
RISK MANAGEMENT POLICY AND GUIDELINES FOR WATER ALLOCATION PLANS



Government of South Australia
Department of Environment,
Water and Natural Resources

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1 INTRODUCTION

1.1 Overview

Risk-based approaches to water planning provide the basis for a disciplined and transparent process of water allocation planning, which focuses effort where it is most needed, documents learning and the rationale for decisions for the future, and creates a mechanism for all stakeholders to be involved in a meaningful way. It is an important tool to support the trade-offs required in water allocation planning, the policies in water allocation plans and for the implementation, monitoring and evaluation associated with a water allocation plan.

The overarching objective of water management in South Australia is to manage water within sustainable limits and provide water for the environment and for social and economic activities with acceptable certainty. Three key categories of risk, which have the potential to affect this objective, are outlined below:

Table 1: Categories of risk for water allocation planning

Risk category	Explanation
1. Risks to the resource*	Risks which have the ability to damage the effective function of the resource
2. Risks to community values	Risks which affect the productivity and value to communities of the resource
3. Risks to the effective operation of the plan	Risks to the policies and strategies which have been developed to mitigate the risks in the other two categories

* The resource in this context relates to the water resource, as well as the associated ecosystems.

The Risk Management Policy and Guidelines for Water Allocation Plans (the Policy and Guidelines) outlines South Australia's commitment to a risk-based approach to water planning and provides guidelines which clearly articulate the steps, procedures and tools to incorporate the principles and processes set out in the Risk Management Framework for Water Planning and Management (the Risk Management Framework) for the water allocation planning process. It also provides minimum requirements in terms of process and documentation for each step.

1.2 Objectives

The objectives of the Policy and Guidelines are to provide:

- The policy direction for using a risk-based approach to developing water allocation plans
- The structure and potential methods for developing risk-based water allocation plans
- The minimum standard requirements for each step of the process
- A generic context for risk management for water allocation plans (see Appendix 1).

1.3 Policy statement

Water allocation planning in South Australia will use a risk-based approach, incorporating the process outlined in the Risk Management Framework. This is based on the Australian and New Zealand Standard for risk management (AS/NZS ISO 31000: 2009), the process for which is outlined in Figure 1:

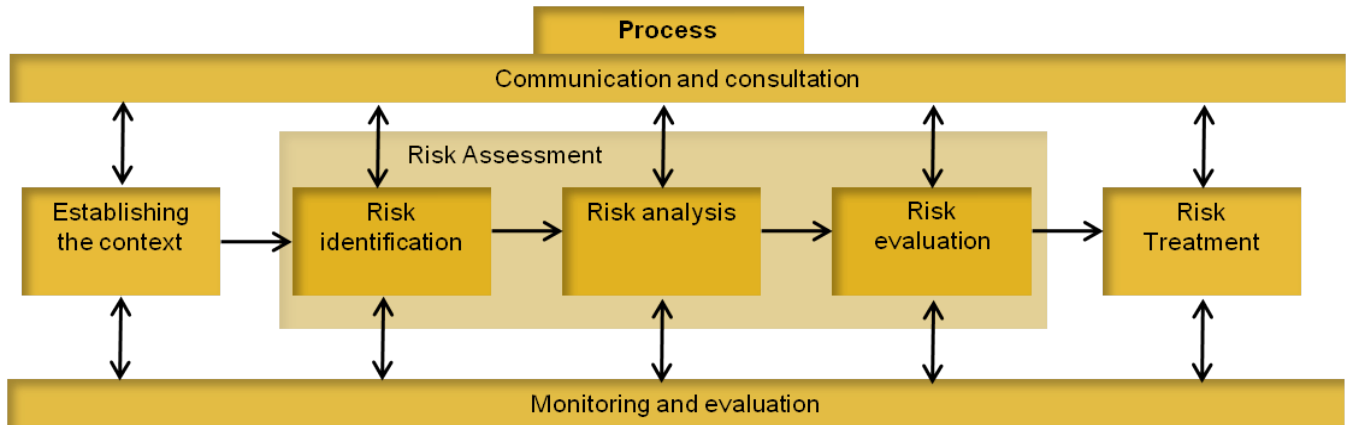


Figure 1. The AS/NZS ISO 31000: 2009 Risk Management Process

All water allocation plans that have not proceeded past the concept statement stage as of the adoption date of this document will include risk management principles in the water allocation planning process and will adhere to the minimum standard requirements for each step in the risk management process as outlined in this document (see Appendix 2).

Where a water allocation plan is developed for the first time after prescription of a water resource, the elements of the risk-based approach that will apply will be determined on a case-by-case basis. Because the granting of water rights to existing users occurs outside the water allocation planning process, it is possible that not all risk management steps apply for first-time plans.

The project management of each water allocation plan is a complementary yet separate procedure to the risk-based approach to water allocation plans. As per any project, business risks to the project associated with staff, skills, knowledge and budgets will be considered as part of the project plan and assessed under the current business risk management frameworks already part of each Natural Resources Management (NRM) Board’s and the Department of Environment, Water and Natural Resource’s (DEWNR) corporate arrangements.

1.4 Alignment of risk management process steps with water allocation plan development

An alignment between the risk management steps and the water allocation plan development process is outlined in Figure 2 and each suggested step is described below. This procedure is likely to require adjustments when tested in practice. It aims to improve the practices which are currently undertaken to develop water allocation plans into an explicit, clearly recorded process. No additional public consultation for risk management is proposed. It is recognised that NRM Boards and regional staff already build in risk management and context-setting discussions into all their stakeholder engagement processes. The Policy and Guidelines can help water planning staff to describe the context and processes in risk management terminology to stakeholders and to improve their understanding of how water allocation plans respond to and address risk.

