South Esk River Catchment Water Management Plan

June 2013

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

Tasmania
Explore the possibilities

Preferred Citation

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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

The South Esk River catchment (above its confluence with the Macquarie River) is located in the northeast and midlands of Tasmania and extends over an area of approximately 3,350 km^2. The catchment rises in the Fingal Tier in the east and is bounded by Ben Lomond and Mt. Saddleback to the north. Its principal subcatchments are drained by the Nile, St Pauls and Break O'Day Rivers. Downstream of Longford, the South Esk River receives inflow from the Macquarie and Meander Rivers before flowing into the Tamar Estuary, thus forming part of the South Esk Basin and the greater Tamar River Basin.

Two local government areas span the South Esk River catchment: the Break O'Day and the Northern Midlands municipalities. There are a number of towns and villages located along the South Esk River and its tributaries including St Marys, Mathinna, Fingal and Avoca in the upper half of the catchment, with Nile, Evandale and Perth being the major population centres in the lower part of the catchment. Most of these towns draw on the South Esk River or its tributaries for their water supply.

The South Esk River catchment supports a highly productive agricultural industry, with farming enterprises largely family-owned and operated, and focusing on irrigated annual cropping, and dryland grazing. Given the suitable physical attributes of the catchment, there is potential for an expansion in irrigated agriculture.

As well as agriculture, the catchment supports a range of forest enterprises and mining industries as well as tourism and recreational ventures.

The South Esk River system is an unregulated system. Whilst farm storages have been built to capture water during the winter months for use in subsequent irrigation seasons, there are no very large dams which regulate the river's flow regime.

Because of its unregulated nature, whilst the river's flow regime is modified, primarily due to the combined influences of water abstraction during the summer irrigation season and other land use practices, it still retains the key elements of the natural flow regime, including: seasonal distribution and variability in flows; frequency, magnitude and duration of flood flow events; and for the most part, natural rates of rise and fall in river level.

The South Esk River has a large annual discharge, and can be considered a highly reliable water resource, particularly with respect to winter flows. Whilst summer flows may become less reliable due to climate change and drought, winter flows will continue to provide a high level of resource security and offer scope for additional irrigation development.

The location of the South Esk River catchment within a hydro-electric district is of key importance in the context of this Water Management Plan. Hydro Tasmania holds a Special Licence under Division 6 of Part 6 of the *Water Management Act 1999*, conferring upon it the right to all the water resources of the catchment (excluding the relatively small volume of water under entitlements held by other water licensees and rights to water under Part 5 of the Act).

As Hydro Tasmania captures water in Trevallyn Dam at the lower end of the South Esk Basin, flows throughout the river system have largely been quarantined from allocation for consumptive use. This arrangement has preserved the natural pattern of flows in the catchment and hence provides the water needs of the environment. Due to its largely unmodified hydrology, the South Esk River has retained many of its freshwater-dependent natural values, a number of which have high conservation value.

There has been a relatively small amount of water allocated for consumptive use, in comparison to the median annual discharge of the river. Notwithstanding the limited amount of consumptive water allocation, in the recent past demand and competition for additional irrigation water under Surety Level 8 allocations has increased, so much so that a moratorium on applications for further Surety Level 8 allocations was imposed in late 2008.

To date, this water has been the most accessible for farmers as Hydro Tasmania transferred the rights to take it without charge (on the basis that it was water that was not able to be captured in Trevallyn Dam and used to generate electricity), and because the flow level at which it could be taken was considered to occur frequently enough to make its taking worthwhile utilising existing infrastructure and new on-farm storages.

The limited amount of existing consumptive water allocation means that there is real scope for sustainable irrigation development based on capturing a proportion of highly reliable winter flows, subject to the agreement of Hydro Tasmania to transfer the rights to take the water.

In this regard, the Lower South Esk Irrigation Scheme was constructed in 2012-2013. Operated by Tasmanian Irrigation, the Scheme takes approximately 6,000 ML of water annually from the South Esk River during winter, store it in Milford Dam, and then supply this water to farmers during the irrigation season by releasing it back into the South Esk River and conveying it downstream.

Furthermore, with the relatively frequent occurrence of flood flows in this river, typically with peak magnitudes of 30,000 – 50,000 ML/day, there is potentially a very large amount of water that could be captured opportunistically. As yet, this part of the resource has not been utilised for consumptive purposes.

The South Esk 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 town and stock and domestic supply, electricity generation, irrigation, recreation and tourism are preserved into the future.

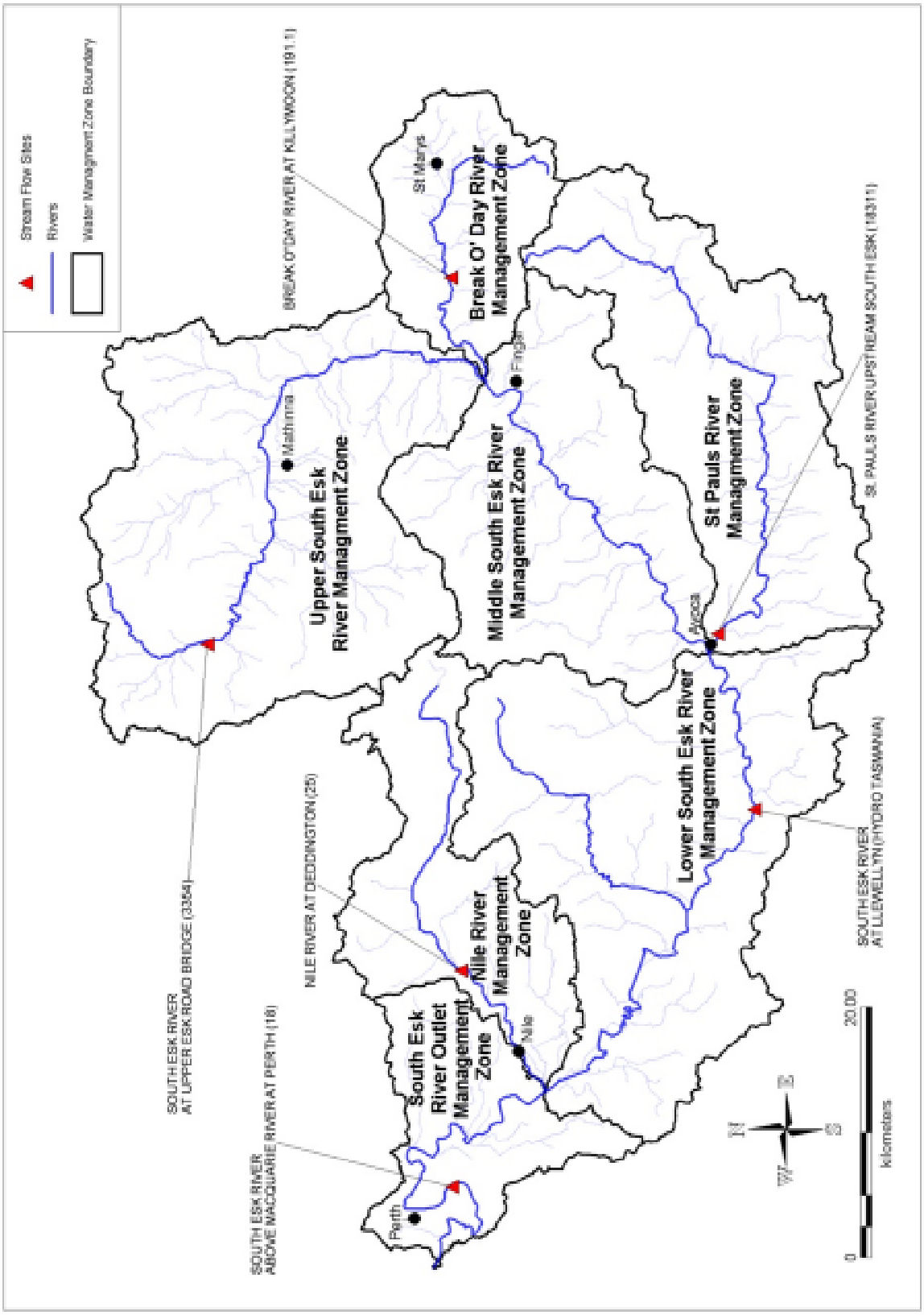

Figure 1 South Esk River catchment showing management zones and stream flow gauging stations.

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PART 1 INTRODUCTION

1.1 Name of Plan

This Plan is titled the South Esk 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 16 June 2013, and takes 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 South Esk River catchment (hereafter ***this catchment***), as shown in Figure 1.

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 St Pauls River and all of its tributaries (hereafter the ***St Pauls River Management Zone***);

b) the Break O'Day River and all of its tributaries (hereafter the ***Break O'Day River Management Zone***);

c) the Nile River and all of its tributaries (hereafter the ***Nile River Management Zone***);

d) the South Esk River and all of its tributaries that enter the South Esk River upstream of its confluence with the Break O'Day River (hereafter the ***Upper South Esk River Management Zone***);

e) the South Esk River and all of its tributaries that enter the South Esk River downstream of its confluence with the Break O'Day River but upstream of its confluence with the St Pauls River (hereafter the ***Middle South Esk River Management Zone***);

f) the South Esk River and all of its tributaries that enter the South Esk River downstream of its confluence with the St Pauls River but upstream of its confluence with the Nile River (hereafter the ***Lower South Esk River Management Zone***);

g) the South Esk River and all of its tributaries that enter the South Esk River downstream of its confluence with the Nile River but upstream of its confluence with the Macquarie River (hereafter the ***South Esk River Outlet 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 and 5) provide a sound management system for the water resources of the South Esk River catchment, and a water regime that best gives effect to the objectives of the Plan.

