NSW GOVERNMENT | Office of Water

Macro water sharing plans – the approach for unregulated rivers

Access and trading rules for pools

Leading policy and reform in sustainable water management

Publisher

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The NSW Office of Water manages the policy and regulatory frameworks for the State's surface water and groundwater resources to provide a secure and sustainable water supply for all users. The Office of Water also supports water utilities in the provision of water and sewerage services throughout New South Wales.

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Access and trading rules for pools.

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1. Introduction

This policy is a macro planning approach for in-river pools, non-tidal and non-estuarine lagoons, wetlands and other lentic waters (standing water) in or associated with unregulated rivers across NSW. This includes anything falling within the definition of a 'lake' found in the Dictionary of the *Water Management Act 2000,* except for tidal pools and estuaries, which are catered for in the current macro planning approach (described in *Macro water sharing plans – the approach for unregulated rivers: A report to assist community consultation*). These lentic waters will be collectively referred to as 'pools' for the purpose of this policy.

Pools in NSW can provide an important source of water for access licence holders, basic landholder rights holders and communities. Pools also have a key ecological function as a critical refuge and habitat for flora and fauna. This policy has been developed to provide additional guidance for Regional Panels in setting water access and trading rules for pools that are covered by unregulated river water sharing plans. The policy refines the current macro planning approach in order to allow access and trading rules to be applied to pools.

Currently, the macro planning approach does not specifically generate access rules that differentiate between in-stream pools and those pools on the floodplain. Pools can pose particular management issues and require rules specifically tailored to address those issues. For example, to maintain pool volumes for a pool within a river, it may be appropriate to establish a rule that requires extraction from the pool to cease when flows drop below a certain level at a reference point in the river. However, for pools that are isolated from the river, the relationship between the volume of water in the pool and the flow at the reference point in the river may not be the most significant management driver. In this case a staff gauge (which measures water level rather than flow-rate) may be a more appropriate means of controlling the volume of water in the pool. This policy is designed to assist in developing rules that recognise the varying level of environmental sensitivity, dependence on extraction from these pools and the hydrological character of the pools.

This policy is designed such that it meets the planned environmental water requirements under sections 8 and 8A of the *Water Management Act 2000.* It provides methods for developing water sharing rules for pools that will protect and restore water for the environment, preserve access for basic landholder rights and share water equitably between consumptive users. These methods form part of a decision framework which recognises the environmental values of pools, various types of pools and community reliance on extraction from these pools. This policy is designed to inform and guide rather than constrain Regional Panels and should be applied to each pool within a macro planning area and operate as a supplement to *Macro water sharing plans – a report to assist community consultation.*

2. Purpose and principles of the policy

The purpose of this policy is to ensure that water sharing plans contain rules that meet the requirements of the Act, adequately protect and restore the environmental values of pools and share water equitably among water users. The default pool rules provide a substitute for the visible flow rule, which can be difficult to implement in large pools, while the adoption of alternate rules provides the flexibility necessary to allow some extraction where the social and economic impact of restricting historical access would be too great. In addition to these requirements, the methods are designed to recommend rules that:

- are consistent and objective, whilst not constraining Regional Panels from considering localised issues
- are implementable, effective and enforceable
- are consistent with the objects and principles of the Act to protect and restore water sources, floodplains and their dependent ecosystems

- are consistent with the objects and principles of the Act to consider and minimise the cumulative impacts of water management licences and approvals and other activities on water sources and their dependent ecosystems
- are mindful of socio-economic impacts and critical human water supply needs
- are consistent with the macro planning approach by recommending rules based on an assessment of instream values, extraction value and community dependence on extraction and hydrological stress
- do not allow increased extractive pressure from pools
- provide for restoration of dependent ecosystems where ecological values are high or impacted from extraction, by allowing for reduced access by users over time.

2.1. Why pools need protection

The methods provided in this policy use an assessment of the environmental values of the pools to select rules that adequately protect these values while not having a disproportionate effect on water availability for extraction. There is a considerable amount of literature that describes the environmental importance of both permanent and temporary pools. It is important to maintain water levels in these pools to:

- maintain the structural integrity of the pool by protecting it from activities that may result in or exacerbate bank erosion and loss of riparian vegetation
- allow for flow events to pass through the system and fill pools further downstream
- create and maintain refuges, breeding and feeding locations for water-based biota as well as migratory fish, bird and other fauna species
- mitigate the impacts of inland and coastal acid sulfate soils on lentic waters
- provide water for basic landholder rights.

A conceptual model is shown in Figure 1 that outlines some of the processes that occur due to extraction of water from pools that impact on fauna. While a conceptual model has not been provided for flora, the policy recognises that extraction of water would also impact on the health and viability of flora species.

Figure 1 Impacts on fauna from extraction of water from pools

2.2. Requirements of the Water Management Act 2000

Under the Act, water sharing plans must "contain provisions for the identification, establishment and maintenance of planned environmental water (***environmental water rules***). Environmental water rules are to be established for all of the water sources in the State as soon as practicable after the commencement of this section."PP[1]

Water sharing plans must also be consistent with the Objects and Principles of the *Water Management Act 2000* which in relation to water sharing require that:

(a) sharing of water from a water source must protect the water source and its dependent ecosystems, and

(b) sharing of water from a water source must protect basic landholder rights, and

(c) sharing or extraction of water under any other right must not prejudice the principles set out in paragraphs (a) and (b).[2]

and generally that:

(a) water sources, floodplains and dependent ecosystems (including groundwater and wetlands) should be protected and restored and, where possible, land should not be degraded, and

(b) habitats, animals and plants that benefit from water or are potentially affected by managed activities should be protected and (in the case of habitats) restored, and

(d) the cumulative impacts of water management licences and approvals and other activities on water sources and their dependent ecosystems, should be considered and minimised, and

This policy meets these requirements by specifying methods for establishing environmental water rules on a water source level designed to protect the water source, its dependent ecosystems and basic landholder rights. Water sharing plans are not required to specify individual environmental water rules for each pool within a water source.