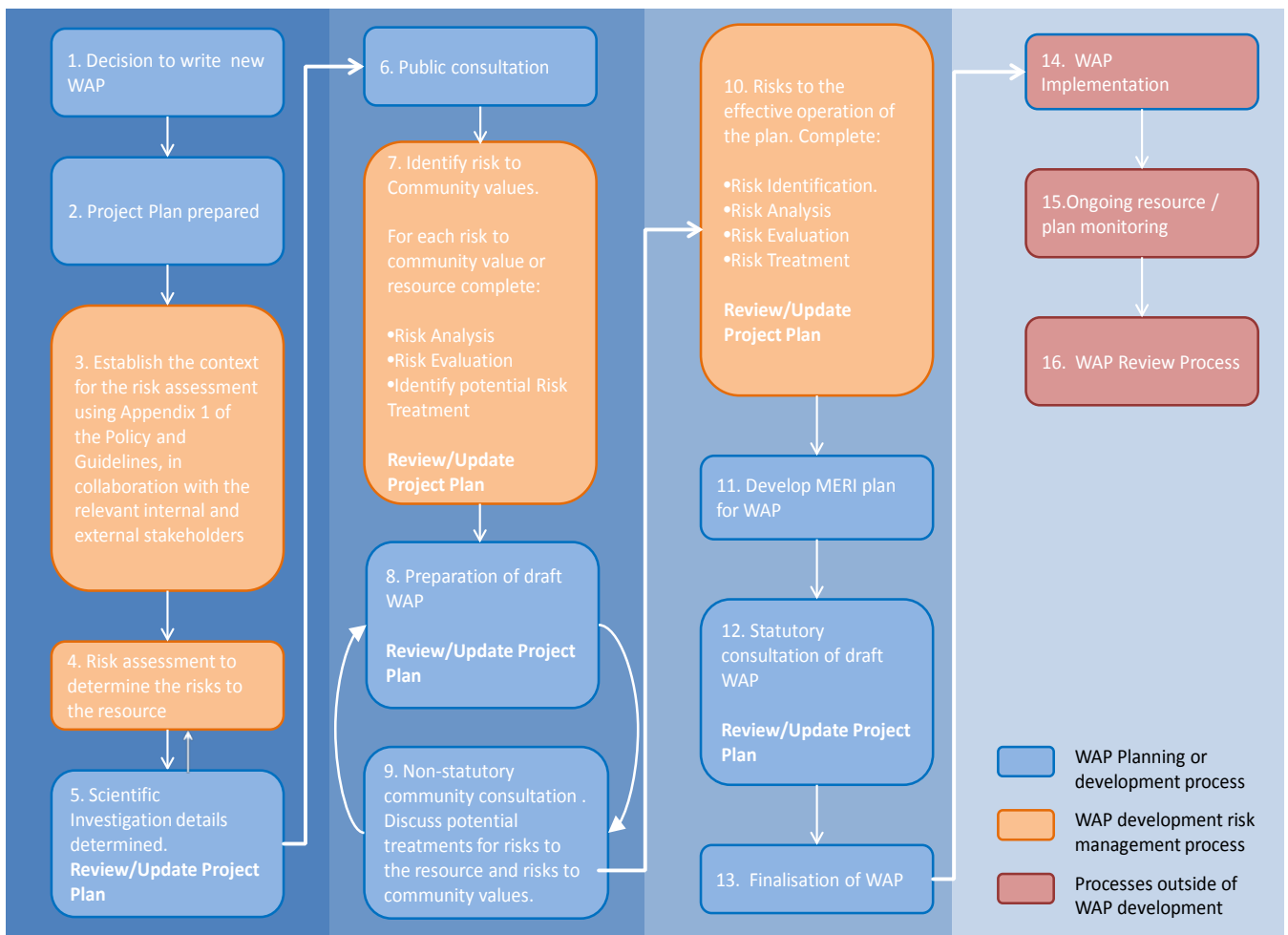


Figure 2. Process for risk assessment in water allocation plans

1. Decide to write/amend a water allocation plan:

The Policy and Guidelines are applicable once the decision to write a water allocation plan has been made. A risk assessment process can be designed on the basis of the Risk Management Framework and Corporate Risk Management Frameworks to support prioritisation and timing of water allocation plan development, but this is out of scope for the Policy and Guidelines.

2. Prepare a project plan for a water allocation plan:

Project plans will need to take into account the risk-based approach to water allocation plans in their preparation, noting the steps presented below.

3. Establish the context for the risk assessment:

The context may be different for the three categories of risk, for example, in terms of stakeholders and risk assessment methods. Appendix 1 will be a starting point which can be made specific for each water allocation plan.

4. Full risk assessment to determine the risks to the resource (Category 1):

This will determine the scientific research and investigations needed in order to satisfy the requirements of the *Natural Resources Management Act 2004* (the NRM Act).

5. Assess needs for scientific investigation in regards to the risks to the resource that are assigned a certain rating but their tolerability indicates the need for further investigations. Investigations will be scoped and the project plan updated accordingly.
6. Public consultation:

Although some external stakeholders may have been involved in the context-setting (step 3), this step is generally the commencement of a public dialogue about the water allocation plan development process.
7. As part of the public consultation undertake:
 - Identification of the risks to community values (**Category 2**) (identify the economic and social values provided by the resource and risk to those values).
 - Risk Analysis (**Category 1 and 2**): the consequence and likelihood of the risk are determined by the chosen method and the effectiveness of current controls is assessed.
 - Risk Evaluation: risks are evaluated against acceptable levels of risk determined during the context-setting.
 - Risk Treatment: options are determined (these inform the policies that are written into the plan and the level of monitoring/management action required).
8. Development of the draft water allocation plan, which is a cyclical process linked to non statutory community consultation (step 9) (potential risk treatment options are discussed with stakeholders).
9. Non-statutory community consultation, which can consist of seeking written comments on discussion papers, public meetings or engagement with Water Allocation Planning Advisory Committees, depending on the process agreed by the relevant NRM Board.
10. As part of the development of the draft water allocation, the risk assessment takes place to assess the risks to the effective operation of the plan (**Category 3**). Risk assessment includes risk identification, analysis and evaluation. It is likely that the most effective type of analysis will be to use a consequence and likelihood table to look at the potential issues that may affect the achievement of the objectives of the plan throughout its life. The information gained through this process will aid in the final choice of treatments for the category 1 and 2 risks. It will also inform the Monitoring, Evaluation, Reporting and Improvement (MERI) plan for the water allocation plan, as well as the development of an implementation plan.
11. Develop the MERI plan for the water allocation plan.
12. Statutory community consultation of the draft water allocation plan:

The statutory consultation could result in final refinement of the risk register. It is not the place for identification of new risks. If risks are identified at this stage of the process, it is likely that earlier steps have not been designed or undertaken properly.
13. Finalisation of the water allocation plan.
14. Implementation of the water allocation plan will be informed by an implementation plan, which commenced development in step 10.
15. Ongoing resource and plan monitoring:

To be outlined in the MERI plan and the implementation plan.

16. Water allocation plan review process:

To be outlined in the MERI Plan for the water allocation plan.

1.5 Requirements of the *Natural Resources Management Act 2004*

Whilst the NRM Act does not explicitly require a risk-based approach to water allocation planning, the NRM Act requirements for water allocation planning can benefit greatly from a structured risk-based approach to water planning. This is illustrated below:

Table 2. Risk related requirements of the NRM Act

Requirements of the NRM Act	Risks to be assessed	Category of risk
<p>76 (4)(a)</p> <p>(i) an assessment of the quantity and quality of water needed by the ecosystems that depend on the water resource and the times at which, or the periods during which, those ecosystems will need that water;</p> <p>(ii) an assessment as to whether the taking or use of water from the resource will have a detrimental effect on the quantity or quality of water that is available from any other water resource</p>	<p>Risk of taking water on water quality and quantity, and ecosystem health and functioning, spatially and temporally</p> <p>Risk of taking water on water quality and quantity of other water resources</p>	Risk to resource
<p>76(4)(ab) and (b)</p> <p>(ab) determine, or provide a mechanism for determining, from time to time, a consumptive pool, or consumptive pools, for the water resource; and</p> <p>(b) set out principles associated with the determination of water access entitlements and for the taking and use of water so that:</p> <p>(i) an equitable balance is achieved between environmental, social and economic needs for water</p> <p>(ii) the rate of taking and use of water is sustainable</p>	<p>Determine the risk of taking water under different scenarios of water availability in terms of impacts on water quality, water quantity and ecosystems, as well as other users.</p> <p>Determine the risks of different ways of taking and using water in terms of impacts on water quality, water quantity and ecosystems, as well as other users and other natural resources (for example soils)</p>	<p>Risk to resource</p> <p>Risk to community values</p>
<p>76(4) (c), (d) and (e)</p> <p>(c) in providing for the allocation of water take into account the present and future needs of the occupiers of land in relation to the existing requirements and future capacity of the land and the likely effect of those provisions on the value of the land;</p> <p>(d) assess the capacity of the resource to meet the demands for water on a continuing basis and provide for regular monitoring of</p>	<p>Determine the risks of not meeting current and future demands for the community</p> <p>Determine the risks of changes in land use and economic development patterns and associated demands for water</p> <p>Determine the risk of proposed water allocation plan policies impacting on</p>	<p>Risk to community values</p> <p>Risk to the resource</p>

