

Victorian Mallee Irrigation Development Guidelines 2017

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Middle: Almond trees in bloom.
Bottom: Dripper irrigation in grape vines. Photos: Mallee CMA.

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The Mallee Catchment Management Authority (CMA) acknowledges and respects Traditional Owners, Aboriginal communities and organisations. We recognise the diversity of their cultures and the deep connections they have with Victoria’s lands and waters.

We value partnerships with them for the health of people and country.

The Mallee CMA Board, management and staff pay their respects to Elders past and present, and recognise the primacy of Traditional Owners’ obligations, rights and responsibilities to use and care for their traditional lands and waters.

A Steering Committee involving key regional partners was established to oversee the review of the Irrigation Development Guidelines. The committee had representation from: Department of Environment, Land, Water and Planning; Department of Economic Development, Jobs, Transport and Resources; Lower Murray Water; Grampians Wimmera Mallee Water; Goulburn Murray Water and the Mallee CMA.



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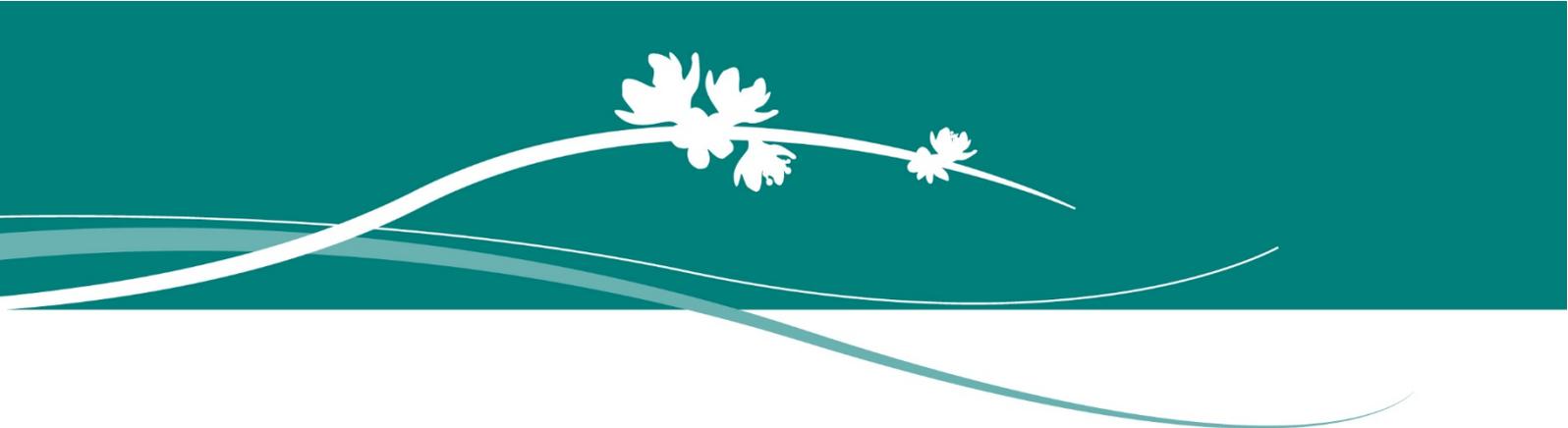
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Abbreviations in this document

AEM	Aerial Electro Magnetic	MAR	Maximum Application Rate
AHD	Australian Height Datum	MAT	Management Action Target
AUL	Annual Use Limit	MBI	Market Based Instruments
BMP	Best Management Practice	MDBA	Murray-Darling Basin Authority
BSM2030	Basin Salinity Management 2030	MDBC	Murray-Darling Basin Commission (now MDBA)
CMA	Catchment Management Authority	ML	Megalitre
DPI	Department of Primary Industries (Now part of DEDJTR)	NRE	Natural Resources and Environment (Department of, now part of DELWP/DEDJTR)
DSE	Department of Sustainability and Environment (Now part of DELWP)	NRM	Natural Resource Management
DEDJTR	Department of Economic Development, Jobs, Transport and Resources	NRSWS	Northern Region Sustainable Water Strategy
DELWP	Department of Environment, Land Water and Planning	N2SAB	Nyah to South Australian Border
EC	Electrical Conductivity	PLM	Public Land Manager
EVC	Ecological Vegetation Classes	RCS	Regional Catchment Strategy
GIS	Geographic Information System	RCT	Resource Condition Target
GMW	Goulburn-Murray Water	RWC	Rural Water Corporation
GWMW	Grampians-Wimmera Mallee Water	SAAC	Salinity Accountability Advisory Committee
Ha	Hectare	SBIEG	Small Block Irrigator Exit Grant
Ha/yr	Hectares per year	SDE	Salt Disposal Entitlements
HIZ	High Impact Zone	SDL	Sustainable Diversion Limit
ID	Irrigation Development	SIS	Salt Interception Scheme
IDC	Irrigation Development Coordinator	SIZ	Salinity Impact Zone
IEMAP	Irrigation Environmental Management Action Planning	SMP	Salinity Management Plan
IRES	Irrigation Recording and Evaluation System	VCAT	Victorian Civil and Administrative Tribunal
ISC	Index of Stream Condition	VMIDG	Victorian Mallee Irrigation Development Guidelines
IT	Intermediate Target	VMSWQMP	Victorian Mallee Salinity and Water Quality Management Plan (Draft)
LCC	Land Conservation Council	VPP	Victorian Planning Provisions
LIZ	Low Impact Zone	VWR	Victorian Water Register
LMW	Lower Murray Water	WCI	Wetland Condition Index
LWMP	Land and Water Management Plan	WFP	Whole Farm Planning
		WUE	Water Use Efficiency
		WUL	Water Use Licence

Glossary of Terms

Annual Use Limit (AUL): the maximum volume of water that in any 12 month period may be applied to the land specified in a water use licence or water use registration.

Basin Salinity Management 2030 (BSM2030): a basin wide strategy developed by the Murray Darling Basin Authority together with Basin governments to manage salinity in the Basin over a 15-year period. The strategy builds on the successes of the Basin Salinity Management Strategy (2001-2015)

Biodiversity: the variety of all life forms – the different plants, animals and micro-organisms, the genes they contain, and the ecosystems of which they form a part of.

Catchment Management Authority (CMA): statutory body established under the *Catchment and Land Protection (CaLP) Act 1994*. CMAs have responsibilities under both the *CaLP Act 1994* and the *Water Act 1989*, which include river health, regional and catchment planning and coordination, and waterway, floodplain, salinity and water quality management.

Declared water system: a declared water system is a water system that has been declared in accordance with Section 6A of the *Water Act 1989*. Water rights and Take and Use Licences (TUL) in declared water systems have been converted into unbundled entitlements.

Delegate: a person to whom the power is delegated under the instrument of delegations.

Delivery share: an entitlement to have water delivered to land in an irrigation district and a share of the available water flow in a delivery system.

EC Units: Electrical Conductivity provides a fast and convenient way to measure salinity. Sea water has a salinity of about 50,000 EC Units.

Groundwater: all subsurface water, generally occupying the pores and crevices of rock and soil.

High-reliability water share: A water share against which seasonal allocations made as a first priority. High-reliability water-shares are expected to reach 100% allocations in 95 years out of 100.

Irrigation and drainage plan (IDP): An application for a new water use licence or for a variation to a

water use licence which must be accompanied by an irrigation and drainage plan.

LIZ /HIZ: Low Impact Zones /High Impact Zones: Salinity impact zones that define areas in which irrigation development is encouraged/discouraged based upon salinity impact to the river and implemented through a differential charging system.

Megalitre (ML): 1 million litres.

Pumped Irrigation Districts: Irrigation districts supplied by large pumps capable of supplying multiple irrigators at once.

Salinity Credit allowance: Entitlements to increase river salinity at Morgan. These are only earned at the State level in return for investments that reduce River salinity by at least the same amount if not more.

Seasonal water allocation: The amount of water available for a water year, determined by the Water Corporation and expressed as a percentage of a water share. Sometimes this term is shortened to 'allocation'.

Small Block Irrigator Exit Grant: A Federal government incentive for irrigators to exit the irrigation industry. Grants were first paid in 2009. The five-year moratorium, preventing the irrigation of these properties, ceased in 2014.

Take and Use Licence (T&UL): A T&UL is a fixed term entitlement to take and use water from unregulated water systems such as: a waterway, catchment dam, spring, soak or aquifer. In the Mallee, T&UL only applies to groundwater extraction in the Murrayville Groundwater Management Area. Each licence is subject to conditions set by the Minister and specified on the licence.

Unbundling: The conversion of a prior water right or T&UL (take and use licence) in a declared water system into three separate entitlements being: a water share, a delivery share or extraction share, and a water use licence. The term unbundling refers to the separation of water entitlements from land (30 June 2007).

Water Corporation: Corporations (previously known as Authorities) established under the *Water Act 1989* that have responsibilities to supply water for urban, irrigation, domestic, stock and commercial use in irrigation districts and water districts. Some corporations also have delegated responsibilities for

controlling the diversion of water from waterways, passing flows and the extraction of groundwater.

Water Entitlement: Previously known as a water right (or licensed volume in case of private diverters), now known as high security water share.

Water Share: A Water Share is a legally recognised, secure share of the water available for use in a defined water system. A water share is specified as a maximum volume of seasonal allocation that may be made against that share. Water shares may be high or low-reliability.

Water Use Licence (WUL): A licence that authorises the use of water from a regulated system for the purposes of irrigation on the land specified under that licence. The licence sets out the conditions for use, such as how much water can be used on the specified parcel of land in a single irrigation season. A WUL is needed to irrigate the property and the licence is tied to the land.

Works Licence: A licence that authorises the construction, alteration, operation, removal or decommissioning of: any works on a waterway, or a bore, or a dam belonging to a prescribed class of dams.

1. Introduction

The Victorian Mallee has had a long history of developing and managing approval processes in regards to new irrigation developments culminating in over 35,000 hectares of irrigation expansion since 1994. In many respects the region has been at the forefront of developing effective processes aimed at minimising the negative environmental impacts of changes in land use associated with irrigation developments.

The success of the region in attracting large-scale investment in irrigation, while maintaining River salinity levels, has in part been due to well-articulated and well understood approvals processes. This success has also resulted from a truly integrated and partnership approach adopted by the regional agencies which has resulted in the ability to process applications in a timely and effective manner.

1.1. Purpose

The Victorian Mallee Irrigation Development Guidelines (herein referred to as the Guidelines) have been designed to provide a comprehensive

guide for use by relevant government agencies involved in the process of assessing and approving irrigation development applications. These processes are in place to ensure all irrigation development adopts appropriate standards and prevents the increased water use from causing irreversible damage to the environment such as: water logging, land and water salinisation, groundwater and river pollution (Figure 1).

The primary purpose of the Guidelines is to describe and document the following:

- The approval process for irrigation development applications from an agency perspective;
- Agreed roles and responsibilities for each respective agency;
- Agreed interaction and communication protocols between agencies; and
- Relevant Acts of Parliament and supplementary information, and linkages with other environmental or cultural heritage protection measures and non-Victorian government agencies.



Figure 1. Localised damage to native vegetation caused by rising groundwater (Photo: Mallee CMA).

The Guidelines provide a clear pathway for irrigation development applications to progress through the approvals process. It identifies each government agency required to be consulted and who is responsible for approving each step in an efficient and effective manner.

1.2. Who is this document for?

The Guidelines have been developed for use by government agency officers within the geographic boundary of the Victorian Mallee catchment (Figure 2). Agency staff implement the Guidelines through a partnership arrangement. The agencies include regional Water Corporations, Department of Environment, Land, Water and Planning (DELWP), Department of Economic Development, Jobs, Transport and Resources (DEDJTR), and Parks Victoria.

There are three Water Corporations involved in the implementation of the Guidelines within the Mallee region including:

- Lower Murray Urban and Rural Water Corporation (Murray water system and diversions downstream of Nyah to the South Australian Border);
 - Goulburn-Murray Rural Water Corporation (Murray water system and diversions upstream of Nyah but within the Mallee CMA boundary);
and
- Grampians-Wimmera Mallee Water (Local Management Plan (LMP) for the Murrayville area and for groundwater extractions from the Murrayville limestone aquifer).

These Guidelines have not been written for use by irrigation developers. Development Information Packages have been specifically designed for use by irrigation developers to supplement these Guidelines. The information packages describe the irrigation

development approval process, information requirements, minimum standards and responsibilities from an applicant's perspective. The information packages are available to prospective developers and can be obtained from the Irrigation Development Coordinator (IDC).

¹ Previously Water Supply Protection Agreement and Groundwater Management Plan.

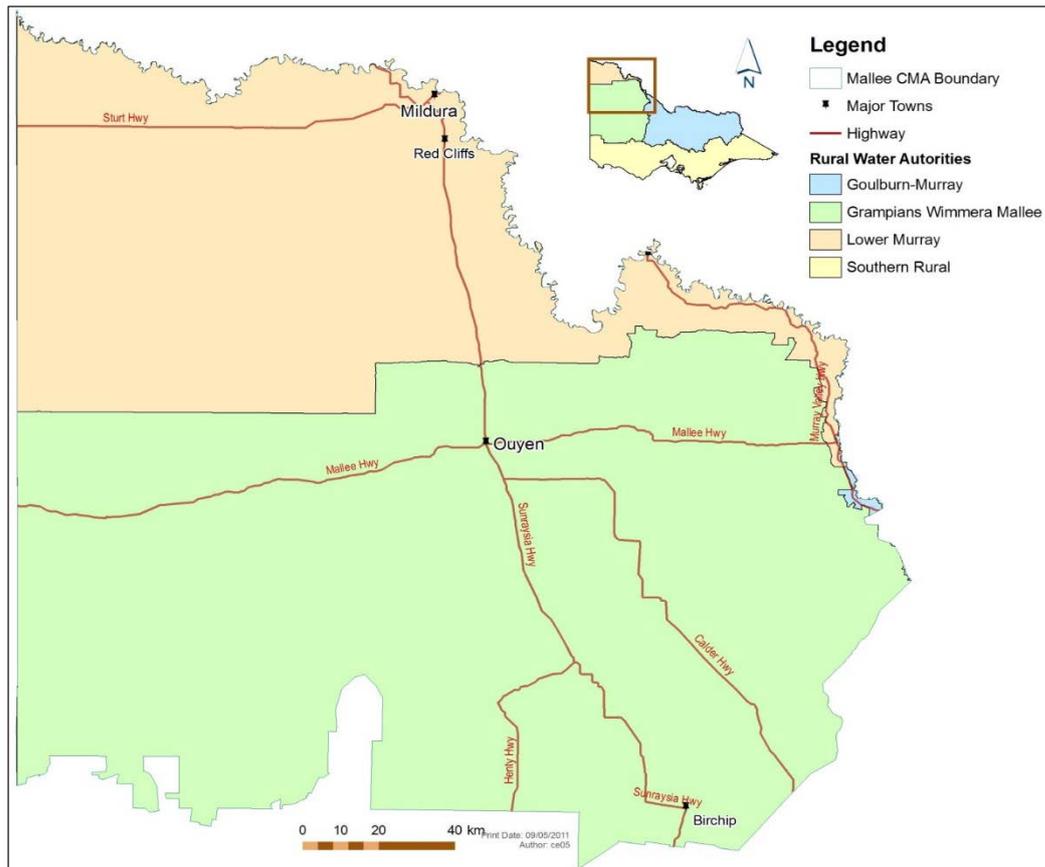


Figure 1. Mallee CMA and Water Corporation boundaries

1.3. Why do we need these Guidelines?

The Guidelines are designed within the context of the Mallee landscape to address environmental issues that are specific to the Mallee region, both above and below the ground surface. Salt is a natural feature of the Victorian Mallee and the mobilisation of salt through the landscape has been exacerbated through human activities such as land clearing and irrigation. River salinity is well recognised as an unavoidable consequence of irrigating in the Mallee as excess irrigation water readily filters through the soil profile, past the root zone, and into the regional groundwater system. Increased groundwater pressure in this regional aquifer forces saline groundwater to discharge into the River Murray which bounds the northern border of the Mallee region (750

kilometres). For over 120 years irrigation in the Mallee has been adding salt to the river in this way.

Since 1994, policies have been in place to manage the potential for irrigation developments to discharge salt into the river by adopting a system of salinity impact zones (SIZ) and trade mechanisms to direct irrigation to areas of least salinity impact. At the same time irrigation development guidelines have been employed to ensure all new developments adopt best practice standards in the design of irrigation systems and reduce the impact of development activities on the environment.

The Guidelines are the principal tool to ensure irrigation development and related infrastructure and construction works meet best practice standards in order to avoid or minimise the on-site and off-site impacts on the environment.

1.4. Risk management framework

Key decisions in the application of the Guidelines are based on a risk management framework using the Ministerial Water Use Objectives

(Appendix 1). This approach ensures appropriate rigour and consistency is applied to each and every step of the process for each and every application.

In approving irrigation development applications, agencies must take into consideration information provided by the applicant and ensure the information is adequate in demonstrating that the development will not increase the risk on the environment by complying with the Ministerial Water Use Objectives (Appendix 1):

- Managing groundwater infiltration;
- Managing disposal of drainage;
- Minimising salinity;
- Protecting biodiversity; and
- Minimising cumulative effects of water use.

Irrigation development applications are required to demonstrate that the required standards and

processes as outlined in this document have been met. The provision of the appropriate information with adequate level of detail will assist in the progression of the irrigation development application in a timely, effective and cooperative manner.

However, it must be noted that compliance with the process does not guarantee approval. At times applications may not be approved as a result of issues brought to light during the course of the process.

1.5. When to use these Guidelines

The Guidelines assist in processing applications for new, or variations to, existing Water Use Licences (WUL), Take and Use Licences (T&UL) or Works Licences (WL).

The application of the Guidelines for converting dryland to irrigation land is clear and triggered by the need to create a new WUL, T&UL or new WL.

However over time there has been an increase in the number of scenarios where a WUL already exists on

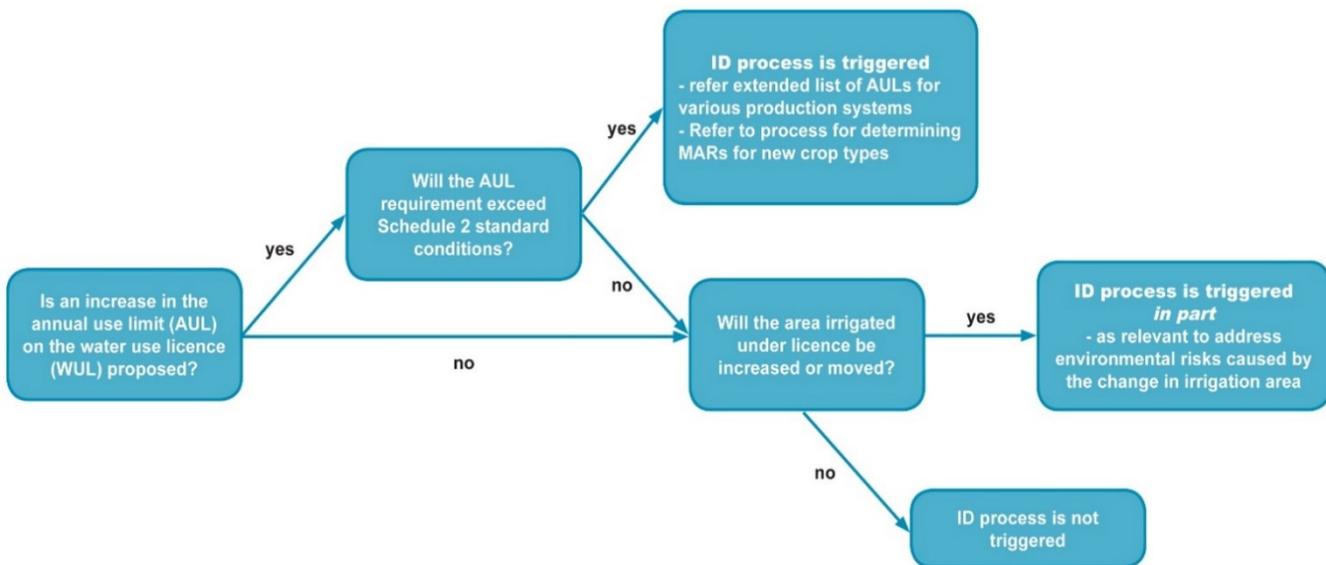


Figure 2. Decision tree to determine when the Irrigation Development Guidelines are triggered for existing WUL or T&UL

a property of an owner who is wanting to re-develop or intensify their water use by: changing the crop type, irrigation system, or expanding their area of irrigation. In these situations the Guidelines are used in part to determine the level of risk posed by the increased water use. The process within the Guidelines helps to provide the required information that demonstrates that there is no new risk to the environment created with the change in irrigation practice (Figure 3).

Figure 3 provides guidance in determining when the Guidelines are triggered for varying an existing WUL or T&UL.

1.5.1. Water Use Licence

The Guidelines are used in processing applications to create a new, or vary an existing, WUL. The Guidelines identify risks to the environment and matters for consideration in formulating appropriate conditions for approval associated with the WUL.

Examples of irrigation development or re-development where the Guidelines may be applied include applications involving:

- Land for which there has never been a licence (DSE, 2010);
- Land that has not been irrigated for 10 years, or the water licence has been previously revoked or cancelled (*Water Act 1989*; Section 64 AL);
- An increase to the existing Annual Use Limit (AUL) above the level specified on an existing WUL (DSE, 2010);
- An increase to the existing Annual Use Limit (AUL) above the Schedule 2 standard water use conditions level for the existing or intended crop; or
- An increase to the area irrigated on the land that is specified on an existing licence and approved for irrigation purposes (Note: outside of an

irrigation district the area of land specified under licence is informed by the Irrigation Drainage Plan (IDP)).

1.5.2. Take and Use Licence

The Guidelines are also used in assessing applications to create a new T&UL for groundwater extraction. In the Mallee most of the groundwater is highly saline and unsuitable for either irrigation or stock and domestic use. There is a localised area near Murrayville, however, where a T&UL may be issued in order to extract groundwater from the underlying limestone aquifer. These licences are managed within the Murrayville Water Supply Protection Areas (WSPA) and apply to GMMW customers.

The development application process follows the same steps as those undertaken for WULs and takes into account all of the same examples of irrigation development as stated above for WULs.

Each T&UL is subject to conditions set by the Minister and is required to be specified on the unbundled licence.

Groundwater extraction within the Murray trench is not permitted as it is interlinked with the Murray water system which is a regulated water system and therefore requires a WUL to be issued, as opposed to at T&UL, by either GMW or LMW.

1.5.3. Works Licence

The Guidelines are used to process Works Licence applications and consider the appropriate standard and, where appropriate, specific conditions required to authorise the take, use, conveyance and storage of water from Victorian waterways. The Guidelines will be initiated for works licence applications if (DSE, 2010):

- New works are required to deliver water to the land specified in a new licence application (or changing conditions); and
- Existing works are being modified to deliver water to land specified in a new licence application.

1.6. When the Guidelines do not apply

The approval process for water use licences will not be initiated:

- When the sale of land requires the issuing of a new WUL on land already being irrigated, provided there is no net increase in the AUL or the area allowed to be irrigated;
- Further land may be developed within a property boundary in an irrigation district provided the AUL specified in the WUL is not exceeded or increased.

Note: The area covered by a WUL on a property in an irrigation district in a declared system (e.g. Red Cliffs Irrigation District) is in most cases the whole property, unless otherwise specified in the WUL.

The requirement to prepare Irrigation and Drainage Plans and the standard conditions for new or varied WULs will not apply in the following circumstances:

- Where a WUL is cancelled because part of the land to which it refers is transferred to a different party – new licences may be issued for each part of the land without the imposition of any extra conditions, provided that each licence has an appropriate share of the previous AUL and the sum of the new AUL is no greater than the previous AUL;

- Where irrigation is to be extended to some new land but will be within the AUL of the existing licence – extensions in land area that are judged by the Minister (or delegate)¹ to be minor may be covered by a licence variation without the imposition of any extra conditions (Appendix 1);
- Where irrigation is to be intensified on some land already covered by a licence and an increase in the AUL on the licence is sought, requirements for an irrigation and drainage plan and the standard conditions for new or varied WULs will apply but with such modifications that are judged by the Minister (or delegate)² to be reasonable in the circumstances, and with consideration given to the Water Use Objectives determined by the Minister (Appendix 1); and
- The property was subject to the Commonwealth Government small block irrigators exit grant (SBIEG offered in 2009) and is returning to irrigation after completion of the five-year water use moratorium. In this scenario, the AUL is reissued to the same quantum as that previously approved on the WUL immediately prior to its cancellation, with reinstatement of the same irrigation system, and will not trigger the Guidelines (refer Appendix 7). Note: The Guidelines would be triggered in instances where any additional AUL above the amount previously specified on the licence cancelled under the SBIEG is sought, or if a new irrigation system is proposed to be installed.

An application for a works licence being renewed, amended or transferred may not necessitate the requirement of preparing a Works Plan if the Water Corporation deems that the works licence does not have significant deficiencies or amendments. The delegate may determine which, if any, of the standard

² Risk assessments against the Water Use Objectives are employed to determine whether the extension of land is judged to be minor.

¹ Risk assessments against the Water Use Objectives are employed to determine whether the modifications are judged to be reasonable.

conditions for works licences should be added to the licence.

The issuing of a water use licence or a works licence cannot be withheld based on the requirements of other Acts of Parliament. However, it is important for proponents to be aware that the proposed developments may not proceed without first obtaining all necessary approvals (DSE, 2010).

1.7. Review of the Guidelines

The Mallee Catchment Management Authority (Mallee CMA) is the custodian of this Guideline document which is reviewed and updated every three years. Changes to the document will reflect any changes in policy that may affect the irrigation development process, roles and responsibilities, or information requirements. Each review is led by the Mallee CMA in consultation with the agencies involved in their implementation, including the three Water Corporations, DEWLP, DEDJTR, Local Government and other Community and Industry Groups. The revised document is endorsed by the Boards of directors for the Water Corporations, DEDJTR and DELWP and the Mallee CMA.

The Guidelines may be amended within this timeframe to improve clarity and accuracy. These are considered to be editorial in nature and therefore do not require broad consultation or Board signoff but will be endorsed by the Irrigation Development Group (ID Group).

Further information about the application of the Guidelines or the irrigation development process can be obtained by contacting the IDC, DEDJTR located at Irymple.

2. Background to the Victorian Mallee Irrigation Development Guidelines

2.1. Nyah to South Australia Border Salinity Management Plan

The Guidelines were first introduced as part of the Nyah to South Australia Border Salinity Management Plan (SMP) in 1993. The plan recognised that expansion in irrigation development was a major threat to the riverine environment and could lead to significant increases in river salinity. It recommended that for new developments, an appropriate level of environmental impact assessment be required in accordance with the magnitude of the development proposed (DSE, 1992). At that time, conditions on the use of water such as those necessary to minimise impacts from salinity were managed through conditions placed on an irrigation licence issued under Sections 57 and 61 of the *Water Act 1989*.

2.2. Unbundling of Murray water systems

On 1 July 2007 Victoria unbundled all irrigation licences on regulated river systems, specifically on the Murray, Goulburn, Loddon and Campaspe systems. These licences were unbundled into the ownership of a water share, works licence and WUL or registration. The unbundling process committed to managing the transition from a bundled to an unbundled water access arrangement with the least possible impact on irrigators. It recognised the need to change wording and administrative arrangements, but in doing so did not change pre-existing standards and conditions.

In 2011 the Mallee CMA revised the Guidelines to ensure consistency with relevance to unbundled water licences and the introduction of:

- WULs (in unbundled systems the WUL was introduced to better manage the impacts of using water on land and to ensure that best practices are adopted for new irrigation developments);
- The Ministerial Determination of Water Use Objectives (Appendix 1);
- Standard Water Use Conditions (Appendix 2);
- Policies for Managing Works Licences (Appendix 3); and
- Policies for the Management of T&ULs (Appendix 4).

In unbundled water systems (e.g. the Murray water system) the conditions on the use of water run with the land and the ownership of water runs with a person; the use of water can only be managed through conditions placed on the WUL and no use conditions can be placed on the ownership of a water share. Conditions on the supply of water to the development are managed through conditions on a works licence, in the case of private diversion, or on capacity constraints in a pumped irrigation district.

2.3. Bundled water systems

The Guidelines recognise that irrigation licences have not yet been unbundled in groundwater systems e.g. Murrayville.

The environmental standards for irrigation developments using groundwater in the Murrayville area will be the same as those described for a WUL. However conditions will be determined by the GMMW and tied to a bundled licence rather than an unbundled licence.

3. Legislative Framework and Mallee Regional Catchment Strategy Context

3.1. Overall framework

There are two main legislative and administrative pathways associated with WULs:

- The Victorian *Water Act 1989*;
- The Regional Catchment Strategy (RCS) developed under the *CaLP Act 1994*.

The WUL is the legislative vehicle that brings the two together. Outlined in this section are the relevant policies related to irrigation development.

However, agency staff and developers also need to be aware that conditions may also be set under:

- Planning and Environment Act 1987;
- Aboriginal Heritage Act 2006;
- Flora and Fauna Guarantee Act 1988;
- Environmental Protection and Biodiversity Conservation Act 1999;
- Wildlife Act 1975; and
- Any other requirements contained in Acts of Parliament and implemented by other authorities or by other states.

It is important that irrigation developers are made aware that there may be additional requirements under these acts when applying for a WUL (refer Section 7). The applicant will need to engage with the relevant authorities outside of the irrigation development process in order to ensure all legislative obligations are met.

Whilst the issuing of a licence cannot be withheld based on the requirements of other Acts of Parliament, a licence to divert water, if issued, does not override or negate the need for the applicant to meet the requirements under other acts of

Parliament. Therefore, it is important for applicants to be aware that the proposed development is unlikely to proceed without first obtaining all necessary approvals.

3.2. Victorian Water Act 1989

The Victorian *Water Act 1989* is the legislation governing the way water entitlements are issued and allocated in Victoria. It defines water entitlements and establishes the mechanisms for managing Victoria's water resources. Table 1 outlines sections of the Victorian *Water Act 1989* relevant to new irrigation development (DSE, 2010).

Table 1. Sections from the Victorian *Water Act 1989* relevant to new irrigation development.

	Section	Description
Water Use Licence	Section 64L	A person requires a WUL under Section 64L to use water on land for irrigation purposes if the water is taken from a declared water system (i.e. an unbundled system such as the Murray water system).
	Section 64M	In dealing with an application, the relevant Water Corporation is required to consider: <ul style="list-style-type: none"> • Impacts the proposed use may have on other persons or the environment (in particular water logging, salinity and nutrient impacts); • Whether or not the proposed use can meet Standard Water Use Conditions that would apply to the licence, if granted; • Any comments received from the CMA, if the application was referred to the CMA and comments received within 30 days of the referral; and • Any other matters the Minister considers relevant to that Corporation.
Take and Use Licence	Section 51	A person requires a licence under Section 51 of the Act to 'take and use' water from a groundwater system, which is not a declared system (i.e. water system that has not been unbundled).
	Section 53 and 56	In considering an application for such a licence, and the conditions to be imposed, the Water Corporation is required to consider matters outlined under Section 53 and 56 of the Act, including: <ul style="list-style-type: none"> • Any adverse effect the exercise of rights under the licence is likely to have on in-stream uses of water, on the aquifer or on the flow of water within the waterway (e.g. water availability, permissible consumptive volume, water quality); • The effects on the implementation of the conservation policy of the government, and the need to protect the environment, including the riverine and riparian environment; • The purpose for which the water is to be used; and • Any other matter that the Minister thinks fit.
Works Licence	Section 67	A works licence is required to construct and operate works on a waterway, groundwater bore and certain private dams. A works licence is generally required to pump water from a waterway or aquifer. A works licence can authorise a person to enter onto and install works on Crown Land; but it does not authorise the applicant to lay pipes on freehold land or to remove vegetation.
	Section 68	Section 68 lists the matters to be taken into account in considering an application for a works licence.

3.2.1. Unbundling and Ministerial Determinations

In 2007 changes to the Victorian *Water Act 1989* included the unbundling of water entitlements, which separated water from land. Water entitlements were split into three component parts:

- A water share;
- A delivery share, which is a share of delivery capacity (extraction from a waterway for private diverters or delivery shares within pumped districts); and
- A WUL (or registration for purposes other than irrigation) to use water on specific land parcels subject to certain conditions.

The setting of Water Use Objectives, WUL conditions and works licence conditions all occur under the Victorian *Water Act 1989*.

The Water Corporations act as delegates of the Minister for Water, and on behalf of the Minister, authorise the use of water through issuing WULs and works licences. In the Mallee there are two Water Corporations that take on this responsibility: Lower Murray Water and Goulburn-Murray Water in the regulated Murray water system.

In granting a WUL or works licence, Water Corporations must assess whether or not the proposed use of water is consistent with the Ministerial Water Use Objectives (Appendix 1) and standard water use conditions, and they must follow the policy for managing works licences.

3.2.2. Water Use Objectives

The Ministerial Determinations set out five Water Use Objectives that WULs must meet (Appendix 1):

- Managing groundwater infiltration;
- Managing disposal of drainage;
- Minimising salinity;
- Protecting biodiversity; and

- Minimising cumulative effects of water use.

3.2.3. Standard Water Use Conditions

The Ministerial Determination for Standard Water Use Conditions (Appendix 2) describes the baseline requirements that address the Water Use Objectives. These requirements need to be met in order for the relevant Water Corporation to grant and issue a WUL as a delegate of the Minister for Water. This determination applies to all WULs granted for use of water from water systems that are declared under Section 6A of the Act, including WULs that are deemed to have been created as a result of declaration of a water system, and WULs granted after a water system has been declared (“new or varied WULs”), as set out in the determination.

There are two types of standard water use conditions depending on whether the WUL existed before unbundling (and therefore is deemed to be created under Schedule 15 of the Victorian *Water Act 1989*) or has been created (new) or varied post-unbundling. Each of these is discussed below. The main focus for the Guidelines is on new or varied licences as detailed in Section 6 of this document.

Licences created under Schedule 15 of the Victorian *Water Act 1989* (pre-unbundling)

WULs that existed at the time the Ministerial Determination for standard water use conditions came into effect, or were created as part of the process of unbundling the water system, are subject to the following standard conditions (Appendix 1):

- Managing groundwater infiltration – Metering;
- Managing groundwater infiltration – Pondered Irrigation;
- Managing groundwater infiltration – Seasonal Adjustment; and
- Managing disposal of drainage water.

New or varied water use licences (post unbundling)

Under the Ministerial Determination irrigation developments or irrigation expansion activities requiring new or varied WULs are required to meet higher performance levels that are closer to best practice.

More stringent standard water-use conditions are therefore applied, including the development of an irrigation drainage plan (IDP) as set out in Schedule 1 of the Ministerial Determination. The key purpose of an IDP is to illustrate how the irrigation system design and proposed drainage water disposal takes into consideration the characteristics of the landscape and soil type, and how it minimises harmful side-effects. By matching crop types to soil suitability, and then designing irrigation systems based around that information, the irrigation development can meet a number of the water use objectives, including minimising recharge to the groundwater.

The standard conditions for a new or varied WUL is described in more detail in Section 4.4.1.

3.2.4. Specific Water Use Conditions

Where a development might require specific conditions to be placed on the WUL, which are not catered for within the standard conditions, the relevant Water Corporation may place “Specific Conditions” on the licence provided that these conditions meet the Minister’s Water Use Objectives (Appendix 1).

Specific or special conditions may be requested by approval agencies to meet individual requirements specific to a location or circumstance peculiar to a development proposal. This would normally occur in response to a specified environmental risk or risks, having been identified in association with the development, which may require a higher level of management or mitigation activity than allowed for within the standard water use conditions.

3.2.5. Policies for Managing Works Licences

The procedures and processes to be applied to an application for renewal, amendment or transfer of a works licence are set out in the Policies for Managing Works Licences (Appendix 3). These Policies apply to all licences under Section 67 of the *Water Act 1989* that are associated with the authorised take, use, conveyance or storage of water in Victoria. These policies were amended in October 2010 with all related previous policies being revoked.

Key requirements set out in Part two of the policies are:

- The scope of works;
- Requirements for issuing of a works licence; and
- Guidance for assessing applications that include construction and installation of dams and bores.

These requirements are detailed in Section 4.

3.2.6. Managing Water Use Licences in Salinity Impact Zones

In 2007 the Victorian Minister for Water set “Policies for Managing Water Use Licences in Salinity Impact Zones” (Appendix 5). The policies largely carry on the salinity management approach adopted in 1994 under the Victorian Government and community driven Nyah to the South Australian (SA) Border Salinity Management Plan (SMP). This approach ensures that the environmental costs in terms of coping with extra salt in the river are absorbed into the costs associated with irrigation development activities.

Three features are important to these policies including: zoning of irrigation areas to identify land with the lowest salinity impact; applying a salinity offset charge commensurate with the impact associated with irrigation within each zone; and enabling trade of AUL where permitted. Within some irrigation districts the ability to trade AUL is

dependent on the capacity of the delivery system to deliver additional water.

Salinity impact zones assist in planning for irrigation development

The Victorian Mallee has been divided into 12 discrete salinity impact zones (SIZ): seven low impact zones (LIZ) and five high impact zones (HIZ) (Table 2). These were determined through an extensive assessment of the geological and hydrogeological characteristics of the region in the early 1990s (Thorne et. al., 1990) and refined in 2001 (SKM, 2001). The salinity impact zones indicate the relative potential for irrigation water to displace naturally saline regional groundwater into the River Murray.

New irrigation development activities are more suitable to occur in the seven Low (salinity) Impact Zones (LIZ): LI1 to LI7, where salinity impacts due to irrigation are lowest. Irrigation activities within the HIZ must make use of existing watering allowances (AUL) as policy mechanisms prevent any increase in the total volume of water applied in the HIZ due to the higher risk of impacting on the salinity of the river from irrigating these areas.

The *Policies for Managing Water Use Licences in Salinity Impact Zones* (2007, Appendix 5) adopted megalitres of AUL as the unit of account for irrigation-induced river salinity in the Victorian Mallee. The AUL governs the maximum number of megalitres of water that can be applied to the land covered by the licence in any year and is included on every WUL as a particular condition. Importantly, those policies also put a cap on the AULs in the HIZ, while also flagging the potential for caps to be applied in other zones (Cummins, 2009). Refer to Appendix 5 and Figure 4 for further information on zoning.

The annual increase in AUL for each of the 12 salinity accounting zones provides the basis for reporting to the State and Commonwealth Government under the BSM2030 strategy which is administered by the

MDBA. The annual reporting is undertaken by the Mallee CMA each year using WUL-AUL information from the Victorian Water Register (VWR).

Salinity Offset Charges

The guiding policy document *Policies for Managing Water Use Licences in Salinity Impact Zones* specifies that charges (upfront capital and ongoing operation and maintenance charges) are to be imposed in granting a new water use licence or in varying an existing water use licence. These charges are collected to fund works and measures that will offset the salinity impact on the River as a result of increased water use for irrigation purposes as measured by increased annual use records. Subject to any cap that might apply, each megalitre of extra AUL in the LIZ attracts a capital charge. This charge may be paid either as a single up-front payment or as ten equal annual instalments. The instalments are adjusted by CPI each year and calculated so as to generate the same present value as the single up-front payment (assuming payments are made at the end of each year and further assuming a discount rate of four per cent). The amounts payable can be found on the Water Corporation website and for 2016/2017 are shown in Table 2. For the HIZ, rules prevent the issuing of new AULs, therefore no charge is set for this zone.

In granting a new WUL, or in varying an existing WUL, salinity offset charges are collected and accrued to contribute towards the cost of works and measures that off-set the rise in salt in the River associated with the increase in irrigation activity.

The Water Corporation as a delegate of the Minister for Water calculates the payment for each megalitre of the AUL issued and from the charges per megalitre for the relevant Salinity Impact Zone as set out in Schedule 3 of the *Policies for Managing WULs in Salinity Impact Zones* (Appendix 5).

Where a payment is outstanding, the delegate follows the payment provisions in the relevant Water Corporation Rural Customer Charter.

Operation and maintenance charges are imposed to contribute towards the cost of operating and

maintaining works and measures to offset salinity impacts. This charge is paid annually. The amount payable can be found on the Water Corporation website and for 2016/2017 are shown in Table 2.

Table 2. Salinity Impact Zones and Salinity Offset Charges³ 2016/17.

Salinity Impact Zones	Section	Salinity Charging Zones	Capital charge per megalitre of AUL	Operation and Maintenance charge per megalitre of AUL
LI 1	0.00	L1	\$35.93	\$4.52
LI 2	0.02			
LI 3	0.05	L2	\$92.17	
LI 4	0.07	L3	\$184.37	
LI 5	0.10			
LI 6	0.15	L4	\$368.77	
LI 7	0.20			
HI 1	0.30	HIZ	N/A*	N/A
HI 2	0.35			
HI 3	0.40			
HI 4	0.45			
HI 5	0.50			

* Rules prevent the issuing of new AULs in the HIZ, therefore no charge is set for this zone.

³ These zones have previously been referred to as Hazard B zones and labelled LIZB1 etc. The nomenclature used here is the same as that used by the Minister in the 2007 "Policies for Managing Water-Use Licences in Salinity Impact Zones" and adopted within the Victorian Water Register. The charge for L2 is 2.5 times the charge for L1; the charge for L3 is 2.0 times the charge for L2; and the charge for L4 is 2.0 times the charge for L3.

