



Upper Ovens River

Water Supply Protection Area

Water Management Plan

August 2011

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PLAN APPROVAL

I, Peter Walsh, Minister for Water, approve this management plan in accordance with section 32A(6) of the *Water Act 1989*.

PETER WALSH MLA

Minister for Water

Date

ACKNOWLEDGEMENTS

In accordance with the *Water Act 1989* a consultative committee was appointed on 4 May 2009 with the task of preparing a management plan for the Upper Ovens River Water Supply Protection Area. The consultative committee consisted of people with a range of expertise with knowledge and experience in matters covered by this plan.

In developing the management plan the consultative committee considered complex management and technical issues.

The Minister acknowledges the work of the following people who were members of the consultative committee.

Alan Barlee	Chair
Sid Dalbosco	Landholder/farmer
John Fleming	Landholder/farmer
Brian Casey	Landholder/farmer
Alan Monshing	Landholder/farmer
Peter Antonello	Landholder/farmer
Robert Rigoni	Landholder/farmer
William Milne	Landholder/farmer
Kerry Murphy	Tobacco and Associated Farmers Co-operative
Matthew O'Connell	North East Catchment Management Authority
Edward Tappe (in part)	Goulburn-Murray Water
Stephen Gemmill (in part)	Goulburn-Murray Water
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Peter Slocomb (in part)	North East Water
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The work of the agency personnel that supported the consultative committee is also acknowledged, Fiona Spruzen, Simon Baker, Steven Nicol and Robert Steel from the Department of Sustainability and the Environment, Scott Ridges, Matthew Pethybridge and Daniel Lovell from Goulburn-Murray Water and Dennis Watson from Department of Primary Industries.

EXECUTIVE SUMMARY

This management plan has been prepared under the Water Act 1989 for the protection of both the groundwater and surface water resources of the Upper Ovens River water supply protection area. Under the Water Act, the objective of the management plan is to make sure that the water resources of the area are managed equitably and to ensure the long-term sustainability of those resources.

Through the operation of the management plan, water has been set aside for the environment as an environmental water reserve. The objective of maintaining an environmental water reserve is to preserve the environmental values and health of water ecosystems, including their biodiversity, ecological functioning and quality of water and the other uses that depend on environmental condition. Historically, management of water resources has been primarily to share it between surface water users because little was known about the needs of the environment. Groundwater extractions have not been restricted in the past other than when groundwater has been extracted from dragline holes close to the Ovens River.

The management plan aims to strike a balance between the competing needs for water in the area and to ensure that the environmental, social and economic benefits which the water resources provide are not only maintained, but also enhanced.

Management arrangements in the Plan recognise that groundwater in the unconsolidated sedimentary aquifer and surface water resources are highly connected. Seasonal groundwater level trends in observation bores closely mirror the water level trends observed in the Ovens River. In recognition of the level of interaction between groundwater and waterways in the catchment, two management zones will be established. Each management zone is based on the level of risk that groundwater extractions have on reducing flows in the waterways in the area during low flow periods. Management Zone 1 includes all of the surface water resources in the Protection area and the groundwater resources in the unconsolidated sedimentary aquifer, reflecting the high level of connectivity between these resources. Management Zone 2 comprises the groundwater resources in the fractured rock aquifer, reflecting the limited connectivity between this resource and surface water.

The Plan establishes a water sharing regime to manage water use in the Ovens River and its tributaries, with a focus on low flow periods where there are increased risks to the environment and other water users. Restrictions on the taking of water will be imposed when there are significant reductions in stream flows, which may occur in some years during summer. The restrictions will apply to irrigation and commercial users in Management Zone 1 who use either surface water or groundwater taken from the unconsolidated sedimentary aquifer.

Surface water users have been on water restrictions in the past and may have had their reliability impacted by the unrestricted access of groundwater users. The water sharing regime under this Plan will give surface users a similar level of reliability of access to water as they have had historically. Groundwater users have not had their access to water restricted in the past. In recognition of the impact to their reliability of supply, transitional arrangements have been provided for these water users to provide them time to adapt to the new rules. Groundwater users without permanent plantings will be subject to the same level of restrictions that applies to surface water users from 2015/16. Groundwater users with permanent plantings will be subject to the same levels of restriction that will apply to surface water users from 2020/21.

The compliance point for managing the water sharing regime will be the Ovens River at the Myrtleford gauge. This compliance point will be used to manage both surface water and groundwater users; this has changed from historic management where the compliance triggers were based on flow in the Ovens River at the Bright gauge. This change is necessary because of the risk that flows in the river between Bright and Myrtleford could cease even if flows at Bright were maintained.

The water sharing regime comes into operation when flows in the Ovens River at Myrtleford fall to 100 ML/d. When this occurs, water users will still be able to take 100 per cent of their water entitlement, but a roster will be imposed that determines when water can be taken. If flows continue to decline, restrictions on the amount of water that can be taken will come into operation. If the flows fall to 1 ML/d then a ban on taking water is imposed. In the larger tributaries of the Ovens River, a ban on taking water will be imposed when the flow in a tributary falls to 2 ML/d which is consistent with the pre-existing management arrangements.

The bans on taking water are designed to prevent the licensed extraction of water causing the stream and deep pools to dry out, thereby threatening critical habitat. Even so, there is a risk that the stream may dry out

in extremely dry years. Restricted access to water under the water sharing regime does not apply to registered farm dams or domestic and stock users.

Rules have been established that will allow both surface water and groundwater licences to be transferred. If licences are transferred in an upstream direction the new licence holder will only be able to take water during the winter period. If a licence is transferred in a downstream direction the volume of water received by the new user will be 80 per cent of the volume previously available. These arrangements are put in place to prevent other users and the environment being adversely impacted. In Management Zone 1, surface water licences and groundwater licences will be interchangeable in recognition of the high level of interconnection between these resources although rules have been developed to manage the impacts of taking water on flows in the waterways. All transfers will be subject to the matters that must be taken into account as set out in section 40 of the Act.

The management plan controls the issue of new licences to restrict the total volume of licences that are able to access water over summer to 14,546 ML/yr. New winter-take licences and groundwater licences from the fractured rock aquifer are allowed as a result of a transfer only. The Plan limits (Caps) the volume of licences to 69,995ML/yr. These rules aim to reduce water extraction that impacts on stream flows in summer time while allowing development to take place that has negligible impact on stream flows during the winter period.

Each year a report on the operation of the Plan will be submitted to the Minister for Water and North East Catchment Management Authority. The annual report will also be made publicly available so that the community can be kept abreast of how the water resources in the area are being managed.

DEFINITIONS AND TERMS

- “**Act**” means the *Water Act* 1989;
- “**all-year licence**” means a licence to take and use water at any time during a year but does not include a registration licence;
- “**annual report**” means the report on the administration and enforcement of the Plan prepared by the Corporation in accordance with section 32C of the Act;
- “**aquifer**” means a geological structure of formation permeated or capable of being permeated permanently or intermittently with water;
- “**bore**” has the same meaning as in the Act and includes dragline holes.
- “**compliance point**” means a location on a waterway that is used to determine the volume of water passing that location each day either by reference to a stream gauge or by observation.
- “**Corporation**” means Goulburn-Murray Rural Water Corporation;
- “**Department**” means the Department of Sustainability and Environment;
- “**Environmental Water Reserve**” has the same meaning as in the Act and includes water that has been set aside under the Plan;
- “**fractured rock aquifer**” is the water bearing formation of the Pinnak Sandstone and Granites in the Protection Area;
- “**groundwater licence**” means a licence to take and use groundwater;
- “**licence**” means a licence issued under section 51 or 51(1A) of the Act;
- “**licence volume**” means the maximum volume of water authorised to be taken each year under a licence;
- “**Management Zone 1**” means the surface water of the Protection Area and the unconsolidated sedimentary aquifer;
- “**Management Zone 2**” means the fractured rock aquifer;
- “**ML/d**” means megalitres of water per day;
- “**ML/yr**” means megalitres of water per year;
- “**ML**” means a megalitre of water;
- “**Murray Darling Basin Cap**” means the limit set on the volume of surface water able to be diverted from each of the Basin’s major river systems;
- “**Plan**” means this management plan for the Upper Ovens River Water Supply Protection Area;
- “**Prescription**” means a prescription contained in the Plan;
- “**Protection Area**” means the Upper Ovens River Water Supply Protection Area;
- “**registration licence**” means a licence applied for prior to 30 June 2003 and issued under section 51(1A) of the Act to take and use water from a dam, spring or soak;
- “**restriction stage**” means a stage of a water sharing regime that restricts or bans a licence holder from taking water;
- “**surface water licence**” means a licence to take water from a waterway, spring or soak or private dam or, in respect of a private dam, to harvest water;
- “**sustainable diversion limit**” means, for a catchment, the total volume of surface water that may be taken in the catchment between 1 July and 31 October in any year, as determined by the Department as part of a statewide assessment or after detailed study of a localised area in accordance with any policies issued by the Minister for Water from time to time;
- “**unconsolidated sedimentary aquifer**” is the water bearing formation consisting of the gravels, sands, and clays that have infilled the valleys of the Protection Area through alluvial and colluvial processes;
- “**winter-take licence**” means a licence to take and use water during the period between 1 July and 31 October, or in respect of a private dam, to harvest water during that period.

1 THE PROTECTION AREA

1.1 Overview

The Upper Ovens River Water Supply Protection Area covers an area of approximately 1,580 km² of the catchment of the Upper Ovens River upstream of its confluence with the Buffalo River near Myrtleford in north east Victoria as shown in Figure 1. The Upper Ovens Water Supply Protection Area was declared on the 2 October 2008 under the powers conferred by Section 27(1) of the *Water Act 1989*. A more detailed map of the declared area is shown in Plan No. LEGL./04-210, which may be inspected at the Central Plan Office, Department of Sustainability and Environment, 570 Bourke Street, Melbourne. A plan of the area may also be viewed on the Goulburn-Murray Water Website www.g-mwater.com.au.

The Upper Ovens River is an unregulated river without a large dam to regulate its flows. It provides important unregulated stream flows to the environmentally valued and heritage listed Lower Ovens River and the Murray River. From its junction with the Buffalo River it extends upstream for approximately 70 km in a south easterly direction. In its most upper reaches, above Harrietville, the Upper Ovens River comprises two fast flowing mountain streams, the east and west branches. The major tributaries of the river include Barwidgee Creek, Buckland River, Buffalo Creek, Happy Valley Creek, Morses Creek, Roberts Creek, Myrtle Creek, Two Mile Creek, Eurobin Creek and Snowy Creek. The upper reaches of the main stem and of most tributaries are forested with habitats ranging from dry sclerophyll woodland to wet ash forest, snow gums and alpine woodlands/grasslands at higher elevations. Pine plantations are also a feature of the upper catchments. Below the township of Harrietville, the Ovens River flows through a narrow floodplain only a few hundred metres wide. Numerous small tributaries joining the river cause it to gain in size. From Bright the river basin flattens out and broad cleared floodplains become the countryside's dominant feature.

The primary land use in the area is agriculture followed by plantation forestry. Grazing and dry-land farming predominate. However, there is significant irrigation development along the river flats bordering the Ovens River and its major tributaries. Both surface water and groundwater are used for irrigation of horticulture including nuts, berries, wine grapes, hops and apples. Traditionally, tobacco was the main crop up until 2006 when tobacco contracts were not renewed. Alternative crops to tobacco are now being explored. Surface water and groundwater are also used extensively throughout the area for domestic and stock purposes. Approximately 6,000 people live in the townships of Myrtleford, Porepunkah, Bright, Wandiligong and Harrietville all of whom rely on a water supply from the Ovens River and its tributaries. A year-round tourism industry thrives in the area. Average annual rainfall in the area varies from between 905 mm at Myrtleford and 1,891 mm (recorded outside the protection area at Mount Hotham)¹.

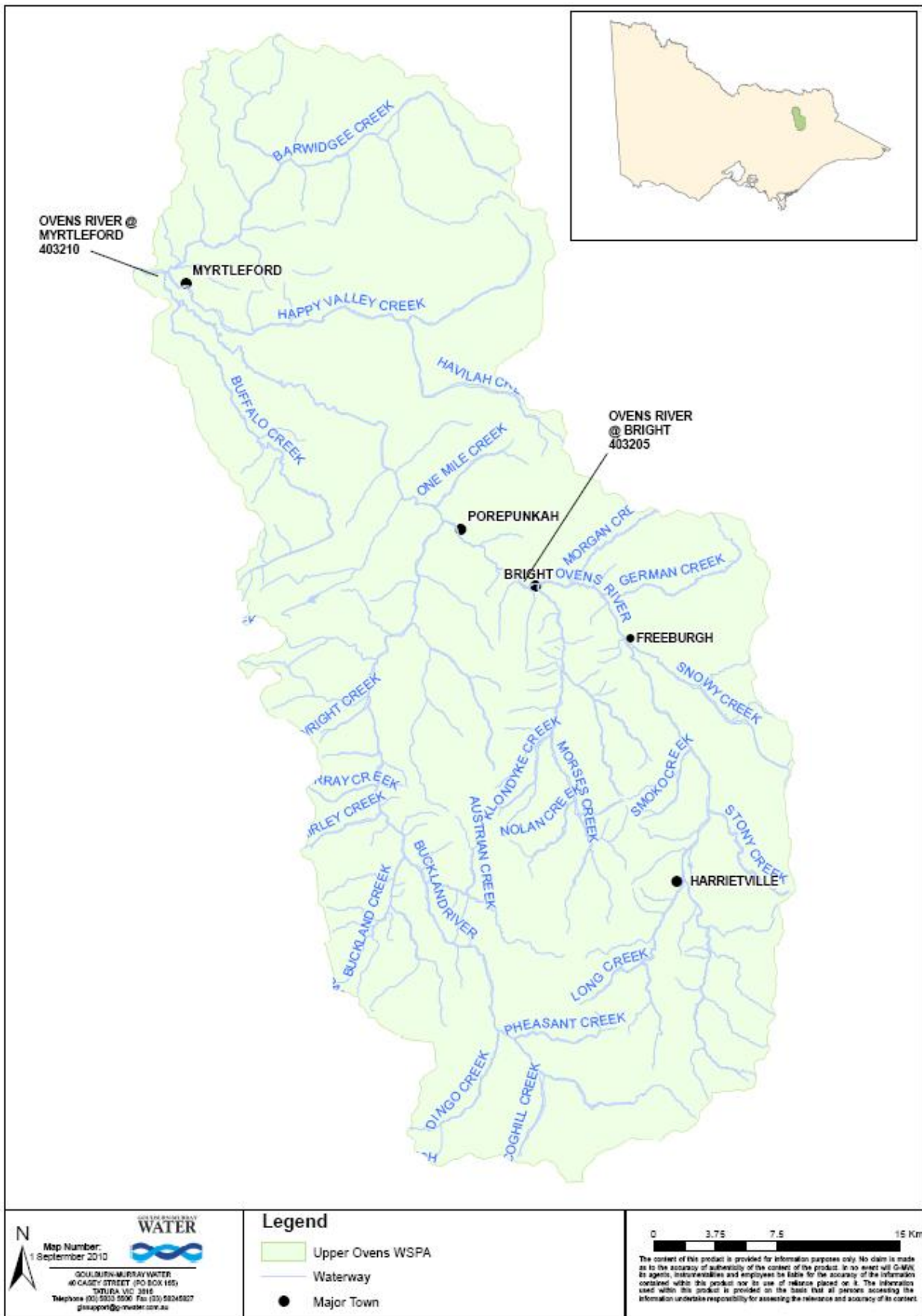
The surface water and groundwater resources in the area are highly connected. In many instances groundwater is used in conjunction with surface water, particularly as a backup supply when surface water availability diminishes in the drier months. Groundwater is mainly extracted from the unconsolidated sedimentary aquifer which lies beneath and adjacent to the Ovens River and its tributaries. The Ovens catchment experiences stress during the summer months of very dry years when flows are at their lowest and when demand on surface water and groundwater supplies are at their highest. This stress can lead to a decline in water quality, available habitat for aquatic species and the general health of the river. However, in general the flow regime of the Ovens catchment is largely intact, with surface water and groundwater extraction generally having only minor impact on flows.

1.2 Integrated management

Several pieces of technical work carried out in recent years confirm that there is strong hydraulic connection between the alluvial groundwater system and the surface water system in the Protection Area. In highly connected systems, integrated management is desirable and this approach has been confirmed at both a State level² and at a National level, through the National Water Initiative³. One of the objectives of the National Water Initiative is to recognise the connectivity between surface water and groundwater resources; it recommends management of connected systems as a single resource. Management should recognise that in some connected systems, increased groundwater extraction can reduce stream flow and the reliability of surface water entitlements. The *Northern Region Sustainable Water Strategy 2009* states that allocation, trade and management rules must recognise the level of interaction.⁴

This management plan details consistent management arrangements that recognise the high level of connectivity between surface water and the groundwater in the Protection Area, particularly in the unconsolidated sedimentary aquifer.

Figure 1: Upper Ovens River Water Supply Protection Area



2 DEVELOPMENT OF THE PLAN

2.1 What is a Management Plan?

A Management Plan is a legal document prepared under the *Water Act 1989*. A Management Plan defines the total amount of water in a Water Supply Protection Area and prescribes how it will be shared between water users and the environment. It aims to recognise the needs of existing and future water users whilst attempting to maintain or improve waterway health by protecting minimum flows for the environment. Providing sufficient environmental flows to achieve healthy rivers is a key component of ensuring the long-term sustainability of the water resources. Figure 2 shows the processes involved in developing a management plan.

2.2 Why the Ovens River?

In 2004, the Upper Ovens River was identified as a priority unregulated river, requiring the development of a Stream Flow Management Plan. Further work has since been conducted that demonstrated the high connectivity between groundwater and surface water resources. Consequently, the *Northern Region Sustainable Water Strategy 2009* endorsed the development of an integrated water management plan for the Upper Ovens catchment, the first plan of its kind in Victoria. The outcomes of this process will be used to inform the management of highly-connected systems in the future.

2.3 Who develops a Water Management Plan?

A Consultative Committee appointed by the Minister for Water prepares a draft Plan which the Minister may then approve with or without amendments or the Minister may refuse to approve it. The Consultative Committee is made up of landholders, representatives of government agencies and Environment Victoria. A draft Plan is prepared in accordance with the guidelines issued by the Minister.

By referring to numerous scientific and other studies, the consultative committee identified improvements that could be made in the management of licences to take and use water. The draft Plan aims to balance reliability for water users while reducing environmental risks during summer.

2.4 Consultation and information available during the development of the Plan

The development of a draft Plan involves consultation with a wide range of interested parties to ensure that the management arrangements are appropriate to the needs of water users and the community in general. Prior to the submission of the final draft plan to the Minister, comments are sought from interested persons. The Consultative Committee considers the comments and may make any appropriate changes to the draft Plan.

2.5 Review by Independent Technical Audit Panel

The supporting technical information that was used to develop the Plan has been reviewed by an independent Technical Audit Panel. The objective of this review, conducted by scientific experts, is to ensure that the information considered by the Consultative Committee is sound and can be used to develop an accurate and thorough Management Plan for the Protection Area. These reports can be found at www.g-mwater.com.au.

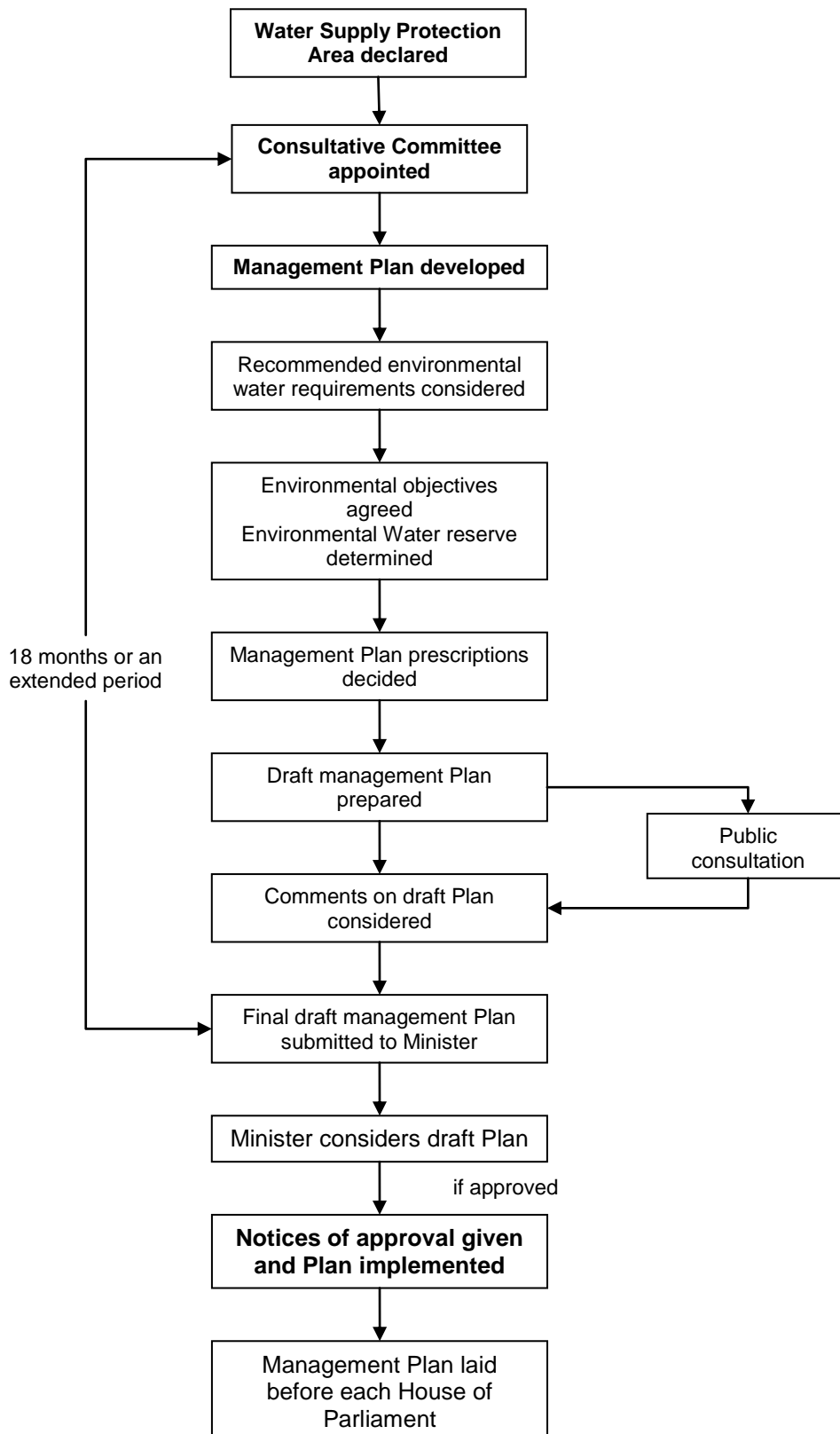
The Technical Audit Panel has reviewed the Management Plan and provided a report on the draft Plan during the consultation period. A summary of this report is appended to the Plan and a full copy of the report will be submitted to the Minister along with the Plan.

2.6 Approval of the Draft Plan

Once the draft Plan is submitted to the Minister, the Minister may approve it with or without amendments or refuse to approve it.

If the Minister approves the draft Plan it must be laid before each House of Parliament within five sitting days of the approval. The Parliament has the ability to disallow an approved management plan in whole or in part.

Figure 2: Flow chart of the development of a management plan under the *Water Act 1989*.



3 OBJECT OF THE MANAGEMENT PLAN

The object of the Management Plan as set out in section 32A of the Act is to make sure that the water resources of the Protection Area are managed in an equitable manner and to ensure the long-term sustainability of those resources. Preparation of these objectives occurred in consultation with the 'Guidelines for the Draft Management Plan' which were prepared in accordance with section 30 of the Water Act 1989 by the Minister for Water, 4 May 2009.

The specific objectives developed by the consultative committee are to:

- facilitate the integrated management of the surface water and groundwater resources of the Protection Area
- provide for essential water use, including domestic and stock, environmental, and human needs
- manage the impact of groundwater extraction on stream flows and of stream extraction on groundwater levels, particularly during low-flow periods
- maximise opportunities for all water users to adapt their operations so as to maintain or improve productive outcomes
- provide enhanced opportunities for licensed water entitlements to be utilised for the most productive and environmentally beneficial uses
- provide for the protection and improvement of water dependant ecosystems within the Protection Area
- prevent the occurrence of extraction-induced (i.e. unnatural) cease-to-flow events in the Upper Ovens River and its tributaries
- maintain and protect sufficient natural variability of the flow regime to provide for the beneficial uses and environmental values of water resources within the protection area and also downstream
- recognise and provide for non-consumptive beneficial uses of the river system (e.g. social, community, recreation, tourism)
- achieve community understanding of groundwater and surface water management issues through effective communication, consultation and engagement
- develop measures of the effectiveness of the management plan against these objectives.

4 ADMINISTRATION AND ENFORCEMENT

The Corporation has the duty of administering and enforcing the management plan.

5 WATER RESOURCES

5.1 Surface water resources

The Upper Ovens River is an unregulated river without major storages. Flows in the Ovens River are close to natural in both frequency and magnitude. The annual flow for the Upper Ovens River is measured at Gauge 403210 at Myrtleford (shown in Figure 1) which records all flows from the Upper Ovens River catchment and all of its tributaries except for Barwidgee Creek and Happy Valley Creek.

On average, the annual flow in the Ovens River at Myrtleford is 584,000 ML/yr. However, flow is highly variable and an annual flow has been as recorded as low as 69,000 ML/yr in 2006. Flow statistics for the Ovens River (gauge 403210) between 1961 and 2007 are shown in Table 1. These statistics indicate that the river receives relatively good flows for the majority of the time. Lowest flows occur over the late summer/autumn months and the highest flows occur during winter and early spring (September). Although very low flows have been recorded over the summer period, these occur infrequently. This is shown by the 90th percentile flow column in the table which demonstrates that for ninety percent of the time flows are 30 ML/d or greater in February, which is traditionally the month with the lowest flows.