These provisions are made in accordance with sections 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 South Esk River catchment, which recognises and balances the water needs of the environment with the 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, which have been developed in consultation with the community. 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) Maintain and enhance water dependent ecosystems.

b) Provide adequate environmental base flows.

c) Maintain variable flows including flood events to support water dependent ecosystems.

d) Ensure that environmental water receives a greater level of security than consumptive water, other than essential town water supplies and stock and domestic water supplies.

e) Avoid water quality impacts during conveyance of water via a watercourse.

f) Recognise the connectivity between groundwater and surface water.

2.2.2 Water Usage and Development Objectives

a) Ensure security of water for stock and domestic use and town supply.

b) Actively encourage the taking of water in winter and reduce reliance/emphasis on summer water abstraction.

c) Accurately monitor and assess water resources and water use.

d) Protect existing rights when considering further allocations.

e) Identify water for growth and foster development of the water resource subject to water availability.

2.2.3 Social Objectives

a) Recognise the importance to the community of the use of the river for recreational purposes and tourism.

b) Maintain the aesthetic values of the river.

c) Seek to maintain the health of the river system essential for the happiness, welfare and prosperity of the people in the South Esk River catchment, now and into the future.

d) Increase community knowledge of water resources and the links between water use and river health.

e) Increase community involvement in managing the river's water resources.

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 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 2004), 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.

In order to account for conveyance losses due to seepage and evaporation, and ensure that only the water conveyed that actually reaches the extraction point is taken, accounting for conveyance losses will be a condition of any Watercourse Authority granted. Under this Plan, establishing conditions to account for losses of water conveyed within and between the management zones described in Part 1.6.1 of this Plan will be guided by the information set out in Table 1.

Table 1 Guideline loss rates for conveyance of water between management zones within the South Esk River catchment.

		TO						
		Zone 1	**Zone 2**	**Zone 3**	**Zone 4**	**Zone 5**	**Zone 6**	**Zone 7**
FROM	**Zone 1**	0	-	-	-	-	25%	35%
	Zone 2	-	0	-	-	25%	35%	45%
	Zone 3	-	-	0	-	-	-	25%
	Zone 4	-	-	-	0	10%	20%	30%
	Zone 5	-	-	-	-	0	10%	20%
	Zone 6	-	-	-	-	-	0	10%
	Zone 7	-	-	-	-	-	-	0

Zone 1: the St Pauls River Management Zone
Zone 2: the Break O'Day River Management Zone
Zone 3: the Nile River Management Zone
Zone 4: the Upper South Esk River Management Zone
Zone 5: the Middle South Esk River Management Zone
Zone 6: the Lower South Esk River Management Zone
Zone 7: the South Esk River Outlet Management Zone

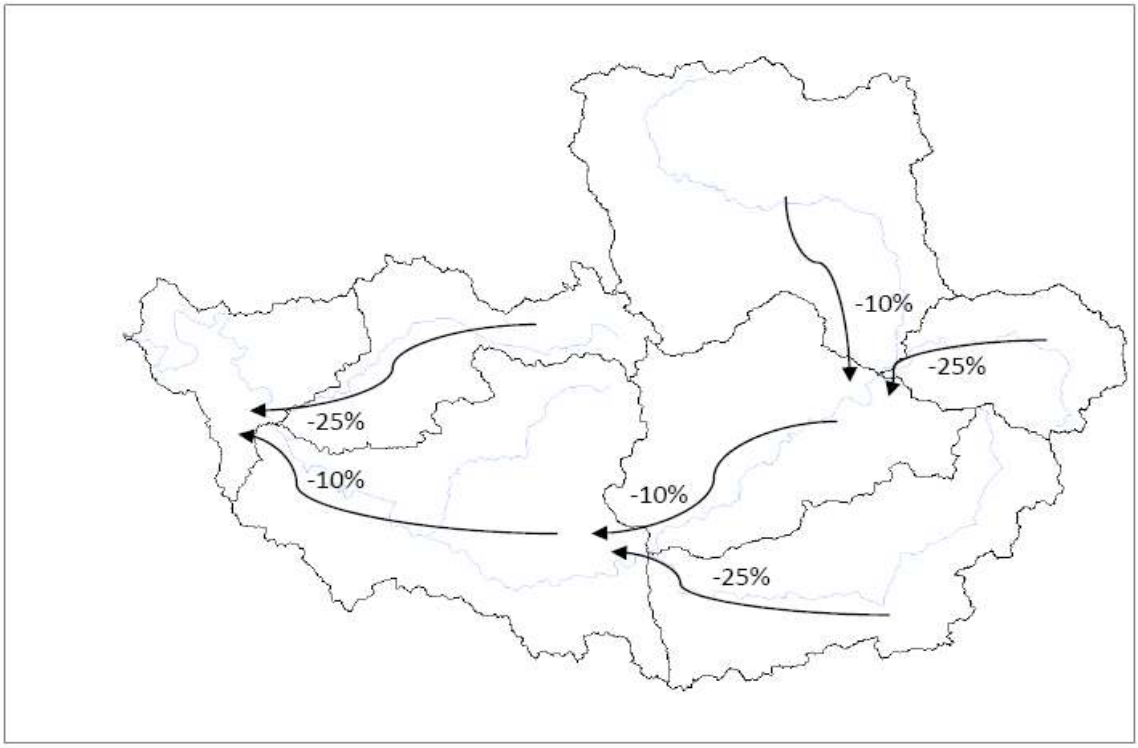

Figure 2 Guideline loss rates for conveyance of water via a watercourse in the South Esk River catchment.

In Table 1, a loss rate of 0 indicates that in general, no losses have to be accounted for and all the water conveyed can be taken at the extraction point, whereas 20% indicates that in general, 20% losses will apply and hence only 80% of the water conveyed can be taken at the extraction point (where no value is given water may not be conveyed between the relevant zones).

As examples, an application to convey 20 ML of water from Mathinna to Pig Creek (both within the Upper South Esk River Management Zone), would not generally have to account for any conveyance losses. An application to convey 20 ML of water from Mathinna to Evandale (from the Upper South Esk River Management Zone to the South Esk River Outlet Management Zone) would generally have to account for losses of 30%, effectively allowing the downstream recipient to extract 14 ML. An application to convey 50 ML of water from Royal George to Avoca (both in the St Pauls River Management Zone) would not generally have to account for any conveyance losses, whereas an application to convey 50 ML of water from Royal George to Glen Esk (in the Lower South Esk River Management Zone) would generally have to account for losses of 25%, effectively allowing the downstream recipient to extract 37.5 ML.

Whilst the approval of a Watercourse Authority will be guided by the conveyance loss rates set out in Table 1, relevant specific circumstances of each individual conveyance, and information provided by applicants for a Watercourse Authority, will be considered in the approval process.

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.

All water taken under Surety Level 8 allocations must be taken through a water meter installed in accordance with the relevant Departmental standard.

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 also 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 Groundwater Management

This Plan recognises the connectivity between surface water and groundwater. Accordingly 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.

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 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 and 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.

With respect to surface water, this Plan provides scope for further development in this catchment through the potential provision of new water allocations.

The granting of new water allocations will be undertaken in accordance with Part 6 of the Act, and any relevant policies and guidelines developed under section 8(1)(b) in place at the relevant time. In granting a new 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).

As this catchment falls within the South Esk River Hydro-electric District, the water resources in the catchment are in effect already fully committed. Hydro Tasmania holds a Special Licence under Division 6 of Part 6 of the Act, conferring on it the right to all the water resources of this catchment, with the exception of rights held under Part 5 of the Act, and by other licensees, whose rights were either granted at the commencement of the Act to replace existing rights, or have been granted since by means of a transfer with the agreement of Hydro Tasmania.

As such the allocation limits established in this Plan do not identify additional water for allocation, but rather the volume of water potentially available for new allocations by means of transfer from Hydro Tasmania. The granting of new allocations will be within the specified limits of this Plan and subject to the agreement of Hydro Tasmania.

Any application for a water licence, new allocation or transfer will be assessed on a case by case basis, 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 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 any entitlements 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 323 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 three licences with Surety Level 3 allocations in this catchment.

Surety Level 4 Water access entitlements of special licensees such as Hydro Tasmania (under Part 6, Division 6 of the Act).

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.

Surety Level 7 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 6.

Surety Level 8 Water access entitlements under Part 6 of the Act for the taking of low reliability water. Water under these allocations can only be taken when the relevant flow threshold has been reached.

In addition to allocations granted at the various levels of surety, this Plan also provides licensees with opportunistic access to take flood water in this catchment. Given the opportunistic nature of this water, access will be provided by notice 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 5.3 of this Plan).

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 November 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 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 Conversion of Summer Take Allocations to Winter take Allocations

A licensee may apply to vary the take period of an allocation, in which case the agreement of Hydro Tasmania is required prior to the variation being approved. Where a variation is sought to convert a summer take allocation to a winter take allocation, an increase of up to 30% of the water volume may be granted where this has first been agreed by Hydro Tasmania.

4.4 Surface 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 best give effect to the Plan's objectives.

4.4.1 Surface Water Yield

The median annual yield of the South Esk River catchment is estimated at 807,787 ML, based on data from 1970 to 2003.

