

# **THE GUIDELINES FOR GROUNDWATER PROTECTION IN AUSTRALIA**

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## **REGULATORY REVIEW**

**PREPARED FOR GEOSCIENCE AUSTRALIA**

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## EXECUTIVE SUMMARY

This Regulatory Review investigates, analyses and reports on the extent to which the legislation, regulation and policy of the Australian jurisdictions (as at July 2009) adopt the key elements of groundwater quality protection set out in the *Guidelines for Groundwater Protection in Australia* (ARMCANZ and ANZECC, 1995) (**Groundwater Guidelines**), an element of the National Water Quality Management Strategy, Australia's overarching strategy for improving water quality.

The central concept of the Groundwater Guidelines is that of beneficial uses or environmental values—the purposes for which water quality is protected for a particular groundwater body. The Groundwater Guidelines suggest that jurisdictions use three forms of intervention to protect groundwater quality: intervention by “command”, by market incentives, and by community participation and education. The Guidelines recommend the following general approach to groundwater protection planning: assessing the resource; setting beneficial uses and accompanying criteria; developing “protection strategies” based on groundwater management, environment protection and land-use planning; and applying contingency measures and monitoring requirements.

The Review analysed almost 300 items of legislation, regulation and policy relevant to groundwater protection, categorised into three “Frameworks” that mirror the three “protection strategies” outlined in the Groundwater Guidelines. The “Groundwater Management Framework” deals primarily with groundwater allocation, use and management, utilities, and drinking water sources. The “Environment Protection Framework” deals with point source and diffuse pollution, waste management, environment protection in the resources industries, environmental impact assessment, contaminated sites, State of the Environment reporting, control of chemicals, and water quality objectives. Finally, the “Land-Use Planning Framework” deals with groundwater quality in the context of land use and development, land clearing, and Crown land management.

The Review has found that the key elements of the Groundwater Guidelines are generally well implemented through the legislation, regulation and policy of the Australian jurisdictions, albeit often without explicitly referring to the Groundwater Guidelines.

Most jurisdictions use a combination of command, market, and public participation approaches to groundwater protection across their Groundwater Management, Environment Protection and Land-Use Planning Frameworks. Of these three approaches, the jurisdictions favour command approaches. Flexible and adaptable approaches to command intervention have developed since the publication of the Groundwater Guidelines, alleviating at least some of the disadvantages noted in the Guidelines. Public consultation and education are very commonly used in relation to instruments that are relevant to groundwater quality protection, but legal or policy requirements for specific groundwater quality education programs are rare. Of the three approaches, market approaches are used least, although they are often referred to at a high level.

The jurisdictions all use the concept of beneficial uses or environmental values for groundwater, though they have applied these concepts to differing degrees. Encouragingly, some jurisdictions have strongly linked the use of beneficial uses for groundwater across Groundwater Management, Environment Protection and Land-Use Planning Frameworks. The jurisdictions generally implement the groundwater management, environment protection and land-use planning tools set out in the Guidelines, to greater and lesser degrees. The areas of diffuse pollution and market incentives, in particular, offer opportunities for further implementation.

There are several sources of difference in the jurisdictions' implementation of the Guidelines. Firstly and most fundamentally, they differ in the precise range of elements of the Guidelines which they adopt. Secondly, the legal effect of an element may be different depending on the legal mechanism used, whether an action is mandatory or discretionary, or adopted in a legally enforceable instrument as opposed to a stand-alone non-statutory policy. Finally, key terms such as “groundwater”, “pollution”, and “environmental harm” are defined differently across Australia.

As might be expected, Australian legislation, regulation and policy in relation to groundwater protection have become significantly more sophisticated since the Groundwater Guidelines were published nearly 15 years ago. This Review presents a series of recommendations (summarised briefly on the next page), which aim to ensure that the Groundwater Guidelines reflect these changes and remain at the forefront of regulatory thinking on groundwater quality.

## SUMMARY OF KEY RECOMMENDATIONS

This Review recommends that the Groundwater Guidelines be revised to:

- include references to “new” concepts and “new” issues in the area of groundwater protection, which have appeared and developed in the legislation, regulation and policy of the jurisdictions over the last decade; and
- update references to legislation, regulation, policy and agencies, which have become obsolete (in relation to both Australian and overseas examples), and include references to significant legislation, regulation and policy, which have appeared since the Guidelines were published.

Addressing these matters will ensure that the Groundwater Guidelines remain relevant into the future, and provide a useful source of guidance for jurisdictions seeking to review their legislation, regulation and policy in the area of groundwater protection.

Chapter 4 of this Review presents a series of key findings and recommendations for consideration during a future review of the Groundwater Guidelines. The key recommendations are, in summary:

**1. Expand the existing discussion in relation to the precautionary principle, the polluter pays principle and equitable considerations (in the form of intergenerational equity).**

These principles are particularly useful in the context of groundwater protection, given the potential for irreversible impacts, the high costs of remediation, and the long time periods required for attenuation – factors which are acknowledged throughout the NWQMS. Whereas in 1995, these principles had only just gained currency, in 2009 they are firmly rooted in the jurisdictions’ legislation, regulation and policy, and the subject of significant legal and policy interpretation.

**2. Expand the existing discussion in relation to intervention by “command”.**

Legal techniques directly to control activities that may pollute groundwater have developed substantially beyond the rigid mechanisms described in the Groundwater Guidelines. They now include flexible and adaptable tools such as “best practice environmental management” and general environmental duties.

**3. Include modern examples of Australian best practice in relation to market incentives, controlling diffuse sources of pollution and waste minimisation.**

While some jurisdictions implement measures in these areas to an extent; presenting modern examples of “best practice” implementation in the Groundwater Guidelines could assist in achieving more comprehensive implementation.

**4. Include discussion of the following “new” issues in groundwater protection: (a) water quality requirements of groundwater dependent ecosystems, including stygofauna; (b) the potential threat to groundwater quality posed by climate change; (c) “cultural and spiritual values” as a beneficial use; (d) regulation of geothermal energy and greenhouse gas sequestration; (e) regulation of water use as well as abstraction; (f) managed aquifer recharge; (g) acid sulfate soils; and (h) strategic impact assessment.**

These matters have appeared or developed significantly since 1995. They are all now addressed in the legislation, regulation or policy of multiple jurisdictions, and are likely to become even more important in the future.

**5. Include discussion of the significantly expanded role of the Commonwealth in the area of water management and water quality legislation, regulation and policy.**

Since the Groundwater Guidelines were published, the influence of the Commonwealth in the water area has expanded significantly, for example, through the following measures, each of which is relevant to groundwater protection: the *Water Act 2007*, the *National Water Initiative*, the National Water Commission, and National Environment Protection Measures.

## LIST OF ABBREVIATIONS

**ANZECC:** the Australian and New Zealand Environment and Conservation Council

**ANZECC Guidelines:** ANZECC and ARMCANZ, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (2000), available at [http://www.mincos.gov.au/publications/australian\\_and\\_new\\_zealand\\_guidelines\\_for\\_fresh\\_and\\_marine\\_water\\_quality](http://www.mincos.gov.au/publications/australian_and_new_zealand_guidelines_for_fresh_and_marine_water_quality), viewed 26 July 2009

**APVMA:** Australian Pesticides and Veterinary Medicines Authority

**ARMCANZ:** the Agriculture and Resource Management Council of Australia and New Zealand (not presently operating)

**CMA:** Catchment Management Authority

**EIA:** environmental impact assessment

**EPA:** Environmental Protection Authority, or Environment Protection Authority (depending on the jurisdiction)

**ESD:** ecologically sustainable development, a principle expressed very commonly in Groundwater Management Frameworks and Environment Protection Frameworks. This principle often encompasses the precautionary principle, the polluter pays principle, and the principle of intergenerational equity.

**Framework Table:** a table set out in Appendix A (being a Groundwater Management Framework Table, Environment Protection Framework Table, or Land-Use Planning Framework Table), which describes the legislation, regulation and policy of a jurisdiction in relation to a group of issues

**GAB:** Great Artesian Basin

**GDE:** groundwater dependent ecosystem

**Groundwater Guidelines** or **Guidelines:** *Guidelines for Groundwater Protection in Australia* (ARMCANZ and ANZECC, *National Water Quality Management Strategy*, September 1995), available at [http://www.mincos.gov.au/data/assets/pdf\\_file/0010/316099/guidelines-for-groundwater-protection.pdf](http://www.mincos.gov.au/data/assets/pdf_file/0010/316099/guidelines-for-groundwater-protection.pdf), viewed 20 June 2009

**MDBA:** Murray-Darling Basin Authority, established by the *Water Act 2007* (Cth)

**NRM:** natural resource management

**NWI:** National Water Initiative

**NWQMS:** National Water Quality Management Strategy

**Review:** this regulatory review of the Groundwater Guidelines

**State:** in this document, includes both States and also mainland Territories of Australia

## TABLE OF CONTENTS

<b>CHAPTER 1: THE NWQMS AND THE GROUNDWATER GUIDELINES</b>	<b>1</b>
1. Introduction to the nature and scope of the Review	1
2. The National Water Quality Management Strategy	1
2.1 NWQMS Policies and Processes	3
2.2 Implementation Guidelines	4
3. The Groundwater Guidelines	5
3.1 Key concepts	5
3.2 Developing a protection plan	6
<b>CHAPTER 2: ANALYTICAL METHODOLOGY AND FORMAT</b>	<b>8</b>
1. Aims of analysis	8
2. Analytical methodology	8
<b>CHAPTER 3: GENERAL ANALYSIS AND RECOMMENDATIONS</b>	<b>15</b>
1. Introduction	15
2. The influence of the Groundwater Guidelines	15
3. Differences in implementation between jurisdictions	17
4. Underlying principles	17
4.1 Precautionary principle	17
4.2 Polluter pays principle	19
4.3 Equitable considerations	21
4.4 Beneficial uses and values (now termed environmental values)	22
5. Forms of intervention	24
5.1 Intervention by command	24
5.2 Intervention using market approaches	25
5.3 Intervention using public participation and education	26
6. Groundwater Management Framework	27
6.1 Reservation of special areas	27
6.2 Management plans	28
6.3 Controls on extraction	32
6.4 Well construction measures and other well-related measures	33
6.5 Water supply and the protection of public water supply wells	34
6.6 Gathering groundwater information	35
7. Environment Protection Framework	38