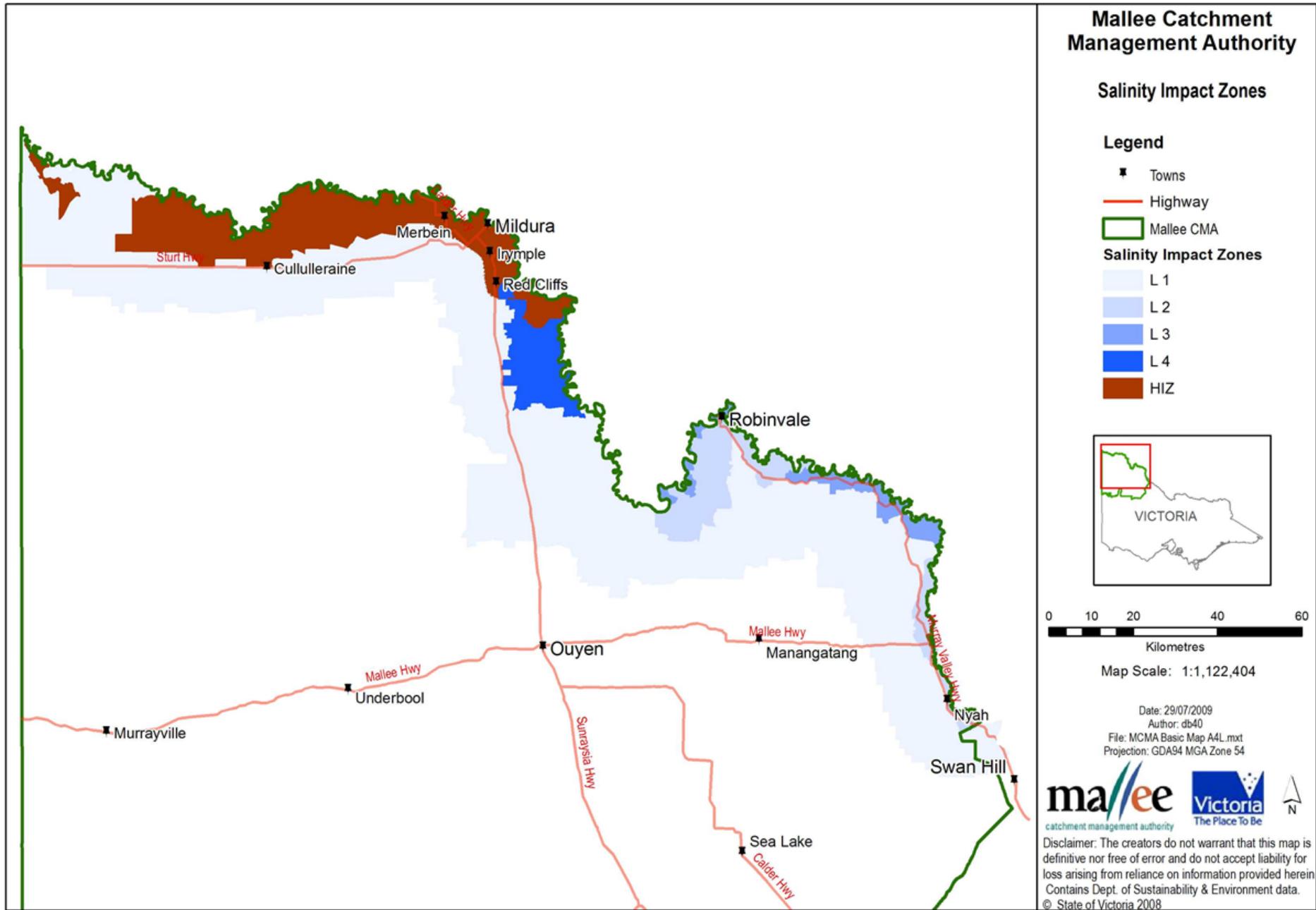


Figure 4: Mallee Salinity Impact Zones.

3.3. Catchment and Land Protection Act (CaLP) 1994

The *CaLP Act 1994* has an objective of establishing a framework for the integrated and coordinated management of catchments which will maintain and enhance long-term land productivity while also conserving the environment. The Act aims to ensure that the quality of the State's land and water resources and their associated plant and animal life are maintained and enhanced.

The *CaLP Act 1994* provides for the development of RCSs by Catchment Management Authorities which, among other things, must assess the nature, causes, extent and severity of land degradation of the catchments in the region and identify areas for priority action.

Local Planning schemes must have due regard for the RCSs. With regard to WULs, the RCSs relate to the conditions placed on the use of water.

3.3.1. Mallee Regional Catchment Strategy (2013-2019)

The RCS is the overarching integrated planning framework for land, water and biodiversity in the Mallee region (Mallee CMA, 2013). The RCS sits as an overall framework for the region's sub-strategies and action plans. It was developed in partnership with key regional stakeholders and provides a six-year plan for strategic action to support and focus the ongoing coordinated effort between land, water and biodiversity management agencies within the region.

The RCS sets an aspirational vision for the management of natural, cultural and productive landscapes; long-term (20-year) objectives for the condition of assets within these landscapes; short-term (6-year) strategic actions required to achieve these objectives; and identifies the regional partners responsible for the delivery.

The RCS does not set specific management activities or on-ground targets; these are found within supporting plans that sit under and align to the RCS, such as the Mallee (Irrigation Region) Land and Water Management Plan (LWMP).

3.3.2. Land and Water Management Plan

The LWMP seeks to protect the region's natural resource assets from the impacts of irrigation to ensure long-term sustainability of the irrigation industry and the community in which it is based. These guidelines align with the LWMP providing the requisite level of technical detail necessary for the approval process and the accounting of impacts.

The LWMP recognises that new irrigation development can have detrimental impacts upon the environment, particularly salinity impacts on the River Murray. The plan continues the approach first adopted under the N2SAB SMP for salinity management.

It conforms to the BSM2030 with the impact of new irrigation developments regarded as the Mallee's, and more broadly Victoria's, biggest accountable action on the Murray Darling Basin Salinity Register A⁵

The LWMP continues the case management approach to provide assistance to developers in navigating the various legislative requirements and assist in the implementation of these guidelines. The Guidelines is one of the companion documents to the Mallee's LWMP (Mallee CMA, 2010) that assist the region in meeting the water use objectives under section 64U of the Water Act Ministerial Determinations.

⁵ The Salinity Registers track all actions that are assessed to have a significant impact on salinity, being a change in average daily salinity at Morgan of at least 0.1 EC within 100 years after the estimation is made.

4. Irrigation Development Assessment Process

4.1. General overview

The agreed process for assessing ID applications in the Mallee region is presented as a flow chart in Figure 5. There are a number of government agencies and numerous steps involved in the process to ensure that all issues are given due consideration. The complexity of the process is offset by clear roles and responsibilities for each agency and an agreed collaborative approach between agencies to ensure each application is assessed consistently and in a cost and time effective manner from both an agency and applicant perspective.

To facilitate the process a dedicated IDC operates as a conduit between the applicant and the government agencies, providing a valuable source of information exchange between the applicant and the agency from the start to the completion of the approvals process.

A risk-based approach is adopted to ensure that an appropriate level of assessment is conducted to meet the risks identified and allows the process to be tailored to the issues associated with individual applications. This means the level of information requested and other requirements are dependent upon the complexity and level of potential risk identified for the proposed development. A proposed development that has identified impacts on the environment such as groundwater rise, native vegetation removal, or large scale land-use changes, for example, may be required to provide more comprehensive information and employ suitably qualified experts. While for redevelopment scenarios the risks may be much lower, and may require a simpler application process. The level of risk is assessed early in the investigation phase to assist

with determining the level and type of information required to inform the process.

The following process broadly describes the interactions between agencies and the applicant and accompanies the flow chart in Figure 5. It does not describe internal business procedures for each agency as this is the responsibility of each respective agency.

- 1. Initial enquiry** – initial contact can be made by a potential applicant via a number of different avenues including Water Corporation, Mallee CMA, Mildura Rural City Council (MRCC), Mildura Development Corporation (MDC), DEDJTR etc. Agencies are encouraged to refer the enquiry directly to the IDC by providing the potential applicant with the IDC contact details or forwarding their details to the IDC by email. The IDC serves as a central contact person into the ID process, ensuring consistency in the information provided and reducing the time demands on individual agencies in fielding enquiries. The IDC can guide the applicant through the process and identify the responsible agency at each step.
- 2.** The IDC will establish contact with the potential applicant to seek further information on the types of works, property location, scale of development, crop type and water requirement etc. The IDC will provide the potential applicant with further information about the general requirements involved in undertaking the ID process, potential risks that need to be considered and resources available to assist in the development of their applications. The IDC provides the potential applicant with an overview of the ID approvals process which includes the irrigation development application (IDA) form.

- 3. Irrigation development application (IDA) –** the IDA form must be completed and signed by the land owner and returned to the IDC for the process to commence. Sometimes the initial enquiry is made by someone representing the land owner rather than the actual land owner. The land owner's consent by way of signature on the IDA form is a requirement for the application to be formally registered. On receipt, the IDC will: generate a project number; create a hard-copy project file; and commence the internal checklist to document and monitor the application progress.

4.2. Investigation phase

The investigation phase marks the start of the ID process. It commences with the formal registration of the development activity and contacting the relevant government agencies.

- 1. Site visit by IDC –** The IDC will coordinate a site visit with the applicant in order to determine/identify any early issues that may have a bearing on the type and level of information required to be presented by the applicant. Prior to undertaking the site visit the IDC will undertake a desktop review of land title information, flood inundation overlays etc. The IDC will coordinate this process and seek additional specialist/expert help if required. When on site the IDC will complete the Irrigation Development Checklist, as a preliminary assessment of environmental and biodiversity related issues associated with the proposed development and pump/pipeline route and may give the applicant an early indication of the likelihood of the development proceeding and/or the level of complexity likely to be encountered.
- 2. Irrigation Development Checklist (see Development Information Packages) –** The ID Checklist takes into consideration the water use objectives and considers land and water environmental management practices to protect and enhance biodiversity values and minimise impacts from water use. This activity incorporates a site inspection of both the proposed development site and any public land identified for infrastructure provision in relation to the development (i.e. proposed river pump site and pipeline route to the development site).
- 3. Preliminary Hydrogeological Assessment -** A preliminary hydrogeological assessment is required to determine whether the area is at risk of developing a perched water table. This preliminary assessment will determine if there is sufficient existing data available to provide the evidence and certainty to categorise the level of risk. It is a quick and inexpensive approach that can easily determine the risk of water table development and whether a more detailed hydrogeological investigation is required. However, if a high risk is identified during the preliminary assessment, or if there is not enough data available to make an assessment, then a more detailed hydrogeological investigation is required (refer Section 6.4.2).
- 4. ID Group review of IDA –** The IDA and preliminary information collected during the site visit, irrigation development checklist and the outcome of the preliminary hydrogeological assessment, will be presented to the ID Group by the IDC either during a regular meeting or one specially convened to discuss the intentions of the application. This provides an early opportunity for the ID Group to identify if there are any pre-existing or known 'show

stoppers' or issues that will need to be addressed or further considered during the assessment phase.

Where development activities have occurred without appropriate approvals or permits, the ID process may require the issue to be rectified /addressed before the application is progressed to the next phase of the process. In some instances these issues may be considered to be a 'show stopper', preventing the IDA from being approved.

5. Consultation with the ID Group and IDC -

The Water Corporation will determine if the ID Guidelines are triggered (refer Section 1.5). While the Guidelines clearly apply to greenfield development where dryland is converted to irrigation, redevelopment scenarios, where there is an existing WUL on a property, may only trigger the Guidelines when the redevelopment poses a new or increased risk to the environment compared to the previous irrigation activity. For redevelopment scenarios the level of detail required of the application will depend on the level of environmental risk posed by the redevelopment or changed irrigation practices (refer Appendix 6). At this time, the Water Corporation will endeavour to seek advice from DELWP who provides specialist assistance, advice and guidance on water availability and system-scale constraints. If delivery constraints are identified, the IDA will be put 'ON HOLD' until further advice from DELWP and the Water Corporation is provided to the IDC.

6. Preliminary information requirements - The IDC uses the feedback provided by the ID Group meeting and incorporates this in a 'letter of advice' to the applicant. The letter provides an early indication of the type and level of assessment that will need to be undertaken

during Phase 2 of the Assessment. The letter provides the applicant with the opportunity to assess the level of effort and expense associated with proceeding with the irrigation development application before any expense has been incurred. This is an appropriate time to remind the applicant of "due process" and that any undertaking of development activities outside of this process is not advised and is done at their own risk/expense, including any rework required to align with the required conditions.

It is important to note that additional information may be identified as the process progresses and as a result of more detailed assessments. The full extent of the information required by the application may not always be evident at the outset of the process.

7. Development Information Package is provided to the applicant as relevant to the development. Often large-scale greenfield (dryland) developments require approvals for both water use activities as well as pump and pipeline activities. Detailed plans are required to be developed and approved in order for the relevant licences to be granted.

4.2.1. What comes first - the works licence or the WUL?

The sequencing of these approvals is important and described below.

Water delivery activities: Water Infrastructure (works licence)

Before any pump and pipeline works can commence a number of approvals must be obtained; including, in order:

1. Land owners' approval to occupy the land which is likely to include public land manager (PLM) consent for works on Crown Land along waterways as well as private land owners for any proposed pipeline routes.
2. Planning permit from Local Council to use the land both for construction purposes as well as ongoing operation and maintenance.
3. A works licence from the Water Corporation to construct and use the water infrastructure.

Types of works requiring the above approvals include:

- The construction of new infrastructure;
- The alteration of existing infrastructure including upgrades and modifications where there is a change and/or increase in the construction footprint previously approved; and
- Decommissioning of old infrastructure.

A works licence is a pre-requisite for the approval of a WUL. Because of this, it is advised that assessments and approvals associated with the construction of water infrastructure and works licences are undertaken first as this may determine if the development is able to proceed.

No works are allowed to commence prior to PLM consent, planning permission or works licences have been obtained. This also applies to the storage of construction materials in the construction area.

Water use activities: Irrigation Drainage Plan (WUL)

Before water is able to be delivered to the property a WUL associated with the land parcel must be approved by the Water Corporation. This will not be granted without a works licence for the associated irrigation infrastructure. Applicants are therefore strongly encouraged to commence the necessary approvals processes associated with water delivery and infrastructure to ensure works like pump and/or pipeline installations can be completed before commencing any water use activities on the property.

Any works undertaken before the WUL is approved is not recommended and is at the risk of the applicant/ landowner.

4.3. Assessment phase

The 'letter of advice' provided by the IDC to the applicant outlines the type of information that is required to be collected and presented for consideration in the approvals process. Throughout the process the onus is on the applicant to engage suitably qualified experts to undertake the necessary assessments and collect the information needed to determine if there are potential environmental risks associated with the development.

It is equally important to provide the evidence required to demonstrate that the development will not pose any environmental risks both on-site and off-site. This information is compiled into plans that describe the means by which all impacts will be mitigated and demonstrate compliance with the Guidelines and Ministerial Determinations. This will include technical reports from various fields of expertise, depending on the scope of works proposed e.g. geophysical surveys, monitoring equipment, engineering reports etc. Refer to Section 6 for the information and technical assessments required.

4.3.1. Water delivery infrastructure assessments

Early consultation with the DELWP Land Planning and Approvals Officer will assist in determining the type of assessments required to gain PLM consent. The type of water delivery assessments, water infrastructure installation and operation will be determined by the scope of works and how they will impact on the environment and the usability of the surrounds. In order to determine the level of environmental risk, a Siting and Design (Refer to Development Information Package), or Site Environmental Management Plan (Refer to Mallee CMA website) must be submitted to DELWP.

Once DELWP is satisfied that all risks have been adequately addressed in the information provided by the applicant, PLM consent to occupy the land is issued and the applicant has three weeks to apply for a Planning Permit from local council to use the land for construction purposes.

On receipt of a Planning Permit the applicant may then apply for a works licence from the Water Corporation. This will include the development of a works plan to demonstrate how the risks associated with construction and ongoing operation of the infrastructure will be mitigated (see Section 6).

Many technical assessments required for PLM consent will also inform the works plan. It is important for the applicant to fully understand the information requirements from the outset to prepare for and/or reduce the costs associated with undertaking these assessments.

4.3.2. Water use assessments

The information requirements may include:

- Soil survey;
- Irrigation design;
- Surface and sub-surface drainage design;
- Hydrogeological investigation; and

- Planning approvals.

The soil survey is independently reviewed by the DEDJTR Soils Advisor. This includes an onsite inspection of soil pits and review of the completed soil survey maps.

As part of the assessment process the soils advisor together with the soil surveyor, irrigation designer and hydrogeologist will review the following: soil survey information, irrigation and drainage designs, and hydrogeological assessment. This review will assist in identifying areas at risk of developing: perched water tables, lateral movement of irrigation drainage, and surface pooling that may affect crop productivity and/or the health of native vegetation. This group will recommend: changes to irrigation and drainage designs to align with best practice, where to locate shallow groundwater table monitoring bores, where required and nominate a monitoring frequency for early detection of rising ground water tables.

Additional recommendations may be made about soil amelioration or intersecting surface drainage to protect environmental values including stands of native vegetation. The water use assessments will be used to inform the development of an irrigation and drainage plan (IDP) providing the evidence to demonstrate how the risks associated with the farm activities will be minimised (see Section 6).

4.3.3. Other statutory approvals and licences or permits

The applicant needs to be aware that other assessments and approvals or permits/ licences may be required for various aspects of the irrigation development activity. Examples of these may include but are not limited to: NSW Government regulations which often requires sign-off from Maritime Services and Fisheries, Planning Permits for native vegetation removal (including lopping) managed by local councils, Cultural Heritage approvals etc.

It is not easy to generalise about when planning permits are or are not required. This will differ between municipalities and will depend on the land in question and the activity proposed. Each Zone, Overlay and Particular Provision will require different information to be submitted with a planning application.

Prospective developers having identified a parcel of land should in the first instance contact the local planning department or ask the IDC about specific requirements.

It is the applicant's responsibility to ensure all other approval requirements are addressed (refer Section 7). These approvals are required to be included in the package of information presented to the ID Group and will be considered during the process of endorsement by the ID Group.

4.3.4. ID Group endorsement

Once the assessment phase has been completed, the water delivery and water use technical assessments and related information are compiled into a Works Plan (WP) and/or an Irrigation Drainage Plan (IDP). These 'Plans' are submitted by the applicant to the IDC and then circulated to the ID Group for review. Endorsement by the ID Group is required before a licence can be issued by the Water Corporation.

The process for reviewing these Plans is outlined below:

1. The WP and/or IDP is submitted by the applicant to the IDC and then circulated to the ID Group for review.
2. The ID Group will review the information presented in the WP and/or IDP to determine if there is adequate information that clearly describes the risks at the site, as well as the impacts on other water users. The assessments should also demonstrate that the

planned development and future operations have been suitably designed to address any risks and adequately protect and preserve the environment.

This includes other approvals and assessments that may be required from other government agencies e.g. Cultural Heritage Approval; NSW Government and NSW Maritime; Local Planning etc. or other permits/approvals as required e.g. power, hydrogeological plans etc. (refer Section 6).

3. If the level of information is not sufficient or further information is requested by the ID Group, the IDC will write to the applicant listing any missing or additional information requirements.
4. When the additional information has been provided by the applicant, and the ID Group is satisfied that the information provided meets the requirements of this Guidelines, the application can proceed to the licensing and issuing phase.
5. If the risks identified by the assessments are deemed too great and therefore are not supported by the ID Group, the IDC will write to the applicant detailing why the application has not been endorsed.

4.4. License issuing phase

The Water Corporations in consultation with the ID Group determine the specific conditions that are appropriate for each works or water use licence based on the information provided by the applicant and as a result of the investigation and assessment phase. The Specific Conditions set out the particular parameters within which the applicant must operate when irrigating under the Works Licence and /or WUL.

At times the ID Group may seek expert advice external to the ID Group in order to formulate suitable recommendations for licence conditions.

4.4.1. Standard and Specific Conditions for Works Licences and WUL

Works Licence Conditions

Works licences to construct, operate, alter, decommission or remove works associated with the extraction of water (i.e. bores, pumps and dams) are subject to conditions set by the Minister and are specified on the licence (Refer to Appendix 3 – Policies for Managing Works Licences). These conditions must be consistent with and refer to the contents of the works plan, management plan, dam safety surveillance plan, dam safety emergency management plan or other relevant (and referenced) document.

The conditions on a works licence will address:

- The scope of works covered under the licence;
- The responsible entity for the licence;
- The terms and conditions of the licence;
- Considerations for licence renewals and amendments;
- Specification around extraction limits;
- Water meter installation and use; and
- Site specific information (such as management plans).

Water Use Licence Conditions

Standard and Specific Conditions for the WUL may be applied to a WUL to meet the Ministerial Water Use Objectives that are consistent with, and in reference to, the contents of the IDP.

The Standard Conditions on a WUL will address:

- Managing groundwater infiltration – required metering of water delivery to the specified area of land under licence.
- Managing disposal of drainage - surface and subsurface drainage strategy within the property boundary;
- Minimising salinity - irrigation design and irrigation water salinity concentration that meets the soil characteristics; salinity offset charges required to mitigate the River impacts caused by irrigating the specified area of land; and
- Protecting biodiversity – installing, maintaining and monitoring groundwater bores including reporting requirements to observe any impact of the irrigation activity on native vegetation, the habitat of native animals or wetlands as well as corrective actions where there is a breach.

Particular or special conditions include:

- The annual water use limit for any season; and
- Requirements that govern the use of ponded irrigation.

For more information, refer to Appendix 2 – Standard Water Use Conditions

4.4.2. ID group endorsement

On endorsement of the Plans by the ID Group the IDC sends a letter to the applicant (copy to Water Corporation) with notification that the application has been endorsed, subject to the licence conditions that will be provided by the Water Corporation. In the same letter the applicant is requested to formally

lodge the application with the Water Corporation: Form 29 'Issue of a Works Licence'; Form 31 'Variation to Existing Licence'; Form 23 'Water Use Licence'; or Form 24 'Variation to existing WUL together with the FINAL WP or IDP.

4.4.3. Licence application forms

When the WP and/or IDP are complete, the proponent is required to formally lodge an application form with the Water Corporation: Form 29 'Issue of a Works Licence'; Form 31 'Variation to Existing Licence'; or Form 23 'Water Use Licence' together with the final WP or IDP as required.

This information is used by the Water Corporation to officially register and approve all water use licence and works licence information, including conditions, in the Victorian Water Register (VWR).

The Water Corporation notifies the IDC via email when the application has been approved, as recorded in the VWR. The IDC completes the checklist for the IDA and closes the project file.

4.5. Application response times

The IDC and all agencies involved in assessing applications will work together in order to ensure applications are reviewed and assessed in a timely manner. To aid the efficiency and effectiveness of the application process all agencies will apply a 28-day response time from the time they receive an application, to review, provide comment and request additional information. If further information is required the process will not proceed until the information is provided.

The IDC will also ensure that applicants are regularly updated on the progress of their application during its review.

4.6. Costs associated with the processing of applications

There are fees and charges associated with the processing of forms by the Water Corporations.

Other authorities may have fees and charges associated with assessing an irrigation development application e.g. Local Planning permit etc. These fees and charges are available from the relevant agency and are to be paid by the applicant.

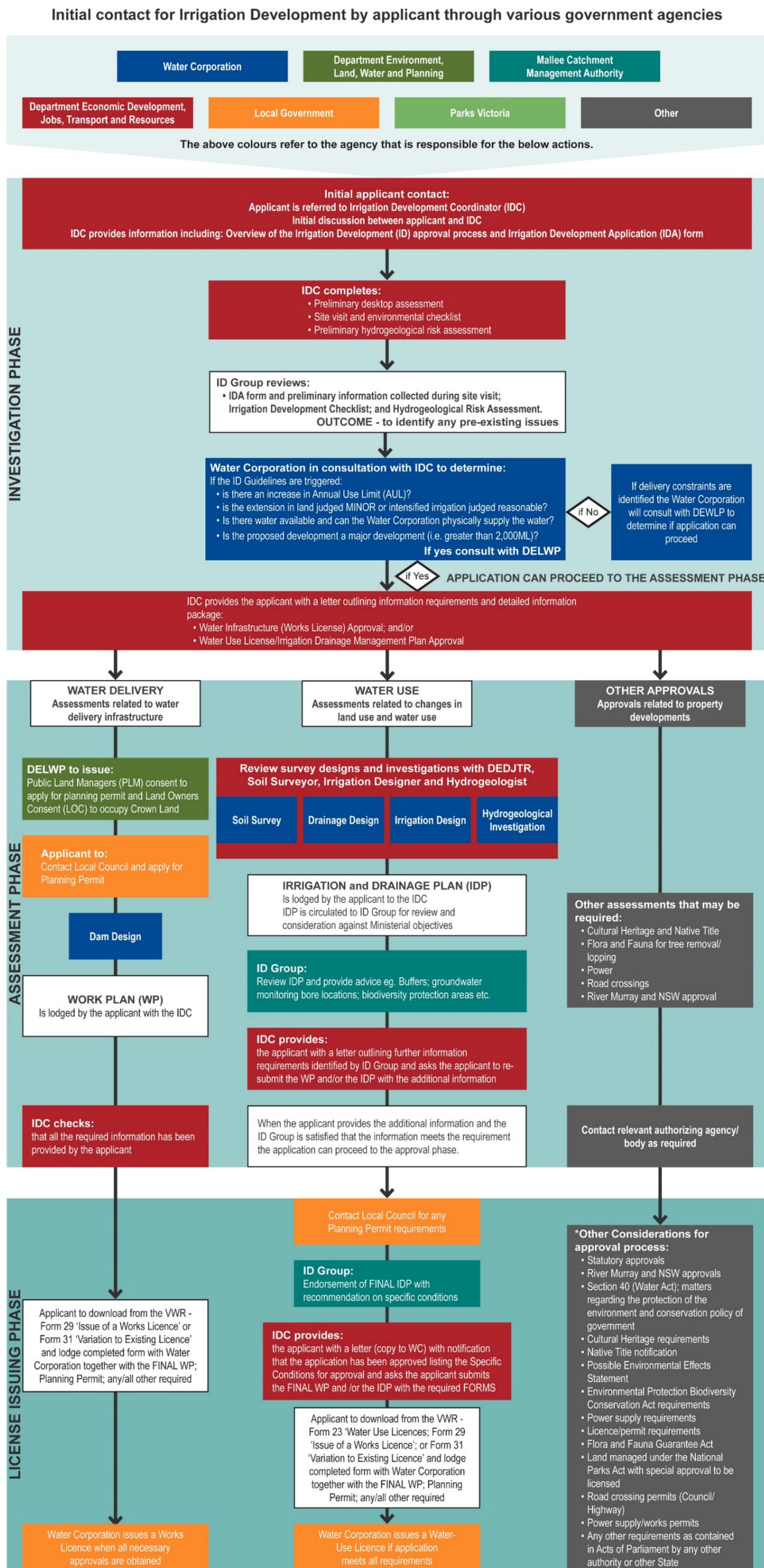
Fee schedules can be obtained by contacting the relevant agencies.

4.7. Appeals process

There is a three-step appeals process in place for applicants that are not satisfied with how the guidelines have been implemented in relation to their irrigation development application. These steps include:

- Step 1: if an applicant is dissatisfied with the outcome of the application, or the process, standards, or timelines applied in this process, the applicant will first request an appointment to meet and discuss their grievance with the IDC and the relevant organisation.
- Step 2: if Step 1 does not resolve the issue, the applicant can then write to the CEO of the Mallee CMA to formally register their grievance and seek an alternative course of action.
- Step 3: if neither Step 1 nor Step 2 have been successful in settling the dispute, an appeal may be directed to the Victorian Civil and Administrative Tribunal (VCAT). VCAT deals with disputes between people and government (State/Local) bodies about planning and land valuation, licences to carry on a business and many other Government decisions.

Figure 3. Mallee Irrigation Development Assessment Process.



WATER DELIVERY
Assessments related to water delivery infrastructure

DELWP to issue:
Public Land Managers (PLM) consent to apply for planning permit and Land Owners Consent (LOC) to occupy Crown Land

Applicant to:
Contact Local Council and apply for Planning Permit

Dam Design

WORK PLAN (WP)
Is lodged by the applicant with the IDC

IDC checks:
that all the required information has been provided by the applicant

WATER USE
Assessments related to changes in land use and water use

Review survey designs and investigations with DEDJTR, Soil Surveyor, Irrigation Designer and Hydrogeologist

Soil Survey

Drainage Design

Irrigation Design

Hydrogeological Investigation

IRRIGATION and DRAINAGE PLAN (IDP)
Is lodged by the applicant to the IDC
IDP is circulated to ID Group for review and consideration against Ministerial objectives

ID Group:
Review IDP and provide advice eg. Buffers; groundwater monitoring bore locations; biodiversity protection areas etc.

IDC provides:
the applicant with a letter outlining further information requirements identified by ID Group and asks the applicant to re-submit the WP and/or the IDP with the additional information

When the applicant provides the additional information and the ID Group is satisfied that the information meets the requirement the application can proceed to the approval phase.

OTHER APPROVALS
Approvals related to property developments

Other assessments that may be required:

- Cultural Heritage and Native Title
- Flora and Fauna for tree removal/lopping
- Power
- Road crossings
- River Murray and NSW approval

Contact relevant authorizing agency/body as required

LICENSE ISSUING PHASE

Applicant to download from the VWR - Form 29 'Issue of a Works Licence' or Form 31 'Variation to Existing Licence' and lodge completed form with Water Corporation together with the FINAL WP; Planning Permit; any/all other required

Water Corporation issues a Works Licence when all necessary approvals are obtained

Contact Local Council for any Planning Permit requirements

ID Group:
Endorsement of FINAL IDP with recommendation on specific conditions

IDC provides:
the applicant with a letter (copy to WC) with notification that the application has been approved listing the Specific Conditions for approval and asks the applicant submits the FINAL WP and /or the IDP with the required FORMS

Applicant to download from the VWR - Form 23 'Water Use Licences; Form 29 'Issue of a Works Licence'; or Form 31 'Variation to Existing Licence' and lodge completed form with Water Corporation together with the FINAL WP; Planning Permit; any/all other required

Water Corporation issues a Water-Use Licence if application meets all requirements

***Other Considerations for approval process:**

- Statutory approvals
- River Murray and NSW approvals
- Section 40 (Water Act); matters regarding the protection of the environment and conservation policy of government
- Cultural Heritage requirements
- Native Title notification
- Possible Environmental Effects Statement
- Environmental Protection Biodiversity Conservation Act requirements
- Power supply requirements
- Licence/permit requirements
- Flora and Fauna Guarantee Act
- Land managed under the National Parks Act with special approval to be licensed
- Road crossing permits (Council/Highway)
- Power supply/works permits
- Any other requirements as contained in Acts of Parliament by any other authority or other State

5. Roles and Responsibilities

5.1. The Applicant

The onus is on the applicant to provide the evidence that demonstrates: the impacts of the proposed development on the environment, the means by which any impacts are to be mitigated, and compliance with the Guidelines. The applicant:

- Is defined in these Guidelines as the owner of the land on which the proposed development is to occur and to whom the licence is granted, or a person/s who has been authorised by the landowner to undertake the development on the owner's behalf;
- Completes and forwards all necessary documentation in relation to the proposed development as outlined in the Development Information Package; and
- Ensures that the legal responsibilities under all relevant acts of Parliament and legislation such as the Aboriginal Heritage Act 2006, Planning and Environment Act 1987, Environment Protection and Biodiversity Conservation Act 1999, Flora and Fauna Guarantee Act 1988 and Wildlife Act 1975 are complied with.

There are various fees and charges associated with the processing of forms by the Water Corporations and other government agencies. These fees and charges are available from the relevant organisations and are to be paid by the applicant.

5.2. Irrigation Development Group

Inter-agency co-operation is an integral part and requirement of the irrigation development application review process. Mallee Irrigation Development (ID) Group provides a forum to collaborate, evaluate and work through complex irrigation development proposals.

The ID Group:

- Provides guidance and advice to the Mallee IDC in regards to irrigation development matters;
- Provides agency support and advice on the aspects of the Mallee irrigation development approval process to ensure regional compliance with the Victorian *Water Act 1989*;
- Assists irrigation developers and participating agencies to adhere to the Victorian Mallee irrigation development approval process as documented in these guidelines;
- Ensures irrigation development applications are processed in a timely manner and cost-effectively;
- Endorses WPs and IDPs as part of the approvals process;
- Provides advice to Water Corporations in formulating conditions on WUL, works licences and T&UL;
- Ensures the statutory requirements for each agency within the ID Group are fully considered and addressed, and provides advice and guidance to the Mallee CMA on any reviews of these guidelines with the aim of keeping the document up to date with current legislative requirements and government policies and strategies.

The ID Group is made up of a number of key government agencies for which there is a core working group comprised of:

- IDC (DEDJTR);
- Water Corporations (LMW, GMW, GMMW);
- Regional Planning (DELWP);
- Soils Advisor (DEDJTR); and
- Land and Water Management Plan co-ordination (Mallee CMA).

At times the ID Group may need to consult further with the following government agencies:

- Parks Victoria;
- DELWP Water Group;
- Aboriginal Victoria
- DELWP Biodiversity; and
- DELWP Public Land Administration.

These agencies may attend meetings less frequently or on an as needed basis.

The ID Group is coordinated by the IDC and meets at least monthly, or as required to address issues that arise.

5.3. Irrigation Development Coordinator (IDC)

The IDC plays a crucial role in the implementation of the guidelines. This includes:

- Providing private land owners and referral authorities with a preliminary assessment of potential environmental issues and offsite impacts of water use and irrigation of the proposed development through the irrigation development process;
- Collecting and recording data associated with irrigation developments in accordance with agreed standards as documented in the IDG Terms of Reference;

- Providing a single point of contact for all Mallee irrigation development related matters for applicants and partner agencies;
- Providing advice to partner organisations on whether the guidelines are being adhered to by applicants and partner agencies;
- Ensuring applicants are guided through the irrigation development approvals process as per the Guidelines in a timely manner;
- Convening and chairing the inter-agency ID Group meetings in order to ensure that all matters relevant to new irrigation development are being efficiently and effectively addressed;
- Documenting discussion for each ID group meeting as minute taker; and
- Tracking and reporting IDA progress to the ID Group and applicant by maintaining the ID Checklist (See Development Information Packages).

5.4. Water Corporations

The Water Corporations are the Minister's delegates responsible for the issue of WULs, works licences and T&ULs in accordance with the Victorian *Water Act 1989* and associated Ministerial Determinations. A Water Corporation may not approve the issue of a works licence, WUL and or the T&UL to new developments unless the statutory requirements of the Water Corporations, and other stakeholder organisations, have been documented, evaluated and approved. Agencies and authorities with statutory responsibility have agreed to work with the water corporations in applying these Guidelines.

In issuing relevant licences, the Water Corporations:

- Are satisfied with the standard of the IDP and/or WP accompanying the application;
- Assess applications against, and enforce compliance with, the standard water use

conditions as outlined in the Ministerial Determinations; the Water Corporations consider in granting a WUL whether or not the proposed use of water is consistent with the Water Use Objectives (Appendix 1);

- Follow the requirements outlined under the 'Policies for Managing Take and Use Licences' (Appendix 4) and the 'Policies for Managing WULs in Salinity Impact Zones' (Appendix 5) when issuing a T&UL, and a WUL;
- Consult with DELWP in determining if extraction share is available to service the proposed development;
- Notify the applicant of the requirement to pay salinity offset charges in line with the Minister's policies for managing water use licences in the Mallee; and
- Formulate suitable conditions for the works licence or WUL after consultation with the required agencies: Mallee CMA, DELWP, DEDJTR Soils Advisor, Parks Victoria and other agencies as required. Suitable conditions will be discussed and specified by the ID Group meeting. The standard conditions will be included as conditions on all licences. Specific conditions should be identified during the application process and included on the licence following ID Group consideration.

5.5. Department of Environment, Land, Water and Planning (DELWP) – Land Planning and Approvals

DELWP – Regional Planning is a referral authority for advising Local Government on biodiversity and Crown Land issues through the planning permit application process.

They also manage licensing and authorise the use of or activities on Crown Land and are responsible for issuing public land manager's consent to allow

applicants to apply for a planning permit. The DELWP regional planning referral authority can:

- Endorse works licences on Public Land as Land Owner; and
- Provide advice on any relevant biodiversity protection arrangements.

5.6. Department of Economic Development, Jobs, Transport and Resources (DEDJTR)

The DEDJTR Soils Advisor provides advice to the Water Corporations on the technical aspect of IDPs, including:

- Reviews independent soil survey results from applicants. This includes an onsite inspection of soil pits and review of the completed soil survey maps. As part of the assessment process the DEDJTR Soils Advisor may make environmental-based recommendations mainly concerning drainage issues and the placement of shallow groundwater monitoring sites to detect any potential lateral movement of irrigation drainage from the site and/or detection of perched water tables that may threaten remnant native vegetation;
- Provides, where relevant, information on irrigation best management practices and soil amelioration strategies.

5.7. Mallee Catchment Management Authority (CMA)

- Is the lead agency for ensuring the Guidelines are up to date with current legislation and are consistent with the RCS and the LWMP as well as any other government policy directive;
- Provides advice to the Mallee CMA Board, DELWP and MDBA on the annual salinity debits incurred from irrigation development activities;
- Enacts appropriate approvals processes to ensure adequate salinity credits are available to support existing irrigation areas and to support sustainable irrigation expansion; and
- Is a referral authority for advising agencies, Local Government and individuals on rivers, wetlands and floodplain issues and matters, particularly as part of the planning permit approval process undertaken by statutory authorities.

5.8. Department of Environment, Land, Water and Planning (DELWP) – Water and Catchments Group

- Provides high level policy advice to the Mallee CMA and other agencies on the preparation and endorsement of the Guidelines through the Irrigation Development Guidelines Advisory Note;
- Provides an oversight role and funding to support implementation of the guidelines to support DEDJTR in the undertaking of the IDC role;
- Provides specialist assistance, advice and guidance on water availability and system-scale constraints;
- Is a signatory to the authorisation of a works licence; and

- Provides advice and interpretation of Ministerial policies and administrative requirements.

5.9. Local Government

- Assesses planning permit applications relating to land development, drainage, flooding, native vegetation, waterways, cultural heritage and earthworks, and issues planning permits, where relevant;
- Enforces compliance of planning permit conditions; and
- Is responsible for the application of the Victorian Planning Provisions locally.

5.10. Parks Victoria

- Is a land manager of Crown Land administered under the *National Parks Act 1975* and the *Crown Land Reserves Act 1978*;
- Provides land managers advice to DELWP in its role as a referral authority in dealing with Planning Permit applications, Public Land Manager's Consent and Planning Scheme Amendments in accordance with the *Planning and Environmental Act 1987*; and
- Is responsible for the issue of Section 27 consent, under the *National Parks Act 1975*.

5.11. Aboriginal Affairs Victoria (AAV)

- Provides advice to the ID group on cultural heritage matters.

6. Information requirements and technical assessments

6.1. Irrigation Development Checklist

An Irrigation Development Checklist is undertaken to identify the potential issues associated with the proposed development and may give the applicant an early indication of the likelihood of the development proceeding and/or the level of complexity likely to be encountered (refer Development Information Packages).

The Irrigation Development Checklist takes into consideration the Water Use Objectives and considers land and environmental management practices to protect and enhance biodiversity values and minimise impacts from water use.

This activity incorporates a site inspection of both the proposed development site and any public land identified for infrastructure provision in relation to the development (i.e. proposed river pump site and pipeline route to the development site).

The completed Irrigation Development Checklist report will provide advice on the requirements for a detailed environmental assessment report, soil survey, drainage design, the irrigation design, hydrogeological assessment and dam design. It will also provide advice on buffer distance between the crop and native vegetation and any other specific conditions (e.g. monitoring).

6.2. Public Land Manager Consent

Privately owned river pumps and associated infrastructure are commonly located within the public conservation and resource zone and Public Park and Recreation Zone along the length of the Murray River. In order to construct, alter, operate, remove or decommission any works from Victorian water

systems, consent from the public land manager is required first and before an application is made for a planning permit or a works licence.

For further details on the information requirements refer to the Standards for Site Environmental Management Plans (Refer to Mallee CMA website: <http://www.malleecma.vic.gov.au/>) and Siting and Design Guidelines (Refer to Development Information Package).

6.3. Works Plan to inform the Works Licence

The purpose of a Works Plan is to protect the aesthetic, archaeological, cultural and conservation values of the riverine and riparian environment and public land areas.

Pumps, pump houses, pipelines, access tracks and associated water diversion works must meet the standards necessary to minimise their impacts on other persons and the environment. This must involve an assessment of local conditions and the appropriate siting, construction, operation and maintenance of water diversion works.

The works licence for private diverters also employs strategies to minimise impacts on other water users by placing limitations on an extraction share and extraction rates during periods of rationing or other restriction, required to be specified as part of the works plan.

Key components of a Siting, Construction, Operation and Maintenance (Works) Plan

A Works Plan (WP) must clearly describe the type and location of irrigation infrastructure required to be constructed to extract water from the River and the intended pathway to deliver it to the farm. A WP should include:

- Siting map of proposed works;
- Construction plan;
- Hazardous dam construction or alteration plan;
- Environmental Assessment Report (constructing or altering a waterway dam);
- Decommissioning Plan; and
- Operation Plan.

Consideration must be given to what mechanisms will be undertaken to meet the standards necessary and to minimise the impacts on other persons and the environment during construction as well as ongoing operation of the water delivery infrastructure into the future. For further details on the information requirements refer to Appendix 3.

- Guidance note on dam safety decision principles (DSE, 2012);
- The Strategic Framework for Dam Safety Regulation (DSE, April 2014); and
- Dam Safety Fact Sheet - Dams in Victoria (DEPI, 2014).

6.4. Irrigation Drainage Plan that informs the WUL

Under the Ministerial Determination (2007) Schedule 1 of the Standard Water Use Conditions (Appendix 2) an application for a new or varied WUL must be accompanied by an IDP for the area of land being developed or expanded. The IDP must provide the information necessary to demonstrate how the development meets the necessary standards to minimise the impacts of water use on other persons

and the environment (in particular water logging, salinity and nutrient impacts). The IDP must involve an assessment of local conditions and appropriate design of irrigation systems. The key purpose of an irrigation and drainage plan is to match the way land is irrigated and drainage disposed of, with the characteristics of the land and soil, in order to efficiently meet the objective of minimising harmful side-effects of irrigation.

The IDP must include:

- A map of the proposed development clearly identifying the irrigation footprint;
- Topographical survey;
- Soil survey report and maps;
- Irrigation design and management;
- Arrangements for drainage disposal; and
- Biodiversity protection arrangements.

For the new or varied water use licence to be granted, the irrigation and drainage plan must be endorsed by the relevant Water Corporations and a reference to the plan recorded as part of the water use licence.

6.4.1. Assessments that inform the IDP

A. Soil survey assessment

A soil survey is undertaken to provide information to assist the irrigation designer in proposing an irrigation system capable of applying accurate irrigation depth to maximise productivity whilst minimising the risk of off-site impacts.

Information required for the area proposed to be irrigated is provided by a suitably qualified soil surveyor on an overlay of a map of the property and soil data sheets, and includes physical and chemical soil characteristics.

Spacing for the soil sampling is undertaken on a 75 by 75 metre grid however broader spacing may apply

for less intensive agriculture after a risk assessment demonstrating that this is justified.

The soil survey information is provided in a written report that includes:

- Clear property identification/identifiers (Crown Allotment etc.);
- Description of topography, hydrogeology and previous land use;
- Key aspects of climate;
- Soil profile descriptions;
- Factors affecting potential root-zone depth;
- Soil/water interactions e.g. drainage, permeability, infiltration;
- Readily available water;
- At least 10% of the pits are to be characterised for soil chemistry (including EC, pH and Boron);
- Land capability; and
- Amelioration recommendations.

An overlay of soils grouped into similar irrigation management units is also required.

A DEDJTR soils advisor undertakes an independent assessment of all irrigation development soil surveys conducted in the region; this includes an onsite inspection of soil pits and review of the completed soil survey maps. As part of the assessment process the soils advisor together with the soil surveyor, irrigation designer and hydrogeologist, will review the soil survey information and identify areas at risk of developing: perched water tables, lateral movement of irrigation drainage, and surface pooling that may affect crop productivity and/or the health of native vegetation. This group will recommend where shallow groundwater table monitoring bores should be located and nominate a monitoring frequency for early detection of groundwater table build-up.

These recommendations will in part be based on the recorded depth to water-impeding layers, including

depth to clay and/or hardpans which may be a potential risk. The Irrigation Development Checklist will be considered to ensure groundwater monitoring bores are installed in areas that will assist in early detection of water table development before impact upon native vegetation. Additional recommendations may be made about soil amelioration or intersecting surface drainage to protect environmental values including stands of native vegetation. The recommendations are forwarded to the relevant Water Corporations in an assessment report. The Water Corporations will include the recommendations (in whole or part) as conditions on the WUL.