The surface water yield of each subcatchment 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

each of the subcatchment outlets over a 33 year period (1970 to 2003), and are set out in Tables 2 and 3.

Table 2 Surface water yield for the summer take period for each management zone of the South Esk River catchment (at the subcatchment outlet).

	Yield (ML)	
	80% reliability[1]	50% reliability (median yield)[2]
St Pauls River Management Zone	5,669	11,460
Break O'Day River Management Zone	6,553	18,451
Nile River Management Zone	8,552	14,700
Upper South Esk River Management Zone	29,475	55,275
Middle South Esk River Management Zone	45,882	85,781
Lower South Esk River Management Zone	70,140	115,676
South Esk River Outlet Management Zone	82,359[3]	135,587[3]

Table 3 Surface water yield for the winter take period for each management zone of the South Esk River catchment (at the subcatchment outlet).

	Yield (ML)	
	80% reliability[1]	50% reliability (median yield)[2]
St Pauls River Management Zone	8,772	28,814
Break O'Day River Management Zone	17,600	39,192
Nile River Management Zone	61,359	91,381
Upper South Esk River Management Zone	177,230	252,470
Middle South Esk River Management Zone	232,737	340,576
Lower South Esk River Management Zone	307,140	457,432
South Esk River Outlet Management Zone	382,962[3]	558,409[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 the total yield of the South Esk River catchment.

4.4.2 Summer Take Allocations

Allocation limits for each management zone for the summer take period are set out in Table 4 (refer Part 7.3.1 of this Plan for an explanation of how these limits were derived). In this catchment, the total volume of water available as summer take allocations, at a level of reliability of greater than 50% is 22,660 ML[4].

As at the date of this Plan's adoption, the volume of existing summer take allocations (at Surety Levels 5 and 6) is 14,718 ML. On this basis there is scope for the granting of new summer take allocations (up to 7,942 ML in this catchment), noting that this will be subject to the agreement of Hydro Tasmania to transfer the rights to take the water.

To ensure that there is no impact on the reliability of existing summer take allocations and ensure that adequate water is available for the environment, any new summer take allocations will be granted at Surety Level 7, and will also be subject to conditions that ensure allocations at a higher surety level have priority of access during times when surface water is limited. Any new summer take allocations must be recognised as having a relatively low level of reliability.

4.4.3 Winter Take Allocations

Allocation limits for each management zone for the winter take period are set out in Table 5 (refer Part 7.3.1 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 greater than 50% is 134,816 ML[5].

As at the date of this Plan's adoption, the volume of existing winter take allocations (at Surety Levels 5 and 6) is 20,540 ML. On this basis, there is considerable scope for the granting of new winter take allocations, noting that this will be subject to the agreement of Hydro Tasmania to transfer the rights to take the water. New winter take allocations will generally be granted at Surety Level 6. Where a new winter take allocation is demonstrated to be at a level of reliability of less than 80%, it will be granted at Surety Level 7 and will also be subject to conditions that ensure allocations at a higher surety level have priority of access during times when surface water is limited.

[4] Reliability indicates the likelihood of the total volume of 22,660 ML being available during the summer take period. Whilst this *volume* is likely to be available at a level of 50% reliability over the take period, daily flow conditions and the application of daily access rules (cease to take and daily limits on extraction) may limit the extent to which water is accessible on a daily basis. Based on historical flow records (1973 – 2008) it is likely that Surety Level 5 and Surety Level 6 water demands may be met in full during the summer take period between 23 days per month and 29 days per month and 17 days per month and 24 days per month respectively.

[5] Reliability indicates the likelihood of the total volume of 134,816 ML being available during the winter take period. Whilst this *volume* is likely to be available at a level of 50% reliability over the take period, daily flow conditions and the application of daily access rules (cease to take and daily limits on extraction) may limit the extent to which water is accessible on a daily basis.

Table 4 Allocation limits for the summer take period for each management zone of the South Esk River catchment, indicating the volume of water available for allocation at the subcatchment outlet[6].

	Allocation Limit (50% and Greater Reliability) (ML)[7]	Existing Summer Take Allocations (ML)[8]	Existing Summer Take Allocations (Cumulative) (ML)[9]	Additional Summer Take Allocations (ML)[10]
St Pauls River Management Zone	2,274	1,052		1,222
Break O'Day River Management Zone	3,831	248		3,583
Nile River Management Zone	2,069	2,069[11]		0
Upper South Esk River Management Zone	10,603	2,364		8,239
Middle South Esk River Management Zone	13,742	2,228	4,840	8,902
Lower South Esk River Management Zone	20,588	3,530	9,422	11,166
South Esk River Outlet Management Zone	22,660[12]	3,227	14,718[13]	7,942[14]

[6] Water availability at a local scale will be dependent on location in the subcatchment.

[7] Whilst these allocation limits allow water to be allocated up to the relevant volume within an individual management zone, the total volume of allocations across these zones must be within the allocation limit for the South Esk River catchment (22,660 ML).

[8] Indicates volume of water allocated within each management zone, as at the date of this Plan's adoption.

[9] Indicates the cumulative volume of water allocated within, and upstream of, each management zone (for zones which are fed by upstream zones).

[10] These volumes are the difference between the allocation limits and the volumes of existing summer take allocations (cumulative volume for zones which are fed by upstream zones). Hydro Tasmania is legally entitled to this water under its Special Water Licence and hence an agreement with Hydro Tasmania to transfer rights to the water will be required for any additional summer take allocations.

[11] At the date of this Plan's adoption, there are two Surety Level 3 allocations in the Nile River subcatchment totaling 7,320 ML, under which water can be taken over the entire year. As there is a total volume of 280 ML of Surety Level 5 and 6 summer take allocations in the Nile River subcatchment, it is assumed that 1,789 ML of the Surety Level 3 volume is taken during the summer take period.

[12] Indicates total volume of water available for summer take allocation in the South Esk River catchment.

[13] Indicates total volume of existing summer take allocations in the South Esk River catchment, as at the date of this Plan's adoption.

[14] Indicates total volume of water available for additional summer take allocations in the South Esk River catchment, as at the date of this Plan's adoption.

Table 5 Allocation limits for the winter take period for each management zone of the South Esk River catchment, indicating the volume of water available for allocation at the subcatchment outlet[15].

	Allocation Limit (50% and Greater Reliability) (ML)[16]	Existing Winter Take Allocations (ML)[17]	Existing Winter Take Allocations (Cumulative) (ML)[18]	Additional Winter Take Allocations (ML)[19]
St Pauls River Management Zone	6,023	353		5,670
Break O'Day River Management Zone	13,638	828		12,810
Nile River Management Zone	19,106	8,449[20]		10,657
Upper South Esk River Management Zone	66,523	2,166		64,357
Middle South Esk River Management Zone	97,911	322	3,316	94,595
Lower South Esk River Management Zone	116,777	5,930	9,599	107,178
South Esk River Outlet Management Zone	134,816[21]	2,492	20,540[22]	114,276[23]

[15] Water availability at a local scale will be dependent on location in the subcatchment.

[16] Whilst these allocation limits allow water to be allocated up to the relevant volume within an individual management zone, the total of allocations across these zones must be within the allocation limit for the South Esk River catchment (134,816 ML).

[17] Indicates volume of water allocated within each management zone, as at the date of this Plan's adoption.

[18] Indicates the cumulative volume of water allocated within, and upstream of, each management zone (for zones which are fed by upstream zones)

[19] These volumes are the difference between the allocation limits and the volumes of existing winter take allocations (cumulative volume for zones which are fed by upstream zones). Hydro Tasmania is legally entitled to this water under its Special Water Licence and hence an agreement with Hydro Tasmania to transfer rights to the water will be required for any additional winter take allocations.

[20] The remaining 5,531 ML of the Surety Level 3 allocations in the Nile River subcatchment is assumed to be taken during the winter take period, in addition to 2,918 ML of Surety Level 5 allocation (see footnote 10, page 17).

[21] Indicates total volume of water available for winter take allocation in the South Esk River catchment.

[22] Indicates total volume of existing winter take allocations in the South Esk River catchment, as at the date of this Plan's adoption.

[23] Indicates the total volume of water available for additional winter take allocations in the South Esk River catchment, as at the date of this Plan's adoption.

4.4.4 Surety Level 8 Allocations

A significant amount of water has been allocated in the South Esk River catchment at Surety Level 8 (Table 6; refer Appendix D).

Table 6 Surety Level 8 allocations in the South Esk River catchment.

	Surety Level 8 Allocations (Number)[24]	Surety Level 8 Allocations (ML)[24]	Estimated Maximum Daily Extraction (ML)[24]
St Pauls River Management Zone	2	490	30
Break O'Day River Management Zone	0	0	0
Nile River Management Zone	0	0	0
Upper South Esk River Management Zone	0	0	0
Middle South Esk River Management Zone	0	0	0
Lower South Esk River Management Zone	5	5,458	377
South Esk River Outlet Management Zone	1(8)[25]	206(6,154)[25]	10(417)[25]

This Plan provides for the daily management of extraction of water under Surety Level 8 allocations. In addition to specifying threshold flow levels at which water can be taken under Surety Level 8 allocations (refer Part 5.2 of this Plan), the taking of water will be limited to an overall maximum volume of 600 ML/day for this catchment.