Table 1: Flow statistics for the Ovens River at Myrtleford (Gauge 403210)

Month	Median Flow ML/d	90th Percentile Flow ML/d	Minimum Daily Flow Recorded ML/d
January	291	42	0.9
February	178	30	0.9
March	133	47	0.7
April	166	82	4.0
May	298	125	88.9
June	844	228	110
July	1320	327	139
August	2650	673	225
September	2730	725	181
October	1880	506	57
November	1140	306	14.7
December	592	95	1.0

5.2 Groundwater resources

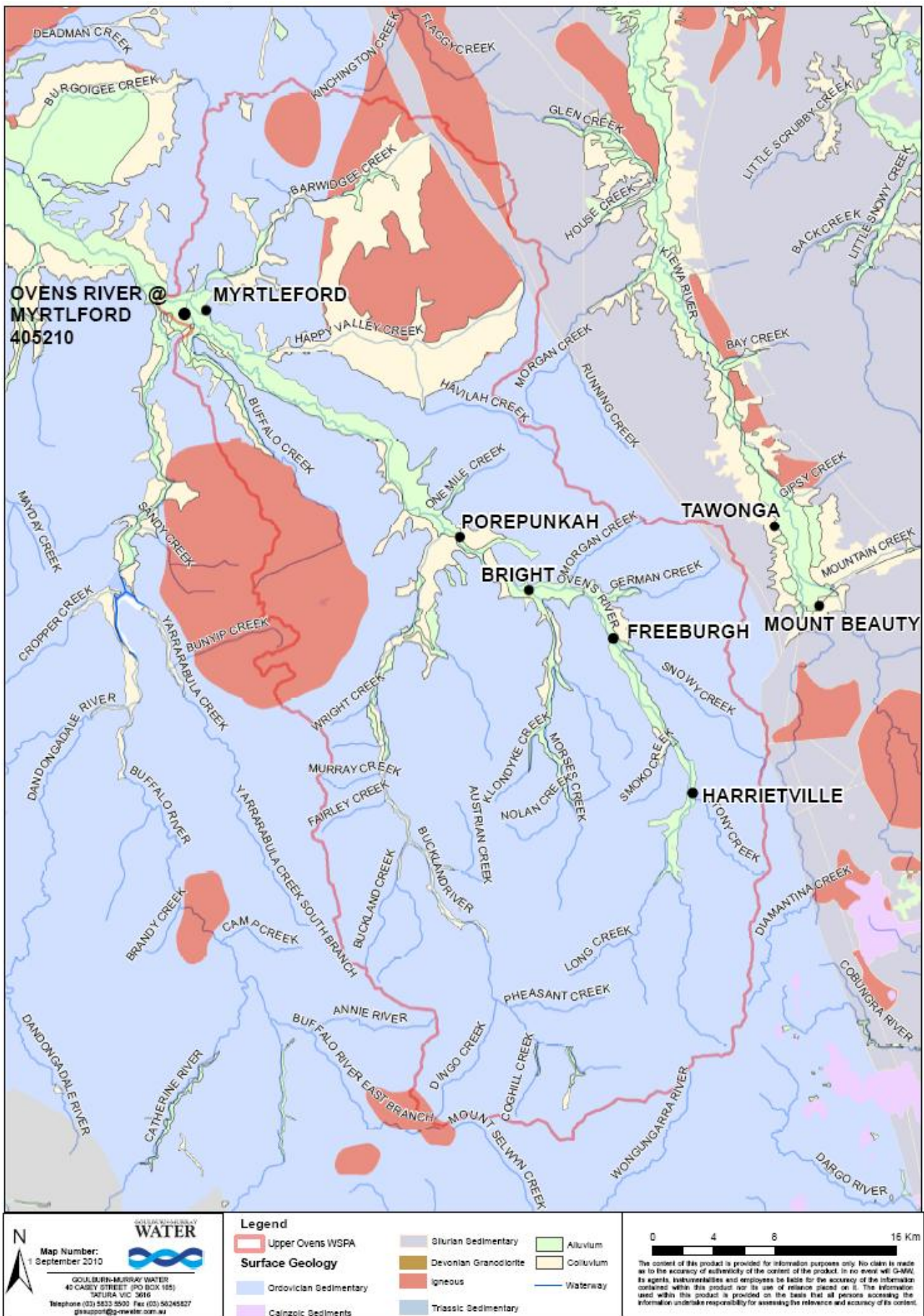
5.2.1 Geology

The regional geology in the Upper Ovens catchment is dominated by marine sedimentary rock (Pinnak Sandstone) that was formed in the Ordovician period 500 million years ago. Approximately 100 million years later (Devonian period) volcanic activity saw several mountains push through the sedimentary rock. Weathering (alluvial processes) has eroded the sedimentary rock, creating deep, narrow sided valleys. The softer tops of the volcanos have also eroded leaving the hard granites that exist today (Mt Buffalo). The eroded materials (unconsolidated alluvial and colluvial sediments) have been deposited into the valleys. Gold mining and associated dredging has also altered the area. These processes have left the surface geology of the catchment in its current state as outlined in Figure 3 and Figure 4 which are interpreted from geological maps.^{5 & 6}

Figure 3: Major Ovens Valley geology elements (looking down valley towards Bright)



Figure 4: Geology of the Upper Ovens River Water Supply Protection Area



5.2.2 Groundwater aquifers

Groundwater is present in both the fractured sedimentary rock and the unconsolidated sediments in the Upper Ovens catchment, and these units make up the two separate groundwater flow systems.⁷ An extensive groundwater system exists as a fractured rock aquifer in the Ordovician sandstones and granite intrusions. The second aquifer system is the unconsolidated sedimentary aquifer and consists of complex unconsolidated sediments deposited in the valleys (alluvium and colluvium see Figure 4). Both aquifers contain good quality water.

5.2.3 Fractured rock aquifer

The fractured rock aquifer is present for the whole of the Upper Ovens catchment area. It is covered by unconsolidated sedimentary aquifers in the valleys and is present at the surface in the mountain areas with a total area of 1514 square kilometres. The fractured rock aquifer has very large volumes of water held in storage. Average annual recharge from rainfall to the fractured rock aquifers is 165,000 ML/yr⁸.

Bores in the fractured rock aquifer generally have low yields of around 0.1 ML/d. Water in this aquifer is mainly used for domestic and stock purposes, although some small scale irrigation developments also rely on groundwater from this source.

5.2.4 Unconsolidated sedimentary aquifer

The unconsolidated sedimentary aquifer covers 132 square kilometres of the Upper Ovens catchment and has an average annual recharge from rainfall of 61,000 ML/yr⁹. Although not as large as the fractured rock aquifer, this aquifer is the main groundwater resource used in the area. Higher yields of up to 1 ML/d are obtained from this aquifer, which is the primary source of the groundwater used for irrigation.

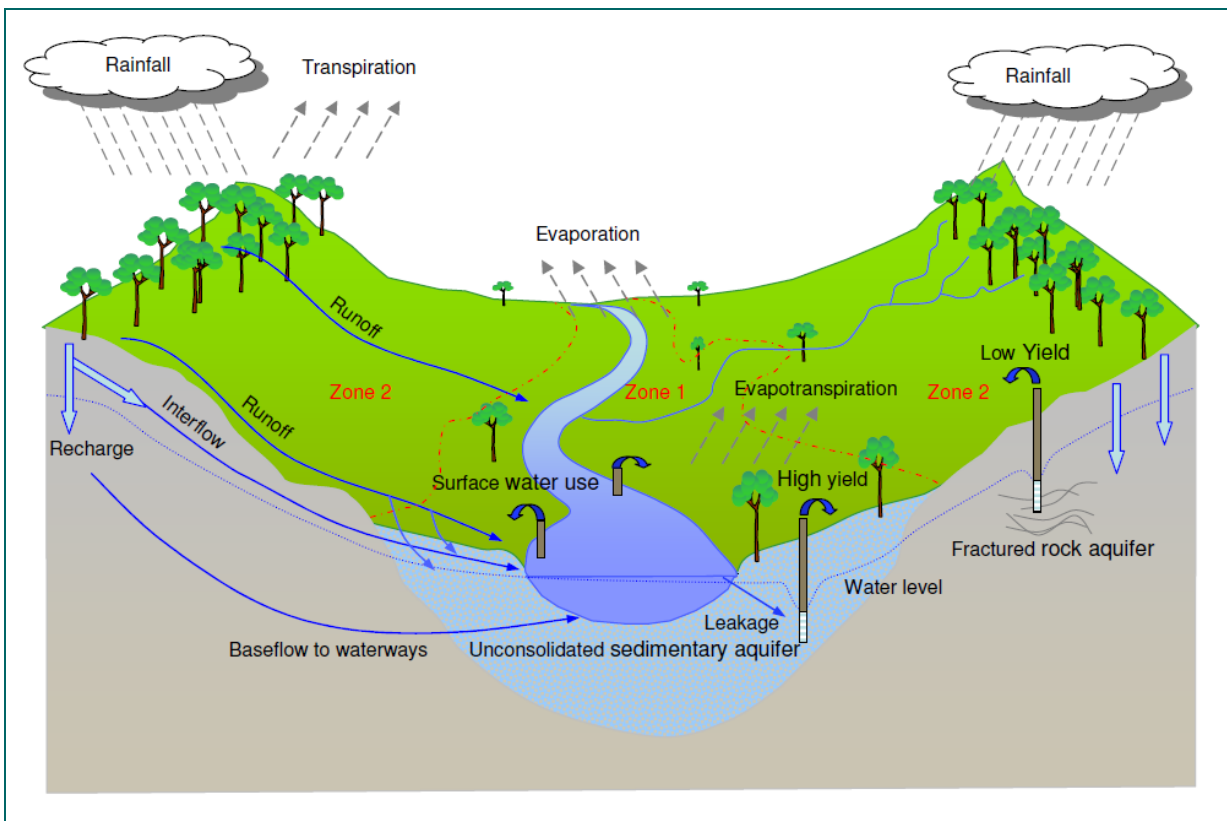
5.3 Groundwater and surface water processes

5.3.1 Catchment scale interactions

Groundwater levels loosely follow topographic contours and groundwater flows follow these gradients with groundwater flowing from the higher parts of the catchment to the lower parts all influenced by rainfall. The fractured rock aquifer is geographically the large regional aquifer but less known about associated groundwater movement and behaviour. It has been estimated that over 27,000 ML/yr of groundwater flows from the fractured rock aquifer into the unconsolidated sedimentary aquifer both directly and via the colluvial deposits.

The flow of groundwater in the unconsolidated sedimentary aquifer is complex, with local and regional flow cells conceptualised in Figure 5. In general regional terms, the greatest flow of groundwater from all aquifers (148,000 ML/yr) is horizontally towards the river, which acts as a drain. Only a small proportion (less than 150 ML/yr) flows down the valley directly through the unconsolidated sedimentary aquifer.^{10 & 11}

Figure 5: Surface water and groundwater processes



5.3.2 Groundwater and surface water interactions within the fractured rock aquifer

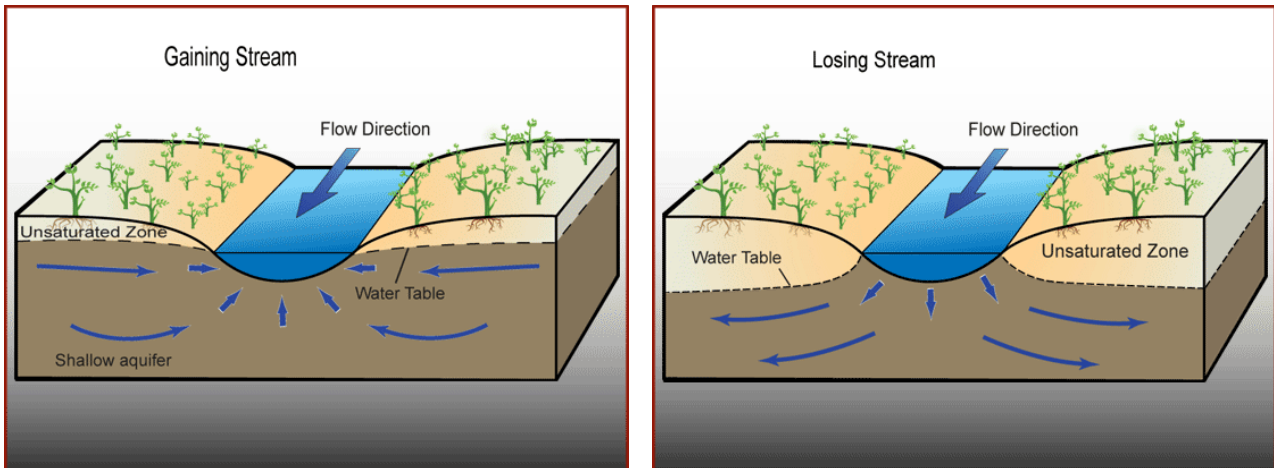
Interactions between the Ovens River and fractured rock aquifer are not as well understood. However, the fractured rock aquifer has a much lower rate of transfers with surface water than the unconsolidated sedimentary aquifer and the timeframes for the interactions are also much longer. Given the low transmissivity, large storage volume and complex nature of fractured rock aquifer responses to extraction, there is less potential that groundwater extraction from this aquifer will significantly reduce stream flows.

5.3.3 Groundwater and surface water interactions within the unconsolidated sedimentary aquifer

The unconsolidated sedimentary aquifer is hydraulically connected to the Ovens River via a continuous saturated zone and studies have shown a strong hydraulic connection between the Ovens River and that aquifer.^{12&13} The Ovens River will gain or lose water from or to groundwater depending on the gradient between the water table (groundwater level) and the height of water in the river (river stage).

When the groundwater level is higher than the river stage, groundwater flows into the river and the river is identified as a gaining stream as shown in Figure 6. Conversely, if groundwater levels drop below the river stage, the river will lose water to groundwater and become a losing stream. However, it should be noted that data from observation bores at Myrtleford between 1980 and 2009 indicates that the water table has never dropped below the level of the stream at this location. It is possible that this has occurred at other locations.

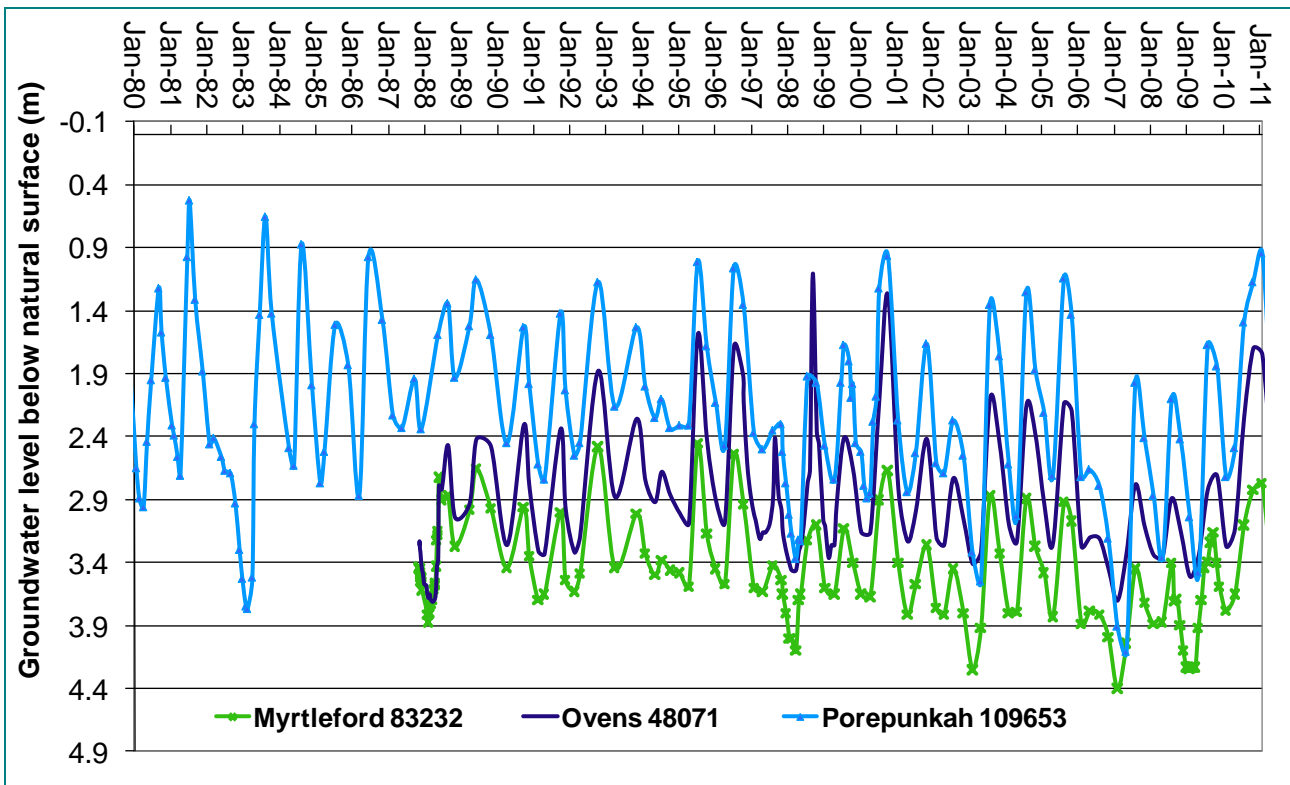
Figure 6: Behaviour of connected systems



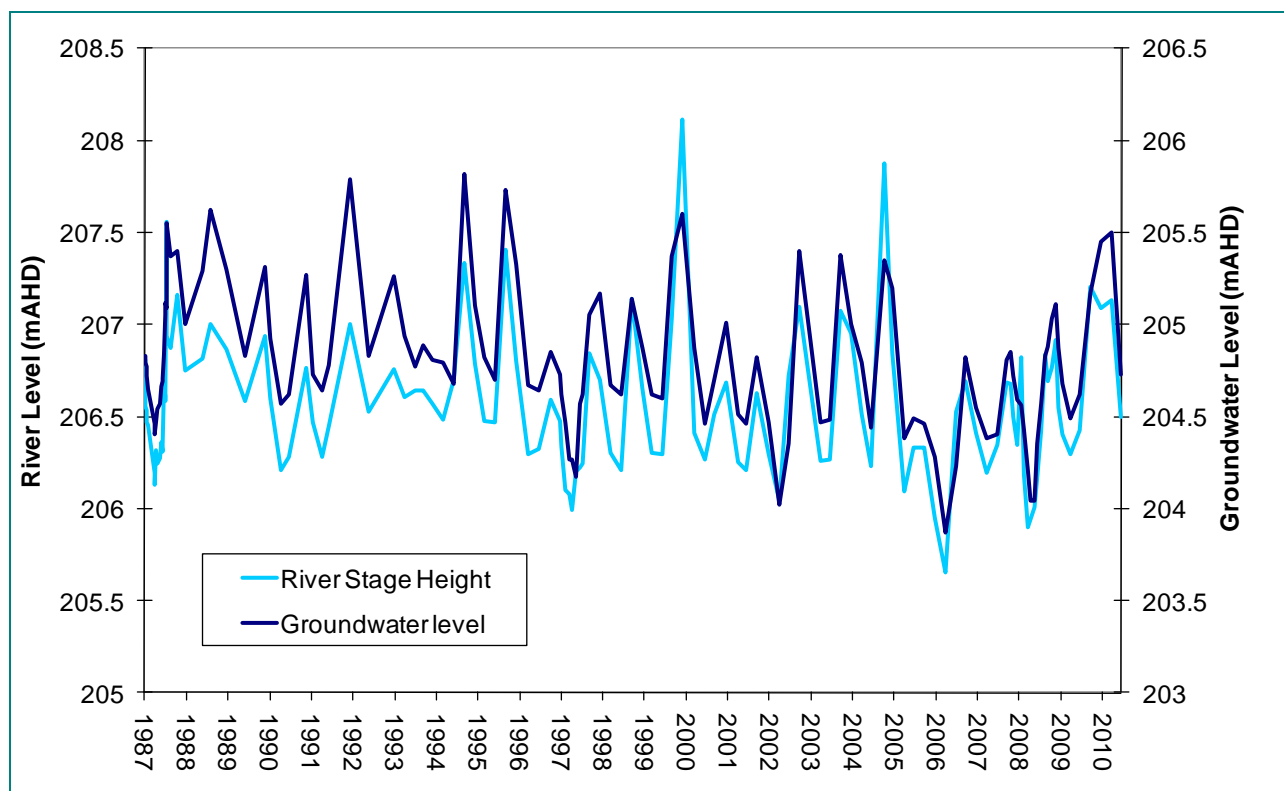
Source: Bureau of Rural Sciences (from Winter et al¹⁴)

Groundwater levels in the unconsolidated sedimentary aquifer vary seasonally but otherwise remain relatively steady, as shown by the hydrographs in Figure 7. Annual groundwater level fluctuations are primarily in response to rainfall, discharge to the river and groundwater extraction. Rises in river levels closely match rises in groundwater levels. In the main, aquifer recharge occurs over the winter months and lead to increased groundwater levels. Groundwater levels drop over summer in response to discharge to the river, higher evapotranspiration and extraction by groundwater users. Aquifer behaviour is consistent throughout the unconsolidated sedimentary aquifer in the Ovens River valley, with observation bores at all depths showing similar trends (Figure 7).¹⁵

Figure 7: Bore hydrographs in the unconsolidated sedimentary aquifer



The high transmissivity of the sediments in the valley means there is a rapid exchange of water between groundwater and the river. Figure 8 shows a high correlation between river levels and groundwater levels at Myrtleford. This is typical of the high hydraulic connectivity between the aquifer and the river throughout the Protection Area.

Figure 8: Seasonal patterns of Ovens River heights and groundwater levels at Myrtleford

River levels and groundwater levels in the unconsolidated sedimentary aquifer have the same seasonal response as shown in Figure 8. In the wet winter periods, groundwater and river levels rise in response to increased rainfall. In summer, river levels drop and groundwater levels also drop. In very dry seasons, such as 2006/2007, groundwater levels drop significantly, and the river stops flowing above the surface in some sections. Although flow is not seen on the surface, there is some flow through the gravels in the river bed. Groundwater is very important during these times as the Ovens River will still gain from groundwater where the river has deeply incised into the unconsolidated sediments. Groundwater provides water to deep pools in these areas and prevents the river flow from dropping much below the river bed¹⁶.

6 WATER ENTITLEMENTS

6.1 Introduction

Section 8 of the Act specifies the rights that people have to water. Some entitlements to water are not formally issued, but exist under the Act by virtue of an individual's private ownership of or access to land. Otherwise, a right to water in the Protection Area may only be exercised if a person has a licence.

A person has a right to water for domestic and stock use free of charge from a waterway or a bore when that person occupies:

- land on which the water flows or occurs
- freehold land adjacent to the waterway
- land containing a bore.

For irrigation or other commercial purpose a licence is required to take and use:

- water from a waterway
- groundwater
- water from a spring, soak or dam.

A licence for domestic and stock purposes is also required when a person wishes to take water from a waterway and there is a Crown land reserve or other land between the waterway and that person's property.

There are three main types of licences issued for irrigation or commercial purposes:

- all-year licences (groundwater and surface water)
- winter-take licences (surface water)
- registration licences (surface water from a dam, spring or soak).

The rights of a water corporation to take water are specified in section 9 of the Act. A bulk entitlement is the most common form of water entitlement issued to a water corporation, although other entitlements such as a licence may also be issued.

Surface water is currently the primary source of water in the Protection Area. A total volume of 10,816 ML/yr is licensed to be taken from surface water. An additional 2,431 ML/yr of surface water is authorised to be taken under bulk entitlements. Groundwater is also an important source of water in the area, with 3,730 ML/yr licensed to be taken from groundwater sources. Under licence and bulk entitlements, a total of 16,977 ML/yr is authorised to be taken from all sources in the Protection Area.

6.2 Surface water entitlements

6.2.1 Licences

A total of 471 surface water licences allow 8,517 ML (excluding registration licences) of water to be taken in the Protection Area each year. Licences issued for irrigation account for 7,910 ML/yr or 93 per cent of the volume of water authorised to be taken.

All-year licences account for over 90 per cent of the licence entitlement, and most of the demand for water occurs during the summer and autumn months. Dams on waterways are generally licensed as winter-take licences, but dams not located on a waterway (catchment dams) can also fall into this category. Winter-take licences are included in the all-year licence details in Table 2 but these account for less than 10 per cent of licence entitlement. Although much of the water taken under winter-take licences is also used during the summer and autumn months, conditions on these licences only allow water to be harvested in on-stream or off-stream dams during the months of July to October.

There are 81 registration licences in the Protection Area that authorise the use of 2,298 ML/yr for irrigation and commercial use. Most of these registration licences relate to catchment dams, although some of the dams that are subject to registration licences may also be located on small waterways. In 2002 the Act was amended, requiring a licence for water used for irrigation or commercial purposes from a dam not located on a waterway and from a spring or soak. Registration licences were issued to people who had pre-existing irrigation and commercial water use from a dam, spring or soak in a 10-year period prior to that date. Although most of these licences relate to dams, there are no conditions on the licence regarding when water can be harvested. However, many registration licence holders harvest water during the winter months and use it in the summer and autumn months. Registration licences are spread throughout the Protection Area, with the greatest concentration of these licences in the Barwidgee Creek and Happy Valley Creek catchments (Figure 9).

Of the total licence entitlement of 8,517 ML/yr, approximately 50 per cent of this volume is authorised to be taken from the Ovens River, 25 per cent from Buffalo Creek, Happy Valley Creek, Barwidgee Creek, Buckland River and Morses Creek and 25 per cent from other tributaries.

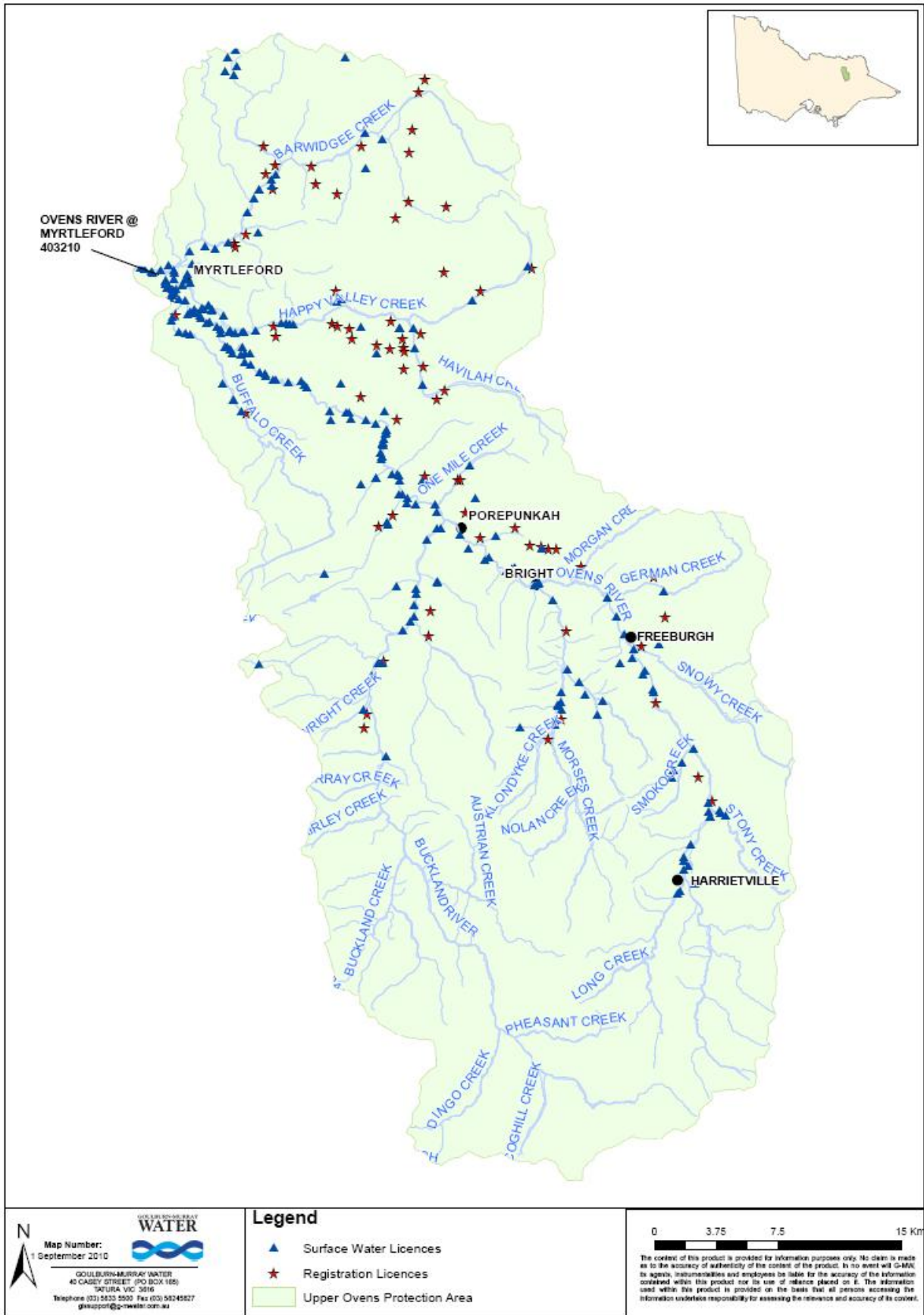
Table 2 provides details of the surface water licences in the Protection Area and Figure 9 shows the distribution of surface water licences in the Protection Area.