B. Irrigation design

The irrigation design must be completed by a certified irrigation designer to the certification body's standards and provide information on anticipated crop water requirements and proposed maximum application rates, irrigation system specifications, and a map identifying delivery supply point and the area to be irrigated. Irrigation design will need to consider buffer requirements from retained native vegetation (refer Section 6.4.3).

The general principle in the design is that the irrigation system should be capable of applying an irrigation depth equivalent to or less than the readily available water of the soil, appropriate to the crop. Areas of similar readily available water are to be grouped as irrigation management units and supplied separately, based on the results of the soil survey.

Flood and furrow irrigation should not occur where the calculated minimum depth that can be applied (taking into account infiltration rates, slopes, length of irrigation runs and discharge rate) exceeds the readily available water within the estimated crop root-zone.

C. *Management and monitoring of irrigation*

Performance standards for irrigation management, monitoring and reporting is included as part of the IDP. These standards provide managers of the irrigation system and regulators with information that allows routine assessment of the volume of water passing the root zone. It is this water that passes the root zone that creates the pressure head in the groundwater, and hence the salinity impacts in the River and surrounding low-lying areas.

A plan for monitoring groundwater levels and quality may be required as part of the IDP. The proponent is responsible for implementing the monitoring plan and reporting results to the Water Corporations.

Test wells may be required to monitor water tables between the proposed irrigation development and sensitive sites. Normally these will only be required if the sensitive site is downslope of the irrigation area.

Monitoring of test wells will provide an early indication of perched groundwater tables and the need for a drainage system to be installed.

Refer to Mallee CMA website for the guidelines for the installation and management of shallow ground water bores (Guidelines for the installation and Management of Test-wells and Piezometers).

D. *Arrangements for drainage disposal*

The IDP must include an appropriate contingency drainage design.

The need for a subsurface and/or surface drainage scheme and re-use system must be considered. A design is to be developed for the appropriate system(s) and include:

- Volume of water to be collected;
- Details of any approved on-site disposal site and/or details of any off-site disposal site;
- Details of approvals for any proposed re-use schemes and/or irrigation storages; and

- Location of pumps, discharge or re-use points.

E. *Biodiversity protection arrangements*

The IDP must identify those parts of the property and adjacent land where the use of water for irrigation poses direct and ongoing risks to wetlands, native vegetation, or the habitat of native animals. This assessment may need to be done by a suitably qualified person/consultant.

For those areas, the IDP must specify mitigating measures and suitable monitoring parameters, as well as appropriate monitoring equipment and locations for the equipment to be installed. The IDP must also specify equipment maintenance standards, data reading, recording, reporting and auditing requirements, corrective action thresholds, corrective action procedures, and corrective action time limits.

Appropriate protection arrangements may include buffers between irrigated areas and native vegetation.

6.4.2. Hydrogeological assessments

The purpose of the hydrogeological assessment is to determine the likely environmental impacts caused by changes to groundwater levels in the vicinity of the development. The hydrogeological assessment is required to identify:

- The potential for irrigation to increase water levels in perched and regional groundwater systems;
- Likely groundwater flow paths and rates;
- The likely impact of change in water tables with regard to the impact on the river, the floodplain corridor, native vegetation, public land, neighbouring land, roads and any other built infrastructure or other beneficial use;
- Areas unsuitable for irrigation, as determined by the soil survey information and potential for

surface water pooling and groundwater formation;

- The need for sub-surface drainage and disposal of drainage effluent which need to be considered when developing the IDP;
- The level of confidence of the above assessments, based on data quality for the site; and
- The need for additional monitoring of the groundwater levels.

An initial hydrogeological assessment is undertaken by the IDC to determine whether the area is at risk of developing a perched water table (refer to Appendix 8). This will be done during the investigation phase and may determine that the site (on the whole, or in part) is unsuitable for irrigation, in which case further expense and inconvenience by the applicant is avoided.

A detailed hydrogeological investigation will not normally be required where the development is less than 50 ML in total water use, or 10 ha in size, unless a high environmental impact is identified at the proposed site. An initial assessment may not be required where previous hydrogeological investigations have been conducted over the property and these are available to the IDC.

There are several primary attributes that determine the level of risk; these include: depth to the regional water table (not to be mistaken with shallow/perched water table), degree of land slope, presence and thickness of clay and/or other restricting layers, and geographic proximity to native parks and/or reserves.

A preliminary assessment of the likely hydrogeological risk can be undertaken by assessing each attribute and applying a risk rating as shown in Table 2.1 (Aquaterra, 2010). The risk categories are defined as:

High – a high risk is assigned where the presence of high value native vegetation is present within a 500-metre proximity to a new development or where the development is adjacent to a National Park.

Medium – A medium risk is assigned where the presence of known physical attributes at a site indicate that it has a pre-disposition to perched watertable development (i.e. clay layer or other restrictive layers) is present and there is a lack of good data and layer information available to show reduced risk (i.e. the layer is discontinuous); and

Low – a low risk is assigned to a site where there is no high value native vegetation in proximity or within the boundary of the development site and/or where the pre-disposition to perched watertable development is insignificant.

Attribute/Parameter	Measurement	Risk Rating	Colour Indication
Depth To Regional Water Table	<5m	High	Red
	5-10m	Medium	Yellow
	>10m	Low	Green
Slope	>3%	High	Red
	1-3%	Medium	Yellow
	<1%	Low	Green
Presence of Blanchetown Clay	Presence	Moderate	Yellow
	Absence	Low	Green
Geographic Proximity to Native Reserves (500m)	Within 500m	High	Red
	Outside 500m	Low	Green
Geographic Proximity to Native Vegetation (250m)	Within 250m	High	Red
	Outside 250m	Low	Green
Thickness of Blanchetown Clay	>5m	High	Red
	0m-5m	Medium	Yellow
	0m (Absence)	Low	Green
Overall Property Rating	1 / 2 / 3	Low/Moderate/High	Green/Yellow/Red

Table 3. Hydrogeological Risk Impact Assessment Categorisation (Aquaterra, 2010).

The assessed risk category and the nature of the application will determine the investigation's path and level of detail that will be required to gain approval.

High – must undertake a Level 1 hydrogeological investigation. The specification for this is included in Appendix 8.

Medium – Depending on the reason for this rating, one of the following investigations must be undertaken:

1. Level 2 hydrogeological investigation – independent review and recommendations by a qualified hydrogeologist. The investigation must include on-site assessments to determine additional detail about potential groundwater processes and environmental assets at risk that is not available from existing data.
2. Level 3 hydrogeological investigation – independent opinion from a qualified hydrogeologist. This level is undertaken when the assessor has some doubt about the result of the desktop assessment. The doubt may

arise from conflicting information or from a lack of data to support a clear risk categorisation.

3. Level 4 hydrogeological investigation – this level is intended to provide additional certainty that the risk is minimal. This will include a cross-check against existing monitoring bores and results/outcomes of other development assessments nearby, if publically available.

Low – No further hydrogeological investigation is required for the application. The Water Corporation may require monitoring and the DEDJTR soils advisor will provide advice on where these are best located. These bores will require frequent monitoring in order to track rising watertables and provide early warning for the requirement to implement measures that protect native vegetation (e.g. drainage systems).

The information required for each level of investigation is specified in Appendix 8 and broadly covers:

- The likely depth to the regional groundwater based on available records;
- The location and existence of any aquifer(s) down to the basement bedrock;
- The typical annual fluctuation of groundwater and piezometric levels of significant aquifers and the hydraulic head difference between aquifers;
- Groundwater gradients, groundwater quality and likely variability of quality;
- Location of any current or potential areas of groundwater interaction with the surface;
- Location of any existing or potential areas of groundwater discharge within the vicinity of the irrigation development that may be exacerbated by irrigation development;
- The likely need for sub-surface drainage, and consequent need to set aside areas within the development for sub-surface drainage disposal;
- Location of groundwater monitoring bores to track changes in perches and regional groundwater levels;
- The assessment generally will require consideration of a 'source–pathway–receptor' model to assess risk (EPA publication 668) in that the sources of groundwater rise are identified and the potential for this rise to cause on-site and off-site impacts on the environment and other irrigators is fully considered. Aquaterra (2010) in Appendix 8 provides guidance on four different levels of investigation reflective of the level of risk;
- The investigation and/or approval process may recommend the installation of groundwater bores and a monitoring program. The collection of groundwater data should comply, as a

minimum, with the Guidelines for the Installation and Management of Test-wells and Piezometers (refer to Mallee CMA website); and

- The information collected during the hydrogeological assessment will assist in determining if there are any required changes to the standard vegetation buffers employed (Figure 6).

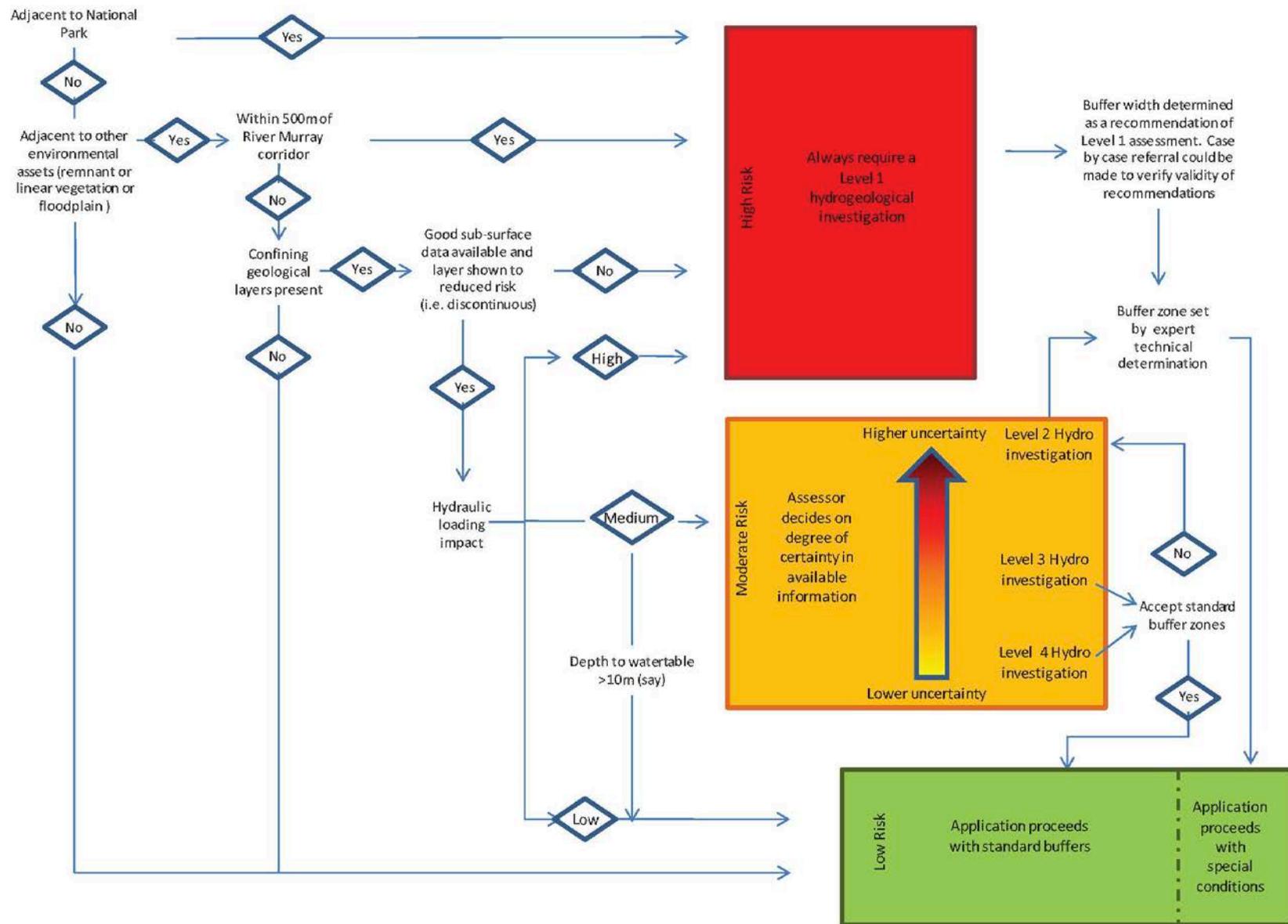


Figure 4. Mallee Hydrogeological Assessment and Vegetation Buffers Framework (Aquaterra 2010)

6.4.3. Vegetation buffers

Since the year 2000, buffers have become a standard planning tool for irrigation developments within the Mallee region and are used as a mitigating measure to protect surrounding remnant vegetation from irrigation farming practices. Buffers have been adopted in an attempt to reduce the impact on native vegetation and biodiversity values caused by:

- Spray drift;
- Noise and damage caused by operating machinery;
- Dust;
- Soil erosion and surface water movement;
- Weed infestation; and
- Groundwater movement.

Buffer requirements are determined using a risk-based approach depending on two main factors:

- The assessed level of risk a proposed irrigation development is likely to have on native vegetation; and
- The quality and condition of the native vegetation on which the proposed irrigation development is likely to impact.

The two factors above can only be determined through obtaining data specific to the site and

adopting conservative buffer distances as per the standards in Table 4. The adoption of conservative buffer distances should only be reduced where the applicant can demonstrate that biodiversity values will not be impacted on. This can be done by providing further evidence e.g. the development is downslope of vegetation or is not hydrogeologically connected. This may require drilling investigations or mitigating works and is required to be described in the IDP together with the supporting investigations or studies. The standard buffer distances are summarised in Table 4. Further guidance on hydrogeological terminology and vegetation buffer description is provided in Appendix 9.

In order to reduce these buffer zones, evidence is required to be presented by the applicant to demonstrate the impact of the development both with and without mitigating works. Any such works will need to be recommended by a qualified hydrogeologist with relevant modelling to determine likely impacts and may be independently reviewed by the licensing authority prior to approval of the final irrigation development application and conditions. A review will not be undertaken until the irrigation design has been completed as the design will influence the decision process.

Environmental asset/value	Standard hydrogeological buffer
Land administered under the <i>National Parks Act 1975</i> and significant reserves under the <i>Crown Land (Reserves) Act 1978</i>	200m
Native vegetation stand of significance (e.g. State Park, wetland etc.)	50m
Roadside vegetation or vegetation corridor (if buffer is un-vegetated)	50m
Roadside vegetation or vegetation corridor (if buffer is re-vegetated)	25m
Remnant patch within property (if buffer is un-vegetated)	50m
Remnant patch within property (if buffer is vegetated)	25m
Scattered vegetation (including single paddock trees) within property	5m

Table 4. Standard vegetation buffers for irrigation developments (adapted from Aquaterra, 2010).

6.5. Further information

There are a number of key resources that can be used to guide delegates and applicants through the renewal, amendment or transfer of a works, or water use licence, including:

- Development Information Packages;
- The Victorian Mallee Irrigation Region – Standards for Site Environmental Management Plans (Sunraysia Environmental Pty Ltd, 2011) – see Mallee CMA website;
- Siting and Design Guidelines for Water Diversion Works on or across Crown Land (NRE, 2001) – see Development Information package;
- Your Dam Your Responsibility (DSE, 2007);
- ANCOLD Guidelines on Assessment of the Consequences of Dam Failure (ANCOLD, 2000); and
- Dams and Dam Safety – see Victoria State Government website
<http://www.depi.vic.gov.au/water/governing-water-resources/dams>.

7. Other approvals required for irrigation development

The issuing of a water use licence or a works licence cannot be withheld based on the requirements of other Acts of Parliament; however, it is important for proponents to be aware that the proposed development may not proceed without first obtaining all necessary approvals.

7.1. Local Council requirements

Land use and development are controlled by “responsible authorities”, usually local government, under planning schemes. Planning schemes set out policies and requirements for the use, development and protection of land. There is a planning scheme for every municipality in Victoria. Planning schemes throughout Victoria consist of:

- A State Planning Policy Framework;
- A Local Planning Policy Framework (containing a Municipal Strategic Statement);
- Zone and overlay provisions;
- Particular provisions;
- General provisions; and
- Definitions.

The State Planning Policy Framework covers very broad issues/policies that affect the whole of the State, such as housing. The Local Planning Policy Framework contains a Municipal Strategic Statement and local planning policies. This section provides the long-term directions for land use and development in the local municipality.

The Zone, Overlay and Particular Provision requirements provide the controls over the type of use and development allowed in each zone. This is primarily the information with which new irrigation developers will be concerned.

There may also be local laws that could affect a development; for example a local law may prohibit

the discharge of water on to Council land, such as roadsides.

7.1.1. Public Land Manager consent

Works within the public conservation and resource zone and Public Park and Recreation Zone require consent from the public land manager prior to applying for a planning permit.

7.1.2. Planning permits

It is not easy to make generalisations about when planning permits are required and when they are not. This will differ between municipalities and will depend on the land in question and the activity proposed. Each Zone, Overlay and Particular Provision will require different information to be submitted with a planning application.

For example, a parcel of land may be zoned Farming, allowing general agricultural pursuits while requiring a permit for more intense uses such as a piggery or rice growing. The parcel may also be subject to a Salinity Management Overlay that may require a permit for earthworks, and a Rural Floodway Overlay, which may require a permit to construct or carry out any works. The proposed development may also be subject to a particular provision relating to, for example, signage or a local law may apply.

Prospective developers having identified a parcel of land, should in the first instance contact the local planning department or ask the IDC about specific requirements.

The planning approval process can vary in time depending on the complexity of the development and the level of referral required. Local Council may need to refer the application on to another agency, such as DELWP, the Mallee CMA, the Water Corporation (Lower Murray Urban and Rural Water Corporation, Goulburn-Murray Rural Water Corporation or Grampians-Wimmera Mallee Water) or VicRoads. In

some cases the agency must be given 28 days to respond, before Local Council can make a decision.

Most new irrigation developments will occur within existing Farming Zones and pump/pipeline infrastructure from the River Murray will occur within the Public Conservation and Resource Zone. The type of activities controlled in Zones throughout the State will vary depending on the applicable overlays. Overlays contain special planning controls that protect special features of land covered by the overlay. There are a number of types of Planning Scheme Overlays that are likely to affect rural land:

- Environmental Significance;
- Vegetation Protection;
- Significant Landscape;
- Erosion Management;
- Salinity Management;
- Floodway;
- Land Subject to Inundation;
- Special Building; and
- Bushfire Management.

7.1.3. Uses and developments which may require a planning permit

This is a list of examples only and may not be complete. Please contact your relevant Local Council for advice:

- Rice growing or other ponded irrigation;
- Cattle Feedlots;
- Native Vegetation Removal (including limb lopping);
- Pump and/or pipelines on or across Crown Land;
- Earthworks (including laser grading);
- Timber production;
- Intensive animal husbandry;
- Subdivision; and

- Constructing a building or other construction or carrying out works.

7.1.4. Local Council planning approval

Application may be approved subject to conditions, or may be refused. If refused, an applicant may appeal the decision to VCAT.

7.1.5. River Murray and NSW approvals

Developments on the Murray River may require a NSW Development Application or other approval from the relevant NSW municipality and/or authorities (e.g. fisheries, maritime). Applicants are advised to contact the relevant Local NSW Council for advice on approvals.

7.1.6. Further information

Further information is available at:

- Biodiversity Assessment Guidelines (http://www.depi.vic.gov.au/___data/assets/pdf_file/0011/198758/Permitted-clearing-of-native-vegetation-Biodiversity-assessment-guidelines.pdf);
- Siting and Design Guidelines for Water Diversion Works across Crown Land (NRE, 2001). Refer to Development Information Package; and
- Standards for Site Environmental Management Plans (Mallee CMA 2010) – refer Mallee CMA website.

7.2. Aboriginal Heritage protection

The *Aboriginal Heritage Act 2006* (amended 2016) and *Aboriginal Heritage Regulations 2007* provides for the protection and management of Victoria's Aboriginal heritage (e.g. Aboriginal places, objects and human remains etc.) from irrigation development activities on private land as well as public land.

Irrigation development activities (e.g. construction of river pumps, pipeline routes, land preparation etc.), in culturally sensitive landscapes can cause significant harm to Aboriginal cultural heritage. In these situations the Act may require the preparation of a Cultural Heritage Management Plan (CHMP). The amended Act 2016 introduces a Preliminary Aboriginal Heritage Test (PAHT) to determine whether or not a cultural heritage management plan (CHMP) is required for the proposed development activity. In some circumstance the planner or developer may need to obtain a cultural heritage permit or enter into a cultural heritage agreement with the relevant Registered Aboriginal Party (RAP).

The Act provides clear guidance to planners and developers about due diligence requirements and consideration of Aboriginal cultural heritage needs. In some situations work cannot proceed until compliance is met. All irrigation development activities must proceed within the framework of the legislation and it is the applicant's responsibility to ensure adherence to this legislation. The applicant is required to know that significant penalties apply to breaches.

Other changes to the amended Act 2016 include: empowering Registered Aboriginal Parties (RAPs) to determine cultural heritage permit applications introducing 30-day Cultural Heritage Plan timeframe (stop the clock); and changes to fees and charges collected under the Act.

7.2.1. Further information

Further information is available at:

- Aboriginal Affairs Victoria (<http://www.vic.gov.au/aboriginalvictoria>);
- General enquiries – 1800 762 003
- Information Victoria Call Centre - 1300 366 356
- Email: Aboriginalaffairs@dpc.vic.gov.au
- Heritage Division, Department of the Environment, Water, Heritage and the Arts <http://www.environment.gov.au/heritage/about/indigenous/index.html>
- Email: atsihpa@environment.gov.au
- Aboriginal Heritage Act 2006 (amended 2016) (<http://www.vic.gov.au/aboriginalvictoria/heritage/aboriginal-heritage-act-2006-and-2016-amendment.html>);
- Aboriginal Heritage Act 2006 – Information sheets;
- Aboriginal Heritage Regulation 2007;
- Guide to Preparing Aboriginal Cultural Heritage Management Plans;
- Cultural Heritage Management Plan Tool;
- The *Aboriginal Heritage Act 2006* - Advisory note - June 2007;
- Aboriginal and Torres Islander Heritage Protection Act 1984; and
- Local Governments planning and building permits and Cultural Heritage Management Plan.

7.3. Environmental Protection and Biodiversity Conservation

Local governments are encouraged to tell applicants that some actions may need Commonwealth approval under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*.

According to the Australian Government's Department of the Environment and Energy, the *EPBC Act* is the government's central piece of environmental legislation.

It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places defined in the Act as matters of national environmental significance.

The *EPBC Act* enables the Australian Government to join with the states and territories in providing a national scheme of environment and heritage protection and biodiversity conservation.

The *EPBC Act* focuses Australian Government interests on the protection of matters of national environmental significance, with the states and territories having responsibility for matters of state and local significance.

The Department of Environment and Energy administers the *EPBC Act* to meet the following objectives:

- Provide for the protection of the environment, especially matters of national environmental significance;
- Conserve Australian biodiversity;
- Provide a streamlined national environmental assessment and approvals process;
- Enhance the protection and management of important natural and cultural places;
- Control the international movement of plants and animals (wildlife), wildlife specimens and products made or derived from wildlife; and

- Promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources.

It is the applicant's responsibility to ensure their actions will not impact on a matter of national environmental significance and to ensure they have all necessary approvals before taking an action.

7.3.1. Further information

Further information is available at:

- Department of the Environment and Energy: 1800 803 772;
- Environment Protection and Biodiversity Conservation Act (EPBC) 1999 and Regulations 2000;
- Farming and the national environment law: *EPBC Act*;
- *EPBC Act* – Environment Assessment Process - Referral flowchart;
- *EPBC Act* – Environment Assessment Process – Fact Sheet; and
- www.environment.gov.au/epbc.

7.4. Flora and Fauna conservation

The *Flora and Fauna Guarantee Act (FFG) 1988* is the key piece of Victorian legislation for the conservation of threatened species and communities and for the management of potentially threatening processes.

The flora and fauna conservation and management objectives are:

- To guarantee that all taxa of Victoria's flora and fauna can survive, flourish and retain their potential for evolutionary development in the wild;
- To conserve Victoria's communities of flora and fauna;
- To manage potentially threatening processes;
- To ensure that any use of flora or fauna by humans is sustainable;
- To ensure that the genetic diversity of flora and fauna is maintained;
- To provide programs of community education in the conservation of flora and fauna; to encourage co-operative management of flora and fauna through, amongst other things, the entering into of land management co-operative agreements under the *Conservation, Forests and Lands Act 1987*; of assisting and giving incentives to people, including landholders, to enable flora and fauna to be conserved; and
- To encourage the conserving of flora and fauna through co-operative community endeavours.

Works or other activities on Public Land, which may impact on protected plants will require a Protected Flora Licence or Permit under the *FFG Act*. All native vegetation likely to be impacted should be checked against the Protected Flora List (DEPI, 2014) to determine whether FFG approvals are required. Protected Flora Permits can be obtained from the

Department of Environment, Land, Water and Planning's regional office.

7.4.1. Further information

- Department of Environment, Land Water & Planning: 136186
Email: customer.service@delwp.vic.gov.au
- Flora and Fauna Guarantee Act 1988 (<http://www.dpi.vic.gov.au/dse>)

7.5. Wildlife protection and conservation

The purpose of the *Wildlife Act 1975* is to establish procedures in order to promote the protection and conservation of wildlife, the prevention of taxa of wildlife from becoming extinct and the sustainable use of and access to wildlife; and to prohibit and regulate the conduct of persons engaged in activities concerning or related to wildlife.

Some of the ways the Act achieves these objectives include gifting the land to the Secretary in order to propagate wildlife or conserve wildlife habitat; and establishing State Wildlife Reserves, which may be classified into State Game Reserves, State Game Refuges, State Fauna Reserves, Game Management Stations or other classifications as specified (management plans to be created).

7.6. Floodplain Management and Works on Waterways

7.6.1. Statutory planning responsibilities

The Mallee CMA has statutory planning responsibilities under the *Planning and Environment Act 1987*; as well as being the regional caretaker of river health. Activities include statutory planning and flooding referrals, works on waterways permitting, flood and river health awareness, development of and support for flood studies, including support for cost-effective flood mitigation measures and flood warning systems.

These waterway and floodplain statutory actions/responsibilities are underpinned by Sections A and B of the Waterway and Floodplain Management Strategies (Mallee CMA, 2001).

7.6.2. Flood level advice

Flood advice for a specific property in the Mallee region can be obtained from the Mallee CMA. Flood

advice helps landowners to understand their risks and is useful for:

- People looking to buy or rent a property;
- Property owners looking to renovate their house or build an extension; and
- Developers looking to subdivide a property.

Generally most works within a defined flood prone area require a planning permit from the local Council. Council will refer these development proposals to the Mallee CMA for advice and/or its approval. The Mallee CMA encourages landowners/developers to obtain flood level advice early so that any development proposal identifies and mitigates potential risks associated with flooding.

The Victorian Planning Provisions (VPPs) provide the basis for all statutory land use planning controls in Victoria. The main mechanisms of the VPPs with respect to floodplain mapping and control are contained in the following zones and overlays:

- Urban Floodway Zone (UFZ);
- Environmental Significance Overlay (ESO);
- Design and Development Overlay (DDO);
- Floodway Overlay (FO); and
- Land Subject to Inundation Overlay (LSIO).

There are specific controls relating to buildings and works proposals contained within the overlay control. There are also extensive guidelines that the responsible authority must consider before deciding on an application. All applications must be referred to the relevant floodplain management authority, unless *in the opinion of the responsible authority the proposal satisfies requirements or conditions previously agreed in writing between the responsible authority and the floodplain management authority.*

7.6.3. Works on waterways

Many work practices in the past have caused major degradation of waterways. To protect and rehabilitate

rivers and creeks there is a need to ensure that any works undertaken on designated waterways do not adversely affect the health of those waterways.

Works and activities within the bed and banks of designated waterways require a permit from the Mallee CMA. Works and activities may include:

- Bridges;
- Culverts;
- Fords;
- Service crossings;
- Storm water outlets;
- Drop structures;
- Stream deviations;
- Extractions;

- Bed and bank stabilisation;
- Large woody debris removal; and
- Vegetation management.

7.6.4. Further information

Further information regarding these matters can be obtained from the Mallee CMA, Planning and Reporting Officer, Strategy and Policy, on: 035051 4377.

8. Process for assessing and approving Annual Use Limit (AUL) higher than Schedule 2 of the Standard Water Use Conditions

The annual use limit associated with WUL is calculated by multiplying the area being irrigated with the specified 'maximum application rate' (MAR) as listed in Schedule 2 of the Ministerial Determination of Standard Water Use Conditions (refer Appendix 2). There are a number of crops and canopy surfaces listed in Schedule 2.

Schedule 2 also allows for the application of higher MAR determined by applying the principles and methodology that are consistent with "Crop evapotranspiration – guidelines for computing crop water requirements", FAO Irrigation and Drainage Paper 56 (Allen R.G., 1998).

The FAO56 methodology is suitable for use by an individual grower or industry group to demonstrate that the higher application rate can be safely applied to unique crops or production systems all-the-while avoiding water logging, land and water salinisation and groundwater pollution.

This chapter describes the process and information requirements for individual growers wishing to apply for an AUL for a crop type that is unlisted in Schedule 2 of the Ministerial Determinations for Standard Water Use Conditions.

8.1. Process for determining applications for issuing AUL using MARs above Schedule 2

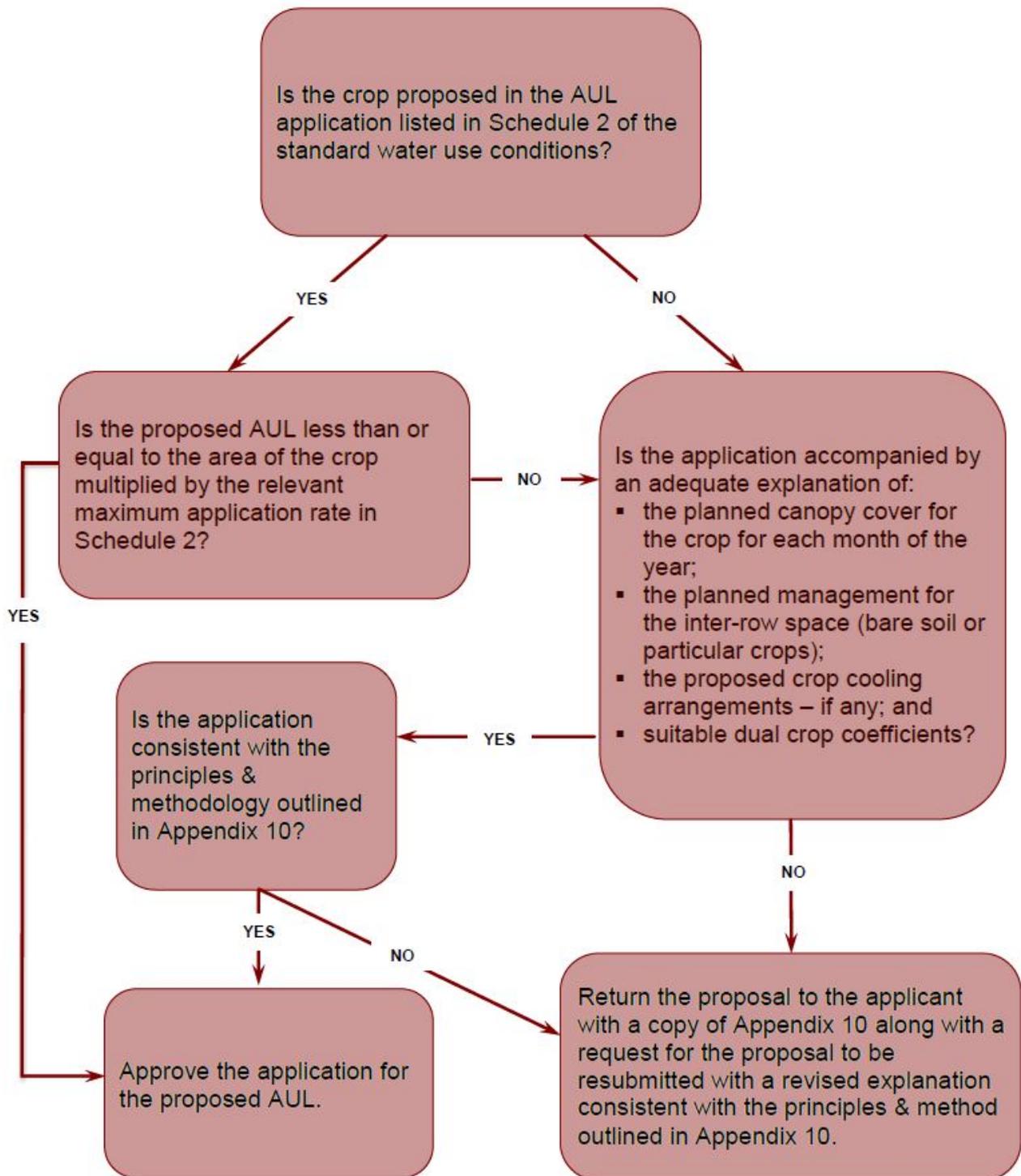
The key steps in the process of determining applications MARs above Schedule 2 include: investigation, assessment, and approvals, and are outlined in Figure 7.

The information requirements and calculations used to determine a suitable MAR is found in Appendix 10.

It is recommended that the proforma (Appendix 10) is completed by a qualified agricultural scientist, irrigation engineer or an Irrigation Australia Certified Irrigation Designer or Certified Irrigation Agronomist.

The completed proforma is presented to the IDC for initial assessment by the ID Group. The ID Group may seek advice from DELWP, and/or a technical specialist, when reviewing the application and determining whether the application should be approved.

Figure 5. Process for assessing AUL applications for MARs greater than Schedule 2 of the Minister's Determination - Standard Water Use Conditions



9. References

- Allen R.G. (1998) *Crop evapotranspiration – Guidelines for Computing crop water requirements*, FAO Irrigation and Drainage Paper 56.
- ANCOLD (2002) *Guidelines on Assessment of the Consequences of Dam Failure*.
- Aquaterra (2010) *Mallee Hydrogeological Buffers*. Final report to the Mallee CMA, February 2010.
- Cummins, T. (2009) *Capping Annual Use Limits within Salinity Impact Zones in the Victorian Mallee*, Final Report.
- DSE (1992) *Nyah to South Australian Border Salinity Management Plans*, Environmental Report.
- DSE (2007) *Your Dam Your Responsibility*, A Guide to the Managing of Safety of Farm Dams.
- DSE (2010) *Advisory Note on Irrigation Development Guidelines in Victoria (Version 2.0)*
- Mallee CMA (2013) *Regional Catchment Strategy*.
- Mallee CMA (2010) *Land and Water Management Plan*.
- Mallee CMA (2001) *Waterway and Floodplain Management Strategies*.
- Minister for Water (2007) Ministerial Determinations.
- NRE (2001) *Siting and Design Guidelines for Water Diversion Works on or across Crown land*. Department of Natural Resources and Environment, Mildura.
- RMCG (2013) *Augmentation of the Mallee Regional Policy for Setting Annual Use Limits on Water-Use Licences*. Final report for the Mallee CMA, June 2013.
- Sunraysia Environmental Pty Ltd (2011) *Victorian Mallee Irrigation Region Standards for Site Environmental Management Plans*.

10. Appendices

Appendix 1 – Ministerial Water Use Objectives.

Appendix 2 – Standard Water Use Conditions.

Appendix 3 – Policies for Managing Works Licences.

Appendix 4 – Policies for Managing of Take and Use Licences.

Appendix 5 – Policies for Managing Water-use Licences in Salinity Impact Zones

Appendix 6 – Redevelopment within the Victorian Mallee irrigation areas - defining 'Minor', 'Reasonable' and the application of the New Irrigation Development (NID) Guidelines.

Appendix 7 – Process for reactivating SBIEG properties (LMW).

Appendix 8 – Specifications for Hydrogeological investigations.

Appendix 9 – Guidance on Hydrogeological terminology and vegetation buffer description.

Appendix 10 – Process for assessing applications for maximum application rates

Appendix 1 – Ministerial Water-Use Objectives

Water Act 1989

WATER-USE OBJECTIVES

I, John Thwaites, Minister for Water, Environment and Climate Change, as Minister administering the **Water Act 1989**, make the following determination of water-use objectives.

Authorising provision

1. This determination is made in accordance with section 64T(1) and (2)(a) of the **Water Act 1989** (the Act).

Commencement

2. This determination comes into force on the day on which it is made.

Application

3. This determination applies to all water-use licences granted for use of water from water systems that are declared under section 6A of the Act.

*Notes: * under section 64M of the Act, one of the considerations in granting a water-use licence is whether or not the proposed use is consistent with the water-use objectives that would apply to the licence. Under sections 64Z(2), 64AD and 64AG(2) of the Act, any standard or particular conditions that are placed on existing or new water-use licences, and any variation of existing licence conditions, must be consistent with the water-use objectives that apply to the licence.*

Under section 64U of the Act, water-use objectives may provide for minimising the impacts of water use on other persons and the environment, including the following –

- (a) managing groundwater infiltration;*
- (b) managing disposal of drainage;*
- (c) minimising salinity;*
- (d) protecting biodiversity;*
- (e) minimising cumulative effects of water use.*

Water-use objectives

4. The water-use objectives are:

(a) Managing groundwater infiltration

To limit infiltration to groundwater systems arising from irrigation so as to minimise or avoid waterlogging, land salinisation, water salinisation and groundwater pollution.

* These notes in italics are explanatory only, and are not part of the formal water-use objectives.

(b) Managing disposal of drainage

To control the disposal of drainage from irrigation so as to minimise or avoid waterlogging, salinising or eutrophying waterways, wetlands, native vegetation, native animal habitats, groundwater and other persons' property.

(c) Minimising salinity

To ensure that, where limits on groundwater infiltration and controls on drainage disposal are not sufficient to manage identified risks of land or water salinisation, licence-holders are responsible for the full costs of measures to reduce those risks, or, alternatively, the full cost of any necessary offsetting works.

(d) Protecting biodiversity

To set corrective action thresholds and corrective action procedures where limits on groundwater infiltration and controls on drainage disposal are not sufficient to manage identified risks, associated with water use, to specific wetlands, native vegetation stands, or native animal habitats.

(e) Minimising cumulative effects of water use

To ensure that, where a series of individually acceptable expansions in water use within a defined area reaches a previously announced level, the combined impact on other people and the environment is dealt with by remedial action such as a communal drainage scheme, with water users in the area who expand their use after the announcement contributing to the capital cost in line with their expansion in use compared with total use (and remaining costs shared by government and water users in a way judged after due consultation to be equitable).

Dated:

22.6.07



JOHN THWAITES MP

Minister for Water, Environment and Climate Change

Appendix 2 – Standard Water Use Conditions

Water Act 1989

STANDARD WATER-USE CONDITIONS

I, John Thwaites, Minister for Water, Environment and Climate Change, as Minister administering the **Water Act 1989**, make the following determination of standard water-use conditions and of the information to accompany applications for water-use licences.

PART 1 – GENERAL

Authorising provision

1. This determination is made in accordance with sections 64P, 64Y(1) and 64AI of the Act.

Commencement

2. This determination comes into force on the day on which it is made.

Application

3. This determination applies to all water-use licences granted for use of water from water systems that are declared under section 6A of the Act, including water-use licences that are deemed to have been created as a result of declaration of a water system, and water-use licences granted after a water system has been declared (“new water-use licences”), as set out in the determination.

Definitions

4. In this determination –

“Act” means the **Water Act 1989**;

“**endorsed irrigation and drainage plan**” means a plan prepared in accordance with Schedule 1 of this determination and endorsed by the Minister.

Note: * where the Minister has delegated responsibility for water-use licences to a water authority, the water authority on behalf of the Minister will endorse irrigation and drainage plans – and take the various other actions which in these conditions are described as being the responsibility of the Minister.

“**ponded irrigation**” means the application of water to the surface of a field where runoff is prevented.

PART 2 – WATER-USE LICENCES DEEMED TO BE CREATED UNDER SCHEDULE 15 OF THE ACT

Notes: the major regulated surface water systems in northern Victoria are to become declared systems on 1 July 2007, and those in southern Victoria on 1 July 2008. Prior water rights or prior joint rights (i.e. including a domestic and stock allowance)

* Notes in italics throughout this document are explanatory only, and are not part of the formal standard water-use conditions.

and section 51 licences are to be unbundled on that day into component entitlements, including a water-use licence.

Under clauses 4(3), 5(3) and 13(3) of Schedule 15 of the Act, water-use licences created at conversion will authorise water to be used for irrigation on the relevant land, subject to:

- (a) the same conditions as those that applied to the use of water immediately before the appointed day, and*
- (b) an annual use limit determined in accordance with the conversion rules.*

In general, the conditions applying to the use of water immediately before the appointed day are to the effect that:

- (a) water used for the purposes of irrigation on the land specified in the licence must be measured through a meter approved by a water authority unless the water authority has granted an exemption in writing, and*
- (b) where irrigation results in drainage from the land specified in the licence, that drainage water must be disposed of in ways that meet with the standards, terms and conditions adopted from time to time by the water authority.*

In some cases, where there has been a recent irrigation development or expansion, the conditions applying to the use of water are quite detailed and specific, set after a thorough survey and planning process had been undertaken. These specific conditions will be preserved in the water-use licences, for example by reference back in such a case to the former take and use licence.

But in most cases, the conditions are to the effect of paragraphs (a) and (b) above. While these are summations of the pre-existing conditions, they are not the actual conditions, which are variously expressed and scattered amongst several parts.

To ensure that there is no uncertainty about the conditions that apply, (a) and (b) above are being put in place through this determination as standard conditions. Under section 64AE(2) of the Act these will prevail, if ever it is claimed there is inconsistency with the conditions that existed previously (either in the former section 51 licences or set when water rights were purchased).

(These standard conditions will not, however, quash any of the more specific conditions that have been set in some cases and that need to be preserved, since it is considered that these very basic standard conditions will not be inconsistent with the more specific conditions.)

Standard conditions for water-use licences deemed to be created under Schedule 15 of the Act

5. Water-use licences that exist at the time this determination comes into effect or that are created subsequently through declaration of a water system are subject to the following standard conditions:

Managing groundwater infiltration

- (a)** Water used for the purposes of irrigation on the land specified in the licence must be measured through a meter approved by a water authority unless the water authority has granted an exemption from this requirement in writing.
- (b)** Pondered irrigation must not be carried out on the land specified in the licence without the addition of particular conditions governing the use of such an irrigation system.

Note: ponded irrigation (for example to grow rice) requires a planning permit – entailing referral to a water authority.

Managing disposal of drainage

- (c) Where irrigation results in drainage from the land specified in the licence, that drainage water must be disposed in ways that meet with the standards, terms and conditions adopted from time to time by the water authority.

PART 3 – NEW OR VARIED WATER-USE LICENCES

Notes: long-established irrigation will be subject to very basic conditions, as set out above. Over time these conditions could potentially be gradually lifted by setting further standard conditions, but this would likely be targeted at the very worst practices.

Where there is a new irrigation development or a major expansion of irrigation, on the other hand, relatively high performance levels are required, closer to best practice. The clauses below set out the requirements.

Irrigation and drainage plan

- 6. (1) Subject to clause 8, an application for a water-use licence under section 64O of the Act or for a variation to a water-use licence under section 64AH of the Act must be accompanied by an irrigation and drainage plan that has been prepared in accordance with the requirements set out in Schedule 1.
- (2) The Minister must endorse the irrigation and drainage plan as approved when the application is approved.