Under this Plan, maximum daily extraction rates will be specified on relevant water licences. This will occur after all pending applications for Surety Level 8 allocations (those received prior to 1 December 2008) have been processed. The specification of maximum daily extraction rates will consider existing levels of extraction, and provide for reasonable extraction rates in regard to pending applications. In specifying these rates, the aim will be to achieve an overall maximum volume of daily extraction of 600 ML/day for this catchment.

As set out in Table 6, the estimated maximum volume of water extracted on a daily basis in this catchment under existing Surety Level 8 allocations is 417 ML. In the event that the setting of daily extraction rates on Surety Level 8 allocations (including those related to pending applications) provides an overall maximum volume of extraction that is less than 600 ML/day, additional Surety Level 8 allocations may be considered.

[24] As at the date of this Plan's adoption.
[25] Figure in brackets refers to the South Esk River catchment.

4.5 Opportunistic Access to Water

In addition to allocations granted at the various levels of surety, this Plan 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 5.3 of this Plan).

4.6 Authorisation to Take Water Under Section 90 of the Act

In addition to opportunistic access as provided for under Parts 4.5 and 5.3 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.

In accordance with section 90 of the Act, permission may only be granted to take water from a water resource within a hydro-electric district with the agreement of the relevant electricity entity. As this catchment is within the South Esk Hydro-electric District, the agreement of Hydro Tasmania is required before permission can be granted.

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 restriction 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, 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[26], will not be permitted when the measured flow drops to the thresholds set out in Table 7.

Table 7 Cease to take thresholds (ML/day) as measured at the relevant stream flow gauging station (South Esk River at Llewellyn for the South Esk River and Break O'Day River Management Zones; St Pauls River above South Esk River for the St Pauls River Management Zone; and Nile River at Deddington for the Nile River Management Zone).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
South Esk River and Break O'Day River Management Zones	40	40	40	40	250	400	700	800	1,000	560	220	40
St Pauls River Management Zone	2	2	2	2	18	20	40	48	48	22	16	2
Nile River Management Zone	9	9	9	9	28	23	23	23	23	27	22	9

Whenever the cease to take provision is in effect, owners of an instream dam are required to ensure that its outlet is operated to pass all inflow entering the storage (with the exception of water taken for a specified purpose under Part 5 of the Act). 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.

It should be noted that the cease to take thresholds set out in Table 7 do not take into account water that may be conveyed in the South Esk River catchment, where that water passes a relevant stream flow gauging station. Any conveyance volume registering at a

[26] Surety Level 3 allocations on the Nile River will also be exempted from the cease to take provision.

relevant stream flow gauging station will need to be factored in to the application of restrictions.

5.1.2 Staged Restriction Management Regime for the Taking of Water Under Summer Take Allocations

In this catchment, the implementation of restrictions on the taking of water during the summer take period will be guided by a staged restriction management regime. The staged restriction management regime provides guidance on the progressive implementation of restrictions, and is intended to ensure a fair and orderly transition from no restrictions, through to the prohibition of the taking of water, depending on stream flow conditions.

Under the staged restriction management regime, the taking of water under lower surety allocations will progressively be restricted, followed by the taking of water under higher surety allocations, as necessary.

The implementation of restrictions on the taking of water under summer take allocations will be guided by the staged restriction management regime set out in Tables 8 and 9.

The prohibition on the taking of water under Surety Level 7 allocations is set at a relatively high flow level, recognising the needs of the freshwater ecosystem and that these will be new allocations.

Table 8 Restriction stages for summer take allocations in the South Esk River catchment, excluding the St Pauls River and Nile River Management Zones, as measured at the stream flow gauging station on the South Esk River at Llewellyn.

Restriction Stage	Threshold Flow (ML/day)		Restrictions
	December to April	November	
Stage 1	339	527	Prohibition on the taking of water under Surety Level 7 allocations
Stage 2	125	305	50% reduction on the taking of water under Surety Level 6 allocations
Stage 3	105	285	Prohibition on the taking of water under Surety Level 6 allocations
Stage 4	86	266	50% reduction on the taking of water under Surety Level 5 allocations
Stage 5	50	230	50% reduction on the taking of water under Surety Level 5 allocations - water to be taken on Tuesday, Thursday and Saturday only
Stage 6	40	220	Cease to take - prohibition on the taking of water under Surety Level 5 allocations

Table 9 Restriction stages for summer take allocations in the St Pauls River Management Zone, as measured at the stream flow gauging station on the St Pauls River above the South Esk River.

Restriction Stage	Threshold Flow (ML/day)		Restrictions
	December to April	November	
Stage 1	32	32	Prohibition on the taking of water under Surety Level 7 allocations
Stage 2	6	20	50% reduction on the taking of water under Surety Level 6 allocations
Stage 3	4.5	18.5	Prohibition on the taking of water under Surety Level 6 allocations
Stage 4	3	17	50% reduction on the taking of water under Surety Level 5 allocations
Stage 5	2	16	Cease to take - prohibition on the taking of water under Surety Level 5 allocations

The restriction thresholds at which the taking of water under Surety Level 7 allocations in the summer take period is prohibited (ranging between 339 and 527 ML/day as measured at Llewellyn) are higher than the restriction thresholds for Surety Level 8 allocations (see Tables 9 and 11). The lower restriction thresholds for Surety Level 8 allocations reflect that water is being taken under receding high flow conditions (i.e. a high flow event has already passed through the system), whereas the restriction thresholds at which the taking of water under Surety Level 7 allocations is prohibited are intended to operate across a much broader range of flow conditions, and primarily when flows are well below the Surety Level 8 access thresholds.

Notwithstanding this, at any time during the summer take period when water is authorised to be taken under Surety Level 8 allocations, the restriction thresholds specified for Surety Level 8 allocations (Table 11) will also apply to Surety Level 7 allocations. At all other times during the summer take period, the restriction thresholds specified in Table 9 for Surety Level 7 allocations will apply.

5.1.3 Implementation of Restrictions

Restrictions on the taking of water have effect only where a notice has been issued under section 92 of the Act.

An Authorised Officer has some flexibility on the implementation of the cease to take provision. 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.

Notwithstanding the cease to take provision and staged restriction 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.

Flexibility in the implementation of the staged restriction management regime will be employed to best balance a fair and orderly transition from no restrictions through to full restrictions, while maximising the opportunity to take water as it becomes limited.

5.2 Rules for Access Under Surety Level 8 Allocations

The taking of water under Surety Level 8 allocations will not be permitted until river flow, as measured at the relevant stream flow gauging station, exceeds the relevant threshold level set out in Table 10. Once the relevant threshold level has been reached and an Authorised Officer has provided notification, licensees with a Surety Level 8 allocation will be able to take water for up to 5 days subject to the flow remaining above the levels set out in Table 11.

This period may be extended by up to a further seven days, with the agreement of Hydro Tasmania and upon notification provided by an Authorised Officer, on occasions when Trevallyn Dam continues to spill and river flow remains above the levels set out in Table 11.

It should be noted that there may be times when flow remains above the levels set out in Table 11 for extended periods, however, water may not be able to be taken beyond the end of an authorised five day period if Hydro Tasmania does not provide its agreement (for example, because Trevallyn Dam may not be spilling).

The Nile and St Pauls Rivers have separate threshold flows for the taking of water under Surety Level 8 allocations, in recognition of the differing hydrology of these systems. These thresholds reflect the localised nature of high flow events in these parts of the South Esk River catchment.

Table 10 Threshold flow as measured at the relevant stream flow gauging station for the taking of water under Surety Level 8 allocations.

	Stream Flow Gauging Station	Threshold Flow (ML/day)
South Esk River and Break O'Day River Management Zones September - November (inclusive)	South Esk River at Llewellyn	First event in period: 3,000 Subsequent events: 2,020
South Esk River and Break O'Day River Management Zones December - August (inclusive)	South Esk River at Llewellyn	First event in period: 3,000 Subsequent events: 2,020
St Pauls River Management Zone	St Pauls River above South Esk River	230
Nile River Management Zone	Nile River at Deddington	780

Table 11 Restriction thresholds (ML/day) for taking water under Surety Level 8 allocations as measured at the relevant stream flow gauging station (South Esk River at Llewellyn for the South Esk River and Break O'Day River Management Zones; St Pauls River above South Esk River for the St Pauls River Management Zone; and Nile River at Deddington for the Nile River Management Zone).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
South Esk River and Break O'Day River Management Zones	170	170	170	170	250	400	700	800	1,000	560	350	170
St Pauls River Management Zone	10	10	10	10	18	20	40	48	48	22	25	10
Nile River Management Zone	9	9	9	9	28	23	23	23	23	27	22	9

5.3 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 specified threshold flow has been reached and specific notification has been provided by an Authorised Officer.

The threshold flow for opportunistic access to water is 6,500 ML/day as measured at the Llewellyn stream flow gauging station on the South Esk River.

Once this threshold level 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 the flow falls below 6,500 ML/day or Trevallyn Dam ceases to spill, whichever occurs earlier.

Flow in the South Esk River at the Llewellyn stream flow gauging station has exceeded 6,500 ML/day for 3.6% of the time, or approximately 13 days per year, since 1973. For guidance, the annual volume of water potentially available, based on the historic record between 1973 and 2008, is set out in Table 12.

Table 12 Annual volume of water potentially available under opportunistic access in the South Esk River catchment.

