at the Latrobe gauging site (Nov 2003 to April 2004) and cease to take flows under the Plan