<p>the capacity of the resource to meet those demands; and (e) identify and assess methods for the conservation, use and management of water in an efficient and sustainable manner.</p>	<p>land values Determine the risk of inefficient use of water</p>	
<p>76(4d)(a) (a) set out appropriate policies and principles to assist in regulating the transfer of, or other dealings with, water management authorisations or water access entitlements (which policies may include provisions that provide for the varying of any water management authorisation or water access entitlements or prevent specified classes of transfers or dealings in specified circumstances).</p>	<p>Identify the risks related to proposed transfer rules Identify the risks of changes in the location or manner of take and use of water</p>	<p>Risk to resource Risk to community values</p>
<p>76(6) and (7) (6) If the taking, or the taking and use, of water from a water resource has, or is likely to have, a detrimental effect on the quantity or quality of water that is available from another water resource, the water allocation plan for the first mentioned resource must take into account the needs of persons and ecosystems using water from the other resource as well as the needs of persons and ecosystems using water from its own resource and may, to achieve an equitable balance between competing interests, include provisions designed to prevent or reduce those detrimental effects. (7) If the taking, or the taking and use, of water from a water resource affects, or is likely to affect, the management of water in another water resource, the water allocation plan for the second mentioned water resource may include provisions relating to the taking, or the taking and use, of water from the first mentioned water resource.</p>	<p>Identify potential risks of taking and use of water from the prescribed resource on other water resources, in terms of quality, quantity, ecosystem health and functioning and communities</p>	<p>Risk to resource Risk to community values</p>

The risk management process

Sections 2–6 of the Policy and Guidelines step through the risk management process according to the Australian and New Zealand Standard for risk management (outlined in Figure 1).

- Section 2 discusses the communication and consultation processes
- Section 3 discusses the linkages with monitoring and evaluation
- Section 4 and Appendix 1 cover the establishment of the context
- Section 5 deals with the risk assessment process
- Section 6 addresses the risk treatment.

2 COMMUNICATION AND CONSULTATION

2.1 Internal communication

Communication should be maintained throughout the production of a water allocation plan. A project plan for the water allocation plan is the first step in its production and communication between stakeholders at the initial stages should set the scene for consistent and clear communication throughout the process. Communication between the relevant NRM Board and the wider DEWNR should be maintained throughout the development of the water allocation plan.

2.2 External consultation and community engagement

External consultation and community engagement should occur as defined by the water allocation plan communication strategy.

Minimum Standard Requirement

1. The process for water allocation plan development outlined in the project plan includes consultation steps with all relevant stakeholders to establish the context for risk management.

3 MONITORING AND REVIEW

3.1 Monitoring

There are strong linkages between Monitoring, Evaluation, Reporting and Improvement (MERI) and risk-based approaches for water allocation planning and these linkages need to be recognised throughout the processes of developing a water allocation plan and undertaking risk management.

DEWNR and NRM Boards currently resource and undertake monitoring and assessment of water resources within the state, sometimes in collaboration with other agencies. Monitoring information will feed directly into the assessment of risks to the resource and will inform the confidence in risk assessments. Areas of low confidence may trigger additional monitoring activity. In addition where a risk assessment has been undertaken and a risk has been identified as requiring treatment, monitoring could be one of the treatment options.

The program logic that underpins MERI is helpful to identify risks and risk statements in turn can be converted into assumptions to be tested during the MERI cycle. This is discussed in more detail in the Risk Management Framework.

The links to MERI are also relevant for the other risk categories and risk assessments in these categories can be informed by monitoring outputs and in turn can trigger review of monitoring effort and focus. Monitoring is also important to inform the assessment of the effectiveness of risk treatments.

The draft 'MERI Guidelines for Water Allocation Plans' provide further information about the timing and method for monitoring water allocation plans including risks.

Minimum Standard Requirements

2. Relate monitoring and evaluation section of the water allocation plan to the outcomes of the risk assessments, including the confidence in the risk assessment.
3. Monitoring and evaluation need to be considered as options for risk treatments.
4. Monitoring and evaluation for a water allocation plan needs to include assessment of the effectiveness of chosen treatments.

4 ESTABLISH THE CONTEXT

The context-setting step for risk management is a critical step in the process and if done well, will ensure that the consequent steps will take less effort. It includes the following steps:

1. Determine the internal and external stakeholders and the dependencies/culture within and between them (internal and external context)
2. Establish why a risk assessment is needed
3. Establish the context in which the assessment fits within the broader resource management and planning process
4. Establish the objectives of the risk assessment with stakeholders
5. Determine the risk criteria:
 - a. Describe the risk categories to be measured and the spatial and temporal scales over which they operate
 - b. Determine the method to be used for the risk assessment: based on time, cost, complexity and resource issues
 - c. Determine criteria by which it will be decided a risk is acceptable or tolerable or needs treatment e.g. all risks assessed as 'high' need ongoing management and monitoring
6. Determine the location of outputs from each stage of the risk assessment products
7. Determine the roles and responsibilities in the risk management process.

To assist with this step of the process a generic risk management context is provided as a starting point (see Appendix 1). It is recommended that the generic context for water allocation planning is reviewed and amended to suit each water allocation plan development process.

Minimum Standard Requirements

5. Context-setting is built into the project plan for a water allocation plan.
6. Context-setting for risk management occurs at the commencement of a water allocation plan development process.
7. All context-setting steps are completed and clearly documented.

5 RISK ASSESSMENT

There are **three key risk assessments** that will be undertaken as part of the risk-based approach to water allocation plans:

1. Risks to the resource (**Category 1**)
2. Risks to community values (**Category 2**)
3. Risks to the effective operation of the plan (**Category 3**).

All three assessments should have a significant overlap of stakeholders to ensure consistency and agreed understanding.

In water allocation plans risks need to be assessed with an understanding of how they manifest at multiple scales. The emphasis which is placed on the current versus the long term nature of risk will be important. For the purposes of risk assessment in a water allocation plan it will be simplest to consider risks in terms of the life of the plan, which will be between five and ten years, but maintain an appreciation of the longer term nature of risk through ongoing monitoring initiatives. Similarly, some risk will manifest at local spatial scales, such as risks to particular important socio-ecological assets. Others will be able to be assessed and treated at the scale of a catchment. It is important to keep the concept of scale in mind when assessing risks.

The risk assessment process includes the following key steps:

1. Risk identification
2. Risk analysis, including an assessment of effectiveness of current controls and an assessment of confidence in risk assessment
3. Risk evaluation against criteria for tolerability or acceptability set during the establishment of the context.

The product of the assessment is a risk register. An example of a risk register is provided in Appendix 3.

5.1 Risk identification

Risk identification involves the identification of risk by all key stakeholders. Risks which are identified should be registered in the appropriate location for subsequent analysis and treatment.

5.1.1 Risks to the resource

Risks to the resource should be identified jointly by the NRM Boards and DEWNR in engagement with experts in that area.

5.1.2 Risks to community values

Risks to community values should be determined through a workshop with the appropriate stakeholders. Communities should identify values of the resource to them and risks to those values. Considering the ecosystem services concepts can be valuable in this case.

5.1.3 Risks to effective operation of the plan

Risks to plan objectives are closely linked to the ongoing management/monitoring of the water allocation plan objectives throughout the life of the plan. This assessment should be done jointly between the NRM Board and DEWNR when the objectives have been set.

There are a number of methods to identify risks. As mentioned previously, the program logic approach, in particular the outcomes hierarchy used in MERI is a useful tool, because it helps to identify different levels at which risks can occur (see example below).