	Estimated Annual Volume of Water Potentially Available (ML)	Estimated Daily Volume of Water Potentially Available (ML)
80% of years	9,333	893
60% of years	55,487	2,411
50% of years	85,767	3,277
20% of years	206,240	11,587
10% of years	236,557	18,570

It should be noted that the information set out in Table 12 is for guidance purposes only, and that in some years there may be very little or no water available under opportunistic access.

Between 1973 and 2008, the average volume of water that would have been available is estimated to be 105,677 ML per annum, though there were three years when there would have been no water available.

The information set out in Table 12 is based on flows at Llewellyn stream flow gauging station, and therefore 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.

5.4 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 to their dam.

5.5 Variation to Take Period for Summer Take Allocations

Notwithstanding Part 4.2 of this Plan, an Authorised Officer may, upon a request from a licence holder with a summer take allocation, notify that licensee that they are permitted to take water prior to 1 November. This decision will be based upon whether there have been sufficient flows in this catchment since 1 May to enable relevant licensees with winter take allocations to take their allocated volumes.

For guidance, the volumes of water that will need to pass the stream flow gauging station on the South Esk River at Perth, before earlier commencement of the taking of water under summer take allocations will be considered, are set out in Table 13. In addition, sufficient flow will have had to occur within each management zone to ensure that holders of winter take allocations within those zones have had sufficient opportunity to take their allocated water.

Table 13 Volume of water that needs to pass the stream flow gauging station on the South Esk River at Perth after 1 May to enable earlier commencement to the take period for summer take allocations.

Determination Date[27]	Environmental Volume (ML)[28]	Winter Take Volume (ML)[29]	Total Volume (ML)[30]
1 June	7,750	51,350	59,100
1 July	19,750	51,350	71,100
1 August	41,450	51,350	92,800
1 September	66,250	51,350	117,600
1 October	96,250	51,350	147,600

[27] Date at which determination of earlier commencement to the summer take period considered.

[28] Volume of water equal to the cumulative total of the daily cease to take volume.

[29] Volume of water equal to 2.5 times the total winter take allocation volume in this catchment (based on 50% passing flow requirement and addition of a buffer volume). Figures as at the date of this Plan's adoption.

[30] Sum of environmental volume and 2.5 times the total winter take volume. Figures as at the date of this Plan's adoption.

PART 6 MONITORING AND REPORTING

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

The basis of measuring the effectiveness of this Plan in giving effect to 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.

6.1 Monitoring

6.1.1 Stream Flow Monitoring

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

6.1.2 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 provisions in Part 4 of this Plan. Water licence information is available on the Department's WIST website.

6.1.3 Installation of Water Meters

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

6.1.4 Water Extraction

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

6.1.5 Transfers of Water Licences and Allocations

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

6.1.6 Restriction Management

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

6.1.7 River Health and Water Quality 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 management actions in this catchment, and hence the information is limited in the extent to which it can directly be used to 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.

6.2 Reporting

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

PART 7 STATUTORY REQUIREMENTS UNDER SECTIONS 14 AND 15 OF THE *WATER MANAGEMENT ACT 1999*

Part 7 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.

7.1 A Statement of the Objectives of the Plan, Including the Environmental Objectives (Section 14(2)(a))

7.1.1 Environmental Objectives

a) Maintain and enhance water dependent ecosystems.

b) Provide adequate environmental base flows.

c) Maintain variable flows including flood events to support water dependent ecosystems.

d) Ensure that environmental water receives a greater level of security than consumptive water, other than essential town water supplies and stock and domestic water supplies.

e) Avoid water quality impacts during conveyance of water via a watercourse.

f) Recognise the connectivity between groundwater and surface water.

7.1.2 Water Usage and Development Objectives

a) Ensure security of water for stock and domestic use and town supply.

b) Actively encourage the taking of water in winter and reduce reliance/emphasis on summer water abstraction.

c) Accurately monitor and assess water resources and water use.

d) Protect existing rights when considering further allocations.

e) Identify water for growth and foster development of the water resource subject to water availability.

7.1.3 Social Objectives

a) Recognise the importance to the community of the use of the river for recreational purposes and tourism.

b) Maintain the aesthetic values of the river.

c) Seek to maintain the health of the river system essential for the happiness, welfare and prosperity of the people in the South Esk River catchment, now and into the future.

d) Increase community knowledge of water resources and the links between water use and river health.

e) Increase community involvement in managing the river's water resources.

7.2 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))

The water regime that best gives effect to the environmental and other relevant objectives of this Plan is one that represents a balance in providing water to maintain environmental values and providing water for consumptive and other purposes.

The South Esk River catchment is located within a hydro-electric district, conferring on Hydro Tasmania the right to all the water resources of this catchment (excluding the relatively small volume of water under entitlements held by other water licensees and rights under Part 5 of the Act). Together with the location of Trevallyn Dam at the bottom of the river system, these circumstances have resulted in two important outcomes.

Firstly, whilst the median annual discharge of the South Esk River is large (808,787 ML), a relatively small volume of water has been allocated for consumptive use to date (approximately 41,000 ML or 5% of the median annual discharge). The second factor is that Hydro Tasmania is considered to be a non-consumptive user of water, and the location of Trevallyn Dam at the bottom of the river system means that the bulk of the natural flow regime has been preserved upstream of the Dam.

Given this context, there is a unique opportunity for further development of the water resource for irrigation and other consumptive uses, whilst still preserving most elements of the natural flow regime.

Hence, for the South Esk River catchment, the water regime that best gives effect to the environmental and other relevant objectives of this Plan is one that retains the key characteristics of the natural flow regime, albeit with some modification of natural flows reflecting the extraction of water for consumptive purposes. As a result, this regime provides the overall water needs of the environment, while also providing secure access to water for consumptive purposes, generally at a high level of reliability.

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 or mimicked. For the South Esk River, the key components of the natural flow regime that are relevant to identified freshwater ecosystem values, and the ecosystem more broadly include:

a) base flows that sustain ecosystem health and populations of aquatic biota, and provide refuge during dry times;

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 and maintaining geomorphic processes;

c) flood flows that support riparian zones, floodplains and wetlands, and maintain connectivity and exchange of resources between the river and its floodplain;

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 flows.

As a key aim of this Plan is to provide reliable access to water for consumptive purposes, the water regime, whilst retaining much of its natural pattern of flow variability, is one in which there is some modification of natural flows. The greatest degree of modification is in the low flow component of the flow regime, reflecting that the direct taking of water for irrigation generally coincides with the driest part of the year.

Accordingly, much of the management focus of this Plan is targeted at the summer irrigation season, to ensure that a proportion of low flows are protected from extraction and retained in the system and that the sharing of water between consumptive users is conducted in a fair and equitable fashion.

It is worth highlighting that the water regime under this Plan provides significant opportunity for further development through additional winter take allocations. These allocations are 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.

Under this Plan, the water regime is managed through a combination of:

a) the provision of subcatchment allocation limits which also indicate the potential amount of water available for further allocation;

b) the application of seasonal and daily limits on surface water abstraction, based on the location of the resource and individual allocations;

c) the application of a cease to take provision which prohibits the taking of water when recorded flow is less than a certain threshold flow;

d) the application of staged restriction management to ensure that water users with lower surety allocations are not impacting upon those with higher surety allocations;

e) the application of other daily access provisions such as opportunistic flood take thresholds or the application of event-based rules;

f) licence requirements to pass flows through instream storages.

7.3 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))

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

a) secure access to water for stock and domestic purposes;

b) a flow regime that meets the needs of aquatic ecosystems and maintains identified ecosystem values;

c) secure and certain access to water for irrigation and other commercial purposes, and for further development of the water resource for these purposes.

This Plan includes management provisions that ensure a water regime that best gives effect to its environmental and other relevant 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.

7.3.1 Environmental Objectives

a) Maintain and enhance water dependent ecosystems.

A key consideration in managing the water resources of the South Esk River catchment is the provision of a water regime that meets the needs of its freshwater ecosystems. Whilst recognising that an array of factors may have a profound effect on water dependent ecosystems, this Plan aims to maintain and enhance water dependent ecosystems to the extent that flow management is important.

In general, Tasmania's unregulated rivers and streams are managed to provide a water 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 to meet environmental water needs is based on maintaining or mimicking key flow components of the natural 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 2010; 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 South Esk River catchment, as identified through the Conservation of Freshwater Ecosystems Values Database and field surveys, consist of native fish assemblages, riparian tree assemblages, macrophyte assemblages and vulnerable, rare or endangered species and communities including the South Esk freshwater mussel, three caddis fly species, a Hydrobiid snail, the South Esk pine, *Eucalyptus ovata* forest and lowland *Poa* grassland (DPIW 2007a). Riparian floral communities that include Tasmanian *Bertya*, purple loosestrife, tall quillwort, drooping sedge, bitter *Cryptandra*, narrow leaf *Pomaderris*, small leaf *Spyridium*, slender knotweed and the midlands wattle, are also present.

The focus of this Plan in maintaining freshwater ecosystem values is therefore on maintaining the key characteristics of the natural flow regime into the future. Under this Plan, the overall natural character of the seasonal distribution, duration, magnitude, and frequency of different flows is retained. By retaining this variability, the water regime will continue to play its role in regulating the physical and biological process in the South Esk River and hence broadly meet the water needs of its freshwater ecosystem values.

With respect to environmental water needs, 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, from water extraction, and providing measures to ensure that the water regime maintains or mimics these key components of the natural flow regime 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 meets its environmental objectives.