Table 2: Surface water licence details as at January 2010

Waterway	All –year licences						Registration licences ¹		Totals	
	Irrigation		Other ²		D&S ³		No	ML/yr	No	ML/yr
	No	ML/yr	No	ML/yr	No	ML/yr				
BARWIDGEE CREEK	20	448.9	-	-	12	24	16	206	48	678.9
BASIN CREEK	-	-	-	-	2	4	-	-	2	4
BELLS GULLY	-	-	-	-	7	16	-	-	7	16
BRIDGE CREEK	-	-	-	-	1	2	-	-	1	2
BUCKLAND RIVER	9	369.2	-	-	15	36	4	59	28	491.2
BUCKLAND RIVER TRIBS	1	17	-	-	-	-	-	-	1	17
BUFFALO CREEK	9	560.1	-	-	6	12	2	36	17	608.1
CHAPEL CREEK	-	-	-	-	1	2	-	-	1	2
DEEP CREEK	-	-	-	-	2	4	-	-	2	4
DEVILS CREEK	-	-	-	-	8	16	1	22	9	38
DUMPHYS CREEK	-	-	1	2	1	2	-	-	2	4
EUROBIN CREEK	2	106	-	-	9	22	2	95	13	223
FEATHERTOP CREEK	1	10	-	-	4	10	-	-	5	20
GERMAN CREEK	1	110	-	-	5	12	2	52	8	174
GROWLERS CREEK	4	8	3	6	8	18	-	-	15	32
HAPPY VALLEY CREEK	26	900.8	-	-	10	22	18	681	54	1,603.8
HAVILAH CREEK	2	103.8	-	-	11	28	3	81	16	212.8
HIT OR MISS CREEK	1	18	-	-	-	-	-	-	1	18
JACKSONS CREEK	1	25	-	-	1	2	-	-	2	27
JAGOES CREEK	1	13	-	-	3	6	-	-	4	19
KANGAROO CREEK	4	98.4	-	-	-	-	-	-	4	98.4
KEATINGS CREEK	2	73.1	-	-	-	-	-	-	2	73.1
KENNEDYS CREEK	2	101	1	2.5	-	-	-	-	3	103.5
LONG TUNNEL CREEK	2	6	-	-	6	18	-	-	8	24
MORSES CREEK	8	245.9	-	-	32	70	3	184	43	499.9
MURRAYS CREEK	-	-	-	-	1	2	-	-	1	2
MYRTLE CREEK	5	183.4	-	-	5	12	1	3	11	198.4
ONE MILE CREEK	1	4.2	-	-	9	18	2	30	12	52.2
OVENS RIVER TRIBS	4	46.3	1	2	19	40	14	533	38	621.3
OVENS R U/S BUFFALO	92	4,140	-	-	48	104	4	125	144	4,369
PEABODY GULLY	-	-	-	-	1	2	-	-	1	2
ROBERTS CREEK	2	108	-	-	3	6	5	148	10	262
SANDY CREEK	1	36	-	-	-	-	2	22	3	58
SMOKO CREEK	3	34	2	4	5	10	-	-	10	48
SNOWY CREEK	1	28	-	-	3	6	1	6	5	40
STAKEY CREEK	-	-	-	-	3	6	-	-	3	6
STONY CREEK	3	29.8	3	16	2	6	1	15	9	66.8
TAYLORS CREEK	1	8	-	-	-	-	-	-	1	8
TWO MILE CREEK	2	70	-	-	-	-	-	-	2	70
UNION GULLY	-	-	-	-	1	2	-	-	1	2
WHISKY CREEK	1	8.2	-	-	1	2	-	-	2	10.2
WRIGHTS CREEK	-	-	-	-	3	6	-	-	3	6
TOTALS	212	7,910.1	11	32.5	248	548	81	2,298	552	10,815.6

¹ As many registration licences are not on waterways the data reflects the general catchment in which they are located² Other includes aquaculture and power generation³ D&S = domestic and stock

Figure 9: Surface water licences in the Protection Area



6.2.2 Unlicensed domestic and stock rights

There is limited data on the extent of unlicensed domestic and stock rights. People normally exercise these rights by using water directly from small streams that flow through their property or adjacent to it, or by harvesting water in farm dams.

6.2.3 Urban bulk entitlements

Within the Protection Area, North East Water provides a water supply to the townships of Harrietville, Bright, Wandiligong, Porepunkah and Myrtleford.

Four bulk entitlements¹⁷ issued under sections 43 and 47 of the Act specify the arrangements under which North East Water can take water from various waterways in the Protection Area. Each entitlement specifies; the waterways from which water can be taken, the volume that can be taken each year, the daily rate that can be taken and the minimum flow when extraction must cease. Table 3 provides details of these bulk entitlements. North East Water may also obtain additional volumes through water transfers and it also holds a groundwater licence authorising an annual volume of 75 ML/yr as a back-up supply for Myrtleford.

Table 3: Summary of North East Water's bulk entitlements

Town	Source	Bulk entitlement (ML/yr)	Additional volume by annual transfer (ML)	Maximum extraction rate (ML/d)
Harrietville	Simmons Creek	91	74	3.8
	Ovens River – east branch			2.4
Bright/ Wandiligong	Ovens River	704	366	9.5
	Bakers Gully Creek			5.0
Porepunkah	Buckland River ¹	166	54	1.3
Myrtleford	Buffalo Creek	1,470 ²	not applicable	5.5

¹ When not supplied from Bright

² The Authority may not take more than 2424 ML in any consecutive two-year period

6.3 Groundwater entitlements

6.3.1 Licences

There are 106 groundwater licences issued in the Protection Area, authorising the use of 3,730 ML/yr year. Approximately 92 per cent of the total entitlement is authorised to be used for irrigation purposes.

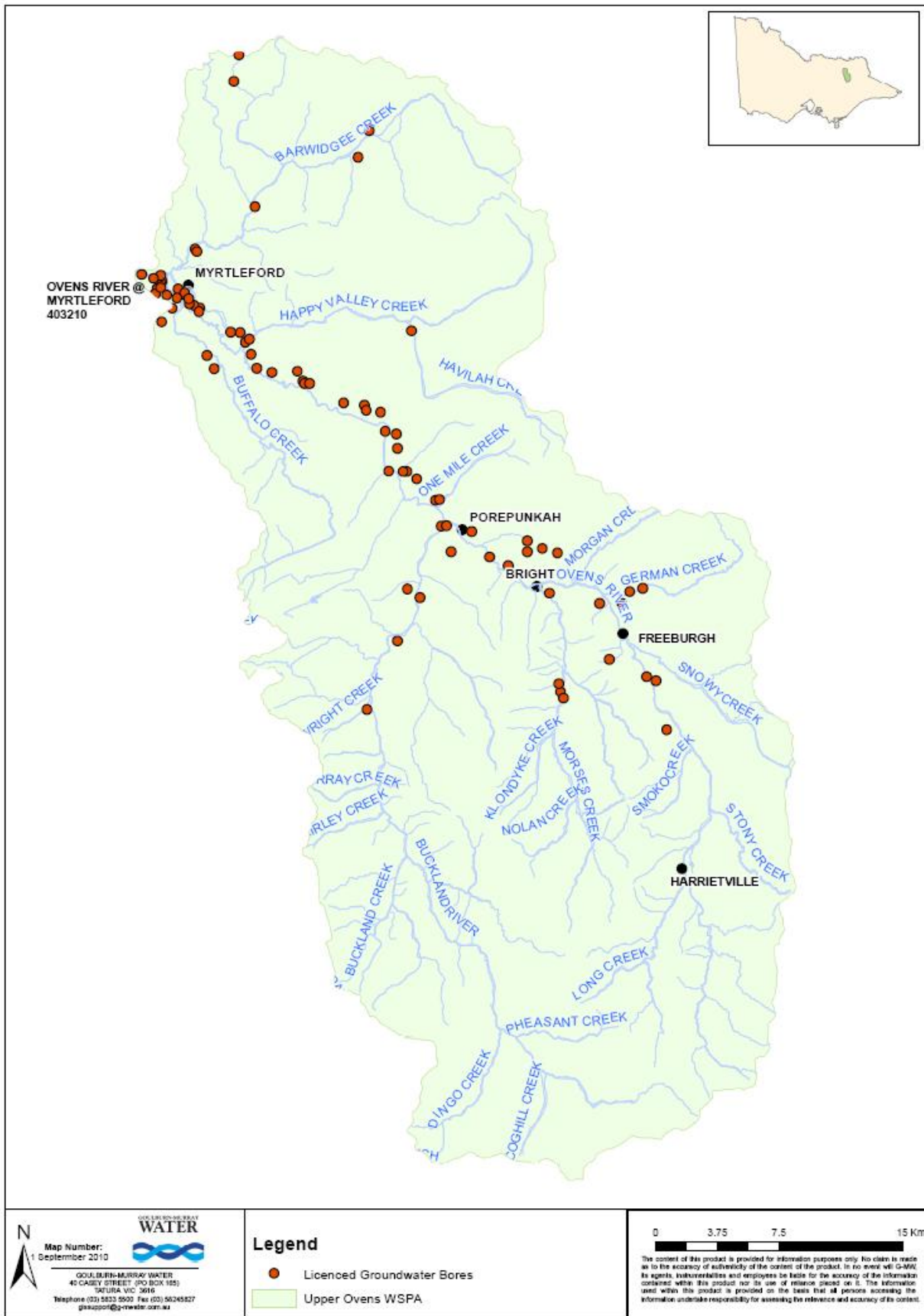
Table 4 shows details of the groundwater licences in the Protection Area.

Table 4: Groundwater licence details

Licence Type	No. of Licences	Volume (ML/yr)
Urban supply	1	75
Commercial	10	51
Commercial residential	3	47
Dairy Wash	2	4
Industrial	1	5
Irrigation	89	3,548
Total	106	3,730

The majority of licences are located adjacent to the Ovens River and its major tributaries. Figure 10 shows the distribution of groundwater water licences within the Protection Area.

Figure 10: Groundwater Licences in the Protection Area



6.3.2 Unlicensed domestic and stock entitlements

A person using water from a bore for domestic and stock purposes generally does not, require a take and use licence. The Corporation has identified 318 bores that have been constructed over the years solely for domestic and stock purposes, although some of these bores may no longer be in use.

7 WATER USE

7.1 Introduction

Agriculture in the Upper Ovens valley is focused on the river flats and gentle slopes of the valley sides. The largest land use is grazing and dry land farming; however, there is also a large amount of irrigation of pasture, hops, vineyards, nuts and orchards. Both surface water and groundwater are used for irrigation. Surface water is also used for town supply throughout the area.

Table 5 shows the estimated amount of water used in the Protection Area. River diversions licences greater than 10 ML and town supplies have been metered from the late 1990's, while groundwater has only been metered since 2008 and then only for licences greater than 20 ML. The majority of water use in the area is between Bright and Myrtleford. In general, water use is well below entitlement volume and tends to increase in dry years when demand is higher and the resource scarcer. This trend is demonstrated by the differences between the estimated maximum use and average use in Table 5.

Table 5: Metered and estimated water use in the Protection Area

Type of use	Average metered Use (ML)	Maximum metered Use (ML)	Estimated maximum water use (ML)
River diversions ¹	2,880	3,791	5,700
Town supplies	1,550	1,682	1,682
Groundwater extraction ²	500	650	1,200
Total	5,894	7,670	8,582

¹ Metered data does not include licences on tributaries or licences with an entitlement below 10 ML/y as they are not metered

² Metered data does not include usage from licences with an entitlement below 20 ML/y as they are not metered

7.2 Irrigation and commercial use

Irrigation is primarily summer based and is reliant on river flows and groundwater extractions. Most surface water is pumped directly from waterways. In most years, flows in the Ovens River are sufficient to allow extraction to occur without restrictions. However, during dry summers when flows are low, river extraction may be restricted or banned for varying periods.

Restrictions and bans on surface water extraction during low flow periods may result in reduced crop yields and, in extreme circumstances, crop loss. Consequently an estimated 36 irrigators have both a groundwater and surface water licence and may have used groundwater when surface water supplies were curtailed.¹⁸ However, due to the high level of connectivity between the alluvial aquifer and Ovens River, this groundwater use is likely to have reduced surface water users' access to water, especially for users downstream of Bright. It may have also increased the length of restrictions and ban periods. In other areas of the State, where groundwater is not available, irrigators have traditionally built farm dams to provide a backup supply in times of summer flow shortages. However, in the Protection Area, groundwater is readily available and the construction of dams has not been seen as necessary.

As shown in Figure 11 demand for irrigation varies seasonally. Maximum extraction averages around 38 ML/d with peaks over 50 ML/d in the summer months, due primarily to the large variability in climate. Irrigation demands include both surface water and groundwater demands). Demands for town and household use are around 6 ML/d making irrigation the biggest user of water in the catchment with the main demand occurring over the summer months – see Figure 12. In the past, restrictions on surface water irrigation and commercial users have been based on flows recorded at Bright and were linked to urban restrictions. Restrictions have occurred roughly once every 10 years and when they have occurred users have had limited or no access to water for extended periods. For example in the summer of 2006/07, the driest year on record, surface water users had restricted access to water for sixteen weeks and were banned from extracting water for nine weeks.

Figure 11: Daily irrigation demand

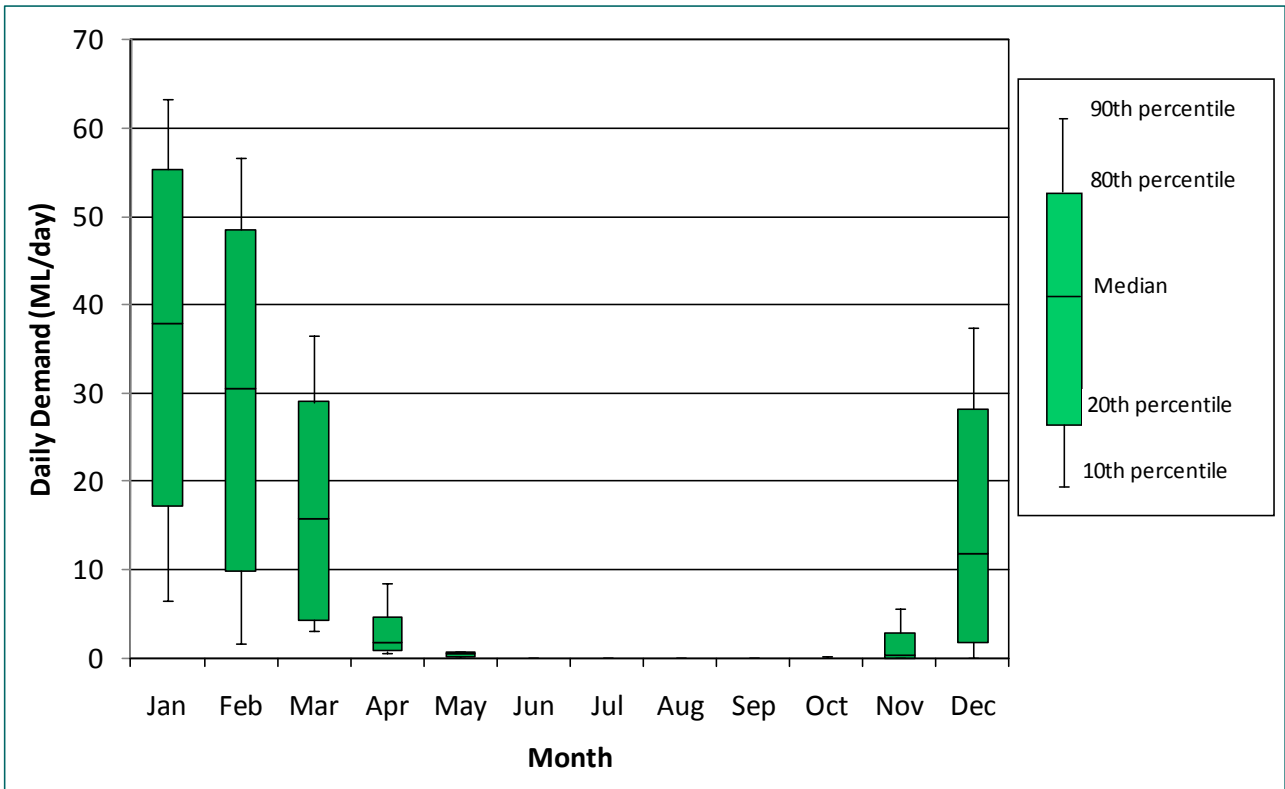
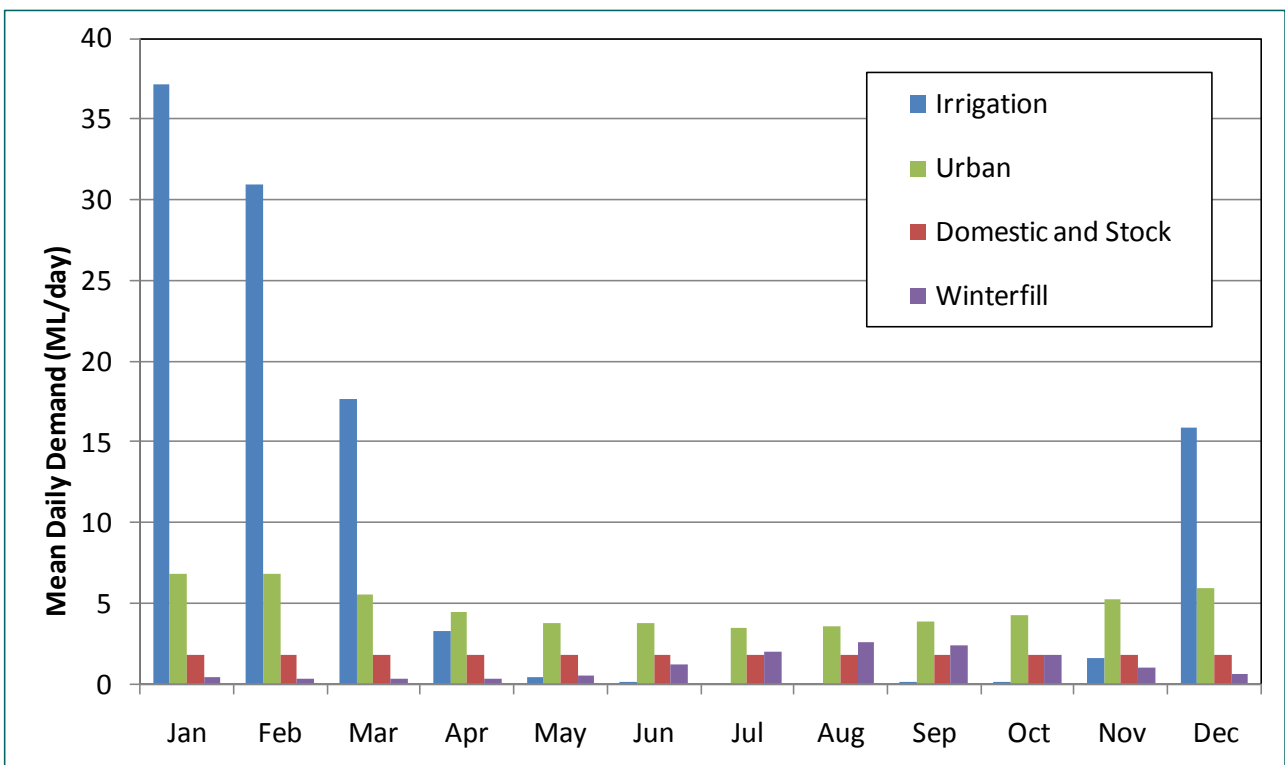


Figure 12 compares the daily demand between various water uses. Demand from winter-take licences is also included in the graph over the summer period as some on-stream dams still capture some flows during the summer months. The estimated use of water by the holders of registration licences is also included.

Figure 12: Mean Daily demand for various uses



7.3 Domestic and stock use

7.3.1 Surface water

There is widespread use of surface water in the Protection Area for domestic and stock purposes. Many people use water for this purpose generally without the need for a licence under section 8 of the Act and the volume of water used by these people each year is not known. However, some domestic and stock users do require a licence. There are currently 292 licences for domestic and stock use in the Protection Area. While these are generally not metered, a rough estimate can be made by ascribing a 2 ML/yr volume to each licence. Using this estimate equates to roughly 500 ML/yr of surface water used for domestic and stock purposes.

7.3.2 Groundwater

There is no reliable data on the amount of groundwater taken in the area for domestic and stock purposes. However, a rough estimate can be made by ascribing a 2 ML/yr volume to each domestic and stock bore. This equates to approximately 636 ML/yr.

7.3.3 Urban use

Average annual use for urban supply is 1550ML/yr see Table 5. Table 6 shows the breakdown of the annual volume of water diverted by North East Water to supply individual towns during 2007/08¹⁹. While urban use is not as high as irrigation use, the demand is relatively constant over the whole year as shown in Figure 12.

Table 6: Urban water use 2007/2008

Town	Source	Volume diverted 2007/08 (ML)
Harrietville	Simmons Creek and Ovens River – east branch	62
Bright/Wandiligong	Ovens River and Bakers Gully Creek	654
Porepunkah	Buckland River	48
Myrtleford	Buffalo Creek	740
Total		1,504
No groundwater was used during 2007/2008		

Urban users also have their access to water restricted in years with low flows. Restrictions are currently based on flows recorded at Bright. Urban restrictions occur more frequently than for irrigation, although urban users will always have some access to water for critical human needs. Bright and Myrtleford have had restrictions over summer for the past five years. In 2006/07 restrictions were in place for an eight month period.

7.4 Other uses

The Ovens River supports a range of recreational activities including swimming, canoeing, recreational fishing and aesthetic enjoyment. The Ovens River valley is a popular tourist destination and the river and its walking tracks are a major attraction.

8 THE ENVIRONMENTAL WATER RESERVE

8.1 General Condition of the Catchment

The Ovens River catchment provides important ground and surface water to the environmentally valued, heritage listed Lower Ovens River and the Murray River. The catchment also contains important native fish populations, such as Trout Cod and Mountain Galaxias as well as significant wetlands and vegetation communities. Further, the groundwater supports summer surface water flows and groundwater dependent ecosystems including wetlands and vegetation communities on the floodplain such as freshwater meadows and shallow freshwater marshes.

The Upper Ovens River catchment is generally in good environmental condition. The Index of Stream Condition 2004, which brings data together from a variety of sources to give a detailed overall picture of river condition, rated the majority of the Upper Ovens River catchment as being in moderate to good condition. This generally good result reflects the low level of flow stress in the catchment for most of the year and extensive areas of dense forest cover in the upper catchment.

The environmental assets that rely on the river can be impacted by groundwater and surface water extraction. The detailed understanding of water use in the catchment, outlined in the above sections, will assist in the resource being managed so as to maintain the Upper Ovens River catchment in a good environmental condition.

8.2 Legislative Provisions

The Act enables water to be set aside as the environmental water reserve. Water can be set aside for the environment in a number of ways. An environmental entitlement can be allocated or water can be set aside through the operation of a licence or bulk entitlements or other instruments that authorise water to be taken. Water can also be set aside for the environment through the operation of a management plan.

Section 32A (3) of the Act enables a management plan to make prescriptions to ensure that the environmental water reserve is maintained in accordance with the environmental water reserve objective.

Section 4B(1) of the Act provides that *“The environmental water reserve objective is the objective that the environmental water reserve be maintained so as to preserve the environmental values and health of water ecosystems, including their biodiversity, ecological functioning and quality of water and the other uses that depend on environmental condition.”*

This Management Plan sets aside water for the environment in three main ways by:

- restricting the taking of water as set out in section 12
- restricting and prohibiting the issue of licences as set out in section 13
- establishing rules for licence transfers and licence conversions as set out in section 14.

Water is also set aside for the environment through the operation of the Murray-Darling Basin Act 1993. In 1995 the Murray-Darling Ministerial Council decided to introduce a Cap on diversions of water from the Basin at 1993/94 levels of development. The Council determined that a balance needed to be struck between the significant economic and social benefits that have been obtained from the development of the Basin's water resources on the one hand, and the environmental needs of water in the rivers on the other.²⁰ As the Ovens River catchment is within the Murray Darling Basin, the Cap on diversions applies to the Protection Area.

8.3 Environmental flow requirements

A significant amount of technical work has been undertaken in the Protection Area to determine the appropriate environmental flows for the Upper Ovens River and its major tributaries. Environmental flow recommendations²¹ were made in 2006 by an expert scientific panel, following a study overseen by an inter-agency steering committee and with community and scientific input. The study used the Victorian endorsed FLOWS method.²² The method determines and describes the key flow components used to recommend an environmental flow regime. The flow components are characterised by season and duration and include cease to flow, low flows, freshes, high flows, bankfull flows and overbank flows.

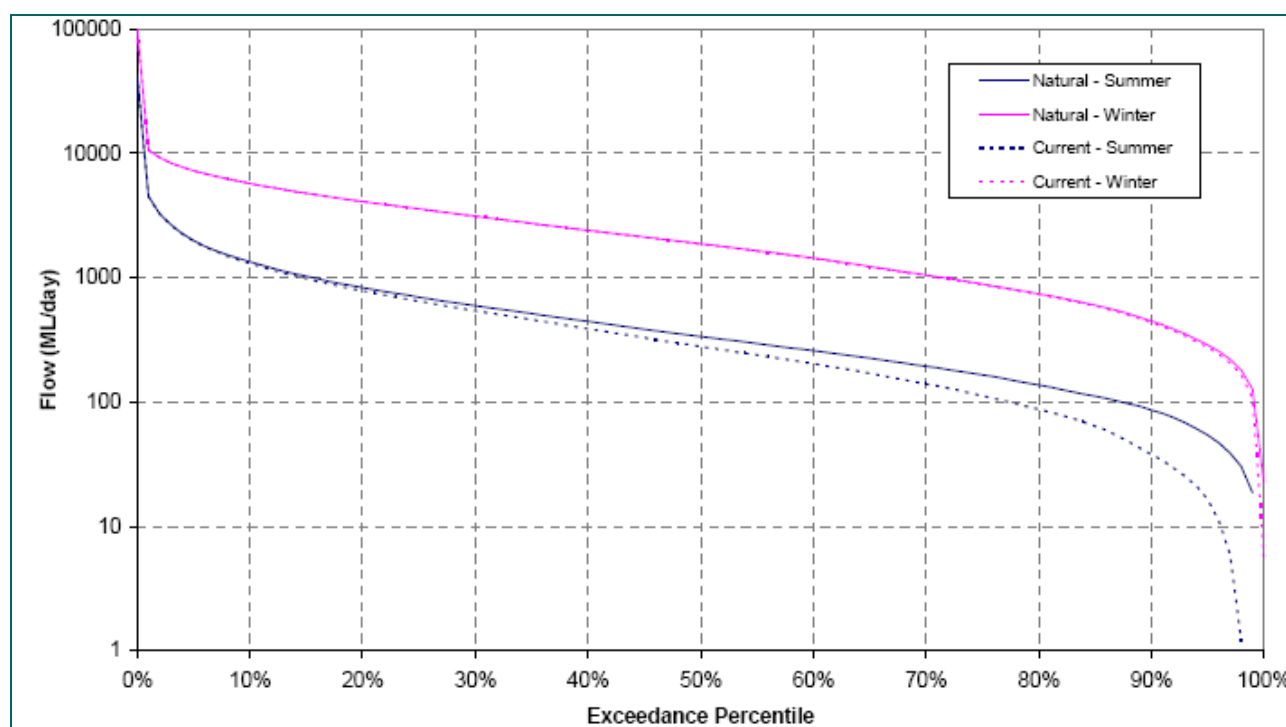
The FLOWS study recommended environmental flows for eight reaches in the Upper Ovens River catchment. Flow recommendations for those reaches during summer and winter low flow periods are shown in Table 7.

The FLOWS study found that the current flow regime for the Upper Ovens River is very close to its natural flow regime. That is, what the flow in the river would be with no extraction or dams. Further, the environmental condition of the catchment was also found to be in generally good condition. However, the study found that summer low flows can be significantly affected by water extraction as shown in Figure 13. The FLOWS study provided recommendations to maintain, restore or enhance the identified values of the Protection Area.

Table 7: Summary of low flow recommendations using the FLOWS methodology

Reach	Description	Summer Low flow (ML/d or natural)	Winter Low flow (ML/d or natural)
1	Ovens River upstream of Morses Creek	19	135
2	Ovens River: Morses Creek to Buckland River	60	300
3	Ovens River: Buckland River to Buffalo River	137	740
4	Morses Creek catchment	8	48
5	Buckland River catchment	64	216
6	Buffalo Creek catchment	7	54
7	Happy Valley Creek catchment	7	19
8	Barwidgee Creek catchment	15	26

Figure 13 shows the comparison of modelled flows between natural flows and current flows. The exceedance percentile is the amount of time flows in the Owens River are at, or greater than, the given flow. The figure highlights that the winter flows are not greatly impacted by water extractions. The natural winter flow curve and current winter flow curve (which includes extractions) are very close together. However, during the summer period there is a marked difference between the natural summer flow curve and the current summer flow curve (The current flow regime was the level of demand based on the 2004/05 development level). This demonstrates the effect that water extraction over summer has on flow. It is for this reason that a major focus of the Plan relates to better managing the impact that extraction has on summer low flows.