2.3. River Flow Objective 1

A fundamental principle for the effective management of pools is the NSW Government's River Flow Objective 1 which is to "protect natural water levels in pools of creeks and rivers and wetlands during periods of no flow". The default rules prescribed by this policy are designed to give full protection to the natural water level of pools during no flow events.

The alternate rules resulting from applying the methods in this policy are aimed at defining an acceptable level of access to pools when there is no flow in rivers in the associated water source. These alternate rules are designed to consider the local hydrological, environmental and socio-economic considerations and achieve an outcome that minimises any impacts. Regional Panels may also elect to include rules that gradually move users to a higher level of rule (either a full containment level or CtP) and over time provide full protection to the natural water level of pools.

[1] Section 8(2) and (3) of WMA 2000
[2] Section 5(3) of WMA 2000

3. Policy approach for types of pools

The approach this policy outlines for setting access and trading rules for pools is based upon the existing macro planning approach, adapted to take account of the different hydrological characteristics and extraction patterns of pools. How this approach is applied varies between natural pools and artificial pools created by structures covered by a water supply work approval. For details on rules for natural pools, see *section 4 Method for Setting Access and Trading Rules for Natural Pools*. For details on rules for pools created by structures covered by a water supply work approval, see *section 5 Method for Setting Access and Trading Rules for Pools Created by Structures Covered by a Water Supply Work Approval*.

Since it is not practical to identify and create site-specific rules for every natural pool in a water sharing plan area, the focus of the approach adopted in this policy is to establish a default rule of 100 per cent full containment level for the majority of pools. This may then be modified by Regional Panels in specific circumstances if it is justifiable and feasible to do so to allow limited access to pools. The default rule will be applied by describing the pools generically in the water sharing plans. Where default rules are not suitable for a given pool or set of pools, Regional Panels may apply the alternate rules.

3.1. Developing a default rule for different categories of pools

A default water access rule and trading rules for pools of different types have been developed based on the principles *underpinning the Water Management Act 2000* and the macro planning approach. In recognition that different rules are appropriate for different types of pools, alternate rules have been developed for two broad categories of natural pools. A different default rule applies to artificial pools created by structures covered by a water supply work approval that are not based on these categories; however, these categories may be relevant in developing alternate rules for pools created by structures covered by a water supply work approval.

The two categories are as follows.

1. Category 1

Natural pools that are:

(a) not a stream (regardless of size); or

(b) are on a flood-runner or floodplain; or

(c) are on an effluent that only commences to flow during high flows.

Category 1 pools fill during high flow events where the river or stream breaks its banks or are intermittently filled by a high-flow effluent from a river or as a result of overland flow during or following periods of rainfall. They may also be dependent on groundwater to maintain water levels in times of no flow. This category of pools includes most natural lagoons and billabongs.

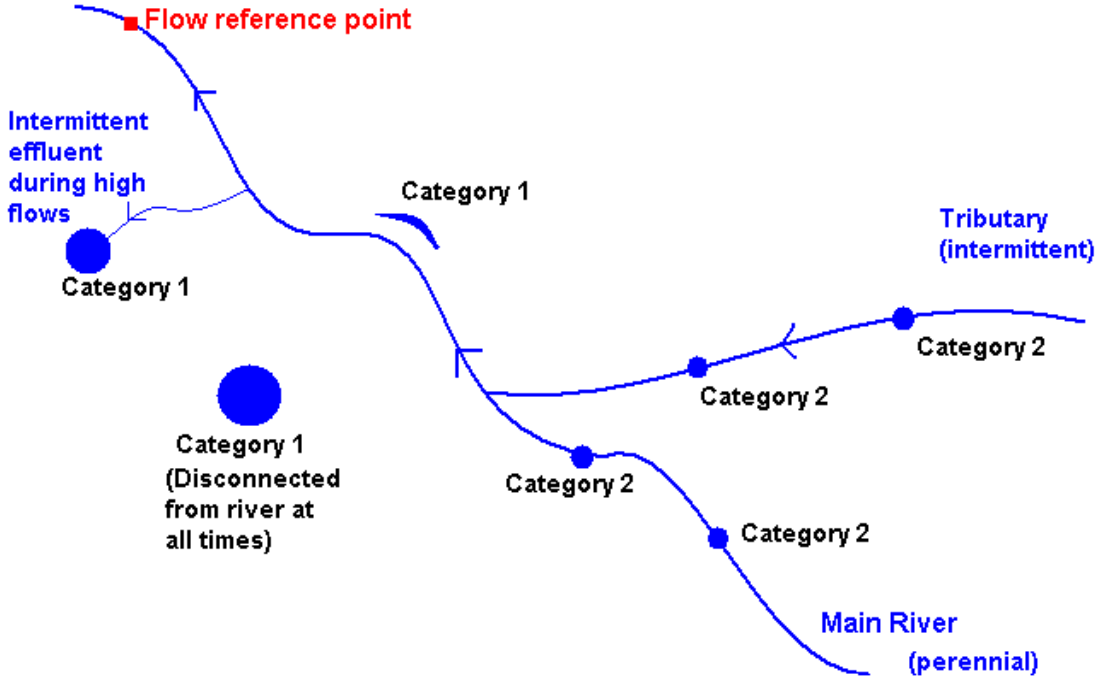
2. Category 2

Natural pools that are not in Category 1.

Category 2 pools can be found within the channels of perennial or intermittent rivers. As flows subside in the channels of intermittent rivers, pools remain and may be permanent or temporary in nature. As larger pools evaporate or are drained, smaller in-stream pools may form.