Standard conditions for new or varied water-use licences

- 7. Subject to clause 8, a water-use licence that is granted under section 64L of the Act or varied under section 64AG or 64AH of the Act after this determination comes into effect is subject to the following standard conditions:

Managing groundwater infiltration

- (a) Water used for the purposes of irrigation on the land specified in the licence must be measured through a meter approved by a water authority unless the water authority has granted an exemption from this requirement in writing.
- (b) Unless the Minister, with the written agreement of the relevant Catchment Management Authority, has declared a seasonal adjustment to annual use limits to accommodate exceptionally high evapotranspiration, the maximum volume of water that may be applied to the land specified in the licence in any 12-month period from 1 July to 30 June will be the annual use limit, calculated from the sum of the maximum application rates as set out in Schedule 2 multiplied by the area to which each of those rates apply.

Note: the annual use limit will be a particular condition recorded as part of the licence but derived from the standard condition set out above.

- (c) Pondered irrigation must not be carried out on the land specified in the licence without the addition of particular conditions governing the use of such an irrigation system.

Managing disposal of drainage

- (d) Where irrigation results in drainage from the land specified in the licence, water may only be used for irrigation while that drainage water is disposed of in accordance with:
 - (i) the arrangements specified in the endorsed irrigation and drainage plan, and
 - (ii) any terms and conditions that apply to a drainage service that is employed.

Minimising salinity

- (e) Where the endorsed irrigation and drainage plan identifies that the quality of the water being used for irrigation poses significant risk of salt accumulating in the irrigated soil, water may only be used for irrigation if its electrical conductivity lies within the range specified in the endorsed irrigation and drainage plan.
- (f) Where –
 - (i) the endorsed irrigation and drainage plan shows that all or part of the land being irrigated is within a ‘salinity impact zone’, and
 - (ii) the Minister under section 287A of the Act has given notice in writing requiring the owner to make a payment or payments towards the cost of works or measures to off-set any impact on river salinity –water may only be used for irrigation while the payments are being made as required in the notice.

Protecting biodiversity

- (g) Where the endorsed irrigation and drainage plan identifies that the use of water for irrigation poses direct and ongoing risks to wetlands, native vegetation, or the habitat of native animals, water may only be used for irrigation while the licence holder meets the relevant monitoring and correctional requirements specified in the plan with regard to:
 - (i) installing and maintaining the specified monitoring equipment; and
 - (ii) following the specified data reading, recording, reporting and auditing requirements; and
 - (iii) carrying out the specified corrective action procedures, within the specified time, where a specified threshold for these is breached.

New or varied licences where plans and certain conditions are not required

- 8. The requirement under clause 6 to prepare an irrigation and drainage plan, and the standard conditions for new or varied water-use licences under clause 7, will not apply in the following circumstances:
 - (a) Where a water-use licence is cancelled under section 64S(2) of the Act because part of the land to which it refers is transferred to a different party –

new licences may be issued for each part of the land without the imposition of any extra conditions, provided that each licence has an appropriate share of the previous annual use limit and the sum of the new annual use limits is no greater than the previous annual use limit.

- (b) Where irrigation is to be extended to some new land but will be within the annual use limit of the existing licence –

extensions in land area that are judged by the Minister to be minor may be covered by a licence variation without the imposition of any extra conditions.

Note: licences created by conversion in an irrigation district will apply to the whole of each property.

- (c) Where irrigation is to be intensified on some land already covered by a licence and an increase in the annual use limit in the licence is sought –

clauses 6 and 7 will apply but with such modifications as are judged by the Minister to be reasonable in the circumstances, bearing in mind water-use objectives determined by the Minister.

Dated:

20.6.07



JOHN THWAITES MP

Minister for Water, Environment and Climate Change

Schedule 1

Irrigation and Drainage Plans

Background

Irrigation developments must meet the standards necessary to minimise the impacts of water use on other persons and the environment (in particular waterlogging, salinity and nutrient impacts). This must involve an assessment of local conditions and appropriate design of irrigation systems.

The key purpose of an irrigation and drainage plan is to match the way land is irrigated and drainage disposed of, with the characteristics of the land and soil, in order to meet efficiently the objective of minimising harmful side-effects.

In those regions covered by a Land and Water Management Plan or a Salinity Management Plan approved by the Minister, an appropriate overlay from within a certified whole-farm plan may be accepted as an irrigation and drainage plan.

In accordance with clause 6, an irrigation and drainage plan that meets the requirements of this Schedule must accompany an application for a new or varied water-use licence that will allow a new development or major expansion.

For the new or varied water-use licence to be granted, the irrigation and drainage plan must be endorsed by the Minister (or by the water authority if it has delegated responsibility). A reference to the plan will be recorded as part of the water-use licence.

Requirements

1. Requirements within this schedule may be waived by the Minister after consultation with and written agreement from the relevant Catchment Management Authority.
2. If the relevant Catchment Management Authority seeks further information on any of the matters listed below because it considers this necessary to determine whether the site is suitable for sustainable development and what the potential off-site impacts are, then the Minister may require that further information.
3. An irrigation and drainage plan must include:

A. MAP OF PROPOSED DEVELOPMENT

A map of the proposed development is to be prepared which clearly identifies:

- (a) property boundaries;
- (b) areas to be irrigated;
- (c) type and location of crops to be planted;
- (d) location of existing features e.g. buildings, roads, channels, drains, fences, water storages, reuse systems;
- (e) location of proposed features; and
- (f) existing native vegetation

B. TOPOGRAPHICAL SURVEY

A topographical survey, including elevation data and suitable contours is to be prepared.

Check-bank, flood and furrow irrigation systems: Please note, the maximum slope allowable is 1:50.

C. SOIL ASSESSMENT

Either:

C1. For pressurised irrigation systems anywhere and any form of irrigation on mallee soils (that is soils of aeolian origin)

(Pressurised irrigation systems include drippers, microjets, centre pivots, lateral move irrigators and fixed sprays. More detailed soil survey information is required on mallee soils because they are extremely variable.)

Soil profile survey

Note: the survey provides information which will assist the designer prepare an irrigation system capable of applying accurate irrigation depth to maximise productivity whilst reducing the risk of off-site impacts.

Information required for the area proposed to be irrigated, to be provided on an overlay of the map of the property and soil data sheets, is as follows:

- (a) soil information to be obtained by a suitably qualified soil surveyor;

Information to be obtained at each site	
⇒ Soil texture of each layer	⇒ Mottling
⇒ Depth of each layer	⇒ Pedality
⇒ Depth of potential crop root zone	⇒ Dispersion index
⇒ Readily available water	⇒ Coarse fragments
⇒ Soil colour	

- (b) minimum pit depth of 1.5 metres or soil core to 1.8 metres;
- (c) grid spacing of 75 metres by 75 metres (broader spacings may apply for less intensive agriculture); and
- (d) measurements of pH and soil salinity (ECe) to be obtained at representative soil types. Soil salinities should be measured for each distinctive soil horizon to 1.5 metres.

Or:

C2. For flood irrigation systems on non-mallee soils

Soil survey

Note: the soil survey provides information that will help the developer determine the soil's suitability for sustainable broadacre irrigation.

Information required for the area proposed to be irrigated is to be provided on an overlay of the base map of the property and on soil data sheets.

Soil samples are to be taken from cores dug every 150 metres by 150 metres or data from previously published soil maps that show:

- (a) soil salinity for the subsoil (60-90 cm depth) in dS/m ECe (maximum threshold of 4dS/m ECe); and
- (b) soil permeability (infiltration rates) based on texture determinations (with a minimum requirement of a >30 cm thick layer of >40 % clay within the top 90 cm of the soil surface).

For both cases (C1 and C2):

Written report

A written report must be provided which includes:

- (a) description of topography and previous land use;
- (b) key aspects of climate;
- (c) soil profile descriptions;
- (d) factors affecting potential root-zone depth;
- (e) soil/water interactions e.g. drainage, permeability, infiltration;
- (f) readily available water;
- (g) land capability;
- (h) soil amelioration proposals; and
- (i) hydrogeology – if in the view of the author this is relevant and the authority requires it.

An overlay of soils grouped into similar irrigation management units is also required.

D. IRRIGATION DESIGN AND MANAGEMENT

For all developments:

- (a) anticipated crop water requirements and proposed maximum application rates;
- (b) irrigation system specifications;
- (c) map identifying delivery supply point and area to be irrigated; and
- (d) proposed irrigation scheduling arrangements.

Additional requirements for horticultural properties and for all developments on mallee soils:

The irrigation design must be completed by a certified irrigation designer in accordance with the following principles:

- (a) The irrigation system should be capable of applying an irrigation depth equivalent to or less than the readily available water of the soil, appropriate to the crop. Areas of similar readily available water are to be grouped as irrigation management units and supplied separately based on the results of the soil survey.
- (b) Flood and furrow irrigation should not occur where the calculated minimum depth that can be applied (taking into account infiltration rates,

slopes, length of irrigation runs and discharge rate) exceeds the readily available water within the estimated crop root-zone.

E. ARRANGEMENTS FOR DRAINAGE DISPOSAL

The irrigation and drainage plan must include an appropriate contingency drainage design.

The need for a subsurface and/or surface drainage scheme and re-use system must be considered. A design is to be developed for the appropriate system(s) including the:

- (a) volume of water to be collected;
- (b) details of any approved on-site disposal site and/or details of any off-site disposal site;
- (c) details of approvals for any proposed re-use schemes and/or irrigation storages;
- (d) location of pumps, discharge or re-use points.

Upstream of the Nyah pumps, if the weighted soil salinity is greater than 600EC, the irrigation and drainage plan must include a preliminary sub-surface drainage plan identifying an appropriate contingency area for *evaporative* disposal in the event that subsurface drainage is required. Any land identified as being required for evaporative disposal must not developed for irrigation.

F. BIODIVERSITY PROTECTION ARRANGEMENTS

The irrigation and drainage plan must identify those parts of the property and adjacent land where the use of water for irrigation on the property poses direct and ongoing risks to wetlands, native vegetation, or the habitat of native animals.

For those areas, the irrigation and drainage plan must specify appropriate preventative measures, appropriate monitoring parameters, appropriate monitoring equipment, and appropriate locations for the equipment to be installed. The plan must also specify equipment maintenance standards, data reading, recording, reporting and auditing requirements, corrective action thresholds, corrective action procedures, and corrective action time limits.

Note: The granting of a water-use licence does not remove the need to apply for any authorisation or permission necessary under any other Act with respect to anything authorised by the licence.

Schedule 2

Maximum application rates

1. This Schedule sets out the maximum application rates (in megalitres per hectare per year), which are to be used in conjunction with irrigated areas (in hectares) to determine annual use limits
2. These maximum application rates have been determined taking account of:
 - (a) all sources of water used on the property (including groundwater and surface water);
 - (b) annual crop irrigation requirements (including evapotranspiration and leaching);
 - (c) soil hydraulic conductivity; and
 - (d) uniformity of water application / irrigation system efficiency.
3. The principles and methodology that have been followed take into account crop water requirements consistent with “**Crop evapotranspiration – Guidelines for computing crop water requirements**”, FAO Irrigation and Drainage Paper 56,
4. The maximum application rates set out in this schedule take into account some regional considerations, notably variations in evapotranspiration and rainfall.
5. Where the proponent can show, using the principles and methodology set out in the above publication, that – because of local conditions, special crops, or an individual irrigation and drainage system – the application rate can safely be higher than the relevant one set out here, then the Minister may employ such higher application rate in determining the annual use limit.

Mallee region (downstream of Nyah pumps)

The maximum application rates in the following table are subject to clause 5 above.

Crop type	Maximum application rate
Wine grapes	9 ML/ha
Dried vine fruits	9 ML/ha
Table grapes	12 ML/ha
Citrus	12 ML/ha
Almonds	14 ML/ha
Olives	12 ML/ha
Walnuts	15.5 ML/ha
Carrots (summer plus winter crop)	12 ML/ha
Potatoes (summer plus winter crop)	15 ML/ha
Other	As agreed in writing by Department of Sustainability

	and Environment after consultation with relevant water authorities, and Mallee CMA.
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Goulburn-Murray Water region (upstream of Nyah pumps)

Drainage class	Maximum water use, on suitable land
Off-farm drainage <i>and</i> drainage re-use, <i>or</i> pressurised irrigation systems	10 ML/ha (11 ML/ha in the Loddon Murray Area north of Kangaroo Lake)
<i>Either:</i> off-farm drainage, <i>or:</i> drainage re-use	7.2 ML/ha
<i>No</i> off-farm drainage or drainage re-use	5 ML/ha

In northeastern Victoria irrigation is used primarily to supplement rainfall. Both evaporation and rainfall vary significantly across the region. Therefore maximum application rates, in ML/ha, will vary. They will be calculated using the following formula:

- (a) subtract average rainfall in the period October to April inclusive (measured in millimetres) from average evaporation in the same period (as calculated excluding the highest 10% of years); then
- (b) multiply the difference by a crop factor for the specified crop (either the crop factor set out in FAO Irrigation and Drainage Paper 56 or another reasonable use factor approved by the Minister); then
- (c) divide the product by 100 (to express the result in ML/ha).

Note: maximum application rates for the regions managed by Southern Rural Water, Melbourne Water, and Grampians Wimmera-Mallee Water are to be developed by the Department of Sustainability and Environment in consultation with the water Authorities and relevant Catchment Management Authorities, and put in place before 30 June 2008 by an amendment to this determination.

Appendix 3 – Policies for Managing Works Licences

Water Act 1989

Policies for Managing Works Licences

I, Lisa Neville MP, Minister for Water, as Minister administering the *Water Act 1989*, issue the following policies for the management of works licences.



LISA NEVILLE MP
Minister for Water

Date: 2/5/16

PART 1 - GENERAL

1. Purpose

The purpose of this document is to establish under Division 2 of Part 5 of the Act, written policies for the management of works licences associated with the authorised take, use, conveyance and storage of water from Victorian water systems (including both declared and undeclared systems).

2. Manner of taking effect

- (1) Where an Instrument of Delegation made under section 306 of the Act requires any powers, discretions, functions, authorities and duties to be exercised in accordance with written policies issued by the Minister, a delegate managing works licences must do so in accordance with these Policies.
- (2) The provisions in the Act relating to the management of works licences include –
 - (a) sections 65, 67, 67A, 68, 69, 72, 73 and 74 of the Act (concerning applications to issue, renew or transfer works licences);
 - (b) section 71 and 73A of the Act (concerning conditions on works licences);
 - (c) sections 78, 79 and 80 of the Act (concerning directions for works); and
 - (d) section 84V and 84ZB of the Act (concerning recording works licences in the water register).

3. Commencement

These Policies come into operation on the day on which they are issued.

4. Application

These Policies apply to all licences under section 67 of the Act to construct, alter, operate, remove, or decommission –

- (a) works on a waterway;
- (b) bores; and
- (c) dams;

that are associated with the authorised take, use, conveyance or storage of water in Victoria.

Note: These policies supplement but do not replace the requirements under section 68 of the Act for delegates to have regard for various matters notably those listed in section 40(1)(b) to (n) of the Act, covering environmental and third party effects, before approving applications to issue, renew, amend or transfer works licences.

Note also that these policies do not extend to the exercise of delegated licensing powers regarding works on a waterway not associated with the take and use of water (i.e. bridges or fencing) or works associated with the deviation (temporarily or permanently) of a waterway.

Note also that under section 69(4) of the Water Act 1989 neither the Minister nor the Crown is liable to pay damages in respect of any injury, damage or loss caused by the flow of water from works authorised to be constructed, altered, operated, removed or decommissioned by a licence issued under section 67.

5. Revocation of Policies made previously

- (1) The Policies for Managing Works Licences issued by the Acting Minister for Environment, Climate Change and Water, on 8 July 2015 are revoked.
- (2) Clause 7 of the Ministerial Guidelines for Licensing Irrigation and Commercial use – Surface Water issued by the Minister for Environment and Conservation on 28 June 2002 is revoked.
- (3) Clause 5 of the Ministerial Guidelines for Licensing Groundwater for Urban Water Supply Purposes issued by the Minister for Water on the 7 July 2008 is revoked.

Note that the Guidelines for Farm Dam Transitional Support Measures issued on 4 June 2002 and the Procedures for Registering or Licensing Existing Irrigation and Commercial Use and Dams issued in June 2002 have expired.

6. Definitions

“Act” means the *Water Act 1989*;

“associated works” means works that are related to the diversion, extraction, conveyance or storage of water taken through works that require a works licence;

“authority” means a water corporation or a Catchment Management Authority;

“bore completion report” means a report made, in accordance with the delegate’s requirements, by a licensed driller upon completion of construction, alteration or decommissioning of a bore;

“dam safety emergency plan” means a document containing procedures for dealing with an emergency as a result of the failure, or the likely failure of the dam, and also containing communication directories of stakeholders;

“dam safety surveillance plan” means a document containing procedures for the continuing examination of the condition of a dam, and the review of operation, maintenance and monitoring procedures and results, in order to determine whether a deficient trend is developing or appears likely to develop;

“delegate” means a person to whom the relevant power is delegated under and Instrument of Delegation made under section 306 of the Act;

“delivery share” means an entitlement to the service of having water delivered under section 222(1)(a) of the Act, at specified volumes during specified periods;

“Department” means the Department of Environment, Land, Water and Planning;

“investigation bore” means a bore drilled for the purpose of investigating the potential to access groundwater at a specified location;

“management plan” means a management plan that is for a water supply protection area and has been approved by the Minister under section 32A of the Act;

“Minister” means the Minister administering the Act;

“observation bore” means a bore constructed for monitoring groundwater levels at a particular site;

“occupier” means the occupier of the land on which the bore is situated or is intended to be situated;

“potentially hazardous dam” means a dam on a waterway or a dam described in section 67 (1A) of the Act ;

“private dam” means a private dam as defined in section 3 of the Act, whether or not on a waterway;

“register operational date” is –

- (a) for those works licences managed by Goulburn-Murray Rural Water Corporation, Melbourne Water Corporation, Gippsland and Southern Rural Water Corporation or Lower Murray Urban and Rural Water Corporation, 31 August 2009;
- (b) for those works licences managed by Grampians and Wimmera Mallee Water Corporation, 2 July 2011; and
- (c) for those works licences managed by any other delegate, a date that the Secretary of the Department advises the delegate in writing;

“State Control Centre” means Victoria’s primary control centre for the management of emergencies.

“take and use licence” means a licence issued under Division 2 of Part 4 of the Act;

“Water Management Information System” refers to the website where Victoria’s surface water and groundwater monitoring data can be accessed;

“water register” means the Victorian water register established under Part 5A of the Act;

“waterway” means a waterway defined in section 3 of the Act;

“works licence” means a licence issued under Division 2 of Part 5 of the Act;

“works plan” means a plan prepared in accordance with Schedule 2 of these policies and endorsed by the delegate when approving an application to issue, renew, amend or transfer a works licence.

PART 2 –WORKS LICENCE REQUIREMENTS

7. What works a works licence can cover

- (1) A single works licence may authorise more than one separate works requiring a licence under section 67 of the Act, provided that all the works are situated –
 - (a) within one type of water system (such as groundwater or unregulated surface water); and
 - (b) in the case of surface water, within the same waterway or catchment; or
 - (c) in the case of groundwater, within the same groundwater management unit or aquifer.
- (2) In accordance with section 71 of the Act, a works licence may include conditions relating to any associated works.

8. Works licence holders

- (1) A delegate must not issue a licence to operate works, if another person already holds a licence to operate the works.
- (2) Where more than one licence has been issued for the operation of the same works in the past, the delegate should consider consolidating these works licences upon renewal.
- (3) A delegate should only, to the extent practicable, issue, renew or approve the transfer of a works licence to –
 - (a) a single individual; or
 - (b) an incorporated body; or
 - (c) a limited number of individuals who are using water taken through the works for a shared business.

Note that a works licence may be issued or transferred to any type of incorporated body including an environmental authority or an urban or rural water corporation.

Note also that if the delegate is made aware that one of the licence holders has died, the delegate should request the remaining licence holder(s) to submit an application to change or update the licence holder information.

9. Works siting

A delegate may issue, renew or approve the transfer of a licence to operate works (such as pumps) that can be moved between several sites, provided that each site is described in the works licence and the assessment and documentation described in clause 21 is followed for each site.

10. Management plans

In considering an application to issue, renew, amend or approve the transfer of a works licence in an area for which a management plan has been approved, a delegate must apply any requirements of that plan.

11. Terms of works licences

- (1) In issuing or renewing a works licence a delegate must specify a term for which the works licence will remain in force.

- (2) In deciding on the term of a licence to construct, alter, remove or decommission works, the delegate should consider setting a term no longer than twelve months.
- (3) In considering an application to transfer a works licence with an expiry date within the next twelve months, the delegate may issue a new works licence with a tenure determined in accordance with sub-clause (4).
- (4) In deciding on the term of a licence to operate works, the delegate should consider setting a term that –
 - (a) expires at the same time as a related take and use licence;
 - (b) expires at the same time as other works licences with geographic similarities;
 - (c) does not exceed 20 years and, in the case of a dam with dam safety and surveillance conditions, a lesser term may be determined by the Authority that will issue the licence; and
 - (d) is not less than 12 months.

Note: where works licences on the Latrobe River have been renewed for an unlimited period and accordingly do not expire, the delegate may amend the conditions of these works licences to the extent necessary to comply with a management plan, in accordance with section 73(1) of the Act.

12. Renewal of a works licence

- (1) When a delegate receives an application to renew a licence to construct or alter works, and that licence has previously been renewed, the delegate may refuse the application and require the licence holder to apply for a new works licence.
- (2) When a delegate has not received an application from a licence holder to renew a licence to operate works within twelve months of the expiry of that licence, the delegate should notify the licence holder that if an application for a new licence is not received within the next three months, then the delegate may require the licence holder to decommission or remove the works.
- (3) When a delegate receives an application to renew a licence to operate works and is aware that any conditions on the existing works licence have not been complied with, the delegate must consider not approving the renewal of that licence and/or issuing a direction to alter the works.

Note that under sections 78, 79, 80 and 81 of the Act a delegate may, by notice in writing, direct the occupier of any works to remove or alter those works to comply with any conditions of the licence, prevent misuse, reduce waste or pollution or to protect the environment.

Note that when approving an application to renew a works licence, the delegate may, in accordance with section 72 of the Act, amend or delete any of the conditions to which the licence is subject or add a new condition provided the changes do not make the works licence subject to any condition to which it could not have been made subject under section 71(1). That section focuses on accounting for water use, protecting the water resource, protecting the environment and protecting the safety of people and property.

13. Amendment of a works licence

- (1) In accordance with section 73 and 73A of the Act, a delegate may amend a works licence –

- (a) to ensure compliance with an approved management plan; or
- (b) in the case of a private dam, to include conditions relating to dam safety;
- (c) upon application by the licence holder, to vary the amount of water that may be taken from an aquifer or waterway in particular periods or circumstances, including the extraction share.

Other changes to the conditions on a works licence can be made when renewing or approving the transfer of an existing works licence. Physical changes to the works will normally require a licence to alter works.

14. Limits on extraction

- (1) In issuing, renewing, amending or approving the transfer of a licence to operate works the delegate may, for each separate works covered by that licence, specify the –
 - (a) maximum extraction rate, which represents the peak capacity of the works to extract water from a waterway or aquifer;
 - (b) maximum daily volume, which represents the maximum volume that the licence holder is authorised to take through the works in one day; and
 - (c) maximum annual volume, which represents the maximum volume that the licence holder is authorised to take through the works in one year.
- (2) In issuing, renewing, amending or approving the transfer of a licence to operate works on a waterway in a declared system, the delegate must –
 - (a) include in the works licence a condition that specifies an extraction share which represents an entitlement to a share of the water available for extraction subject to the physical flow constraints of the system; and
 - (b) specify the extraction share in megalitres per day; however the rate does not entitle the licence holder to always extract that daily volume, but rather allows the resource manager to ration the volume actually extracted from the system in accordance with varying levels of supply and demand.

Note that in undeclared systems, extraction shares are not required because restrictions can be applied using the licence volume as a basis, whereas in declared systems the water entitlement volume is unbundled from the right to have water delivered via a waterway.

Note also that when more than one separately managed enterprise takes water through the works, the users should be encouraged to document an agreed way for the extraction share to be apportioned between the properties.

15. Metering requirements

- (1) In accordance with section 71(1)(ac)(ii) of the Act, in issuing, renewing, or approving the transfer of a works licence a delegate may include conditions relating to the installation and use of meters.
- (2) When setting conditions relating to the installation and use of meters on a works licence, the delegate must, subject to other provisions in this clause, ensure that the conditions are consistent with those on any related take and use licences or other water entitlement.

- (3) When issuing any new works licence related to the taking of water for irrigation and commercial use, a delegate must include a condition requiring the installation and use of a meter approved by the delegate.
- (4) When amending in accordance with section 73, renewing or approving the transfer including on change of ownership of land, of an existing irrigation or commercial works licence, the delegate must include a condition requiring the installation of a meter approved by the delegate –
 - (a) for all works licences relating to a water entitlement to take –
 - (i) 10 megalitres or more from a surface water system; or
 - (ii) 20 megalitres or more from a groundwater system; or
 - (b) for any other works licences that the delegate sees fit.
- (5) The obligation on the delegate in sub-clause (3) or (4) may be waived if in the delegate’s view a meter would be impracticable, in which case the delegate must –
 - (a) document the reasons for its view; and
 - (b) identify in a condition on the works licence a substitute method for estimating to the delegate’s satisfaction the volume of water taken.
- (6) In addition to the requirements under sub-clause (3) or (4), where water extracted by the works is intended for use by more than one separately managed enterprise, when issuing a works licence, a delegate must, and when renewing or approving the transfer of a works licence, a delegate may –
 - (a) include a condition requiring the installation, upkeep and use of meters approved by the delegate to measure the volume of water delivered to each enterprise (referred to as the ‘child’ meters); and
 - (b) include a condition outlining how transmission losses, if any, which occur between the parent meter and the child meters will be assigned.

Note that the above does not preclude a delegate from requiring more extensive metering. For example the delegate may require metering of works used for domestic and stock purposes.

16. Winter fill requirements

In setting the conditions on a licence to operate works related to a winter fill take and use licence, the delegate must include a condition that –

- (a) outlines the limited period that water may be taken through the works; and/or
- (b) in the case of an on-waterway dam, requires all inflow during the non-take period to bypass the dam.

17. Potentially hazardous dams

- (1) If the delegate receives an application to –
 - (a) issue a works licence for a private dam on a waterway or a private dam not on a waterway and having dimensions at least as great as those specified in section 67(1A) of the Act,
 - (b) renew or approve the transfer of a private dam on a waterway or a private dam not on a waterway and having dimensions at least as great as those specified in section 67(1A) of the Act,

the delegate may require the applicant to assess the consequence of the dam's failure and determine a consequence category based on the *ANCOLD Guidelines on Consequence Categories for Dams, 2012* (or its successor) or the Department's *Consequence Screening Tool for Small Dams, 2014* (or its successor).

- (2) If the delegate receives an application to issue, renew or approve the transfer of a works licence for a dam that –
 - (a) the applicant has determined in accordance with sub-clause (1) has a consequence category of “significant, high or extreme”; or
 - (b) belongs to a class of dams prescribed under section 67(1A) of the Act;the delegate must treat the dam as being potentially hazardous and specify conditions in accordance with sub-clauses (3) to (6).
- (3) In setting the conditions on a licence to construct or alter a potentially hazardous dam, the delegate must require the applicant to –
 - (a) engage a suitably qualified engineer to –
 - (i) design the proposed dam or changes to the existing dam;
 - (ii) supervise the construction;
 - (iii) prepare dam safety surveillance plans;
 - (iv) prepare dam safety emergency plans; and
 - (v) prepare an inspection report to the satisfaction of the delegate certifying whether the construction was undertaken in accordance with the conditions of the licence.
 - (b) notify the delegate of any deficiencies identified in the structure of the dam, and have a suitably qualified engineer carry out any remedial works to the satisfaction of the delegate;
 - (c) within 30 days of the dam being constructed, provide the delegate with –
 - (i) copies of the dam safety surveillance and emergency plans prepared in accordance with sub-clause (a);
 - (ii) a copy of the completed inspection report prepared in accordance with sub-clause (a); and
 - (iii) if the dam's construction varies from the endorsed works plan, a copy of an updated works plan including new drawings certified by a suitably qualified engineer; and
 - (d) provide the relevant municipal council with a copy of the dam safety emergency plan prepared in accordance with sub-clause (a).
- (4) In setting the conditions on a licence to operate a potentially hazardous dam, the delegate must require the applicant to –
 - (a) notify the delegate of any deficiencies identified in the structure of the dam, and have a suitably qualified engineer carry out any remedial works to the satisfaction of the delegate;
 - (b) ensure that the requirements of the dam safety surveillance plan and dam safety emergency plan are complied with; and
 - (c) provide the delegate with a copy of the dam safety surveillance plan –
 - (i) within 12 months of the issue of a new works licence; and

- (ii) inspection and monitoring records at any time requested by the delegate.
- (5) In considering an application to issue, renew or approve the transfer of a licence to operate a dam that is potentially hazardous, the delegate may include a condition that requires the applicant to engage a suitably qualified engineer to verify or update the dam safety surveillance plan and/or dam safety emergency plan.
- (6) In considering an application to issue a licence to remove or decommission a dam that is potentially hazardous, the delegate must include a condition that requires the applicant to engage a suitably qualified engineer to -
 - (a) supervise the removal or decommissioning of the dam; and
 - (b) prepare a completion report within 30 days of completing the work certifying whether the construction was undertaken in accordance with the conditions of the licence.
- (7) When issuing or approving the transfer of a works licence for a dam, whether or not on a waterway and whether or not potentially hazardous, the delegate must provide the licence holder with a copy, free of charge, of literature produced by the Department regarding responsibilities in the management of private dams.

Note also that a “suitably qualified engineer” means a person eligible for membership of the Institution of Engineers Australia who is able to demonstrate competence in the design, construction supervision and surveillance of dams.

Note also that, in accordance with section 80 of the Act, a delegate may give directions to any dam owner, whether or not that dam requires a licence under section 67 of the Act, regarding, but not limited to –

- (a) making specified improvements to the dam;*
- (b) taking specified measures to keep the dam under surveillance; and*
- (c) removing or decommissioning the dam.*

Note also that where a dam is a potentially hazardous dam, the delegate, in setting the licence conditions on a licence, is entitled to rely on the advice, recommendations and reports prepared by the suitably qualified engineer.

18. Bore construction requirements

If the delegate receives an application to issue a works licence to construct a bore that may be used in the future to extract water under a take and use licence, the delegate may include conditions on the licence that –

- (a) require the applicant to obtain and supply information about the bore and groundwater including, but not limited to –
 - (i) downhole geophysical surveys;
 - (ii) a bore location survey to an accuracy of at least 5.0 metres; and
 - (iii) a bore elevation survey to an accuracy of at least 0.05 metres.
- (b) specifies the conduct of a pumping test including, but not limited to –
 - (i) the required qualifications of the person who designs the pumping test;
 - (ii) the type of pumping test, the pumping rate and minimum duration;

- (iii) requirements for the disposal of pumped discharge;
- (iv) requirements for the laying of pipelines; and
- (v) selection of the discharge point to minimise the impact to the environment and to exclude the possibility of recharging the aquifer.

Note when issuing a licence to construct a bore, the delegate must have regard for any guidelines issued by the Department relating to bore construction.

19. Standard conditions

- (1) Starting from the relevant register operational date, in issuing, renewing, amending or approving the transfer of any works licence, a delegate must include in the works licence the relevant standard conditions as set out in Schedule 1 to these policies, provided they are not inconsistent with any requirements of a management plan or a related take and use licence or water-use licence.
- (2) A delegate may, where the delegate deems it appropriate having regard to the matters to which the delegate must have regard under section 68 of the Act, –
 - (a) add any condition that is relevant to a particular situation from a list of pre-defined conditions provided in the water register; or
 - (b) add a special condition that is not pre-defined but is relevant to a particular situation, in which case the delegate must signify in the water register any such special condition so that the Department can be informed about it.
- (3) A delegate may, where the delegate deems it appropriate, add a condition to a works licence that refers to the content in a works plan, management plan, dam safety surveillance plan, dam safety emergency plan or other relevant document which is recorded on the water register or within an appropriate filing system managed by the delegate.

20. Correcting or updating works licence data

- (1) In accordance with section 84ZB of the Act, if the delegate is made aware of any data relating to an active works licence, the delegate, if satisfied that it is necessary to do so to reflect the current status of a record or information, may consider correcting these errors in the water register.
- (2) The data that a delegate may consider correcting includes but is not limited to –
 - (a) contact details – where the holder of the works licence has not changed, but the holder has requested a different contact address;
 - (b) related entities – where the delegate is made aware of other water-use licences or water-use registrations or water entitlements that are associated with the works licence; and
 - (c) location data – where the location has not changed, but improved information has become available, for instance on co-ordinates or land title details.
 - (d) works details – where the works authorised in the licence have not changed, but due to inaccessibility of information at the time the licence was entered in the water register, the detail was omitted from the record.

- (3) Upon renewal of a works licence, the delegate may notify the licence holder of any corrections made to their licence in accordance with this clause, since the licence was issued or last renewed.

PART 3 – PROCESS FOR DECIDING ON WORKS LICENCES

21. Items to consider and document

- (1) Prior to the determination of an application to issue, renew, amend or approve transfer of a works licence, a delegate must document the manner in which it has had regard to the matters to which the delegate must have regard under section 68 of the Act.
- (2) Prior to the determination of an application to issue, renew, amend or approve the transfer of a works licence, a delegate may request the applicant, for the purposes of addressing the matters in section 68 of the Act, to provide details about the site of the proposed and/or existing works, including but not limited to -
 - (a) a plan of the site (including an indication of proximity to associated works, other works, waterways, access roads);
 - (b) photographs of the site showing the existing and, if applicable, proposed works, associated works and key property features;
 - (c) coordinates of the works site;
 - (d) capacity and size of works; and
 - (e) land title information.
- (3) Where an existing works licence is being renewed, amended, or transferred to a new licence holder, and within the last five years the delegate has undertaken a thorough investigation of the matters to which the delegate must have regard including where appropriate via a site inspection, then the delegate may rely on that earlier investigation, and the documentation under sub-clause (1) may simply note that this is how the matters have been considered.

Note that documentation of an earlier consideration may include dam safety surveillance reports undertaken within the last five years and provided to the delegate in accordance with a required dam safety surveillance plan.

22. Preliminary assessment

When a delegate receives an application to issue a licence to construct, alter or operate works, the delegate must notify the applicant, if they have not done so already, that the granting of a works licence does not grant any rights to take and use water and that any extraction or harvesting of water using the works must be in accordance with a separate licence or right to take and use water.

23. Works on a waterway

- (1) When a delegate receives an application to issue a works licence and is uncertain whether the works are located on a waterway, the delegate must determine if there is a waterway.
- (2) Prior to determining an application to construct a dam on a waterway with high ecological value or on a watercourse, the delegate must –
 - (a) be satisfied that the applicant has thoroughly investigated –

- (i) alternative sites for the dam; and
- (ii) alternative sources of water supply; and
- (b) obtain from the applicant the results of an environmental assessment report which demonstrates that the proposed works will not have unacceptable impacts on downstream ecological or riparian values at or near the site.
- (c) include conditions in accordance with current environmental practice, including the provision of the Environmental Water Reserve and provision of appropriate fish passage.

Note that the “Waterway Determination Guidelines” issued by the Minister for Environment and Conservation in September 2002 or its successor should be used to determine if the works are located on a waterway.

Note also that a waterway with high ecological value is a waterway that is a wetland or marsh; or has native in-stream and riparian vegetation; or is known to support flora and fauna of conservation significance. A watercourse means a waterway with defined bed and banks where water flows regularly but does not need to flow continuously.

Note also that guidelines relating to the requirements of an environmental assessment report, and the selection criteria for consultants suitable to conduct such assessments, are contained in Schedules 3 and 4.

24. Replacing existing works

- (1) If the holder of a licence to operate works wants to replace the works, the delegate must require an application for a licence to decommission the works and an application to construct new works.
- (2) In relation to an application to replace an existing domestic and stock bore (i.e. a bore that does not require a licence to operate) the delegate must require an application for a licence to decommission the existing bore and an application to construct a new bore.

25. Approval of land owner

- (1) Prior to the determination of an application to issue a works licence, subject to sub-clause (2), the delegate must require the applicant to provide the following –
 - (a) if the applicant is the owner of the land on which either the works or associated works are located, evidence of that land ownership;
 - (b) if the works or associated works are located –
 - (i) on freehold land not owned by the applicant, written consent from the land owner identifying where the works and associated works are sited;
 - (ii) on an easement, evidence that the applicant has notified the easement owner;
 - (iii) on Crown land, written consent from the Minister administering the *Conservation, Forests and Land Act 1987*;
 - (iv) on a waterway within a park referred to in section 30M of the *National Parks Act 1975*, written consent of the Minister administering the *National Parks Act 1975*; and

- (v) on a waterway located within the Shepparton Regional Park or Kerang Regional Park (as referred to in section 29IA of the the Crown Land (Reserves) Act 1978), the written consent of the Minister administering the *Crown Land (Reserves) Act 1978* pursuant to section 29IA. If in the future the Crown Land (Reserves) Act 1978 is amended to require consent to any works on lands reserved under that Act, the delegate must ensure that consent is obtained. .
- (2) If the application is for a licence to construct a bore solely for domestic and stock use, or to construct an investigation or observation bore if the bore is to be located on land owned by the applicant, the applicant is not required to submit evidence of that land ownership.

Note that in many cases requirement (iii), (iv) and (v) of sub-clause (b) may be met by the signature(s) of the Crown land manager(s) on the works licence application form. Under this approval the land manager may limit the nature and extent of the works sited on public land or may refuse to issue approval to occupy land if in issuing the approval the intent of the status of the land will be compromised.

Note also that additional approval under section 30G of the National Parks Act 1975 or under the Crown Land (Reserves) Act 1978, the Forests Act 1958, the Land Act 1958 or the Wildlife Act 1975 may be required to place any works (such as a pipe) across Crown land.

26. Works plan

- (1) Subject to sub-clauses (2), (3) and (4) an application to issue or renew a works licence must be accompanied by a works plan that is prepared in accordance with the requirements set out in Schedule 2.
- (2) Where in the delegate's view a works licence that is being renewed does not have significant deficiencies, the delegate may modify or waive the requirement to prepare a works plan.
- (3) Where the application relates to a bore, the delegate may waive the requirement to prepare a works plan provided that the works licence specifies that any construction or decommissioning is carried out by a licensed driller, and the construction, operation or decommissioning of the bore is undertaken in accordance with the specifications in the most recent edition of Minimum Construction Requirements for Water Bores in Australia.
- (4) Where the application relates to a renewal of a works licence for a dam and the applicant has provided the delegate with a copy of a dam safety surveillance plan and emergency management plan approved by a suitably qualified engineer, the delegate may adopt these as the works plans for that dam.
- (5) When approving an application relating to a works licence that has required a works plan, a delegate must give each works plan a unique identification code so that the works licence conditions can refer to the provisions of that plan.
- (6) When the delegate receives an application for the transfer of a works licence with the relevant works plan, the delegate must notify the transferee that the plan exists and that it may be referred to in the licence conditions.

- (7) When the delegate receives an application to renew a works licence with the relevant works plan, the delegate may review the plan and require the applicant to update it, prior to approving the renewal of the licence.

27. Referrals

- (1) When a delegate receives an application to issue a works licence they must refer a copy of the application without delay to –
 - (a) the relevant bodies listed in section 67A in relation to a private dam;
 - (b) the relevant catchment management authority or Melbourne Water in relation to any works on a waterway; and
 - (c) any relevant parties in line with the delegate’s own policies and procedures in relation to a bore.
- (2) When the delegate refers an application to another body in accordance with section 67A of the Act, the delegate must include any documentation provided by the applicant including works plans, dam safety surveillance plans, dam safety emergency plans and relevant written consents from land owners or land managers.

28. Advertising works licence applications

- (1) When a delegate receives an application to issue a new works licence relating to a dam, whether or not on a waterway, the delegate must request the applicant to give written notice to, and invite submissions from –
 - (a) the owner or occupiers of land immediately upstream; and
 - (b) the owners or occupiers of land immediately downstream for two kilometres, or the first three downstream owners or occupiers, whichever is the lesser number of properties; and
 - (c) place at least one advertisement in a newspaper generally circulating in the area.
- (2) When the delegate has made a decision about an application to issue a works licence, the delegate must notify anyone who made a submission of the decision including their rights and avenue of appeal, within 30 days of the decision being made.

Note that when a delegate receives an application to issue a works licence for any other works than a dam, the delegate may use discretion as to whether the applicant should give notice of the application in accordance with section 65 of the Act.

29. Final checks before approval

Prior to issuing, renewing, amending or approving the transfer of a works licence, a delegate must check that the following have been considered –

- (a) any requirements of an approved management plan relating to the area of the works;
- (b) any relevant works plans;
- (c) any details provided by the applicant in accordance with sub-clause 21(2) of this policy;
- (d) any details collected by the delegate or the delegate’s representative during a visit to the works site; and

- (e) any relevant requirements in the relevant Irrigation Development Guidelines.

PART 5 - RECORDING OF WORKS LICENCES

30. Use of the water register

- (1) Starting from the register operational date that applies to the works licences that it manages, a delegate –
 - (a) must record in the water register any works licence that the delegate issues, amends or renews or whose transfer it approves;
 - (b) must record in the water register when a works licence to construct, alter, remove or decommission has been acted on;
 - (c) may record in the water register any works licence that existed prior to the register operational date and that is still current –
 - (i) where the delegate renewed the works licence less than three months prior to the register operational date and in doing so put standard water conditions in accordance with clause 18 into the works licence, or
 - (ii) where the delegate in any other way is at any time after the register operational date able to make a complete and authoritative record of the works licence in the register;
 - (d) for any works licence that existed prior to the register operational date and that is still current but does not have a complete and authoritative record in the water register in accordance with paragraph (c), must keep a note in the water register of the following aspects of the works licence:
 - (i) a reference to the delegate's file where the record of the works licence is kept,
 - (ii) the name of the works licence holder and the expiry date.
- (2) The delegate must ensure that for each licensed works the following is recorded in the water register –
 - (a) a description of the land the works are or are proposed to be located on, including –
 - (i) land title details; and
 - (ii) where available, the co-ordinates of the works;
 - (b) a description of the works, including –
 - (i) the river basin or groundwater management unit the works connect to;
 - (ii) the category of works (i.e. groundwater works, works on a waterway or catchment dam); and
 - (iii) in the case of a dam, whether or not the dam is potentially hazardous.
- (3) When an endorsed works plan relates to a works licence, the delegate should store a copy of that plan in the water register flagging its relationship to that works licence.

31. Water Management Information System

A delegate must ensure that the Water Management Information System (or any database deemed to be its successor by the Department) is updated when any changes are made to data in the water register regarding but not limited to –

- (a) bore status (i.e. proposed, active, decommissioned);
- (b) bore location co-ordinates; or
- (c) bore depth.