<b>7.1</b>	<b>Water quality protection objectives and beneficial uses</b>	<b>38</b>
<b>7.2</b>	<b>Waste hierarchy</b>	<b>41</b>
<b>7.3</b>	<b>Licensing of point sources and discharges in protected areas</b>	<b>42</b>
<b>7.4</b>	<b>Environmental impact assessment</b>	<b>43</b>
<b>7.5</b>	<b>Monitoring requirements</b>	<b>45</b>
<b>7.6</b>	<b>Contingency measures</b>	<b>45</b>
<b>7.7</b>	<b>Controlling diffuse sources</b>	<b>47</b>
<b>8.</b>	<b>Land-Use Planning Framework</b>	<b>48</b>
<b>8.1</b>	<b>Land zoning and land-use risk matrices</b>	<b>49</b>
<b>8.2</b>	<b>Protection for drinking water sources and recharge zones</b>	<b>50</b>
<b>8.3</b>	<b>Controls on particular developments and risky activities</b>	<b>51</b>
<b>8.4</b>	<b>Measures related to the development and administration of planning tools</b>	<b>52</b>
	<b>CHAPTER 4: KEY FINDINGS BY JURISDICTION</b>	<b>55</b>
<b>1.</b>	<b>Introduction</b>	<b>55</b>
<b>2.</b>	<b>Commonwealth</b>	<b>55</b>
<b>3.</b>	<b>Australian Capital Territory</b>	<b>58</b>
<b>3.1</b>	<b>Implementing the Guidelines – key areas of strength</b>	<b>58</b>
<b>3.2</b>	<b>Opportunities for further implementation of the Guidelines</b>	<b>58</b>
<b>3.3</b>	<b>Beyond the Guidelines – innovative regulatory responses</b>	<b>58</b>
<b>4.</b>	<b>New South Wales</b>	<b>62</b>
<b>4.1</b>	<b>Implementing the Guidelines – key areas of strength</b>	<b>62</b>
<b>4.2</b>	<b>Opportunities for further implementation of the Guidelines</b>	<b>62</b>
<b>4.3</b>	<b>Beyond the Guidelines – innovative regulatory responses</b>	<b>62</b>
<b>5.</b>	<b>Northern Territory</b>	<b>66</b>
<b>5.1</b>	<b>Implementing the Guidelines – key areas of strength</b>	<b>66</b>
<b>5.2</b>	<b>Opportunities for further implementation of the Guidelines</b>	<b>66</b>
<b>5.3</b>	<b>Beyond the Guidelines – innovative regulatory responses</b>	<b>66</b>
<b>6.</b>	<b>Queensland</b>	<b>70</b>
<b>6.1</b>	<b>Implementing the Guidelines – key areas of strength</b>	<b>70</b>
<b>6.2</b>	<b>Opportunities for further implementation of the Guidelines</b>	<b>70</b>
<b>6.3</b>	<b>Beyond the Guidelines – innovative regulatory responses</b>	<b>70</b>
<b>7.</b>	<b>South Australia</b>	<b>74</b>
<b>7.1</b>	<b>Implementing the Guidelines – key areas of strength</b>	<b>74</b>

<b>7.2</b>	<b>Opportunities for further implementation of the Guidelines</b>	<b>74</b>
<b>7.3</b>	<b>Beyond the Guidelines – innovative regulatory responses</b>	<b>74</b>
<b>8.</b>	<b>Tasmania</b>	<b>78</b>
<b>8.1</b>	<b>Implementing the Guidelines – key areas of strength</b>	<b>78</b>
<b>8.2</b>	<b>Opportunities for further implementation of the Guidelines</b>	<b>78</b>
<b>8.3</b>	<b>Beyond the Guidelines – innovative regulatory responses</b>	<b>78</b>
<b>9.</b>	<b>Victoria</b>	<b>82</b>
<b>9.1</b>	<b>Implementing the Guidelines – key areas of strength</b>	<b>82</b>
<b>9.2</b>	<b>Opportunities for further implementation of the Guidelines</b>	<b>82</b>
<b>9.3</b>	<b>Beyond the Guidelines – innovative regulatory responses</b>	<b>82</b>
<b>10.</b>	<b>Western Australia</b>	<b>86</b>
<b>10.1</b>	<b>Implementing the Guidelines – key areas of strength</b>	<b>86</b>
<b>10.2</b>	<b>Opportunities for further implementation of the Guidelines</b>	<b>86</b>
<b>10.3</b>	<b>Beyond the Guidelines – innovative regulatory responses</b>	<b>86</b>

#### **APPENDIX A: FRAMEWORK TABLES**

#### **APPENDIX B: COMPLETE LIST OF FINDINGS AND RECOMMENDATIONS**



## CHAPTER 1: THE NWQMS AND THE GROUNDWATER GUIDELINES

### 1. Introduction to the nature and scope of the Review

This Regulatory Review forms part of a larger review of the *Guidelines for Groundwater Protection in Australia*, published in 1995 by the Agriculture and Resource Management Council of Australia and New Zealand (**ARMCANZ**) and the Australia and New Zealand Environment and Conservation Council (**ANZECC**) (**Groundwater Guidelines**).

The objectives of the Review are to investigate, analyse and report on the extent to which the legislation, regulations and policies of the Australian jurisdictions reflect and adopt the key elements of groundwater protection set out in the Groundwater Guidelines.

The Review analyses the laws, regulations and policies of the Australian Capital Territory, New South Wales, the Northern Territory, Queensland, South Australia, Tasmania, Victoria, Western Australia (the **States**)<sup>1</sup> and the Commonwealth, as they stand at July 2009. The scope of the Review does not include informal policies in the nature of information to the public, funding programs, by-laws and laws and policies at the sub-State level,<sup>2</sup> or common law and legislation regarding the liability of authorities, land owners, operators and lenders for past contamination.

### 2. The National Water Quality Management Strategy

The National Water Quality Management Strategy (**NWQMS**) is Australia's overarching strategy for improving water quality. The NWQMS was developed co-operatively by the Commonwealth and the States through two Ministerial Councils – the ARMCANZ and the ANZECC. The Natural Resources Management Ministerial Council, which assumed the functions of ARMCANZ, and the Environment Protection and Heritage Council, which assumed the functions of ANZECC and the National Environment Protection Council (**NEPC**), are now responsible for the NWQMS, including the Groundwater Guidelines.

The NWQMS aims to achieve a nationally consistent approach to managing water quality, while allowing different jurisdictions the flexibility to respond to differing circumstances at regional and local levels. The NWQMS comprises two types of documents:

- (a) higher level documents describing policies and processes, which deal with water quality at a strategic level; and
- (b) lower level guidelines, which deal with water quality in the particular context of end uses and particular water sources.

At the higher level, the NWQMS includes three documents produced by ARMCANZ and ANZECC: *Water Quality Management – An Outline of the Policies* (1994), *Policies and Principles – A Reference Document* (1994) (**Policies and Principles Document**), and *Implementation Guidelines* (1998) (**Implementation Guidelines**). These documents provide the framework within which the Groundwater Guidelines operate, and set out the broader context for analysing how the jurisdictions implement the Guidelines. At the lower level, several guideline documents deal with benchmarks for water quality and monitoring, groundwater protection, different types of diffuse and point sources, and recycled water. Figure 1, below, sets out how the documents relate to each other, and their relevance to groundwater protection.

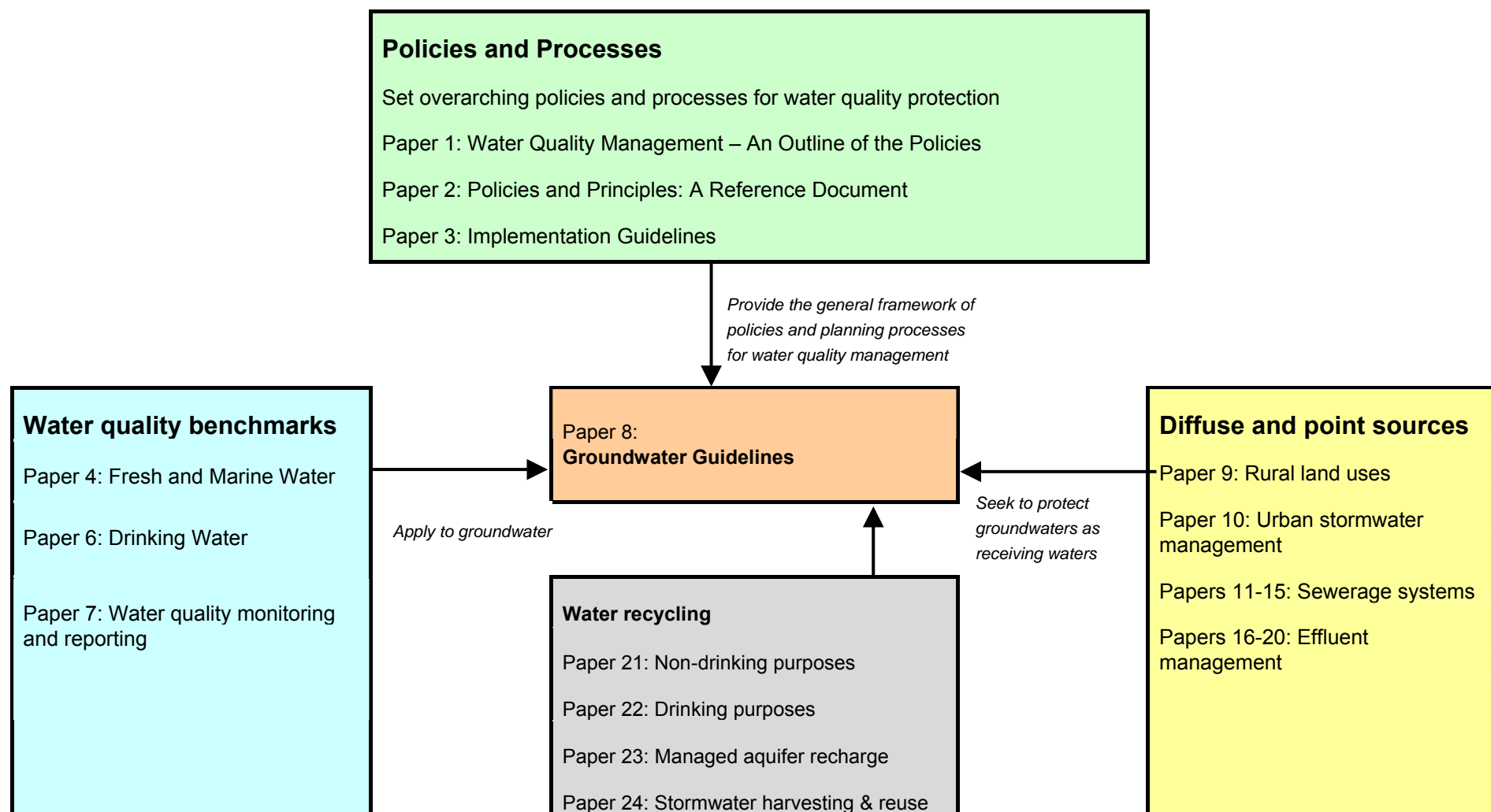
The sections below summarise the Policies and Principles Document and the Implementation Guidelines, and briefly describe their application to groundwater protection, before focusing on the Groundwater Guidelines themselves in section 3.

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<sup>1</sup> Note that for the purposes of this Review, the term "States" is used to refer to both states and also territories, but does not refer to the Australian Antarctic or offshore territories.

<sup>2</sup> This includes regional policies and policies and by-laws at the local government level. There are approximately 700 local government bodies in Australia (for example, shires, municipalities, cities, etc): "About local government", Australian Local Government Association, available at <http://www.alga.asn.au/about/>, viewed 7 June 2009.