Pools within each of the two categories vary in scale and permanence. A diagram of types of pools that fall into the two categories are shown in Figure 2.

Figure 2 Examples of the two categories of pools



3.2. Considering alternate rules

Where pools have been identified in a plan area as potentially requiring a different access rule to the default rule, the policy allows Regional Panels to consider implementing more or less restrictive rules based on a number of additional considerations, including the macro planning approach assessment of instream values, hydrologic stress and an assessment of extraction value and community dependence on extraction. These assessments are described in more detail in *Section 4 Method for Setting Access Rules for Natural Pools.*

For example, more restrictive rules may be recommended during plan development where a pool has been identified as high environmental value or high risk to instream values. The policy is also sufficiently flexible to allow for different levels of access where there is a high extraction value and instream value for inland pools or risk to instream value for coastal pools is relatively low. Risk to instream value is determined by the standard *Risk = Consequence x Likelihood* concept which is applied to pools as described in section 4.3.

For pools created by structures covered by a water supply work approval, alternate rules to the default rules can be recommended based on considerations such as the purpose of the structure, number of access licences on the pool and existing management arrangements.

Section 4 Method for Setting Access Rules for Natural Pools provides examples of alternate water access rules and provides guidance as to how they should be applied.

4. Method for setting access and trading rules for natural pools

This method applies to all natural pools within an unregulated river water sharing plan area. For pools created by structures covered by a water supply work approval, see *Section 5 Method for Setting Access and Trading Rules for Pools Created by Structures Covered by a Water Supply Work Approval.*

The steps detailed below should be applied to generate access and trading rules for natural pools, however the level of detail involved in the assessments at each step will vary depending on localised circumstances. It will be unnecessary to develop pool rules in certain circumstances – for example where flow classes have been established that are suitable for all users.

For example, where the method is being applied to generate rules for individual pools, the assessments at each step are likely to involve more detailed analysis and may include the collection of hydrologic data and licence information. If the method is being followed simply as a preliminary assessment to see if the default rule is appropriate for a broad category of pools, such a detailed process may not be necessary. Where additional information is gathered during public exhibition of the water sharing plan, it will be necessary to revisit this method to give appropriate consideration to the new information.

4.1. Step 1 – Identify individual pools with known value or management issues

The first step is to identify any pools in the water sharing plan area of known environmental or cultural value or with known water sharing issues, for example where competition has been an issue between groups of water users. These can be identified by Licensing and Compliance Branch staff and Environmental Evaluation and Performance (EEP) Branch staff of the NSW Office of Water in consultation with regional Department of Primary Industries and Office of Environment and Heritage staff that are part of the water sharing plan working group, and as appropriate, additional agency staff with expertise in aquatic ecology, fisheries management and environmental flow management.

As these pools have known complex issues, they will likely require special attention throughout the following steps to ensure any rules adopted recognise these requirements. These pools are hereafter referred to as ‘individually managed pools’. Given the time constraints associated with the preparation of water sharing plans, very few individually managed pools are likely to be identified initially. However, water sharing plans will contain amendment provisions to allow pools to be identified as individually managed pools throughout the life of the plan based on relevant studies (see *Chapter 6 Implementation of this Policy* for more information).

Any individually managed pools identified as having high environmental value by the Regional Panel shall be referred to the EEP Branch within the NSW Office of Water so that further studies can be undertaken or additional information gathered to inform the development of appropriate access rules.

4.2. Step 2 – Identify instream value for categories of pools and individually managed pools

The instream value determined through the macro planning approach for the whole water source will be the starting point for assigning an instream value to categories of pools and individually managed pools within the water source.

As instream value is calculated at a water source level, the level may not be appropriate for the pools within the water source so it is important that Regional Panels consider whether the instream value determined for the water source can be appropriately applied to each of the two categories of pools as well as any individual pools identified at Step 1.

Information on the importance of pools as for flora and fauna and instream values of pools should be used when assessing whether the macro instream value at the water source level is appropriate. Where it is not appropriate, the instream value for an individually managed pool or category of pool should be adjusted. For example, the instream value for a water source may have been determined to be high because of the presence of a threatened species within the main river channel. The panel may then determine that the high rating should not apply to the Category 2 pools where the habitat requirements for the threatened species are not met and it can be certain that the threatened species does not occur within these pools. The panel may then lower the instream value rating accordingly.

Alternatively, the water source rating may be medium although there is a Category 2 pool of known high value. The macro instream value at the water source level can then be increased by the panel for the pool. A change to the instream value needs to be justified based on information from Regional Panel, working group members or stakeholders during consultation.

The instream value of categories of pools and individually managed pools will inform the assessment of the appropriateness of applying the default rule to these pools.

4.3. Step 3 – Identify hydrologic stress value for categories of pools and individually managed pools in coastal areas

For inland pools, hydrologic stress is not a useful measure for distinguishing between pools as hydrological stress is assumed to be high. This is a reasonable assumption given most inland unregulated systems have been embargoed since the early 1990s and the Stressed Rivers assessment consistently scored inland unregulated systems as ‘highly stressed’. As hydrologic stress is assumed to be high for all inland pools, the risk to instream value is also automatically considered to be high. However, for coastal pools, this is not the case and therefore it is appropriate to determine both instream value and hydrologic stress for these pools so that risk to instream value can be determined.

The hydrologic stress value determined through the macro planning approach for the whole water source will be the starting point for assigning a hydrologic stress value to categories of pools and individually managed pools within the water source for the coastal water sharing plans. It is normally calculated as the ratio of extraction (based on an estimate of peak daily demand) to flows at the 80th percentile, which is an indicator of supply. The extraction calculation assumes full development of all access licences to reflect potential growth in extractions.

Regional Panels can nominate a different stress value for a category of pool or an individually managed pool based on their local knowledge where data suggests that the stress value should be increased or decreased. Hydrologic stress data for a pool would include information on water availability over time.