Schedule 1: STANDARD CONDITIONS FOR WORKS LICENCES

Works licences relating to all types of works

Note that the standard conditions relating to metering (items 3, 4 and 6 to 10 below) only need to be included in works licences where metering is required in accordance with clause 15 of these policies.

1. Each person named as a licence holder is responsible for ensuring all the conditions of this licence are complied with.
2. The licence holder must, when requested by the Authority, pay all fees, costs and other charges under the *Water Act 1989* in respect of this licence.

for licences to construct, alter and operate works only

3. Meters must be installed at the licence holder's expense, unless the Authority determines that it will contribute to the cost.
4. Meters used for the purpose of this licence are deemed to be the property of the Authority.

for licences to operate works only

5. The licence holder must at all times provide the Authority with safe access to inspect all works listed on this licence.
6. Works may only be operated under this licence if it is taken through a meter approved by the Authority.
7. The licence holder must at all times provide the Authority with safe access to meters for the purpose of reading, calibration or maintenance.
8. The licence holder must notify the Authority within one business day if the meter ceases to function or operate properly.
9. The licence holder must not, without the consent of the Authority, interfere with, disconnect or remove any meter used for the purposes of the licence.
10. Water may only be taken through the works if the works are located at the site specified in the licence.
11. The licence holder must keep all works, appliances and dams associated with this licence, including outlet pipes and valves, in a safe and operable condition, and free from obstacles and vegetation that might hinder access to works.
12. Works must not be altered, removed or decommissioned without a licence that authorises alteration, removal or decommissioning.
13. Water must not be taken through the works if the Authority reasonably believes fuel, or lubricant, or any other matter used in connection with works and appliances associated with this licence, is at risk of polluting a waterway, or aquifer, or the riparian or riverine environment.
14. The licence holder must construct and maintain bund walls around any hydrocarbon-fuel-driven engine, motor, fuel storage or chemical storage used in connection with this licence, in accordance with the timeframe, specifications, guidelines or standards set down by the Authority.
15. Water must not be taken through the works if the Authority reasonably believes that the taking of water, through the works and appliances associated with this licence, is at risk of causing damage to the environment.

Works licences relating to private dams

for licences to construct or operate on-waterway dams

16. Bypass mechanisms must be installed and maintained in good working order to ensure that –
 - a. outside the take period specified on any related take and use licence, none of the natural flow in the waterway is harvested into the dam, and
 - b. during the take period, minimum passing flow rates of [number to be specified] megalitres per day are passed by the dam.

for licences to construct or operate off-waterway dams

17. Bypass mechanisms must be installed and maintained in good working order to ensure no run-off is harvested outside the take period.

for licences to construct a potentially hazardous dam

18. The dam and associated works must be designed and constructed under the direct supervision of an engineer eligible for membership of the Institution of Engineers Australia who is able to demonstrate competence in the design, construction supervision and surveillance of dams.
19. The licence holder must ensure that the engineer responsible for design and construction of the dam holds professional indemnity insurance for an amount of \$[insert text here] million with an undertaking to maintain the cover for at least seven years following the construction of the dam.
20. The licence holder must notify the Authority at least five business days prior to work commencing on the dam, and must also notify the Authority if work is to cease for an extended period during construction.

for licences to operate a potentially hazardous dam

21. The dam and associated works must not be made operational until the Authority acknowledges receipt of a completed and acceptable dam safety surveillance plan and an emergency management plan.
22. The dam safety emergency plan must include actions to be taken by the licence holder that provide effective and timely warnings to potentially impacted downstream communities, Victorian Police, Victoria State Emergency Service and the Authority in the event of a possible or actual dam failure.
23. The dam safety surveillance plan and dam safety emergency plan must be signed off by a suitably qualified engineer.
24. The licence holder must lodge two copies of a dam safety emergency plan with the Authority. The authority must then provide a copy of this plan to the State Control Centre.
25. The licence holder must provide the Authority with the results of any dam safety surveillance plan within 12 months of the issue of this licence and thereafter inspection and monitoring records at any other time requested by the Authority.
26. The licence holder must, if directed by the Authority, amend the dam safety surveillance plan and dam safety emergency plan at any time.

27. If a deficiency is found in the structure of the dam that is likely to lead to an uncontrolled flow of water from the dam, the licence holder must immediately advise the Authority of the nature of the deficiency and engage a suitably qualified engineer to propose a program to rectify it.
28. The licence holder must carry out, to the satisfaction of the Authority, any remedial works identified by a suitably qualified engineer.
29. The dam and associated works must not be altered, removed or decommissioned without a works licence that authorises alteration, removal or decommissioning.

Works licences relating to bores

for licences to construct or alter a bore

30. The works referred to in the licence must not be made operational until the Authority acknowledges receipt of an acceptable Bore Completion Report.
31. The bore(s) must be drilled at the location specified in the application approved by the Authority, but if after drilling a bore is considered unsatisfactory, another bore may be drilled at an alternative site no greater than 20 metres from the authorised site and no closer to neighbouring bores or nearby waterways, or as authorised by the Authority before the commencement of drilling.
32. The bore(s) must be constructed so as to prevent aquifer contamination caused by vertical flow outside the casing.
33. If two or more aquifers are encountered, the bore(s) must be constructed to ensure that an impervious seal is made and maintained between each aquifer to prevent aquifer connection through vertical flow outside the casing; under no circumstances are two or more aquifers to be screened within the one bore or in any other manner to allow connection between them.
34. Drilling must not exceed the proposed depth unless the Authority approves, in advance, drilling beyond this depth.
35. The diameter of the bore-casing must not exceed [insert number here] millimetres.
36. The bore(s) must be constructed so that water levels in the bore(s) can be measured by an airline, a piezometer or a method approved in writing by the Authority.

for licences to construct, alter or decommission a bore

37. The bore(s) must be constructed, altered and/or decommissioned, in accordance with the Minimum Construction Requirements for Water Bores in Australia, Edition 3, or its successor.
38. The bore(s) must be constructed, altered and/or decommissioned, by, or under the direct supervision of, a driller licensed under the Water Act 1989 as a either a Class 1, 2 or 3 driller with appropriate endorsements.
39. Bore construction, alteration and/or decommissioning, must be supervised, and certified to be in accordance with the approved application, by a person accredited as [insert text here].
40. The licence holder must ensure that the licensed driller sends a Bore Completion Report to the Authority within twenty-eight working days of the bore(s) being completed.

41. All earthworks must be carried out, and all drilling fluids and waters produced during construction and development must be disposed of, in ways that avoid contaminating native vegetation, waterways, aquifers, the riparian environment, the riverine environment or other people's property.
42. Construction must stop immediately if the Authority reasonably believes that fuel, lubricant, drilling fluid, soil or water produced during construction and development is at risk of being spilled into native vegetation, waterways, aquifers, the riparian environment, the riverine environment or other people's property.
43. The licence holder must construct and maintain bund walls, in accordance with the timeframe, specifications, guidelines or standards prescribed by the Authority, to prevent fuel, lubricant, drilling fluid, soil or water produced during construction and development from being spilled into native vegetation, waterways, aquifers, the riparian environment, the riverine environment or other people's property.

for licences to operate a bore

44. The licence holder must, if required by the Authority, provide the Authority with the results of water quality tests on samples of water pumped from the bore.
45. The licence holder must provide the Authority with safe access to the licensed bore and works for the purposes of obtaining water level measurements, water samples and any other information or data pertaining to the operation of the bore, the works and the aquifer.
46. The bore(s) must not be altered or decommissioned without a works licence that authorises alteration, or decommissioning.

Schedule 2: WORKS PLAN

Background

A works plan enables the applicant to demonstrate that the public safety, aesthetic, archaeological, environmental and water resource values of the waterway, aquifer, or the riparian or riverine environment will be protected during construction, alteration, operation and/or decommissioning of the works (and associated works).

In setting conditions on a works licence, the delegate may refer to the provisions of a relevant works plan. This by no means transfers any risks or obligations associated with the management and operation of the works from the licence holder to the delegate.

The applicant is responsible for ensuring that the works plan complies with the Aboriginal Heritage Act (2006) and is consistent with any agreement made under the Native Title Settlement Framework (2009) such as an Indigenous Management Agreement or Land Use Activity Agreement.

The applicant is responsible for ensuring that the works plan complies with matters listed under section 40 (b) to (n) of the Act, including matters listed under any relevant act and or strategy such as the relevant regional strategy for healthy rivers and wetlands.

Requirements

1. Requirements within this Schedule may be modified or waived by the delegate after consultation with and written agreement from the relevant Catchment Management Authority.
2. If the relevant Catchment Management Authority seeks further information on any of the matters listed below because it considers this necessary to determine whether the site is suitable for sustainable development and the potential off-site impacts, then the delegate may require further information.
3. A works plan must include –
 - (a) a siting map in accordance with sub clause 4 of this Schedule;
 - (b) if the application is for a licence to construct or alter works on a waterway, a construction plan in accordance with sub clause 5 of this Schedule;
 - (c) if the application relates to a potentially hazardous dam, the requirements specified in sub clause 6 of this Schedule;
 - (d) if the application is for a licence to construct or alter an on-waterway dam, an Environmental Assessment Report in accordance with sub clause 7 of this Schedule;
 - (e) if the application is for a licence to decommission or remove works, a decommissioning plan in accordance with clauses 8 and 9 of this Schedule;
 - (f) if the application is to construct, alter or operate works, an operation plan in accordance with sub clause 10 of this Schedule.
4. A siting map of the proposed works is to be prepared which clearly identifies –
 - (a) property boundaries and land ownership of the land on which the works and associated works are sited;
 - (b) existing native vegetation;
 - (c) the location of the proposed works and associated works.
 - (d) details of the actual works including, but not limited to -

- (i) fully dimensioned design plans including cross sections and any relevant technical features; and
 - (ii) survey of the waterway channel at the works location for any works on waterways.
- (e) the location of existing features including waterways, works, buildings, powerlines, easements, roads, access tracks, fences, channels, drains, pipelines, water storages.

Note that any works on a waterway must be located to avoid unstable sections of the waterway including banks that are susceptible to slumping, (such as the outside of tight river bends or vertical banks); and areas where siltation is likely to affect inlets, (such as the inside or a river bend where sand accumulates).

5. A construction plan must be prepared by the applicant which clearly identifies how the applicant will –
- (a) liaise with relevant Aboriginal and cultural heritage authorities to avoid or minimise the impacts on any relevant sites or objects;
 - (b) avoid or minimise disturbance to native vegetation;
 - (c) avoid or minimise impact on threatened species and communities;
 - (d) restore any native vegetation that is disturbed with local indigenous species in accordance with an approved native vegetation offset plan;
 - (e) decommission any disused works, which are assessed as having no aesthetic or historic value, and remove the material from the site within 30 days of the works becoming redundant;
 - (f) prevent fuel or lubricant or any other matter used in connection with works and appliances from entering into and polluting the waterway, the riparian or riverine environment;
 - (g) return soil disturbed during construction to its original profile and compact and revegetate it to protect it from erosion;
 - (h) restore ground surface levels disturbed by excavation and installation and revegetate with local indigenous species;
 - (i) make provision for the installation of meters to the licensing authorities requirements;
 - (j) ensure that no filters filtrate, irrigation controls and fertigation are placed on the waterway; and
 - (k) minimise disturbance to the floodplain and waterway by, where practical, –
 - (i) consolidating the works sites and access tracks;
 - (ii) making use of existing works, access tracks and powerlines;
 - (iii) placing new powerlines and delivery pipes underground;
 - (iv) ensuring any pumphouses are as small as practicable;
 - (v) colouring and screening any pumphouses to be compatible with the surrounding environment.

- (l) where practical, fix power authority-approved electrical fittings above the Nominal Flood Protection Level (300 mm above the 100 year ARI flood level).
 - (m) where practical, raise and secure suction pipes above bank slopes to minimise the collection of flood debris; and
 - (n) where practical, ensure the inlet, strainer and foot valves can accommodate fluctuation in water levels (including fluctuations below any existing weir pool minimum operating levels).
6. For any potentially hazardous dam, a plan for constructing the proposed works or altering the existing works must also include:
- (a) details of the suitably qualified engineer(s) and any contractor(s) responsible for the:
 - (i) investigation and design,
 - (ii) construction supervision; and
 - (iii) preparation of the dam safety surveillance plan and dam safety emergency plan.
 - (b) technical features of the dam including:
 - (i) type of dam (i.e. earthfill, rockfill or concrete)
 - (ii) other details including height of wall, full supply level, surface area, spillway capacity, designed flood (AEP), outlet pipe and upstream and downstream valve.
 - (c) hazard category (very low to extreme) according to the ANCOLD guidelines.
 - (d) locality plan at an appropriate scale showing orientation, location of roads, bridges, buildings and fences in the vicinity of the embankment, and the area to be inundated by the stored water.
7. When constructing, enlarging or replacing a private dam on a waterway with high ecological values or on a watercourse, an Environmental Assessment Report must be completed by a suitably qualified consultant and be developed in consultation with relevant catchment management authority or any departmental directions.
- (Note that the Department may issue guidelines relating to the requirements of an Environmental Assessment Report).*
8. When removing or decommissioning a potentially hazardous dam, a detailed plan must be developed by a suitably qualified engineer.
9. A plan for removing or decommissioning existing works is to be prepared which clearly identifies how the applicant will where practical –
- (a) liaise with relevant Aboriginal and cultural heritage authorities to avoid or minimise the impacts of decommissioning on any relevant sites or objects;
 - (b) avoid or minimise disturbance to native vegetation;
 - (c) avoid or minimise impact on threatened species and communities;

- (d) prevent fuel or lubricant or any other matter used in connection with works and appliances from entering into and polluting the waterway, or aquifer, or the riparian or riverine environment;
- (e) restore any native vegetation that is disturbed during decommissioning with local indigenous species in accordance with an approved native vegetation offset plan;
- (f) restore ground surface levels and waterway embankments to reflect the topography prior to the works' construction and compact and revegetate the site with local indigenous species to protect it from erosion;

(Note that for works on a waterway, the banks may require beaching to protect against erosion from river flow);

- (g) where practical, make use of existing powerlines, works and access tracks;
- (h) shut down and revegetate any tracks that will not be required for future access.

10. A plan for operating and maintaining the proposed works is to be prepared which clearly identifies how the applicant will –

- (a) keep the site clear of rubbish and debris at all times;
- (b) monitor and avoid any damage, erosion or degradation to the nearby waterway, aquifer or riparian environment resulting from the works;
- (c) prevent fuel or lubricant or any other matter used in connection with works and appliances from entering into and polluting the waterway, or aquifer, or the riparian or riverine environment; and
- (d) not interfere with or restrict the access rights of the public or other water users.

SCHEDULE 3

SELECTION CRITERIA FOR CONSULTANTS TO UNDERTAKE ENVIRONMENTAL ASSESSMENT REPORT

A list of suitably qualified consultants will be derived from these selection criteria.

- The consultant should have experience in conducting environmental impact assessments, including details and limitations of methods employed (eg. timing of assessment and effects of seasonality).
- The consultant should have a good understanding of the cumulative impacts of diversions and potential changes to flows.
- Consultant team should have demonstrated expertise in:
 - Fish biology, including distribution, habitat and flow requirements.
 - Terrestrial flora, including riparian and other areas likely to be impacted by dam construction (eg. native grasses and orchids).
 - Riparian ecosystem requirements (eg. riparian fauna).
 - Amphibians, other aquatic vertebrates, reptiles, water birds and macroinvertebrates.
 - Aquatic ecological processes and threats to the ecosystem (eg. barriers to fish movement, sedimentation, changes to flow, water quality, temperature, loss of habitat heterogeneity).
 - Hydrology (eg. assessment of potential changes to flow downstream).

If the consultant does not have expertise in one or two areas, then they should demonstrate how they would bring in those skills (eg. form a partnership or consortium). The consultant should state the name and qualification of the person(s) who provided the expertise.

- Proven track record of producing clear, concise and well-documented reports in appropriate time frames. There should be evidence of high quality and defensible work.
- Familiarity with sources of biological data, including the DELWP and EPA databases, and other appropriate lists/publications. The consultant must be able to extrapolate the information from the databases to the region where the dam is to be placed.
- Good knowledge and understanding of Victorian and Commonwealth legislative requirements, including (but not limited to):
 - *Water Act 1989*
 - *Flora and Fauna Guarantee Act 1988*
 - *Victoria's Biodiversity Strategy (1999)*
 - *Native Title Act 1993*
 - *Environment Protection and Biodiversity Conservation Act 1999*
 - *Planning and Environment Act 1987*
 - Catchment Management Authority regional management plans
 - local Council planning schemes and other strategies

The consultant should demonstrate how the assessment report addresses issues relevant to any legislative and policy obligations. Under clause 66 of the *Conservation Forest and Lands Act (1987)*, water authorities are required to submit plans of works to the Secretary of the Department of Environment, Land, Water and Planning for comment, where such works will involve the “construction of dams, weirs or other structures in or across watercourses which potentially interfere with the movement of fish, or the quality of aquatic habitat”.

SCHEDULE 4

REQUIREMENTS FOR ENVIRONMENTAL ASSESSMENT REPORTS

AIM OF REQUIREMENTS

To guide consultants to prepare adequate Environmental Assessment Reports that enable the evaluation of the environmental impacts of proposed new, enlarged or replacement dams.

APPLICATION

Consultants who have been engaged to prepare an Environmental Assessment Report must ensure that the Report conforms to the requirements listed in this Schedule.

The Licensing Authority is required to refer an application for a licence to take and use water and a licence to construct a dam to the following referral bodies:

- (a) the Department of Environment, Land, Water and Planning (DELWP); and
- (b) the relevant Catchment Management Authority; and
- (c) the relevant Council (construction licence only); and
- (d) Melbourne Water, in Melbourne Water's area; and
- (e) any Authority holding a bulk entitlement

If a referral body considers that an Environmental Assessment Report does not comply with the requirements listed in this Schedule, the consultant may be required to provide further information.

ROLE OF ENVIRONMENTAL ASSESSMENT REPORT

Consultants are required to collect information and provide advice on any potential impacts to the environment. They are not required to provide fishway designs, undertake fish surveys or provide recommendations on specific environmental flows.

Consultants are also not required to provide a final recommendation on the proposal; this is the responsibility of the Referral bodies and Licensing Authority.

DATA COLLECTION

Consultants are expected to undertake site inspections as part of preparing the Environmental Assessment Report. However, extensive field studies, such as detailed flora and fauna surveys or environmental flow studies, are not part of the process.

Consultants will need to utilise databases and other publications as sources of existing information on sites of conservation significance for wetlands, indigenous flora, fauna (including fish) and fauna habitat in the catchment in order to complete the Environmental Assessment Report.

In reporting on existing information consultants should also include a description of habitats, populations or assemblages of significance at a local, regional, state or national level.

REPORT STRUCTURE

All sections of the report must be completed. The guidelines are aimed at highlighting the type of information that will be required for assessment. The level of detail required will depend on the environmental issues associated with the proposal. Where sections are not applicable; information is not available; or there is insufficient data, it must be noted down in the report with justifications. Some of the information required in this report will be available from the applicant.

Part 1: Background Information

1.1 Accurate Location of dam Site

The Environmental Assessment Report must include a map or photocopy with the following features:

- north point;
- Melways/ VicRoads / Australian Map Grid Zone and Northing and Easting of the proposed site;
- indication of the topography;
- an appropriate scale (1:25,000, 1:10,000 or similar) to show:
 - the proposed dam and diversion;
 - the position of surrounding waterways, streams and tributaries, wetlands or other natural features and their names where possible;
 - boundaries of the applicant's land and approximate measurements;
 - location of adjacent roads and distance from nearest intersecting roads;
 - existing dams on waterway or run-off channel, and on surrounding properties;
 - existing indigenous vegetation (both instream and riparian);
 - field inspection sites; and
 - sites of all photos included in report.

1.2 General Information

The Environmental Assessment Report must include the following general information to convey an understanding of the nature of the proposal in relation to the surrounding land and water use in the catchment. The report must also include the field inspection date(s).

Dam Site and Catchment Condition

- estimated catchment area above proposed dam;
- landuse on property and adjacent areas (eg. forested, irrigation, dairy, horticulture etc.);
- general comments on flows in the system, including seasonal variation (eg. permanent, ephemeral, months of flow). Gauged flow data should be used if available, otherwise some indication from local landholders can be useful;
- purpose of dam (eg. pasture, commercial, vines, aquaculture etc.);
- description of dam characteristics (volume of water at full supply level, position relative to stream and other dams); and
- Ecological Vegetation Class description of any existing riparian vegetation – extent and type.

Stream Condition

- stream condition from the Index of Stream Condition (ISC) web site via the **Water Management Information System** <http://data.water.vic.gov.au/monitoring.htm>

If no information is available from the web site, then the following information must be included:

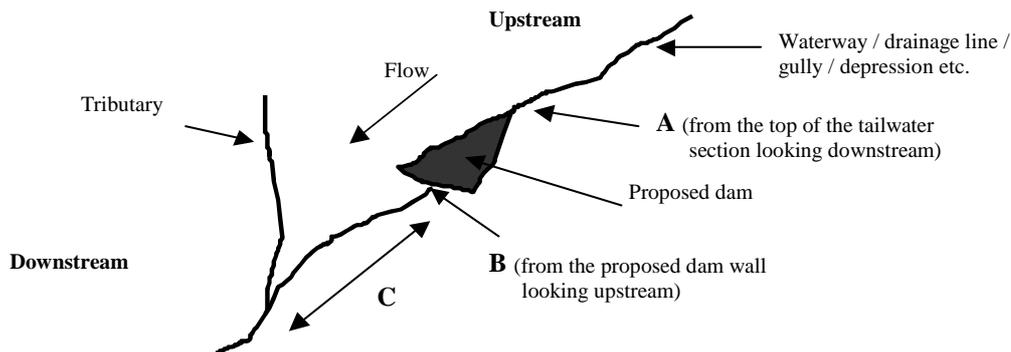
- presence and location of any pools and riffles;
- substrate type (eg. silt, gravel, rocky etc);
- instream debris (eg. snags, leaf packs etc);
- bank stability; and
- riparian vegetation (eg. extent, width, composition, location etc.)

1.3 Photographs

Photographs should be provided of the proposed dam site:

- Taken from (A) downstream (refer to diagram below), and
- (B) upstream; and
- waterway / drainage line / gully / depression etc. downstream of proposed site at several locations (C: up to 500m downstream or to the next major tributary, whichever is the lesser)

The photographs must be labelled with site details and distance. They must also be clear, focussed and show sufficient details of the proposed site and other relevant sites. Please indicate on the locality map from where the photographs were taken as per the following example.



1.4 Legislation, Policy and Programs

The Environmental Assessment Report must include comments on whether the proposal is consistent with the following legislation, policies, plans and strategies. The Licensing Authorities will have information regarding some of the following legislation, policies, plans and strategies.

The report must include names and details of officers contacted within each of the following organisations.

Contact organisation - regional offices of DELWP:

- Aboriginal and Torres Strait Islander Heritage Protection Act 1984;
- Archaeological and Aboriginal Relics Preservation Act 1972;
- Directory of Important Wetlands in Australia (including Ramsar, JAMBA and CAMBA listings);
- Fisheries Act 1995;
- Flora and Fauna Guarantee Act 1988 and associated action statements;
- Heritage Rivers Act 1992;
- Matters of national significance (*Environment Protection and Biodiversity Conservation Act 1999*);
- Victoria's Biodiversity Strategy (Victoria's Biodiversity - Our Living Wealth, Victoria's Biodiversity - Sustaining Our Living Wealth, Victoria's Biodiversity - Directions in Management).

Contact organisation - regional Catchment Management Authority or Catchment and Land Protection Board:

- Catchment and Land Protection Act 1994;
- Regional Catchment Strategy;
- Regional Vegetation Plans;
- Regional River Health Plans;
- Regional Waterway Management Plans;
- Salinity Management Plans;
- Nutrient Management Plans;
- Flood plain Management Strategy and Plans

Contact organisation - Local Government:

- Matters to be covered by the Planning Permit where required;
- Planning and Environment Act (1987); and
- Victorian Planning Provisions (1996).

Contact organisation - regional office of the Victorian Environment Protection Authority:

- State Environment Protection Policy (Waters of Victoria) 1999.

Contact organisation – regional Rural Water Corporation or Non-metropolitan Urban Water Corporation:

- relevant Bulk Entitlement Orders;
- relevant Streamflow Management Plans; and
- special water supply catchment areas.

Part 2: Specific Environmental Issues

The Environmental Assessment Report must include comment on the specific environmental issues listed below. In addressing each issue, consultants must take into account any relevant legislation, policies and programs outlined in section 1.4, and discuss the potential impacts of the construction and operation of the dam itself.

2.1 Existing Information

The Environmental Assessment Report must include a summary of relevant existing information, in particular, the following DELWP databases (contact the Arthur Rylah Institute, Heidelberg):

- Flora Information System;
- Atlas of Victorian Wildlife;
- Aquatic Fauna Database;
- Wetlands Database; and
- other relevant publications, including Sites of Significance Reports.

Information from the databases may need to be extrapolated to the appropriate reach of the catchment. It is likely that many streams will not have been surveyed. In these cases consultants should list species that have been recorded in or in the vicinity of nearby streams (from DELWP databases or other appropriate reports) and comment on the likelihood of those species occurring in the area under review, though there may be no formal records of their occurrence. For example, if no fish species data exists for the local area of the dam proposal, but the species is recorded further downstream, the consultant needs to provide a justifiable assessment of whether the species is likely to be found at the proposed dam site, based on the fish database and their own knowledge. If there is a lack of data, or data is unavailable, then any knowledge gaps should be highlighted.

Sources of information must be referenced and all methods used as part of site inspections or desktop calculations must be clearly outlined.

2.2 Stream Flows

Although the Interim Diversion Limit Methodology and Sustainable Diversion Limits project will provide an indication on catchment and sub-catchment yields, the Environmental Assessment Report must:

- discuss the potential impacts to the existing flow regime at a local level as a result of the proposal;
- state whether any designated environmental flows exist downstream of the proposed site and discuss the potential impacts on this flow as a result of the proposal (eg. changes to the frequency, duration, timing and magnitude of flows). These may be derived from any relevant Bulk Entitlement Orders, Streamflow Management Plans or other sources.

2.3 Fish

Fish species in the system need to be considered since changes to natural flow patterns will affect fish species and dams on waterways have a potential to impede flows and act as physical barriers to fish passage - preventing migratory species from reaching important spawning grounds and habitat, and isolating populations.

The Environmental Assessment Report must include:

- a list of fish species found, or likely to be found, in the system (both native and introduced);
- conservation status of native fish at a state and national level;
- general comment on fish habitat in the catchment and at the local site; and
- discussion of the potential impacts of the proposal on fish life histories and habitat (including localised movement and migration).

2.4 Other Fauna

The Environmental Assessment Report must:

- List fauna dependent on the aquatic environment including their conservation status (at state and national level). Major groups of fauna may include:
 - platypus;
 - water rats;
 - crustaceans (eg. freshwater crayfish);
 - reptiles;
 - frogs;
 - mussels; and
 - aquatic macro-invertebrates
- discuss potential impacts of the proposal on these species and their habitat (including hollows in trees).

2.5 Riparian and Instream Vegetation

The Environmental Assessment Report must:

- describe (and provide photos of) any remnant instream and riparian vegetation downstream of the dam site to the next major tributary and discuss likely impacts on this vegetation due to changes in flow;
- highlight whether any native vegetation is to be cleared or inundated by the proposed dam, and the importance of this vegetation including its role as wildlife corridors;
- describe species and their current condition that will be inundated, cleared or disturbed by irrigation run-off as a consequence of the proposed dam. The consultant must report on the species and/or communities (including Ecological Vegetation Class) affected and the nature and extent of the disturbance; and
- state whether there is woody debris such as logs and branches at the proposed site and how this will be affected by the proposal.

2.6 Wetlands, springs and soaks

The Environmental Assessment Report must:

- identify any wetlands, marshes or soaks on, or adjacent to the proposed site (including ephemeral wetlands and dry lakebeds) - and describe or mark on the map their size and position;
- assess whether the dam will alter any existing wetland or soak either directly (eg. inundation by the dam or its tailwaters) or indirectly (eg. wetlands downstream of the proposed dam site that may be affected by changes to flows); and
- potential impacts on wetlands high conservation value (eg. Ramsar, CAMBA and JAMBA listed wetlands) must be specifically addressed.

2.7 Water Quality

The Environmental Assessment Report must:

- outline any known or suspected water quality issues that exist in the catchment; and
- discuss the potential effects on water quality of changes to flow likely to result from the proposed development (eg. sedimentation, salinity, dissolved oxygen concentrations, temperature etc.).

The Environment Protection Authority or the Catchment Management Authority should be able to provide information on water quality issues.

2.8 Land Tenure

The Environmental Assessment Report must describe land tenure adjacent to and downstream of the proposed dam site (eg. special conservation areas and National Parks, Heritage Rivers and Natural Catchment Areas as described by the Heritage Rivers Act and associated management plans, special water supply catchment areas etc.).

Part 3: Industries Dependent on Natural Environment

The Environmental Assessment Report must state whether any of the following industries exist immediately downstream of the dam and how they are likely to be affected by the diversion of water, and the construction and operation of the dam itself:

- recognised recreational fishery;
- aquaculture;
- commercial fishery; and
- recognised tourism and recreation values.

Part 4: Conditions on Construction and Operation of Dam

4.1 Timing of Construction

The direct impact of dam construction will vary depending on the water level of a stream and any rainfall that may occur during the construction process. Any earthworks etc., on or near a waterway should be conducted in a manner that reduces impact on the environment including:

- minimising the restriction of fish movement;
- limitation of vegetation removal; and
- limitation of sediment input.

The Environmental Assessment Report must provide a clear indication of the month(s) in which it is proposed to construct the dam in order to minimise potential environmental impacts (eg. water quality, erosion, sedimentation, interference with base flows required to maintain aquatic and riparian biota).

4.2 Dam Specifications and Management

In some circumstances there may be specific conditions that need to be placed on the operation of the dam to minimise the impacts of the dam to environmental values.

The Environmental Assessment Report must discuss the need for, but not necessarily specify:

- passing flows;
- fish passage;
- site rehabilitation;
- bank stabilisation; and
- restriction of stock access to the dam or waterway.

Appendix 4 – Policies for Managing of Take and Use Licences

Water Act 1989

Policies for Managing Take and Use Licences

I, Peter Walsh, Minister for Water, as Minister administering the *Water Act 1989*, reissue the following policies to the rural water corporations for the management of take and use licences under Division 2 of Part 4 of the Act.



PETER WALSH
Minister for Water

Date: 2.2.2014

PART 1 – GENERAL

1. Purpose

The purpose of this document is to establish written policies for the management of take and use licences.

2. Manner of taking effect

- (1) Where an Instrument of Delegation made under section 306 of the Act requires any powers, discretions, functions, authorities and duties to be exercised in accordance with any written policies issued by the Minister, a delegate managing take and use licences must do so in accordance with these Policies.
- (2) The provisions in the Act relating to the management of take and use licences include –
 - (a) sections 51, 53, 58 and 62 of the Act (concerning applications for the issue, renewal or transfer of a take and use licence), and
 - (b) section 56 of the Act (concerning conditions in a take and use licence).

3. Commencement

These Policies come into operation on the day on which they are issued.

4. Application

These Policies apply to all licences to take and use water in Victoria. It is clear from certain clauses however that those clauses only apply to licences for surface water or groundwater or to licences in particular areas or water systems.

Note: these Policies supplement but do not replace the requirements under section 53 of the Act for delegates to have regard to various matters notably those listed in section 40 of the Act, covering environmental and third party effects, before approving applications to issue, renew or transfer licences.

5. Revocation of guidelines made previously

- (1) The “Ministerial Guidelines for Managing Diversion Licences” issued by the Minister for Environment and Conservation on 14 October 2002 are revoked.
- (2) The “Ministerial Guidelines for Licensing groundwater for Urban Water Supply” issued by the Minister for Water on 7 July 2008 are revoked.
- (3) The “Ministerial Guidelines for Licensing Irrigation and Commercial Use Surface Water” issued by the Minister for Environment and Conservation on 26 June 2002 are revoked.

6. Definitions

“**Act**” means the *Water Act 1989*;

“**all-year licence**” means a licence that permits a person to take (including by harvesting in a catchment dam) surface water at any time during a year;

“**annual use limit**” in relation to a licence means the maximum volume of water that may be applied to the land specified in the licence in any water season;

“**available water**” for a catchment means the volume of water not yet authorised to be taken and thus currently available to be taken between 1 July and 31 October in any year, and is calculated by subtracting the volume of water currently authorised to be taken between 1 July and 31 October (under a licence, a bulk entitlement, or a private right under section 8(1) or 8(4)(c) of the Act) from the sustainable diversion limit for that catchment;

“**catchment dam**” means a dam that solely harvests run-off and is not on a waterway or used to store water taken from a waterway;

“**delegate**” means a person to whom the relevant power is delegated under an Instrument of Delegation made under section 306 of the Act;

“**Department**” means the Department of Environment and Primary Industries;

“**licence**” means a take and use licence issued under Division 2 of Part 4 of the Act;

“**licence volume**” is the maximum volume that the licence holder is authorised to take under a licence in a water season or in any shorter take period stated in the licence;

“**management plan**” means a management plan that is for a water supply protection area and that has been approved by the Minister under section 32A of the Act;

“**new licence**” includes a licence that results from an application for issue of a licence or for approval of a transfer of a licence, but does not include a licence that results from an application to renew a licence under section 58 of the Act;

“**northern Victoria**” means that part of Victoria north of the Great Dividing Range (that is, that part of Victoria in the Murray-Darling Basin);

“**register operational date**” is –

- (a) for those licences managed by Goulburn-Murray Water or Melbourne Water or Southern Rural Water, 31 August 2009; and
- (b) for those licences managed by any other delegate, a date that the Secretary of the Department advises the delegate in writing;

“southern Victoria” means that part of Victoria south of the Great Dividing Range;

“stormwater works” means

- (a) channels, drains or pipes or associated works, including box culverts, owned or operated for the purpose of collecting or conveying stormwater runoff from an urban area or development; and
- (b) retarding basins or wetlands constructed or operated for the purpose of holding or treating stormwater runoff from an urban area or development; and
- (c) in the case of Melbourne Water Corporation, works listed in Melbourne Water Corporation’s asset register and used for the purposes of carrying out its regional drainage functions under Part 10 of the Act;

“sustainable diversion limit (SDL)” 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 statewide assessments, unless a different value has been determined, either –

- (i) as part of a management plan, or
- (ii) after detailed study of a localised area in accordance with Schedule 1;

“unregulated water system” means a surface water system where flows in waterways are not regulated by public dams to secure water supplies to licence holders;

“unregulated trading zone” means a part of an unregulated water system listed in Schedule 4;

“water allocation” in relation to a licence, means the volume of water allowed to be taken under the licence in the current water season, and unless the delegate has determined a lower proportion in a particular water season is the same as the licence volume;

“water register” means the Victorian water register established under Part 5A of the Act;

“water season” means any period of 12 calendar months beginning on 1 July in any year and ending on 30 June in the following year;

“water share” means a water share issued under Division 2 of Part 3A of the Act;

“winter-fill licence” means a licence that only entitles a person to divert surface water to, or harvest surface water in, a private dam during specified months including some winter months.

PART 2 – ISSUE OF LICENCES

7. Limits on the issue of new licences

- (1) A delegate may not issue any new licence if this would result in the total volume of licences and other authorisations to take water from an area (for example, a river basin) or water system (for example, an aquifer), being greater than any permissible consumptive volume (PCV) determined for that area or water system under section 22A of the Act.

Note: this is consistent with section 55(2B) of the Act – though that section does not cover licences, that result from transfers, for example; and frames the limit in terms of possible allocation or use of water, rather than in terms of the volume of licences and other authorisations.

- (2) In northern Victoria, a delegate may not issue any new licence for surface water, except where the delegate does this as a result of –
- (a) a transfer of a licence under section 62 of the Act, or
 - (b) the cancellation of a water share under section 33ABA of the Act, or
 - (c) the surrender of licences to be replaced by consolidated licences or divided licences or licences with different conditions, or
 - (d) the surrender of a registration licence to be replaced by a licence in accordance with section 51A of the Act, or

(e) a sale of a water licence by a water corporation or the Minister –

and in each of these cases the delegate may issue the licence only to the extent of the volume of the licence transferred or surrendered, the water share cancelled, or the water sold.

- (3) In the river basins in southern Victoria, a delegate may not issue any new all-year licence, except where the delegate does this as a result of –
- (a) a transfer of an all-year licence under section 62 of the Act, or
 - (b) the cancellation of a water share under section 33ABA of the Act, or
 - (c) the surrender of all-year licences to be replaced by consolidated licences or divided licences or licences with different conditions, or
 - (d) the surrender of a registration licence to be replaced by a licence in accordance with section 51A of the Act, or
 - (e) a sale of water by a water corporation or the Minister –

and in each of these cases the delegate may issue the licence only to the extent of the volume of the licence transferred or surrendered, the water share cancelled, or the water sold.

Note: even the issue of a winter-fill licence will generally need to be the result of a transfer, since most of the southern river basins have no room left under their PCVs or their SDLs.

Issue of a licence via a transfer is still subject to the trading rules below and the requirements under section 53 of the Act to have regard to adverse effects.

- (4) Where sub-clause (2) or (3) would otherwise prevent a delegate from issuing a licence to extract water from a waterway, a delegate may issue a licence if the licence includes a condition that requires all the water to be returned to the waterway or to be used in the waterway for a non-consumptive purpose.

Note: in a declared water system, where licences generally have been replaced by “unbundled” rights, it is still possible, under section 51(1AA) of the Act, in specific circumstances to have a licence, including where full return is a condition.

- (5) In issuing a licence under section 51(1AA), a delegate will specify the licence volume as the volume to be taken and a condition must be included in the licence to require a specified volume of water to be returned to the waterway.
- (6) Where sub-clauses (1), (2) or (3) would otherwise prevent a delegate from issuing a licence to extract water, a delegate may issue a licence in the circumstances and subject to the conditions specified in clause 9A.

8. Management Plans [removed]

9. Sustainable diversion limits applied to winter-fill licences

- (1) In considering any application for the issue of a winter-fill licence, or for the transfer of a winter-fill licence to a different extraction point, or for the transfer of an all-year licence to become a winter-fill licence at a different extraction point, a delegate must –
 - (a) calculate, using the sustainable diversion limit methodology as set out in Schedule 1, the available water for:
 - (i) the catchment that covers the whole area upstream of the point at which water is proposed to be taken,
and, as required under paragraph (b) of this Policy, for:
 - (ii) progressively larger catchments moving downstream from the point at which the water is proposed to be taken; and
 - (b) subject to sub-clause (2), refuse the application –
 - (i) where the application is for *issue* of a winter-fill licence with no transfer, if there is not enough available water in the catchment referred to in paragraph (a)(i) or in any of the downstream catchments referred to in paragraph (a)(ii) as far as the furthest downstream catchment for which sustainable diversion limits are defined for the river basin;
 - (ii) where the application is for any *upstream transfer* to be a winter-fill licence, if there is not enough available water in the catchment referred to in paragraph (a)(i) or in any of the downstream catchments referred to in paragraph (a)(ii) as far as the catchment immediately upstream of the one that includes the point from which the transfer is proposed.
- (2) A delegate may approve the transfer of an all-year licence to become a winter-fill licence which the delegate would otherwise be required to refuse under sub-clause 9(1)(b), if it is the delegate's view that –
 - (a) the adverse effect on winter flows will be outweighed by the beneficial effect on summer flows, and this assessment is agreed to in writing by the relevant catchment management authority, and
 - (b) there will be no undue adverse impacts on other water users.

Note: any downstream transfer to be a winter-fill licence is allowable under this Policy, assuming the transfer is down the same tributary or to a waterway into which the tributary flows. If the transfer is to a different tributary that flows into the waterway further downstream, the transfer should be seen as consisting of two legs: a downstream transfer to where the different tributary flows in, and an upstream transfer.

9A. Licensing of stormwater

- (1) Notwithstanding the other provisions in this Part, a delegate may issue a licence, including an all-year licence, to extract water from –
 - (a) the stormwater works of an Authority; or
 - (b) a waterway within an urban area at a place downstream of the stormwater works of an Authority or a municipal council.

- (2) A delegate must not consider any application for a licence to extract water as provided for in sub-clause (1) from an area in respect of which a permissible consumptive volume has been declared, unless the Minister has made commensurate adjustments to that permissible consumptive volume or granted an exemption from the requirements of section 55(2B)(a) of the Act.

Note: an Order setting a PCV may expressly take into account extractions from the stormwater works of an Authority. Otherwise, if an application for a licence to extract water would result in a PCV being exceeded, a specific exemption from the requirement of section 55(2B)(a) of the Act must be obtained from the Minister to enable the licence application to be considered and assessed.

- (3) In respect of any licence to extract water from the stormwater works of an Authority that drain directly to the sea, the licence volume must not exceed the estimated amount of water available at the place specified in the licence as the point of extraction (the point of extraction).
- (4) In respect of any licence to extract water from the stormwater works of an Authority that do not drain directly to the sea, the licence volume must not exceed –
 - (a) in the case of stormwater works that service an urban area existing as at August 2006 –
 - (i) 50% of the estimated net increase in runoff and net decrease in groundwater recharge resulting from a existing urban development or a higher percentage if the findings of an environmental study demonstrates, to the satisfaction of the delegate, that the higher percentage will result in net environmental benefits;
 - (ii) less any authorised extractions of water from the stormwater works upstream of the point of extraction; or
 - (b) in the case of stormwater works that service an urban area that has been developed since August 2006 (a new urban development) –
 - (i) up to 100% of the estimated net increase in runoff and net decrease in groundwater recharge resulting from the new urban development;
 - (ii) less any authorised extractions of water upstream from the point of extraction.

Note: August 2006 is the month in which the Central Region Sustainable Water Strategy was released announcing the new state-wide policy for stormwater.

- (5) The delegate must not issue a licence to extract water from a waterway within an urban area unless –
 - (a) the licence volume does not exceed the amount calculated in the same way as provided for in sub-clause (4) in respect of the net increase in flow in the waterway due to discharges to the waterway from the stormwater works of an Authority or a municipal council; and
 - (b) the delegate has obtained the relevant catchment management authority's approval in principle to any associated works on the waterway.
- (6) Before estimating the net increase in runoff resulting from an urban development, the delegate must be satisfied that adequate modelling has been carried out to quantify the amount of stormwater generated by the development

and the flows resulting from that development at the proposed point of extraction.

- (7) Any licence described in sub-clause (1) must include appropriate conditions, such as conditions restricting when water can be taken, the specification of a passing flow and metering and monitoring requirements to ensure that other authorised users are not adversely affected and the environmental water reserve is maintained in accordance with the environmental water reserve objective.

9B Licensing to recover water as part of a Managed Aquifer Recharge Scheme

- (1) In this clause—

“**MAR scheme**” means a scheme for the intentional recharge of an aquifer, either by injection or infiltration, and recovery by planned extraction;

“**recharge volume**” means, in relation to a MAR scheme, the volume of water disposed of underground under a section 76 MAR approval and in accordance with that approval;

“**section 76 MAR approval**” means approval issued under section 76 of the Act to dispose of water underground by means of a bore in relation to a MAR scheme.