**Figure 1: The structure of the National Water Quality Management Strategy in overview**



## 2.1 NWQMS Policies and Processes

The Policies and Principles Document sets out policy principles for water quality management (Part A) and a water quality management process (Part B). It emphasises the importance of water quality both to species and healthy ecosystems and also to the economic and social structures of society. It adopts the following national strategic water quality policy objective, informed by the National Strategy for Ecologically Sustainable Development, which is the “comprehensive philosophical umbrella under which to pursue the issue of water quality management” (Policies and Principles Document, p.4):

to achieve sustainable use of the nation’s water resources by protecting and enhancing their quality while maintaining economic and social development  
(Policies and Principles Document, p.6)

### (a) Policy principles

The central policy principles of the Policies and Principles Document include:

- (i) using market-based instruments that complement command-and-control legal mechanisms. Examples include water pricing and licence fees to cover the administration of regulation and monitoring, discharge levies and tradeable effluent permits, non-compliance fees which are higher than the profits from non-compliance, performance bonds, remediation levies, and subsidies or other encouragement to adopt waste minimisation technology;
- (ii) developing water quality goals by determining the relevant environmental values (also called beneficial uses), which are particular values or uses of the environment that contribute to public or private benefit, welfare, safety or health, and which require protection;
- (iii) setting corresponding water quality criteria, which are maximum levels of contamination that a particular use or value can tolerate, based on scientific evidence and informed judgement;
- (iv) acknowledging community ownership of water resources;
- (v) implementing a systems approach to water quality management, which includes:
  - (A) using both regulatory and market-based measures;
  - (B) using modern technology in cleaner production processes and waste minimisation initiatives;
  - (C) taking account of diffuse pollution;
  - (D) ensuring that public sector sewage and wastewater disposal recovers the full cost of treatment from users; and
  - (E) encouraging long term improvements in technology.

### (b) Model water quality management process

Under the Policies and Principles Document, a model water quality management process involves:

- (i) integrating national, State and regional planning, in which national level guidelines are implemented at the State level using water quality planning and policy instruments. Regional communities identify local environmental values to be protected, and local management strategies are developed and implemented;
- (ii) establishing and reviewing environmental values and corresponding water quality criteria either as non-mandatory targets or legally enforceable

standards, depending on the most effective means of achieving the overall objective;

- (iii) adopting a holistic catchment management approach, which understands water quality in the context of land use, integrates agencies and interest groups at different levels, and uses community consultation to develop catchment-based plans and strategies;
- (iv) monitoring water quality to identify problems, determine the effectiveness of regulatory programs, evaluate long-term trends in environmental quality and direct resource management decisions;
- (v) enforcing the “rules” in relation to both regulatory and also economic instruments. This may include “on-the-spot” fines and penalty notices; and
- (vi) controlling both:
  - (A) point source pollution, through discharge licenses and licence limitations (encoded in administrative guidelines or regulations) designed to meet the in-stream or aquifer quality goals, accompanied by economic incentives for clean production, and technology-based effluent management guidelines for major industries; and
  - (B) diffuse source pollution, through a “best management practice” philosophy in urban runoff measures and rural land management, through education, market-based measures, and in some cases direct regulatory control.

In addition, the Policies and Principles Document suggests that the administrative setting for a model water quality management process should have the following characteristics: clarity and consistency, with explicitly assigned responsibilities; accountability through monitoring and reporting; stakeholder involvement; consistency with physical constraints (for example, catchments); adaptability to changing conditions; and opportunities to harness market forces.

### **(c) The place of groundwater**

Groundwater receives special mention in the Policies and Principles Document, on the basis that cleaning up groundwater contamination is usually very difficult, sources are often difficult to control (for example, landfills, storage tanks, pipelines and tailings dams), and contamination may become apparent when it is already too late to remedy.

## **2.2 Implementation Guidelines**

The Implementation Guidelines recommend steps to develop and implement plans to manage fresh water, coastal waters and groundwater, and to implement a community communication program.

### **(a) Principles, process, product**

The Implementation Guidelines reflect the principles set out in the Policies and Principles Document, and also set out a detailed process for formulating a water quality protection plan. The process involves:

- (i) establishing a working group and a stakeholder advisory committee;
- (ii) setting water quality targets;
- (iii) identifying and collating existing information on water quality conditions, environmental values, and uses;
- (iv) proposing desirable environmental values;

- (v) assessing the effects of adopting these values in terms of social, environmental, economic, scientific, administrative and policy considerations;
- (vi) endorsing the water quality objectives at the government level; and
- (vii) reviewing and monitoring progress against the targets, including through a regional review committee.

The process is intended to lead to sustainable water resources that meet the needs of society, delivered through an action plan, which includes a mix of tools to achieve that objective – regulatory, market-based and educational.

**(b) The place of groundwater**

Groundwater receives special mention in the Implementation Guidelines, on the basis that it is often difficult to specify its extent, overextraction may affect groundwater quality, and cleaning up contamination is slow and expensive.

Appendix B of the Implementation Guidelines sets out 12 suggested steps for developing groundwater management plans, which are reflected in the steps which the Groundwater Guidelines recommend for developing a protection plan (see below).

**3. The Groundwater Guidelines**

Published in 1995, the Groundwater Guidelines are the only element of the NWQMS that specifically seeks to protect groundwater from contamination. Paper 23, which focuses on managed aquifer recharge, seeks to minimise human and environmental risks associated with managed aquifer recharge activities. The Groundwater Guidelines apply the elements of the higher level NWQMS documents at a detailed level, in the groundwater context. The Groundwater Guidelines adopt a number of key concepts, and set a planning process for protecting groundwater quality, described below.

**3.1 Key concepts**

Chapters 1 and 2 of the Groundwater Guidelines introduce the Guidelines' objective, scope, and context, and outline the need for groundwater protection. Chapters 3 to 5 set out the key elements of the Guidelines for the purposes of this Review, namely:

- (a) the underlying principles of the Groundwater Guidelines, being the concepts of beneficial uses and values, the polluter pays principle and equitable considerations in relation to groundwater quality protection (Chapter 3 of the Guidelines), while the precautionary principle also features in the Guidelines (pp.11 and 40);
- (b) approaches to groundwater protection, namely:
  - (i) three forms of "intervention": first, intervention by command—that is, by laws which directly control actions and activities; second, intervention through market mechanisms; and third, intervention through public participation and education (section 4.1 of the Guidelines); and
  - (ii) three types of "protection strategies" or types of legislative tools, within which particular protection measures are undertaken: first, groundwater management; second, land-use planning; and third, environment protection (sections 4.2 to 4.6 of the Guidelines); and
- (c) a general approach to groundwater protection planning, which involves assessing the resource, setting beneficial uses and accompanying criteria, developing protection measures, providing contingency measures and monitoring requirements, and implementing the plan (Chapter 5 of the Guidelines).

### 3.2 Developing a protection plan

The Groundwater Guidelines use the term “plan” broadly:

Groundwater protection plans and their component measures may take many forms. They may vary from policy statements outlining broad management objectives to prescriptive regulatory programs, including statutory controls and specific regulations on contaminating activities: p.33.

They suggest the following steps for preparing a “plan”, in this broad sense (Figure 3, Groundwater Guidelines):

- (a) Define broad objectives for groundwater protection planning (para 5.4).
- (b) Assess the resource: understand the quantity, quality and extent of the resource (para 5.3).
- (c) Identify beneficial uses and values: identify the objectives of protection in terms of specific beneficial uses and values for the resource, recognising that these can differ for different parts of a large aquifer (paras 5.4 and 5.5). This will also require an assessment of the resource, existing and planned developments, environmental features and allocation policies.

The Groundwater Guidelines adopt the five broad categories of beneficial uses and values of groundwater that were outlined in the 1992 version of the ANZECC Australian Water Quality Guidelines for Fresh and Marine Waters (para 3.2):

- (i) ecosystem protection;
- (ii) recreation and aesthetics;
- (iii) raw water for drinking water supply;
- (iv) agricultural water; and
- (v) industrial water.

A beneficial use is the expression of a desired long-term outcome for a particular groundwater resource (para 4.2). Beneficial uses are now termed “environmental values” and are described in the current ANZECC Guidelines as:

- (i) aquatic ecosystem protection;
- (ii) primary industries (irrigation and general water uses, stock drinking water, aquaculture and human consumption of aquatic foods);
- (iii) recreation and aesthetics;
- (iv) drinking water;
- (v) industrial water; and
- (vi) cultural and spiritual values.

If there is no identified beneficial use or value (for example, in the case of a deep, extremely poor quality confined aquifer), “developments which affect the water quality in the aquifer would have to be carefully evaluated and justified in a way that meets the precautionary principle” (para 3.2).

- (d) Set water quality criteria for the beneficial uses to be protected. Criteria may be narrative and therefore flexible, or prescriptive (para 5.6). Criteria may be applied at the boundary of a zone of discharge, at the boundary of a property on which discharge occurs, or at the point of discharge of effluent (para 5.7).
- (e) Select appropriate protection strategies. There are three major types of protection strategies (para 4.2):

- (i) groundwater management tools, including vulnerability maps, aquifer classification systems, wellhead protection plans and measures related to the allocation and utilisation of the resource (para 4.2 and 4.3);
  - (ii) land-use planning tools to prevent groundwater contamination at inappropriate locations (paras 4.2 and 4.4); and
  - (iii) environment protection tools to control point source and diffuse pollution, minimise the production of waste, and protect groundwater at specific sites (paras 4.2 and 4.5).
- (f) Engage in monitoring and review. A monitoring and review program should assess the effectiveness of a groundwater strategy (para 5.10), both:
  - (i) in a broad sense, including an assessment of the extent to which the plan has been implemented, the success of the plan in meeting its goals, and difficulties in implementation and compliance; and also
  - (ii) in a technical sense, through groundwater monitoring, including monitoring by a person whose activities pose a contamination risk, monitoring consistent with standards chosen, and reporting to the regulating agency.
- (g) Include contingency measures: approval for a contaminating activity should include contingency measures that will apply in the event of contamination, for example, no action, ceasing the activity, containment, and clean-up (para 5.11).
- (h) Select and implement preferred options: select a broad approach for State-wide application, and develop local measures at a more detailed level.

## CHAPTER 2: ANALYTICAL METHODOLOGY AND FORMAT

### 1. Aims of analysis

This Regulatory Review analyses the extent to which, and precisely how, each Australian jurisdiction has implemented the elements of the Groundwater Guidelines through its legislation, regulation and policy.

The methodology adopted for this analysis seeks to analyse individual items of legislation, regulation and policy (almost 300 in total) in a way which:

- (a) facilitates reaching general conclusions about how particular groups of elements of the Groundwater Guidelines have been implemented;
- (b) contains sufficient detail to identify opportunities for further implementation, new and innovative approaches to implementation, and also measures which target new groundwater protection concerns that were not apparent when the Guidelines were published; and
- (c) enables comparisons to be made between jurisdictions.

The depth of analysis was aligned with these aims, rather than the Review aiming to provide a complete description of every item of legislation, regulation and policy in great detail. To augment this view, and to add an operational perspective, additional comment should be sought from the jurisdictions.

It is important to note that the aims and scope of the Review did not include examining the extent to which jurisdictions use tools which are available under legislation, through this is sometimes noted in passing. For example, a jurisdiction may provide very comprehensively for considering groundwater quality in legislation for groundwater management plans, but not actually have prepared any groundwater management plans for some parts of the State.