Hydrologic stress is relevant when setting alternate trading rules to the default rules as described at Step 8.

Hydrologic stress is also used for coastal pools, in combination with instream value, to determine the risk to instream values. Risk to instream value and extraction value and community dependence on extraction (see Step 4) is relevant for setting alternate access rules as described at Step 7.

Risk to instream value is determined by the following formula:

Risk to instream value = instream value x hydrologic stress

When determining hydrologic stress, regional panels should also consider the social and economic importance of pools for supplying non-licensed water needs (basic landholder rights and direct stock watering) during periods of no flow. Panels should consider the cumulative impact of allowing additional licensed extraction on both non-licensed priority extraction and the within pool environmental values.

4.4. Step 4 – Identify extraction value and community dependence on extraction for categories of pools and individual pools

Next, the extraction value and community dependence on extraction for each of the categories of pools and individually managed pools should be determined. Extraction value and community dependence is calculated for water sources as part of the macro planning approach based on the volume and economic value of current levels of water extraction, and the local community's resilience to change. It should be noted that this differs from the hydrologic stress which assumes full development of access licences. The economic value of water extracted is derived from information obtained via the volumetric conversion survey undertaken by the Department of Land and Water Conservation in 2000. The Australian Bureau of Statistics Index of Social Advantage and Disadvantage is used to get an indication of a community's resilience for change. The index includes the following:

- percentage of unemployment
- percentage of low income households
- percentage of single parent households
- the level of post-secondary qualifications
- access to the Internet and other services.

The panel should gather information from local licensing staff to determine the extraction value of the categories of pools and individually managed pools within the water source and compare this to the overall extraction value and community dependence on extraction of the water source. An assessment should then be made as to whether it is appropriate to apply the extraction value and community dependence on extraction level for the water source as a whole to the category of pool or individually managed pool or make appropriate adjustments to reflect specific characteristics of the category of pool or individually managed pool. For example, in a water source rated as having a high level of dependence on extraction there may be some pools on which there are no users. In this case it may be appropriate to lower the rating for those pools to low or to develop specific rules for the pools in question. The determination for extraction value and community dependence is relevant for setting alternate access rules as described at Step 7.

4.5. Step 5 – Individually managed pools: describe the hydrology and water requirements for instream values

Step 5 applies only to individually managed pools identified at Step 1.

Where a pool has been identified in the plan area as having high environmental and/or cultural value or having known water sharing issues, the Regional Panel should identify how water levels are maintained in the pool. In particular, the groundwater and surface water dependence of the pool should be established as this will influence both the types of rules that can be applied and the water requirements of the identified instream values.

Where the pool has known high environmental and/or cultural value, the water requirements for the identified instream values should be identified. Appendix 1 describes some simple methods for establishing the water requirements for the identified instream values. This step should be informed by the technical knowledge of ecologists, anthropologists and hydrologists if available.

4.6. Step 6 – Check if default access rules are appropriate

Next, the default access rules outlined in Table 1 can be assessed to see if they are appropriate for Category 1 and Category 2 pools and any individually managed pools based on information collected in Steps 1 to 5.

In making this assessment, the Regional Panel should consult with additional agency staff with expertise in aquatic ecology, fisheries management and environmental flow management as appropriate.

Table 1 Default water access rules for natural pools

Pool category	Water access rules
1	Water users must cease pumping when the water level in the pool drops below the level equivalent to 100% of the full containment volume of the pool. Where there are existing site specific conditions in the pool that are more restrictive than this default no drawdown rule, then these conditions should be continued for those licences and considered as an alternate rule for all users on the pool. For example, a condition might prohibit pumping in certain months or for more than a certain number of hours per day, which may be more restrictive than this default no drawdown rule. In terms of individually managed pools, the 100% containment level should be specified as the water height or depth equivalent to the full containment level. This is so that compliance can be more easily assessed. No other access rules are to apply (such as the visible flow rule).
2	In water sources or management zones where a Very Low Flow Class will be established, water users must cease pumping when flows are in the Very Low Flow Class. The Very Low Flow Class could be set as a visible flow at a nearby stream gauge, crossing or rock bar. It should be noted that the visible flow at the pump site rule does not establish a Very Low Flow Class. In water sources or management zones where a Very Low Flow Class will be established, the drawdown rule described in the paragraph below (i.e., no drawdown below 100% of full containment volume) below may be applied **in addition** to the Very Low Flow Class cease to pump. (Note that the intent of allowing the pool rule in **addition** to very low flow access is to prevent potentially perverse outcomes – for example where flow at the end of a catchment is above the very low flow class but where flow has ceased in the upstream parts of the management zone. It cannot be used to allow access to pools once flows below the very low flow level (CTP) have ceased.) Where no Very Low Flow Class has been established for a water source or management zone, a drawdown rule will be applied such that water users must cease pumping when the water level in the pool drops below the level equivalent to 100% of the full containment volume of the pool. In terms of individually managed pools, the 100% level should be specified as the water height or depth equivalent to the full containment level. This is so that compliance can be more easily assessed. Where there are existing site specific conditions in the pool that are more restrictive than the cease to pump rules as set out above, then these conditions should be continued for those licences and considered as an alternate rule for all users on the pool. For example, a condition might prohibit pumping in certain months or for more than a certain number of hours per day, which may be more restrictive than this default no drawdown rule. No other access rules are to apply (such as the visible flow at the pump site rule).

If Regional Panels are not able to assess whether specific rules should apply to individually managed pools, then they may simply adopt rules that apply to the two categories of pools. Where information is not available to adequately assess the instream values and extraction value and community dependence on extraction for a category of pool and information is not available to describe the hydrology and water requirements for instream values of an individual pool, then this category of pool and the individually managed pool should receive the default access rules outlined in Table 1. In combination with the trading rules, these rules protect water for the environment and set the conditions under which water may be extracted. These rules can be applied by describing the pool category generically in the plan.