Figure 13: Comparison of natural and current flow regime - Owens River at Myrtleford

Modelling shows that under natural conditions, the river would still drop below the FLOWS recommended environmental flow in dry years. For example, as shown in Figure 13, flows at Myrtleford drop below the summer flow recommendation of 137 ML/d approximately 20 per cent of the time. Conversely, for 80 per cent of the time, flows are above the minimum environmental flow recommendation. Although stream flows naturally drop below the environmental flow recommendations, extraction of both surface water and groundwater can increase how frequently this occurs (frequency) and duration of such occurrences. Changes to the frequency and duration of these low flows can cause adverse environment impacts.

Under natural conditions (no extraction), summer flows in the Ovens River of less than 137 ML/d were predicted to have occurred in 77 years out of 100 for an average of 8.1 weeks. When surface water and groundwater extraction are taken into consideration, summer flows of less than 137 ML/d occur in 89 years out of 100 for an average of 9.5 weeks²³. The change in frequency and duration of summer low flows due to extraction is not significantly impacting on the environment at this flow level (137 ML/d). However, water extraction, including groundwater extraction, does increase the frequency and duration of very low flow events (less than 30 ML/d) and non-natural cease to flow events in the Upper Ovens River.

Groundwater extractions that increase the frequency and duration of very low flow and cease to flow events are the greatest risk to the environment. Due to these risks, the impacts of extraction on the environment when flows fall below the minimum summer flow recommendation were investigated in more detail.

Each flow recommendation is made up of different environmental objectives that relate to environmental features, such as water quality and habitat. Each of these objectives will be met by different levels of flow²⁴. The environmental objectives and related flows for the Upper Ovens River between the Buckland and Buffalo Rivers are shown in Table 8. Information in this table has been used to consider the impact on the environment for flows below the environmental flow recommendation. Section 10 of this Management Plan prescribes restrictions on taking both surface water and groundwater during times of low flows in response to the environmental flow recommendations.

Table 8: Ovens River summer environmental flow objectives provided under various flow scenarios

Flow level at Myrtleford	Environmental objective provided for by different summer low flows
>0 ML/d	Channel wetting and maintaining some water in pools Aquatic plant watering Provision of critical macroinvertebrate habitat.
7 ML/d	As above and additional surface flow for maintaining water quality in pools (avoiding stratification)
30 ML/d	As above and provision for small native fish passage between pools
60 ML/d	As above and increasing diversity of macroinvertebrate habitat
137 ML/d	As above and large native fish passage between pools. Full environmental summer low flow objectives met

9 IMPACTS OF THE TAKE AND USE OF WATER

9.1 Impacts of the take and use of surface water

The flow in the Ovens River and its tributaries can be significantly impacted during summer by water extraction as described in section 8.3. In order to equitably share the available water over this period, a roster and restriction regime on surface water users has been a feature of surface water management in the area for many years. The Management Plan imposes a water sharing regime on surface water users that is only slightly different from that which has operated historically (Sharing of water over summer is described in section 10).

9.1.1 Winter-take and registration licences

Streams in the Ovens River catchment experience high flows over the winter period. Dams used by winter-take licence holders and registration licence holders harvest water during this period. At present water use over winter is less than 3000ML/yr compared to an annual flow of 584,000ML/yr. The impact of water harvesting in these dams over winter is currently less than 5 ML/d as shown in Figure 12. These users have minimal impact on the flows over the critical low flow summer period as they use water stored in their dams which were filled during the high flow, winter period.

The current Victorian State-wide methodology for determining the sustainable level of water use over the winter period is known as the Sustainable Diversion Limit (SDL). The SDL in the Protection Area sets the amount of water that can be taken sustainably at close to 70,000ML/yr. SDLs are also determined for smaller

catchments within the Protection Area and set out how much water can be taken in each of those catchments along with providing minimum passing flows when possible.

The combination of high flows and low demand over winter mean there is potential for more utilisation of the winter water resource. Moving demand from the summer period to the winter period will allow more flow during summer where extraction is currently impacting low flows. Winter flows will remain protected by capping licence volumes.

9.2 Impacts of the take and use of groundwater

As a result of recent studies, the impacts of taking groundwater from the unconsolidated sedimentary aquifer on waterways during the low flow periods are now better understood. Although, for many years water managers have been aware that pumping groundwater from dragline holes close to the Ovens River has an impact on river flows. Consequently, water users that extract water from dragline holes within 200m of the river have been licensed as surface water and subject to the same level of restrictions that applied to river diverters.

Recent studies have shown that groundwater extraction from the unconsolidated sedimentary aquifer reduces stream flows within days to weeks. Although groundwater extraction at a greater distance from the river has a lesser immediate impact on stream flows than groundwater extraction close to the river, all groundwater extraction from the unconsolidated sedimentary aquifer has the potential to lower groundwater levels below the base of the stream and cause it to dry up.

9.2.1 Impacts of taking groundwater from the fractured rock aquifer

There are estimated to be 18 users licensed to take a total of 555ML/yr from the fractured rock aquifer. Annual recharge into the fractured rock aquifer is estimated to be nearly 165,000ML/yr. Although the annual recharge is not considered to be a sustainable extraction volume, it gives an indication of the availability of the resource. Use of the fractured rock groundwater resource is currently insignificant in terms of the annual recharge and there is potential to further utilise this resource.

Extraction from the fractured rock aquifer has a delayed response to reducing stream flow with the effect generally occurring over the winter period when flows are high, resulting in minimal impact. Moving the summer demand from the unconsolidated sediment aquifer to the fractured rock aquifer will help to protect stream flow during the critical summer months.

Since bores in the fractured rock aquifer generally have a low yield of around 0.1 ML/d, a very large number of bores would be required to significantly impact the resource. The potential for this is low given that the majority of the fractured rock lies in areas of the catchment that are unable to be developed, such as state or national parks.

The impact on stream flows of taking groundwater from the fractured rock aquifer is small. Consequently, groundwater users in the fractured rock aquifer will not be subject to the restrictions imposed under the water sharing regime proposed for those who take water from the unconsolidated sedimentary aquifer and streams. However, a limit on the amount of groundwater that can be extracted from this aquifer has been set (see section 13.1). Investigation into the level of any increase in demand relative to the cap and any potential management issues should be undertaken when the Plan is reviewed in five years time.

9.2.2 Impacts of taking groundwater from the unconsolidated sedimentary aquifer

Groundwater extracted from the unconsolidated sedimentary aquifer during an irrigation season can reduce stream flows within that season. In the Protection Area the lag between extraction from the unconsolidated sediment aquifer and the associated reduction in stream flow is relatively short (less than one month).

The amount of time it takes for groundwater extraction to reduce stream flow (known as lag time) varies with the distance to the river. At a distance of 10 m from the river, a bore can withdraw 100 per cent of the extracted volume from the river in an irrigation season. At a distance of 300 m from the river, 65 per cent of the water extracted from a bore could come from the river during an irrigation season.²⁵ In dry years, groundwater pumping has the potential to reduce groundwater levels below the level of the river and cause the river to become a losing stream (Section 5.3.3).

Over the summer period, groundwater provides baseflow in the Ovens River. In most years the impact of groundwater use on stream flows is of no concern as summer flows are above 30 ML/d at Myrtleford for more than 90 per cent of the time at Myrtleford, see Table 1. When stream flows are below 30 ML/d, groundwater provides the main source of water for the river. In extremely dry years, such as 2006/07, flows

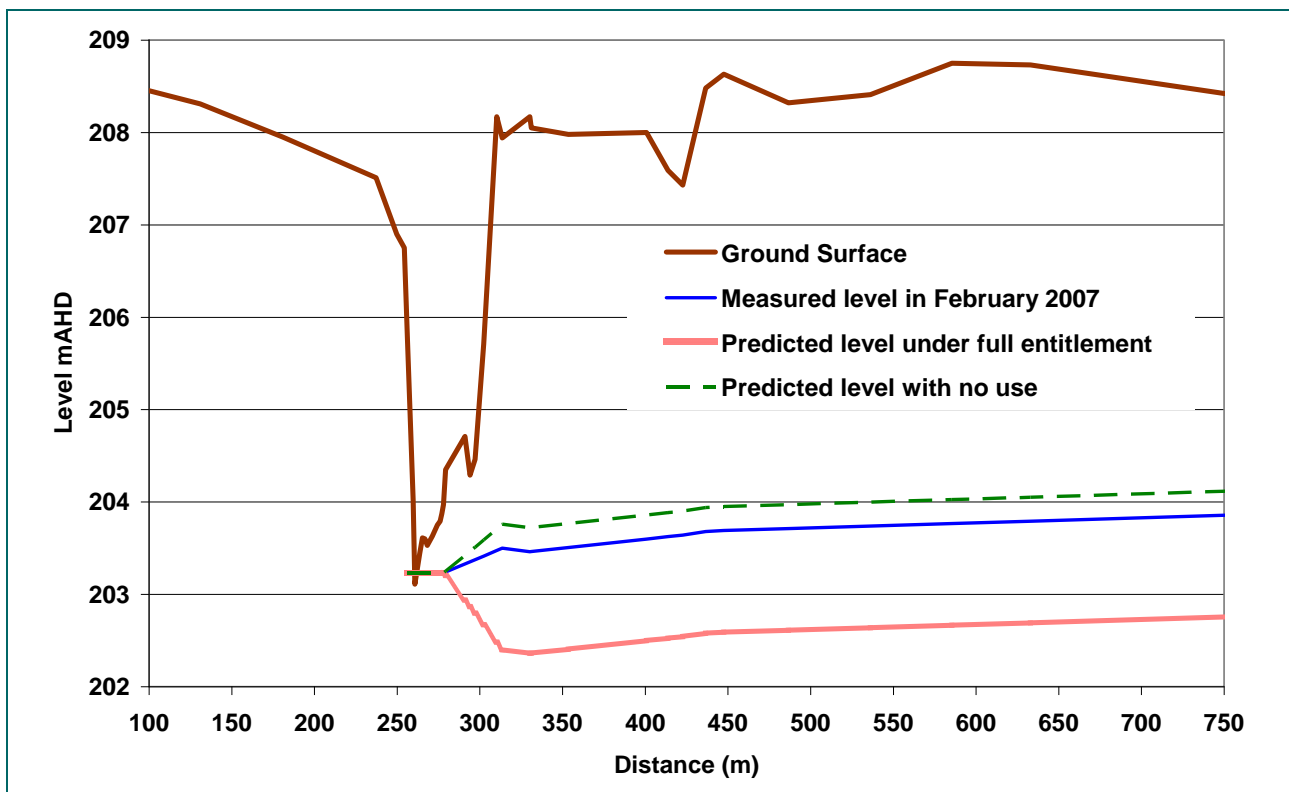
drop to very low levels of less than 2 ML/d. At these times, groundwater provides the minimal stream flows needed and maintains the water in the deep pools. Groundwater is therefore vital to the survival of a number of aquatic species in the river during these times. Groundwater use from the unconsolidated sedimentary aquifer in extremely dry years is the biggest risk to maintaining flows in the river.

Modelling has shown that flows in the Ovens River at Myrtleford are reduced by an estimated 2.3 ML/d and the water table drawn down by 0.13 m by the current average levels of groundwater use (approximately 650 ML/yr) over the summer period. While this level of use has some impact on baseflows, there is a risk that groundwater use could increase to the full licence entitlement level of 4,010 ML/yr. Use at this level would reduce stream flows by an estimated 9 ML/d and would draw down the water table by 1.1 m.²⁶

In extremely dry years, such as 2006/07, this estimated drawdown would cause groundwater levels to drop below the base of the streambed. If this occurs, water from the river would be lost to the aquifer. This could cause long sections of the river to dry up completely and dewater the deep pools, which would result in the loss of critical habitat. This scenario is the most critical risk to the environmental condition of the Ovens River and its tributaries. To protect low flows all extraction from the unconsolidated sedimentary aquifer needs to be restricted in line with surface water in periods of low flow.

Figure 14 shows the possible impacts of groundwater extraction in an extreme drought year of 2006/07 at Myrtleford. Under current estimated maximum extraction levels of up to 1,200 ML/yr, the fall in the groundwater level is minimal. However, if all of the licensed volume of groundwater was extracted groundwater levels would be likely to fall below the base of the stream and dry out the river. Figure 14 also shows the predicted groundwater level if there was no groundwater use (no-use scenario).

Figure 14: Predicted groundwater level impacts from groundwater extraction



Historically, water use from draglines closer than 200m from a waterway has generally been subject to a surface water licence and rosters and restrictions have been imposed. This was in recognition of the impact of groundwater extraction in reducing stream flow. Draglines outside of this zone were not managed the same way as it was thought that this use did not impact on stream flows to the same extent. However, new information shows that all extraction from the unconsolidated sedimentary aquifer will rapidly reduce stream flow and potentially dewater the river. To provide equitable sharing of the resource between users and to protect low flows in the river all extraction from the unconsolidated sedimentary aquifer need to be restricted in line with surface water during periods of low flow.

9.2.3 Impacts of taking groundwater on groundwater dependant ecosystems

The extent and types of groundwater dependant ecosystems (GDEs) in the Upper Ovens River catchment are not well understood, although freshwater meadows and shallow freshwater marshes are expected to be supported. Given the low levels of current development related to the total water resources, it is expected that GDEs should be relatively undisturbed in so far as their water requirements are concerned. It is expected that GDE's will become better understood during the life of the Plan, resulting in improved understanding of the link between water management and GDE's.

Groundwater use at historic levels from the unconsolidated sedimentary aquifer lowers groundwater levels by a small amount (0.25 m). Natural variation in groundwater levels of around 2-3 m as shown in Figure 7 is much greater. Thus the impact of extraction on groundwater levels is only an issue in extremely dry years. Recent modelling has shown that recovery of groundwater levels would occur each winter even under extraction of full entitlement and under climate change.²⁷ As a result, it is not expected that groundwater use will significantly alter groundwater levels from that which would have been expected under natural variation.

The Plan will limit the use of groundwater from the unconsolidated sedimentary aquifer in order to minimize the potential for extraction to lower groundwater levels in extremely dry years. This is likely to protect GDEs reliant on the water in this aquifer.

Another risk to GDEs is localised impacts from groundwater extraction. In granting new licences and managing existing licences, the Corporation must consider any additional impacts that individual users may have on the environment, which also aids in the protection of GDEs.

9.3 Impacts of taking water for domestic and stock use

It is estimated that approximately 600 ML/y of groundwater is extracted for domestic and stock use. Modelling the impact of this use, assuming a constant daily extraction volume throughout the year, indicates that there is a subsequent reduction of flow in the Ovens River at Myrtleford of less than 2 ML/d. Modelling is conservative as it assumes the use of 2 ML/yr from every groundwater bore. Many of these bores may not actually be used, thus it is expected that the actual impact is less than this. A significant future increase in domestic and stock use is not expected due to the rural nature of the catchment.

Since current levels of domestic and stock use are not thought to be significantly influencing the flow regime, the Plan does not place restrictions on licensed domestic and stock use. However, the Corporation will continue to monitor the impact of licensed domestic and stock use and make appropriate recommendations when the Plan is reviewed. Domestic and stock use that is permitted under section 8(1) of the Act will also not be restricted as a management plan can only restrict licensed water use.

10 WATER SHARING BETWEEN USERS

10.1 Meeting the object of the management plan

As set out in section 32A of the Act the object of the management plan is to make sure that the water resources of the Protection Area are managed in an equitable manner and so as to ensure the long-term sustainability of those resources. It is therefore necessary to ensure that there is an equitable water sharing regime between water users and that there is also sufficient water provided to meet the needs of the environment.

As winter flows are generally high and minimally impacted by water extraction, it is expected that the environmental low flow recommendations made by the FLOWS study for the winter months will be met without the need for restrictions. However, the environmental low flow recommendations during the summer months cannot be met in all years without a significant adverse impact on licensed water users. Consequently, the water sharing regime under this Plan balances the needs of all water users and the environment, during times of low flow.

As the Upper Ovens River is unregulated, the only way to allow for adequate flows for the environment is to manage extraction from the Ovens River, its tributaries, and groundwater. In the past, in years where summer flows are low, the Corporation has implemented a water sharing regime for surface water users. This has involved rosters and restrictions that limit water extraction from the Ovens River and its tributaries. As flow declined the restriction level increased, when flow hit a minimum level, a ban on extraction by surface water users was introduced.

Due to the high correlation between groundwater levels and river levels, extraction from the unconsolidated sedimentary aquifer also reduces river flows (as explained in section 5.3.3). Increased extraction of groundwater in the unconsolidated sedimentary aquifer also has the potential to cause long sections of the river to dry up completely and dewater deep pools. If unrestricted this would result in the loss of critical habitat and have significant negative impacts on river health, as well as reducing the reliability of supply of surface water users. Past water sharing arrangements did not address this issue.

To adequately protect summer low flows, the Management Plan prescribes restrictions on the taking of both surface water and groundwater in the unconsolidated sedimentary aquifer. The restrictions will only affect water users during low flow periods, generally over the summer. Extractions from the deeper, fractured rock aquifer have minimal impacts on stream flows. Consequently, restrictions will not apply to taking water from this aquifer.

10.2 Sharing summer low flow

The water sharing regime in this Plan has been developed to ensure that the highly connected groundwater and surface water resources are managed in an equitable manner and that the social and economic impacts of farming activities in the area are balanced with the needs of the environment.

To balance the needs of the environment and the needs of water users, environmental benefits gained at various flows have been assessed.²⁸ The objectives and the flows levels in the Ovens River at Myrtleford required to meet those objectives are shown in Table 9. The environmental objectives relate to environmental features such as water quality and habitat.

The inequity of unrestricted groundwater use was also considered in developing the water sharing regime. In times of low flow, groundwater use reduces flow in the Ovens River, which may negatively impact surface water users by reducing either their direct access to water or their reliability of access by increasing the severity or duration of bans and restrictions.

The Plan prescribes restrictions on taking both surface water and groundwater during times of low flows to allow for equitable sharing of the resource between users and to help meet some of the more critical environmental objectives whilst optimising user access. The Plan establishes a water sharing regime designed to place restrictions on the taking of water when flows are insufficient to meet all users' needs. Restrictions will be progressively implemented when stream flows fall below specified levels in order to allow the available water to be fairly shared between users. These arrangements have been tailored to the particular characteristics of stream flows in both the Ovens River and its tributaries while, as far as possible, meeting the needs of both groundwater and surface water users.

In determining the appropriate water sharing regime consideration has been given to the impact of taking water on stream flows and the affect that restrictions would have on the viability of irrigated farming enterprises.

It has been noted that:

- summer stream flows in the Upper Ovens River fall below the FLOWS recommended environmental flow of 137 ML/d approximately 20 per cent of the time (section 8.3)
- taking water has a minor impact on increasing the frequency and duration of flow events below 137 ML/d (section 8.3)
- the greatest environmental risk to the river is the potential that groundwater extraction from the unconsolidated sedimentary aquifer during periods of very low river flow has to reduce critical habitat by drying up sections of the river and dewatering deep pools (Section 9.2.2)
- Groundwater extraction from unconsolidated sedimentary aquifers reduces flow in the Ovens River. In periods of very low flows, this reduction in flow may reduce the reliability of access of surface water users by increasing the severity or duration of bans and restrictions.

Table 9 compares the reliability of access that users would be subject to if extraction was banned at particular flow levels and includes a description of the environmental benefits (features) that are met at each flow level. The table relates to flows in the Ovens River at Myrtleford (Section 9.2.2).

The table shows that banning water extraction once flows at Myrtleford drop to 137 ML/d would have a significant impact on licensed water users. Under this scenario, a licensed water user would be unable to extract water in 73 out of every 100 years for a period of up to 10 weeks. However, summer low flow environmental objectives would be fully met under this scenario.

At the other end of the scale, banning access to water once flow at Myrtleford drops to 1 ML/d would have a much smaller impact on a water user. Under this scenario, a water user would be denied access to water in 3 out of every 100 years for a period of up to 1 week. Assuming that there is no groundwater extraction from the unconsolidated sedimentary aquifer, aquatic plant watering and critical macroinvertebrate habitat is provided for under this scenario.

Table 9: Environmental flow benefits vs reliability of supply

Ban flow trigger at Myrtleford (ML/d)	Reliability of access information Based on historic flows		Environmental features provided for by summer low flows (protected at ban trigger scenario)
	Approximate years in 100 with ban	Average duration of ban (weeks)	
1.1 (equivalent to existing ban level of 4 ML/d at Bright)	3	1*	Surface water features at Bright managed to this level.
1	3	1*	Wetting bottom of channel, Maintaining pool depth, Aquatic plant watering and critical macroinvertebrate habitat provided for.
7	5	3	As above plus additional surface flow for maintaining water quality in pools (avoids stratification)
10	5	4	As above
20	8	8	As above
30	14	7	As above plus small native fish passage between pools provided
60	22	9	As above plus increasing diversity of macroinvertebrate habitat
137	73	10	As above plus large native fish passage between pools. Full environmental flow objectives met

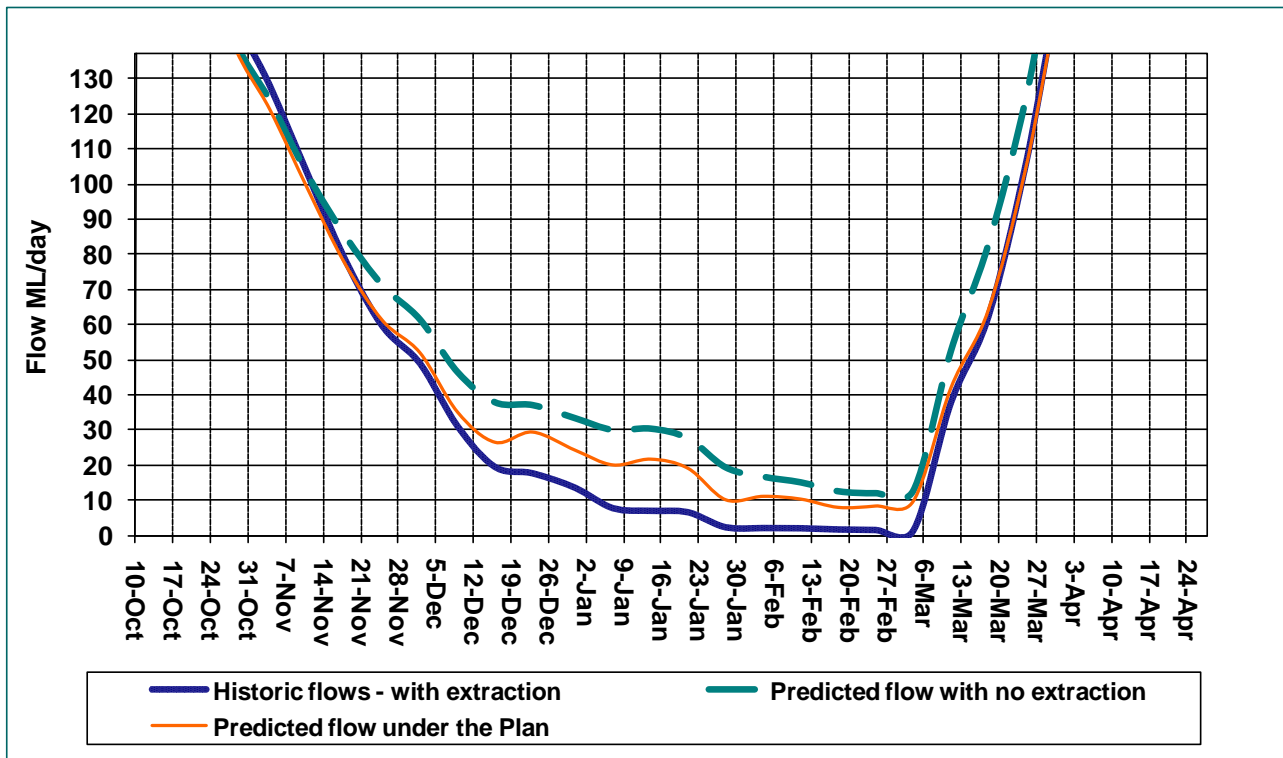
* Although on average the duration of bans is only one week, for extremely dry years such as the summer of 2006/07 bans can last for 9 weeks

To determine the flow characteristics and patterns in extreme low flow years, daily summer flows for the 1982/83 and 2006/07 summers (the most severe droughts on record) were averaged and plotted. To remove small short term fluctuations, the flows were averaged over five days. The resulting graph, depicted in Figure 15, shows the seasonal trend which can be expected in these critical low flow years. The graph indicates that levels of restrictions set under this management plan will result in stream flows midway between historical management arrangements and stream flows that would occur under natural conditions.

The graph indicates that in extremely dry years, stream flows drop rapidly from October and recover after the first major rain event. In these years, denying access to water will not stop stream flows dropping below 137 ML/d or greatly influence the duration of the low flow event.

At flow events above 60 ML/d, denying access to water in dry years does not significantly alter the duration or magnitude of a low flow event. It is not until stream flows drop below 40 ML/d that banning access to water at this trigger begins to have a measurable impact on the duration and frequency of low stream flows

Figure 15: Estimated flows at Myrtleford in extreme low flow years 1982/83 and 2006/07



If access to water was denied at 30 ML/d, the environmental benefits described in Table 9 would provide sufficient water to allow small native fish to swim between pools. However, the impact on water users would be significant at this level, with access to water being denied in 14 out of every 100 years for periods up to seven weeks duration. The level of impact that this would have on licensed water users compared to the environmental gain is not regarded as sufficient to justify bans at this level.

The largest impact on the environmental condition of the river and on water users is when the river ceases to flow. Denying access to water has therefore focused on preventing this outcome from being caused by extraction.

In the past, restrictions on surface water extractions have been based on flows at Bright. However, by using this gauge, stream flows between Bright and Myrtleford are difficult to manage and there is a risk that flows could cease due to extraction in this reach, even though flows at Bright are maintained. Moving the compliance point to Myrtleford will prevent extraction from causing the river to stop flowing below Bright and is the first step to minimise extraction causing cease to flow events.

Of even greater risk to the environmental condition of the river and to surface water users during extreme low flow events is water extraction from the unconsolidated sedimentary aquifer. Groundwater use has not been subject to restrictions in the past, and during extreme low flow events there is a risk that groundwater extraction could result in the stream bed and deep pools to drying out. To mitigate this risk, licences that extract groundwater from the unconsolidated sediment aquifers are included in the rosters and restrictions. This will also provide more equitable water management between users.

Restrictions on surface water extraction in the past have been based on flows at Bright; bans were introduced when flows dropped to 4 ML/d (equal to 1.1 ML/d at Myrtleford). The environmental condition of the Ovens River has been maintained under these arrangements. By moving the compliance point to Myrtleford and including groundwater in the restriction schedule the flow regime and related environmental condition should be protected.

Maintaining the current ban levels under the Plan means that the reliability of access for surface water users is unchanged, However because groundwater users have not been previously subject to bans and restrictions, there will be significant implications for businesses that rely on this source of water in very dry years.

Imposing the same water sharing regime on both surface water and groundwater users ensures a more equitable water sharing arrangement between these users. It also minimises the risk that a cease to flow event will occur for the whole of the Upper Ovens River, and protects the critical habitat of deep pools provided by groundwater baseflow to the river. Banning flows above this level, while providing greater environmental benefits, would increase the impact on irrigators and especially groundwater users who have not been restricted in the past.

The water sharing regime described in section 12.1 not only imposes a ban on the use of water at extreme low flow events in the Ovens River and its tributaries, but it also shares the available flows between users as the flows diminish during the summer months. The water sharing regime is activated when flows of 100 ML/d and below are observed. If water sharing did not occur and licence holders were to use water in an uncontrolled manner, it is likely that a ban on using water would be implemented sooner due to lack of stream flows. By providing the river system with a higher minimum level of flow than would otherwise occur, the water sharing regime also provides environmental benefits for the Ovens River and its tributaries.