### 2. Analytical methodology

The methodology for the Review involved:

**Step 1:** developing three standard “Framework Tables”, which categorise and set out important components of the Guidelines for the three broad types of legislation, regulation and policy, corresponding to the three major types of “protection strategies” described in the Groundwater Guidelines:

- (i) a Groundwater Management Framework Table, for analysing legislation, regulation and policy relating to groundwater allocation, use and management, including groundwater in the context of natural resource management, utilities and drinking water sources and supply;
- (ii) an Environment Protection Framework Table, for analysing legislation, regulation and policy relating to point source and diffuse pollution, waste management, environment protection in the resources industries, environmental impact assessment, contaminated sites, State of the Environment reporting, control of chemicals, and water quality objectives; and
- (iii) a Land-Use Planning Framework Table, for analysing legislation, regulation and policy relating to land use and development, land clearing, and Crown land administration.

Each Framework Table details how a jurisdiction has implemented a particular component of the Guidelines, with reference to the relevant provision of the legislation, regulation or policy. It also represents the extent of implementation of a particular component using the following symbols:

- meaning the Framework explicitly provides for this element of the Guidelines;



- meaning the Framework goes some way towards providing for this element of the Guidelines; and
- meaning the Framework does not provide for this element of the Guidelines.

These standard Framework Tables are set out as Tables 1 to 3 below. Each row sets out the kinds of considerations which are relevant to determining whether, and how, a jurisdiction has implemented a particular component.

Appendix A sets out the complete Framework Tables for each jurisdiction. Each main Framework Table is preceded by an introductory reference table, which sets out: (1) the most important items of legislation, regulation and policy (“key items”) and their abbreviated forms of reference; (2) other items of legislation, regulation and policy (“supplementary items”), and their abbreviated forms of reference; and (3) terminology and acronyms used in the main table which require explanation.

- Step 2:** identifying relevant items of legislation, regulation and policy by reviewing each jurisdiction’s Administrative Arrangements Orders (which set out the legislation administered by each minister or department of the Government) and agency websites;
- Step 3:** analysing each item identified to assess how it implements components of the Groundwater Guidelines, and annotating the relevant Framework Table with the relevant symbol and explanation of implementation.

**Important note:** this methodology focuses on *explicit recognition* of groundwater quality issues. However, it is important to note that even if an item of legislation, regulation or policy does not explicitly or generally mention a groundwater quality matter (which may

cause implementation to be assessed with the symbol ○, or ●), this does not necessarily mean that groundwater quality impacts *could not* be taken into account, since in many decision-making scenarios they would be unlikely to be viewed as irrelevant considerations. Rather, the methodology stems from the objective of this Review to identify evidence that the jurisdictions have positively implemented the elements of the Groundwater Guidelines. Further, explicitly including groundwater quality as a decision-making consideration would help to focus the attention of decision-makers in a way which is more likely to lead to good groundwater quality outcomes.

**Step 4:** for ease of use:

- (i) summarising key points in relation to each jurisdiction’s implementation of the Groundwater Guidelines (key strengths, opportunities for further implementations, and innovative approaches); and
- (ii) representing the extent of each jurisdiction’s implementation of the Groundwater Guidelines using a diagram for each Framework Table.

**Table 1: Standard Groundwater Management Framework Table**

Form of protection suggested by the Guidelines, and page references		Considerations relevant to whether the element has been implemented
1 2 3 4	Principles (primarily pp.9-13)	Precautionary principle (pp.11, 40)
		Does the precautionary principle (or similar formulation) appear in a statement of objectives or purposes which must, or may, be considered by decision-makers?
	Polluter pays principle (p.11)	Does the polluter pays principle (or similar formulation) appear in a statement of objectives or purposes which must, or may, be considered by decision-makers?  Can the government take action in response to pollution and recover its costs from a person responsible for the pollution?  Must a groundwater user provide a financial security?  Are the full costs of managing groundwater recovered?
	Equity considerations (p.12)	Do equity or fairness considerations appear in a statement of objectives or purposes which must, or may, be considered by decision-makers?  Can equity considerations guide the balancing of competing interests relating to groundwater in other ways?
5	Beneficial uses and values (pp.10-12, 39-41)	Noting that environmental values and water quality objectives are generally set within the Environmental Protection Framework, are they nonetheless used or referred to in the Groundwater Management Framework?
5 6 7	Forms of intervention (pp.14-15)	Command (p.14)
		At a general level, in what ways does the Groundwater Protection Framework directly control activities which are relevant to groundwater quality protection?  (Note that specific types of control are dealt with later in this table – for example, see rows 25 to 29 in relation to well construction measures).
	Market (pp.14-15)	How does the Groundwater Protection Framework provide for financial incentives to protect groundwater quality?  Do financial incentives (or similar formulation) appear in a statement of objectives or purposes which must, or may, be considered by decision-makers?  (Note that the market elements of groundwater management plans are dealt with in row 16 below).
8	Community participation and education (p.15)	Does community participation or education appear in a statement of objectives or purposes which must, or may, be considered by decision-makers?  Do key actors have specific functions relating to community participation and education, where this would relate to groundwater quality protection?  (Note that community participation processes of groundwater management plans are dealt with in row 14 below).
8	Reservation of special areas (p.16)	Stressed areas (p.16)
9		Is there provision for designating stressed areas which are being affected (including in relation to water quality) by groundwater extraction?
10		Public water supply areas (p.16)
11		Is there provision for designating public water supply areas for protection?
12		Other
13		Is there a provision for any other kind of area to be reserved to protect groundwater quality?
11	Management plans (pp.18-20)  (that is, a plan for regulating individual behaviour once a groundwater body is being used by many competing users)	Types of management plans for which the legislation or regulation provide
12		What are the main types of groundwater management plans (both statutory and non-statutory) and what is their general nature?
13		Component studies (p.18)
14		Is there a formal requirement to undertake component studies before preparing, or while preparing, a groundwater management plan?  (Component studies may include an assessment of the resource base, water demands, and their location, appropriate methods of extraction, recharge and discharge characteristics, water quality variation, environmental and land subsidence issues, control of application rates and of contaminants and monitoring needs: Groundwater Guidelines, p.18)
15		Surface water – groundwater interaction (p.18)
16		Is there a formal requirement to address interaction between groundwater and surface water, or a formal acknowledgement of the potential for interaction?
17		Public consultation (p.19)
		Is there a formal requirement to consult the public in relation to groundwater management plans, and, if so, what forms must any public consultation take?
		Coordination with other agencies
		Is there a formal requirement to consult other government agencies in relation to groundwater management plans, and, if so what forms must any consultation take?
		Market incentives (p.19)
		Are market incentives explicitly a component of a management plan?
		Monitoring program (p.20)
		Is there an explicit requirement to monitor the implementation of the groundwater management plan, or to review its effectiveness?

Form of protection suggested by the Guidelines, and page references		Considerations relevant to whether the element has been implemented
18	Enforcement (p.20)	Is the groundwater management plan enforceable? Is it directly binding, or are its provisions implemented in an indirect way (for example, must another instrument be consistent with the groundwater management plan)?
19	Controls on extraction (p.16) - Licences and permits	Groundwater quality considered in allocating groundwater (pp.9, 19)
20		Does the regime for authorising groundwater extraction provide for the decision-maker to consider the impacts on groundwater quality of the proposed extraction, when deciding whether to grant an authorisation?
21		Quality considered in setting conditions on taking water
22	Other methods of limiting extraction	Enforcement (p.20)
23		Are the requirement to obtain an authorisation to extract groundwater, and any condition imposed on such an authorisation, enforceable?
24		The Groundwater Guidelines suggest that resource allocation and resource protection are interdependent management tasks. Are there other methods of limiting extraction, in addition to licences dealt with in rows 19 to 21, above?
25	Well construction measures (p.16)	Water quality considerations (pp.9, 19)
26		Does the method of limiting extraction provide for the decision-maker to consider quality in deciding whether to impose the control?
27		Enforcement (p.20)
28		Is the method of limiting extraction directly binding or are its provisions implemented in an indirect way?
29		The Groundwater Guidelines suggest that resource allocation and resource protection are interdependent management tasks, however it does not distinguish between resource allocation through licensing of bores and licensing of extraction. This row addresses the former, and the extent to which water quality is considered.
30	Water supply and protection of public water supply wells (pp.25-27)	Bore licensing
31		Are bore drillers required to be licensed?
32		Driller licensing (pp.16, 25)
33		Is there any formal requirement for bores to be constructed in a particular way?
34		Rules for bore construction (p.25)
35		Is there any formal requirement for a bore, once constructed, to be operated or maintained to a particular standard?
36	Other well-related measures	Rules for operation and maintenance of bore (p.25)
37		Is there any formal requirement for a bore, once constructed, to be operated or maintained to a particular standard?
38		Enforcement (p.20)
39		Are the well construction measures binding and enforceable?
40		Is a water supplier or related party empowered to control activities occurring near supply borefields, which may pose a threat to groundwater quality?
41		Protection zone around supply bores (p.26)
42	Gathering information	Is there provision for protection zones around drinking water supply bores?
43		Requirements to monitor up-gradient and within zone (pp.25, 26)
44		Is there a formal requirement for a water supplier to carry out monitoring of its raw water source bores and surrounding relevant areas?
45		Response plan in event of contamination (p.26)
46		Must a water supplier respond in a particular way to contamination incidents?
47	Other well-related measures	Reporting in the event of contamination (p.25)
48		Must a water supplier report a contamination incident to a relevant agency or person?
49		Enforcement (p.20)
50		Are these measures in relation water supply protection (rows 30 to 34 above), binding and enforceable?
51	Gathering information	Well abandonment requirements (pp.16, 25)
52		Do any formal requirements apply to abandoning or decommissioning a well?
53		Controls on disposal of waste via wells (p.16)
54		Do any formal requirements apply to disposing of waste via a well?
55	Gathering information	Strategic assessment of groundwater resources (p.38)
56		How does the Groundwater Management Framework provide for increasing knowledge about the condition of groundwater resources?
57		Monitoring of critical overdraw (p.16)
58		Is there a formal requirement to monitor critical overextraction of groundwater resources?
59	Gathering information	Vulnerability mapping (pp.20-22)
60		Is there a formal requirement to undertake mapping of the vulnerability of a groundwater body to contamination?
61	Gathering information	Aquifer classification systems (pp.22-23)
62		Is there a formal requirement to develop or use systems for classifying aquifers according to specific attributes?