The default rules in Table 1 are based on the assumption that the extraction value and community dependence on extraction value for the pools is low and instream value (inland pools)/high risk to instream value (coastal pools) is medium to high. Therefore it is important to check that these default rules are appropriate. Where these default rules are determined to be inappropriate for a category of pool or an individually managed pool, an alternate rule can be developed. For example an individually managed pool

may be known to have a high level of extraction value and community dependence on extraction value and a low instream value may therefore require a less restrictive access rule.

Note: any pool that does not have licensed water users on the pool should always be subject to at least the default rule specified in Table 1.

4.6.1 More information on the default rules

More information on the default rules contained in Table 1 is provided below.

Drawdown rule

A drawdown rule will apply to all Category 1 and Category 2 pools in water sources or management zones without a Very Low Flow Class established. A 'drawdown' rule is proposed instead of the 'visible flow into and out of the pool' rule that has previously been applied to pools. The 'visible flow at the pump site' rule will still apply to licence holders that do not pump from pools. A drawdown rule may also optionally apply to Category 2 pools in water sources with a Very Low Flow Class established. This would require water users to cease pumping from these pools when their extraction begins to draw the pool down below a specified level. It is designed to complement the Very Low Flow Class and is not designed to allow access once cease to pump conditions have been reached. Where a compliance issue is detected, the NSW Office of Water may install a gauge or other device to indicate the specified level. This will give an objective reference point from which to measure the drawdown that is occurring. The drawdown limit therefore protects the remaining water for the environment. An allowable drawdown level below the full containment volume of the pool may be selected as an alternate rule through following the process in Step 7.

Very Low Flow Class cease to pump rule

For Category 2 pools in water sources or management zones with a Very Low Flow Class established, the default rule requires water users to cease pumping when flows at the flow reference point are in the Very Low Flow Class established for the water source or management zone. This recognises that these pools benefit from very low flows and extraction during these times could have a material impact on these flows. As previously stated in Table 1, the 'visible flow at the pump site' rule does not establish a Very Low Flow Class.

Existing licence conditions

Licence conditions specific to the site are likely to have been developed where there have been issues of competition between water users or the site has high environmental value. For all pools, where these site and often licence specific conditions have been developed, these conditions should be retained on the licences if they are more restrictive than the default rule. These conditions should also be considered as an alternate rule under Step 7 to be applied to all other licences on that pool. Licensing staff will be required to identify any licences in the plan area with these conditions prior to the commencement of the plan.

4.7. Step 7: Develop alternate access rules to the default rule

There are a number of alternate rules that can be recommended by the Regional Panel where less restrictive access rules than the default is determined to be appropriate at Step 6. In developing alternate rules, the Regional Panel should consult with additional agency staff with expertise in aquatic ecology, fisheries management and environmental flow management as appropriate. The degree of environmental protection provided by the access rules recommended for an individually managed or category of pool varies with the extraction value and community dependence on extraction value and instream value (inland pools)/high risk to instream value (coastal pools). Table 2 shows the range of drawdown rule that would be appropriate to apply to a pool for the different categories of instream value (inland pools)/risk to instream value (coastal pools) and extraction value and community dependence on extraction.

Note: An alternate drawdown level must not increase access to pools. In general, all licences within a given pool should be subject to the drawdown rule within the applicable range given in Table 2. However, if an existing condition on a licence in the pool is more restrictive than the generally applicable drawdown rule, that condition should be continued for that licence. For example, if a condition for one licence on a pool allows access down to 90% of the full containment volume, then the more restrictive licence condition should be continued for that licence if the generally applicable drawdown rule or the applicable range of drawdown rule from Table 2 is less than 90% of full containment volume.

Table 2 Range of alternate access rules, instream value (inland pools)/risk to instream value (coastal pools) and extraction value and community dependence on extraction

	Low extraction value and community dependence on extraction	Medium extraction value and community dependence on extraction	High extraction value and community dependence on extraction
High risk to instream values (coastal pools) **High instream value (inland pools)**	CtP so 100% of full-volume protected	CtP so 100-80% of full-volume protected	CtP so 100-80% of full-volume protected
Medium risk to instream values (coastal pools) **Medium instream value (inland pools)**	CtP so 100% of full-volume protected	CtP so 100-80% of full-volume protected	CtP so 100-50% of full-volume protected
Low risk to instream values (coastal pools) **Low instream value (inland pools)**	CtP so 100-50% of full-volume protected	CtP so 100-50% of full-volume protected	CtP so 80-50% of full-volume protected

The drawdown levels given in Table 2 may be applied in addition to any Very Low Flow Class established for the water source or management zone for Category 2 pools.

To ensure compliance with these rules, the drawdown rule may be specified as a height below the full containment volume, and a publicly accessible 'staff' gauge (measures height but not flow), or other measuring methods, would need to be made available. The staff gauge does not necessarily have to be in place at the commencement of the plan and installation of staff gauges, or other measuring methods, may be prioritised if compliance issues are raised.

The Regional Panel may select a different drawdown level than indicated in Table 2 or another management option not listed in section 4.7.1. below where justified, based on the considerations 1-8 listed below. As with drawdown levels indicated in Table 2, it is important that any alternate drawdown level does not increase an individual's access to pools and should always be set on an individual scale equal to or greater than any drawdown level permitted under the individual's current licensing arrangements. The selection of an alternate access rule should consider the following:

1. identified environmental values and their water requirements

2. the level of competition in the pool and existing access arrangements with water users (extraction value and community dependence on extraction)
3. extraction volume from pool relative to pool volume and drawdown rates
4. the hydrology of the pool including seepage and evaporation
5. mechanisms by which pools are filled, e.g. groundwater fed, rainfall or controlled pumping
6. water requirements for basic landholder rights and other non-irrigation purposes
7. considerations of how the rules will be implemented and enforced (e.g. accessibility of information relating to pool level, resources for management, available gauges)
8. phasing in any more restrictions constraining pumping from pools to allow a period of adjustment to new rules.