Limiting the volume of water allocated to a particular level is an effective measure in maintaining the overall hydrological character of a river system. Generally, the approach used to determine the water allocation limit for a river system is based on assessing the volume of water available at a certain level of reliability, taking into account environmental water needs.

Whilst a water allocation limit is an effective measure in preserving the overall hydrological character of a river system, daily access rules aim to 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.

The approach to determining allocation limits is one in which water for the environment and stock and domestic use is “quarantined” from allocation. Under this Plan, the limit for allocation of surface water in the relevant take period has been calculated using the following:

$$\text{Allocation limit} = (A - B) + [(C-A) \times 0.2]$$

where:

A = yield at 80% reliability (based on flow and modelled data for the relevant take period between 1970 and 2003);

B = the volume of water deemed necessary for stock and domestic use (including fire fighting) and for the basic ecological functions of the freshwater environment;

C = yield at 50% reliability (based on flow and modelled data for the relevant take period between 1970 and 2003).

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, for each of the winter take and summer take periods, the volume of water deemed necessary for the environment and stock and domestic purposes is derived by adding the 20^{th} percentile yield (winter take period) and 30^{th} percentile yield (summer take period) for each of the months in the relevant 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 above) from the yield at 50% reliability (C in the equation above) is retained for the environment (hence, a 20% proportion is available for allocation). This is based on retaining 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.

Under this Plan, water allocation at Surety Levels 5 to 7 will be limited to 19% of the median annual yield of this catchment’s surface water resources.

b) Provide adequate environmental base flows.

One of the greatest challenges in the management of surface water resources is maintaining adequate base flows during dry periods, as this is usually the time at which consumptive demands for water are highest.

Within this Plan, a cease to take provision is the main access rule, supported by a staged restriction management regime. This provision preserves base flows by setting a flow threshold, such that, when stream flow drops to this threshold, extraction of water under a licence is prohibited and instream dams are required to pass all inflows (with the exception of water taken for a specified purpose under Part 5 of the Act and under a Surety Level 1 allocation).

This measure aims to ensure that there is sufficient base flow to sustain ecosystem health and populations of aquatic biota, and that the frequency and duration of low flow conditions are not artificially increased to a level detrimental to the river ecosystem. It should be emphasised that under very dry conditions, river flows may fall below the cease to take threshold naturally, and in some instances, flow may cease altogether.

It should be noted that the cease to take thresholds set out in Table 7 do not take into account water that may be conveyed in the South Esk River catchment, where that water passes a relevant stream flow gauging station. Any conveyance volume registering at a relevant stream flow gauging station will need to be factored in to the application of restrictions.

This means that the Department will have to work closely with Tasmanian Irrigation in particular in relation to the conveyance of water as part of the operation of the Lower South Esk Irrigation Scheme. Whilst water supplied through the Scheme will not pass a stream flow gauging station, it is recognised that the provision of information on water conveyance will assist other water users in understanding what is happening in the relevant part of the South Esk River on a day to day basis, and in relation to measured stream flow information.

The water regime provided under this Plan retains natural base flows up to the cease to take thresholds set out in Part 5 of the Plan.

Detailed environmental flow assessments have been undertaken (DPIW 2007b), stemming from which were recommendations on minimum flow requirements. These recommendations were based on analysis of habitat availability, and considering in particular connectivity between pools, maintenance of instream habitat for macroinvertebrates and fish, and provision of sufficient wetted area for instream ecological processes.

The preservation of base flows that maintains the 50th percentile of available habitat was recommended as an appropriate cease to take flow threshold.

During the summer take period, this Plan maintains baseflows in the South Esk River up to 40 ML/day during the December – April period, and up to 220 ML/day in November. During the winter take period, this Plan maintains base flows close to the levels recommended through detailed environmental assessments.

During the December - April period, the cease to take flow threshold is considerably less than the recommended minimum environmental flow thresholds (100 – 160 ML/day), and hence there is a higher level of risk to the environment as a result. This is a pragmatic outcome of the water planning process, representing a balance between environmental and consumptive water needs. Whilst it would be preferable to set cease to take flow thresholds as recommended, the potential impact on irrigation water supply would have been significant.

Notwithstanding that the cease to take flow threshold is lower than recommended during this period, base flows up to 40 ML/day are considered sufficient to maintain a degree of connection between pools and some wetted habitat in riffle areas. Furthermore, the potential risks associated with adopting a lower cease to take flow threshold are to some extent mitigated by the overall retention of the river system's natural hydrological character.

Nevertheless, in providing for the conversion of existing summer take allocations to winter take allocations, this Plan aims to reduce the overall demand for water during the drier months, and hence reduce pressure on the aquatic ecosystem. In addition, the taking of water under any new summer take allocations will be restricted at a flow threshold that maintains the 75th percentile of available habitat.

c) Maintain variable flows including flood events to support water dependent ecosystems.

The water regime provided under this Plan retains much of the flow variability of the natural flow regime, and hence will support water dependent ecosystems. By specifying allocation limits that preserve a minimum of 81% 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 40 ML/day cease to take threshold during the summer take period, and smaller freshes and intermediate flows immediately above the 2,020 ML flow threshold that applies to the taking of water under Surety Level 8 allocations (for subsequent events to the initial 3,000 ML/day triggered event in autumn and spring).

The particular access rules relevant in this context are those related to the taking of water under Surety Level 8 allocations, and the opportunistic taking of water from flood flows. The Surety Level 8 allocation access rules contained within this Plan ensure that freshes and intermediate flows are preserved in spring and autumn until the first bank full flow occurs (3,000 ML/day), after which these type of flows are preserved up until 2,020 ML/day. Furthermore, this Plan limits extraction under Surety Level 8 allocations to 600 ML/day. These provisions are based on recommendations stemming from detailed environmental flow assessments (DPIW 2007b).

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.

In regard to flood flows, this Plan ensures that these flows are preserved up to 6,500 ML/day, which is sufficient to inundate significant areas of the river's floodplain. The rules for opportunistic access to water will ensure that water extraction during flood events does not impact significantly on the size and duration of floods, and rates of change of flow at these times. 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.

d) Ensure environmental water receives a greater level of security than consumptive water, other than essential town water supplies and stock and domestic water supplies.

The water regime provided by this Plan delivers environmental water at a greater level of security than consumptive water other than essential town water supplies and stock and domestic water supplies. Water access rules, particularly in relation to restriction management, have been developed in recognition of the priority of access set out in the Act.

Stock and domestic and essential town water supplies are afforded the highest surety under the Act (Surety Level 1). With regard to town water supply, there is usually a Surety Level 1 allocation and Surety Level 5 allocation, such that the use of water for non-essential purposes, such as watering parks and gardens, can be restricted in line with other Surety Level 5 allocations. Environmental water is afforded the second highest priority (Surety Level 2).

Accordingly, at times of limited water supply, the access rules under this Plan ensure that the only water afforded a higher level of priority than environmental water is that required for essential human and stock needs.

e) Avoid water quality impacts during conveyance of water via a watercourse.

Any conveyance of water via a watercourse will need to be assessed and approved in accordance with Part 6A of the Act; a key consideration in this goes to whether there are likely to be any detrimental impacts on water quality.

f) Recognise the connectivity between groundwater and surface water.

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, groundwater flows and levels critical to surface water flows should be maintained within the natural bounds of variability.

Any extraction of groundwater within the area of this Plan 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 taking of groundwater in this catchment.

7.3.2 Water Usage and Development Objectives

a) Ensure security of water for stock and domestic use and town supply.

The water regime provided under this Plan ensures the security of water for stock and domestic use and essential town supply. Under the *Water Management Act 1999*, priority of access for stock and domestic and town water supplies is conferred through the highest level of surety (Surety Level 1) afforded to Part 5 Rights and essential town water supply allocations.

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 town supply is not allocated to other uses, and that 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 low flow and cease to flow events may limit the availability of surface water for stock and domestic purposes and town supply.

b) Actively encourage the taking of water in winter and reduce reliance/emphasis on summer water abstraction.

The water regime provided under this Plan is one in which highly reliable water is available for allocation during winter, notwithstanding that a transfer of the rights to take the water has to first be agreed with Hydro Tasmania prior to the granting of new allocations. Furthermore, in recognition of the environment's water needs during the summer take period, any new summer take allocations will be granted at a lower surety level (Surety Level 7), have stringent access conditions and hence must be recognised as having a relatively low level of reliability.

Furthermore, this Plan also actively encourages the taking of water in winter and reduced reliance on summer water abstraction through its provision to enable conversion of summer take allocations to winter take allocations.

c) Protect existing rights when considering further allocations.

In providing a water regime that best gives effect to its objectives, this Plan identifies the volume of water available for allocation, and hence provides water users with certainty as the reliability of their allocations will not be eroded by continuing and uncontrolled allocation.

Whilst this Plan provides this certainty, it must be recognised that the reliability of existing entitlements may be reduced through the impacts of climate change and drought.

Preserving the reliability of existing water allocations is particularly relevant to the granting of any new summer take and Surety Level 8 allocations, where the competition for limited water is recognised. Any new summer take allocations will be granted at a lower surety level than existing allocations (Surety Level 7), and new Surety Level 8 allocations will only be granted up to the 600 ML/day extraction limit. With regard to the winter take period, new allocations will be granted at Surety Level 7 where they are demonstrated to be at a level of reliability of less than 80%. In addition, licence conditions will be applied where appropriate to protect existing rights and ensure allocations at a higher surety level have priority of access during times when surface water is limited.

d) Identify water for growth and foster development of the water resource subject to water availability.