**Table 2: Standard Environment Protection Framework Table**

Form of protection suggested by the Guidelines, and page references		Considerations relevant to whether the element has been implemented
1	Principles (pp.9-13)	Precautionary principle (pp.11, 40)
2		Does the precautionary principle (or similar formulation) appear in a statement of objectives or purposes which must, or may, be considered by decision-makers?
3		Polluter pays principle (p.11)
4		Does the polluter pays principle (or similar formulation) appear in a statement of objectives or purposes which must, or may, be considered by decision-makers?  Can the government take action in response to pollution and recover its costs from a person responsible for the pollution?  Is there any requirement to provide a financial security in relation to an activity that poses a threat to groundwater?  Can an agency which acts to protect groundwater recover the reasonable costs of doing so?
5	Forms of intervention	Equity considerations (p.12)
6		Do equity or fairness considerations appear in a statement of objectives or purposes which must, or may, be considered by decision-makers?  Are proponents of projects required to have regard to equitable considerations?
7		Beneficial uses and values (pp.10-12, 39-41)
8		How are beneficial uses or environmental values generally provided for and used? (Note that these elements are discussed in detail below in rows 9 to 15).
9	Water quality protection objectives and beneficial uses	Command (p.14)
10		At a general level, in what ways does the Environment Protection Framework directly control activities which are relevant to groundwater quality protection? In particular, what general duties and offences does it provide for?  (Note that specific types of control are dealt with later in this table – for example, see below, row 17, in relation to licensing of point sources).
11		Market (generally pp.14-15)
12		How does the Environment Protection Framework provide for economic instruments that may be used to protect groundwater quality? For example, tradeable discharge permits (pp.45, 46) or taxes on contaminants (p.46)?  Do financial incentives (or a similar term) appear in a statement of objectives or purpose which must, or may, be considered by decision-makers?
13	Controlling sources of contamination	Community participation and education (p.15)
14		Does community participation or education appear in a statement of objectives or purposes which must, or may, be considered by decision-makers?  Do key actors have specific functions relating to community participation and education, where this would relate to groundwater quality protection?
15		Strategic assessment of groundwater resource (p.38)
16		How does the Environment Protection Framework provide for increasing knowledge about groundwater resources?
17	Water quality protection objectives and beneficial uses	Define beneficial uses and values (pp.39-40)
18		How does the Environment Protection Framework define a beneficial use or environmental value?  Does it define a “standard” set of beneficial uses and values, which may later be assigned to different water bodies?  What does the standard set of beneficial uses and values include?
19		Identify beneficial uses (pp.40-41)
20		Which beneficial uses and values are assigned to groundwater bodies, and how are they assigned?
21	Water quality protection objectives and beneficial uses	Apply criteria (narrative or prescriptive) (pp.41-42)
22		How are water quality criteria applied to a beneficial use or value?  Are criteria narrative or prescriptive?
23		Points of application of criteria (pp.42-43)
24		Where are water quality criteria applied? At the boundary of a zone of discharge, at the boundary of the property upon which a contaminant is discharged, or at the point of discharge?
25	Water quality protection objectives and beneficial uses	Monitoring and review program focusing on extent of implementation and extent to which goals are met (pp.46-47)
26		Is there an explicit requirement to monitor the implementation of beneficial uses and values, or to review their effectiveness?
27		Inter-agency coordination (p.48)
28		Is there a formal requirement for the “lead” government agency to consult other government agencies in relation to setting beneficial uses and values?
29	Controlling sources of contamination	Enforcement of criteria for beneficial uses
30		Are water quality criteria in relation to beneficial uses and values directly binding and enforceable?
31		Waste hierarchy (p.29)
32		Does the waste hierarchy (waste avoidance, re-use, recycling, treatment, and disposal) appear in a statement of objectives or purposes which must, or may, be considered by decision makers?  Is the waste hierarchy applied directly in a way that may benefit groundwater

Form of protection suggested by the Guidelines, and page references		Considerations relevant to whether the element has been implemented
17	Licensing of contaminants and point sources (p.30, App.1)	<p>protection?</p> <p>How are point sources of potential groundwater contamination licensed under general environmental protection laws, and (if applicable) under resource laws and laws relating to pesticides dangerous goods, and resources?</p> <p>What types of point sources must be licensed?</p> <p>Are the potential impacts on groundwater quality of the activity directly or indirectly considered in licensing decisions?</p>
18	Inter-agency coordination (p.48)	In relation to licensing a point source, is there any formal requirement for the lead decision-making agency to consult other agencies?
19	Requirements for impact assessment (p.30)	For what types of potentially contaminating activities is an environmental impact assessment required? Does the process directly or indirectly address potential threats to groundwater quality?
20	Prescription of activities/discharges in protected areas (p.45)	Does the Environmental Protection Framework impose particular requirements in relation to understanding potentially contaminating activities within designated protection areas?
21	Monitoring requirements (p.46)	May, or must, potentially contaminating activities be subject to monitoring requirements?
22	Contingency measures, including clean-up requirements (pp.47-48) and levels of action required in response to contamination (pp. 23-25)	<p>What tools may be used to respond to groundwater contamination?</p> <p>What action is required in response to contamination?</p>
23	Controls on diffuse source contamination (pp.17, 30)	How are potentially diffuse sources of contamination controlled?

**Table 3: Standard Land-Use Planning Framework Table**

	<b>Form of protection suggested by the Guidelines, and page references</b>		<b>Considerations relevant to whether the element has been implemented</b>
1	Principles (pp.9-13)	Precautionary principle (pp.11, 40)	Does the precautionary principle (or a similar term) appear in a statement of objectives or purposes which must, or may, be considered by decision-makers?
2		Polluter pays principle (p.11)	Does the polluter pays principle (or a similar term) appear in a statement of objectives or purposes which must, or may, be considered by decision-makers?
3		Equity considerations (p.12)	Do equity or fairness considerations appear in a statement of objectives or purposes which must, or may, be considered by decision-makers?
4		Beneficial uses and values (pp.10-12, 39-41)	Are beneficial uses and values (which are generally set within the Environmental Protection Framework) used or referred to in the Land-Use Planning Framework?
5	Forms of intervention	Command (p.14)	How does the Land-Use Planning Framework directly control the development and use of land for activities that have the potential to pollute groundwater?
6		Market (generally pp.14-15)	How does the Land-Use Planning Framework provide for economic instruments that may be used to protect groundwater quality? For example, do financial incentives appear in a statement of objectives or purposes which must, or may, be considered by decision-makers?
7		Community participation and education (p.15)	Does community participation or education appear in a statement of objectives or purposes which must, or may, be considered by decision-makers?  Do key actors have specific functions relating to community participation and education, where this would relate to groundwater quality protection? (Note that specific public consultation requirements in relation to key planning documents are set out below, row 20).
8	Specific approaches to protection	Vehicle for protection	What are the main types of land-use planning instruments (statutory and non-statutory) used to protect groundwater quality, and what is their general nature?
9		Use of land-use risk matrix to judge compatibility of land uses with water quality protection (p.44)	Is there provision for developing or using a matrix of land-use types and risk of groundwater contamination?  Do other provisions provide for considering land capability or suitability for the proposed activity, in a way that may protect groundwater quality?
10		Land zoning taking into account underlying groundwater (pp.43-44)	Is there provision for land zoning to take into account the need to protect the quality of underlying groundwater resources?
11		Protection for water supply protection areas (p.27)	Is there provision for protecting groundwater supply protection areas?
12		Protection of groundwater recharge zones (p.28)	Are there controls on the types of activities which may occur in groundwater recharge areas?
13		Controls on land clearing due to connection with groundwater quality (p.28)	How is land clearing controlled, and do these controls consider the potential impacts of land clearing on groundwater quality?
14		Controls on land development due to connection with groundwater quality (p.28)  For example controls on mining, quarrying, waste disposal (p.28)	In general, how does the Land-Use Planning Framework control the use and development of land for activities that may potentially contaminate groundwater?  Are groundwater quality impacts explicitly relevant considerations in relation to decisions to authorise use and development?
15		Controls on rural and urban runoff (p.28)	Are controls applied to urban and rural runoff?
16		Controls over use of sewage effluent (p.44)	Are controls applied to the use of sewage effluent? (Note that the Environment Protection Framework may also apply controls through licensing requirements for potentially polluting activities).
17		Manage land uses to reduce risks of contamination (p.44)	How may permissible types of uses and developments be managed to reduce risks of groundwater contamination?
18		Veto or referral rights for water and environment agencies in relation to land development (p.45)	May water and environment agencies, or other agencies which have functions relevant to protecting groundwater quality, comment on, impose requirements on, or prohibit, a particular land use or development?
19		Other inter-agency coordination (pp.28, 35)	Are water and environment agencies, or other agencies which have functions relevant to protecting groundwater quality, otherwise involved in preparing or commenting on the instrument?
20		Public consultation (p.28)	Is there a formal requirement to consult the public in relation to the formulation of statutory or non-statutory instruments?
21		Monitoring and review (pp.46-47)	Is there a formal requirement to monitor the implementation of a statutory or non-statutory instrument, or to review its effectiveness?
22		Enforcement (p.20)	Are policies in relation to land use and development binding and enforceable?

## CHAPTER 3: GENERAL ANALYSIS AND RECOMMENDATIONS

### 1. Introduction

As outlined in the methodology (Chapter 2), the Regulatory Review collated the groundwater management, environment protection and land-use planning legislation, regulation and policy of each Australian jurisdiction, and analysed each item against the key elements of the Groundwater Guidelines. This chapter sets out the results of this process. Since the Framework Tables have some common elements—the underlying principles and forms of intervention—it considers these together, followed by the key elements of each standard Framework Table, in turn.

This chapter explains the ways in which and the extent to which, the jurisdictions have implemented each key element using representative examples, for the sake of brevity. Where there appears to be a general gap in implementation, or an issue that the Guidelines do not address, the Review sets out recommendations for consideration in a future review of the Guidelines. The discussion of each element is followed by a Box which summarises the general finding, recommendation, and reference to the relevant Framework Tables in Appendix A for that item, for easy reference and to avoid extensive referencing where this is not required.<sup>3</sup>

This Review examines both “operational” provisions of legislation (for example, provisions which require a decision-maker or other entity to take into account a particular matter, or do a particular thing), and also provisions which set out the objects of legislation. It is important to note that legislative objects are not merely aspirational—rather, they may assist in the interpretation of specific functions conferred by the legislation, or the legislation may explicitly require a decision-maker to “have regard to” them, “further” them, “act consistently” with them, or similar.

Appendix B sets out a complete list of findings and recommendations, extracted from this chapter, for easy reference.

### 2. The influence of the Groundwater Guidelines

This Review has been tasked with determining the extent to which key elements of the Groundwater Guidelines have been implemented in the legislation, regulation and policy of the jurisdictions. It has not sought to investigate the jurisdictions’ motivations for implementing, or not implementing key elements—in other words, it cannot make any firm conclusions on whether a key element of the Groundwater Guidelines has been implemented *because it is an element of the Groundwater Guidelines*, or simply because it is good practice, well accepted, or for any other reason. However, in general terms it is apparent that the Groundwater Guidelines have been an important influence on the Frameworks of the jurisdictions. In particular:

- (a) in the ACT, the *Water Quality Environment Protection Policy 2008* refers to the Groundwater Guidelines;
- (b) at the Commonwealth level, the *Water Act 2007* requires that when the Murray-Darling Basin Authority prepares the water quality and salinity management strategy, which is a key element of the Basin Plan, and when the Commonwealth Water Minister adopts it, each must have regard to the NWQMS (section 25(3));

<sup>3</sup>

**Notes as to format:** For reasons of brevity, this Chapter gives examples of the implementation of a particular element of the Groundwater Guidelines, but does not cover every jurisdiction in relation to every element. Accordingly, a jurisdiction which is not mentioned in relation to an element may nonetheless have implemented it. Chapter 5 provides brief jurisdiction-specific summaries of implementation, the details of which are more fully set out in Appendix A.

**Notes as to terminology:** Since each jurisdiction uses different terminology for approvals—for example, licences, permits, consents, approvals, etc—this Chapter uses the generic term “authorisation” to cover each of these. Similarly, this Chapter uses the term “planning scheme” to describe a development plan, planning scheme, or similar statutory instrument that has effect in relation to planning and development. Finally, the terms “well” and “bore” are used interchangeably.