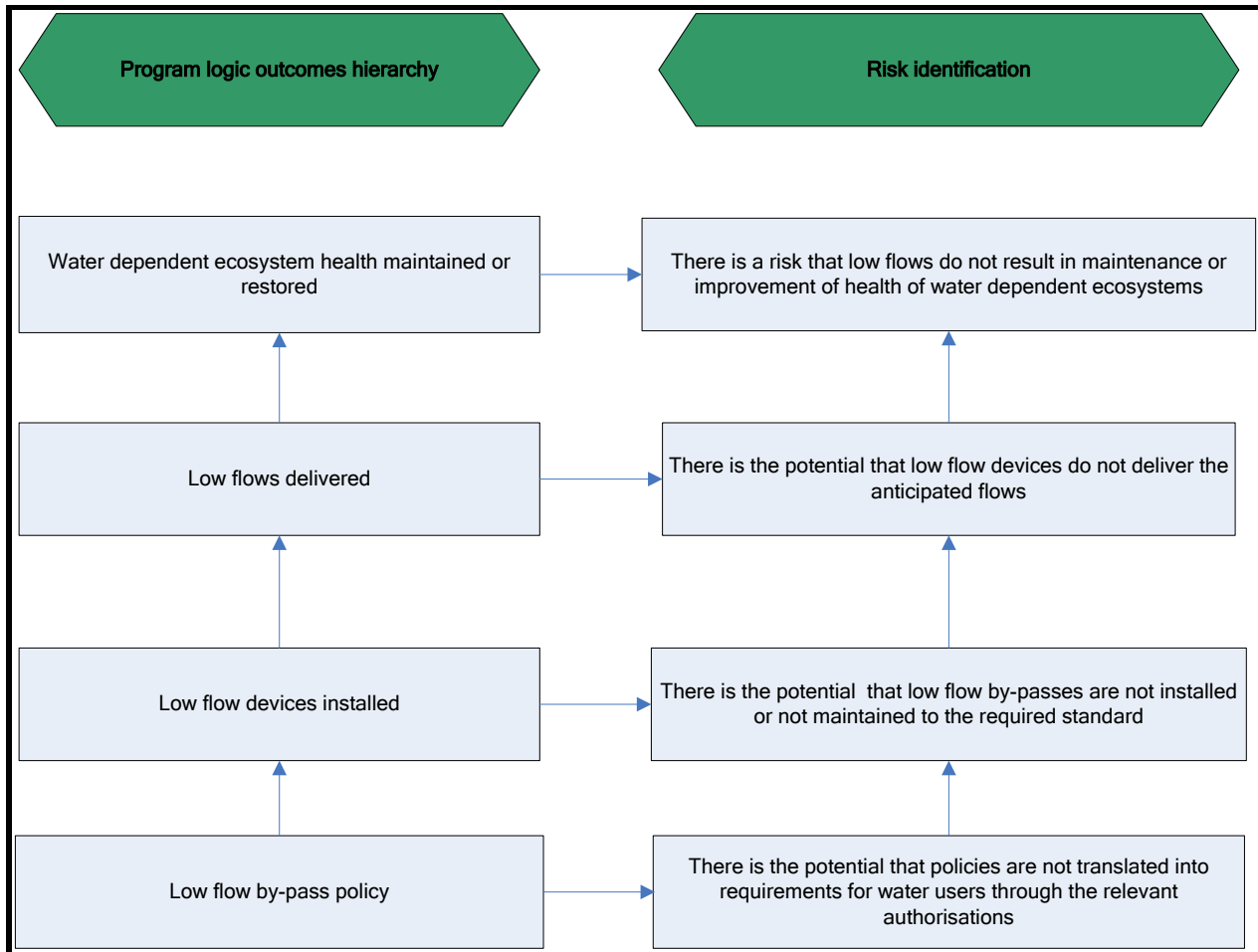


Figure 3. Example of links between program logic and risk identification

Practitioners should refer to the Risk Management Framework for the elements of risk statements and their construction.

It is also acknowledged that there are often a number of risk sources that combine to result in an event, or there are a number of different events that can arise from one risk source and in turn the ultimate consequence can be the result of multiple events. Therefore risk statements will often require further refinement during the course of the risk analysis. The way risk statements are constructed will also depend on the method chosen for the risk analysis, during the establishment of the context.

Minimum Standard Requirements

8. Risks in all three categories clearly identified, involving external stakeholders where appropriate.
9. Risks documented and stored in appropriate risk registers.
10. NRM Act requirements are met in relation to risk identification (see Table 2).

5.2 Risk analysis

The level of risk is modified by either the severity of the outcome (consequence) or the chance of it happening (likelihood). The most common and well known form of risk assessment is the use of a consequence and likelihood matrix. This guidance does not endorse the use of a particular matrix because the criteria for assessing and evaluating risk are dependent on the context of each individual risk assessment. However suggestions for consequence and likelihood ratings are provided for each of the three risk categories.

A procedure for constructing a consequence and likelihood table is provided if this method is deemed appropriate (see Section 5.2.5). More sophisticated and flexible methods of analysis are available and used for risk analysis in water planning (see References section). The choice of method occurs during the context-setting stage (see Appendix 1 and the Risk Management Framework for further discussion of potential methods).

The following sections outline the potential steps in analysing risk including the analysis of current controls and their ability to treat risk.

5.2.1 Consequence analysis

Consequence analysis may vary from a simple description to detailed quantitative modelling depending on the method chosen through the context-setting stage of the process. When using a table approach it is important to have tailored consequence categories which are appropriate for the context within which they are to be used. For example, if a water resource in its natural state is highly saline, different consequence ratings for water quality will be required than where a water resource meets drinking water standards in its natural state. Potential consequence categories for risk to the water resource are presented in Table 3 below.

The risk to resource analysis occurs first in the water allocation planning process to establish the risks to the effective function of the natural resource (see Figure 2). It is important to recognise that consequences will manifest at varying spatial scales and to be explicit about the scale of focus in the assessment.

Analysis of community values and consequences of risk to those values is the second assessment undertaken. It is important to be aware that what is a significant consequence to community values in one community may be quite different in another community. This could depend, for example, on the dependence of that community and the regional economy on the prescribed water resource; the availability and cost of alternative water supplies; and the cultural linkage to water resources. It also depends on the adaptability of a community in terms of its skills, education, age groups, attitudes etc. Potential consequence categories for risk to community values are presented in Table 4 below.

The analysis of risk to the effective operation of the plan occurs last and again the scale is an important consideration. For example, a successful legal challenge to a water allocation plan that covers only a small area with very few users will be very different from a successful legal challenge to a plan with a large number of users and subject to intergovernmental agreements. Potential consequence categories for risk to the effective operation of the plan are presented in Table 5 below.

Table 3. Example consequence table for risks to the resource

Consequence				
	Example category descriptors			
Category	Adverse water quantity	Poor water quality	Health of water dependent ecosystems	Key natural assets
Insignificant	No noticeable deviation from baseline condition in terms of flow regimes, water pressure and water levels	Water quality measure is outside the ANZECC trigger guidelines or other appropriate trigger: <1% of measurements occasions	No noticeable impact to water dependent ecosystems	No noticeable impact to key natural assets
Minor	Some deviation from natural state in terms of water quality, flow regimes, water pressure and water levels (5–10 %)	Water quality measure is outside the ANZECC trigger guidelines or other appropriate trigger: 5–10% of measurement occasions	Some impacts on water dependent ecosystems: 15% of water allocation plan area affected	Some impacts on key natural assets up to 10% of extent affected (if applicable)
Moderate	Moderate deviation from natural state in terms of water quality, flow regimes, water pressure and water levels (10–xx %)	Water quality measure is outside the ANZECC trigger guidelines or other appropriate trigger: 30–50% of measurement occasions	Moderate impacts on water dependent ecosystems: 15–50% of water allocation plan area affected	Moderate impacts on key natural assets up to 25% of extent affected (if applicable)
Major	Major deviation: aquifers become depressurised, permanent water bodies disappear and water levels drop more than xx metres	Water quality measure is outside the ANZECC trigger guidelines or other appropriate trigger: >50% and by x magnitude of measurement occasions	Major impact on water dependent ecosystem: >50% of water allocation plan area affected or key asset significantly degraded	Extensive impact on key natural assets
Catastrophic	Aquifers sustain structural damage, fresh water lenses or aquifers lost; watercourses cease to flow for more than xx months/years	Water quality measure is outside the ANZECC trigger guidelines or other appropriate trigger: >95% of measurement occasions by 50% magnitude	Water dependent ecosystems are in imminent danger of irreparable damage likely leading to long term adverse resource conditions: >90% of water allocation plan area affected	Key natural assets irreparably damaged