The water regime provided under this Plan is one in which there is significant scope for water development to proceed through the granting of new allocations. In this regard, certainty is provided by identifying how much water may be available for further development, and the level of reliability of that water.

This Plan provides a water allocation limit for this catchment of 22,660 ML during the summer take period and 134,816 ML during the winter take period. As at the date of this Plan's adoption, the volume of existing allocations is 14,718 ML for the summer take period and 20,540 ML for the winter take period.

The water available for allocation during the winter take period is at a relatively high level of reliability, with the 134,816 ML likely to be provided in full 5 years in 10, with approximately 100,000 ML likely to be provided 8 years in 10.

This Plan also identifies significant opportunity to harvest water from flood flows. Whilst these flows are intermittent, they occur relatively frequently in the South Esk River. Under this Plan's opportunistic access rules, the threshold flow of 6,500 ML/day would have provided access to 106,000 ML of water per annum on average over the past 35 years (noting that in some years, there would have been no water available).

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.

7.3.3 Social Objectives

As outlined above, the water regime provided under this Plan is one in which the key characteristics of the natural flow regime are retained and which provides secure and reliable access to water for essential needs, consumptive use and electricity generation. Accordingly, this Plan's social objectives will be achieved as the water regime:

a) should not limit recreational values through an increased incidence of flow related water quality impacts;

b) should meet the needs of freshwater ecosystem values and hence maintain the aesthetic values of the river and river health;

c) has been derived through consultation with the community, ensuring an increase in community knowledge and involvement with regard to the use and management of the river's water resources.

7.4 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 South Esk 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 South Esk River catchment.

This Plan is 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 South Esk 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 South Esk River catchment.

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

Furthermore, any conveyance of water via a watercourse will need to be assessed and approved in accordance with Part 6A of the Act; a key consideration in this goes to whether there are likely to be any detrimental impacts on water quality.

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

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

The South Esk River is a large river with a median yield in excess of 800,000 ML. To date, relatively little (approximately 5%) of this yield has been allocated for consumptive water use, due largely to the inclusion of this catchment within a hydro-electric district. In this regard, the South Esk River has provided a secure source of water for electricity generation.

The volume of water allocated for consumptive use as at the date of this Plan's adoption can be broadly met at a relatively high level of reliability. Some issues have emerged, particularly in recent years, with access to water during the summer take period, a situation that may be exacerbated by climate change and future droughts.

Water during the winter take period is highly reliable, notwithstanding that infrastructure is required to capture and store this water for later use during the irrigation season. Whilst recognising there is potentially substantial costs associated with infrastructure development, there are undoubted benefits in terms of secure and certain water supplies.

In the South Esk River catchment, 323 ML of water is allocated at Surety Level 1 for town water supply. This is an insignificant amount of water in comparison to the yield of this catchment and it is highly unlikely that this water would ever be unavailable (notwithstanding that limitations on supply may occur during prolonged dry conditions where a town water supply offtake is located on a smaller tributary).

As set out elsewhere in this Plan, the water available for allocation during the winter take period (134,816 ML) is likely to be provided in full 5 years in 10, with approximately 100,000 ML likely to be provided 8 years in 10. The granting of new allocations will rely on an agreement to transfer the rights to take the water by Hydro Tasmania, which having gained operational flexibility in recent years with the commissioning of Basslink and alternative electricity generation infrastructure, is potentially better able to consider this issue.

There is around 95,800 ha of irrigable land in the South Esk River catchment, with approximately 13,400 ha currently under irrigation. Based on a socio-economic assessment undertaken as part of the development of this Plan, irrigation application rates in this catchment (depending on crop type) range from 2.4 to 6.4 ML/ha, with an average application rate of 3.5 ML/ha (Marsden Jacob Associates 2009). Applying the average application rate, 47,000 ML of water is required for irrigation each year at the current level of development. As at the date of this Plan's adoption, approximately 41,000 ML of water is allocated (Surety Levels 5-8).

The total Surety Level 5, 6 and 7 allocations available under this Plan (157,000 ML) would provide for approximately 45,000 ha of irrigation in this catchment based on the average application rate.

7.6 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 to first set the context for these considerations. This Plan sets out a management framework for the water resources of the South Esk River catchment, and hence any effects of the Plan must be considered strictly in relation to changes in access to water, both in terms of the volume of water available and the way that water may be taken.

The Department commissioned a socio-economic assessment as part of the development of this Plan, to assist understanding of any potential effects it may have on existing and future users (Marsden Jacob Associates 2009).

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 South Esk River catchment's water resources.

As discussed previously, the inclusion of this catchment within a hydro-electric district is an important part of this Plan's context, as to date there has been relatively little water allocated. In this regard, the starting point for this Plan in giving effect to its objectives is that existing rights to water are maintained, and that access to water is largely preserved at the level to which existing licence holders have become accustomed.

This Plan undoubtedly provides benefits through its clear identification of water available for allocation, which has been determined in consideration of maintaining a high level of reliability. In identifying a significant volume of water available for allocation, and specifying access rules that ensure the taking of water is conducted in an orderly fashion and allows for the opportunistic harvesting of water, this Plan clearly articulates the irrigation development opportunities available.

Furthermore, there is a multitude of options to access water available under this Plan so that individual users can make informed decisions specific to their business needs based on the different access and infrastructure costs associated. These options can also be considered in relation to the risk profile of each individual business.

Notwithstanding the clear benefits of this Plan to consumptive water users, the Plan does introduce some changes to the rules under which water may be accessed and conveyed via a watercourse. In considering these changes, it is also important to consider what has not changed as a result of this Plan. Of most significance, whilst detailed scientific assessments indicated that the cease to take threshold flow during the summer take period should ideally be raised significantly, the status quo has been maintained under this Plan. This is in recognition of the likely significant impacts on water dependent businesses had the recommended flow thresholds been adopted.

Whilst this Plan has introduced cease to take thresholds during the winter take period, this change is not considered to have any impact on water dependent businesses. Unlike the summer take period where daily access to water is extremely important, the focus of the winter take period is generally on capturing the volume of relevant water allocations over the seven month period. Whilst there may be days on which the taking of water into storage may be prohibited, the winter yield of the South Esk River is highly reliable and provides ample scope for dam owners to fill their storages.

Even if the entire 135,000 ML of water available for winter take allocation was taken up, this volume of water is likely to be delivered in full 5 years in 10, with approximately 100,000 ML likely to be delivered in full 8 years in 10.

In regard to the changes in access for Surety Level 8 allocations, there are likely to be both positive and negative effects on relevant licensees. Restricting the overall allocation of Surety Level 8 water within the 600 ML/day extraction limit will ensure that the reliability and usefulness of these allocations is maintained. However, the lifting of the flow threshold for the taking of water under these allocations (to 3,000 ML/day for the initial event in autumn and spring) is likely to reduce the number of days on which water can be accessed. The socio-economic assessment indicates that on average, thirteen fewer days will be available per year on which water can be taken under a Surety Level 8 allocation as a result of this Plan (based on streamflow records over the 1997-2008 period). However, the assessment also indicates that the level of allocation as at the date of this Plan's adoption is relatively reliable, with existing allocation holders likely to receive their full allocation around 9 years in 12. This means that relevant licensees would only need to purchase water from Hydro Tasmania in a minority of years, if they wished to exercise this option.

This Plan introduces changes to the commencement date of the summer take period, with all Surety Level 5 and 6 summer take allocations commencing on 1 November. This change has been introduced to ensure there is scope to manage competition for water in dry years, where the taking of water under a Surety Level 6 summer take allocation during October may have undermined the security of a downstream Surety Level 5 winter take allocation.

It is recognised that an earlier commencement to the irrigation season has become the norm due to reduced rainfall and changes in cropping practices. However, it is important to ensure that the risk borne by water users relying on summer take allocations is not potentially transferred to higher surety allocation holders, particularly those who have invested substantially in water storage.

Whilst there may be costs associated with this provision, it must also be emphasised that an earlier start to the taking of water under a summer take allocation (prior to 1 November) will be authorised as long as licensees with winter take allocations have had sufficient opportunity to take their full allocation.

The remaining change this Plan introduces that is likely to be of significance to water dependent businesses is the application of exchange rates to the conveyance of water via a watercourse. It is acknowledged that in certain instances, the cost of accessing the same volume of water may increase under this Plan as the relevant water user will need to purchase a larger volume of water to cover the conveyance losses. It must, however, be emphasised that these costs are in reality a result of transparency; under this Plan the relevant costs are properly identified and apportioned on a user pays principle.

Prior to this Plan, these were hidden costs, and the volume of water taken under conveyance was likely to have included water that the relevant user was not strictly entitled to, given that loss factors were not properly considered.

PART 8 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.

8.1 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.

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.

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.

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.

hydro-electric district means a hydro-electric district created under Part 9.

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.

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.

8.2 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 entitled to take from a watercourse under a licence, between 1 November and 30 April inclusive (in the South Esk 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 entitled to take from a watercourse under a licence, between 1 May and 30 November inclusive (in the South Esk 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 9 REFERENCES AND FURTHER INFORMATION

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

DPIPWE (2010). *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.

DPIW (2007a). *Assessment of Freshwater Ecosystem Values in the South Esk River Catchment: Guidance for Water Management*. Department of Primary Industries and Water, Report Series WMP 07/11.