- (c) in NSW, the *Groundwater Quality Protection Policy 1998* refers to the Groundwater Guidelines, and in doing so, states that it “has been designed to be consistent with the objectives, policies and processes outlined for groundwater by the [NWQMS]” (p.14);
- (d) in the NT, the Department of Natural Resources, Environment, the Arts and Sport states that, in relation to declarations of beneficial uses under the Water Act it “works to the water quality guidelines and the Beneficial Use process set out in [the NWQMS]”;<sup>4</sup>
- (e) in Queensland, the *Environment Protection (Water) Policy 1997* adopts the NWQMS and Groundwater Guidelines approach to an extent which suggests that the documents were a key influence;
- (f) in SA, EPA Guidelines explicitly link the establishment of environmental values and water quality objectives under the *Environment Protection (Water Quality) Policy 2003* (which apply to groundwater) with applying the NWQMS in SA;<sup>5</sup>
- (g) in Tasmania, the *State Policy on Water Quality Management 1997*, which reflects many of the elements of the Groundwater Guidelines, makes reference to the NWQMS and its role is seen as being the statutory mechanism for delivering the NWQMS in Tasmania;<sup>6</sup>
- (h) in Victoria, the *State Environment Protection Policy (Groundwaters of Victoria) 1997* reflects the Groundwater Guidelines to a degree which suggests, along with its publication date, that the Groundwater Guidelines were a key influence; and
- (i) in WA, the *State Water Quality Management Strategy for Western Australia 2001* (which this Review has analysed through its Framework for Implementing) is regarded as the State-level strategy for implementation of the NWQMS in WA, and other key WA statutory policies which deal with groundwater also refer to the NWQMS and state that they are consistent with its principles.<sup>7</sup>

Finally, it is noted that some work has suggested that there is a low level of awareness of the NWQMS (and presumably, the Groundwater Guidelines component of the NWQMS), among natural resource management practitioners, few of whom have directly used the Guidelines.<sup>8</sup> This Review suggests that there is a relatively high degree of implementation of the key elements of the Groundwater Guidelines in the jurisdictions’ legislation, regulation and policy. Accordingly, even though it seems there may be a low level of awareness of the Guidelines themselves, this may have little practical consequence for groundwater protection if decision-makers and natural resource management practitioners

<sup>4</sup> NT Department of Natural Resources, Environment, the Arts and Sport, *Fact Sheet: Beneficial Use Declarations*, undated, available at <http://www.nt.gov.au/nreta/publications/natres/pdf/BUDS.pdf>, viewed 21 July 2009.

<sup>5</sup> SA EPA, *Establishing Environmental Values and Water Quality Objectives—Applying the National Water Quality Management Strategy in South Australia* (EPA Guidelines 738/07), available at [http://www.epa.sa.gov.au/pdfs/guide\\_ev.pdf](http://www.epa.sa.gov.au/pdfs/guide_ev.pdf), viewed 13 August 2009.

<sup>6</sup> Department of Environment, Parks, Heritage and the Arts Environment Division, *Review of the State Policy on Water Quality Management 1997: Discussion Paper* (October 2008), p.27, available at <http://www.environment.tas.gov.au/file.aspx?id=3719>, viewed 13 August 2009.

<sup>7</sup> See, for example, the following documents prepared by the Western Australian Planning Commission:  
 (1) Statement of Planning Policy No.2: Environment and Natural Resources Policy (gazetted 10 June 2003), cl5.2, available at: <http://www.planning.wa.gov.au/Plans+and+policies/Publications/134.aspx>, viewed 13 August 2009;  
 (2) *State Planning Policy 2.9: Water Resources* (19 December 2006), cl2.2, available at: <http://www.planning.wa.gov.au/Plans+and+policies/Publications/1281.aspx>, viewed 13 August 2009;  
 (3) *Statement of Planning Policy No.2.7: Public Drinking Water Source Policy* (10 June 2003), cl2, available at <http://www.planning.wa.gov.au/Plans+and+policies/Publications/149.aspx>, viewed 13 August 2009; and the  
 (4) Waters and Rivers Commission, *Statewide Policy No.5: Environmental Water Provisions Policy for Western Australia* (2000, updated 2005), available at [http://portal.water.wa.gov.au/portal/page/portal/Policies/StatewidePolicies/Content/STATEWIDEPOLICY\\_5.pdf](http://portal.water.wa.gov.au/portal/page/portal/Policies/StatewidePolicies/Content/STATEWIDEPOLICY_5.pdf), viewed 13 August 2009.

<sup>8</sup> John Bennett and Andrew Moss, “Implementing the National Water Quality Management Strategy—Insights from Capacity Building Workshops around Australia”, paper presented to the 8<sup>th</sup> International River Symposium, Brisbane, Australia, available at <http://www.riversymposium.com/2005/index.php?element=8>, viewed 13 August 2009.



use their own legislation, regulation and policy, which in fact reflects the Guidelines to a significant degree.

### **3. Differences in implementation between jurisdictions**

As is apparent in the sections below, the jurisdictions have generally implemented the key elements of the Groundwater Guidelines. Where there appear to be gaps in implementation, the different jurisdictional contexts should be remembered. These differences lead naturally to legal and policy differences, and therefore, differences in their implementation of the Guidelines.

There is great variation in the extent to which each State jurisdiction uses groundwater, and the extent to which the territory of each State is subject to activities which may contaminate the environment in general, and groundwater in particular. For example, by way of general indication of this difference, the NT and ACT established Environment Protection Authorities (or similar) in 2007 and 1997, respectively, whereas jurisdictions such as NSW and Victoria established their authorities in the 1970s.

Further, the legal effect of adopting an element of the Guidelines may be different in different jurisdictions. This will depend on precisely how a provision is formulated, whether an action is mandatory or discretionary, or adopted in a legally enforceable instrument as opposed to a non-statutory policy. Moreover, although not discussed at length in this report, it is also important to note that key terms such as “groundwater”, “pollution”, and “environmental harm” have different legal definitions across Australia.

Finally, it is noted that the Guidelines themselves expect variation in implementation—they are expressed to be a framework to “enable each State, Territory and the Commonwealth to develop policies and strategies which are tailored to their specific needs” (p.1).

## **4. Underlying principles**

### **4.1 Precautionary principle**

While not formally described as an “underlying principle”, the precautionary principle appears several times throughout the Groundwater Guidelines, particularly in relation to decisions to allow an activity to contaminate an aquifer.

The majority of the jurisdictions’ Groundwater Management Frameworks explicitly adopt the precautionary principle, usually by expressing the concept of ecologically sustainable development (**ESD**) as an object of an item of groundwater management legislation. ESD is then defined to include the precautionary principle. The principle is typically operationalised in groundwater management legislation by requiring:

- (a) all persons involved in the administration of the legislation, and all persons with functions, powers under the legislation, to “have regard to” and seek to further ESD, “taking into account” the precautionary principle (in the case of SA);
- (b) certain decision-makers to exercise some of their functions under the legislation “consistently with” or “in a way that advances” the principles of ESD or a legislative purpose which refers to ESD (see, for example, NSW and Queensland); or
- (c) certain decision-makers to exercise a particular function “taking into account” the principles of ESD (in the case of the Commonwealth, Victoria, and Western Australia).

Through these provisions, the precautionary principle can influence many groundwater management decisions, which have the potential to affect groundwater quality. For example, the precautionary principle is used in relation to the following functions:

- (a) in SA, preparing a water allocation plan for groundwater, which must include an assessment as to whether the taking of or use of groundwater may detrimentally affect the quality of the water available from any other resource (see row 12, SA Groundwater Management Framework Table);

- (b) at the Commonwealth level, the MDBA preparing, and the Commonwealth Water Minister adopting, the Basin Plan for the Murray-Darling Basin, which must include a water quality and salinity management plan (see row 11, Cth Groundwater Management Framework Table);
- (c) in Victoria, a Sustainable Water Strategy, which identifies ways to improve the quality of surface water and groundwater in the context of strategic regional water planning (see row 11, Vic Groundwater Management Framework Table);
- (d) in Queensland, a decision to publish a notice restricting or prohibiting the taking of groundwater, one of the justifications for which is groundwater contamination (see row 23, Qld Groundwater Management Framework Table); and
- (e) in Queensland, provision for the preparation of water use plans if there are risks that water use may cause deteriorating water quality (see row 11, Qld Groundwater Management Framework Table).

The Environment Protection Frameworks of the jurisdictions take a similar approach to adopting the precautionary principle, commonly including the principle within the objects of legislation. In particular, they apply it to functions relating to environmental impact assessment, contaminated land management, and issuing orders to secure a person's compliance with an environmental duty. For example, Tasmania and SA use the precautionary principle when assessing the risks of environmental harm, and Tasmania even requires a proponent preparing materials for an EIA to demonstrate that the proposed activity is consistent with the precautionary principle. The instruments containing groundwater quality objectives in Tasmania and Victoria are both explicitly founded on, or pursue, the precautionary principle.

In recent times, the precautionary principle has become a common and integral part of environmental protection generally in Australia and internationally.<sup>9</sup> This Review has found that most Australian jurisdictions give the precautionary principle a much greater role than that discussed in the Groundwater Guidelines. For example, the *NSW Groundwater Quality Protection Policy* notes that the precautionary principle is "particularly applicable to groundwater management in NSW", and the *NSW State Groundwater Dependent Ecosystems Policy* states that the precautionary principle should be applied to protect groundwater dependent ecosystems. In SA, the Department of Land, Water and Biodiversity Conservation has produced a fact sheet dealing with the use of the precautionary principle in the *Natural Resources Management Act 2004* (SA)—the key Act regulating groundwater quality in the context of water allocation and use.

Few of the jurisdictions' Land-Use Planning Frameworks adopt the precautionary principle. Where it is adopted, the method is similar to that used for the other Frameworks, namely, that certain planning instruments, and certain decision-makers, must exercise their functions to give effect to the precautionary principle (see, for example, ACT and NSW).

<sup>9</sup>

See Jacqueline Peel, *The Precautionary Principle in Practice: Environmental Decision-Making and Scientific Uncertainty* (2005), for a description of the development of the principle in Australian environmental law.

#### Box 4.1: Precautionary principle

**General finding:** The jurisdictions generally adopt the precautionary principle in their Groundwater Management and Environment Protection Frameworks, and to a lesser extent, in their Land-Use Planning Frameworks. They generally require either all or some decision-makers to have regard to the precautionary principle as an element of the principle of ESD, when exercising all or certain of their functions, including functions that have the potential to affect groundwater quality.

**Recommendation:** The Groundwater Guidelines mention the precautionary principle mainly in the context of deliberately allowing aquifer contamination. A future revision of the Guidelines should significantly expand the role of the precautionary principle to reflect the prominence of the principle in modern legal frameworks that have the potential to affect groundwater quality, and the greater role that most jurisdictions give to the principle in the context of groundwater management.

**Framework Table Reference (Appendix A):** row 1 of each Framework Table.

## 4.2 Polluter pays principle

The Groundwater Guidelines suggest applying the polluter pays principle to ensure that those who pollute groundwater pay a penalty commensurate with the damage caused. The Guidelines suggest a “strong” version of the polluter pays principle, under which a person undertaking a potentially contaminating activity must not only bear the full costs of protecting the aquifer, but also must “show on a continuous basis that the activity did not pollute the groundwater body” (p.10).