Table 4. Example consequence table for risks to community values

	Consequence				
	Example category descriptors				
Category	Impact on quantity or quality of water for irrigated agriculture	Impact on quantity or quality of water for human consumption	Impact on quantity or quality of water for industrial/mining/forestry	Impact on quantity or quality of water for amenity/recreation	Impact on quantity or quality of water for cultural purposes
Insignificant	No noticeable limitations or impacts on end use	Water quality measure is outside the ANZECC trigger* guidelines or other appropriate trigger: <1% of measurements occasions	No noticeable limitations or impacts on end use	No noticeable impact on amenity or recreation services derived from water resource	No noticeable damage to objects or sites of cultural and historical significance
Minor	Some minor impacts on end use	Water quality measure is outside the ANZECC trigger guidelines or other appropriate trigger: 5–10% of measurement occasions	Some limitations or impacts on end use	Minor impacts: noticeable reductions in water levels, change in odour, or increase in sediment, algal bloom or pest plants and animals, change in abundance of native species	Isolated and temporary cases of: repairable damage to objects or sites of cultural & historical significance; impacts within emotional and psychological capacity of the community
Moderate	Some damage to crops/infrastructure and soils occurs	Water quality measure is outside the ANZECC trigger guidelines or other appropriate trigger: 30–50% of measurement occasions	Some damage to trees/infrastructure and soils occurs	Certain activities restricted for short periods of time, for example fishing, swimming or boating, localised fish deaths or significant reduction in specific species	Long-term and more widespread damage to objects or sites of cultural and historical significance, impacts beyond emotional and psychological capacity in some parts of the community

Category	Impact on quantity or quality of water for irrigated agriculture	Impact on quantity or quality of water for human consumption	Impact on quantity or quality of water for industrial/mining/forestry	Impact on quantity or quality of water for amenity/recreation	Impact on quantity or quality of water for cultural purposes
Major	Significant reduction in productivity, damage to crops, infrastructure and soils	Water quality measure is outside the ANZECC trigger guidelines or other appropriate trigger: >50% and by x magnitude of measurement occasions	Significant reduction in productivity, damage to infrastructure	Longer term restrictions on activities, minor health impacts occur, widespread algal blooms, or fish deaths	Significant loss or damage to objects or sites of cultural and historical significance, impacts beyond emotional and psychological capacity in large parts of the community
Catastrophic	Water is unusable for irrigated agriculture	Water quality measure is outside the ANZECC trigger guidelines or other appropriate trigger: >95% of measurement occasions by 50% magnitude	Water is unusable for original purpose	Irreversible loss of functions: species disappear; water becomes unusable for recreational purposes, serious health impacts	Widespread loss of objects or sites of cultural and historical significance, impacts beyond emotional and psychological capacity in all parts of the community

*ANZECC guidelines for drinking water

Note: Figures are illustrative only. Figures have been marked as 'x' where it is unhelpful to include a number as decisions are highly dependent on the individual context

Table 5. Example consequence table of risks to effective operation of the plan

	Consequence		
	Example category descriptors		
Category	Unintended policy outcome	Impact on plan outcomes	Unexpected events
Insignificant	Unintended policy outcome with no impact on plan objectives or outcomes	Impact on plan measure with no noticeable impact on plan outcomes	No noticeable impact on plan outcomes
Minor	Unintended policy outcome with some impact on plan objectives or outcomes	Some impact on plan measure, but outcome, but other measures are in place to support achievement of outcome	Some impact on plan outcome
Moderate	Unintended policy outcome with a noticeable impact on key plan objectives or outcomes	Noticeable impact on a plan outcome but not a key outcome. Key measure to achieve outcome affected.	Noticeable impact on a plan outcome but not a key outcome
Major	Unintended policy outcome that undermines key plan objectives or outcomes	Key plan outcome not met	Key plan outcome not met
Catastrophic	Unintended policy outcome that undermines state-wide objectives or outcomes or results in a failure to meet intergovernmental obligations and/or major financial exposure for Government of SA	Plan fails: key outcomes not met	Plan fails: key outcomes not met

5.2.2 Likelihood analysis

Likelihood is defined as the ‘chance of something happening’ and may be expressed as scores, probabilities or qualitative descriptors. As for consequences, scores may aid in producing an overall risk ranking if a risk matrix approach is warranted.

The likelihood of some events or circumstances occurring will also be modified by the adoption of a water allocation plan and the provisions within it. It is therefore helpful to document how the provisions in the plan will modify the likelihood of the risk given the controls that will be put in place.

The likelihood of some natural phenomena will be unchanged by the adoption of a water allocation plan. These events include drought, flood, fire and other natural events. An example of likelihood categories is provided in Table 6 below:

Table 6. Example likelihood table (following the NWI Policy Guidelines for Water Planning & Management)

Likelihood		
Category	Example category descriptions	
	Qualitative descriptor	Probability of occurring
Rare	Event occurs 1 in every 100 years	<1%
Unlikely	Event occurs 1 in every 20–50 years	1–20%
Possible	Event occurs 1 in every 5–10 years	21–80%
Likely	Event occurs annually	80–95%
Almost certain	Event occurs many times per year	>95%

5.2.3 Controls analysis (assessing the effectiveness of current controls)

Water allocation plans and the policies and provisions they contain are themselves a form of risk control. Other documents and actions identified in the current management summary during the context-setting can also be a source of controls. Risk analysis in the context of water allocation planning therefore involves an analysis of the current controls that are in place through the operation of the water allocation plan or other plans.

The steps involved in risk analysis are identified in the Risk Management Framework. In the context of water allocation plans, risk analysis includes:

- Identifying the existing controls to the risks
- Determining whether the current controls are modifying risk to a level that is tolerable (determined at the context-setting stage)
- Identifying whether the controls are operating in the manner intended and can be demonstrated to be effective (see Table 7 and Table 8).

Current control measures are already in place in most areas. These may be within current plan policies or management actions. Both the degree of implementation and effectiveness of the control measures affect either the level of consequence or likelihood of the risk in question. These levels may be assessed in term of percentage below:

Table 7. Assessment of the level of implementation of control measures

Implementation	Percentage
Complete implementation	>95%
Mostly complete	75–95%
Partially complete	30–75%
Mostly incomplete	5–30%
Not implemented	<5%

Table 8. Assessment of the effectiveness of current controls

Effectiveness	Level of effectiveness of control	Percentage
Controlled	Total control or mitigation of risk	>95%
Mostly controlled	Risk is controlled in most circumstances	75–95%
Partially controlled	Risk controlled in some circumstances	30–75%
Mostly uncontrolled	Risk is mostly uncontrolled by measures	5–30%
Not controlled	Controls do not mitigate the impacts of the risk	<5%

It is recognised that all policies within the water allocation plan or other plans/strategies and actions may not require such rigorous assessments. It may be prudent to choose several key areas for this assessment.