- (2) The provisions of this clause, with the exception of sub-clause (11), relate to licences to recover water as part of a MAR scheme and, in the event of any inconsistency with other parts of this document, the provisions of this clause prevail.
- (3) An application for a licence must be accompanied by:
 - (a) a works licence(s), or an application for a works licence(s) under section 67;
 - (b) a section 76 MAR approval or an application for section 76 MAR approval; and
 - (c) a Project Plan satisfying the requirements in the Policies for Managing Section 76 Approvals.
- (4) A delegate must consult with the executive director responsible for water entitlements in the Department on an application for a licence.
- (5) A licence must include a condition that prohibits the licence holder from taking during a water season more than a specified percentage of the recharge volume for that water season (adjusted to take account of any permitted carryover and any volume temporarily transferred to another person or location).
- (6) A delegate must not specify a percentage that will result in a detrimental effect on the aquifer, other water users or the environment.
- (7) In the case of an unconfined aquifer, the specified percentage must not exceed 80 per cent of the recharge volume for a water season, unless the applicant provides sufficient evidence to warrant a higher percentage.
- (8) In the case of a confined aquifer, the specified percentage must not exceed 100 per cent of the recharge volume for a water season.
- (9) If a delegate is of the opinion that carryover could have a detrimental impact on the aquifer, other water users or the environment, a delegate must include a condition in the licence to manage those adverse impacts.

- (10) A delegate must refuse an application to temporarily transfer a licence, where the volume to be transferred exceeds the specified percentage referred to in sub-clause (5).
- (11) A delegate must refuse an application to take water from an aquifer which has been or will be recharged as part of a MAR scheme if the delegate is of the opinion that the issue of the licence may have an adverse effect on the MAR scheme.
- (12) If the proponent of a MAR scheme already holds a licence to take and use water from the aquifer and applies under section 59A for the amendment of the licence to recover water as part of the MAR scheme, the provisions of this clause apply to the application to amend the licence and the provisions of the amended licence which relate to the MAR scheme.

10 Fencing of Crown frontages

Notwithstanding other provisions in this Part, where a landholder –

- (a) holds a licence under section 130 (“agricultural licence”) or section 138 of the *Land Act 1958* over a Crown land frontage along a waterway, which licence does not permit grazing other than for less than a month a year for conservation purposes, and the Crown land frontage has within the previous five years been fenced off to exclude stock access, or
- (b) has held a licence under the *Land Act 1958* allowing grazing of a Crown land frontage along a waterway, which licence has been –
 - (i) cancelled to implement a recommendation of the Victorian Environment Assessment Council, or
 - (ii) surrendered as part of an arrangement for the Crown land frontage to be managed by a committee of management,

a delegate may issue to the landholder an all-year licence to pump water from the waterway for stock to drink, provided that –

- (c) in northern Victoria the Murray-Darling Basin Authority has agreed to commensurate adjustments to the cap on diversions set in Schedule E of the Murray-Darling Basin Agreement, and in southern Victoria the Minister has made commensurate adjustments to any relevant permissible consumptive volume; and
- (d) the licence is for a volume that is no greater than a reasonable estimate of the volume of water that the landholder’s stock have been drinking directly from the waterway; and
- (e) the licence, and any future licence issued as a result of an application to renew the licence, includes –
 - (i) a condition that requires water taken under the licence to be used for the purpose of stock watering, and
 - (ii) conditions that require the licence holder to –
 - (a) continue to hold the Land Act licence, for cases in paragraph (a), and
 - (b) ensure that stock do not gain access to the waterway other than for short periods in accordance with the Land Act licence for cases in paragraph (a), or for short periods with the agreement of the relevant land manager for cases in paragraph (b), and

- (iii) a condition that prevents the licence from being transferred to any other location; and
- (f) the delegate adheres to any guidelines set by the Secretary of the Department with respect to the circumstances where licences may be issued, calculation of licence volumes, and conditions to be placed in the licences; and
- (g) the delegate –
 - (i) takes action under section 60 of the Act to revoke the licence if there is a failure to comply with any conditions in paragraph (e)(ii), and
 - (ii) does not approve any application to transfer the licence or any future licence issued as a result of an application to renew the licence, other than to new owners of the same land.

Note: in a declared water system, for a licence to be used in this situation requires the purpose to be prescribed in accordance with section 51(1AA) of the Act.

The water that stock drink represents a diversion that is not metered and is not provided for in the cap. Licences should only cover the amount stock were drinking in 1993/94 conditions, and then the cap should be able to be increased by the same amount.

11. Licensing dairy shed water [removed]

PART 3 – CONDITIONS AND REQUIREMENTS

12. Taking of water

- (1) In issuing, renewing, or approving the transfer of a licence a delegate must include in the licence such conditions with respect to the taking of water that are required to protect the environment and other water users.
- (2) Any licence issued, renewed or transferred must include conditions that allow –
 - (a) in periods of low water availability or low water quality, the application of rosters and other restrictions by the delegate to regulate the rate at which water can be taken, and
 - (b) in the case of groundwater licences unless the delegate is satisfied that this is not necessary, water allocations to be determined by the delegate at the beginning and during the course of a water season that are less than 100 per cent of the licence volume.
- (3) For all waterways and aquifers where the number of licences is more than twelve, a delegate should as far as is practicable agree in advance with –
 - (a) the relevant catchment management authority, or
 - (b) the executive director responsible for water entitlements in the Department – on an allocation policy or on a restriction policy, including trigger flow rates or quality levels or groundwater levels and the corresponding allocation or restriction levels to be applied, and publish these on its website.

Notes: before agreeing to any allocation or restriction policy the executive director responsible for water entitlements should consult with the executive director responsible for river health. A policy could be set in a management plan, and if so that is what must be followed. Publication of a policy could be as part of a management plan, local management rules or some other document.

- (4) The delegate should determine water allocations or apply restrictions:
 - (a) where an allocation policy or a restriction policy has been agreed in advance in accordance with sub-clause (3), consistent with what has been agreed; and
 - (b) in other cases, as necessary to protect the environment and other water users.
- (5) For licences that are being used to take water from waterways during the period between 1 July and 31 October, in establishing trigger flow rates and corresponding restriction levels under sub-clause (3), and in applying restrictions in other cases under sub-clause (4)(b), the delegate should have regard to the minimum flow thresholds for these months, in the way set out in Schedule 1.

13. Limitations on taking under a single licence

A delegate may not issue, renew or approve the transfer of a licence that allows the licence holder to take water under the licence –

- (a) from more than one type of water system (such as from groundwater *and* unregulated surface water); or
- (b) in the case of surface water licences, from more than one river basin, or from more than one waterway or catchment; or
- (c) in the case of groundwater licences, from more than one groundwater management unit, or from more than one aquifer; or
- (d) from more than one unregulated surface water trading zone; or
- (e) using more than one method of taking (such as via an on-waterway dam *and* harvesting in a catchment dam); or
- (f) during more than one take period (such as from July to October *and* all-year).

14. Take period for winter-fill licences

- (1) If a delegate issues a winter-fill licence, or approves the transfer of any surface water licence – whether winter-fill or all-year – to be a winter-fill licence including where the extraction point stays the same, the delegate must, unless a management plan requires a different take period, make it a condition of the licence, –
 - (a) where water will be taken from a waterway to an off-waterway dam, that water only be taken from the waterway between 1 July and 31 October; and
 - (b) where water will be harvested in an on-waterway dam, that water only be harvested in the dam between 1 July and 31 October, and that at all other times flows be allowed to pass downstream without diminution; and
 - (c) where water will be harvested in a catchment dam, that water only be harvested in the dam between 1 July and 31 October, and that at all other times run-off be allowed to run past the dam without diminution.

Note: for an on-waterway dam, bypass mechanisms are required that allow all the flows to pass outside the take period, but that also allow for minimum passing flows during the take period. See standard condition 13 in Schedule 2.

- (2) For an existing winter-fill licence which allows diversion or harvesting to start two months earlier than 1 July, any diversion or harvesting in May or June is to be interpreted as occurring after 1 July for the purposes of these Policies.
- (3) Subclause (1) does not apply to the transfer of an existing winterfill licence which allows diversions or harvesting to start two months earlier than 1 July, if the transfer is within the same farm business and for use at the same location.

Note: Subclause (3) is intended only to apply for family succession planning and for family transition based on evidence of an existing family partnership.

15. Licences for groundwater where the aquifer yield is uncertain

In cases where there is uncertainty about the yield of an aquifer or about the potential adverse impacts of groundwater extraction, in issuing or in approving the transfer of a licence for groundwater, the delegate should consider –

- (a) setting a term no greater than three years; and
- (b) including conditions relating to monitoring, protection of the environment, reporting, and compensation; and
- (c) including conditions relating to provision of information prior to renewal.

16. Requirement to own or occupy land

- (1) Subject to sub-clauses (2) and (3), a delegate may not issue, renew, or approve the transfer of a licence to a person who does not own or occupy land specified in the licence where the water taken under the licence is to be used.
- (2) Sub-clause (1) does not apply in the following situations:
 - (a) where the water is to be carted, including for dust suppression, road works, or emergency supplies;
 - (b) where the licence holder is to be a syndicate which uses the water to cover losses in transporting water to the syndicate's members;
 - (c) where the water is to be used for urban water supply;
 - (d) when agreed to in writing by the Secretary of the Department.
- (3) Despite sub-clause (1), if the land specified in a licence has been sold to another person, in order to give the holder of the licence sufficient time to transfer the licence a delegate may renew the licence once only, for a maximum period of 12 months, unless otherwise determined in writing by the Minister.

17. Use of water

- (1) In issuing, renewing, or approving the transfer of a licence a delegate must include in the licence such conditions with respect to the use of water on land that are required to protect the environment and other water users, as the delegate considers appropriate covering:
 - (a) managing groundwater infiltration,
 - (b) managing disposal of drainage,
 - (c) minimising salinity,
 - (d) protecting biodiversity, and

- (e) minimising cumulative impacts of water use.
- (2) Any licence issued, renewed or transferred may include an annual use limit as well as the licence volume, and the annual use limit may specify a volume of water that is different from the licence volume.

Note: where the licence volume is less than the annual use limit or nil, then use of water may only exceed the licence volume if the balance of water that may be taken in the current water season is temporarily transferred to the licence holder.

- (3) A delegate may increase an annual use limit set in a licence, either –
 - (a) as part of a temporary or permanent transfer of another licence to the licence holder, or
 - (b) temporarily, to accommodate exceptionally high evapotranspiration, where the relevant catchment management authority has agreed to such an increase in writing.
- (4) In accordance with section 40(1)(m) of the Act, a delegate may refuse to issue or approve the transfer of a licence if, in the delegate's view, the prospective holder of the licence could not reasonably use that amount of water on the nominated land.

18. Irrigation and drainage plans

- (1) Subject to sub-clause (3), a delegate must require a person who makes an application for the issue or renewal of a licence or for approval of the transfer of a licence to provide an irrigation and drainage plan that has been prepared in accordance with the requirements set out in Schedule 3.
- (2) A delegate may reject or seek changes to an irrigation and drainage plan that has been submitted in accordance with sub-clause (1), but must endorse an irrigation and drainage plan as approved before approving the application.
- (3) The requirement under sub-clause (1) to prepare an irrigation and drainage plan will not apply in any of the following circumstances:
 - (a) where an existing licence is being renewed, or transferred to a new licence holder but is to cover the same land, and in the delegate's view the existing licence does not have significant deficiencies;
 - (b) where use of water under the licence is for domestic and stock purposes or for any other purpose that does not include irrigation.
- (4) A delegate may modify or waive the requirement under sub-clause (1) to prepare an irrigation and drainage plan where –
 - (a) the annual use limit in the licence is to be less than 20 megalitres, and
 - (b) in the delegate's view, any adverse impact from the use of water under the licence is likely to be minor.

19. Terms of licences

- (1) In issuing, renewing, or approving the transfer of a licence a delegate must specify the term for which the licence will remain in force, which in accordance with sections 56(3) and 58(5) of the Act is no more than 15 years.
- (2) In deciding on the term of a licence a delegate should have regard to the degree of uncertainty about the water resource and about the impacts of taking water,

and should set a relatively short term where this uncertainty is relatively extensive.

- (3) For a licence for unregulated surface water, a delegate should consider setting a term no greater than five years.

Note: where licences on the Latrobe River have been renewed for an unlimited period and accordingly do not expire, the delegate may amend the conditions of these licences to the extent necessary to comply with a management plan, in accordance section 59(1) of the Act.

20. Metering requirements

- (1) In accordance with section 56(1)(a)(xii) of the Act, in issuing, renewing or approving the transfer of a licence a delegate may include conditions relating to the installation and use of meters.
- (2) In determining conditions relating to the installation and use of meters –
 - (a) subject to sub-clause (3), a delegate must include in all new licences where the water taken under the licence is to be used for irrigation or commercial purposes, a condition requiring the installation of a meter approved by the delegate; and
 - (b) subject to sub-clause (3), where an existing licence is being renewed or amended a delegate must ensure that it includes a condition requiring the installation of a meter approved by the delegate if the licence volume is –
 - (i) 10 megalitres or greater, for unregulated surface water, and
 - (ii) 20 megalitres or greater, for groundwater; and
 - (c) the obligation on the delegate in paragraph (b) does not apply if in the delegate's view a meter would be impracticable, in which case the delegate must –
 - (i) document the reasons for its view, and
 - (ii) identify in the licence a substitute method for estimating to the delegate's satisfaction the volume of water taken.
- (3) Notwithstanding sub-clause (2), a delegate must follow any policy on metering that may be adopted by the Minister.

Note: the above does not preclude a delegate from requiring more extensive metering. Metering requirements for an area could be stipulated in a management plan.

21. Standard conditions

- (1) Starting from the relevant register operational date, in issuing, renewing or approving the transfer of any licence, a delegate must include in the licence the standard conditions as set out in Schedule 2, provided they are not inconsistent with any requirements of a management plan.
- (2) A delegate may, where the delegate deems it appropriate having regard to the matters to which the delegate must have regard under section 53 of the Act, –
 - (a) add any condition that is relevant to a particular situation, and that is chosen from a list of pre-defined conditions provided in the water register;
or

- (b) add a special condition that is not pre-defined but is relevant to a particular situation, in which case the delegate must signify in the water register any such special condition so that the Department can be informed about it.

PART 4 – PROCESS FOR DECIDING ON LICENCES

22. Advertising and notification - surface water licence applications

When a delegate receives an application to issue a new or the transfer of a surface water take and use licence for commercial or irrigation use, the delegate must require the applicant to: –

- (a) Give written notice to, and invite submissions from the owner or occupier of land immediately upstream;
- (b) Give written notice to, and invite submissions from the owner or occupiers of land immediately downstream for 2km or the first 3 downstream owners or occupiers of properties, whichever is the lesser; and
- (c) Place at least one advertisement in a newspaper generally circulating in the area if an application is for greater than 20ML. If the application is for a volume greater than 50ML a second advertisement is required.

Note: The authority may require the applicant to undertake additional notifications as it sees fit

22A Referrals

The delegate must ensure that sufficient information is provided by the applicant to meet the requirements of bodies referred to under section 51B of the Act.

23. Applicants, notifications etc. for groundwater licences [removed]

24 Items to consider and documentation of assessment

(1) Prior to the determination of an application to issue, renew or transfer a licence a delegate must document the manner in which it has had regard to the matters under section 53 of the Act.

(2) Prior to the determination of an application to issue, renew or transfer a licence to take and use groundwater for urban purposes, a delegate should require the applicant, for the purposes of addressing the matters in section 53 of the Act, to provide a groundwater assessment report that, as a minimum, meets the requirements of Schedule 3A.

(3) The Licensing Authority must undertake an on-site inspection in respect of any take and use licence application that is –

- a) on a waterway with high ecological values; or
- b) on a watercourse; or
- c) for a volume of water greater than 20 megalitres; or
- d) within a capped catchment; or
- e) within a Water supply Protection Area (surface water).

(4) Where a licence is being renewed, or transferred but is to cover the same land, and within the last five years the delegate has undertaken a thorough consideration of the matters to which the delegate must have regard including where appropriate via a site inspection, then the delegate may rely on that earlier consideration, and the documentation under sub-clause (1) may note that this is how the matters have been considered.

24A Bulk entitlements

If, in the opinion of a delegate, the approval of a licence application could have an adverse effect on an entitlement to water of an Authority that has a bulk entitlement, the delegate must—

- (a) require the applicant to provide information from modelling that enables the delegate to assess the potential adverse effect on the reliability of supply to the holder of the bulk entitlement; and
- (b) provide a copy of the information from modelling to the holder of the bulk entitlement.

Note: Section 51B of the Act requires a delegate to refer the licence application to any Authority holding a bulk entitlement that may be affected by the approval of the application and that Authority may make comment on the application. The above requirement should be exercised by a delegate if it believes that there is a risk of significant adverse impacts on the water available to the bulk entitlement holder.

24B Notification of decision

- (1) The delegate, must without delay, advise the applicant of the determination of the application and the right of review under section 64 of the Act.
- (2) If a person makes a submission on an application in accordance with section 49 of the Act, the delegate must, without delay, advise that person of
 - a. the delegates' decision in relation to the application; and
 - b. if the application has been approved, the right of that person to apply for a review of the decision under section 64 of the Act.
- (3) If an application has been referred to a body under section 51B of the Act, the delegate must, without delay, advise that body of the decision of the delegate in relation to the application and of the conditions attached to any licence.

PART 5 – RECORDING OF LICENCES

25. Use of the water register

- (1) Starting from the register operational date that applies to the licences that it manages, a delegate –
 - (a) must record in the water register any licence that the delegate issues or renews or whose transfer it approves;
 - (b) may record in the water register any licence that existed prior to the register operational date and that is still current –
 - (i) where the delegate renewed the licence less than four months prior to the register operational date and in doing so put standard water conditions in accordance with clause 21 into the licence, or

- (ii) where the delegate in any other way is at any time after the register operational date able to make a complete and authoritative record of the licence in the register;
- (c) for any licence that existed prior to the register operational date and that is still current but does not have a complete and authoritative record in the water register in accordance with paragraph (b), must keep a note in the water register of the following aspects of the licence:
 - (i) a reference to the delegate's file where the licence record is kept,
 - (ii) the name of the licence holder, the type of water system, the licence volume, and the expiry date.
- (2) A delegate must record the following details in relation to a licence that it records in the water register:
 - (a) the name and address of the holder of the licence;
 - (b) the name of the waterway, aquifer or works, the river basin or the groundwater catchment, the type of water system, the method of taking, the licence volume, the expiry date and any temporary transfers;
 - (c) the conditions to which the licence is subject; and
 - (d) any other information that the Minister or the delegate considers necessary.

PART 6 – TRANSFERS OF LICENCES

26. Temporary and permanent transfers

- (1) On approving an application for the permanent transfer of a licence or part of a licence to a different person or location, a delegate should –
 - (a) amend the licence of the seller (transferor), or cancel it and where appropriate issue a licence for a correspondingly smaller volume in its place, and
 - (b) amend any licence held by the buyer (or transferee) or for the new location, or where applicable cancel such a licence and issue a new licence reflecting the volume transferred.
- (2) On approving an application for the temporary transfer of a licence or part of a licence, a delegate should record in the water register –
 - (a) for the licence, the volume that has been transferred, and
 - (b) for any other existing licence that relates to the location where the water is to be taken and used, the volume that has been transferred and is now to be taken and used in accordance with the conditions of this existing licence.
- (3) Any temporary transfer of a licence or part of a licence must conclude at the end of a water season.
- (4) Subject to sub-clause (5), a delegate may only approve an application for the temporary transfer of a licence or part of a licence for a period of one water season, or for the remainder of the current water season.
- (5) A delegate may approve the temporary transfer of a licence for a period of–
 - (a) up to five years if the licence is in an area declared to be a water supply protection area under section 27(1) of the Act and there is a requirement

under section 54 of the Act, that has been in place for over 12 months, to defer applications for permanent transfers, or

- (b) the balance of the term of the licence if the delegate has, as part of the process of developing a local management plan, assessed that the benefits of enabling a temporary transfer for the term of the licence outweigh the potential costs and risks to third parties including the environment.
 - (c) up to five years if in the view of the delegate after consultation with the executive director responsible for water entitlements in the Department that other circumstances exist that warrant a temporary transfer for a period longer than one water season.
- (6) Any part of a licence that is the subject of a temporary transfer from the original licence holder to another person, may not be approved for any further temporary transfer by this other person to take effect during the term of the original temporary transfer.
- (7) While a licence or any part of a licence is the subject of a temporary transfer –
- (a) except as set out in paragraph (b), only such part of the licence that is not subject to this temporary transfer may be approved for a permanent or temporary transfer; and
 - (b) the permanent transfer of the whole licence may be approved, with any temporary transfer still applying to it, but only where the licence is still to apply to the same land.
- (8) If any water has been used under a licence in the current water season –
- (a) except as set out in paragraph (b), the amount of used water must be subtracted from the licence volume that could otherwise be approved in the current water season for a temporary or for permanent transfer;
 - (b) where the licence is still to apply to the same land, the permanent transfer of the whole licence volume may be approved, except that any used water must be deducted from the water allocation available to the buyer in the current year.
- (9) If a licence includes a “sales” clause that provides for additional water to be offered for sale, a delegate –
- (a) must not approve any application to transfer any such offer of additional water, and
 - (b) may approve a temporary transfer of the licence or part of the licence only on condition that the licence holder forfeits any offer of additional water during the period to which the temporary transfer relates.

27. Transfers within or between unregulated surface water trading zones

- (1) Unless a management plan has been approved that establishes different rules, a delegate may only approve an application for the permanent or temporary transfer of an all-year licence to take water from unregulated water systems –
- (a) if the transfer is for use in the same location; or
 - (b) if the licence will be transferred to a downstream user; and

- (c) in northern Victoria if the delegate imposes a condition on the buyer which entitles the buyer, as a result of the transfer, to receive only 80 per cent of the licence volume which has been transferred by the seller.
- (2) Where a transfer provided for under sub-clause (1) is from a tributary downstream to a larger waterway, in deciding whether to approve or refuse the transfer or, if it is to be approved, what conditions to include in the buyer's licence, a delegate –
 - (a) must have regard to whether the buyer would be able to take more water than the seller was able to take because water would be available to the buyer more reliably with fewer restrictions; and
 - (b) may impose a condition on the buyer which entitles the buyer to receive, in northern Victoria less than 80 per cent, and in southern Victoria less than 100 per cent, of the licence volume which has been transferred by the seller.
 - (3) Sub-clause (1) does not apply –
 - (a) where the licence issued to the buyer is a winter-fill licence; or
 - (b) where the seller and the buyer are both located –
 - (i) on the main stem of the Kiewa River (unregulated trading zone 191), or
 - (ii) on the main stem of the Latrobe River and the Upper Murray River (unregulated trading zone 161).
 - (4) Sub-clause (1)(b) does not apply –
 - (a) where the licence issued to the buyer is for domestic and stock purposes only and has a licence volume of two megalitres or less, and in the delegate's view there are sufficient summer flows; or
 - (b) where the Secretary of the Department determines in writing, upon submission of the delegate, that there are sufficient summer flows and no alternative source of supply.

Note: The request for determination must include information on:

- (A) *The nominated locations where the water may be taken with an explanation of why there are no alternative water sources in that area;*
 - (B) *How restrictions and triggers for bans will be implemented for each of the extraction points;*
 - (C) *The maximum extraction rates to avoid impacts on the environment or other users, such as lowering depth of pools in slow-flowing reaches; and*
 - (D) *The requirements to confirm with the delegate, access to streams on a frequent basis during the take and use period.*
- (5) A delegate may not approve a temporary transfer of a winter-fill licence to be an all-year licence.
 - (6) Where a licence is for harvesting run-off in a catchment dam, a delegate may not approve a transfer of the licence to another location unless –

- (a) the transfer is permanent, and
 - (b) either the dam is decommissioned, or the volume transferred is reduced to account for losses from the dam through evaporation and seepage.
- (7) A delegate may only approve a transfer of a licence between different unregulated trading zones in accordance with the rules set out in Schedule 4.

Note: in considering any transfer that would result in a winter-fill licence, it is important to take into account the various policies set out above, in particular Policy 9 on sustainable diversion limits. Likewise any transfer upstream of an all-year licence for domestic and stock purposes, could only be allowed if, in the particular circumstances, there would be no adverse impacts; thus there would need to be sufficient summer flows.

27A Trade within unregulated surface water and groundwater systems

- (1) In developing or amending a local management plan, subject to any guidelines issued for the preparation of local management plans, rural water corporations may develop system-specific trading rules; and
- (2) Where any system-specific water trading rules are developed for inclusion in a local management plan, the executive director responsible for water entitlements in the Department must be consulted before the local management plan is implemented.

28. Transfers between unregulated and regulated water systems

A delegate may approve –

- (a) the issue of a licence in an unregulated trading zone as a result of the cancellation of a water share, or
- (b) the cancellation of a licence in an unregulated trading zone for the purpose of issuing a water share,

only if it is allowed under the “Trading Rules for Declared Water Systems” made by the Minister under sections 33AZ and 64AZ of the Act and under these Policies.

Note: the Trading Rules make it clear that, amongst other things, trade is only possible from an unregulated water system to a regulated water system if there has previously been trade the other way, and that exchange rates apply to trade in both directions.

Schedule 1: METHODOLOGY FOR APPLYING SUSTAINABLE DIVERSION LIMITS

Clauses 9 & 12

Note: the Department has assessed the sustainable diversion limits for nearly 1,600 discrete catchments across the State, and publishes these from time to time. This Schedule explains how different numbers from these statewide assessments can be used in certain limited circumstances, and how the volume of water currently authorised to be taken is arrived at. The water currently authorised to be taken is subtracted from the SDL to calculate the available water.

The Department's work to assess SDLs included an assessment of base flows and peak flows during the winter months that should not be taken out of waterways. Under Policy 0, when a delegate is deciding on trigger flows and restrictions on winter taking, the delegate should take account of these assessments. And as noted under standard condition 13 in Schedule 2, the delegate should also take account of them when setting passing flows during winter for inclusion in the conditions of a winter-fill licence that relates to an on-waterway dam.

1. Definitions

"farm dam equivalence factor" for a catchment means the factor, published from time to time by the Department, by which licence volumes are multiplied to account for the additional impacts on streamflows of harvesting water in an on-waterway or catchment dam compared with taking water directly from a waterway;

"maximum daily volume" means, for a catchment, the total volume of water that could be taken in one day during the period 1 July and 31 October – and is as determined by the Department as part of statewide assessments, unless a different value has been determined by the delegate taking into account local circumstances;

"minimum flow threshold" means, for a waterway, the flow during the period 1 July and 31 October which should be kept in the waterway – and is as determined by the Department as part of statewide assessments, unless a different value has been determined by the delegate taking into account local circumstances.

2. SDLs for certain localised areas

If a delegate can demonstrate that, after carefully considering the results of appropriate topographic and hydrogeological investigation, a localised area would not, under natural drainage conditions, materially contribute to the surface or sub-surface flow of water to any waterways nearby, then the delegate may, in consultation with the relevant catchment management authority, determine the SDL in a way that is appropriate to the area.

This clause provides flexibility to deal with exceptional situations in which application of the statewide assessments of the SDLs is clearly inappropriate. It is expected to apply only in small, closed-catchment situations where natural drainage systems are relatively undeveloped because of recent geological and geomorphological formations, for example, some of the recent volcanic areas in the south-west and sand dune formations in the far west of the State. Delegates should have due regard to groundwater recharge in these closed catchments.

Note that in the standard catchments for which the Department has made assessments, where there is an application for issue of, or transfer to be, a winter-fill licence in one part of the catchment that has some special features (e.g. little resource), in having regard to various matters in section 40 a delegate should consider these features.

3. Determining the volume of water currently authorised to be taken

- (1) Subject to sub-clause (3), in determining, for a catchment, the volume of water currently authorised to be taken between 1 July and 31 October, the delegate must use the statewide assessments of this volume made by the Department, adjusted by the delegate to account for any subsequent increase or decrease in the volume authorised to be taken under licences between 1 July and 31 October since the date the statewide assessments were made.
- (2) When adjusting the statewide assessments under paragraph (1), the delegate must –
 - (a) include estimates of the volume of authorised water to be taken between 1 July and 31 October under:
 - (i) licences to take and use surface water, and
 - (ii) licences to take and use groundwater which the delegate considers have a significant impact on surface water flows (accounted for relative to impact); and
 - (b) for all-year licences, count the following proportion of the licence volumes, this being the fraction of the licence volume deemed to be used between 1 July and 31 October:
 - (i) 25% for a licence to take water for domestic and stock use, and
 - (ii) 10% for a licence to take water for irrigation use, and
 - (iii) 25% for a licence to take water for commercial or industrial use outside Melbourne Water's management area, and
 - (iv) 33% for a licence to take water for commercial or industrial use inside Melbourne Water's management area; and
 - (c) calculate the volume of water currently authorised to be taken as:
 - (i) one megalitre for each megalitre of water authorised to be pumped directly from a waterway under a licence, and
 - (ii) each megalitre of water licensed to be taken by means of an on-waterway dam or a catchment dam multiplied by –
 - A. the farm dam equivalence factor of 1.45, or
 - B. any different value for the farm dam equivalence factor determined and published by the Department.
- (3) In determining, for a catchment, the volume of water currently authorised to be taken between 1 July and 31 October, the delegate may use an alternative method to the one set out in sub-clause (1) if in the opinion of the delegate the alternative method provides a more accurate estimate of this volume, and in this case the delegate must –
 - (a) have regard for the principles and methods used by the Department to determine its statewide assessments, including those set out in sub-clause (2); and
 - (b) in addition to taking into account licences, take into account –
 - (i) bulk entitlements issued under Part 4 of the Act, and
 - (ii) other water extractions which the delegate considers to be significant, including private rights under section 8(1)(a) to (c) and section 8(4)(c) of the Act; and
 - (c) make a detailed record of the method and analysis carried out.

4. Determining if there is available water in a catchment

The delegate must determine the available water for a catchment by subtracting the volume of water currently authorised to be taken in the catchment, as determined under clause 3, from the SDL for the same catchment.

5. Trigger flows and restriction levels

- (1) In accordance with clause 12(5), in establishing a restriction policy or in applying restrictions that regulate taking of water from a waterway between 1 July and 31 October, a delegate should aim –
 - (a) to avoid flows in the waterway at the bottom of the catchment falling, as a result of extraction, below the minimum flow threshold for the catchment;
or, if the delegate considers it more appropriate to use an indicator flow gauge located somewhere else in accordance with sub-clause (2),
 - (b) to avoid flows passing the indicator flow gauge falling, as a result of extraction, below the minimum flow threshold for that indicator flow gauge.
- (2) The delegate may select an indicator flow gauge for use in a restriction policy after considering:
 - (a) indicator flow gauges identified by the Department based on hydrological similarity and proximity, or
 - (b) other information that is available, including local knowledge.

Note: where there are existing on-waterway dams, it is recognised that minimum flow thresholds might in some cases be hard to meet.

6. Passing flows in a condition of a licence for an on-waterway dam

- (1) For the purposes of standard condition 13 in Schedule 2, the bypass mechanism associated with an on-waterway dam should allow all flows in the waterway between 1 July and 31 October to pass downstream of the dam up to and equal to –
 - (a) the minimum flow threshold for the catchment that covers the whole area upstream of the point at which water is proposed to be taken, or
 - (b) after consultation with the relevant catchment management authority, some other flow rate that the delegate considers more appropriate to adopt given the delegate's knowledge of the particular situation.
- (2) If the catchment upstream of the on-waterway dam is a sub-catchment of one of the catchments for which minimum flow thresholds have been determined as part of statewide assessments, the delegate may determine the minimum flow threshold by multiplying the volume-per-area form of the statewide assessment by the area of the sub-catchment.

7. Take rate in a condition of a winter-fill licence

For the purposes of standard condition 6 in Schedule 2, the maximum volume of water that may be taken out of a waterway in any one day between 1 July and 31 October should be set taking into account –

- (a) the statewide assessments of maximum daily volumes, adjusted to take into account other diversions from the catchment; or
- (b) other practical considerations that are relevant in the view of the delegate.

Note: this rule is not easy to apply in practice. In a perfect world, it would require accurate stream gauging for each catchment and a knowledge of how much water all licence holders in a catchment were harvesting at any one time. Delegates should adopt a practical approach. For pumped diversions, this would utilise a delegate's discretion to limit the pump size in the works licence, and recognition that not all licence holders would be pumping at the same time. Strict adherence to this rule is less critical than the minimum flow threshold.

Schedule 2: STANDARD CONDITIONS FOR TAKE AND USE LICENCES

Clause 21

Method of taking

1. Water may only be taken under this licence if it is taken by the following method:
<<method of taking to be specified>>
2. The licence holder must at all times provide the Authority with safe access to inspect all works and appliances used to take water under this licence.

Take location

3. Water may only be taken under this licence if it is taken at the location specified in the licence under "extraction point details". *[for new or transferred licences the extraction point details should include the coordinates, unless there is a special reason why the extraction point can be allowed to move up and down a waterway reach]*

Take volume and rate

[for groundwater and all-year licences]

4. The volume of water taken under this licence in any twelve-month period from 1 July to 30 June must not exceed the licence volume, less any volume that has been temporarily transferred to another person or location << may add ", plus any carryover from the previous period that may be permitted">>.

[for licences related to a MAR scheme]

- 4A The volume of water taken under this licence in any twelve-month period from 1 July to 30 June must not exceed—
 - a. the <<specified percentage >> of the volume of water disposed of underground in that twelve-month period under an approval issued under section 76 in relation to a managed aquifer recharge scheme and in accordance with that approval, including any water quality standards specified, and any relevant authorisations under any other Act;
 - b. plus <<if applicable, the volume of water under this licence not taken in relation to a managed aquifer recharge scheme >>;
 - c. plus any carryover from the previous period that may be permitted;
 - d. less any volume that has been temporarily transferred to another person or location."

[for winter-fill licences]

5. The volume of water taken under this licence in the period during which water may be taken must not exceed the licence volume, less any volume that has been temporarily transferred to another person or location << may add ", plus any carryover from the previous period that may be permitted">> << for an on-waterway dam or a catchment dam, add ", and the volume of water taken will be measured as the volume taken out of the dam between 1 July and 30 June">>.

[for all licences except those in connection with on-stream dams and catchment dams]

6. The maximum volume of water that may be taken under this licence in any one day is <<insert number here>> megalitres. *[for winter-fill licences the maximum take rate should be determined as set out in Schedule 1]*

Temporary transfers to the licence holder

7. If there has been a temporary transfer of another licence to take water at the location, and use water on the land, specified in this licence –
 - a. the extra volume of water taken at the location specified in this licence as a result of the temporary transfer must not exceed the volume transferred, and
 - b. all the conditions of this licence apply to the taking and using of water consequential to the transfer.

Water allocations *[only for groundwater licences, and delegate may choose to omit]*

8. The Authority may determine water allocations at 1 July or during the course of the subsequent twelve-month period that are less than 100% of the licence volume, in which case the licence volume is correspondingly reduced for that twelve-month period.

Take period

[for groundwater and all-year licences]

9. Unless otherwise directed by the Authority, water may be taken at any time between 1 July and 30 June.

[for winter-fill diversion to an off-waterway dam]

10. Unless otherwise directed by the Authority, water may only be taken from the waterway <<period to be specified; normally “between 1 July and 31 October”, but if an existing licence has a longer period this may be retained on renewal>>.

[for winter-fill using an on-waterway dam]

11. Unless otherwise directed by the Authority, water may only be harvested in the on-waterway dam <<period to be specified; normally “between 1 July and 31 October”, but if an existing licence has a longer period this may be retained on renewal>>; at all other times, the entire streamflow must be passed downstream of the dam.

[for winter-fill using a catchment dam]

12. Unless otherwise directed by the Authority, water may only be harvested into the catchment dam <<period to be specified; normally “between 1 July and 31 October”, but if an existing licence has a longer period this may be retained on renewal>>; at all other times, the entire run-off must be passed around the dam.

Passing flows

[for an on-waterway dam]

13. Bypass mechanisms must be installed and maintained in good working order to ensure that –
 - a. outside the take period, none of the natural flow in the waterway is harvested into the dam, and
 - b. during the take period, minimum passing flow rates of <<number to be specified>> megalitres per day are passed by the dam. *[During the winter months the minimum flows should be in line with those determined as part of the statewide assessments, in line with Schedule 1. This condition is not mandatory, however, on renewal of an existing licence that included lesser requirements.]*

[for a catchment dam]

14. Bypass mechanisms must be installed and maintained in good working order to ensure no run-off is harvested outside the take period.

Rosters and restrictions *[which may include bans]*

[if rules have not yet been set]

15. When directed by the Authority, water must be taken in accordance with the rosters and restrictions determined by the Authority and advised to the licence holder.

[for when rules have been set in advance, and the Authority notifies people each time they apply]

16. When directed by the Authority, water must be taken in accordance with the rosters and restrictions as set out in <<"the management plan, local management rules or other document", or else insert name of actual document>> that is available on the Authority's website.

[for when rules have been set in advance, and the onus is on people to check when they apply]

17. Water must be taken in accordance with the rosters and restrictions as set out in <<"the management plan, local management rules or other document", or else insert name of actual document>> that is available on the Authority's website, and before taking water under their licence the licence holder must check the restrictions that currently apply.

Metering of water taken and used *[all these metering conditions only need to be included in licences where metering is required under clause 20]*

18. Water may only be taken under this licence if it is taken through a meter approved by the Authority.
19. Meters must be installed at the licence holder's expense, unless the Authority determines that it will contribute to the cost.
20. Meters used for the purpose of this licence are deemed to be the property of the Authority.
21. The licence holder must at all times provide the Authority with safe access to meters for the purpose of reading, calibration or maintenance.
22. The licence holder must notify the Authority within one business day if the meter ceases to function or operate properly.
23. The licence holder must not, without the consent of the Authority, interfere with, disconnect or remove any meter used for the purposes of the licence.
24. The Authority may, if it deems necessary, make an estimate of the total volume of water taken under this licence.

[the following two conditions – on maintaining works and preventing pollution – only need to be included where they are not covered by a works licence]

Maintaining works

25. The licence holder must keep all dams and other works associated with this licence, including spillways, outlet pipes and valves –
 - a. in a safe and operable condition; and
 - b. free from obstacles and vegetation that might hinder access to the works.

Preventing pollution

26. The licence holder must construct and maintain bund walls around any hydrocarbon-fuel-driven engine, motor, fuel storage or chemical storage used in connection with this licence, in accordance with the timeframe, specifications, guidelines or standards set down by the Authority.

Use of water

27. Water taken under this licence may only be used for the purposes specified in the licence.

[the next two conditions not required where no land is specified in accordance with clause 16]

28. Water taken under this licence may only be used on the land specified in the licence.
29. The licence holder must at all times provide the Authority with safe access to inspect the land on which water is licensed to be used.

[for any licence that allows irrigation and does not require metering]

30. The maximum area that may be irrigated in any 12-month period from 1 July to 30 June is <<the licensed area>>.

[the four following conditions – on groundwater infiltration, disposal of drainage, salinity, and biodiversity – are only essential to be included in licences where the water is to be used for irrigation]

Managing groundwater infiltration

31. The maximum volume of water that may be applied to the land referred to in the licence in any 12-month period from 1 July to 30 June is the annual use limit of <<insert number here>> megalitres, or if the annual use limit is adjusted by the Authority on account of seasonal conditions, this adjusted annual use limit <<to this may be added: “, less any water applied to the same land in the same period under other licences or a water-use licence”>>.

[if the Authority has not specifically fixed a different volume, the annual use limit will be the same as the licence volume]

Managing disposal of drainage

32. Where irrigation results in drainage from the land specified in the licence, that drainage water must be disposed of:
- in accordance with any terms and conditions that apply to a drainage service that is employed; or
 - if any drainage arrangements have been specified in an endorsed irrigation and drainage plan, in accordance with those arrangements.

[the next two conditions only apply when an irrigation & drainage plan has been required]

Minimising salinity

33. Where the endorsed irrigation and drainage plan identifies that the quality of the water being used poses significant risk of salt accumulating in the soil, water may only be used if its electrical conductivity lies within the range specified in the endorsed irrigation and drainage plan.

Protecting biodiversity

34. Where the endorsed irrigation and drainage plan identifies that the use of water poses direct and ongoing risks to wetlands, native flora, or the habitat of native fauna, water may only be used while the licence holder meets the monitoring and correctional requirements specified in the plan.

[for protecting biodiversity, a number of more specific conditions that are pre-defined in the water register could be used as appropriate]

[the next condition only applies to a take and use licence in relation to a MAR scheme]

Managed Aquifer Recharge Scheme Project Plan

34A. Water taken under this licence in relation to a managed aquifer recharge scheme can only be taken if the obligations under the Project Plan <<citation>> are adhered to.

[The following condition for groundwater monitoring and reporting only applies to a groundwater licence where a groundwater assessment report (detailed in Schedule 3A) has been required]. Groundwater monitoring and reporting

34 B. Water taken under this licence may only be taken if the obligations under the Groundwater Assessment Report <<citation>> are adhered to.

Fees

35. The licence holder must, when requested by the Authority, pay all fees, costs and other charges under the *Water Act 1989* in respect of this licence.

Schedule 3: IRRIGATION AND DRAINAGE PLANS

Clause 18

Background

Irrigation developments must meet the standards necessary to minimise the impacts of water use on other persons and the environment (in particular waterlogging, salinity and nutrient impacts). This must involve an assessment of local conditions and appropriate design of irrigation systems.

The key purpose of an irrigation and drainage plan is to match the way land is irrigated and drainage disposed of, with the characteristics of the land and soil, in order to meet efficiently the objective of minimising harmful side-effects.

In those regions covered by a Land and Water Management Plan or a Salinity Management Plan approved by the Minister, an appropriate overlay from within a certified whole-farm plan may be accepted as an irrigation and drainage plan.

In those regions where recycled water is used, a Customer Site Management Plan (CSMP) as required by the EPA may be accepted as an irrigation and drainage plan.

In accordance with Policy 0, an irrigation and drainage plan that meets the requirements of this Schedule must accompany an application for a new or varied water-use licence that will allow a new development or major expansion.

For the new or varied water-use licence to be granted, the irrigation and drainage plan must be endorsed by the Minister (or by the water authority if it has delegated responsibility). A reference to the plan will be recorded as part of the water-use licence.

Requirements

1. Requirements within this schedule may be waived by the Minister after consultation with and written agreement from the relevant Catchment Management Authority.
2. If the relevant Catchment Management Authority seeks further information on any of the matters listed below because it considers this necessary to determine whether the site is suitable for sustainable development and what the potential off-site impacts are, then the Minister may require that further information.
3. An irrigation and drainage plan must include:

A. MAP OF PROPOSED DEVELOPMENT

A map of the proposed development is to be prepared which clearly identifies:

- (a) property boundaries;
- (b) areas to be irrigated;
- (c) type and location of crops to be planted;
- (d) location of existing features e.g. buildings, roads, channels, drains, fences, water storages, reuse systems;
- (e) location of water resources (including depth to groundwater);
- (f) location of proposed features; and
- (g) existing native vegetation, wetlands, and other environmental features.

B. TOPOGRAPHICAL SURVEY

A topographical survey, including elevation data and suitable contours is to be prepared.