The jurisdictions tend to implement the polluter pays principle in their groundwater management legislation to a lesser extent than they implement the precautionary principle. Those that adopt the polluter pays principle to the greatest extent do so through the concept of ESD, which then influences decisions under the relevant legislation (see, for example, the Commonwealth, SA and NSW). It is more common for jurisdictions explicitly to adopt the polluter pays principle, including through the concept of ESD, in their Environment Protection Frameworks (see, for example, NSW, Qld, SA, Tas, WA) rather than their Groundwater management Frameworks. On the other hand, of all the Land-Use Planning Frameworks, NSW is alone in explicitly adopting the polluter pays principle in its key items of legislation, regulation and policy.

Other approaches to adopting the polluter pays principle include:

- (a) adopting measures that reflect the essence of the polluter pays principle, while not naming the principle itself. For example:
  - (i) the WA and ACT Groundwater Management Frameworks empower the WA Water Minister and the ACT EPA, respectively, to take specific actions to protect groundwater quality, and recover the associated costs, if a person who was directed to take that action failed to do so;
  - (ii) Environment Protection Frameworks in every jurisdiction empower a specified person or agency to take action to clean up pollution or remedy environmental harm, and recover the reasonable costs of doing so, if a polluter is directed to do this and fails to do so. This tool occurs both in general environment protection legislation, and also in contaminated sites legislation, which in some jurisdictions exists separately. A typical example is that of the *Environmental Protection Act 1994* (Qld), under which a person may be served with a clean-up notice, which requires a person to take stated action to prevent or minimise contamination, or rehabilitate or restore the environment because of a pollution incident. If the relevant person does not comply with such a notice, an authorised person or a contractor may take the action required in the clean-up notice and the EPA may recover the costs of that action;

- (iii) Environment Protection Frameworks in every jurisdiction may require a person to provide a financial assurance or security as a condition of a licence to undertake a potentially contaminating activity. This tool occurs in both general environment protection legislation, and also legislation dealing with specific subject matters, such as resources and pesticide control. As a typical example, in Queensland, the holder of an environmental authorisation for mining activities must give the EPA a financial assurance in relation to “the costs that the EPA might reasonably incur in taking action to prevent or minimise environmental harm, or rehabilitate or restore the environment”. In this context, “the environment” encompasses groundwater since it is defined to include all natural and physical resources, and “environmental harm” means any adverse effect or potential adverse effect on an environmental value, which includes an environmental value of groundwater set out in the *Environment Protection (Water) Policy 1997* (Qld);
  - (iv) Environment Protection Frameworks typically link the fee associated with a licence to conduct potentially polluting activities to the volume of waste handled or discharge produced (for example, the NT), or a score based on the environmental risk associated with an activity (for example, Queensland);
- (b) applying the polluter pays principle, or a similar formulation, to certain components of a Groundwater Management or Environment Protection Framework, for example:
  - (i) strategic water plans: a Victorian Sustainable Water Strategy (a strategic regional water plan that deals with water quality) must take into account the principle that “persons who generate pollution and waste should bear the cost of containment, avoidance and abatement”;
  - (ii) water use for irrigation: under Victoria’s Groundwater Management Framework, licences which are necessary to use water for irrigation have, as an objective, to ensure that licence holders are responsible for the costs of water salinisation caused by irrigation. NSW adopts a similar approach in its non-statutory *NSW Groundwater Quality Protection Policy*, which states that a “groundwater pumper shall bear the responsibility for environmental damage or degradation caused by using groundwaters that are incompatible with soil, vegetation or receiving waters” (see row 2, NSW Environment Protection Framework Table); and
  - (iii) contaminated land: under the NSW contaminated sites legislation, the EPA is to have regard to the polluter pays principle in the exercise of its functions, and is to seek the implementation of that principle in the management by other persons of contaminated land.

Several different formulations of the polluter pays principle appear in the jurisdictions’ Groundwater Management Frameworks. Some jurisdictions require polluters to bear “the costs of containment, avoidance or abatement” (for example, the Groundwater Management Frameworks in NSW and Victoria), whereas a weaker version requires polluters to bear only an “appropriate share of the costs that flow from their activities” (for example, the Groundwater Management Framework in SA).

It was not apparent from this Review that any jurisdiction sought to recover the full costs of groundwater quality management from polluters.

#### **Box 4.2: Polluter pays principle**

**General finding:** The jurisdictions generally adopt the polluter pays principle in their Groundwater Management and Environment Protection Frameworks, but only rarely in their Land-Use Planning Frameworks. They commonly require either all or some decision-makers to have regard to the polluter pays principle as an element of the principle of ESD, when exercising all or certain of their functions, including functions that have the potential to affect groundwater quality. It is also common to implement the polluter pays principle through requiring a financial assurance before issuing a licence to undertake certain activities, linking licence fees to the potential for pollution, and allowing a specified agency to recover the reasonable costs associated with remedying environmental harm, including harm to a protected environmental value of groundwater.

**Recommendation:** A future revision of the Groundwater Guidelines could provide further detail on how the polluter pays principle may be implemented, using the many examples provided by current legislation, regulation and policy. The Guidelines may also benefit from re-visiting the precise intended meaning of the polluter pays principle, since the jurisdictions differ in relation to what costs, and how much of these costs, the principle requires a polluter to bear.

**Framework Table Reference (Appendix A):** row 2 of each Framework Table, and row 22 of each Environment Protection Framework Table.

### **4.3 Equitable considerations**

The Groundwater Guidelines suggest that decision-making in relation to groundwater quality should seek to ensure equity and fairness.

Equitable considerations are ubiquitous in the Groundwater Management and Environment Protection Frameworks, though less so in Land-Use Planning Frameworks. The jurisdictions provide for equitable considerations in different ways. Some jurisdictions refer to equitable considerations as an element of ESD, typically using either:

- (a) a reference to intergenerational equity (see, for example, Cth, NSW and Vic); or
- (b) the following formulation: “decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations” (see, for example, Cth, Qld, NT and SA).

Intergenerational equity is commonly defined to mean “that the present generation should ensure that the health, [bio]diversity, and productivity of the environment is maintained or enhanced for the benefit of future generations” (see, for example, Cth Groundwater Management Framework Table, ACT Land-Use Planning Framework Table, and Vic Environment Protection Framework Table).

Some jurisdictions adopt equitable considerations directly in the purposes of a piece of relevant legislation, typically stating that a purpose of the legislation is to provide for the “orderly, efficient and equitable” sharing or use of water resources (see, for example, NSW, Vic and WA). Queensland refers to providing “equity between present and future generations” (see Qld Land-Use Planning Framework Table).

### Box 0: Equity considerations

**General Finding:** Since the Groundwater Guidelines were published, the concept of intergenerational equity has become a well-entrenched element of water management and environment protection laws throughout most Australian jurisdictions. This concept may well prove very useful in the context of protecting groundwater quality, given the long time-frames involved in cleaning up contamination.

**Recommendation:** A future revision of the Groundwater Guidelines could consider updating the comments in relation to “equitable considerations” to reflect the concept of intergenerational equity, and discuss further how this concept should take effect in the context of groundwater quality protection.

**Framework Table Reference (Appendix A):** row 3 of each Framework Table.

## 4.4 Beneficial uses and values (now termed environmental values)

The final, and perhaps most central, “underlying principle” of the Groundwater Guidelines is that of beneficial uses and values or environmental values (the terms are interchangeable), which determine the level of protection afforded to a groundwater body. This section provides a brief overview of how beneficial uses and values are established, and how they are used throughout the Groundwater Management, Environment Protection and Land-Use Planning Frameworks, before beneficial uses are discussed in more detail in section 7.1, below.

Many State jurisdictions establish beneficial uses and values in their Environment Protection Frameworks, commonly using a statutory environmental policy (see, for example, Qld, Vic, SA and WA). The ACT, NSW, NT and Tasmania take different approaches. The ACT establishes beneficial uses and values in a statutory land-use planning instrument, whereas NSW formulates beneficial uses and values using a non-statutory instrument driven by public consultation. Tasmania uses a statutory State Policy, which is separate from the general environmental protection system, and the NT uses an instrument under its Water Act to establish beneficial uses for water bodies.

There is wide variation in how beneficial uses and values are implemented within the Groundwater Management, Environment Protection and Land-Use Planning Frameworks of the States:

- (a) Groundwater Management Frameworks generally do not explicitly implement beneficial uses and values. Those that do implement them use provisions relating to water authorisations (such as licences to extract water or install bores, etc) and statutory water management plans to do so, for example by:
  - (i) setting a “target” that statutory water management plans incorporate water quality objectives, which are based on beneficial uses (see, for example, the 2002 NSW State Water Management Outcomes Plan, now expired);
  - (ii) stating that the relevant decision-maker must consider the instrument that establishes beneficial uses and values when developing a statutory water management plan (see, for example, Qld);
  - (iii) stating that water quality objectives, which are based on beneficial uses, guide the objectives set for statutory water management plans (see, for example, Tas); and
  - (iv) perhaps the strongest implementation tool – subjecting every water authorisation (permit, licence, or consent), which is granted after a declaration of beneficial uses and values for a water body, to a condition that nothing shall be done under the authorisation which prejudices an applicable beneficial use (see, for example, the NT);

- (b) It is relatively more common for Environment Protection Frameworks explicitly to use beneficial uses and values. This is typically done in the context of EIA and authorisations to carry out potentially polluting activities, for example, by:
  - (i) in relation to an environmental authorisation—requiring that it be granted consistently with (or not inconsistently with), or having regard to, or considering, an instrument that sets beneficial uses or water quality objectives set for beneficial uses and values (see, for example, the NT, Qld, SA, Vic, and WA);
  - (ii) requiring proponents of activities which are subject to EIA to demonstrate that the activity is consistent with the water quality objectives set to protect beneficial uses and values (see, for example, Tas); and
  - (iii) (less commonly) the instrument which establishes beneficial uses itself setting independent requirements for the conduct of activities that may cause pollution (see, for example, SA); and
- (c) Land-Use Planning Frameworks use beneficial uses and values relatively less often, and sometimes apply them in a relatively weak form, only requiring that they be considered. For example, some Land-Use Planning Frameworks:
  - (i) require that a decision-maker who is preparing a planning scheme prepare it “in accordance with” a document setting out beneficial uses, or that the decision-maker consider such a document (see, for example, Tas and Qld);
  - (ii) require or permit a decision-maker, when considering whether to grant a planning or development authorisation, to consider an instrument establishing beneficial uses or water quality objectives for beneficial uses (see, for example, NT and Vic); or
  - (iii) empower a minister to amend a planning scheme to make it consistent with an instrument setting beneficial uses (see, for example, SA).

The Commonwealth has only recently assumed legislative powers in relation to water quality under the *Water Act 2007* (Cth). The Basin Plan for the Murray-Darling Basin must include a water quality and salinity management plan, which must be prepared having regard to the NWQMS, though there is no explicit mention of beneficial uses and values. Further, the Basin Plan, which sets requirements for water resource plans for Basin water resources, must include requirements in relation to water quality and salinity objectives for local areas.