5.2.4 Confidence in the results of a risk assessment

To address uncertainty associated with knowledge gaps for quantitative and qualitative assessments it is useful to provide a level of confidence associated with the assessments that have been undertaken. These will relate to the type of data or expert reference that has been used, the expertise of the team involved (risk source and risk assessment experience) in the assessment and the level of agreement reached between the risk assessment team.

Experience has shown that addressing knowledge gaps through expressing the confidence or certainty in the risks assessments is more helpful than treating knowledge gaps as a source of risk. Table 9 shows the categories of certainty for the type of data used. This information will help to inform the level of confidence that can be placed in the assessment and inform which areas need further investigation.

A low level of confidence may mean that the risks analysis needs to be repeated with a different group of people that have more relevant expertise. It can also trigger specific monitoring or research activities. Monitoring activities can be incorporated in the MERI plan for a water allocation plan.

Table 9. Descriptor levels of uncertainty associated with data available (adapted from Australian Emergency Management Committee, 2010)

Confidence criteria	Low confidence	Moderate confidence	High confidence
Data/information	Not location specific; anecdotal evidence only; not tested	Location specific (regional scale); validated historical or scientific evidence	Location specific (local scale); validated historical or scientific evidence based on specific hypothesis testing
Team knowledge	Neither risk source, risk assessment process or location specific	Risk source or process and location specific	Risk source and process and location specific
Agreement	Neither on interpretations nor on risk levels	On interpretations or risk levels	On interpretations and risk levels

5.2.5 Designing a risk matrix (consequence and likelihood table)

The consequence and likelihood table or risk matrix is one of the most common qualitative tools used for risk analysis. If it is deemed the appropriate tool, the steps below will help to guide the creation of an appropriate table.

When designing a risk matrix the tolerability of risk is important to consider, otherwise there is the potential to create a table that does not reflect the boundaries for tolerability agreed upon in the context-setting stage.

Step 1: Determine the type of consequences which need to be considered.

Step 2: Determine the severity range of the consequences (it may be helpful to use numbers rather than only qualitative descriptions). Where it is known that there is data available for the assessment these ranges may include quantitative descriptions.

Step 3: Determine the way in which to express likelihoods. For most risks it will be appropriate to use the life of the plan for such assessments, however, for long term risks such as climate change a longer term time scale will need to be considered.

Step 4: Create a risk ranking matrix (see Table 10). The risk ranking matrix enables the consideration of combination of consequence and likelihood to produce a risk ranking. Where numbered levels have been used this will enable an overall risk level score to be determined.

Table 10. Risk ranking matrix for Comparative Risk Assessment

	<i>Consequence level</i>				
<i>Likelihood level</i>	Insignificant	Minor	Moderate	Major	Catastrophic
	1	2	3	4	5
Almost certain 5	Yellow	Yellow	Red	Red	Red
Likely 4	Yellow	Yellow	Yellow	Red	Red
Possible 3	Green	Yellow	Yellow	Yellow	Red
Unlikely 2	Green	Green	Green	Green	Yellow
Rare 1	Green	Green	Green	Green	Green

Low risk level = green; Medium risk level = yellow; High risk level = red

Minimum Standard Requirements

11. The consequence and likelihood is assessed and documented.
12. The analysis of current controls is documented.
13. The analysis of confidence in the risk assessment is documented.

5.3 Risk evaluation

Risk evaluation involves assessing the level of risk in relation to the tolerability/acceptability of risks which have been set out when establishing the context. This is the stage where decisions are made about whether or not further action needs to be taken. Where risks are deemed to be ‘not tolerated’, treatment options should be considered.

In some circumstances it may be deemed that further information is required to fully comprehend the nature of the risk, particularly if it would provide greater confidence. In the context of water allocation plans a decision about whether more detailed assessments are warranted and over what timescale may need to be made i.e. for the current plan or in time to provide information for the next. In some circumstances this will be able to take place immediately and in others will be part of the ongoing monitoring of the resource or community performance.

5.4 Evaluating treatment requirements

The final stage of risk evaluation is the ‘decision point’ on whether or not treatment is required. Risks which have been evaluated as ‘not tolerated’ will need to be treated. The first step in

determining risk treatments should be based on an agreed trigger for treatment determined by the tolerability of risk identified at the context-setting stage. Table 11 provides an example of a table which helps support this decision.

Table 11. Requirements for risk treatment

Level of risk	Treatment required?*	Tolerability
Low	No. Continue with current operational policies and level of monitoring/management	Tolerated
Medium	Yes. Investigate and where practicable, implement policies to reduce risk, increase monitoring intensity, prioritise further research to reduce knowledge gaps	Some tolerability
High	Yes. Take action immediately, monitor and manage intensively.	Not tolerated

* Examples only - qualifying words such as 'intensity' need to be defined by users

Minimum Standard Requirements

- 14. Risks evaluated against risk tolerability are identified through context-setting.
- 15. A decision on whether or not further action is required is determined and documented.

6 RISK TREATMENT

6.1 Selecting potential treatments

The type or level of treatment considered will be based on the level of risk which directly relates to the tolerability of risk. There are a number of tools available to evaluate different treatment options, such as workshops, cost-benefit analysis and Bayesian Belief Networks. Appendix 1 of the Risk Management Framework provides more information on some of these tools. Scenario analysis or further decision support tools may also be used if appropriate.

Treatment options evaluation criteria

The criteria below were developed to support decision making when considering a number of treatment options when addressing overallocation. They are considered useful in a more generic sense to select treatments for inclusion in a water allocation plan:

Table 12. Treatment options evaluation criteria

Criteria	Explanation
1. Administrative simplicity	Does the proposal require complex administrative processes and structures in order to implement? These could include staffing requirements, legislative amendments, the capacity of the licensing and metering systems or the skill base required to calculate or implement the proposal.
2. Appropriateness	Is the proposal based on sound environmental/hydrological, economic and/or social rationales?
3. Community acceptance	Is the proposal supported by a majority of the community and a broad representation of different sectors or interest groups?
4. Effectiveness	Will the proposal achieve the objectives without leading to perverse outcomes? Does it reduce the risks in terms of likelihood or consequence?
5. Efficiency	Is the proposal economically efficient?
6. Equity	Does the proposal treat all affected parties in an equitable manner? Equity can be assessed from two perspectives – process and outcome. Process equity assesses if the process used to determine potential changes to water extraction has treated all affected parties equitably. Outcome equity assesses if the outcome of a process or proposal results in equitable changes to all affected parties. It is possible for a process to be equitable, but for that process to result in outcomes that are perceived to be inequitable.

7. Legality	Is the proposal consistent with South Australia’s legislative framework for water management e.g. the NRM Act? This may require consideration of additional legislation such as the <i>Water Act 2007</i> (Cth) or agreements such as the <i>Groundwater (Border Agreement) Act 1985</i> and the Intergovernmental Agreement on a National Water Initiative.
8. Transparency	Will the proposal allow the community to have accessibility, usability, ease of understanding, and a capacity to audit information and processes? Does the proposal provide for openness, communication, and accountability with the community?

The treatment of risk is likely to require negotiation and trade-offs between competing users. The provision of some risk treatments will have the ability to treat more than one risk. For example, the provision of low flows for ecological outcomes can also reduce impacts of upstream diversions and interception for downstream users.

Essentially what currently happens during the consultation phase of a water allocation plan is that the community identifies whether the proposed treatments in the plan are acceptable to them. This information is captured and used to negotiate trade-offs and an optimum package of policies and management actions. The risk assessment process can help to clearly demonstrate what trade-offs the community is making.

Minimum Standard Requirements

- 16. Risk treatments that are a “no regrets” option or deal with multiple risks are considered first.
- 17. Treatments are clearly related to the level of risk and tolerability of risk identified.
- 18. Risk treatment options are evaluated against an agreed set of criteria.