11 MANAGEMENT ZONES

11.1 The two management zones for groundwater and surface water

The Management Plan establishes two management zones in the Protection Area which are based on the interaction between groundwater and the larger waterways in the catchment. Each management zone is based on the level of risk that groundwater extractions have on reducing flows in the Ovens River during low flow periods.

From a groundwater perspective, the management zones are based on the two distinct hydrogeological units of the Upper Ovens catchment, which broadly follow surface geology features shown in Figure 4. Management Zone 1 includes the unconsolidated sedimentary aquifer. Management Zone 2 refers to the fractured rock aquifer.

In Management Zone 1 there is a high risk that groundwater extractions will reduce the flows in the Ovens River and its tributaries during the low flow period and have adverse affects on both surface water users and on the environmental condition of the catchment. Hence Management Zone 1 also consists of all the surface water resources including the rivers and tributaries and the unconsolidated sedimentary aquifer. In this zone the time lag impacts on the reduction in stream flows is within days to weeks of pumping groundwater.

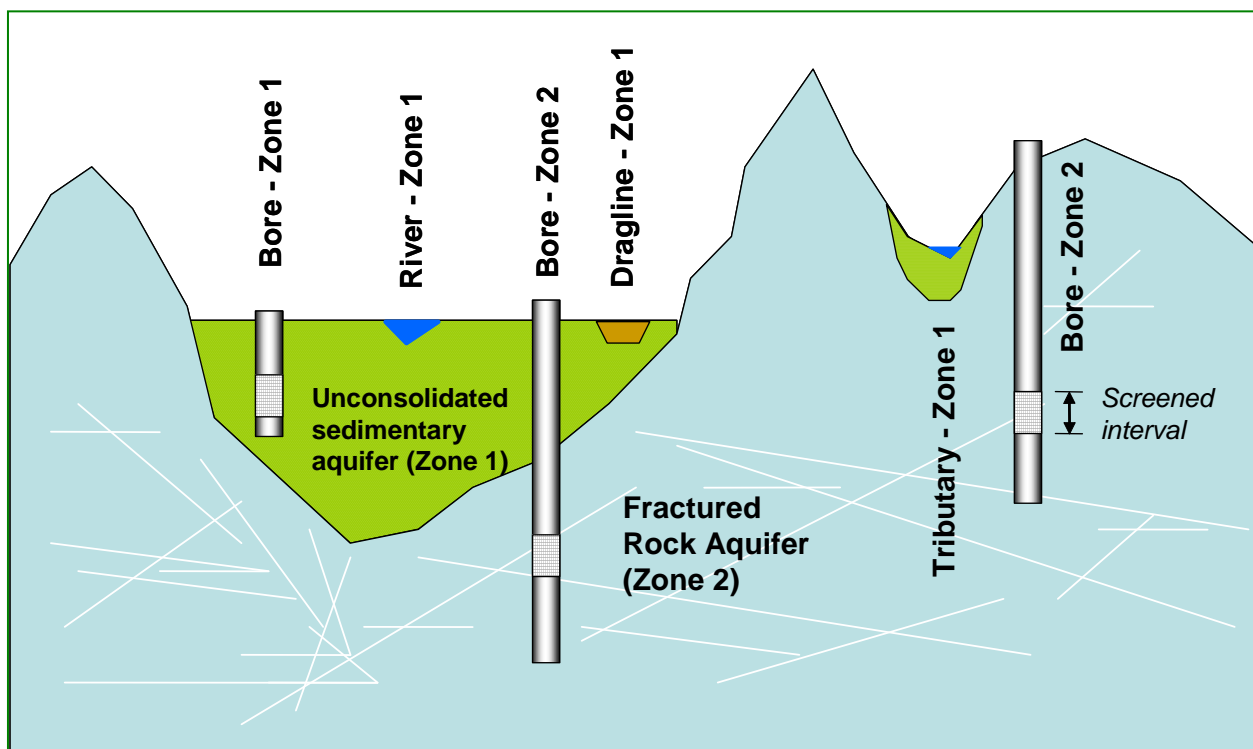
Management Zone 2 consists of the groundwater resource in the fractured rock aquifer. The impacts of on reducing stream flows by extracting water from this zone are expected to be weeks to months or longer, depending on the location of the extraction point. Consequently, there is a low risk that groundwater extractions in Zone 2 will reduce the flows in the Ovens River and its tributaries during the critical low flow period.

11.2 Defining management zones for bores

The Corporation will be responsible for classifying and determining the relevant management zone for existing bores. The Corporation will make an assessment based on existing information such as the bore's construction details and known geology for the area to identify the aquifer from which water is able to be taken. Sites with inadequate information, or sites with conflicting information will be inspected to collect more information to allow assessment. If following the site inspection there is insufficient information for the Corporation to determine the aquifer, the default position will be that the bore is deemed to be in Management Zone 1. Licence holders will be notified in writing as to the classification of their bores as either Zone 1 or 2. Accompanying the notification will be basic details on the technical information used in the assessment and reasons for the decision. A graphical representation of the management zones incorporating both surface water and groundwater is shown in Figure 16.

A licence holder may request to have this decision reviewed if they believe that the corporation has made an error, if information used to make decision is incorrect, or they can provide evidence to the Corporation that shows that groundwater is extracted from a different zone. The corporation will undertake further investigations and review their decision based on any new information. The licence holder will be notified in writing the corporations findings from the review and decision.

Figure 16: Two dimensional representation of the management zones



PRESCRIPTIONS – MANAGEMENT ZONES

1. Prescriptions that apply to the taking of groundwater in Management Zone 1 apply to the taking of groundwater from all bores in the Protection Area unless the bore is only capable of extracting groundwater from the fractured rock aquifer.

12 RESTRICTIONS ON TAKING WATER

12.1 The water sharing regime

12.1.1 General

Surface water users have been on water restrictions in the past. The water sharing regime under this Plan will give surface users a similar level of reliability of access to water as they have had historically. However, groundwater users have not had their access to water restricted in the past and transitional arrangements have been provided for these water users, as set out in section 12.2. These arrangements have been designed to provide substantial time for groundwater users to make any necessary adjustments to their water requirements or to their storage and irrigation facilities.

The water sharing regime applies to all-year licence holders in Management Zone 1 who normally take water during the summer months. The regime is activated when flows in the Ovens River or tributaries fall below the specified levels.

Groundwater users in Management Zone 1 will be managed to the same trigger levels as surface water users who take water from the main stem of the Upper Ovens River, even if the bore from which water is taken is adjacent to a tributary stream. A number of surface water users on tributaries also rely on groundwater during dry summer months when some of the tributaries cease to flow. If these groundwater users were subject to the restrictions that apply to surface water users on tributaries, their irrigation enterprise would be severely affected. There is also a relatively low level of groundwater use adjacent to the tributaries and the transfer arrangements set out in section 14 of the Plan limit future development. Consequently, the impact of groundwater use on these tributaries is assumed to be minimal.

12.1.2 Commencement of the water sharing regime

The water sharing regime will commence on 1 July 2012, the first financial year following approval of the Management Plan. This date allows groundwater users and the Corporation adequate time to prepare for the irrigation season and it avoids the confusion that would result if the regime came into operation part way through an irrigation season.

12.1.3 Roster and restriction stages

The water sharing regime comprises five stages:

- **Stage 1** is a roster that schedules when licence holders can take water without any reduction to the amount of water that they are authorised to take under their licence.
- **Stages 2 to 4** restricts the amount of water that can be taken.
- **Stage 5** prohibits the taking of water.

The flow rates that determine the restriction stage are primarily measured by a stream gauge on the Ovens River at Myrtleford. However, there are also various compliance points on tributaries that are used to determine stream flows. In some instances stream gauges do not exist at the compliance point and the Corporation will determine the flow rate by observation.

The stages of restrictions under the new water sharing regime are shown in Table 10.

Table 10: Stages of restrictions

Restriction Stage	Description of restriction stage	Share of entitlement available %
Stage 1	Water usage rostered	100
Stage 2	Volumetric limitations imposed	75
Stage 3	Volumetric limitations imposed	50
Stage 4	Volumetric limitations imposed	25
Stage 5	No pumping permitted	0

Water users who take water from the Ovens River and groundwater users in Management Zone 1 will be subject to restrictions imposed when stream flows fall below specified flow rates at Myrtleford. Restrictions on taking surface water from tributaries will be subject to restrictions imposed when stream flows fall below specified flow rates at Myrtleford and in addition flow rates appropriate to those tributaries.

12.1.4 Share of entitlement

The implementation of rosters and restrictions has been a common management technique used by the Corporation to manage water use during low flow periods both in the Upper Ovens catchment and in other areas. When a restriction stage is introduced, each water user will be entitled to a share of the water available, referred to as a share of entitlement. Table 10 shows the percentage share of entitlement available to a water user during each restriction stage.

To determine the share of entitlement that will be available to each individual water user the Corporation will calculate the share of entitlement for each licence holder in accordance with the following formula

$$S = P \left(\frac{V}{L} \times T \right)$$

where-

S = the share of entitlement

V = the licence volume of a individual licence holder

L = the chosen length of the irrigation season

P = the percentage share of entitlement available refer to Table 10

T = number of days in the roster/restriction cycle period

Example:

For the season the Corporation has decided that the irrigation season (L) will be 100 days and a roster/restriction cycle (T) will run for ten days. Bill is one of the irrigators and has a licence entitlement of 80 ML/yr.

Bill's share of entitlement under each 10 day roster/restriction cycle under Stages 1 to 4 is as follows:

Stage	Formula	Share of entitlement per roster cycle (10 days)
Stage 1	$S = 1.0 \left(\frac{80}{100} \times 10 \right)$	= 8 ML
Stage 2	$S = 0.75 \left(\frac{80}{100} \times 10 \right)$	= 6 ML
Stage 3	$S = 0.5 \left(\frac{80}{100} \times 10 \right)$	= 4 ML
Stage 4	$S = 0.25 \left(\frac{80}{100} \times 10 \right)$	= 2 ML

When restrictions are introduced, the Corporation will use this formula to determine the volumes of water able to be taken by an individual licence holder over the roster cycle. The Corporation will then allocate pumping periods for each individual water user based on extraction rates specified in their licence. Active water users will be notified of the roster/restriction requirements specific to them.

12.1.5 Compliance points

In the past, the stream gauge at Bright was used to instigate rosters and restrictions in the Upper Ovens River catchment. However, by using this gauge, stream flows between Bright and Myrtleford are difficult to manage and there is a risk that flows could cease in this reach even though flows at Bright are maintained. A more appropriate compliance point for instigating the water sharing regime is at the bottom of the system at Myrtleford.

The stream gauge at Myrtleford no. 403210 will be the new compliance point used to determine the stream flows that will be used to activate the various restriction stages of the water sharing regime in most cases. This compliance point is relevant to both groundwater users who take water from the unconsolidated sedimentary aquifer and surface water users due to the high correlation between groundwater levels and river levels as described in section 5.3. However, for the tributaries additional compliance points will be used to determine the most severe stage of restriction on each tributary. This recognises that some tributaries may cease to flow while there are still sufficient flows in the Ovens River to meet user needs.

12.1.6 Arrangements for the Ovens River, its tributaries and groundwater in Management Zone 1

The water sharing regime for the Ovens River and groundwater licence holders in Management Zone 1 will apply to the holders of all-year surface water licence who take water from a waterway, and to the holders of all-year groundwater licences in Management Zone 1.

Table 11 shows the various stages of the water sharing regime for Ovens River surface water users and groundwater users in Management Zone 1 and provides a comparison of the flow triggers for rosters and restrictions that have historically been used to manage surface water use and the flow triggers adopted under this management plan.

Under the management plan, the flow triggers for restriction stages 3 and 4 are different to those that were used in the past. Imposing these two restriction stages at a higher flow increases the probability that flow will not fall to the Stage 5 ban level as might otherwise be the case. Taking earlier action to prevent flows from declining to the Stage 5 ban levels aims to minimise crop losses, which is important to all irrigators particularly those with permanent plantings.

Table 11: Water sharing regime – for the Ovens River, its tributaries and Management Zone 1 groundwater users

Restriction Stage	% of entitlement share available	Historic flow rate triggers at Bright (ML/d)	Comparative historic flow rate triggers at Myrtleford (ML/d)	Management plan flow rate triggers at Myrtleford (ML/d)
Stage 1	100	60	100	100
Stage 2	75	40	60	60
Stage 3	50	20	10	30
Stage 4	25	10	2	10
Stage 5	0	5	1	1

The impact that each restriction stage will have on water users reliability of supply is shown in Table 12. The most severe restriction stage is Stage 5, when the flow at Myrtleford drops to 1 ML/d or less. It is predicted that this event will occur in three years out of every one hundred years.

Table 12: Potential impacts of restrictions on a water user's reliability of supply

	Water sharing regime stages					
	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	All
Trigger flow at Myrtleford (ML/d)	100	60	30	10	1	-
Frequency of restrictions (per 100 years)	60	30	14	5	3	60
Average Duration (Weeks per year)	4	4	6	6	1	8
Maximum Duration (Weeks per year)	9	9	9	11	7	26

Figures shown in Table 12 are based on average weekly flows and assume that the restriction stage only occurs for the period that flows are at or below the figure. The maximum duration for stage 5 restrictions is based on the period of lowest recorded flows in the 2006/07.

For restriction stages 1, 2 and 5 the reliability of supply of surface water users would be the same as under historic management arrangements. Stages 3 and 4 will occur slightly more frequently under the new management arrangements. Historically, Stage 3 restrictions would have occurred approximately 10 years in 100 for an average duration of 4 weeks, compared to 14 year in 100 for an average duration of 6 weeks under the proposed rules. Similarly, Stage 4, which historically occurred 3 years in 100 for an average of 4 weeks, is now expected to occur 5 years in 100 for an average of 6 weeks. These restrictions and bans will be new to groundwater users, who have not been restricted in the past.

12.1.7 Arrangements for tributaries

The Corporation has operated a restriction regime for the Ovens River tributaries in the past. This management has imposed bans on extraction when various flow triggers are reached in individual tributaries.

Water users on Buffalo Creek, Roberts Creek, Barwidgee Creek, Myrtle Creek, Snowy Creek, Happy Valley Creek, and Morses Creek have previously been subject to Stage 5 ban when stream flows in each tributary fell to 2 ML/d. However, water users have not been subject to formal restriction stages 1 to 4 based on flow triggers but rather rosters that aimed to maintain flows in the tributaries above 2 ML/d. Under this Management Plan, users on these tributaries will be subject to restriction stages 1 to 5 and these stages will be applied on the basis of trigger flows in the Ovens River at Myrtleford. In addition, when the flows in these tributaries fall to 2 ML/d however, a Stage 5 ban will be imposed irrespective of the level of flow in the Ovens River. This is to reflect the current level of management in these tributaries.

Water users on the Buckland River, Two Mile Creek and Eurobin Creek have previously been subject to restriction Stages 1 to 5, based on stream flows in the Ovens River at Bright. Under this Management Plan, users on these tributaries will be subject to the same restriction stages as users on the Ovens River which will be activated in accordance with flows recorded at the Myrtleford.

Table 13: Compliance points for tributaries

Waterway	Compliance Point
Buffalo Creek	Clemens Lane bridge – Myrtleford
Roberts Creek	Roberts Creek Road bridge (lower crossing) - Porepunkah
Barwidgee Creek	Great Alpine Road bridge – Myrtleford
Buckland River	Myrtleford Stream Gauge No. 403210
Two Mile Creek	Myrtleford Stream Gauge No. 403210
Eurobin Creek	Myrtleford Stream Gauge No. 403210
Snowy Creek	Snowy Creek Road bridge – Freeburgh
Happy Valley Creek	Ovens township – Great Alpine Road
Morses Creek	Great Alpine Road bridge - Bright

The new management arrangements mean that all-year Zone 1 groundwater and surface water licences will be subject to the same restrictions based on the Ovens River flows at Myrtleford. In addition, surface water users in tributaries will be on a stage 5 ban if flows in the tributaries drop to 2 ML/d.

Not all tributary streams are equipped with stream gauges and, in these circumstances, the Corporation will estimate stream flows based on a visual inspection of the compliance point as per the current management practices. The compliance points for the tributaries are shown in Table 13.

PRESCRIPTIONS – RESTRICTIONS ON TAKING WATER IN MANAGEMENT ZONE 1

2. Prescriptions 3, 4, 5, 6 and 7 apply to the taking of surface water or groundwater under an all-year licence in Management Zone 1 while a Restriction Stage is in effect unless –
 - (a) the licence is for domestic and stock use; or
 - (b) the licence is subject to a condition that a portion of the water taken and used is to be returned to the water system; or
 - (c) the special transitional arrangements in Prescriptions 12 to 16 apply.
3. On or after 1 July 2012, the Corporation subject to its discretion in Prescription 9 must declare the Restriction Stage specified in Column 1 of the table below if satisfied that the flow rate at steam gauge no.403210 at Myrtleford (the compliance point) will shortly be equal to or less than the corresponding flow rate specified in Column 3.

Column 1	Column 2	Column 3
Restriction Stage	Share of entitlement (%)	Flow rate at compliance point (ML/d)
1	100	100
2	75	60
3	50	30
4	25	10
5	0	1

4. On or after 1 July 2012, the Corporation must declare Restriction Stage 5 in respect of the tributary specified in Column 1 of the table below if satisfied that the flow rate at the compliance point specified in Column 2 will shortly be equal to or less than 2 ML/d.

Column 1	Column 2
Tributary	Compliance point
Buffalo Creek	Clemens Lane bridge – Myrtleford
Roberts Creek	Roberts Creek Road bridge (lower crossing) – Porepunkah
Barwidgee Creek	Great Alpine Road bridge – Myrtleford
Snowy Creek	Snowy Creek Road bridge – Freeburgh
Happy Valley Creek	Ovens township – Great Alpine Road
Morses Creek	Great Alpine Road bridge – Bright

5. During a Restriction Stage, a licence holder is authorised to take water only at the times and at the rates specified by the Corporation.
6. During Restriction Stage 2, 3, or 4 a licence holder is authorised to take only the corresponding percentage share of entitlement specified in Column 2 of Prescription 3.
7. If a Restriction Stage 5 is declared -
- under Prescription 3, a licence holder must not take any water during the Restriction Stage; or
 - under Prescription 4, in respect of a tributary, a licence holder must not take any water from that tributary during the Restriction Stage.
8. Subject to its discretion in Prescription 9, the Corporation must declare a Restriction Stage is lifted, if satisfied that the flow rate at the compliance point is above the corresponding flow rate and likely to remain so.
9. The Corporation may decide not to declare a Restriction Stage 2, 3 or 4 or declare a Restriction Stage 2, 3, or 4 is lifted if of the opinion that the Restriction Stage or any lifting of the Restriction Stage is likely to be in place for less than 10 days.
10. The Corporation must give notice to each affected licence holder of -
- the declaration of a Restriction Stage and details of-
 - the times and rates at which water can be taken during the Restriction Stage;
 - if relevant, the licence holder's percentage share of entitlement for the Restriction Stage;
 - the date on which the declaration takes effect; and
 - the declaration that a Restriction Stage has been lifted.
11. The Corporation must display on the Corporation's web site an explanation of the methodology used to calculate the percentage share of entitlement for all affected licence holders.

12.1.8 Arrangements for groundwater in Management Zone 2

Groundwater users in Management Zone 2 will not be subject to the water sharing regime because the impact that groundwater extraction has in that zone on stream flows is considered to be negligible.

12.1.9 Environmental water reserve and summer low flow objectives met by the Plan

In respect of the taking of water during the summer period, the environmental water reserve required to be maintained under this Plan, is the amount of water that flows in the Ovens River downstream of stream gauge no. 403210 at Myrtleford, fed by surface water or groundwater or both, that is equal to or less than 1 ML/d as well as all 'above cap' water, which includes water that is left over after limits on diversions have been reached.

The Plan prevents groundwater or surface water extraction from occurring that would cause flows in the Ovens River at Myrtleford to decline below 1 ML/d. Thereby providing an environmental water reserve that protects the following environmental flow objectives:

- wetting the bottom of river channel and maintaining pool depth
- watering of aquatic plants
- the provision of critical macroinvertebrate habitat.

12.2 Transition period for groundwater users in Management Zone 1

12.2.1 General

All surface water users who take water for irrigation and commercial purposes have had their access to surface water curtailed in the past through the imposition of rosters and restrictions during low flow periods.

When access to surface water was curtailed, many water users relied on groundwater to irrigate their crops. In many situations, groundwater has been used as a backup supply by surface water users however, there are other water users who rely solely on groundwater. The use of groundwater has never been subject to rosters or restrictions.

To allow groundwater users in Management Zone 1 time to adjust to the new water sharing arrangements, a period of transition is established under this management plan whereby the severity of restrictions imposed on groundwater users will be phased in over a period of up to nine years.

Any groundwater licence that has been transferred after the Plan has been approved will not be subject to the transition arrangements.

12.2.2 Groundwater users without permanent plantings

Groundwater users in Management Zone 1 that do not irrigate permanent plantings will not be subject to the same level of restrictions that will apply to surface water users until 2015/16. The stages that these groundwater users will progressively be subject to are shown in Table 14.

12.2.3 Groundwater users with permanent plantings

Groundwater users in Management Zone 1 who irrigated permanent plantings before the Management Plan was approved will not be subject to the same level of restrictions as apply to surface water users until 2020/21. This is because permanent plantings could die if they are not irrigated. This would result in major long-term economic consequences for the irrigator as these plants would need a long timeframe in which to again become fully productive. Allowing a nine-year transition period will enable the permanent planting irrigator to develop alternative water supply strategies within an extended timeframe. The restriction stages applicable to groundwater users with permanent planting are shown in Table 14. There are estimated to be 26 groundwater users in this category.

Permanent plantings are those types of plants that take a number of years for production to be re-established if they die. They also include perennial plants that are expensive to replace. They include trees that produce fruit or nuts, grape vines, hops, kiwifruit and berries (other than those which can be planted and productive within a year).

For a crop to be classified as a permanent planting, a groundwater user must first have the crop assessed by the Corporation. The groundwater user must contact the Corporation within the first twelve months after the

management plan has been approved to have the crop assessed. The Corporation will examine the crop and make a determination as to whether the crop is a permanent planting and will measure the area of the planting. The extended transition period will only apply to the area irrigated by the permanent planting. If the groundwater user irrigates an area in addition to the permanent planting area, the additional area will be subject to the same transition period as other non-permanent planting groundwater irrigators.

Only permanent plantings established before 30 June 2010 will be subject to the new transition arrangements. A groundwater user that establishes a new permanent planting after this date will not qualify for the extended transition period.

Transition arrangements apply to the land established with a permanent planting before 30 June 2010. This means that if the permanent planting is replaced (e.g. due to age/disease) it will still be covered by the transitional arrangements that applied to the original planting. If land covered by an eligible permanent planting is replaced with a planting that does not meet the permanent planting criteria then the transitional arrangements will cease to apply to this land.

12.2.4 Summary of the transition period

Table 14 provides a summary of the water sharing arrangements for groundwater users and the period of transition for different types of groundwater users in comparison to surface water users. It identifies the restriction stages to which each user will be subject when water sharing arrangements are activated during low flow periods.

Table 14: Transition for water sharing regime

Year	Groundwater users		Surface water users & new groundwater enterprises
	Permanent plantings	Other crops	
	Restriction stage	Restriction stage	Restriction stage
2012/13	1 to 3	1 to 3	1 to 5
2013/14	1 to 3	1 to 3	1 to 5
2014/15	1 to 3	1 to 4	1 to 5
2015/16	1 to 3	1 to 5	1 to 5
2016/17	1 to 3	1 to 5	1 to 5
2017/18	1 to 3	1 to 5	1 to 5
2018/19	1 to 3	1 to 5	1 to 5
2019/20	1 to 4	1 to 5	1 to 5
2020/21	1 to 5	1 to 5	1 to 5

PRESCRIPTIONS – TRANSITIONAL ARRANGEMENTS FOR ZONE 1 GROUNDWATER

12. As provided in Prescription 2(c), Prescriptions 13 to 16 apply to the percentage share of entitlement the holder of a groundwater licence in Management Zone 1 is authorised to take while Restriction Stage 4 or 5 declared by the Corporation under Prescription 3 is in effect -
13. The holder of a groundwater licence in Management Zone 1 is authorised to take only the percentage share of entitlement specified in Column 2 of the table in Prescription 3 that corresponds to -
 - (a) Restriction Stage 3, if Restriction Stage 4 or 5 is declared between 1 July 2012 and 30 June 2014, inclusive; or
 - (b) Restriction Stage 4, if Restriction Stage 5 is declared between 1 July 2014 and 30 June 2015, inclusive,
14. The holder of a groundwater licence in Management Zone 1 who uses water to irrigate an approved permanent planting is authorised to take only the percentage share of entitlement specified in Column 2 of the table in Prescription 3 that corresponds to -
 - (a) Restriction Stage 3, if Restriction Stage 4 or 5 is declared between 1 July 2012 and 30 June 2019, inclusive; or
 - (b) Restriction Stage 4, if Restriction Stage 5 is declared 1 July 2019 and 30 June 2020, inclusive.
15. If the holder of a groundwater licence in Management Zone 1 irrigates land used for an approved permanent planting and land that is not used for an approved permanent planting, Prescription 14 only applies in respect of water taken to irrigate the land that is used for the approved permanent planting.
16. If a groundwater licence is transferred after the Plan is approved Prescriptions 13 and 14 do not apply in respect of water taken under a licence resulting from that transfer.
17. For the purposes of Prescription 14 and 15 land used for an approved permanent planting is -
 - (a) land used prior to 30 June 2010 –
 - (i) for growing trees producing fruit or nuts, grape vines, tea, hops, kiwifruit vines and berries (other than those which can be planted and be productive within a year); or
 - (ii) for growing plants that take three or more years to re-establish; or
 - (iii) as a green or a tee of a golf course,
 provided the Corporation–
 - (b) received written notice from the licence holder within 12 months from the date the Plan is approved advising that the licence holder has used the land since 30 June 2010 for the purposes specified in paragraph (a); and
 - (c) is satisfied that the criteria in paragraph (a) are met.

13 RESTRICTIONS AND PROHIBITIONS ON ISSUING LICENCES**13.1 Limits (Caps) on the volume of licences to take and use water**

An important part of a Management plan is to limit (cap) the volume of licensed water use to sustainable levels in order to maintain the objectives of the Plan. Summer flows in the Ovens River and tributaries are protected in the Plan by restricting extraction of water from Zone 1 in periods of low flow. If additional all-year licences in Zone 1 were allowed to be held and used, these would further reduce stream flows and the reliability of access for current users. However, use of groundwater in Zone 2 and surface water over the winter period (winter-take) is having minimal impact on stream flows and there is the potential to further utilise these resources (Section 9.1.1 and 9.2.1).

Currently the combined volume of Zone 1 all-year licences is 14,546ML/yr (the combined total of all-year groundwater and surface water licences and registration licences), consequently the plan limits the volume of all-year Zone 1 licences at this volume. Registration licences are included in the volume as Section 51A of the Act requires the Corporation to issue an all-year licence to a person surrendering registration licence and applying for an licence under Section 51 (1) (a) or (ba).