For example, the percentages of storage suggested to be protected for Category 1 pools may be changed based on information on the water requirements of instream values or where the allowable drawdown level is too restrictive, such as for Category 1 pools that are on the floodplain and totally isolated from the river where licence holders under current arrangements can draw the pool down to a lower level. Another example may be where it is desirable to manage a chain of pools as one system as the pools are highly connected both laterally and longitudinally.

The considerations listed above should also inform the analysis of any existing individual licensing conditions that have been developed for a specific site to see whether these conditions should apply to all water users on that pool instead of the default rule.

4.7.1. Additional management options

There may be some cases where a drawdown rule alone is not sufficient to address all management issues. It may be appropriate to apply other management options in addition to the drawdown rule depending on the levels of instream value (inland pools)/risk to instream value (coastal pools) and extraction value and community dependence on extraction. Whether a particular management option is appropriate also depends on how water levels are maintained in the pool, which has been identified at Step 5 for individually managed pools. Additional management options are explained below and situations where it may be appropriate to apply these options are also identified.

Regional panels are also encouraged to consider transitioning to a higher level of rule over the life of the plan. For example where high ecological values are present that are threatened or impacted by historical extraction, access could initially be set at an 80 per cent draw down with a stepped reduction in access over the life of the plan to achieve the desired level of protection. This is consistent with the Macro water sharing plan process and allows users time to reduce their reliance on pool water to meet *the Water Management Act 2000* objective of restoring critical habitat.

4.7.1.1. Drawdown rate rules (TDELs/IDELs)

Description and when to apply

In pools with high extraction value and community dependence on extraction, drawdown rates can be used to ensure water is not extracted from the pools at a rate that exacerbates competition or bank stability issues or that increases impacts on ecosystems that are sensitive to rapid water level fluctuations. Drawdown rates can also be used when there is a need to ensure that pools further down the system can receive enough water for their environmental water requirements from medium-large flow events that occur in close sequence. This can slow down the rate at which water is drawn down so that successive events can move through the system. There is the possibility of using Total Daily Extraction Limits (TDELs) or Individual Daily

Extraction Limits (IDELs) to restrict access licence holders on particular pools from taking more than a certain volume of water from the pool per day. However, there are significant issues with using TDELs and IDELs to implement a drawdown rate constraint, including equity with other users in the water source in times of moderate-high flows, difficulty in implementing such rules and the costs and resources required including real-time metering and compliance. In addition, consideration must be given to whether access licence holders should be restricted to a daily volume limit when the pool level is being maintained by any source of inflow. For these reasons, it is not advised that implementing drawdown rate constraints be considered for the first water sharing plan, but may be considered for future plans. As IDELs are less flexible for access licence holders, these should only be considered where there is a high extraction value and community dependence on extraction.

4.7.1.2. First flush rule

Description

First flush rules can be used when there is a need to ensure that pools have an opportunity to fill to a certain extent before water is taken. These rules can also allow pools further down the system receive enough water from medium-large flow events for their environmental water requirements by requiring users to delay pumping when the pool is full while the event passes. This type of rule may be particularly important for pools that are only filled by medium-large flow events, such as those on flood-runners. A steeper sloping catchment would have a short first flush rule as opposed to a flat catchment where the first flush could be significantly longer.

When to apply

This type of rule should only be considered where extractions from pool-filling flow events are significant and ideally where infrastructure is available to implement such a rule. As such, it is more likely that these rules are considered for individually managed pools where this information is gathered in Step 5. This infrastructure would include real-time telemetry gauges that provide information that is readily accessible to all users. Table 3 below indicates when first flush rules could be considered in addition to the drawdown rate specified in Table 2 depending on the level of instream value (inland pools)/risk to instream value (coastal pools) and extraction value and community dependence on extraction for that individual or category of pool.

Table 3 When first flush rules might apply to pools that fill from high flow events

	Low extraction value and community dependence on extraction	Medium extraction value and community dependence on extraction	High extraction value and community dependence on extraction
High risk to instream values (coastal pools) **High instream value (inland pools)**	✘	Consider first flush rules	Consider first flush rules
Medium risk to instream values (coastal pools) **Medium instream value (inland pools)**	✘	Consider first flush rules	Consider first flush rules
Low risk to instream values (coastal pools) **Low instream value (inland pools)**	✘	✘	✘

4.7.1.2. Refill rule

Description

A refill rule is a type of commence-to-pump rule that provides that a pool must refill to a specified level, which is higher than the cease-to-pump level, before pumping can recommence. A refill rule can be used when there is a need to ensure that a pool has an opportunity to refill to a level where environmental water requirements for the pool are met or where there is sufficient water above the cease-to-pump level to ensure that commencing pumping will not result in a rapid reinstatement of the cease-to-pump rule. By having a refill rule linked to a standing water level rather than a time delay prevents users from artificially being excluded from access in 'flashy' systems where the pool either refills quickly or becomes drowned out.

When to apply

This type of rule should only be considered where extractions from pool-filling flow events are significant and where setting the commence-to-pump level higher than the cease-to-pump reduces risk to environmental values or a risk of rapid reinstatement of the cease-to-pump. Table 4 below indicates when refill rules could be considered in addition to the drawdown rate specified in Table 2 depending on the level of instream value (inland pools)/risk to instream value (coastal pools) and extraction value and community dependence on extraction for that individual or category of pool.