Melbourne Water can provide its customers with relevant contour maps in most circumstances.

Check-bank, flood and furrow irrigation systems: Please note, the maximum slope allowable is 1:50.

C. SOIL ASSESSMENT

Either:

C1. For pressurised irrigation systems anywhere and any form of irrigation on mallee soils (that is soils of aeolian origin)

(Pressurised irrigation systems include drippers, microjets, centre pivots, lateral move irrigators and fixed sprays. More detailed soil survey information is required on mallee soils because they are extremely variable.)

Soil profile survey

Note: the survey provides information which will assist the designer prepare an irrigation system capable of applying accurate irrigation depth to maximise productivity whilst reducing the risk of off-site impacts.

Information required for the area proposed to be irrigated, to be provided on an overlay of the map of the property and soil data sheets, is as follows:

- (a) soil information to be obtained by a suitably qualified soil surveyor;

Information to be obtained at each site	
⇒ Soil texture of each layer	⇒ Mottling
⇒ Depth of each layer	⇒ Pedality
⇒ Depth of potential crop root zone	⇒ Dispersion index
⇒ Readily available water	⇒ Coarse fragments
⇒ Soil colour	

- (b) minimum pit depth of 1.5 metres or soil core to 1.8 metres;
- (c) grid spacing of 75 metres by 75 metres (broader spacings may apply for less intensive agriculture); and
- (d) measurements of pH and soil salinity (ECe) to be obtained at representative soil types. Soil salinities should be measured for each distinctive soil horizon to 1.5 metres.

Or:

C2. For flood irrigation systems on non-mallee soils in northern Victoria

Soil survey

Note: the soil survey provides information that will help the developer determine the soil's suitability for sustainable broadacre irrigation.

Information required for the area proposed to be irrigated is to be provided on an overlay of the base map of the property and on soil data sheets.

Soil samples are to be taken from cores dug every 150 metres by 150 metres or data from previously published soil maps that show:

- (a) soil salinity for the subsoil (60-90 cm depth) in dS/m ECe (maximum threshold of 4dS/m ECe); and
- (b) soil permeability (infiltration rates) based on texture determinations (with a minimum requirement of a >30 cm thick layer of >40 % clay within the top 90 cm of the soil surface).

Or:

C3. For irrigation systems in southern Victoria

Soil survey

Note: the soil survey provides information that will help the developer to design irrigation systems capable of applying irrigation water accurately and to uniform depths so as to maximise productivity whilst reducing the risk of off-site impacts.

An understanding of soil variability in the region (previous soil maps) will determine the required intensity of soil sampling. The required information includes:

- soil layers and depth
- any impervious layers
- soil texture
- hydraulic conductivity (permeability)
- soil pH
- salinity/sodicity
- nutrient availability – nitrogen, phosphorus and potassium

For all cases (C1, C2 and C3):

Written report

A written report must be provided which includes:

- (a) description of topography and previous land use;
- (b) key aspects of climate;
- (c) soil profile descriptions;
- (d) factors affecting potential root-zone depth;
- (e) soil/water interactions e.g. drainage, permeability, infiltration;
- (f) readily available water;
- (g) land capability;
- (h) soil amelioration proposals; and
- (i) hydrogeology – if in the view of the author this is relevant and the authority requires it.

An overlay of soils grouped into similar irrigation management units is also required.

D. IRRIGATION DESIGN AND MANAGMENT

For all developments:

The irrigation and drainage plan must show:

- (a) anticipated crop water requirements and proposed maximum application rates;
- (b) irrigation system specifications;
- (c) map identifying delivery supply point and area to be irrigated; and
- (d) proposed irrigation scheduling arrangements.

Additional requirements for horticultural properties and for all developments on mallee soils:

The irrigation design must be completed by a certified irrigation designer in accordance with the following principles:

- (a) The irrigation system should be capable of applying an irrigation depth equivalent to or less than the readily available water of the soil, appropriate to the crop. Areas of similar readily available water are to be grouped as irrigation management units and supplied separately based on the results of the soil survey.
- (b) Flood and furrow irrigation should not occur where the calculated minimum depth that can be applied (taking into account infiltration rates, slopes, length of irrigation runs and discharge rate) exceeds the readily available water within the estimated crop root-zone.

Additional requirements for southern Victoria:

- (a) a plan for monitoring nutrient balance and nutrient movement; and
- (b) a plan for monitoring groundwater depth and groundwater quality.

E. ARRANGEMENTS FOR DRAINAGE DISPOSAL

The irrigation and drainage plan must include an appropriate contingency drainage design.

The need for a subsurface and/or surface drainage scheme and re-use system must be considered. A design is to be developed for the appropriate system(s) including the:

- (a) volume of water to be collected;
- (b) details of any approved on-site disposal site and/or details of any off-site disposal site;
- (c) details of approvals for any proposed re-use schemes and/or irrigation storages;
- (d) location of pumps, discharge or re-use points.

Upstream of the Nyah pumps, if the weighted soil salinity is greater than 600EC, the irrigation and drainage plan must include a preliminary sub-surface drainage plan identifying an appropriate contingency area for *evaporative* disposal in the event that subsurface drainage is required. Any land identified as being required for evaporative disposal must not be developed for irrigation.

F. BIODIVERSITY PROTECTION ARRANGEMENTS

The irrigation and drainage plan must identify those parts of the property and adjacent land where the use of water for irrigation on the property poses direct and ongoing risks to wetlands, native vegetation, or the habitat of native animals.

For those areas, the irrigation and drainage plan must specify appropriate preventative measures, appropriate monitoring parameters, appropriate monitoring equipment, and appropriate locations for the equipment to be installed. The plan must also specify equipment maintenance standards, data reading, recording, reporting and auditing requirements, corrective action thresholds, corrective action procedures, and corrective action time limits.

Note: the granting of a licence does not remove the need to apply for any authorisation or permission necessary under any other Act with respect to anything authorised by the licence.

Schedule 3A: A GUIDE TO GROUNDWATER ASSESSMENT REPORTS

26. Aim

This document provides a guide for the preparation of groundwater assessment reports.

Purpose of the groundwater assessment report

The groundwater assessment report is a collection of basic information about the groundwater at the proposed groundwater extraction site. It must identify any potential impacts of extraction on existing groundwater users and the environment and propose a monitoring and protection programs to assist in identifying and dealing with any risks.

The delegate refers to the groundwater assessment report when considering an application for a groundwater licence for urban water use.

Data collection

The groundwater assessment report must present all data analysis. Appropriate methods must be used for data collection and the methods must be detailed in the groundwater assessment report. All data gaps, sources of uncertainty and assumptions should be estimated or described.

Pumping tests

A pumping test should be conducted for high volume and/or high risk proposals. Unlike a pumping test to determine bore yield or select an appropriate pump, a pumping test to determine aquifer parameters requires measurement of water levels in nearby observation bores.

The following is a guide to the appropriate pumping test duration and rate for gathering information on aquifer parameters:

- a) constant rate test, pumping for at least 3 days followed by period of recovery for groundwater licence applications seeking to extract less than 100ML per year;
- b) constant rate test, pumping for at least 7 days followed by period of recovery for groundwater licence applications seeking to extract between 100ML and 400ML per year; or
- c) constant rate test, pumping for at least 14 days followed by period of recovery for groundwater licence applications seeking to extract greater than 400ML per year.

The delegate should encourage applicants to make productive use of the water extracted for a pumping test. The pumping test discharge point should be used or disposed of to minimise any environmental impacts.

Study area

The study area will depend on the proposed extraction volume, but a delegate may require a large study area if there are other risk factors (such as close proximity to surface water features).

Licence application	Groundwater assessment report study area
< 100 ML/yr	0.5 km radius from production site
100 – 400 ML/yr	1.5 km radius from production site
> 400 ML/yr	4km radius from production site or a groundwater management area

Contents of a groundwater assessment report

As a minimum, a groundwater assessment report should use the following format and include—

Required sections for report	Description of content
Part 1: Study area	Description and map of study area.
Part 2: Background information	Groundwater management arrangements including: <ul style="list-style-type: none"> • PCV • existing groundwater licences • any groundwater management plan in the area
Part 3: Groundwater setting	<ul style="list-style-type: none"> • Stratigraphy • Potentiometric levels • Groundwater salinity at the site • Location of nearby groundwater bores (for licensed extraction and domestic and stock) • Hydraulic conductivity and storage parameters of target aquifer • Summary of any pumping tests • Surface water features, wetlands, groundwater dependent ecosystems
Part 4: proposed groundwater extraction	Description of proposed extraction bores including: <ul style="list-style-type: none"> • Depth • proposed yield • timing of extraction
Part 5: risk assessment	Assessment of changes in water level and/or aquifer storage over both short and long term (e.g. one month, six months, one year, three years) using an analytical model (i.e. steady state).
Part 6: management, monitoring and reporting	Detailed management plan for potential impacts on third parties and reporting to delegate. This program should be measure the extraction of groundwater, monitor the behaviour of the groundwater and protect third parties. Suggested monitoring programs are: <ol style="list-style-type: none"> 1. Water level monitoring program that: <ol style="list-style-type: none"> a. Identifies the location and purposes of all observation bores and other existing bores b. Details the requisite monitoring regime c. Provides a demarcation of the predicted area of influence of the bore on the aquifer d. Predicts water level trajectories and residual drawdowns based on intended extraction rates, aquifer characteristics and recharge mechanisms. 2. Groundwater extraction monitoring program which requires the installation of water meters 3. Groundwater salinity protection program which details the location of representation groundwater sampling points and the associated monitoring regime. 4. Environment protection program which details the location of representative groundwater sampling points, associated monitoring regime and trigger levels for review.
Part 7: Technical appendices	Details any relevant technical information, which may include: <ul style="list-style-type: none"> • Bore data • Pumping test reports

Schedule 4: TRADING ZONES FOR UNREGULATED SYSTEMS, AND THE UNREGULATED TRADING ZONES FROM WHICH A LICENCE CAN BE TRANSFERRED

Zone	Description	Can transfer from
110	Goulburn Unregulated tributaries of the Goulburn River above Goulburn Weir. Unregulated tributaries above full supply level of Lake Eildon.	110
120	Broken Broken River above full supply level of Lake Nillahcootie and all unregulated tributaries of the Broken River excluding unregulated sections of the Broken Creek and tributaries below Waggarandall Weir.	120
130	Lower Goulburn All unregulated tributaries of the Goulburn River downstream of Goulburn Weir.	130
140	Campaspe Campaspe River above the full supply level of Lake Eppalock. All unregulated tributaries of the Campaspe River, excluding the Coliban River above Malmsbury Reservoir Embankment and its tributaries above Malmsbury Reservoir Embankment. Unregulated tributaries of the Lower Campaspe River downstream of the Campaspe siphon at Rochester.	140
141	Coliban Coliban River and unregulated tributaries above Malmsbury Reservoir Embankment.	141
150	Loddon Loddon River above the full supply level of Cairn Curran. Bullarook Creek downstream of Lawrence Weir. All unregulated tributaries of the Loddon River above Loddon Weir.	150
Zone	Description	Can transfer from
151	Lower Loddon The Loddon River and all its tributaries downstream of Loddon Weir to the River Murray and Lake Boort, Lake Leaghur, Lake Meering and Little Lake Meran.	151
160	Upper Murray Mitta Mitta River above the full supply level of Lake Dartmouth and all tributaries of the Mitta Mitta River. River Murray upstream of confluence with	160

	Swampy Plains River All of the River Murray tributaries above the full supply level of Hume Weir. Those parts of the unregulated tributaries of the River Murray downstream of Lake Hume to the bridge at Barmah that are above the backwater effects from the River Murray at high flow level.	
161	Upper Murray main stem River Murray above the full supply level of Hume Weir and downstream of confluence with Swampy Plains River.	161
170	Barmah to Nyah Parts of the unregulated tributaries of the River Murray downstream from the bridge at Barmah to the pumping station at Nyah that are above the backwater effects from the River Murray at high flow level. Unregulated sections of the Broken Creek and tributaries below Waggarandall Weir.	170
180	Ovens and King The Ovens River upstream of its confluence with the Buffalo River, the Buffalo River above full supply level of Lake Buffalo, the King River above full supply level of Lake William Hovell and all tributary streams within the Ovens and King River System excluding the regulated components of Tea Garden Creek and Maloneys Creek.	180
190	Kiewa Catchment All tributary streams of the Kiewa River and the Kiewa River upstream of the pondage at Mt Beauty, including the pondage.	190, 191
191	Kiewa Main Stem The Kiewa River main stem between the pondage at Mt Beauty and the River Murray.	191

Schedule 5: RECORD OF CHANGES TO THE POLICIES

Document	Date	Purpose
Amendment (Stormwater) of Policies for Managing Take and Use Licences	27/07/2010	Consistent with the Sustainable Water Strategy for the Central Region, amends the Policies to facilitate the issue of licences to extract water from the stormwater works of an Authority, or from a waterway downstream of the stormwater works of an Authority or a municipal council.
Amendment (Managed Aquifer Recharge) of Policies for Managing Take and Use Licences	21/09/2010	Amends the Policies to facilitate the issue of licences to extract water associated with a MAR scheme.

Appendix 5 – Policies for Managing Water-use Licences in Salinity Impact Zones

Water Act 1989

POLICIES FOR MANAGING WATER-USE LICENCES IN SALINITY IMPACT ZONES

I, John Thwaites, Minister for Water, Environment and Climate Change, in accordance with clause 4 of the Instrument of Delegation made under the **Water Act 1989**, establish the following policies relating to the granting and managing of water-use licences under Part 4B of the Act.

Authorising provision

1. These policies are established under the Instrument of Delegation that was made under section 306 of the Act on 20 June 2007.

Commencement

2. These policies come into operation on the day on which they are issued.

Application

3. These policies apply to all water-use licences that relate to any land that is in a salinity impact zone.

Definitions

4. “**Act**” means the **Water Act 1989**;
“**annual use limit**” means the maximum volume of water that in any 12 month period may be applied to the land specified in a water-use licence;
“**delegate**” means a person to whom the powers to manage water-use licences and to set any related charges are delegated under the Instrument of Delegation;
“**Minister**” means the Minister administering the Act
“**salinity impact zone**” means a salinity impact division delineated in Schedule 1;
“**water-use licence**” means a licence granted under section 64L of the Act.

Caps on annual use limits in salinity impact zones

5. A delegate must not grant or vary a water-use licence if—
 - (i) the annual use limit in the water-use licence that is granted, or
 - (ii) any change to the annual use limit in the water-use licence that is varied—would result in the sum of annual use limits that apply to land—
 - (a) in the high impact zone (“HIZ”), increasing above the level that existed immediately prior to the delegate granting or varying the water-use licence;
 - (b) in any other salinity impact zone, exceeding the maximums set down in Schedule 2.

Annual use limits set as part of conversion

6. Where a water-use licence has been created under Schedule 15 of the Act as a result of a water system being declared under section 6A of the Act—
 - (a) clause 5(a) must not to be interpreted as preventing the annual use limit being set, in accordance with the conversion rules established under Schedule 15, at a level that is higher than the volume of the prior domestic and stock right, water right, prior joint right, or take and use licence in force immediately before the appointed day; and
 - (b) notwithstanding clause 7, a charge to off-set salinity impacts must not be applied with respect to an annual use limit set as part of creation of the water-use licence if the water-use licence has been created from a prior domestic and stock right, water right, prior joint right.

Note: this clause is to ensure that, in the process of defining initial annual use limits immediately after unbundling, the sum of annual use limits in the high impact zone may be increased within certain headroom (after that, in accordance with clause 5(a) the sum in the high impact zone will never increase, it can only decrease), and the charges to pay for works or measures to offset salinity impacts will, in this process, only apply to low impact zones outside irrigation districts.

Charges to off-set salinity impacts

7. In granting a new water-use licence, or in varying an existing water-use licence to allow an increase in annual use limit, a delegate must, subject to clauses 8 and 9:
 - (a) require the owner, under section 287A of the Act, to make a payment or payments towards the cost of works or measures to off-set any impact on river salinity; and
 - (b) calculate the payment or payments in paragraph (a) from each megalitre—
 - (i) of the annual use limit, in a new water-use licence, or
 - (ii) of the increase in annual use limit, in a varied water-use licence—and from the charges per megalitre for the relevant salinity impact zone as set out in Schedule 3; and
 - (c) if an increase in annual use limit is for only one season—
 - (i) subject to paragraph (ii), apply ten per cent of the charge per megalitre in Schedule 3;
 - (ii) not apply any charge if, in a season of high evapotranspiration, the Minister has temporarily raised all the annual use limits in an area; and
 - (d) place a condition on the water-use licence stipulating that water may only be used for irrigation while payments are being made as required by the notice given under paragraph (a); and
 - (e) if the annual use limit is being increased for only one season, place a condition on the water-use licence specifying that the annual use limit will, at 30 June next, return to its previous level.

New licences that replace an existing licence

8. No payment towards the cost of works or measures to off-set salinity impacts under clause 7 is required where a water-use licence is cancelled under section 64S of the Act as a result of part of the land to which it refers being transferred to a different party, and—
- (a) each new water-use licence issued for part of the land has an appropriate share of the annual use limit stipulated in the former water-use licence; and
 - (b) the sum of the annual use limits in all the new water-use licences issued for the land is no greater than the annual use limit stipulated in the former water-use licence.

Transfer of annual use limit from one licence to another licence

9. Where there is a joint application under section 64AH of the Act for the variation of two water-use licences by the holders of the water-use licences, being an application where—
- (i) the holder of one water-use licence is applying to reduce the annual use limit for the water-use licence held by that person; and
 - (ii) the holder of the other water-use licence is applying to increase the annual use limit for the water-use licence held by that person by the same amount—
- (a) if the transfer is to a water-use licence in the same salinity impact zone, no payment towards the cost of works or measures to off-set salinity impacts under clause 7 is required; and
 - (b) if the transfer is to a water-use licence in a lower salinity impact zone (salinity impact zones in Schedule 1 are numbered L1 to HIZ in the order where L1 is the lowest salinity impact zone), no payment towards the cost of works or measures to off-set salinity impacts under clause 7 is required; and
 - (c) if the transfer is to a water-use licence in a higher salinity impact zone, the payment or payments required under clause 7 must be calculated using the difference between the charges per megalitre for the two salinity impact zones that are set out in Schedule 3; and
 - (d) if the transfer is for only one irrigation season, the delegate must include a condition on each the water-use licences specifying that the annual use limit will, at 30 June next, return to its previous level.

Dated: 20.6.57



JOHN THWAITES MP

Minister for Water, Environment and Climate Change

Schedule 2
(clause 5)

**Maximum Sums of Annual Use Limits
in Salinity Impact Zones**

Salinity impact zone	Maximum sum of annual use limits (ML)
L4	-
L3	-

Note: Caps on annual use limits in L4 and L3 have been proposed but not yet agreed. Caps may be put in place by an amendment to these policies to insert volumes in the above table.

Schedule 3
(clause 7)

**Charges per Megalitre of Annual Use Limit for
Different Salinity Impact Zones**

Capital charges for new or increased AUL (without a transfer of AUL), for 2006/07

Each megalitre of new or increased annual use limit will attract a capital charge, to contribute towards the capital cost of works or measures to offset salinity impacts.

This charge may be paid either as a single upfront payment or as ten equal annual instalments. The amounts payable for 2006/07 are shown in the table below.

(The charge for L2 is 2.5 times the charge for L1; the charge for L3 is 2.0 times the charge for L2; and the charge for L4 is 2.0 times the charge for L3.)

(The instalments are calculated so as to generate the same Present Value as the single upfront payment, assuming payments are made at the end of each year and assuming a discount rate of 4%.)

Salinity Impact zone	Upfront capital charge per megalitre of AUL	Alternatively – 10 annual instalments of
L1	\$28.81	\$3.56
L2	\$72.04	\$8.90
L3	\$144.09	\$17.75
L4	\$288.17	\$35.51

Capital charges for a transfer of AUL from one licence to another, for 2006/07

(Under clause 8, these only apply where a transfer is to a higher impact zone, and are calculated as the difference between the charges for the two zones as set out in the table above. The table below sets out the results of these calculations.)

Transfer	Upfront capital charge per megalitre of AUL	Alternatively – 10 annual instalments of
From L3 to L4	\$144.08	\$17.75
From L2 to L4	\$216.13	\$26.63
From L2 to L3	\$72.05	\$8.11
From L1 to L4	\$259.36	\$31.96
From L1 to L3	\$115.28	\$14.21
From L1 to L2	\$43.23	\$5.33

Delegates must set charges under section 287A that are the same as the charges above.

Ongoing operation and maintenance charges, for 2006/07

Each megalitre of annual use limit that is a consequence of entitlement traded in since 1994, including any annual use limit temporarily transferred to a property, will attract an ongoing charge to contribute towards the cost of operating and maintaining works and measures to offset salinity impacts.

The ongoing operation and maintenance charge for each megalitre of annual use limit within any salinity impact zone is \$3.57 a year, as at 2006/07.

Delegates must set annual fees under section 64R that are the same as this charge.

Adjustments for inflation

The amounts of all the fees and charges in this Schedule are for the year 2006/07. Delegates must adjust all the fees and charges (including all instalments, where capital charges are being paid over 10 years) annually for inflation in line with the Consumer Price Index.

Notes: in these policies it is assumed that taking say 50 ML off one parcel of land has a salinity benefit equal to the salinity harm of putting 50 ML on another parcel of land in the same zone. (In other cases we assume that the harm is immediate, eg so a charge to pay for offsets has to be paid upfront. In practice harm – as well as benefits – often take some decades to eventuate, since groundwater movements are slow.)

Under the present policies, transfer of 50 ML from a higher impact zone will yield the same 50 ML of annual use limit in a lower impact zone. This has created headroom to allow for uptake of unused entitlements. In the future this could be reformed so that it would yield a higher volume, eg 100 ML, given this higher volume may have the same salinity impact because it is in a lower impact zone.

Appendix 6 - Defining “Minor”, “Reasonable” Changes to Water Use Licences (Mallee CMA 2011)

Redevelopment within the Victorian Mallee irrigation areas - defining ‘Minor’, ‘Reasonable’ and the application of the New

Irrigation Development (NID) Guidelines

1. PURPOSE:

1.1 To document an agreed agency process in relation to:

Determining ‘minor’ & ‘reasonable’ changes to WUL in context with the Ministerial Determinations.
Redevelopment & triggers for NID guidelines.

2. BACKGROUND:

2.1 On 1 July 2007 Victoria ‘unbundled’ the water systems in Northern Victoria into component entitlements including water use licences (WUL). WULs created from prior water rights or ‘take and use’ licences are subject to:

The same conditions as those that applied to the use of water prior to unbundling; and
An annual use limit (AUL) determined in accordance with the Conversion Rules. The AUL for a WUL was created based on the water entitlement at the time of unbundling or a demonstrated ‘history of use’ (which ever was the greater) up to a maximum volume based on the allocation rate allowable for the land specified in the licence. The AUL is expressed as megalitres of water that can be applied to a parcel of land within a twelve month period. The land and AUL are specified as a standard condition on the WUL.

2.2 The definition of land on which irrigation water may be used varies depending on its location. For Private Diversion Areas, the specified land in the licence is described in greater detail and applied to the irrigation footprint or the land specified to have water applied to it in relation to the extent of the irrigation system outlined in the Irrigation and Drainage Management Plans.

Within the Pumped Irrigation Districts the specified land described in the licence created at unbundling applies to the whole of each property. Water may be applied anywhere within the specified bounds of the property.

2.3 For long-established irrigation areas, such as the pumped districts, there are only basic standard conditions carried over during the unbundling process, such as:

- Managing groundwater infiltration - All irrigation water applied to the land must be measured through an approved water meter; and
- Managing disposal of drainage - All irrigation drainage from the land must be disposed of in ways that meet with the regional standards and terms and conditions.

Over time these conditions could be gradually lifted by setting extra conditions but this would likely be targeted at the very worst practices.

2.4 New or Varied Water Use Licences (Part 3 Standard Water-Use Conditions).

Irrigation and drainage plan - The Ministerial Determinations introduced in 2007 stipulate that all new or varied WUL applications require an Irrigation and Drainage Plan (Water Act S64O - new WUL or Water Act S64H - varied WUL).

Standard conditions for new or varied water use licences - This provides the opportunity for the basic Standard Conditions for pumped districts (as outlined in 3.3) to be reviewed and extra conditions applied with higher performance levels in an attempt to improve the management of water use within these districts if deemed necessary. The Standard Conditions for all new or varied WUL outlined in the Ministerial Determinations is summarised below:

Managing groundwater infiltration:

- a. Metering requirements;
- b. AUL compliance – maximum application rate for the specified area;
- c. Conditions governing ponded irrigation

Managing disposal of drainage.

Minimising salinity:

- a. Salinity impact zones payment of fees

Protecting biodiversity:

- a. Monitoring, recording and corrective actions

3.5 New or varied licences where plans and certain conditions are not required.

However the Ministerial Determination allows for some situations when a WUL may be created or varied without imposing any extra conditions such as:

- Subdivisions where part of the land is transferred to a different party, in which case new WULs are issued for each part of the land including a share of the original AUL proportional to the area of each part, without the impost of extra conditions;
- Irrigation is extended to some new land but will be within the AUL of the existing licence. Extensions to the land area that are considered to be 'minor' may be covered by a licence variation without any extra conditions; and
- Where irrigation is to be intensified on land already covered by a licence and an increase in the AUL is sought an irrigation and drainage plan is required subject to standard conditions (outlined in 3.4) with modifications that are deemed to be 'reasonable' in the circumstances, bearing in mind the water use objectives determined by the Minister.

- 3.6 A workshop was held in January 2010 to discuss the operations and policy issues that evolved from the unbundling process as relevant to the LWMP. Pursuant to Action Items 11 and 12 from this workshop the New Irrigation Development (NID) working group were assigned the following tasks. To determine:
1. How to judge whether an area of land can be considered a 'minor' extension where the WUL can be varied without the imposition of extra conditions.
 2. How to judge what are 'reasonable' modifications to 'irrigation and drainage plans' (IDP) and the 'standard conditions' for new or varied water use licences in cases where irrigation is proposed to be intensified and an increase in AUL is sought on land already covered by a WUL.
 3. Suitable trigger points for the implementation of the regional irrigation (NID) guidelines.
- 3.7 Various re-development scenarios and potential approaches were discussed with the NID working group and Regional Sustainability Technical Advisory Committee in order to determine how to best define scenarios that are 'minor' and 'reasonable' and develop suitable trigger points for the implementation of the NID guidelines. The outcome of these discussions have been incorporated into the comments below and used to formulate the agreed approach. This approach was reviewed and tested by the NID working group, 30th March 2011 and responses incorporated in the steps outlined below.

4. COMMENTS:

- 4.1 It is difficult to give a broad definition for 'minor' extensions and 'reasonable' modifications as there are many different scenarios that may be presented and need to be considered in light of the unique characteristics of each property.

An agreed approach is outlined below which applies a risk management process to determine if the change is 'minor' and to determine 'reasonable' modifications to the standard conditions based on the specific risks identified. The process relies heavily on the knowledge and experience of the water authority and may require referral to other Government agencies. The Water Authority is required to carefully consider the information provided and make a judgement on whether the proposed changes will pose a risk to the environment. It is therefore deemed to be 'reasonable' to modify the standard conditions commensurate with the environmental risk identified. Documented details of the information gathered and risk assessment undertaken provides the rationale and evidence to support the decision made by the Water Authority to modify the standard conditions.

Step 1: Preliminary Information provided by applicant.

A broad outline of what the irrigator proposes to do is obtained. For example, the irrigator wants to change their WUL by changing crop type and requires additional water application. This information will be used in step 2 to determine how the Ministerial Determinations will be applied.

Step 2: Application of the Ministerial Determinations

This step helps to determine one of three categories to which the applicant belongs.

1. Increase in irrigated area. An amendment of an existing WUL where irrigation is extended to some new land beyond the existing irrigation area while the total amount of water applied (AUL) does not change;
2. Increase in water application. An amendment of an existing WUL where the irrigator wishes to increase the amount of water applied to the land (ie increase AUL); or
3. A new WUL is required. The requirement for a new WUL is the trigger for initiating the New Irrigation Development Guidelines. This scenario is not likely to be common in the pumped districts but may occur where land holders received Irrigated Small Block Exit Grants and were required to cancel their WUL. This category is not included in the risk assessment process.

Step 3: Information provided by applicant.

For categories 1 and 2, the following information forms the basis of a risk assessment to determine if the increases (in AUL or area) will impact other persons or the environment or if extra conditions are required to minimise potentially harmful side-effects. The applicant needs to provide details of their proposal and land characteristics in the form of an Irrigation and Drainage Plan.

An Irrigation and Drainage Plan must include the following information:

- (a) A map of property proposed re-development.
 - property boundaries and total size;
 - property location and salinity impact zone (as recorded in the Victorian Water Register);
 - proposed crop type and area to be planted/replanted;
 - current planted areas on the property and existing irrigation systems;
 - location of existing features and infrastructure – house, shed, tracks, channels, drains, power, pumps, water storages etc; and
 - location of native vegetation or other natural land features eg lagoons.
- (b) Topographical survey.
 - a topographical survey, including elevation data and suitable contours is to be prepared where deemed necessary.
- (c) Soil assessment.
 - soil survey maps for the whole property to be developed by a suitably qualified soil surveyor.

(d) Irrigation design and management.

- anticipated crop water requirements and proposed maximum application rates;
- irrigation system specifications;
- map identifying delivery supply point and area to be irrigated; and
- proposed irrigation scheduling arrangements.

(e) Arrangements for drainage disposal.

- an appropriately drainage system must be designed for properties outside of the irrigation tile drain areas.

Table 1 Example Risk Assessment

The owner of 20 ha irrigated wine grape property, with an existing WUL, has purchased a neighbouring property of 2 ha without a WUL. The applicant wishes to extend the irrigation area to include this neighbouring property without an increase in AUL. The specific risks that may be associated with this proposal are listed in the first column and grouped against the Ministerially Determined objectives. Categories for likelihood and consequence have been taken from Table 2.

Specific Risk	Likelihood	Consequence	Risk Rating	Actions to manage risk
Managing Groundwater Infiltration				
1. No soil survey for the additional 2 ha	Unlikely – As the soil survey over the original block has indicated uniform soils	Minor – due to small area involved	Low risk	Nil
2. Irrigation in excess of recommended Application Rates provides a risk in managing groundwater infiltration	Likely – historic records indicates WUL holder consistently exceeds their AUL	Minor - small area involved	High risk	Revised Irrigation & Drainage Management Plan required incorporating additional area
Managing the disposal of drainage				
3. No tile drains exist as extended area was previously used for drying racks.	Unlikely – soil type indicates that drainage is not likely to be a problem	Minor – due to small area involved	Low risk	Nil
Minimising salinity				
4. Water application to new area may increase the amount of salt flushed through the soil profile	Moderate – water application will push salt further down into the soil profile	Minor - property is located in the low salinity impact zone	Moderate risk	Appropriate drainage system to be designed and included as part of redevelopment activities
Protecting Biodiversity				
5. Additional land is adjacent to a stand of rare and threatened native vegetation on road reserve	Remote – the applicant proposes to use drip irrigation & review of the topographical map indicates the vegetation to be located on a high point	Moderate – may have deleterious effects on native vegetation	Moderate risk	A buffer adjacent to the specified stand should be included in the irrigation design.

Table 2 Risk Assessment Matrix

Likelihood	Consequences				
	Insianificant	Minor	Moderate	Maior	Catastrohic
Almost certain Event is expected to occur in most circumstances – frequency, weekly	High Risk	High Risk	Extreme Risk	Extreme Risk	Extreme Risk
Likely Event will probably occur in most circumstances – frequency, monthly	Moderate Risk	High Risk	High Risk	Extreme Risk	Extreme Risk
Moderate Event should occur at some time – frequency, annually	Low Risk	Moderate Risk	High Risk	Extreme Risk	Extreme Risk
Unlikely Event could occur at some time – frequency, every 5 years	Low Risk	Low Risk	Moderate Risk	High Risk	Extreme Risk
Remote Event may occur only in exceptional circumstances frequency, every 10 years or more	Low Risk	Low Risk	Moderate Risk	High Risk	High Risk

Appendix 7 – Checklist on reinstating SBIEG properties

Applicant Name: _____

Applicant Property: _____

Existing PAC Number: _____

1. Confirm the expiry of the 5 year period Yes / No
2. Has customer provided advice on the redevelopment of the property?

Details:

3. New irrigation design submitted? Yes / No
4. Metering requirements checked? Yes / No
5. Has customer applied for new Water Use Licence? Yes / No
6. Has LMW assessed AUL requirements for property? Yes / No
7. Has a delivery share been determined? Yes / No
8. Has new meter been installed? Yes / No
9. Has all information been included into Water Register and Proclaim?

Once all the above has been completed a customer can commence irrigation

Appendix 8 – Specifications for Hydrogeological Investigations

GUIDELINES

Level 1 Investigation Specification

Purpose:

A Level 1 investigation is intended to assess hydrogeological conditions to a high level of certainty and should involve detailed modelling to simulate and predict groundwater processes. This level of investigation is necessary where there is an identified high risk to environmental assets associated with a new irrigation development. In most cases the presence of high value native vegetative areas or parks/reserves within a 500m proximity to a new development will warrant the need for such an investigation to be conducted.

This level of investigation will usually require substantial investment of time, skills and data and may involve large budgets for larger sites.

Requirement:

Detailed numerical modelling will be required to satisfy the requirement of a Level 1 investigation. This will involve the implementation of the measured data from the field investigation to calibrate a numerical model so that it is suitable for predicting the response of a system to specified changes in hydrogeological conditions.

The Level 1 investigation must be undertaken by a qualified hydrogeologist. It should include, but not be limited to;

- Description of property and proposed development
- Summary of geological and hydrogeological parameters
- Risk assessment
- Technical assessment of groundwater processes including field investigations to limit the accuracy of assessment due to broad assumptions
- Sensitivity analysis of adopted parameters
- Triple bottom line justification for buffer zone proposal
- Recommendations

Hydrogeological processes and modelling:

To decide on the degree of complexity, and to scope a modelling study, including assessing data requirements, time and cost, detailed groundwater guidelines by (Middlemis, 2000) provide a useful outline. Figure C1 shows a simple flow chart of the iterative groundwater modelling process.

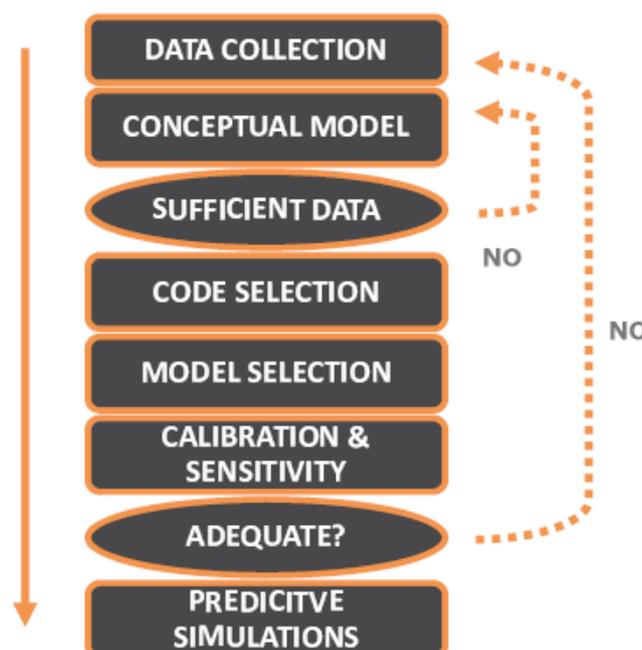


FIGURE C1: The Groundwater Modelling Process



GUIDELINES

In terms of a detailed methodology, model development should be undertaken in three main stages, as indicated in Table C1.

Table C1 Summary of Modelling Methodology

Stage	Description	Tasks
1	Conceptualisation	Define study objectives (general and specific) and model complexity Complete initial hydrological & hydrogeological interpretation, based on available data/reports Prepare conceptual model Select modelling code Prepare detailed modelled study plan (outline grid, boundaries, timeframes, accuracy targets, resources, and data required etc.) Report & review Commonly comprises around 30% (sometimes as high as 60%) of the study effort
2	Calibration	Construct model by designing grid, setting boundary conditions, assigning parameters and other data Calibrate model by adjusting parameters until simulation results closely match measured data (obtained during field investigations) Complete model verification, and sensitivity and uncertainty analysis Report & review Commonly comprises up to 20% of the study effort
3	Prediction	Prediction scenarios Complete sensitivity and uncertainty analysis Report and review Commonly comprises up to 20% of the study effort

Any numerical modelling should, as a minimum, include the following characteristics;

- Improved hydrogeological understanding – site specific and also regionally
- Aquifer simulation – evaluation of aquifer behaviour and how it interacts with other parts of the system (i.e. how an increase in irrigation over an area susceptible to perched watertables can cause lateral flows which can cause salinisation issues in areas)
- Optimising designs for economic efficiency and account for environmental effects (optimisation)
- Evaluating recharge, discharge and aquifer storage processes (water resources assessment)
- Predicting impacts of alternative hydrological or development scenarios (i.e. irrigation developments), which will assist in decision making (i.e. suitable buffer distances)
- Visualisation – to communicate aquifer behaviour between the hydrogeologist/modeller and client.
- Evaluate the major flow processes causing dryland salinity in a catchment, predict and assess options for lowering water tables in a specified time frame
- Determine long term water balances and impacts within intensive irrigation areas
- Assess the performance of groundwater interception and management/monitoring schemes



The type of numerical model usually required at a Level 1 investigation (i.e. the degree of complexity) will at a minimum be a detailed “Aquifer Simulator” would thus be required. This is defined as:

Aquifer Simulator: A high complexity model, suitable for predicting responses to arbitrary changes in hydrological conditions, and for developing sustainable resource management policies for further aquifer systems under stress.

Model data requirements and investigations:

There must be clear objectives and a work plan to identify model data requirements. This may involve design of a field investigations program to fill gaps. The work plan should account for the sites physical features.

The developed conceptual hydrogeological model can be verified in the field or improved to better reflect the site conditions. Accordingly, the following field data collection steps may be undertaken;

- Characterise the site geology and identify units that act as aquifers or aquitards (leading to development of perched aquifers). In many cases it may be necessary to determine the hydraulic properties of the aquifers, and sometimes the aquitards (can be used for numerical modelling).
- Measure groundwater levels to estimate the rates and directions of lateral and vertical groundwater movement.
- Drilling of observation and monitoring bores (needs to be undertaken by a highly qualified hydrogeologist (refer to the Minimum Construction Requirements For Water Bores in Australia by the Land & Water Biodiversity Committee, 2003).
 - Construction design must be recorded in detail, including geology, screen length, drilled depth, depth to water, drilling method, screen type and interval, backfill and method.
 - Wells must be provided with a unique identifying number and their location recorded.
 - Must be survey levelled to mAHD.
- Although the number of bores and locations, depths and screen intervals are site specific, hydrogeological site investigations require at minimum;
 - One bore located up-gradient (and also possibly off site) to indicate the quality of groundwater entering the site.
 - Two or three bores to monitor the aquifer located near, but down-gradient of and also lateral to each main irrigated area.
 - A mix of shallow and deeper bores, screened across the water table aquifer, and constructed using similar techniques to minimise sources of variation in the data.

Whilst it is the responsibility of the hydrogeologist to make the appropriate interpretation of model parameters, the typical parameter ranges adopted for the Eastern Mallee suite of models are provided below in Table C2 as a guide to expected ranges. Full details of the EM Models are included in:

- Aquaterra (2009a) Sunraysia Sub-Regional Groundwater Flow Model (EM2.2) Final Report, Eastern Mallee Model Version 2.2 (EM2.2)
- Aquaterra (2009b) Mallee Zone 5-year Rolling Salinity Review, B-Register “Legacy of History” Assessments – Eastern Mallee Model Version 1.2 (EM1.2)



GUIDELINES

Table C2: Guide to typical Mallee Model parameters (based on EM 1.2 and EM 2.3 Models)

Model Parameter	Adopted Values	Unit	Comments
Dryland Rainfall Recharge Cleared Land Recharge <i>Time-Lag</i> Uncleared Land Recharge	(Range) 1 – 25 0 – 180 0.1	mm/year years mm/year	Cleared land recharge rates would be considered the maximum values while uncleared are the minimum. The time-lag range was derived from SIMRAT (vertical flux algorithm)
Irrigated Horticulture Recharge <i>Time-Lag</i>	(Range) 15 – 270 0 – 30	mm/year years	Highly variable, based on previous findings from EM2.3 model
Drainage Rate	Use actual measured values	ML/ha	Modeller to consider using actual rates or estimating the drainage using infill or other hydrologic techniques. Rates impact on irrigated horticulture recharge rates
Irrigation Supply Irrigation District (Bulk Supply)	Use actual measured values	ML/ha	Modeller to assign appropriate rates which reflect the type of crop being irrigated.
Horizontal Hydraulic Conductivity (Kh) Coonambidgal Formation (Aquitard) Channel Sands Formation (Coarse Sands) Blanchetown Clay Parilla Sands	0.0027 15 0.0027 1 – 25	m/day m/day m/day m/day	
Vertical Hydraulic Conductivity (Kv) Coonambidgal Formation (Aquitard) Channel Sands Formation (Coarse Sands) Blanchetown Clay Parilla Sands	0.00027 1.5 0.00027 0.1 – 2.5	m/day m/day m/day m/day	Site specific aquifer hydraulic parameters should be confirmed from reports of previous work, including drilling programmes, pumping tests and analyses etc.
Specific Yield (Unconfined Storage - Sy) Parilla / Channel Sands (Used in EM)	(Range) 0.05 – 0.15 0.1		
Storativity (Confined Storage - Sy) Parilla / Channel Sands (Used in EM)	(Range) Within 10 ⁻⁴ magnitude 0.0001		
Transmissivity	Use site specific rates depending on Kh and aquifer thickness	m ² /day	
Evapotranspiration Maximum ET Rate (at surface) <i>Extinction Depth</i>	(Range) 300 – 900 2 – 8	mm/year m	Dependent upon soil type, vegetation type and salinity



It must be recognised that sites with significant hydrogeological complexity and high risk factors can require numerous bores to assess the extent of possible irrigation impacts on and off the site.

A comprehensive drilling program may be needed to investigate the unsaturated zone, to monitor multiple aquifers or to monitor different depths within one aquifer, depending on the nature of the problem, the site hydrogeology (presence/absence of Blanchetown Clay), and whether native vegetation or state parks are within close proximity. The use of solid-core diamond drilling should be considered, as this can provide detailed information on the underlying geology and structures such as faults and joints, which may impact the areas sub-surface drainage.

As information is gathered, further phases of field investigation and data analysis may be required to test the models predictability. It is important to recognise that the investigation bores installed during the Level 1 investigation might not be in the best location for long-term monitoring at the site, and additional bores could be required for this purpose.

The possibility of retaining bores for long-term monitoring should be considered when designing a bore network.