The plan proposes to utilise current limitations on the use of water over the winter period to set caps for the volume of winter take and Zone 2 Licences. Currently the Victorian state-wide methodology for determining the sustainable level of surface water use over the winter period is known as the Sustainable Diversion Limit (SDL). Due to the strong connectivity between groundwater and surface water, the Upper Ovens Plan will use this volume to set the cap for winter-fill and Zone 2. To further minimise potential negative impacts of new development the current combined volume of Zone 1 all-year licences will also be included to create an overall cap for all Licensed entitlement (groundwater and surface water) in the Protection Area. As such the management plan does not permit the issue of a new take and use licence for groundwater or surface water that would result in the total licence entitlement exceeding 69,995

SDL volumes are determined for smaller sub-catchments within the Protection Area (Figure 17) which are classified as “named areas” under the Plan. Caps on the volume of licences for each of the named areas can be found in Prescription 22. Although the overall cap applies to all licences, caps in named areas will only apply to the volume of water determined to be taken from Zone 1 over the winter period between 1 July and 31 October and water taken from Zone 2. A proportion of the all-year licences Zone 1 will also be included to reflect any use that may occur over the winter period. The volume of water is determined to be the sum of the following proportion of the licence volumes -

- 100% for a Winter-take licence;
- 100% for a Zone 2 all-year groundwater licence;
- 10% for a all-year licence to take water for Irrigation in Zone 1
- 25% for an all-year licence to take water for any other use in Zone 1
- 145% for a registration licence in Zone 1

The proportions of the licences deemed to be used over the winter take period are consistent with the “Policies for Managing Take and Use licences”, except that all-year zone 2 groundwater licences will be included. Inclusion of Zone 2 groundwater licences reflects the conjunctive management of groundwater and surface water in the plan. In the Upper Ovens the licensed volume of winter-take is low compared to the SDL volumes and there is a lot of potential for further development. Including fractured rock limits the amount of new development in Zone 2 to stay within the surface water caps and thus limits the potential for Zone 2 development undermining the winter fill resource. The large volumes available mean that development of Zone 2 or winter-take will not be overly hindered as would be the case in many other parts of the state where SDL caps are over allocated. Until more is known on sustainable extraction limits from the fractured rock aquifer, the conservative use of the SDL is appropriate.

As the current licence volume is less than the overall cap, the difference between the overall cap for the Protection Area and the amount of licensed entitlement will be able to be traded into the area (as Zone 2 groundwater or winter-take). As at July 2010 approximately 15,000 ML/yr has been allocated in the Protection Area to both surface water and groundwater users and hence there is approximately 54,000ML/yr that is available through licence transfers for new development. No all-year licence may be traded into the Area and it is expected that, over time, the total all-year licence entitlement will reduce

As the all-year licence entitlement volume decreases through trade the reduced volume will be able to be traded into the area as winter-take or Zone 2. Each year the Corporation will publish the total all-year licence entitlement in the annual report on the administration and enforcement of the management plan mentioned in section 20.

13.1.1 Dairy wash licences

In 2010 the Department ran the dairy shed water licence transition program with the aim of ensuring that water used in the dairy shed is fully licensed. This Plan permits a licence to be issued to allow for the use of groundwater or surface water in a dairy in accordance with any State-wide policy approved by the Minister.

Figure 17: Named areas used for capping licensed volume in the Protection area

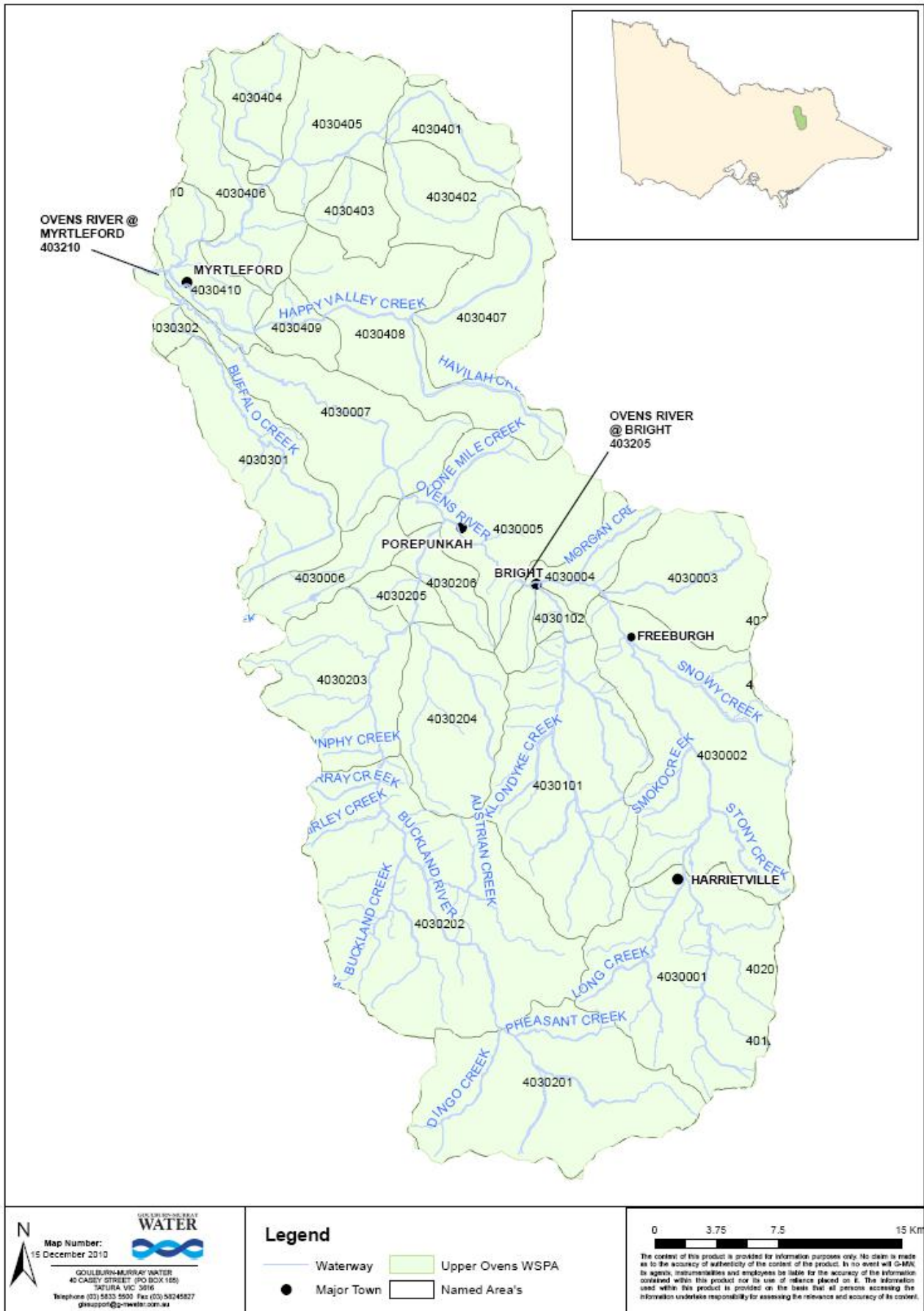


Table 15: Caps on Winter fill and Zone 2 Licence volumes for named areas

Area Reference	Area Name	Cap Volume (ML)	Current authorised entitlement Volume* (ML)
4030001	Ovens River	11330	3
4030002	Ovens River	4618	139
4030003	German Creek	2342	103
4030004	Ovens River	767	28
4030005	Ovens River	1947	877
4030006	Eurobin Creek	2134	144
4030007	Ovens River	2062	647
4030101	Morses Creek	6635	276
4030102	Morses Creek	262	38
4030201	Buckland River East Branch	9142	0
4030202	Buckland River	9500	0
4030203	Buckland River	3225	65
4030204	Devils Creek	3288	32
4030205	Buckland River	504	115
4030206	Buckland River	752	55
4030301	Buffalo Creek	3249	67
4030302	Buffalo Creek	271	68
4030401	Barwidgee Creek	545	97
4030402	Barwidgee Creek	536	23
4030403	Sandy Creek	332	38
4030404	Myrtle Creek	264	101
4030405	Barwidgee Creek	528	92
4030406	Barwidgee Creek	482	70
4030407	Happy Valley Creek	2365	36
4030408	Happy Valley Creek	2344	1039
4030409	Happy Valley Creek	236	108
4030410	Barwidgee Creek	335	156
	Total Cap Volume	69995	4415

* the current licensed entitlement volume is based on licences issued at January 2010

PRESCRIPTIONS – RESTRICTIONS AND PROHIBITIONS ON ISSUING TAKE AND USE LICENCES

18. The Corporation must not issue a new licence unless the new licence relates to -
- the surrender of a licence under section 61 of the Act for the purposes of transferring a licence either within or into the Protection Area; or
 - the cancellation of a water share under section 33ABA of the Act; or
 - the surrender of a registration licence under section 51A of the Act, or
 - the surrender of a licence under section 61 of the Act for the purposes of consolidating two or more licences, dividing a licence or changing the conditions of a licence; or

- (e) the use of groundwater or surface water in a dairy and the issue of the licence is in accordance with any State-wide policy approved by the Minister; or
- (f) an administrative oversight or error or other anomaly.
19. The Corporation must not issue a licence in the circumstances specified in Prescription 18 (a), (b), (c) and (d) if the licence volume exceeds the licence volume of the licence being surrendered or the maximum volume of the water share being cancelled.
20. The Corporation must not issue an all-year licence in any of the circumstances specified in Prescription 18 if to do would result in the volume of all-year licences in Management Zone 1 exceeding 14,546ML/yr.
21. The Corporation must not issue an licence in any of the circumstances specified in Prescription 18 if to do would result in the volume of all licences in Protection Area exceeding 69,995ML/yr.
22. The Corporation must not issue a licence in the circumstances specified in Prescription 18 (a) and (b) if to do would result in the volume of licences authorised to take water in Zone 1 between 1 July and 31 October or from Zone 2 in the area named in the table exceeding the corresponding volume specified for that area or for any downstream area.

Area Reference	Name of Area	Cap Volume (ML)
4030001	Ovens River	11330
4030002	Ovens River	4618
4030003	German Creek	2342
4030004	Ovens River	767
4030005	Ovens River	1947
4030006	Eurobin Creek	2134
4030007	Ovens River	2062
4030101	Morses Creek	6635
4030102	Morses Creek	262
4030201	Buckland River East Branch	9142
4030202	Buckland River	9500
4030203	Buckland River	3225
4030204	Devils Creek	3288
4030205	Buckland River	504
4030206	Buckland River	752
4030301	Buffalo Creek	3249
4030302	Buffalo Creek	271
4030401	Barwidgee Creek	545
4030402	Barwidgee Creek	536
4030403	Sandy Creek	332
4030404	Myrtle Creek	264
4030405	Barwidgee Creek	528
4030406	Barwidgee Creek	482
4030407	Happy Valley Creek	2365
4030408	Happy Valley Creek	2344
4030409	Happy Valley Creek	236
4030410	Barwidgee Creek	335
	Total Cap Volume	69995

23. For the purposes of Prescription 22 each area named in the table is the area as described in Figure 17.
24. For the purposes of Prescription 22 the current volume of licences authorised to take water in Zone 1 between 1 July and 31 October or Zone 2 shall be determined by summing the following proportion of the licence volumes -
 - (a) 100% for a Winter-take licence;
 - (b) 100% for a Zone 2 all-year groundwater licence;
 - (c) 10% for a all-year licence to take water for Irrigation in Zone 1
 - (d) 25% for an all-year licence to take water for any other use in Zone 1
 - (e) 145% for a registration licence in Zone 1
25. For each named area in the Protection Area the Corporation must publish in the annual report the total number and volume for the following licence types as at 30 June -
 - (a) all licences;
 - (b) Licences in Zone 1;
 - (c) all-year groundwater licences in Zone 1
 - (d) all-year surface water licences in Zone 1(exclusive of registration licences)
 - (e) registration licences in Zone 1
 - (f) winter-take licences in Zone 1
 - (g) groundwater licences in Zone 2;

13.2 Works licences

The most suitable site to construct a dam from an environmental and water management perspective is a site which is not located on a waterway. Dams on waterways often restrict the movement of fish, may hinder the passage of flows downstream and have the potential to cause damage during their construction, when they are cleaned out, and if they fail. Dams on waterways are also difficult for water corporations to manage with respect to the passage of flows. A dam located off the waterway is more environmentally friendly and reduces compliance costs.

In recognition of the potential adverse environmental impacts and water management issues the management plan does not allow the Corporation to approve a works licence to construct a dam on a waterway unless the applicant has carried out an environmental impacts study and the licence contains appropriate conditions, consistent with the Policies for Managing Take and Use Licences and Policies for Managing Works Licences, to ensure minimal environmental impacts. However, the Corporation may approve a licence to alter, operate remove or decommission a private dam on a waterway.

PRESCRIPTIONS – RESTRICTIONS AND PROHIBITIONS ON ISSUING WORKS LICENCES

26. The Corporation must not approve an application for a licence under section 67 of the Act to construct a private dam on a waterway unless the applicant has adhered to all legislative requirements and carried out an environmental impacts study and the licence contains appropriate conditions, consistent with the Policies for Managing Take and Use Licences and Policies for Managing Works Licences, to ensure minimal environmental impacts.

14 TRANSFERRING WATER ENTITLEMENTS

14.1 Introduction

The ability to transfer water entitlements provides for development opportunities and can encourage water to move to enterprises where the most value will be generated. It allows individual water users to buy or sell water entitlement to better match their total entitlement to their current water needs. It allows for a new development to be established on land where water had not been previously used. However, safeguards need to be put in place to ensure that adverse impacts on other water users and on the environment are properly considered.

This Management Plan details the conditions under which water transfers are permitted. It sets out rules under which licences can be transferred, and it also permits the conversion of licences from one licence type to another, in recognition of the connectivity between surface water and groundwater in the Protection Area.

The Management Plan establishes two management zones; rules relating to licence transfers and licence conversions are prescribed for the zones.

Although the prescriptions made by this Management Plan establish the rules for transferring water entitlements, each individual application must undergo a rigorous assessment process and approval is not automatic. Any application can be refused or conditions placed on the approval, as determined by the Corporation.

Under this Management Plan, conditions that apply to water trading have been established that:

- facilitate an efficient water trading market that is subject to certain rules
- allow integrated surface water and groundwater trades in highly connected systems
- are consistent between surface water and groundwater, but recognise time lag impacts on stream flows resulting from groundwater extractions
- take into account impacts on third parties and on the environment
- have regard to the stress on summer stream flows
- are the same for temporary and permanent transfers.

14.2 Off-property licence transfers

14.2.1 General

Where the transfer of a licence results in water being used on a different property from than that where the water was previously authorised to be used (an off-property licence transfer) rules need to be developed to manage impacts on other users and on the environment.

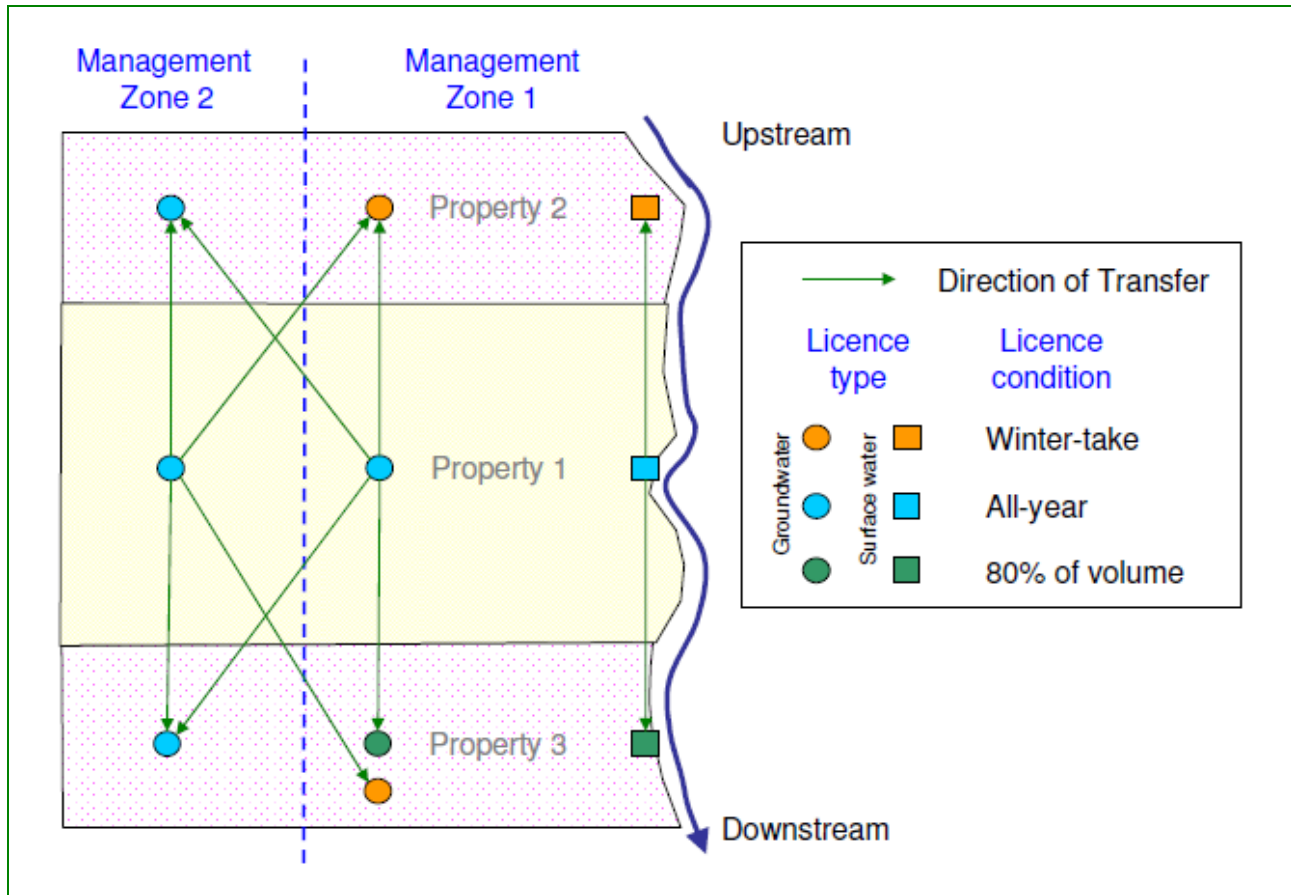
Water trading rules for groundwater and surface water in respect of the unconsolidated sedimentary aquifer and the surface water resources in the area (Zone 1), need to be consistent due to extent of interaction and the high level of development of these resources. Conversely, as groundwater in the fractured rock aquifer (Zone 2) is not highly developed and the connectivity with surface water system is limited to fractured rock exposures, different water trading rules are appropriate.

Water trading arrangements have been developed in respect of the two management zones, with rules specific to each zone. A critical factor in determining the trading rules is the way in which the surface water and groundwater resources interact, and in particular the time lags before extracting groundwater impacts on stream flows.

Different transfer arrangements are required within and between each management zone, which recognise the different impacts that taking water has on stream flows and on third parties. The arrangements also reflect the types of licences within the zones. In Management Zone 1 there are surface water and groundwater licences, whereas in Management Zone 2 there are groundwater licences.

Figure 18 is a schematic of the available licence transfer arrangements under the Plan and which are described in this section.

Figure 18: Licence transfer arrangements



14.2.2 Transfers within Management Zone 1

In Management Zone 1 there are surface water and groundwater licences. The rules for off-property licence transfers are the same for both surface water licences and groundwater licences. This is because the impact of taking water from the surface water system or the groundwater system is essentially the same, even though there may be time lag effects in relation to groundwater extractions.

The licence transfer rules adopted under this management plan are consistent with the rules that have applied to surface water licence transfers in northern Victoria since 1995, following the introduction of the Murray Darling Basin Cap²⁹.

An application to transfer a licence upstream may be approved, but only if the licence subsequently issued is a winter-take licence. An application to transfer a licence downstream may be approved, but with the condition that the licence subsequently issued is for 80 per cent of the licence entitlement transferred.

The downstream trading rule addresses the issue whereby the person downstream may have access to a greater proportion of the licence entitlement that the person upstream would have had (due to flows that occur between the two points). Transfer of water generally results in unused entitlement becoming used and placing more demand on resources, reducing the amount of entitlement. It is a mechanism to prevent third party impacts³⁰.

The upstream trading rule, which results in a winter-fill licence, ensures that there are no undesirable upstream impacts on summer flows that may affect the reliability of water users upstream. It also improves the reliability of water users downstream during the summer months and it reduces adverse environmental impacts upstream, where summer flows are likely to be less than at the downstream location.

Where an application is made to transfer a surface water licence from a tributary to a larger waterway downstream, it is appropriate that the user downstream receives less than 80 per cent of the licence entitlement. The management plan therefore allows the Corporation to approve a licence transfer application with such a licence condition.

To ensure that the stress on summer stream flows is not further exacerbated, the Management Plan does not allow the Corporation to approve the transfer of a winter-take licence to be an all-year licence.

PRESCRIPTIONS – TRANSFERS WITHIN MANAGEMENT ZONE 1

27. Other than as provided in Prescriptions 28 and 31 of this Plan, the Corporation must refuse an application for the transfer of a licence within Management Zone 1 that would result in water being used on a different property that is -
 - (a) downstream of the property on which it was previously authorised to be used unless the licence volume of the licence issued to the transferee is only 80 per cent of the licence volume of the licence to be transferred; or
 - (b) upstream of the property on which it was previously authorised to be used, unless the licence issued to the transferee is a winter-take licence.
28. The Corporation must refuse an application for the transfer of a licence within Management Zone 1 that would result in a winter-take licence becoming an all-year licence.

14.2.3 Transfers within Management Zone 2

In Management Zone 2 there are only groundwater licences.

Although the groundwater resources in this zone may be large, groundwater cannot be extracted in significant quantities because bore yields are low, averaging approximately 0.1 ML/d. As a result, demand for water in this zone is unlikely to be significant, although the ability to access water through trading may be important to some individuals.

As the connectivity between groundwater and surface water in this zone is limited to fractured rock exposures, the impact on springs which may be present at these exposures can be managed by the Corporation's normal licence assessment process. Licence transfer rules that apply to Management Zone 1 are not appropriate in this zone, as the nature of the interaction between groundwater and surface water is different. Therefore the management plan does not make prescriptions in relation to licence transfers in Management Zone 2.

14.2.4 Transfers between Management Zone 1 and 2

Transfers between Management Zones only relate to groundwater licences, as there are no surface water licences in Management Zone 2. Allowing transfers between the zones enables new development to take place, particularly in Management Zone 2, which is not highly developed.

A transfer of an all-year licence from Management Zone 1 to Management Zone 2, without any change to the licence conditions, has the potential to reduce the impact that groundwater extraction may have on summer stream flows in Management Zone 1. Although there is some potential for groundwater extractions in Management Zone 2 to impact on stream flows, the time lag effect is likely to be less immediate and dissipated, depending on the location of the extraction point.

Conversely, the transfer of an all-year licence from Management Zone 2 to Management Zone 1 would have the potential to impact on summer stream flows. Time lag effects are likely to induce losses from the river that could have continuing adverse impacts on the stream, even after restrictions have been imposed during low flow periods. A transfer of a groundwater licence from Management Zone 2 to Management Zone 1 should therefore only result in a winter-take licence being issued.

Allowing winter-take licences to be transferred between zones is permitted, subject to the normal licence assessment process.

All licence transfer applications need to be assessed, and are only approved if the applications meet the assessment criteria. For a transfer of a licence from Management Zone 2 to Management Zone 1 the application is subject to water availability at the site in question and the sustainable diversion limits of the catchment.

PRESCRIPTIONS – TRANSFERS BETWEEN MANAGEMENT ZONE 1 AND 2

29. The Corporation may approve an application for the transfer of a licence from Management Zone 1 to Management Zone 2 without any change to the licence volume of the licence being transferred.
30. The Corporation must refuse an application for the transfer of a licence from Management Zone 2 to Management Zone 1 unless the transfer results in the issue of a winter-take licence.

14.2.5 Domestic and stock transfers

Many people in the Protection Area rely on water from waterways to supply their domestic and stock needs. Where a waterway flows through a person's property, or where a waterway immediately borders a person's property, a licence is not required for domestic and stock use. However, if a Crown land frontage or property owned by someone else exists between a person's land and the waterway, a licence for domestic and stock use is required. A groundwater licence for domestic and stock use is not required in respect of groundwater where a person occupies the site from which the bore water is taken. Within the Protection Area there are approximately 300 surface water licences issued for domestic and stock use.

A prospective domestic and stock water user would need to obtain a licence as a result of a transfer, in the same way as a prospective irrigator would. Although all-year access is required for domestic and stock use, this does not mean that such use is unlimited and not subject to restrictions in times of shortage. Volumes used for domestic and stock purposes are relatively small in comparison to irrigation use over summer, and do not significantly reduce stream flows. If, however, the Corporation determines that the prospective domestic and stock user will use more than 2 ML/yr, then the transfer may be subject to the prescription applicable to licence transfers described in section 14.2.2.

An application to transfer a domestic and stock licence is subject to the normal assessment and approval processes adopted by the Corporation. Approval is not automatic and may be refused, if for example there is insufficient summer flow at the site in question.

A surface water licence will be allowed to be transferred for domestic and stock use to enable the licence holder to take and use water at any time of the year.

PRESCRIPTION – DOMESTIC AND STOCK TRANSFERS

31. The Corporation may approve an application to transfer a surface water licence that results in the issue of an all-year licence, provided that the licence is for domestic and stock use only and the licence volume is no greater than 2ML.

14.2.6 Licence transfers into the Protection Area

Allowing water to be traded into the Protection Area should be consistent with the rules that are established for water trading within the area. A major focus of the water trading rules is to have regard to third party impacts and adverse impacts on the environment. The pre-existing water trading rules for surface water allowed a licence to be transferred into the Protection Area only if the resulting licence was a winter-take licence, as a transfer was considered to be an up-stream transfer.

Allowing water to be traded into the Protection Area has the potential to increase economic development in the area, providing potential water users with a larger market from which to source water. This may enable water to be purchased more cheaply and more easily than would be the case if the market was limited to existing entitlements within the Protection Area.

The approval of an application to transfer a licence into the Protection Area (subject to the sustainable diversion limit) is appropriate provided that the transfer will not adversely affect summer flow (i.e. winter-take or Zone 2 only).

If an application to transfer a licence or water share into the Protection area is received the Corporation may issue a new groundwater licence in Management Zone 2 even if the water entitlement transferred relates to a surface water entitlement

PRESCRIPTION – LICENCE TRANSFERS INTO THE PROTECTION AREA

32. The Corporation may approve an application to transfer a licence or water share into Management Zone 2.
33. The Corporation must not approve an application to transfer a licence or water share into Management Zone 1 unless the transfer results in the issue of a winter-take licence.

14.2.7 Licence transfers out of the Protection Area

The ability to transfer licences out of the Protection Area is governed by the rules that apply to the location at which it is proposed to transfer the licence. The Management Plan does not place restrictions on licences being transferred out of the Protection Area.

It should be noted however, that at the time this Management Plan was prepared, a surface water licence may only be traded out of the Protection Area to a regulated system if there has previously been a trade the other way³¹. In respect of unregulated surface water systems, policies for managing take and use licences only allow a licence to be transferred from the unregulated sections of the Ovens River to the unregulated sections of the King River and the Buffalo River³².

14.3 On-property licence transfers

Licences are commonly transferred with the sale of a property to the new property owner. Many properties change hands as a result of changed family circumstances and licences are routinely transferred to the new property owner.

In most instances, properties are transferred to new owners as a going concern. Any change in licence conditions, similar to those proposed for off-property transfers, may adversely affect the ongoing viability of the business enterprise reliant on the licence.

Under an off-property transfer there is a clear change in the water management of the respective buying and selling businesses, whereas property sales or ownership transfers do not necessarily mean that water usage on that property has changed.

The management plan therefore allows the Corporation to transfer a licence on the transfer or conveyance of the land on which the water is taken without the need to amend the conditions of a licence, in the same way as it is required to do in relation to off-property transfers.

PRESCRIPTION – ON-PROPERTY LICENCE TRANSFERS

34. The Corporation may approve an application to transfer of a licence that would result in water being used on the same property on which it was previously authorised to be used without any change to the licence volume or the period during which the water can be taken.