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APPENDIX 1: GENERIC CONTEXT FOR RISK MANAGEMENT IN WATER ALLOCATION PLANS

I. The internal and external stakeholder context (Context-setting step 1)

i. Internal context

The internal and external context within these guidelines relates to the development of water allocation plans.

Within the water allocation planning process there are key areas of DEWNR and the NRM Boards which are responsible for different aspects of the development, investigations, implementation and science input into the water allocation planning process.

The internal stakeholders of DEWNR involved in providing support for water allocation plans include the following staff functions:

- Policy
- Science
- Operations
- Communications
- Water planners

The governance of water allocation planning within the NRM Boards are different depending on the Board but can include, any or all of the below:

- Water allocation plan advisory committees
- Community advisory committee
- NRM groups
- NRM committee
- Board members
- Regional water planning group

The context of water allocation planning involves communication between the NRM Boards and DEWNR.

ii. External context

DEWNR and NRM Board external stakeholders could include the following:

Table 13. Example of external partners

SA Government Agencies	Commonwealth Institutions	Other external partners
Department of Manufacturing, Innovation, Trade, Resources and Energy	Bureau of Meteorology	Aboriginal groups
Department of Planning, Transport and Infrastructure	Commonwealth Environmental Water Office	Community and industry groups
Department of the Premier and Cabinet	Department of Sustainability, Environment, Water, Population and Communities	Consultants
Environmental Protection Authority	Murray–Darling Basin Authority	Goyder Institute for Water Research
Primary Industries and Regions SA (PIRSA)	National Water Commission	Intergovernmental committees e.g. Border Groundwaters Agreement, Lake Eyre
SA Health		Interstate government departments
		Licensees
		Local Government
		Other water users (stock and domestic)
		SA Water

It is important to consider whether all stakeholders involved in water allocation plan consultation and communication are also the stakeholders involved in setting the risk management context.

II. The need for risk assessment in water allocation plans (Context-setting step 2)

The need for risk management within water allocation plans includes:

Quality assurance

A risk management approach within water allocation plans provides a formal, repeatable process which allows for clear documentation of steps in a transparent manner. It allows for adaptive learning and incorporation of lessons learned in subsequent assessments, monitoring of treatment options and a flexible yet tailored approach. It therefore provides the basis for trade-offs between social, environmental and economic risks.

National drivers

There are a number of drivers for a more robust and structured approach to risk management in water planning:

- Schedule E of the NWI Agreement sets out requirements for water allocation plans including risk assessments.
- The NWI Guidelines for Water Planning and Management focus specifically on a risk management approach to water planning and incorporate a specific risk management module aligned with ISO standards.
- The COAG National Water Planning Report Card requires evidence of specific risk assessments and risk management practices in water allocation planning processes.
- The Murray-Darling Basin Plan and its water resource plan requirements are expected to have specific risk management requirements as this aligns with *Water Act 2007* (Cth) requirements.

The national drivers are outlined in more detail in Table 14.

Table 14. National Drivers for Risk Assessments in Water Allocation Plans

Risk type	Risk category	Requirement
Interception risk	Risk to resource Risk to community values	NWI Policy Guidelines for Water planning and management Schedule E of the NWI Agreement COAG National Water Planning Report Card <i>Water Act 2007</i>
Climate change	Risk to resource Risk to community values	NWI Policy Guidelines for Water planning and management Schedule E of the NWI Agreement COAG National Water Planning

		Report Card <i>Water Act 2007</i>
Knowledge gaps	Risk to the resource Risk to community values Risk to plan objectives	<i>Water Act 2007</i> Schedule E of the NWI Agreement
Land use change	Risk to the resource Risk to community values	NWI Policy Guidelines for Water planning and management Schedule E of the NWI Agreement COAG National Water Planning Report Card <i>Water Act 2007</i>
Connectivity between surface water and groundwater systems	Risk to the resource Risk to community values	NWI Policy Guidelines for Water planning and management Schedule E of the NWI Agreement COAG National Water Planning Report Card <i>Water Act 2007</i>
Over use and/or overallocation	Risk to the resource Risk to community values	NWI Policy Guidelines for Water planning and management Schedule E of the NWI Agreement COAG National Water Planning Report Card
Cultural water use	Risk to community values	NWI Policy Guidelines for Water planning and management Schedule E of the NWI Agreement COAG National Water Planning Report Card
Risks to the resource	Risk to the resource	COAG National Water Planning Report Card

Specified outcomes (environmental, public benefit, others)	Risk to plan objectives	NWI Policy Guidelines for Water planning and management Schedule E of the NWI Agreement COAG National Water Planning Report Card
Mining	Risk to resource Risk to community values	NWI Policy Guidelines for Water planning and management COAG National Water Planning Report Card
Adequate monitoring, compliance and enforcement provisions	Risk to plan objectives	COAG National Water Planning Report Card NWI Agreement <i>Water Act 2007</i>

South Australian policy drivers

Risk management is one of the seven principles of the NRM Standard that forms part of the State NRM Plan 2012–2017. South Australia has committed to a risk-based approach to water planning, and requires risk management steps to be undertaken as part of a water allocation plan development process.

A risk-based approach to water planning compliments the more rigorous project management approach to water allocation plan development which formed part of the Water Planning and Management Reform Program.

A risk-based approach also ensures that key NRM Act requirements are met (see Table 2).

III. Establishing the context with the broader resource management and planning process (Context-setting step 3)

i. Current Management Context

Water allocation plans fit within a broader resource management context which is influenced by broader resource scale planning processes including the State NRM Plan, regional NRM Plans, the Murray-Darling Basin Plan, the *Water Act 2007* (Cth) and the NRM Act. The NRM Act includes the requirements for developing water allocation plans.

Table 15. Current Management Summary

Legislation/national & international agreements	Plans	Operational arrangements/Monitoring projects
<ul style="list-style-type: none"> - <i>Water Act 2007</i> (Cth) - <i>Natural Resources Management Act 2004</i> - Ramsar Convention - Biodiversity Convention - Intergovernmental Agreements (e.g. National Water Initiative, Lake Eyre Basin, Border Groundwaters Agreement) - <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth) - <i>National Parks and Wildlife Act 1972</i> 	<ul style="list-style-type: none"> - South Australia’s Strategic Plan - Water for Good - Murray-Darling Basin Plan - State and Regional NRM plans - Current water allocation plan and licensing conditions/policies - Regional Demand and Supply Statements - Development plans/regulations - Non–statutory plans: <ul style="list-style-type: none"> o Regional development plans o Land and water management plans 	<ul style="list-style-type: none"> - State and condition monitoring <ul style="list-style-type: none"> o Groundwater o Surface water o Water dependent ecosystems - Annual irrigation reporting - Wastewater management controls - Licence conditions and operational procedures - Land clearance controls - Annual reporting by NRM Boards - Compliance checks - Community monitoring - External monitoring (SA Water, EPA)

IV. Risk Assessment Objectives (Context-setting Step 4)

Risk assessment objectives will to some extent line up with the overall objectives for the water allocation plan:

- Community commitment to the water allocation plan
- Provide opportunity for community identification of risk and incorporation of their concerns in decisions about trade-offs between social, economic and environmental concerns
- Sustainable and SMART (Specific, Measurable, Achievable, Realistic, Time-bound) management of the resource
- To direct resources where they are most needed
- To meet state/national obligations – have compliant plans
- To more transparently assess the social, economic and environmental risks

- To prioritise issues for monitoring and compliance
- To document information used in the decision making process regarding trade-offs between users
- To enable learning and transfer of information for the next iteration of the water allocation plan.