Table 4 When refill rules might apply to pools

	Low extraction value and community dependence on extraction	Medium extraction value and community dependence on extraction	High extraction value and community dependence on extraction
High risk to instream values (coastal pools) **High instream value (inland pools)**	✘	Consider refill rules	Consider refill rules
Medium risk to instream values (coastal pools) **Medium instream value (inland pools)**	✘	Consider refill rules	Consider refill rules
Low risk to instream values (coastal pools) **Low instream value (inland pools)**	✘	✘	✘

4.7.1.3. River flow access rules with a delay

Description

Where a Category 1 pool is determined to be highly connected to a river by groundwater, the river rules can be used to set a cease to pump and commence to pump on the pool with an appropriate delay to reflect travel time of the groundwater component of the inflows to the pool based on expert hydrogeological knowledge. For example, for a groundwater connected pool where the travel time for river water to reach the pool is 12 hours, when water users on the river are required to cease taking water, users on the pool would be required to cease 12 hours later. Water users will be able to commence taking water 12 hours after water users on the river are permitted to commence pumping.

When to apply

This type of rule should be considered for Category 1 pools that are highly connected to the river via groundwater. When assessing whether this rule would be appropriate, the mechanism by which the pool fills is important and as such is more likely to be able to be applied to individually managed pools where this information is gathered in Step 5. It is not appropriate to apply these rules to individually managed pools that are filled by local run-off events. Table 5 below indicates when river rules with a delay should be considered in addition to the drawdown rule specified in Table 2 depending on the level of instream value (inland pools)/risk to instream value (coastal pools) and extraction value and community dependence on extraction for that individually managed or category of pool.

Table 5 When river access rules with a delay might apply to pools that are highly connected to the river

	Low extraction value and community dependence on extraction	Medium extraction value and community dependence on extraction	High extraction value and community dependence on extraction
High risk to instream values (coastal pools) **High instream value (inland pools)**	✘	Consider river access rules with a delay	Consider river access rules with a delay
Medium risk to instream values (coastal pools) **Medium instream value (inland pools)**	✘	Consider river access rules with a delay	Consider river access rules with a delay
Low risk to instream values (coastal pools) **Low instream value (inland pools)**	✘	✘	✘

Note that changes to water source or management zone boundaries will need to be considered if rules for the pool are to be different to those for the rest of the water source. Where a different rule is to be applied to a group of pools within a category (for example all Category 2 pools within perennial rivers), then the rule may be applied by segregating the reaches of the perennial rivers as specific management zones and applying the rules to any pools within those reaches.

4.8. Step 8: Trading rules

Water sharing rules also contain provisions to allow or prohibit trading between and within water sources. Default trading rules have been developed consistent with the macro planning approach, which bases rules on an assessment of instream value vs. hydrologic stress. Trades in may be restricted to ensure the environmental values are maintained. Over time, stress on these sensitive areas will be improved by only allowing licences to trade out.

The default trading rules are as recommended for the water source under the current macro planning approach. Where the macro planning approach allows trades into a water source, Regional Panels are able to set different trading rules to ensure that trades do not increase access to pools or result in third-party impacts to existing licence holders.. Trading rules should be selected on a similar basis to the alternate water access rules – i.e. the rules should protect environmental values, basic landholder rights and minimise trading into areas of high competition.

In selecting alternate trading rules, Regional Panels should give consideration to points 1-8 in section 4.7 as well as the following:

1. Prohibiting trade into individual pools or different categories of pool within a water source where trade would result in unacceptable environmental impacts or third-party impacts on existing licence holders.
2. The impact on water availability from trading from downstream Category 2 pools to upstream Category 2 pools and vice versa.
3. Restricting or prohibiting trade into pools where all licence holders are not subject to the same cease to take condition to ensure that new entrants and existing users are treated equitably. Such restrictions could include conditioning any trade into a pool upon the licence traded in being subject to a more restrictive drawdown level that that applicable to other users on the pool.
4. Restricting or prohibiting trade into pools that are isolated from the river, such as Category 1 pools that fill from local run-off events.

5. Method for setting access and trading rules for pools created by structures covered by a water supply work approval

Artificial pools created by structures covered by a water supply work approval are treated differently to natural pools. In most cases, these structures were built to increase the reliability of water supply so that extraction could continue during times of low flow or no flow and are often subject to conditions relating to the way they can be constructed and used. Therefore, the access rules developed for these structures recognise the existing licensing conditions applied to water users on these structures. Where additional information is gathered during public exhibition of the water sharing plan, it will be necessary to revisit this method to give appropriate consideration to the new information.

Artificial pools that do not require access licences and water supply work approvals, such as turkeys nest dams or some harvestable right dams, cannot be subject to access rules and therefore are not subject to this policy.

5.1. Step 1 – Identify pools with known value or management issues

The first step is to identify any artificial pools in the water sharing plan of known environmental, cultural or community value or with known water sharing issues, for example where competition exists between water users on the pool. These will be identified by Office of Water Licensing and Compliance and EEP staff based on their technical and local knowledge of the area, and as appropriate, additional agency staff with expertise in aquatic ecology, fisheries management and environmental flow management. As these pools have known management requirements, they will require special attention throughout the following steps to ensure any rules adopted recognise these requirements.

5.2. Step 2 – Check if default access rules are appropriate

Next, the default access and trading rules outlined in Table 6 will be assessed to see if they are appropriate for the pools identified in Step 1 and any other pools created by structures covered by a water supply work approval that are in the water sharing plan area that were not identified in Step 1.

Table 6 Default water access rules for pools created by structures covered by a water supply work approval

Pool type	Access and trading rules
Pools created by structures covered by a water supply work approval	Existing licence conditions to continue Exempt from the drawdown rule constraints that apply to natural pools For in-river dams, consider a dead storage cease to pump rule if there are outlet works lower than the top of the crest of the weir. The same trading rules apply as the equivalent type of natural pool

The default rules are most appropriate for small structures built for irrigation purposes where the only licence holder on the pool is the approval holder, or there are a small number of other water users that may have contributed to financing the structure and/or do not impact on extractions by the approval holder.