Further assessment process:

A field investigation may include a number of investigation methods, including bore installation, groundwater sampling, groundwater level measurement and aquifer hydraulic testing. Other methods that may be used to better define the level of risk include;

- Geophysics (surface and down-hole)
- Unsaturated modelling

Output:

The output should be a rigorous technical report with detailed recommendations as to how and when the measures adopted to minimise off-site impacts of irrigation will be implemented. It should typically include, but not be limited to:

- Detailed risk assessment
- Technical assessment of groundwater processes including field investigations to limit the accuracy of assessment due to broad assumptions
- Sensitivity analysis of adopted parameters
- Triple bottom line justification for buffer zone proposal
- Detailed recommendations and conclusions.



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Level 2 Investigation Specification

Purpose:

A Level 2 Investigation is required where either the risk is Moderate but with a high degree of uncertainty (at desktop and risk assessment stage) or where standard buffers are rejected by the developer/applicant under a Level 3 or 4 assessment.

Requirement:

The Level 2 investigation must be undertaken by a qualified hydrogeologist and is required to make an assessment similar in structure to a Level 1 investigation. The key difference will be the rigour applied to refining assumptions.

Where a Level 1 Investigation may require significant site work to limit the sensitivity of process model outputs to assumed hydrogeological parameters, a Level 2 allows for a higher degree of interpretation to adequately reflect the reduced overall risk.

Modelling standards:

Within these higher levels of investigation (i.e. Levels 2 and 1) numerical modelling will more than likely be involved to provide a computer-based representation of the essential features of a natural hydrogeological system.

Its two components are a conceptual model and a mathematical model.

The conceptual model is an idealised representation (i.e. a picture) of our hydrogeological understanding of the key processes of the system. A mathematical model is a set of equations, which subject to certain assumptions, quantifies the physical processes active in the system (particularly aquifers) being modelled.

The required resources of time, budget, data and technical expertise will be greater for models with more complexity and where there are higher expectations of outcomes for resource management.

For this level of investigation a basic or even an impact assessment model would be constructed, which are outlined as follows;

- **Basic Model:** A simple model suitable for preliminary assessment (rough calculations), not requiring substantial resources to develop, but not suitable for complex conditions or detailed resource assessment;
- **Impact Assessment Model:** A moderate complexity model, requiring more data and a better understanding of the system dynamics, and suitable for predicting the impacts of proposed developments (i.e. irrigation developments in proximity to native vegetation and parks) or management policies;

Conceptualisation of processes:

In order to develop an understanding of site specific risks, a conceptual model of the hydrogeological setting needs to be developed. This model will indicate the risk that the proposed irrigation and its associated operations have. Depending on the type of irrigation, an even more detailed investigation (Level 1) may be required.

The requirements that a conceptual model are expected to address include;

- It is usually presented graphically as a cross section or a block diagram with supporting documentation that outlines the essential system features.
- It reflects site conditions accurately, as it is used as a basis for developing the monitoring program.
- The effect that the irrigation development would have on the local area, i.e. groundwater flow direction and rate, level and quality, native vegetation impacts. This will include highly detailed maps, plans, cross sections, any existing groundwater results, and schematic diagrams of the environmental setting.



- Relationships between different aquifers at the site, and the potential for interaction between them and surface water bodies.
- Design of model inputs based on a gap analysis of existing drilling data

Supporting documentation that should outline the descriptive and quantitative terms and the essential system features are include in **Table C2**.

Table C2: Conceptual Model Features

Feature	Description	Comment
Boundaries	Location and type of boundaries for the area to be modelled	Boundary types include specified flow, specified head, and head-dependent flow.
Geological Framework	Geological units, and corresponding hydrostratigraphic units Model layers & associated aquifer parameters Bedrock configuration & aquifer or aquitard characteristics	Hydrostratigraphic units comprise geological units with similar aquifer properties. Several geological formations may be combined into one hydrostratigraphic unit (or model layer), or a geological formation may be subdivided into aquifer and confining units (or several layers)
Hydrological Framework & Stresses	Recharge & discharge processes Dominant aquifer flow mechanisms	Definition of aquifer media type (porous medium, fractured rocks, etc.), and surface-groundwater interaction processes.
Human-induced factors	Anthropogenic influences on the system	Pumping, irrigation, drainage, weirs, floodways, land clearing, aquifer storage and recovery, waste discharge, mining, etc.

Scope of field investigation:

At this level of investigation, field work may be required due to the higher level of risk associated. A site investigation must be undertaken to first validate the conceptual model for the site and to fill in any gaps that may arise in the development of the conceptual model. The level of assessment and information that is required in the site investigation must reflect the level of risk that the development poses to groundwater and the surrounding environment, the type of problem being addressed and the hydrogeological setting itself.

Further assessment process:

The types of things a detailed assessment may further require include;

- Designing a monitoring program in an appropriate location based on the field and site investigations
- Derive and implement suitable "Buffer Zones" (to be set by highly qualified hydrogeologist)
- Calculate sub-surface drainage requirements followed by gauged limits of sustainable annual irrigation volumes.

Output:

The output should be a technical report including detailed recommendations as how the measures adopted to minimise off-site impacts of irrigation will be implemented.

The report should include, but not be limited to, the following aspects;

- Description of property and proposed development



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- Summary of geological and hydrogeological parameters
- Risk assessment
- Technical assessment of groundwater processes including field investigations commensurate with the degree of uncertainty in existing data and risk.
- Sensitivity analysis of adopted parameters
- Economic justification for buffer zone proposal
- Recommendations

It should be recognised that soils surveys, irrigation designs and development of an IDMP are processes that will also occur for the development application and so it is appropriate for the Level 2 report suggest buffer contingencies that will allow for further refinement if and when better information becomes available.



Level 3 Investigation Specification

Purpose:

Level 3 is undertaken when the assessor has some doubt about the quality of data used to assess the broad level risks. The doubt may arise from conflicting information or from a lack of data to support a clear risk categorisation. The risk assessment may identify that a proposal could have significant off-site impacts and/or there are native vegetation issues and other sustainability issues requiring further investigation. In these instances a Level 3 investigation may be required, which is a more in depth hydrogeological assessment that would further refine the proposal, continue the risk assessment into a more in depth analysis and provide sufficient confidence for the water authority to approve a proposal.

Requirement:

This level of investigation may require the independent opinion from a suitably qualified hydrogeologist. Background data will be used as well as any other data that can be made available. Other required information will include;

- The typical annual fluctuation of groundwater and piezometric levels of significant aquifers and the hydraulic head difference between aquifers
- The location and existence of any aquifer(s)
- Groundwater gradients, groundwater quality and likely variability of quality
- Location of any current or potential areas of groundwater-surface water interaction
- Location of any existing or potential areas of groundwater discharge within the vicinity of the proposed development that may be exacerbated by irrigation development
- The likely need for sub-surface drainage, and consequent need to set aside areas within the development for sub-surface drainage disposal.

Following from the level 4 data requirements, information needs to be obtained which specifically characterises the sites, history, proposed development, geology, hydrogeology and a record of detailing adjacent land uses. For example;

- **Site History:** Land use – previous, present and proposed.
- **Geology:** Information on the local and regional geology underlying and surrounding the development, which will be available from existing borehole records or from geological maps.
- **Hydrogeology:** Information on the aquifers at the site and in the region. This includes depths, types, quality and hydraulic properties including permeability.
- **History of adjacent land uses:** Past and present uses of surrounding properties which may have caused groundwater issues should be identified where applicable.

Further assessment process:

Within a level 3 investigation, there would be several more assessment processes that would determine whether or not there is still a risk involved. The risk assessment steps outlined in Level 4 are incorporated into the subsequent assessment processes. These include the following;

- Generation of GIS shapefiles for site and produce data sets for various parameters from existing GIS layers. These would then be used to conduct more detailed and accurate hydrological analyses to further determine the degree of risk;
 - **Simple risk assessment:** Assesses the predicted impact of a risk factor on groundwater and the local regions hydrological environment. It is a quantitative approach using conservative (worst case) input parameters, assumptions and methods to consider what could happen under normal operation.
 - **Detailed risk assessment:** Will involve the hydrogeological and hydrological settings in which the site is located, including the various aquifers in the vicinity



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of the proposed irrigation development, the relationships between them and the presence and effectiveness of impeding layers (i.e. Blanchetown Clay).

- An impact assessment, which focuses on groundwater accessions (based on known irrigation rates and leaching fractions within the site). This may include analytical modelling, to determine the change in groundwater storage (most likely increased recharge), which would cause localised mounding of the water table and development of perched water tables.

Output:

A technical report should be produced summarising the potential impacts based on available data and known risk factors. The main focus of this report would be on the conclusions and recommendations whereby detailed and informed judgements would be made on the identified risks and what monitoring and management strategies should be implemented to minimise them.



Level 4 Investigation Specification

Purpose:

A level 4 investigation intended to be a desktop review which aims at identifying whether there are any hydrogeological data that will provide more certainty to the assessment. This level of investigation is intended to be a gap analysis which will be completed to provide the assessor with additional certainty that any identified risk discovered during a preliminary risk assessment is minimal. A level 4 hydrogeological assessment should be rapid and inexpensive, and be based primarily on existing data and related information.

Requirement:

This level will include as a minimum a cross-check against existing monitoring bores and results/outcomes of other development assessments nearby. Other required information will include;

- Data from such sources as the Victorian Water Resources Data Warehouse;
 - Depth to watertable (mAHD)
 - Depth to Regional groundwater (mAHD)
 - Bore locations (Easting and Northing coordinates) and elevation
 - Bore depths, casing and screened interval details
 - Available driller's logs and stratigraphical details.
- Water chemistry (major ion concentrations), Electrical Conductivity (EC) and Total Dissolved Solids (TDS).
- Summary of previous hydrogeological investigations from neighbouring properties including;
 - Key issues identified in investigations
 - Design features for new development (i.e. irrigation) layouts and any drainage controls
 - Monitoring requirements recommended and implemented
 - Past monitoring data

Assessment process:

As part of a level 4 investigation, a general risk assessment should be performed. This will provide the framework to help guide a strategic plan for treatment of any identifiable risks, ultimately allowing for a balanced judgment as to whether a course of action is prudent or desirable given the understanding of the risk involved. The steps involved with the risk assessment are as follows;

1. Identify Potential Receptors;

- Native Vegetation
- National Parks

2. Identify Risk Factors;

- New irrigation development
- Presence of Blanchetown Clay
- Shallow water tables

3. Assess Potential Likelihood & Consequence of Risk factors;

- Increased irrigation in areas exhibiting Blanchetown Clay may lead to the development of perched watertables, possibly leading to lateral migration of groundwater, enhancing salinisation.

4. Make Recommendations;

- Suggest how future monitoring and management programs can be implemented to minimise and control the risk factor impacts.



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Output:

A desktop report, supplementing the risk assessment should be produced, which will;

- Assess bore hydrographs, based on both current and historical data (to determine trends)
- Provide the Water Authority with a reasonable degree of confidence regarding the potential hydrogeological implications from the identified risks.
- Enable the developer/applicant to make an informed decision whether to proceed with a more detailed assessment, Level 2 or accept standard buffer zones.
- Identify the issues that will need to be addressed in a detailed hydrogeological assessment

Appendix 9: Guidance on hydrogeological terminology and vegetation buffer description

Guidance on Terminology in Attachment B:

National Park – A land parcel assigned protection status under the National Parks legislation

High value environmental asset include–

- State Parks,
- River Murray corridor,
- Flora/Fauna Reserves

Hydraulic loading – Refers to the impact that additional irrigation water application may have on the local water table behaviour. Nominal rates to be applied for the initial risk assessment are as follows:

Low < 5ML/ha/yr; Medium 5 – 7ML/ha/yr; High >7ML/ha/yr

Qualification to adoption of nominal rates: Any detailed assessment of hydraulic loading will rely on a site specific understanding of impact on factors such as

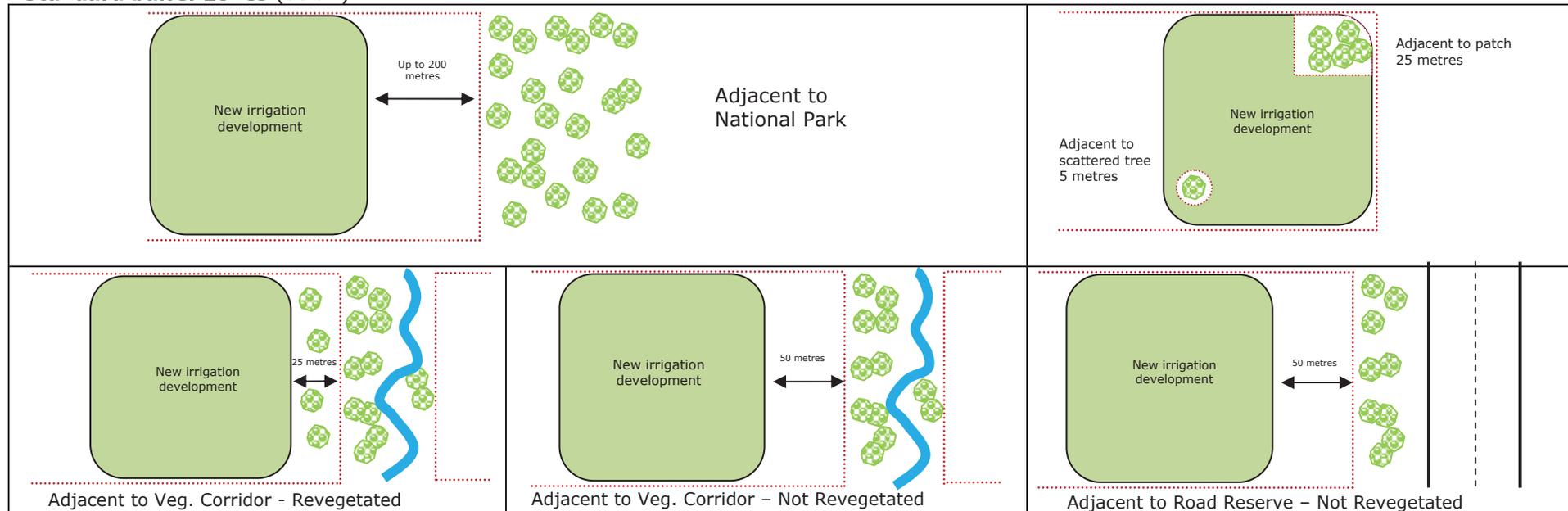
- irrigation application rates relative to soil type with consideration of;
 - intensity (Application rate typically stated in terms of ML/d),
 - frequency (daily/weekly/intermittent irrigation cycle) and
 - duration (number of days for seasonal crops or season total for permanent crops) of irrigation events
- watertable levels relative to geology
- water balance elements such as climate and irrigation cycle management.

The application being considered could be referred to DPI and/or an irrigation designer for preliminary guidance on this parameter in order to determine suitable ranges for specific applications. However, a more detailed assessment of this parameter would be undertaken as part of further Investigations (i.e. post risk assessment).

Regional watertable – Generally describes the groundwater processes that manifest as local impacts but have much broader origin

Perched watertable – Watertable in the unsaturated sub-surface profile caused by presence of an impervious layer preventing downward leakage

Standard buffer zones (below):



Appendix 10 – Process for assessing applications for maximum application rates

The following process has been developed for growers wishing to apply for an AUL using MAR that exceed the higher value listed in either:

- Schedule 2 of the Ministerial Determinations for Standard Water-use Conditions; or
- is unlisted in either of the above.

The process is consistent with “Crop evapotranspiration – guidelines for computing crop water requirements”, FAO Irrigation and Drainage Paper 56 (Allen R.G., 1998) and requires growers to demonstrate that because of local conditions, special crops, or an individual irrigation and drainage system, the application rate can be applied safely without increasing infiltration to groundwater systems or causing water logging, land salinisation, water salinisation or groundwater pollution.

It is recommended that the information is completed by a qualified agricultural scientist, irrigation engineer or an Irrigation Australia Certified Irrigation Designer or Certified Irrigation Agronomist¹.

Glossary of terms used within this process

ECC - Effective Canopy Cover determined by the shade cast at solar noon (i.e. light intercepted by the foliage at midday)

EAS - Effective Average Shade cast at solar noon and solar noon +/- 3h (i.e. the total light intercepted over the day from observation in the morning, midday and afternoon) EAS accounts for the increase in sunlit foliage in the morning and afternoon.

ETo² - Reference evapotranspiration as defined by FAO publication 56.

ETc - Crop evapotranspiration (water requirement)

FAO - Food and Agriculture Organisation of the United Nations

Kcb - coefficient for main crop (Kcb) water requirement

Kc - Crop coefficient to determine crop evapotranspiration (water) requirement

Ke - Coefficient for soil/cover evaporation

¹ See <http://irrigation.org.au/wp-content/uploads/2013/03/cia-factsheet-May-20141.pdf>. Accessed 11/12/2015

² <http://www.fao.org/docrep/x0490e/x0490e0c.htm>. The procedure for predicting the effects of specific wetting events on the value for the crop coefficient Kc. The solution consists of splitting Kc into two separate coefficients, one for crop transpiration, i.e., the basal crop coefficient (Kcb), and one for soil evaporation (Ke): So that $ETc = (Kcb + Ke) ETo$

MAR Information requirements to complete FORM 1

The specific information requirements have been developed using the principles and methodology set out in FAO 56. The information needed includes:

- Proponent details;
- Crop type or crop rotation by month;
- Canopy cover by month;
- Inter-row management or cover crop;
- Crop cooling arrangements;
- Use of shading/ netting or other physical crop protection;
- Estimated $K_c E_{Tc} = (K_{cb} + K_e) E_{T0}^3$. Considering main crop (K_{cb}) and soil/cover evaporation (K_e) that is supported by peer reviewed scientific papers or from site soil or crop monitoring and is consistent with changes in canopy cover. In the absence of this evidence the default will be to apply a K_c value of 1.33 of the Effective Canopy Cover (ECC) as per page 29 of (RMCG et. al. 2013). The ECC is to be provided by the applicant; and
- Type of irrigation system. Note: the use of ponded irrigation systems in Victoria under Standard Water Use Licence Conditions requires a planning permit.

³ <http://www.fao.org/docrep/x0490e/x0490e0c.htm>. The procedure for predicting the effects of specific wetting events on the value for the crop coefficient K_c . The solution consists of splitting K_c into two separate coefficients, one for crop transpiration, i.e., the basal crop coefficient (K_{cb}), and one for soil evaporation (K_e): So that $E_{Tc} = (K_{cb} + K_e) E_{T0}$

FORM 1: MAR Information requirements

1. Name of applicant	
2. Contact details – phone, address	
3. Location of property associated with the WUL	
4. WUL number	
5. Crop type (s) description	
6. Please check to ensure the crop type is not already listed as per Look-up Table 2. Please indicate if this application is for an increase above the maximum application rate listed in Look-up Table 2 or is for an unlisted crop.	
7. Describe special considerations: <ul style="list-style-type: none"> • soil type • crop canopy cover • inter-row management or cover crop • crop cooling arrangements • use of shading/ netting or other physical crop protection 	

<p>8. Please describe basis for proposed Kc considering crop need, cover crop, published literature and other evidence. This needs to be consistent with FAO 56¹ (If necessary please attach supporting evidence, monitoring etc.)</p> <p>ET_c = (K_{cb} + K_e) ET_o (Allen R.G., 1998)</p>	
<p>9. Is this different to published Kc values using FAO 56. Or from Look-up Table 1. If so please explain any difference.</p>	
<p>10. Complete the information below to determine your initial estimate of Maximum Application Rate. This will need to be checked by the NID group who will provide advice to the water corporation.</p>	

¹ Allen, R. G., Pereira, L. S., Raes, D., & Smith, M. (1998). 'Crop evapotranspiration'. FAO Irrigation and Drainage Paper No. 56, Crop evapotranspiration. FAO. Available from <http://www.fao.org/docrep/x0490e/x0490e00.htm>

FORM 2: MAR Calculation table

Month	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
(A1) Effective canopy cover (ECC %) for proposed crop(s) by month (See Method 1 for guide).													
(A2) Proposed Kcb for crop													
(A3) Irrigated cover for cover crop/wetted area. Considering soil % of soil area wetted. Note A1+A3 cannot exceed 100%													
(A4) Proposed Ke for cover crop/understorey / evaporation from wetted soil area (See Method 2 for guide)													
(B) Proposed Kc = (Kcb +Ke) value considering published values, ECC, cover crop and any other special considerations. Cannot exceed 1.33. (See Section 6 for guide)													
C) Standard ETo (90 th percentile)	48	75	111	156	183	211	237	180	157	93	51	40	1542
D) Multiply B x C Water required (mm)													
E) Standard effective rain allowance Effective rainfall supplied (mm) (20 th percentile).	0	10	12	11	15	7	17	14	15	11	20	10	142

F) Deduct E from D= Irrigation required (mm)													
G) Remove any negative numbers and sum for season total													
H) Divide total by 0.85 for irrigation inefficiencies and leaching													
I) Divide by 100 to convert to ML/ha													

Assessment criteria and considerations in review of applications

The assessment criteria includes:

- As per FORM 1 & 2 - the assessment is against “standard year” ET and rainfall that has been developed for defining the irrigation requirements (RMCG et. al. 2013), and for determining the triggers for a seasonal annual use limit adjustment;
- There will also be a maximum Kc value supported by the independent literature review (RMCG et. al. 2013) “values of ETc are energy limited and in irrigation districts Kc cannot exceed 1.3”. Therefore, a maximum Kc of 1.33 (equal to an effective canopy cover of 100%) is to be applied to any crop or crops relying on evaporative cooling.

Applicants may also present evidence in the form of:

- Calibration of crop coefficients from soil moisture or crop monitoring data;
- Calibration from records of actual irrigation water use by growers who have implemented best practice including evidence of climate/ soil and/or crop monitoring to identify root zone drainage and a water balance. Where their usage would need to be calibrated against that year’s ETo (Kc values) and the result (ET of crop) adjusted to reflect the 90th percentile ETo.

Applying the concepts to innovative or double cropping systems

Table 10.1 below provides Kc values for grape vines with inter-row crops. The methodology, used here is consistent with the literature review in RMCG et.al. (2013)¹. The example assumes that vines cover 50% of the area and the inter row makes up the remaining 50%. It uses a separate crop coefficient for the inter-row crop multiplied by the % of ground cover. This is then added to the Kc values for wine grapes with 50% shaded area.

The highlighted cells are for vines (with 50% shaded area) and have not been changed as there is no summer inter-row crop. However, the winter Kc values have increased due to an inter-row winter cover crop. The highlighted Table Grape Kc value is for January cooling (1.3).

Table 10.1: Kc values for vines with inter-row crops and for table grapes with cooling

		CROP TYPE	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
%Area Vines	%Other Crop	User Defined Kc values												
50%	50%	Vines with inter row autumn winter cover crops	0.38	0.38	0.30	0.54	0.69	0.69	0.69	0.69	0.65	0.57	0.38	0.38
50%	50%	Vines with inter row permanent cover.	0.38	0.38	0.68	0.91	1.06	1.06	1.06	1.06	1.02	0.95	0.38	0.38
50%	50%	Vines with zucchini	0	0	0.3	0.79	0.97	1.13	1.13	0.69	0.65	0.57	0	0
50%	50%	Vines with cucumber	0	0	0.3	0.54	0.99	1.1	1.19	1.18	1.06	0.57	0	0
50%	50%	Vines with chinese cabbage	0	0	0.3	0.54	0.69	0.69	0.69	0.69	1.01	1.06	0.51	0
50%	50%	Vines with peas (fresh)	0.35	0.57	0.87	0.54	0.69	0.69	0.69	0.69	0.65	0.57	0	0.25
50%	50%	Vines with beans (green)	0	0	0.55	0.95	1.2	0.69	0.69	0.69	0.65	0.57	0	0
50%	50%	Vines with broad beans	0.5	0.18	0.3	0.54	0.69	0.69	0.69	0.69	0.65	0.82	0.33	0.56
50%	50%	Vines with capsicums	0	0	0.3	0.84	1.08	1.2	1.21	1.21	1.17	1.06	0	0
		Vines with chilli (use capsicum)												
50%	50%	Vines with garlic	0.5	0.5	0.8	1.04	1.12	1.05	0.69	0.69	1	0.98	0.49	0.5
		Vines with squash (use pumpkin if autumn harvest or zucchini if summer harvest)												
50%	50%	Vines with egg plant	0	0	0.3	0.84	1.07	1.2	1.21	1.2	1.11	0.57	0	0
50%	50%	Vines with melons	0	0	0.3	0.79	0.97	1.13	1.13	0.69	0.65	0.57	0	0
50%	50%	Vines with pumpkins	0	0	0.3	0.79	0.97	1.15	1.18	1.12	0.65	0.57	0	0
		Tablegrapes with cooling practices use 1.3 for January (max possible). Not all of Jan likely to be required, but this is offset by Dec/Feb use.												
		Table grapes with cooling at 50% sa	0.00	0.29	0.48	0.90	0.95	0.95	1.30	0.93	0.85	0.78	0.00	0.00

¹ Augmentation of the Mallee Regional Policy for Setting Annual Use Limits on Water-Use Licences *Final Report, June 2013 Mallee CMA*

In-field evaporative cooling of table grapes is increasingly common in the Mallee. It is used to maintain fruit quality on very hot days. Concerns have been raised about how this practice should be accommodated in maximum application rates and therefore in AULs.

The independent literature review (RMCG et. al. 2013) states that “values of ETc are energy limited and in irrigation districts Kc cannot exceed 1.3”. We propose therefore that a Kc of 1.3 be applied for the month of January for those crops relying on evaporative cooling. This may overstate water requirements because cooling is unlikely to be required every day for the whole of January. However, any overestimate would be at least partly offset by the impact of applying any cooling that may be required in hot periods outside January.

Table grape crops in the Mallee are also now commonly covered in plastic to provide rain protection. Transpiration under plastic would be lower due to increased relative humidity, reduced wind and lower radiation, but temperature may be higher. Overall, total crop water use is expected to be lower as per Fidelibus (2013)². For the purpose of this report, plastic is assumed not to be used when determining application rates for table grapes. Irrigators can make their own judgements about whether or not to use plastic and whether or not to apply for a lower AUL than that implied by the maximum application rate. The main task here is to rule in the highest rates justified by the available science.

When used with standard ET and rainfall data, the crop coefficients outlined in Table 10.1 generate the maximum application rates shown in the Table 10.2 below.

Table 10.2 Maximum application rates for vines with inter-row crops and for table grapes (50% shaded area) with cooling

User Defined Kc values	ML/ha max application rate
Vines with inter row autumn winter cover crops	9.0
Vines with inter row permanent cover.	14.9
Vines with zucchini	12.0
Vines with cucumber	13.4
Vines with chinese cabbage	9.8
Vines with peas (fresh)	9.9
Vines with beans (green)	10.7
Vines with broad beans	9.3
Vines with capsicums	15.3
Vines with chilli (use capsicum)	-
Vines with garlic	13.8
Vines with squash (use pumpkin if autumn harvest or zucchinni if summer harvest)	-
Vines with egg plant	14.6
Vines with melons	12.0
Vines with pumpkins	13.1
Table grapes with cooling at 50% sa	13.6

² See <http://www.slideshare.net/viticulture/plastics-for-table-grape-commission-2013> accessed 21/5/13. Matthew Fidelibus UC Davis.

Method 1: Determining Effective Canopy Cover (ECC)

Refer to Victorian Government Ag. Note: Determining effective area of shade in orchards and vineyards to estimate crop water requirement (Note Number: AG 1383 Published: August 2009 Updated: May 2013 - Available from <http://agriculture.vic.gov.au/agriculture/horticulture/fruit-and-nuts/orchard-management/determining-effective-area-of-shade-in-orchards-and-vineyards-to-estimate-crop-water-requirement>).

It is important to note that the Ag. Note provides advice on how to measure shade areas and calculate EAS, in this case only solar noon measurement is required to determine ECC.

Method 2: Guidelines to Determining Soil Evaporation Coefficients (Ke)

In addition to evaporative demand, soil evaporation is a function of the amount of water at the soil surface and the degree of shading by the crop canopy. Therefore, key factors are:

- Irrigation system (partial or full soil coverage - sprinkler or drip) has a large influence on the Ke value;
- Soil texture, after irrigation /rain soil drying is initially rapid (phase 1) and Ke is consequently high, but as the soil surface dries, the evaporation process slows (phase 2) and Ke falls;
- Time of year, with more rapid drying of soil surface in summer;
- Crop stage, degree of shading; and
- Trellis system (i.e. area of shaded soil), frequency of irrigation or rainfall and understorey (cover crop or weed) transpiration need to be taken into account when considering an appropriate Ke.

Ke values in drip-irrigated horticulture/viticulture systems are expected to be highest early in the season when shading by the crop canopy is minimal, cover crops are active and soil moisture may be high due to early season rainfall.

The following Ke values have been calculated for vineyards (from GWRDC Innovator Network):

0.15 – drip irrigated up to 80% canopy cover, no cover crop, clay loam

0.12 – drip irrigated 30-50% canopy cover. No cover crop, sandy loam.

0.55 – mini sprinkler irrigated, 40% canopy cover

0.46 – flood irrigated sandy loam

Look-up Table 1: Crop Coefficients (Kc) – developed for South Australia

The table below has been prepared by the Irrigated Crop Management Service of Rural Solutions South Australia. It is used with permission.

Crop Kc values (FAO56)

RURAL SOLUTIONS SA

CROP TYPE	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Sum
Bare Soil													0.00
Bare Soil Loxton	0.36	0.26	0.29	0.18	0.08	0.10	0.07	0.14	0.09	0.19	0.24	0.36	2.35
Almonds (FAO56)		0.41	0.58	0.80	0.90	0.90	0.90	0.90	0.83	0.71			6.93
Almonds 10%sa		0.26	0.30	0.35	0.37	0.37	0.37	0.37	0.35	0.32			3.07
Almonds 30%sa		0.29	0.44	0.62	0.71	0.71	0.71	0.71	0.66	0.57			5.42
Almonds 40%sa		0.30	0.50	0.76	0.88	0.88	0.88	0.88	0.81	0.70			6.60
Almonds 50%sa		0.31	0.54	0.82	0.96	0.96	0.96	0.96	0.88	0.75			7.13
Almonds 70%sa		0.31	0.55	0.86	1.00	1.00	1.00	1.00	0.92	0.78			7.44
Almonds 90%sa		0.32	0.57	0.89	1.04	1.04	1.04	1.03	0.95	0.81			7.67
Apple (FAO56)			0.61	0.73	0.89	0.95	0.95	0.95	0.95	0.91	0.76		7.69
Apple 10%sa			0.28	0.32	0.38	0.40	0.40	0.40	0.40	0.38	0.35		3.31
Apple 30%sa			0.35	0.50	0.70	0.80	0.80	0.80	0.80	0.74	0.64		6.14
Apple 40%sa			0.38	0.60	0.87	1.00	1.00	1.00	1.00	0.92	0.79		7.56
Apple 50%sa			0.40	0.64	0.94	1.09	1.09	1.09	1.09	1.01	0.85		8.20
Apple 70%sa			0.41	0.66	0.99	1.14	1.14	1.14	1.14	1.05	0.89		8.56
Apple 90%sa			0.41	0.68	1.02	1.18	1.18	1.18	1.18	1.09	0.92		8.85
Artichoke 1stYR	1.00	1.00	0.97	0.50	0.59	0.92	1.00	1.00	1.00	1.00	1.00	1.00	10.98
Artichoke 2ndYR	1.00	0.97		0.54	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	10.43
Asparagus	0.53	0.50	0.50	0.50	0.75	0.95	0.95	0.95	0.95	0.95	0.95	0.91	9.38
Avocado	0.61	0.69	0.78	0.84	0.85	0.85	0.85	0.84	0.81	0.78	0.67	0.60	9.18
Banana	1.00	1.00	1.02	1.11	1.19	1.20	1.20	1.20	1.20	1.20	1.09	1.00	13.41
Banksia	0.69	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.71	0.73	0.74	0.72	8.48
Beans Dry						0.40	0.76	1.15	0.73				3.04
Beans Green			0.50	0.82	1.02								2.34
Beetroot							0.50	0.62	1.02	1.03			3.17
Blueberries			0.32	0.57	0.89	1.05	1.05	1.05	1.05	0.90	0.63		7.51
Boronia	1.04	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.07	1.10	1.11	1.08	12.80
Broad Bean	1.01	0.36								0.50	0.66	1.12	3.65
Broccoli	1.02								0.70	0.74	0.95	1.05	4.45
Brussel Sprout						0.70	0.70	0.77	0.94	1.05	1.04	0.97	6.17
Cabbage	0.99								0.70	0.78	1.00	1.05	4.53
Canola Irrigated	1.07	1.15	1.09	0.61						0.35	0.36	0.66	5.29
Canola Rainfed	0.93	1.00	0.95	0.56						0.35	0.36	0.60	4.76
Cantaloupe					0.50	0.62	0.82	0.80					2.74
Capsicum				0.60	0.77	1.03	1.05	1.05	1.05	0.97			6.53
Carrot Summer				0.72	0.98	1.05	1.01						3.76
Carrot Winter	1.05	1.01								0.70	0.83	1.04	4.63
Cauliflower	1.01								0.70	0.78	0.98	1.05	4.52
Celery								0.70	0.73	0.96	1.05	1.04	4.47
Cherry			0.61	0.73	0.88	0.95	0.95	0.95	0.95	0.90	0.80		7.70
Cherry RL Early cc		0.78	1.05	1.04	0.96	0.86	0.75	0.65	0.55	0.45			7.11
Cherry RL Early nc		0.55	0.80	0.80	0.75	0.68	0.62	0.56	0.50	0.43			5.68
Cherry RL Late cc		0.55	1.00	1.05	1.04	0.95	0.82	0.70	0.58	0.46			7.16
Cherry RL Late nc		0.34	0.76	0.80	0.80	0.74	0.66	0.59	0.51	0.44			5.62
Cherry RL Mid cc		0.55	1.00	1.05	0.99	0.88	0.77	0.67	0.56	0.46			6.93

Cherry RL Mid nc		0.34	0.76	0.80	0.76	0.70	0.63	0.57	0.50	0.43			5.48
Chickpeas	0.98	1.00	0.95	0.56							0.40	0.60	4.49
Chinese Cabbage									0.72	0.98	1.02		2.72
Citrus with cover (FAO56)	0.75	0.75	0.74	0.72	0.71	0.70	0.70	0.70	0.70	0.71	0.73	0.74	8.65
Citrus no cover (FAO56)	0.70	0.70	0.69	0.67	0.66	0.65	0.65	0.65	0.65	0.66	0.68	0.69	8.05
Citrus 10%sa	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	3.58
Citrus 30%sa	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	5.92
Citrus 40%sa	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	7.08
Citrus 50%sa	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	8.26
Citrus 70%sa	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	9.74
Citrus 90%sa	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	10.07
Clover Seed	0.40	0.60	0.98	1.15	1.05	0.67						0.40	5.25
Coffee	1.10	1.10	1.10	1.10	1.10	1.10	1.05	1.05	1.07	1.10	1.10	1.10	13.07
Cotton				0.35	0.60	1.05	1.15	1.11	0.85				5.10
Cowpeas/GreenGram						0.40	0.58	1.03	0.81				2.81
Cucumber					0.60	0.83	1.00	0.98	0.82				4.23
Date Palm	0.90	0.94	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.90	0.90	11.24
Egg Plant				0.60	0.76	1.02	1.05	1.02	0.93				5.38
Eucalyptus	1.20	1.20	1.20	1.20	1.20	1.18	0.98	0.98	1.08	1.20	1.20	1.20	13.82
Faba Bean	0.98	1.15	1.15	0.85	0.41						0.50	0.54	5.58
Garlic	1.00	1.00	1.00	1.00	0.86	0.73			0.70	0.81	0.98	1.00	9.08
Geraldton Wax	1.04	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.07	1.10	1.11	1.08	12.80
Jajoba	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	6.00
Lentil	0.92	1.10	1.10	0.82	0.41						0.40	0.44	5.20
Lettuce Spring	0.72	0.94	0.98										2.64
Lettuce Winter	0.98										0.72	0.94	2.64
Leucadendron	0.69	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.71	0.73	0.74	0.72	8.48
Linseed/Flax	1.00	1.10	1.10	1.09	0.77	0.38					0.35	0.49	6.28
Lucerne AvCutting (Hay)	0.90	0.91	0.94	0.95	0.95	0.95	0.95	0.95	0.95	0.93	0.90	0.90	11.18
Lucerne SeedProd(FAO56)	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	6.00
Maize Grain			0.30	0.40	0.99	1.20	1.13	0.81	0.62				5.46
Millet			0.30	0.62	1.00	0.77	0.33						3.02
Olive	0.50	0.50	0.65	0.66	0.68	0.69	0.70	0.70	0.70	0.70	0.70	0.58	7.76
Olive RedcedYield	0.50	0.50	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.56	7.41
Onion Dry	1.04	1.05	1.05	1.05	0.92	0.79					0.70	0.82	7.41
Onion Green	0.99	1.00	1.00	1.00							0.70	0.80	5.49
Onion Seed	1.05	1.05	1.05	1.05	0.94	0.83			0.70	0.83	1.03	1.05	9.57
Open Water	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	12.60
Palm Tree	0.95	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	11.84
Parsnips	1.02								0.50	0.56	0.89	1.05	4.01
Pasture HighInput	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	12.60
Pasture LowInput	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	9.00
Pasture MedInput	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	10.20
Pea Dry	1.15	0.85									0.50	0.80	3.30
Pea Fresh	0.69	1.14	1.14									0.50	3.48
Pear			0.61	0.73	0.88	0.95	0.95	0.95	0.95	0.90	0.79		7.70
Pecan			0.56	0.68	0.83	0.90	0.90	0.90	0.90	0.83	0.70		7.20
Pimelea	0.69	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.71	0.73	0.74	0.72	8.48
Pineapples	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	6.00
Pistachios				0.42	0.70	1.03	1.10	1.07	0.69				5.01

Plum			0.56	0.68	0.83	0.90	0.90	0.90	0.90	0.83	0.71		7.20
Potato Summer							0.50	0.65	1.11	1.14	0.92		4.32
Potato Winter	0.50	0.59	1.06	1.15	1.00	0.76							5.06
Protea	0.69	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.71	0.73	0.74	0.72	8.48
Pumpkin				0.50	0.56	0.92	0.99	0.87					3.84
Radish Autumn Winter										0.70	0.87		1.57
Radish Spring Summer			0.73	0.89									1.61
Rambutan	0.60	0.67	0.79	0.92	1.05	1.10	1.10	1.10	1.10	0.73	0.50	0.50	10.16
Rhubarb	0.99	0.87	0.50	0.50	0.50	0.77	1.00	1.00	1.00	1.00	1.00	1.00	10.12
Rockmelons				0.50	0.68	0.85	0.83	0.67					3.53
Sesame						0.35	0.77	1.10	0.80				3.03
Silverbeet						0.59	1.02	0.99					2.59
Sorghum			0.30	0.45	0.94	0.99	0.72						3.40
Soybeans						0.40	0.88	1.15	1.15	0.98	0.60		5.16
Spinach	0.98									0.72	0.93	1.00	3.62
Spring Onion - Summer			0.70	0.74	0.97								2.41
Spring Onion - Winter	1.00									0.71	0.87	1.00	3.57
Stonefruit Apricot (FAO56)	0.00	0.00	0.56	0.68	0.83	0.90	0.90	0.90	0.90	0.83	0.71		7.20
Stonefruit Apricot 10%sa			0.27	0.30	0.34	0.36	0.36	0.36	0.36	0.34	0.31		3.00
Stonefruit Apricot 30%sa			0.33	0.44	0.60	0.67	0.67	0.67	0.67	0.62	0.54		5.22
Stonefruit Apricot 40%sa			0.35	0.52	0.73	0.83	0.83	0.83	0.83	0.76	0.65		6.33
Stonefruit Apricot 50%sa			0.38	0.59	0.86	0.99	0.99	0.99	0.99	0.91	0.76		7.44
Stonefruit Apricot 70%sa			0.41	0.68	1.02	1.19	1.19	1.19	1.19	1.09	0.90		8.85
Stonefruit Apricot 90%sa			0.41	0.70	1.06	1.23	1.23	1.23	1.23	1.12	0.93		9.15
Stonefruit Peach (FAO56)			0.56	0.68	0.83	0.90	0.90	0.90	0.90	0.83	0.71		7.20
Stonefruit Peach Reduced Yield			0.57	0.47	0.42	0.68	0.90	0.90	0.90	0.83	0.71		6.38
Stonefruit Riverland early			0.37	0.69	1.02	1.17	0.50	0.50	0.43	0.24			4.92
Stonefruit Riverland mid			0.37	0.69	0.86	0.90	1.01	1.25	0.97	0.24			6.29
Stonefruit Riverland late				0.66	0.86	0.89	1.00	1.25	1.09	0.51			6.26
Strawberry	0.85	0.85	0.85	0.79	0.75				0.40	0.44	0.68	0.85	6.45
Sunflower				0.35	0.45	1.02	1.15	0.76					3.74
Sweet Potato				0.54	1.01	1.15	1.12	0.83					4.64
Sweetcorn			0.30	0.62	1.14	1.12							3.18
TableGrape (FAO56)			0.30	0.42	0.75	0.85	0.85	0.84	0.59				4.60
Table Grape 10%sa		0.26	0.28	0.34	0.35	0.35	0.35	0.35	0.33	0.32			2.93
Table Grape 30%sa		0.27	0.38	0.62	0.65	0.65	0.65	0.64	0.59	0.55			5.01
Table Grape 40%sa		0.28	0.43	0.76	0.80	0.80	0.80	0.79	0.72	0.67			6.04
Table Grape 50%sa		0.29	0.48	0.90	0.95	0.95	0.95	0.93	0.85	0.78			7.08
Table Grape 70%sa		0.29	0.53	1.03	1.09	1.09	1.09	1.07	0.97	0.89			8.04
Table Grape 90%sa		0.30	0.55	1.10	1.17	1.17	1.17	1.14	1.03	0.95			8.57
Tea	0.95	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	11.83
Tomato			0.60	0.63	0.96	1.15	1.12	0.90					5.36
Turf SumActive			0.81	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85		7.61
Turf YrRound Active	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	11.40
Turnip									0.50	0.65	1.08	1.00	3.23
Walnuts			0.50	0.66	0.96	1.10	1.10	1.10	1.10	1.03	0.77		8.32
WaterMelons				0.44	0.87	0.98	0.83						3.12
Wheat/Barley	1.00	1.15	1.11	0.58							0.30	0.50	4.64
Winegrape (FAO56)			0.32	0.55	0.70	0.70	0.70	0.70	0.63	0.51			4.81
Winegrape Reduced Yield (SARDI)				0.29	0.39	0.43	0.43	0.43	0.39	0.24	0.16		2.76

Winegrape 10%sa	0.26	0.28	0.30	0.30	0.30	0.30	0.29	0.28	2.30
Winegrape 30%sa	0.28	0.41	0.49	0.49	0.49	0.49	0.47	0.42	3.56
Winegrape 40%sa	0.29	0.47	0.59	0.59	0.59	0.59	0.56	0.50	4.18
Winegrape 50%sa	0.30	0.54	0.69	0.69	0.69	0.69	0.65	0.57	4.82
Winegrape 70%sa	0.31	0.60	0.78	0.78	0.78	0.78	0.73	0.64	5.39
Winegrape 90%sa	0.32	0.63	0.83	0.83	0.83	0.83	0.78	0.68	5.72
Zucchini	0.50	0.56	0.88	0.88					2.82