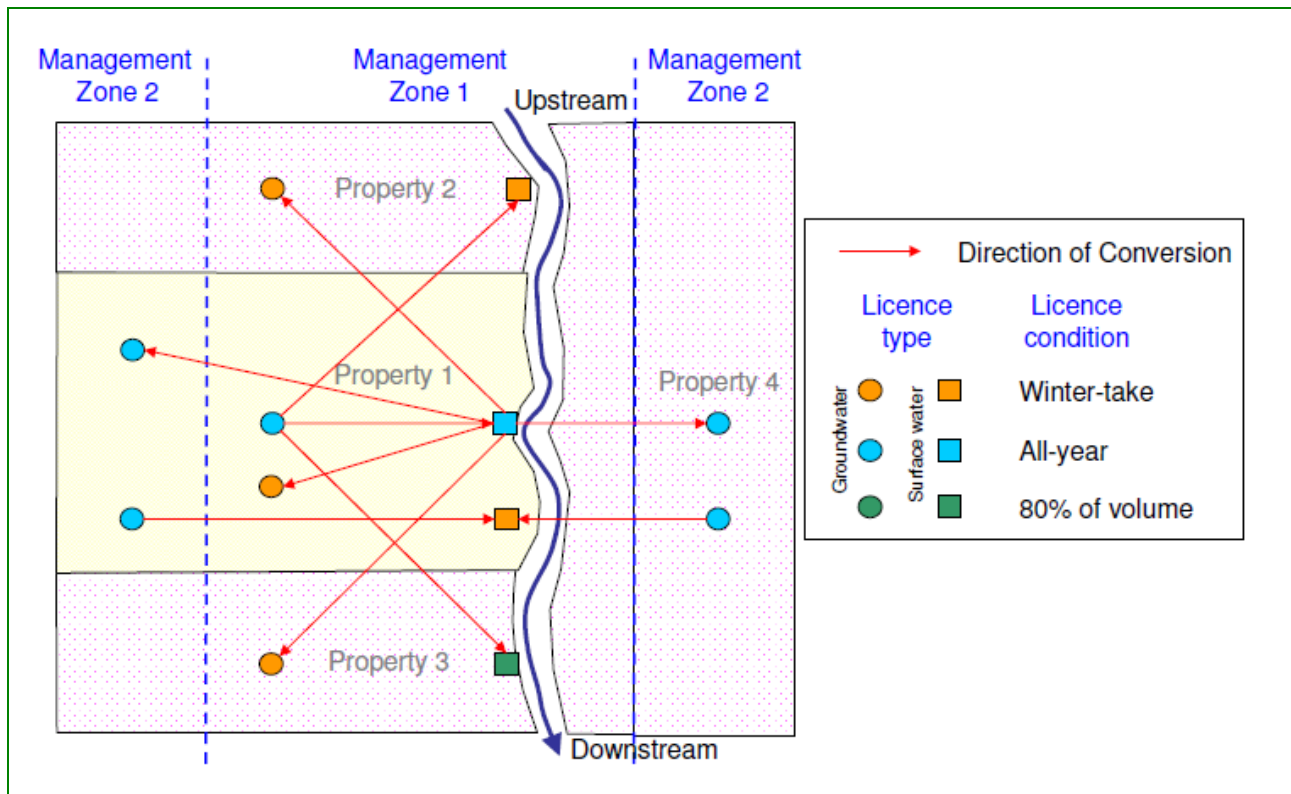
14.4 Licence Conversions**14.4.1 General**

In recognition of the high level of interconnection between the surface water resources and the groundwater resources, particularly in the unconsolidated sedimentary aquifer, the management plan allows licence conversion. This is a process whereby a surface water licence is surrendered and a groundwater licence is subsequently issued or whereby a groundwater licence is surrendered and a surface water licence is subsequently issued.

The management plan sets out the rules that apply to licence conversions taking into account impacts on third parties and on the environment. Different rules apply depending on whether the conversion results in water being used on a different property (an off-property conversion) or on the same property (an on-property conversion). As with licence transfers, each individual licence conversion application must undergo a rigorous assessment process and approval is not automatic. Approval may be refused or conditions may be placed on the approval as determined by the Corporation.

Figure 19 is a schematic of the licence conversion arrangements described in this section.

Figure 19: Licence conversion arrangements



14.4.2 Off-property Licence conversions

Within Management Zone 1, the Corporation may approve an application for an off-property licence conversion of an all-year groundwater licence to a surface water licence upstream if the licence subsequently issued is a winter-take licence. If an application is made for an off-property licence conversion from an all-year groundwater licence to a surface water licence downstream, the Corporation may approve the application and issue an all-year licence, provided that the licence subsequently issued is for 80 per cent of the original licence entitlement. These arrangements, which have regard to third party impacts, are similar to the arrangements for licence transfers discussed in section 14.2.2.

If an application is made for an off-property licence conversion of an all-year surface water licence to a groundwater licence in Management Zone 1, the Corporation may only approve the issue of a groundwater licence as a winter-take licence. In the absence of this arrangement, the extraction of groundwater during the summer time may lead to stream flows declining below restriction trigger levels, which would have adverse third party and environmental impacts. Over time, this arrangement could lead to improvements to the base flow in the stream during critical dry periods.

The Corporation may also approve the conversion of an all-year surface water licence held in Management Zone 1 to a groundwater licence in Management Zone 2 and the groundwater licence may be issued as an all-year licence without any reduction in the licence entitlement. A licence conversion of this nature is similar to a transfer of a groundwater licence between these zones. As mentioned in section 14.2.4, this also it has the potential to reduce the impact that groundwater extraction may have on summer stream flows in Management Zone 1.

If an application is made for the conversion of an all-year groundwater licence in Management Zone 2 to a surface water licence in Management Zone 1, the Corporation may only approve the licence conversion if the surface water licence subsequently issued is a winter-take licence. This requirement avoids additional stress on summer stream flows.

PRESCRIPTIONS – OFF-PROPERTY LICENCE CONVERSIONS

35. The Corporation must refuse an application to convert an all-year groundwater licence in Management Zone 1 to a surface water licence that would result in water being used on a different property that is -
 - (a) downstream of the property on which it was previously authorised to be used, unless the licence volume of the surface water licence is only 80 per cent of the licence volume of the groundwater licence; or
 - (b) upstream of the property on which it was previously authorised to be used, unless the surface water licence is a winter-take licence.
36. The Corporation must refuse an application to convert an all-year surface water licence in Management Zone 1 to a groundwater licence in Management Zone 1 that would result in water being used on a different property on which it was previously authorised to be used unless the groundwater licence is a winter-take licence.
37. The Corporation may approve an application to convert a surface water licence in Management Zone 1 to an all-year groundwater licence in Management Zone 2 without any reduction in licence volume.
38. The Corporation must refuse an application to convert an all-year groundwater licence in Management Zone 2 to a surface water licence in Management Zone 1 that would result in water being used on a different property on which it was previously authorised to be used unless the surface water licence is a winter-take licence.

14.4.3 On-property Licence conversions

Many water users use both groundwater and surface water for irrigation purposes. In recognition of the benefits that can be achieved in providing greater flexibility in the operation of a water user's farming enterprise, the management plan allows on-property licence conversions. In order to provide greater flexibility in the operation of the water user's farming enterprise.

The arrangements for on-property licence conversions are the same as the arrangements for off-property licence conversions and the same rationale applies. In addition converting an all-year groundwater licence into an all-year surface water licence is allowed on the same property

PRESCRIPTIONS – ON-PROPERTY LICENCE CONVERSIONS

39. The Corporation must refuse an application to convert an all-year surface water licence to a groundwater licence in Management Zone 1 for use on the same property on which it was previously authorised to be used unless the groundwater licence is a winter-take licence.
40. The Corporation may approve an application to convert a surface water licence in Management Zone 1 to an all-year groundwater licence in Management Zone 2 for use on the same property on which it was previously authorised to be used without any reduction in the licence volume of the groundwater licence.
41. The Corporation must refuse an application to convert an all-year groundwater licence in Management Zone 2 to a surface water licence in Management Zone 1 for use on the same property on which it was previously authorised to be used unless the surface water licence is a winter-take licence.
42. The Corporation may approve an application to convert an all-year groundwater licence in Management Zone 1 to an all-year surface water licence in Zone 1 for use on the same property on which it was previously authorised to be used without any reduction in licence volume.

15 METERING AND ACCOUNTING FOR WATER

15.1 General

Traditionally, surface water and groundwater licences issued for irrigation use have specified a volume of water to be used on a specific area of land. Limiting the use of water to an area of land was the mechanism to control the amount of water used – in effect a default ‘meter’.

When meters are installed, restricting the area of land on which the water can be used is no longer necessary, as the measured volume is used for compliance purposes.

Metering is desirable for the following reasons:

- **Reporting** – metering enables the Corporation to report annually on the metered use of water within the Protection Area and assists in reporting on their compliance with implementing the Plan.
- **Equity** – metering helps to ensure that the water is shared equitably amongst licence holders, other entitlement holders and the environment.
- **Compliance** - metering ensures water users are complying with the conditions of their licences. Water is a valuable resource, worth many hundreds of dollars per megalitre. Water taken by one person in excess of their entitlement is not available to other users. Metering of water use ensures that the security of this valuable asset is not eroded.
- **Planning and management** – metering aids the development and implementation and review of plans to manage the resource. To properly manage the water resource it is necessary to know how much and from where the water is taken. It also aids in development of water sharing arrangements during times of low flows, when rosters or restrictions are necessary.
- **On-farm management** – metering is an important mechanism to encourage on-farm water efficiency. This can lead to a more productive farming enterprise by increasing the area irrigated without exceeding the licence entitlement.
- **Tradability of water entitlements** – metering facilitates water entitlement trading. It allows users to identify their water requirements and to sell excess water, or alternatively, to purchase additional water to secure their farming enterprises.
- **Reviewing** – metering allows for the collection of data across the life of the Plan that will be analysed and reviewed in five years time to ensure appropriate management has been implemented in the Protection Area.

Government policy is that all significant water use should be metered. As part of a state-wide metering strategy, meters have been installed on all operational groundwater licences that authorise the use 20 ML/yr or more, and on all operational surface water licences that authorise the use 10 ML/yr or more. The policy also stipulates that a meter must be fitted in respect of all new licences. This would include licences issued as a result of an off-property transfer (other than domestic and stock licences). If part of a licence entitlement is transferred, the licence entitlement retained by the original licence holder will need to be metered if it is below the metering threshold. This metering policy does not preclude a Corporation from requiring a meter to be installed below the thresholds.

Within the Protection Area there is a clear inconsistency between the metering thresholds applied to groundwater and those applied to surface water. This inconsistency is particularly apparent given the high level of connectivity between the groundwater and surface water resources in the area. The inconsistency becomes even more apparent in circumstances where an irrigator who uses both groundwater and surface water on the same property may have one source of water metered and the other source not metered.

To deal with this inconsistency, the management plan requires that a meter must be fitted on all operational groundwater bores associated with a groundwater licence that authorises 10 ML/yr or more. Due to the cost of metering, meters should be phased in with all additional meters to be installed within five years of the approval of the plan.

Although metering all water use is a sound proposition in principle, for reasons mentioned above, the cost of metering at levels below the 10 ML/yr would be significant. The Corporation indicates that there are 402 unmetered licences in the Protection Area which includes licences issued for domestic and stock use.

However, if the metering threshold was set at 10 ML/yr for all licences, only 24 additional meters would need to be installed on irrigation and commercial outlets.

Table 16 shows the extent of the current metering in the Protection Area and the extent of the additional metering required under the management plan as highlighted. Note the number of meters installed or needing to be installed is less than the number of licences because meters are only installed in respect of active water users.

Table 16: Extent of current and future metering

Licence type	No. of Licences	No of meters installed	Volume metered (ML)	Volume unmetered (ML)	Total volume (ML)
Surface water					
Irrigation/commercial <10 ML/yr	74	1	7	302	309
Irrigation/commercial ≥10 ML/yr	160	137	6339	1258	7639
Domestic and stock	246	0	0	544	544
Groundwater					
Irrigation/commercial <10 ML/yr	15	2	2	57	59
Irrigation/commercial ≥10 & <20 ML/yr ¹	24	0	0	370	370
Irrigation/commercial ≥20 ML/yr	45	42	2503	243	2745

¹ Shows number of meters needed to be installed on active groundwater users

Registration licences, which mainly relate to farm dams, are not included in the State-wide metering program. These licences were issued to reflect historic use and no annual charges are levied. In many instances the dams are not on perennial waterways, and hence the volume that can be taken each year is limited to the size of the dam. From a compliance perspective, there is limited ability to take water in excess of the licence entitlement. From a planning and water resource management perspective, the Corporation can already make annual estimates of the amount of water used under these licences. Recovery of metering costs from registration licence holders is also not possible. Metering of registration licences is therefore not proposed under the Plan.

Both surface water and groundwater are used throughout the Protection area for domestic and stock purpose. Although the total amount of water used for such purposes may be significant for an individual, the amount used is relatively small when compared to irrigation and commercial use. The cost of metering small volume use is likely to outweigh the benefits, and other compliance measures can be utilised by the Corporation. The Corporation may require a meter to be installed under a condition attached to a licence. Metering of domestic and stock use is therefore also not proposed under the plan.

PRESCRIPTION – METER INSTALLATION

43. Within five years from the time the Plan is approved, the Corporation must ensure that a meter is fitted to every operational works used to take water under a surface water or a groundwater licence, other than a registration licence, that authorises the extraction of 10 ML/yr or more.

15.2 Meter reading and accounting for water use

The collection and storage of water usage data is an important part of water resource management. Section 22 of the Act makes specific reference to the need to collect water usage information and to make it publicly available.

Meters should be read at frequencies necessary to ensure compliance with licence entitlements and also for operational and planning purposes. The Corporation has, in the past, undertaken two meter readings each year and at other times as it sees fit, and this regime is continued under the Management Plan.

In relation to unmetered offtakes, it is necessary to ensure that the area irrigated throughout the irrigation season is within the area limits set under each licence. To ensure compliance, it is necessary to inspect each

unmetered offtake before the irrigation season, to ensure that the irrigation area is within the area allowed. Estimates of the amount of water taken under each unmetered licence should also be made each year.

In the absence of meters, an alternative method of accounting for water use is required. For unmetered irrigation and commercial use a rigorous compliance regime is needed. Before each irrigation season commences, the Corporation will, in respect of unmetered offtakes, determine whether or not irrigation is to occur during the coming season. If irrigation is to occur, the Corporation will identify the area to be irrigated to ensure that it is within the limits imposed under the licence. In addition, the Corporation should visit the unmetered sites during the irrigation season in order to monitor and record water use at least at the same frequency as it visits metered offtakes.

The Corporation should also be required to store water usage data in a data base within 30 days of obtaining the data.

PRESCRIPTIONS – METER READING AND ACCOUNTING FOR USE

44. The Corporation must -
 - (a) read each meter at least twice every year; and
 - (b) determine the volume of water taken each year under the relevant licence.
45. If for any reason the Corporation is unable to determine the volume of water by means of a meter it must estimate the volume of water taken.
46. If water is taken under a licence for irrigation use and is not metered, the Corporation must -
 - (a) prior to the commencement of each irrigation season determine the area to be irrigated for that season;
 - (b) inspect each place at which water is taken as frequently as it inspects meters; and
 - (c) estimate the volume of water taken each year.
47. The Corporation must, within 30 days after a meter is read or an estimate of the amount of water taken is made, record the amount of water taken in a database
48. If the Corporation requests the Licensee to read a meter or to estimate the amount of water used, the Licensee must comply with the request.

15.3 Maintenance of meters

The National Water Initiative Agreement provides a strategy for improving water resource management across Australia. In relation to water meters, the Agreement specifies requirements for national metering standards and a nationally consistent framework for water metering and measurement.

A national framework³³ has been developed to enable implementation of new standards for non-urban water meters and to accommodate future trade measurement requirements. The framework deals with obligations to maintain meters. It is therefore not necessary to specify these obligations in the Management Plan.

16 MONITORING STREAM FLOWS AND GROUNDWATER LEVELS

16.1 Introduction

As part of the State-wide water resource assessment program and to meet other objectives, surface water and groundwater monitoring is undertaken within the Protection Area. A collaborative program of stream flow monitoring is undertaken, involving a number of agencies. Data is collected and used for strategic planning and operational purposes and for other purposes such as flood warning. Groundwater monitoring is also carried out by the Department in the Protection Area as part of a statewide monitoring program.

16.2 Stream flow monitoring

There are eight active surface water monitoring sites in the Protection Area where stream flow gauges are installed. Some sites are equipped with a telemetry device that allows stream flows to be recorded without the need to visit the site.

Stream gauge number 403210 at Myrtleford will be used by the Corporation to manage the use of water by licence holders. Where there are no stream gauges on tributaries, the Corporation will visually inspect the flow rate of the river to manage the use of water by licence holders when stream flows are low.

The Management Plan does not prescribe requirements for the installation of additional stream gauges.

16.3 Groundwater level monitoring

There are 34 State-owned monitoring bores located in the Protection Area. These monitoring bores are part of the State observation bore network which the Department monitors every three months. The data obtained from the monitoring program has provided information which has been used to gain a better understanding of the groundwater system in the Protection Area and, in particular, its interrelationship with the surface water system.

All observation bores in the unconsolidated sedimentary aquifer show similar trends in groundwater level changes. The frequency of monitoring under the current program is adequate to monitor the general trends in this aquifer but a higher monitoring frequency is needed to monitor groundwater-surface water interactions.

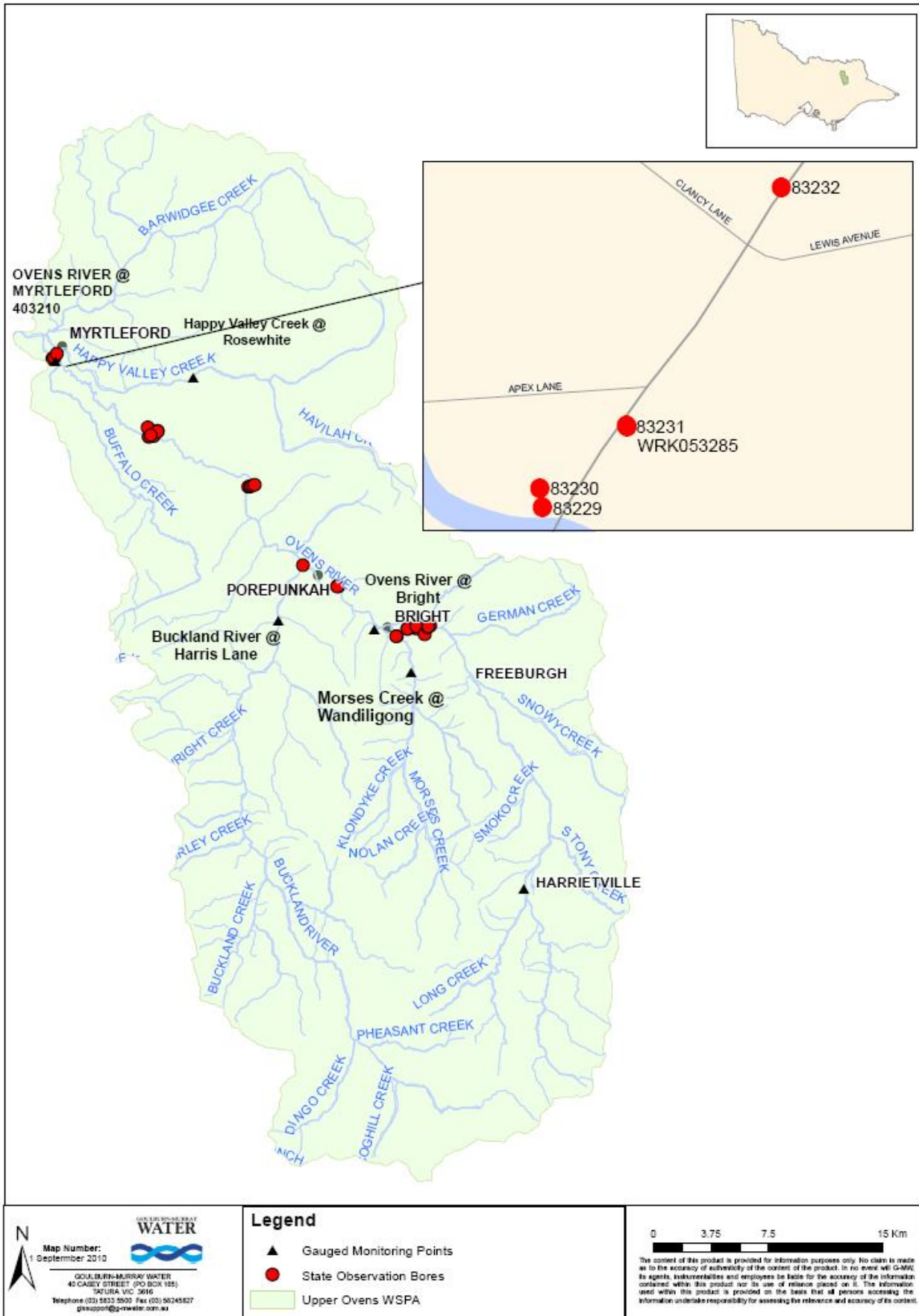
Water level monitoring will be undertaken in bores 83229, 83230, 83231, 83232 and WRK053285 or equivalent, located at Myrtleford, at a frequency consistent with the monitoring of river levels at stream gauge no 403210. Surface water and groundwater monitoring at these sites are reasonably representative of groundwater-surface water interactions throughout the Protection Area.

Monitoring of other bores in the Protection Area will be undertaken as required taking into account pumping intensity and general coverage of the Protection Area. The Corporation will develop a monitoring program in consultation with the Department and details of the program will be presented in the annual report prepared by the Corporation.

It will be the responsibility of the Corporation to ensure that an appropriate level of monitoring is carried out in the area.

Figure 20 shows the location of surface water and groundwater monitoring points.

Figure 20: Surface water and groundwater monitoring sites



PRESCRIPTIONS – MONITORING

49. The Corporation must ensure that an appropriate monitoring program is undertaken to ensure that:
- (a) the flows in the Ovens River at Myrtleford are continuously recorded;
 - (b) the flows in key tributaries are recorded or estimated in low flow periods;
 - (c) the water levels in observation bores at Myrtleford are continuously recorded;
 - (d) the water sharing regime is able to be implemented; and
 - (e) the relationship between groundwater levels and stream levels can be observed.

17 PRIVATE DAMS

Section 32A(3)(c) of the Act allows a management plan to include prescriptions relating to requirements for the location, capacity and operation of private dams which are not licensed and which are not used for domestic and stock use. These include aesthetic or beautification dams.

The ability to build large aesthetic dams in the Protection Area is limited by the topography and site suitability. In addition there may not be the incentive to build such dams due to the area's natural beauty and the extent of existing water based recreational activities. Any dam of significant size that someone may wish to build is likely to be sited on a waterway or to be reliant on a source of water from a waterway and hence be subject to a works licence or a take and use licence. The Corporation's licensing assessment processes can adequately deal with large dams of this type. The Management Plan does not therefore make any prescriptions in relation to aesthetic dams.

Under section 32A(3)(n), the Act also allows for a management plan to prescribe the maximum volume of water that may be retained in each private dam on a particular lot in a plan of subdivision in the Protection Area, or in all private dams on every lot in a plan of subdivision in the Area. The proliferation of domestic and stock dams on subdivisions has the potential to affect the availability of water to existing users and the environment. There have been concerns raised in some areas in the State where a subdivision has occurred and a dam has been constructed on many of the lots in the subdivision.

The ability to make a prescription under section 32A(3)(n) of the Act is specifically restricted to dams on subdivisions and does not relate to domestic and stock dams generally. Controlling dams on subdivisions may be warranted if they are considered to be an impact on the reliability of water to other users or if there is likely to be an adverse environmental impact. This may occur in drier areas of the State but is unlikely to be an issue in the Protection Area. Domestic and stock dams that are proposed to be built on waterways can be dealt with under the normal licence assessment process and concerns over the proliferation of these dams can be dealt with through that process. The Northern Region Sustainable Water Strategy³⁴ has identified a need to improve the management of domestic and stock use generally across the region and actions have been proposed over the next few years to address this issue. The Management Plan does not make any prescriptions in relation to dams on subdivisions.

18 PERMISSIBLE CONSUMPTIVE VOLUME

The permissible consumptive volume for an area is a limit, declared by the Minister, on the total volume of water that can be taken from a specified area or water system. This Management Plan does not recommend a permissible consumptive volume, as the prescriptions in the Plan prohibit the issue of licences and restrict the volume of water that may be taken during times of shortage perform the same function as the declaration of a permissible consumptive volume. In respect of groundwater, a limit was formally placed on the amount of groundwater for all aquifers that may be taken from the Protection Area in 2008 by the declaration of a permissible consumptive volume of 4,010 ML.³⁵ Consequently, the Corporation will apply to the Minister to have the permissible consumptive volume for the groundwater in the Protection Area revoked once the Management Plan has been approved.

PRESCRIPTIONS – Revocation of the Permissible Consumptive Volume

50. Within three months of the approval of the Plan, the Corporation must request the Minister revoke the permissible consumptive volume of 4,010 ML in place for groundwater in the Protection Area.

19 OTHER MATTERS

19.1 Notifications relating to domestic and stock groundwater use

A management plan may prescribe requirements to notify the Corporation of the taking of groundwater from bores in the Protection Area for domestic and stock use. However, a licence to construct a bore is required in most circumstances and therefore the Corporation is aware of the existence of most domestic and stock bores. The *Water (Groundwater) Regulations 2002* also requires domestic and stock bores to be registered and hence an additional notification requirement under the Management Plan is not needed. The cost of administering a notification scheme compared to the benefits is difficult to justify and therefore no prescriptions are made under the management plan in relation to groundwater notifications.

19.2 Payment for groundwater used

A management plan may prescribe conditions relating to payment for the amount of groundwater taken and used from domestic and stock bores. In some areas of the State, groundwater used for domestic and stock purposes can be a significant proportion of the amount of total water use and in these areas arguments could be made that domestic and stock users should contribute to the management costs. However, there is no similar provision relating to people with rights to take surface water for domestic and stock use, other than those people who need a licence. In these circumstances, it is seen to be inequitable to charge domestic and stock groundwater users and not to charge surface water users.

No prescriptions are therefore made under the management plan in relation to the payment for groundwater used for domestic and stock purposes.

19.3 Groundwater supplied by an Authority

A management plan may prescribe restrictions to be imposed on the supply of groundwater by an Authority that takes groundwater from the Protection Area. North East Water is authorised to take groundwater under a licence as a back-up supply for Myrtleford. The supply of groundwater by North East Water is subject to water restrictions imposed in accordance with its operating requirements. Under the Management Plan, the groundwater licence held by North East Water is subject to the same restrictions as other groundwater licence holders in Management Zone 1.

19.4 Licence terms and pricing

During the development of the draft Management Plan two matters came to light which should be dealt with by the Corporation as part of its licensing functions. What can be achieved under the management plan process is limited to those matters set out under section 32A of the Act. Although this Management Plan has addressed a number of matters to ensure a consistent management approach between surface water and groundwater in the areas such as metering, water trading and restrictions on taking water, there are other administrative matters that cannot be dealt with under the plan. These include the terms of licences and pricing.

19.4.1 Licence terms

There is a discrepancy between the terms of groundwater and surface water licences. The terms vary from 1 year to 15 years. The Act does not allow the term of a licence to be amended after it has been issued. However, it is possible to renew the licence for a different period than that for which it was previously issued, provided the period does not exceed 15 years.

In recent years groundwater licences have been renewed for a period of five years whereas many were initially issued for a period of 15 years. On the other hand, some surface water licences that were historically issued for one year have been renewed for a period of 15 years. The surface water licences that have a term of 15 years only apply to those licences on the Ovens River. Surface water licences on the tributaries have a one year licence term.

A consistent approach is warranted. Different licence terms give the perception that a licence with a longer term is more secure than a licence with a shorter term. There is also a potential inequity with regard to licence renewal fees if one licence is required to be renewed more frequently than another licence.

Upon renewal, all licences will be reissued for a period of five years.

19.4.2 Pricing

Under the current pricing regime, there is a large discrepancy between annual charges for surface water and groundwater licences in the Protection Area. In respect of the integrated management of surface water and groundwater, the National Water Commission, in its second biennial assessment of progress in implementation of the National Water Initiative, commented that “*Such integrated water management should also include compatible charging regimes for groundwater and surface water, to prevent market distortions and inequities among water users.*”³⁶

For the Plan implementation there will be cost relating to bringing the management of groundwater in line with surface water. Rather than have the groundwater user pay for the increase in management surface water users should also bear a proportion of these costs as they will have an increased reliability of supply under the Plan. The corporation will spread evenly the costs for implementation of the Plan across all licensed users in the Upper Ovens WSPA. The Corporation may also examine the pricing discrepancies in the future.