There are a number of circumstances where the default rules may not be appropriate. In determining if an alternate rule should be developed, Regional Panels should consider:

1. The purpose of the structure – for example, was the structure built for town water supply or other high priority purposes?

2. Are there other water users on the pool in addition to the approval holder whose extractions may compromise the purpose of the structure? For example, if the structure was built for town water supply purposes, other water users extracting for irrigation from this pool can impact on the reliability of the storage.
3. Existing management arrangements – are there existing arrangements that have been put in place to mitigate specific issues that could be adopted or improved?
4. Existing connectivity concerns such as impacts of extraction on water availability for water users downstream, fish passage and passing of environmental flows. For example, where there is a sequential chain of weirs where there is no means of through flow other than flows passing over the top of the weir.

5.2.1. More information on the default rules

More information on the default rules contained in Table 5 is provided below.

Existing licence conditions

The default position is that existing licence conditions should continue. Licence conditions specific to the site are likely to have been developed where there has been issues of competition between water users or high environmental values have been identified. Many licences and approvals also contain conditions requiring in-river dams to be constructed or modified so that certain flows are passed. Some work approvals for artificial pools, such as those for works on minor streams, may not have licence conditions regulating the taking of water. Licence holders on these pools will be able to continue taking water from these pools without being subject to a cease to take rule. Unlike natural pools, the default rules for these pools require all access licences on these pools to be identified before the commencement of the plan so that existing specific licence conditions may continue. It should be noted that not all licences on such pools will be subject to the same conditions.

Exempt from the drawdown rule

The default position is that these pools will be exempt from the drawdown rule that applies to natural pools in recognition that these structures were built and licensed to allow access to the storage during times of low or no flow.

5.3. Step 3 – Develop alternate rules to default

Recommendation of an alternate access rule or trading rule should be based on considerations 1-4 listed in section 5.2.1 above and can be selected from the types of alternate rules suggested for natural pools in *Section 4 Method for Setting Access and Trading Rules for Natural Pools* with the possibility of allowing access at lower levels than 50 per cent of full containment volume for these types of pools. In addition to setting a level of constrained access, the Regional Panel should also consider combining these rules with requirements to modify infrastructure or operational rules to address connectivity concerns (for example to allow passage for fish and environmental flows). Where information on the instream values, extraction value and community dependence on extraction and hydrologic stress is also relevant for choosing an alternate rule, Steps 2-7 in *Section 4 Method for Setting Access and Trading Rules for Natural Pools* should be undertaken as they would be for natural pools.

6. Implementation of pools policy

These methods are intended as an addendum to the Macro community manual.[3] Working groups will provide advice and recommendations to the Regional Panel regarding the water access rules and trading rules resulting from applying the two methods in this paper. Regional Panels will follow the same process with these methods as for those described in the manual – that is, classification of pools and water access and trading rules can be amended where justified. Reasons for any amendments should be documented.

Regional Panels may request additional expert opinion in circumstances where there are high environmental values and economic activity to ensure that ecosystem functioning is maintained.

Water sharing plans should contain amendment provisions to allow the following to occur based on new information gained through environmental and/or socio-economic studies relating to pools in a plan area:

- Identify a natural pool as an 'individually managed pool' and apply alternate individual rules to that pool (developed following the *Section 4 Method for Setting Access and Trading Rules for Natural Pools)*
- Identify a pool created by structures covered by a water supply work approval as having known environmental or cultural value or with known management issues and apply alternate individual rules to that pool (developed following the *Section 5 Method for Setting Access and Trading Rules for Pools Created by Structures Covered by a Water Supply Work Approval)*
- Where the default rules were applied to a category of pools, alternate rules may be applied to the category (developed following the *Section 4 Method for Setting Access and Trading Rules for Natural Pools)* based on information that shows the default rules are having more than anticipated impacts on the water source and its dependent ecosystems or the socio-economic dependence
- Where a study finds that extraction from a pool is impacting on a high-priority groundwater dependent ecosystem (GDE), access and trading rules for that pool may be developed to protect the GDE.

3 NSW Office of Water (2010), *Macro water sharing plans – the approach for unregulated rivers: A report to assist community consultation*, NSW Office of Water, Sydney available online at http://www.water.nsw.gov.au.

Appendix 1 Determining environmental water requirements

Due to the variety of pools there is no single method for objectively and quantitatively determining all the environmental requirements associated with a pool. Simple methods may include one or more of the following. The choice of method(s) will depend upon the local landscape, how the pool relates to the landscape, expert knowledge and an understanding of the overall morphology of the water system under consideration.

a) **Vegetation** can often be a good indicator of past water regime. Dropping water levels below, for example, the level of benches can expose sensitive vegetation types. This vegetation can range from simple rushes through to main canopy trees. This method involves identifying the benches within the pool that are critical to protecting this vegetation and establishing a water level below which the water should not be artificially drawn down.

b) **Maintaining refuges** The role of a pool as a refuge can change at the onset of seasonal drying or drought as biota move into a pool. Pools identified as refuge value need to maintain that value. As water levels drop, a continuous water body or river can fragment into many smaller bodies. This method involves identifying the level at which fragmentation occurs and establishing a water level under which the water should not be artificially drawn down.

c) **Drawdown** of pools too quickly can impact on the structural integrity of a pool as well as impact on the biota dependent upon that pool. Drawing down water at an excessively fast rate may impact on the stability of the banks. Slumping rates can be used to help determine drawdown rate constraints.

d) **Maintaining permanent water** The primary consideration for water access should be that extraction does not result in the complete removal of water particularly in pools that never historically dried out. Water balance methods can be used that assess rainfall (and any other sources of inflows), evaporation and extraction during periods of a critical drought.