V. Risk Criteria (Context-setting step 5)

Determining risk criteria will settle what risks will be assessed by what method; what will be considered a low, medium or high risk for that specific water resource, community or water allocation plan; and where the limits for acceptability or tolerability of a risk will be.

i. Risk Categories to be assessed (Step 5a)

Table 16. Risks to the resource (Category 1)

Examples of categories of risk	Examples of sources of risk
Adverse water quantity/rate/availability	Climate change/variability
Adverse water quality (including salinity)	Drought, fire, flood
Poor health of water dependent ecosystems	Feral animals and plants
	Interception
	Land management practices

Table 17. Risks to community values (Category 2)

Examples of categories of risk	Examples of sources of risk
Water for irrigated agriculture	Adverse water quality, unsustainable levels of take, inefficient use
Water for human consumption	Adverse water quality, unsustainable levels of take, inefficient use, climate change
Recreational opportunities e.g. fishing	Location of taking or using water, feral animals and plants
Water for other industrial/mining/forestry purposes	Adverse water quality, unsustainable levels of take, inefficient use
Water for spiritual/cultural or religious use	Adverse water quality, unsustainable levels of take, inappropriate location of taking or using water

Table 18. Risks to effective operation of the plan (Category 3)

Examples of categories of risk	Examples of sources of risk
Perception that plan is overly prescriptive, poses a high financial or administrative burden on water users, is inequitable or does not reflect stakeholder input	Public support or input
Policy does not deliver the outcome sought or there are adverse effects	Policy risk
Plan does not meet legal requirements, policies are challenged on the basis of inconsistency with legislation	Legal risk
Practitioners are not capable of implementing the plan	Implementation risk
The public does not comply with the policies of the plan	Compliance risk
Events occur which cause the policies within the plan to be inappropriate and lead to adverse outcomes for environmental, social or economic reasons e.g. bushfire, extreme flooding, prolonged drought	Extreme events

ii. Determining the method suitable for each assessment (Step 5b)

Risk assessment methods are chosen to be fit for purpose. Appendix 1 of the Risk Management Framework provides a description and references to a number of tools.

iii. Determining risk acceptability or tolerability (Step 5c)

Determining risk acceptability or tolerability is intrinsically linked with the consequence ratings constructed in the context of the water resource, the community and the water allocation plan. As outlined in Section 5.2.1, consequence ratings are context specific: a salinity level beyond drinking water standards can be catastrophic in one community, while in another community alternative water sources are available, and the reliance on the water resource for consumptive use is quite low. Loss of a specific wetland is more serious if it contains nationally threatened species, has important cultural significance or is unique.

Therefore, deciding on the process of risk assessment, and if consequence and likelihood tables are used, the method of constructing the consequence tables is an extremely important step and will aid in determining the tolerability of risk.

Stakeholders should decide on a level of tolerability which is associated with a particular risk level.

VI. Outputs from each stage of the risk management process

The outputs for each risk management step will be determined by the risk assessment team. The requirements for water allocation plans in the NRM Act will also dictate the level of documentation that occurs within the water allocation plan itself and what is documented in separate reports or registers. An example of a risk register is provided in Appendix 2.

Table 19. Outputs from the risk management process

Risk Management Steps	Context-setting	Risk Identification	Risk Analysis	Risk Evaluation	Risk Treatment	Monitoring and Evaluation
Output	Report	Register/ water allocation plan	Register/ Report	Register	Water allocation plan	Water allocation plan/MERI plan

VII. Roles and responsibilities

i. Responsibility for Risk Management Steps

The responsibilities for the various steps in the risk management process will need to be agreed in the project plan for the development of the water allocation plan. DEWNR and NRM Boards will be involved in most steps, while external stakeholders will be key participants in some steps.

APPENDIX 2: MINIMUM STANDARD REQUIREMENTS

Minimum Standard Requirements

1. The process for water allocation plan development outlined in the project plan includes consultation steps with all relevant stakeholders to establish the context for risk management.
2. Relate monitoring and evaluation section of the water allocation plan to the outcomes of the risk assessments, including the confidence in the risk assessment.
3. Monitoring and evaluation need to be considered as options for risk treatments.
4. Monitoring and evaluation for a water allocation plan needs to include assessment of the effectiveness of chosen treatments.
5. Context-setting is built into the project plan for a water allocation plan.
6. Context-setting for risk management occurs at the commencement of a water allocation plan development process.
7. All context-setting steps are completed and clearly documented.
8. Risks in all three categories clearly identified, involving external stakeholders where appropriate.
9. Risks documented and stored in appropriate risk registers.
10. NRM Act requirements in are met relation to risk identification (see Table 2).
11. The consequence and likelihood is assessed and documented.
12. The analysis of current controls is documented.
13. The analysis of confidence in risk assessment is documented.
14. Risks evaluated against risk tolerability are identified through context-setting.
15. A decision on whether or not further action is required is determined and documented.
16. Risk treatments that are a “no regrets” option or deal with multiple risks are considered first.
17. Treatments are clearly related to the level of risk and tolerability of risk identified.
18. Risk treatment options are evaluated against an agreed set of criteria.

APPENDIX 3: EXAMPLE OF A RISK REGISTER

One of the products of the risk assessment process is a risk register. The purpose of the risk register is to capture and maintain information on the identified risks for the water allocation plan in a structured and logical manner.

The example in Table 20 relates to the Marne-Saunders Prescribed Water Resources Area and assumes the risk assessment process was completed before the water allocation plan was finalised. The risk assessments were undertaken as a trial in a workshop with NRM Board and Department for Water (now DEWNR) staff with varied levels of expertise in water resources management, risk management and knowledge of the water resources in question.

In this case it was recognised that the treatments for risk A and B were essentially the same. This illustrates that risks to community values are often linked to the risks to the resource and that there are opportunities for “no regrets” treatments.

Key points to note:

Carefully constructed risk statements which avoid stating only consequences or sources of risk will aid in the appropriate assessment of risk (refer to the Risk Management Framework for further details).

It is essential that documentation of the rationale behind the ratings in all columns is kept and is available for review. For instance in the below example it was agreed that the extreme consequence/likelihood scores would be removed when calculating the average scores. It was also noted that within the confidence rating there may be a high confidence in the consequence and a lower confidence in the likelihood rating.

In this case the assessments were undertaken by a panel with limited information at hand and heavily relying on expert advice from a few individuals.

Table 20. Example of a risk register

Id	Category	Risk statement	Current control in place to modify risk	Assessment of current control	Consequence/likelihood (with current control)	Risk rating	Confidence rating	Treatments proposed (if necessary)
A.	1 – Risk to resource	There is the potential that interception via dam development will result in currently healthy ecosystems being degraded	Requirement for a permit for Water Affecting Activities which includes farm dams	Level of implementation: Partially complete (30–75%) Level of effectiveness: Mostly uncontrolled (5–30%)	4 / 4	High	Moderate	<ul style="list-style-type: none"> - Install low flow bypass devices - Reduce dam capacity over time - Protect spring-fed reached from surface water/ groundwater extraction
B.	2 – Risk to community values	There is the potential that interception via dam development will lead to downstream users continuing to have reduced/loss of access to water	Requirement for a permit for Water Affecting Activities which includes farm dams	Level of implementation: Partially complete (30–75%) Level of effectiveness: Mostly uncontrolled (5–30%)	3 / 3	Medium	Low	<ul style="list-style-type: none"> - Education on impacts of dams to downstream users - Monitor of flows and the impacts on downstream users

C.	3 – Risk to effective operation of plan	There is the potential that non-implementation of the plan results in low flow devices not being installed	None	N/A	4 / 3	Medium	Moderate	- Develop a specific implementation plan for low flow by-passes outlining resourcing, responsibilities and timelines and seek endorsement from all key stakeholders
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