20 ANNUAL REPORT AND REVIEW OF THE PLAN

By 30 September each year, the Corporation will prepare an annual report on the enforcement and administration of the plan as required by section 32C of the Act. The report will be given to the Minister for Water and the North East Catchment Management Authority. It will also be made available to the public.

The annual report details the activities undertaken by the Corporation in relation to its duties in relation to the Plan including:

- key observation relating to stream flows and groundwater levels
- the extent of restrictions imposed under the water sharing regime
- details of licences issued, converted and transferred
- details of water usage
- the implementation of the metering and monitoring program
- details of any issues arising throughout the year.

The Corporation must review the operation of the Plan five years after it commences; and thereafter, at intervals of no more than five years. The Corporation must propose any consequential amendment (if any) to the Minister. If the Minister decides that an amendment to the Plan is desirable, the Act provides that a consultative committee be appointed to advise the Minister on the amendment. The process for amending a management plan is similar to the process for approving a plan, including the consideration of public submissions.

Within the next five years it is possible that improvements to summer flows in the Ovens River may occur as a result of an amendment to the bulk entitlement held by North East Water relating to the Bright township . The Bulk Entitlement is the equivalent of a licence for North East Water, it specifies how much and when water can be taken and also requirements for passing flow (the level of flow required before water can be taken) on the Ovens River. If changes to the Bulk Entitlement occur that reduces the amount of water taken over summer and results in an increase in flows,, an amendment to the Management Plan may be warranted. The amendment would be to ensure that any improvements to stream flow gained over summer by North East Water not taking water are passed through the system and not used to increase the reliability of other consumptive users. Consequently, it may be necessary to increase the flow triggers in Prescription 3. Changes should only occur if there is no net reduction to the reliability of access for licensed water users (no increase in the frequency and duration of bans or rosters above those set in this Plan).

20.1 Recommended Research to inform the Review of the Plan

Development of the Plan has relied on a large amount of peer reviewed technical information and local knowledge to inform its prescriptions. The committee have used the best available knowledge to date. However, there are some issues where a lack of certainty in local and scientific knowledge affected the Plan's development and resulting prescriptions. It is important that additional knowledge is gained in respect to these issues to inform the future review of the Plan. The recommended research below focuses on the key issues and uncertainties that arose during the development of the Plan, those on which significant alternative choices are possible.

- (1) What is the ecological risk to the environmental objectives (focus on fish and in-stream biota) of the river with the new minimum flow specifications under the Plan?

Current scientific knowledge of the negative impacts of low flows on aquatic dependant ecosystems was not sufficient to justify the reduction in access to water to irrigators of adopting anything other than the lowest of minimum passing flows. Research (and a monitoring program) is needed to see how fish communities (native and non-native, small and large bodied) are impacted by low flows and how they recover after low flows. The impacts on fish populations/in-stream biota at low flows that need investigation include; habitat locations quality and availability, water quality, competition, recruitment, movement and fecundity. Impacts of the changed duration and frequency of low flows can then be assessed to enable consideration of the need to change the current flow triggers prescribed in the Plan. Taking into account the unregulated nature of the catchment and that low flows are a natural part of the system, what flows are required to meet environmental objectives in the Ovens River and its tributaries?

- (2) Does managing the flow at Myrtleford adequately provide a flow along the length of the main stem of the Ovens River?

The Plan, using the best available knowledge, assumed that maintaining a level of flow at Myrtleford would maintain a surface flow in the Ovens River along its full reach. Monitoring is needed to confirm this assumption and determine if the flow that maintains longitudinal fish passage and surface flow connectivity between pools. This includes developing a better understanding of stream flow gains and losses along the reach and the morphology of the Ovens River. The impact of maintaining low flow connectivity can then be assessed to enable consideration of the need to change the current flow triggers prescribed in the Plan.

- (3) Is the management trigger at Myrtleford sufficient to maintain environmental flow objectives in some or all of the Ovens River tributaries?

Historically, some of the tributaries have been managed to flow triggers. The Plan specifies that this historic management continues but uses the Myrtleford stream flow gauge as the primary compliance point. Work is required to compare tributary flows and demands with Myrtleford flows to determine whether additional tributary gauging is required and whether roster triggers in the tributaries are required. This could include flow measurement on currently ungauged tributaries. The impact of water use in the tributaries can then be assessed to enable consideration of the need to change the current flow triggers prescribed in the Plan.

- (4) Is there the ability for trade of Zone 1 licences upstream?

The plan, in line with current Government policy, does not allow all year round licences in Zone 1 to transfer upstream. This prescription is included to protect environmental values and existing customer's reliability of supply. Research is required to determine where, and in what volumes, water can be transferred upstream without impacting on the environmental values and supply reliability. This involves understanding water availability along the reach, including stream losses. The review of the resource constraints will enable consideration of the need to change the current trade restrictions prescribed in the Plan.

- (5) What is the impact of Zone 2 groundwater pumping on streams during low summer flows?

The plan assumes that Zone 2 groundwater use has only a minor impact on summer low stream flows based on the conceptual understanding of the system and modelling of current impacts. Research is required to investigate the impacts of increased groundwater pumping from fractured rock on stream flows, to allow determination of appropriate extraction rates and locations and timing. This will enable consideration of the need to change the Zone 2 access provisions prescribed in the Plan.

- (6) Can the groundwater aquifers in Zone 1 be split up into further zones with different management arrangements (based on distance from the river, or connection to surface water)?

The plan defines all alluvial aquifers and weathered zone of the fracture rock as being heavily connected to streams, and therefore allows them to be managed in line with the streams. This definition was based on extensive research using existing observation bores and results from numerical models. Groundwater investigations to further understand the connection to surface water and the impacts of extraction from different parts of zone 1 will enable consideration of the need to provide more zones with different groundwater access prescriptions.

- (7) What are the impacts of Zone 1 groundwater use on streamflow in tributaries

The Plan assumes that the interactions between Zone 1 groundwater and surface flow in the tributaries are the same as the Owens River mainstem. Work is required to compare tributary flows and demands to determine whether additional water sharing arrangements such as Zone 1 groundwater access being linked to tributaries trigger flows for restrictions. This could include groundwater investigations in tributaries with proportionally high levels of Zone 1 groundwater entitlement. The impact of water use in the tributaries can then be assessed to enable consideration of the need to change the current flow triggers prescribed in the Plan.

- (8) What is the current and expected future seasonal water use demands and does this impact on the management plan?

The Plan assumes that starting the water resource sharing arrangements (rostering) early in the low flow years to prolong some water access for as long as possible is the most appropriate sharing of the resource. Investigations (monitoring) into the pattern of demands (daily and seasonally) from ground and surface water at low flows would confirm this assumption. The better understanding of the water use can then be assessed to enable consideration of the need to change the current flow triggers prescribed in the Plan.

PRESCRIPTIONS – REVIEW OF THE PLAN

51. The Corporation must:

- (a) review the operation of the Plan:
 - (i) five years after it commences; and
 - (ii) thereafter, at intervals of no more than five years; and
- (b) propose any consequential amendment (if any) to the Minister.

21 REFERENCES

- 1 Bureau of Meteorology, 2010, *Climate statistics for Australian locations*, <http://reg.bom.gov.au/climate/averages/> Australian Government, Canberra.
- 2 Department of Sustainability and Environment, 2004, *Our Water Our Future – Securing Our Water*
- 3 Intergovernmental Agreement on a National Water Initiative, 2004, <http://www.nwc.gov.au>.
- 4 Department of Sustainability and Environment, 2009, *Northern Region Sustainable Water Strategy*, Victorian Government, Melbourne. p.66.
- 5 Geological Survey of Victoria, 1974, *Wangaratta 1:250,000 Geological Map*, Melbourne.
- 6 Tickell, S. J. 1978, *Geology and hydrogeology of the eastern part of the Riverine Plain in Victoria*, Department of Minerals and Energy, Melbourne.
- 7 Shugg, A. 1987a, *Hydrogeology of the Upper Ovens Valley*, Geological Survey of Victoria, Unpublished Report 1987/5. Melbourne.
- 8 GHD 2010 *Report for Ovens Valley Water Resource Appraisal, Volume 1: Data Analysis and Conceptual Model development*. Goulburn-Murray Water Unpublished Report, Melbourne
- 9 GHD 2010 *Report for Ovens Valley Water Resource Appraisal, Volume 1: Data Analysis and Conceptual Model development*. Goulburn-Murray Water Unpublished Report, Melbourne
- 10 Sinclair Knight Merz, 2007a, *Upper Ovens Conceptual Hydrogeological Model*, Goulburn-Murray Water Unpublished Report 2400986:78. Melbourne.
- 11 GHD 2010 *Report for Ovens Valley Water Resource Appraisal, Volume 1: Data Analysis and Conceptual Model development*. Goulburn-Murray Water Unpublished Report, Melbourne
- 12 Ibid.
- 13 Sinclair Knight Merz, 2006a, *A Method for Managing Groundwater –Surface water Interaction in Unregulated streams*, Goulburn-Murray Water Unpublished Report 1916323:136.
- 14 Winter, T. C., Harvey, J.W., Franke, O.L. and Alley, W.M. 1998, *Ground Water and Surface Water A single resource*, U.S. Geological Survey Circular 1139.
- 15 Sinclair Knight Merz, 2007a, *Upper Ovens Conceptual Hydrogeological Model*, Goulburn-Murray Water Unpublished Report 2400986:78. Melbourne.
- 16 Lovell, D, M. 2009 *Conjunctive management of groundwater and surface water resources in the Upper Ovens River Valley*, University of Melbourne, Melbourne
- 17 Department of Sustainability and Environment, 2010 <http://www.waterregister.vic.gov.au/Public/Reports/BulkEntitlements.aspx>
- 18 Rural Water Commission, 1986, *Ovens River Basin – Review of Water Resources*.
- 19 Department of Sustainability and Environment, 2010, *Victorian Water Accounts 2007-2008*, Victorian Government, Melbourne.
- 20 MDBC, 2004, *The Cap brochure*, Murray-Darling Basin Commission, Canberra.
- 21 SKM, 2006, *Upper Ovens Environmental FLOWS Assessment*, Prepared for the Department of Sustainability and Environment, Sinclair Knight Merz, Armadale.
- 22 Department of Natural Resources and Environment, 2002, *The FLOWS method: a method for determining environmental water requirements in Victoria*. Sinclair Knight Merz, CRC Freshwater Ecology, Freshwater ecology (NRE), and Lloyd Environmental Consultants report to the Department of Natural Resources and Environment, Melbourne.
- 23 SKM, 2006, *Upper Ovens Environmental FLOWS Assessment*, Prepared for the Department of Sustainability and Environment, Sinclair Knight Merz, Armadale.
- 24 SKM, 2009, *Upper Ovens River SFMP Background Report - Investigation of Minimum Recommended Environmental Flows* Prepared for the Department of Sustainability and Environment, Sinclair Knight Merz, Armadale.

- 25 Sinclair Knight Merz, 2007a, *Upper Ovens Conceptual Hydrogeological Model*, Goulburn-Murray Water Unpublished Report 2400986:78. Melbourne.
- 26 GHD 2010 *Report for Ovens Valley Water Resource Appraisal, Volume 1: Data Analysis and Conceptual Model development*. Goulburn-Murray Water Unpublished Report, Melbourne
- 27 GHD 2010 *Report for Ovens Valley Water Resource Appraisal, Volume 1: Data Analysis and Conceptual Model development*. Goulburn-Murray Water Unpublished Report, Melbourne
- 28 SKM, 2009, *Upper Ovens River SFMP Background Report - Investigation of Minimum Recommended Environmental Flows* Prepared for the Department of Sustainability and Environment, Sinclair Knight Merz, Armadale.
- 29 Department of Natural Resources and Environment, December 2001, *The Value of Water – A Guide to Water Trading in Victoria*. Victorian Government. Melbourne.
- 30 Department of Sustainability and Environment, November 2009, *Submission to the Australian Competition and Consumer Commission on water Trading Rules Position Paper*.
- 31 Department of Sustainability and Environment, October 2009, *Trading Rules for Declared Water Systems*. Victorian Government. Melbourne.
- 32 *Policies for Managing Take and Use Licences*, September 2009, issued by the Minister for Water. Victorian Government.
- 33 Department of the Environment, Water, Heritage and the Arts, 2009, *A National Framework for Non-urban Water Metering - Policy Paper*. Australian Government, Canberra.
- 34 Department of Sustainability and Environment, 2009, *Northern Region Sustainable Water Strategy*, Victorian Government, Melbourne. p.60-61.
- 35 Victorian Government Gazette, *Permissible Consumptive Volume Groundwater Order July 2008*. Victorian Government Gazette G27, 3 July 2008.
- 36 National Water Commission 2009, *Australian Water Reform 2009: Second biennial assessment of progress in implementation of the National Water Initiative*, NWC, Canberra.

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23 APPENDICES

23.1 Summary of the technical audit panel review of the Draft Plan

Five stages of restrictions apply to surface and groundwater users in management zone 1. Stage 3 and 4 triggers are now different than before to reduce likelihood of reaching stage 5 trigger (worst outcome for users). The TAP is somewhat concerned that the trigger for all tributary creeks is based on flows in the Ovens River at Myrtleford except where the tributary flow falls below an extreme low flow of 2 ML/day. The TAP would have more confidence in the plan if flows in the tributaries were used as a trigger for all stages of restrictions.

The inclusion of groundwater in water allocation rules of the Upper Ovens is major advance in water management in Victoria. While most catchments won't have the same extent of data showing the connection between surface and groundwater, it is essential that such integrated water management strategies are considered in as many catchments as possible and increasing investment is allocated to research on understanding surface water and groundwater links in catchments.

The minimum flows recommended by the FLOWS method (SKM 2006) would have had serious impacts on security of supply to water users in the Upper Ovens catchment. While very dry years are infrequent in this unregulated catchment, bans on surface water extraction in 73% of years for an average of 10 weeks (at 137 ML/d) would clearly threaten the viability of some components of agriculture in the catchment. In contrast, under the previous regime, groundwater users would have unlimited access, despite that fact that dry summers, most of the Ovens River flows are supplied by groundwater.

In contrast to the minimum flows recommended by the FLOWS method (SKM 2006), there is no doubt that the new water management rules, where bans are not introduced until flows reach 1 ML/d at Myrtleford, will result in some environmental objectives not being met in dry years. In particular, passage for larger-bodied fish is severely compromised in a catchment that the MDBA-SRA describes as having relatively poor fish condition. There is an urgent need for research on the hydrologic and hydraulic requirements of key native fish species in the Upper Ovens.

In conclusion, The TAP supports the new draft WMP for the Upper Ovens but with some reservations, especially the negative effects on passage for larger-bodied fish during very dry summers. The TAP is also concerned that some of the recommendations from SKM (2009), as adopted in the draft WMP, are based on limited and inconclusive data. The hydrological, hydraulic and ecological data requirements for developing water management plans in Victoria are on-going issue that needs to be addressed with increased investment in monitoring and research.

23.2 Consultative committee responses to community submissions on the Draft Plan

NEW - North East Water

EV - Environment Victoria

G-MW – Goulburn-Murray Water

NECMA- North East Catchment Management Authority

Management Zones- Prescription 1

Respondent	Feedback (Issues or comment)	Committee Comment
NEW	Support	Noted
EV	Strongly support prescription 1	Noted
C.Leita	Does not support	Noted
R.Tomasoni	Does not support. Issue with lack of technical studies on Ovens upstream of Bright and classification of Zone 1 and Zone 2.	Noted – Significant technical studies have been undertaken using the latest science and have informed the Plan development. The technical understanding is summarised in sections 5, 9 and 10 of the Plan.
NECMA	Support	Noted
H. Weston	Include mapped delineation of the boundaries of Management Zones 1 and 2 at a sufficiently detailed scale for licence holders and property owners to determine which zone is applicable;	The method for defining management zone boundaries was extensively considered. The Committee has previously agreed that a definition using geological aquifers is more robust than mapped boundaries
G-MW	Cost implications for customers in determining whether existing groundwater users are in Zone 1 or 2. This is anticipated to be a large task and will require significant G-MW resources in the order of \$40k	Revision of the method for the corporation to classify existing bores into Zones has occurred in section 11.2. The committee recommends funding is made available to undertake independent technical advice.

Restrictions on Taking Water in Management Zone- Prescriptions 2 to 11

Respondent	Feedback (Issues or comment)	Committee Comment
NEW	Support	Noted
EV	Strongly support prescription 2	Noted
EV	Support the introduction of a restriction regime at flow of 100 ML/day at Myrtleford	Noted
EV	Restriction regime and irrigation ban trigger point suggested under prescription 3 are a major concern. Concern with the resilience of the river to prolonged or repeated periods of flows at low levels. Reference to the flow study of 137 ML/day. Suggest a more appropriate figure of 7 ML/day for ban, which would allow for mixing of the water body to maintain water quality and preserve the perennial nature of the river, while still providing adequate reliability for extractive water users.	Restriction trigger levels were re-considered by the committee but agreed to leave the ban level at 1ML/Day due to the reasons outlined in section 10.2 of the Plan
C.Leita	Does not support	Noted
R.Tomasoni	Does not support. Restrictions occur during the crucial growing period when starting in January making it difficult to produce saleable crops.	Noted
NECMA	Does not support. Believes that the proposed minimum base flow trigger of 1 ML/day at Myrtleford is not high enough to avoid significant environmental risk for the aquatic dependant assets in the upper Owens river. The concern is primarily associated with the uncertainty of system performance at this extreme, the environmental response to these events and the implicit assumption that this suspension trigger will prevent extraction induced cease to flows. Believes a flow of 7 ML/day at least will be of significant environmental benefit. NECMA outlines a number of environmental issues.	Restriction trigger levels were re-considered by the committee but agreed to leave the ban level at 1ML/Day due to the reasons outlined in section 10.2 of the Plan
NECMA	The 100 ML/day trigger is supported and supports sharing arrangements	Noted
NECMA	Does not support tributary arrangements without a higher trigger.	Noted
E. Tomasoni	Not support- This constitutes that 9 out of 10 summers irrigators would on level 2 restrictions	Historical data shows that restrictions of Stage 2 and above will occur 3 times every 10 years.
G-MW	Support – Surface water users are not impacted under the plan when compared to historical practices. And may provide improved access with groundwater users now being conjunctively managed.	Noted
H.Weston	Would like a strategy and assistance to have groundwater users shift from Zone 1 to Zone 2 and thus not need to have restrictions	Previously discussed

Transitional arrangements for Zone 1 Groundwater- Prescriptions 12 to 17

Respondent	Feedback (Issues or comment)	Committee Comment
NEW	NEW requesting its GW assets to be associated with permanent plantings in order to give them 9 years to adapt their planning to the Plan.	NEW during drought periods can apply for a qualification of rights in order to work outside their licence conditions.
EV	Strongly support prescriptions 12 to 16	Noted
C.Leita	Does not support	Noted
R.Tomasoni	Does not support. Does not support the view that someone else has the final say on what can be planted and grown on private land.	The Draft Plan puts no restrictions or gives advice on what can and can not be planted within the Upper Ovens WSPA.

Restrictions and prohibitions on issuing take and use licences- Prescriptions 18 to 25

Respondent	Feedback (Issues or comment)	Committee Comment
NEW	NEW in the future may develop a Zone 2 bore to augment urban supply. It is requesting that the plan accommodate this.	Noted
DSE	(Prescription 22) The draft management plan should clearly state the current winter fill allocation compared to the cap volume in each of the Upper Ovens sub catchments or commit G-MW to providing this information in the near future. This could be addressed by the inclusion of a future work program.	Noted
EV	Support prescription 18-25	Noted

Restrictions and prohibitions on issuing works licences- Prescription 26

Respondent	Feedback (Issues or comment)	Committee Comment
NEW	Support	Noted
DSE	(Prescription 26) The <i>Policies for Managing Works Licences</i> are relevant to the construction and operation of dams. Reference to the <i>Policies for Managing Take and Use Licences</i> should be removed and replaced with the <i>Policies for Managing Works Licences</i> .	Amendment: Inserted in prescription 26, "and policies for Works licences"

Transfers within Management Zone 1- Prescriptions 27 to 28

Respondent	Feedback (Issues or comment)	Committee Comment
NEW	NEW is proposing to transfer the diversion point for its Bulk Water Entitlement for Bright, from Hawthorn Lane in Bright, upstream to Freeburgh, a distance of approximately 7 kilometres. It is intended that the extraction rules associated with the amended BE will permit both summer and winter diversions, but with the different low flow environmental flow triggers. That is, the amended BE will not be exclusively a winter fill BE. These rules have been developed in consultation with DSE and G-MW and should be recognised or accommodated by the plan. NEW seeks clarification as to whether its BE for Bright will be subjected to the same restrictions as are to be applied to irrigation licences.	Noted but outside the scope of this project as NEW bulk entitlement conditions are outside of the Management Plan.
EV	Support	Noted
NECMA	Support	Noted
E.Tomasoni	Not support– This is discriminatory to upper valley water users, it leads to a bias market in favour of downstream users. The market is regulated to not allow free trade of water to all potential and efficient users of this resource.	Noted

Transfers between Management Zone 1 and 2 – Prescription 29 to 30

Respondent	Feedback (Issues or comment)	Committee Comment
NEW	Support	Noted
EV	Support	Noted

Domestic and Stock Transfers- Prescription 31

Respondent	Feedback (Issues or comment)	Committee Comment
NEW	Support	Noted
EV	Support	Noted

Licence Transfers into the Protection Area- Prescription 32 to 33

Respondent	Feedback (Issues or comment)	Committee Comment
NEW	Support	Noted
DSE	The discussion of transfers into and out of the protection area should clearly state whether the transfers are referring to surface water and /or groundwater	Amended text in section 14.2.6 to clarify.
EV	Support	Noted

On-Property Licence Transfers- Prescription 34

Respondent	Feedback (Issues or comment)	Committee Comment
NEW	Support	Noted
EV	Support	Noted

Off Property Licence Conversions- Prescriptions 35 to 38

Respondent	Feedback (Issues or comment)	Committee Comment
NEW	Support	Noted
EV	Support	Noted
E.Tomasoni	Not support – Again this plan fails in protecting groundwater licence holders. The plan agrees that connectivity is very strong between surface and groundwater. Yet does not allow the licence to be transferred or converted to same. Upper Valley landholders are again disadvantaged.	The issue of surface water trade to groundwater is discussed within the Management Plan. The transfer rules have been designed to protect low surface flows during dry periods.

On-Property Licence Conversions- Prescriptions 39 to 42

Respondent	Feedback (Issues or comment)	Committee Comment
NEW	Prescriptions 39 and 42 appear to be inconsistent. If surface water and groundwater within Zone 1 are conceptually to be treated the same shouldn't the restrictions associated with the transfer, from one to the other be the same. It seems unreasonable to require the transfer of an on-property surface water licence to a Zone 1 groundwater licence, to be as a Winter take licence, if the same restriction does not apply in the other direction.	Due to time lags Zone 1 groundwater extraction can continue to reduce stream flows after pumping has ceased. The Plan does not allow transfers to Zone 1 groundwater to reduce the potential for increased impacts of groundwater extraction on stream flow.
EV	Support	Noted
E.Tomasoni	Not support – Discriminatory to Upper valley land users. 20% loss if transferred downstream, 100% less moving a licence upstream within the management zone 1. Zone 2 is under state government control how can a licence be transferred their?	Noted

Meter Installation- Prescription 43

Respondent	Feedback (Issues or comment)	Committee Comment
NEW	Support	Noted
EV	Support	Noted
G-MW	Concern with who pays for meter installation and maintenance for metering between 10 and 20 ML. Cost of meters is \$240 K, then \$12k for annual maintenance, and \$8k for meter reading costs.	No changes to prescription but changes to the process for meter installation. To reduce costs the new method is for G-MW to supply the meter and the user to install. The plan text has been changed to reflect the new process - Section 15.

Meter Reading and Accounting for Use- Prescriptions 44 to 48

Respondent	Feedback (Issues or comment)	Committee Comment
NEW	Support	Noted
E.Tomasoni	Neutral– Estimation made by the corporation is arbitrary and can lead to disputes, what rights does a licence holder have in respect to volumes estimated by an officer of the corporation, if a dispute arises ?	The corporation has documented the deeming process and the committee is satisfied with this practice and sought no modification to these.

Monitoring- Prescription 49

Respondent	Feedback (Issues or comment)	Committee Comment
NEW	Support	Noted
E.Tomasoni	Supports but suggests changes – No monitoring sites between Bright and Harrietville. Why is this so as it is an important stretch of waterway?	Bright and Harrietville surface water gauges are appropriate for flood and resource monitoring.

Revocation of the Permissible Consumptive Volume- Prescription 50

Respondent	Feedback (Issues or comment)	Committee Comment
NEW	Support	Noted
NECMA	Support	Noted
E.Tomasoni	Not support	Noted

Review of the Plan- Prescription 51

Respondent	Feedback (Issues or comment)	Committee Comment
NEW	Support	Noted
DSE	For the purpose of reporting there should be a clear link between monitoring and the plan objectives enabling the corporation to report on the performance of the plan, not just that the Corporation has done everything required of it under the plan.	Inclusion of new section (20.1) outlining possible further research and monitoring projects to inform five year review.
C.Leita	Supports. Review must be done in consultation with the licence holders.	Noted

Additional Comments

Respondent	Feedback (Issues or comment)	Committee Comment
NEW	NEW requests that the Plan provides adequate time for the Corporation to transition over to a water supply strategy that is consistent with the management principles of the Plan. For project planning and delivery purposes a period of 10 years is requested.	Noted but outside the scope of this project as NEW bulk entitlement conditions are outside of the Management Plan.
DSE	DSE in reference to Section 9.2.3. The draft Plan assumes the proposed restrictions on groundwater use in Management Zone 1 will sufficiently protect groundwater dependent ecosystems. The draft management Plan should specify a way in which this assumption will be tested in the future. This could be addressed by the inclusion of a future work program.	Previously discussed, in regards to further research and monitoring projects.
DSE	(Section 19.4.2) The draft plan should clarify the process G-MW must follow to set licence fees. ie, through the Essential Services Commission.	Amended text to say there is a set process for setting licence fees.
R.Tomasoni	This plan impacts greatly on an individuals right to plan their livelihood, after expending lots of money to secure an on farm water supply there is now no compensation package for much expenditure.	A covering letter to the Minister will be sent with the Plan with the Committee's recommendation that some form of financial adjustment, or co-investment with groundwater users to adapt to reduced access to water.
NECMA	Review submission by NECMA which covers proposed monitoring, tributary maintenance, GW users equity, urban arrangements.	Previously discussed
H. Weston	Having plan commencement for the 1 st July 2011, looks like the committee is rushing the plan through.	Amendment: Change starting date to 1 July 2012.
H. Weston	Appropriate references be included in the Plan to the statutory basis for the plan. Also include any guidelines for the preparation of the Plan issued by the Minister and a table which shows how the preparation of the Draft Plan is consistent with these guidelines.	Amendment: inclusion into Plans text ; 1) Date of declaration of WSPA. 2) reference to the Ministerial guidelines based on section 32a of the Water Act.
H. Weston	All prescriptions should be placed in one place in the plan	Noted
H. Weston	Identify a complementary package of financial assistance for directly affected licence holders to implement on farm infrastructure changes	Previously discussed
E. Tomasoni	<ol style="list-style-type: none"> 1. The valley at Smoko is consolidated sedimentary rock, most dragline holes sit well above the river and the small spring water entering these holes comes from deep fractured rock, above the valley floor. 2. Enterprises have been developed along side their GW extraction licence, at a cost to the business. This plan will severely effect the enterprises return on investment, devalue the property and loss of income. 	<ol style="list-style-type: none"> 1. Assessment of Zone 1 and 2 bores discussed previously. 2. Noted
G-MW	Supports Management Zones, restrictions, and trade.	Noted



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