DPIW (2007b). *Environmental Flows for the South Esk Water Management Plan*. Technical Report No. 07/01. Water Assessment Branch, Department of Primary Industries and Water, Hobart.

DPIW (2007c). *Surface Water Hydrology of the South Esk River Catchment*. Technical Report No. WA 07/02. Water Assessment Branch, Department of Primary Industries and Water, Hobart, Tasmania.

DPIW (2008a). *Water Use and Management Arrangements for the South Esk River (Above Macquarie Junction)*. Technical Report WMP 08/01. Water Policy and Planning Branch, Department of Primary Industries and Water, Hobart, Tasmania.

DPIW (2008b). *Water Assessment Water Monitoring Report Series, Water Quality Monitoring in the South Esk River Catchment (above Macquarie)*. (Internal Reference No. WA 07/12). Water Assessment Branch, Department of Primary Industries and Water, Hobart, Tasmania.

DPIW (2008c). *Future Water Demand in the South Esk River Catchment (Above Macquarie Junction)*. Technical Report WMP 08/02. Water Policy and Planning Branch, Department of Primary Industries and Water, Hobart, Tasmania.

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

DPIWE (2005). *Environmental Management Goals for Tasmanian Surface Waters: Macquarie River and South Esk River Catchments*. Final Paper December 2005.

Marsden Jacob Associates (2009) *Socio Economic Assessment of the Draft South Esk Catchment Water Management Plan*.

APPENDICES

Appendix A - Named Surface Water Resources in the Area of the South Esk River Catchment Water Management Plan

Abbotsford Creek	Aberfoyle Creek	Abrahams Creek	Alford Creek
Attleys Creek	Back Gully Creek	Baileys Marsh Creek	Bare Rock Creek
Barn Hill Creek	Barrows Creek	Barton Creek	Batemans Creek
Beans Creek	Ben Lomond Rivulet	Big Hospital Creek	Black Forest Creek
Blackmans Creek	Bowl Creek	Boyes Creek	Break O'Day River
Broad Valley Rivulet	Brooks Creek	Brookstead Creek	Brushy Hill Creek
Buffalo Brook	Bullock Paddock Creek	Burnt Gully Creek	Butler Creek
Cardiff Creek	Castle Cary Rivulet	Cat and Kitten Creek	Cat Creek
Claytons Creek	Coal Creek	Coal Rivulet	Cokers Creek
Coolmore Creek	Coxs Creek	Crouchs Creek	Dans Rivulet
Day Dawn Creek	Delvin Creek	Dodgers Creek	Dry Bed Creek
Dukes River	Edwards Creek	Egan Creek	Evercreech Rivulet
Ewe Run Creek	Farrells Creek	Ferntree Creek	Fingal Rivulet
Fitzallen Creek	Flapjack Creek	Flinty Creek	Forbes Creek
Funny Knob Creek	Gardiners Creek	Gilligan Creek	Gipps Creek
Golden Gully Creek	Grants Creek	Green Valley Creek	Guts Ache Creek
Haslemere Creek	Havelock Creek	Hepburn Creek	Hercules Creek
Hoggetts Hut Creek	Homewood Creek	Hop Pole Creek	Ikes Creek
Jack the Liars Creek	Jacobs Creek	Jimmys Creek	Joe Woods Creek
Johns Creek	Joseph Creek	Joy Creek	Kelletts Creek
Kellys Creek	Kent Creek	Kittos Creek	Kringles Creek
Lewis Creek	Lewis Hill Creek	Lightwood Rivulet	Little Devil Creek
Little Hospital Creek	Little Soapbox Creek	Llewellyn Creek	Long Marsh Creek
Lucks Creek	Lucky Creek	Marathon Creek	Margisons Creek
Marsh Creek	Marshes Creek	Melrose Creek	Memory Creek

Merry Creek	Merrywood Creek	Miami Creek	Micks Creek
Millstream Creek	Milly Brook	Mistletoe Creek	Mullens Creek
Myrtle Creek	New Plains Creek	Newitts Creek	Newmans Creek
Nile River	Nisbet Creek	Ockle Creek	Ocky Burns Creek
Old Toms Creek	Ormley Creek	Otway Creek	Oxford Creek
Panel Marsh Creek	Patterdale Creek	Pegs Hollow Creek	Pig Creek
Pole Creek	Polleys Creek	Pretty End Creek	Rabbitys Creek
Rafferty Creek	Ransom Creek	Ravine Creek	Richardsons Creek
River Tyne	Robinsons Creek	Rockhouse Creek	Rosiers Creek
Rostrevor Rivulet	Roys Hill Creek	Salisbury Rivulet	Salmon Creek
Sawpit Creek	School Creek	Sheepskin Creek	Sheeptail Creek
Silkstone Creek	Sixteen Foot Creek	Sling Pot Creek	Snake Cave Creek
Snow Creek	Soapbox Creek	South Esk River	St Marys Rivulet
St Patricks Creek	St Pauls River	Stable Creek	Stag Creek
Storys Creek	Stynes Creek	Sundial Creek	Sunken Creek
Sweets Creek	Talus Creek	Tasmania Creek	Telopea Creek
Tier Creek	Tiger Creek	Tiger Gully Creek	Tims Creek
Tombstone Creek	Tommy Creek	Tower Rivulet	Township Rivulet
Tullochgorum Creek	Una Creek	Valley Creek	Vickory Creek
Vineys Creek	Walkers Creek	Watts Creek	Williams Creek
Wines Creek	Woodheads Creek		

Appendix B - Flow Measurement Reference Points

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

Water Resource	Stream Flow Gauging Station	Easting	Northing
South Esk River	South Esk River at Llewellyn	547 053	5 370 586
South Esk River	South Esk River at Upper Esk Road	560 020	5 414 204
South Esk River	South Esk River above Macquarie River (at Perth)	516 900	5 394 750
Nile River	Nile River at Deddington	538 200	5 397 199
St Pauls River	St Pauls River above South Esk River	560 400	5 373 500
Break O'Day River	Break O'Day River at Killymoon	588 000	5 394 500

The stream flow gauging station on the South Esk River at Llewellyn is currently used as the primary flow reference point due to the long-term record available at that site.

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 – Surety Level 8 Allocations in the South Esk River Catchment

Over recent years, water allocations have been granted at Surety Level 8 in the South Esk River Basin, taking in the South Esk River, Macquarie River and Meander River catchments. These allocations were granted with the agreement of Hydro Tasmania to transfer rights to water, and allow water to be taken during times of high flow, the magnitude of which is likely to cause a spill over Trevallyn Dam (and hence is not able to be used for the purposes of electricity generation).

Memorandum of Understanding

This agreement and the granting of Surety Level 8 allocations were formalised through a 2004 Memorandum of Understanding (MoU) between the Department, Hydro Tasmania, and the Tasmanian Farmers and Graziers Association.

Water taken under Surety Level 8 allocations was considered the most accessible for farmers on the basis that rights to take it were transferred by Hydro Tasmania free of charge, and because the threshold flow levels at which it could be taken under the terms of the MoU were considered to occur frequently enough to make its taking worthwhile utilising existing infrastructure and new on-farm storages.

Under this Plan, the rules to access water under Surety Level 8 allocations differ significantly from arrangements under the MoU, as environmental water requirements were not considered previously. Access arrangements under the MoU were based solely on the likelihood of Trevallyn Dam spilling.

The MoU explicitly notes that access thresholds for taking water under Surety Level 8 allocations would not be increased unless required under a statutory water management plan.

Once this Plan takes effect, the MoU will cease to apply in the South Esk River catchment, notwithstanding that the agreement has a ten year timeframe. In this regard, the Parties to the agreement note that its implementation is subject to the provisions of the *Water Management Act 1999.*

Moratorium on Applications for Surety Level 8 Allocations

The competition for additional irrigation water under Surety Level 8 allocations increased, so much so that a moratorium on applications for further Surety Level 8 allocations was imposed in late 2008. The moratorium was imposed as an interim measure in advance of this Plan, to ensure that the water needs of the environment could properly be considered before any further allocations were made, and to ensure that the reliability of existing Surety Level 8 allocations was not undermined.

The moratorium provides that all pending applications for Surety Level 8 allocations (those received prior to 1 December 2008) will be processed once this Plan has been adopted, and according to the rules in place at the time they were made.

Maximum Daily Extraction Limit

Given the hydrological characteristics of the South Esk River, with very large flow events occurring relatively frequently, there would appear to be a very large volume of water that could potentially be available under Surety Level 8 allocations. However, the greatest demand for this water occurs during high flow events of smaller magnitude (those up to around bank-full), and these “intermediate” flow events are important for a variety of ecological reasons.

This Plan provides for the daily management of extraction of water under Surety Level 8 allocations. Hydrological and environmental assessment work indicates that in addition to changes in the threshold flow levels at which water can be taken under Surety Level 8 allocations (refer Part 5.2 of this Plan), the taking of water should be limited to an overall maximum volume of 600 ML/day for this catchment.

Without such a daily limit, more and more water is likely to be allocated and licensees are likely to increase the capacity of their pumps to maximise the amount of water they can take from intermediate flows on a daily basis. As well as posing a risk to the environment, this is also likely to greatly diminish the value of these allocations to water users as the reliability will be undermined substantially.

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 2010).

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 2007b). 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 freshwater-dependent environmental values within the catchment (DPIW 2007a), an assessment of hydrology (DPIW 2007c) and water use (DPIW 2008a), and a review of water quality in the catchment (DPIW 2008b).