#### **Box 4.4: Beneficial uses and values (now termed environmental values)**

**General Finding:** Each State jurisdiction has adopted the concept of beneficial uses and values. NSW relies mainly on a policy mechanism, whereas each other State uses a statutory mechanism. This concept of beneficial uses is implemented, to varying degrees, through the Groundwater Management Frameworks, Environment Protection Frameworks, and Land-Use Planning Frameworks. The general method of implementing beneficial uses is to require an authorisation or plan under these Frameworks to be prepared consistently with, or having regard to, beneficial uses.

**Recommendation:** A future revision of the Groundwater Guidelines could describe the ways in which beneficial uses and values may be implemented, using examples from modern Australian legislation, regulation and policy.

**Framework Table Reference (Appendix A):** row 4 of each Framework Table, and row 15 of each Environment Protection Framework Table.

## 5. Forms of intervention

The Groundwater Guidelines outline three forms of intervention by government to influence the activities of individuals and companies in ways that are relevant to groundwater protection. These are intervention by:

- “command” over specified activities or practices, which the Guidelines characterise as useful, but rigid, largely unsuitable for diffuse sources of pollution, potentially inefficient, and ineffective to achieve “better than a prescribed standard”;
- market approaches, which provide a financial incentive for desirable behaviour, and which the Guidelines characterise as potentially more efficient than intervention by command, since they enable polluters to find least-cost methods of reducing pollution; and
- community participation processes, which seek to educate the community, create community pressure against pollution, and assist implementation of a groundwater protection strategy.

### 5.1 Intervention by command

The following represent the most common ways in which the jurisdictions implement intervention by “command”:

- (a) legislative or regulatory requirements to hold a licence to extract groundwater, construct a bore, undertake an activity or carry out a development, where the relevant action has the potential to pollute groundwater, and where a licence for such an action may include conditions to protect groundwater quality;
- (b) prohibiting or regulating particular developments on Crown lands or in certain zones, including developments which are likely to pollute groundwater in water supply areas, under Land-Use Planning Frameworks;
- (c) directions, which may be issued to prevent groundwater pollution on a case-by-case basis, for example:
  - (i) a direction to seal a bore, to cease taking groundwater, or to restrict the amount of waste permitted to enter a bore (see rows 5 and 22 to 24, Groundwater Management Framework Tables); and
  - (ii) a direction to rehabilitate land or to minimise, prevent or control pollution or waste (see row 22, Environment Protection Framework Tables);
- (d) rules for undertaking activities which have the potential to pollute groundwater, for example, constructing bores, abandoning bores, and using agricultural chemicals, and in some cases, complying with codes of practice in relation to particular industries;
- (e) general environmental duties and offences, for example:
  - (i) a duty to take “reasonable and practicable” steps to prevent or minimise environmental harm (see, for example, row 5, ACT, NT, Qld, SA, Tas Environment Protection Framework Tables) or to “act reasonably” in relation to natural resources (SA Groundwater Management Framework Table). In some jurisdictions, codes of practice, or the instruments which set out groundwater beneficial uses and values, are relevant to determining whether a person has contravened this duty; and
  - (ii) offences in relation to polluting waters generally, polluting a water supply, polluting the environment, disposing of waste in a manner that is likely to harm the environment, and causing serious or material environmental harm (see, for example, row 5, NSW, Qld, SA and WA Environment Protection Framework Tables);



- (f) general duties to notify a specified agency of contamination or a serious risk of environmental harm (see for example, ACT, NSW, NT, SA, Tas and WA Environment Protection Framework Tables); and
- (g) requirements, in relation to particular activities, to prepare assessments or plans, which must be considered or approved by a regulatory authority before the activities may proceed. This approach has been implemented:
  - (i) in Environment Protection Frameworks, through requirements relating to environmental impact assessment and operating plans for the resources industries and other high-impact activities; and
  - (ii) in some Groundwater Management Frameworks, by requiring an irrigator to prepare a management plan which deals with potential groundwater salinisation (see, for example, irrigation and drainage plans in rows 19 and 20, Vic Groundwater Management Framework Table, irrigation reports in Tasmania: row 11, Tas Groundwater Management Framework Table, and land and water management plans in Queensland: see row 20, Qld Groundwater Management Framework Table).

Contrary to the Guidelines' characterisation of command approaches as rigid, some modern forms of command intervention have the potential to be very flexible. For example, conditions on environmental authorisations may impose a very broad range of requirements, relating to monitoring, emergency plans, and compliance with codes of practice (see row 17, Environment Protection Frameworks). Similarly, a general environmental duty can apply to numerous different situations, without the need for the legislation to proscribe particular activities or impose rigid, predetermined requirements.

Further, some of the command approaches above lend themselves well to being applied to diffuse source groundwater pollution problems, for example, regulations as to the use of agricultural chemicals and general environmental duties. However, compliance monitoring and enforcement of these forms of regulation are admittedly difficult.

## 5.2 Intervention using market approaches

At the level of objectives and purposes of legislation, it is quite common to see reference to "establishing incentive structures", "market mechanisms" and "incentive mechanisms" in Environment Protection Frameworks (see for example, NSW, Qld, Vic and WA). However, there is less evidence that the jurisdictions have introduced specific market mechanisms. Where this does occur, it tends to be within an Environment Protection Framework, rather than a Groundwater Management or Land-Use Planning Framework.

By far the most common form of market approach is the ability to require the holder of an environmental authorisation or resources authorisation to provide a financial security. The financial security is intended to secure compliance with, among other things, the environmental aspects of the authorisation or of its parent legislation, and the potential costs of clean-up. It is also relatively common to confer on an agency the power to provide subsidies or financial assistance for specified types of activities (for example natural resources management activities and native vegetation conservation), which may be used to benefit groundwater protection (see, for example, row 6, NSW Environment Protection Framework Table and row 6, SA Groundwater Management Framework Table).

Other examples of market approaches include:

- (a) tradeable emissions schemes, also called tradeable permit schemes (see, for example, ACT, NSW and Vic Environment Protection Framework Tables);
- (b) green offset schemes that create a market for "offset credits" (see, for example, NSW and Vic Environment Protection Framework Tables);
- (c) bubble licence schemes, which involve determining the aggregate measure of a pollutant that is permitted to enter the environment, and apportioning the aggregate

measure among members of a group (see, for example, ACT Environment Protection Framework Table);

- (d) a fee system for environmental authorisations, which rewards “best practice” beyond mere compliance with environmental requirements (see, for example, NT, Qld and WA Environment Protection Framework Tables);
- (e) agreements or covenants between a person undertaking a potentially polluting activity and the relevant EPA, which may contain economic incentives to minimise pollution (see, for example, row 6, SA, Tas and Vic Environment Protection Framework Tables);
- (f) grants for innovation in relation to measures that achieve water quality objectives (see, for example, row 6, Tas Environment Protection Framework Table); and
- (g) taxation relief and rate relief for those who undertake measures that achieve water quality objectives (see, for example, row 6, Tas Environment Protection Framework Table).

However, while legislation provides for the establishment of tradeable emissions schemes, green offset schemes, or bubble licence schemes, the Review did not locate any example of such a scheme being used in the groundwater quality context.

### 5.3 Intervention using public participation and education

It is very common for legislation that is relevant to groundwater protection to include an object, or to confer a function on a person or entity, relating to community participation or education. These elements are formulated in many different ways, including:

- (a) that an entity performing a function under an act do so in accordance with the principle that “decisions and actions should provide for broad community involvement on issues affecting them” (see, for example, Qld Groundwater Management Framework Table);
- (b) that an act “promote within the community environmental responsibility and involvement in environmental issues” (row 7, SA Environment Protection Framework Table); and
- (c) that an act “provide for the use and management of the freshwater resources of Tasmania having regard to the need to encourage community involvement in water resource management” and that the relevant Minister “encourage community involvement in water resource management” (row 7, Tas Groundwater Management Framework Table).

Equally, most jurisdictions provide for a range of different types of community consultation (for example, public submissions, public hearings and public meetings) in relation to many matters that have the potential to affect groundwater quality, such as applications for environmental authorisations, water management plans, environmental impact assessments, the designation of stressed areas or water supply areas, planning schemes and State policies.

Some items of legislation and policy also provide for community advisory groups or committees to be established, and public forums to be convened to assist in the administration of an act, or to promote public awareness of a natural resource management issue (see, for example, row 7, Qld and WA Groundwater Management Framework Tables and Qld Land-Use Planning Framework Table, and row 7, SA Groundwater Management Framework Table);

It is relatively uncommon for an item of legislation, regulation or policy to specifically require education programs to be carried out, or to require education specifically in relation to groundwater quality. Queensland requires education programs in relation to water quality management issues, and SA confers on some entities the function of undertaking or supporting education initiatives relating to natural resource management (see row 7, Qld Environment Protection Framework Table and row 7, SA Groundwater Management

Framework Table). Victoria also charges the EPA specifically with promoting public awareness in relation to managing activities to prevent groundwater pollution (row 7, Vic Groundwater Management Framework Table). The Commonwealth Water Act gives the MDBA the function of engaging and educating the Australian community about the “Basin water resources”, a term which is defined to include groundwater and associated GDEs.

A particularly unusual approach to public participation is that adopted in Tasmania’s Groundwater Management Framework, which enables groups of landowners, rather than a public agency, to be responsible for the administration of a water management plan.

#### **Box 5: Forms of intervention**

**General Findings:** Most jurisdictions use a combination of command, market, and public participation approaches to groundwater protection across their Groundwater Management, Environment Protection and Land-Use Planning Frameworks. Of these three approaches, market approaches are used least, although they are often referred to at a high level. Flexible and adaptable approaches to command intervention have developed since the publication of the Groundwater Guidelines, overcoming some of the constraints of what can sometimes be a rigid approach. Public participation and education are very commonly used in relation to instruments that are relevant to groundwater quality protection, but legal or policy requirements for specific education programs in relation to groundwater quality are relatively rare.

**Recommendation:** A future revision of the Groundwater Guidelines may assist jurisdictions by further describing the ways in which the different forms of intervention may be implemented, using examples from modern Australian legislation, regulation and policy. In particular, a future revision could describe modern, flexible approaches to intervention by command, and further examples of market mechanisms.

**Framework Table Reference (Appendix A):** see in particular, rows 5-7 of each Framework Table. Note that row 5 of each Framework Table tends to focus on general duties and offences, whereas the discussion above also summarised wider approaches used through the Frameworks.

## **6. Groundwater Management Framework**

The Groundwater Guidelines suggest that a Groundwater Management Framework should:

- (a) provide for the reservation of special areas to protect areas subject to groundwater stress and contaminated aquifers;
- (b) provide for management plans to govern water allocation and use, while taking account of potential water quality impacts;
- (c) control groundwater extraction where necessary to protect groundwater quality;
- (d) provide for well construction measures, such as driller licensing, rules for bore construction, operation and maintenance and abandonment, and measures to control the disposal of waste via wells;
- (e) provide measures for the protection of public water supply wells, and impose requirements on water suppliers in relation to monitoring, reporting and responding to contamination; and
- (f) provide for the gathering and analysis of information relating to groundwater quality, including strategic assessment, monitoring of critical overdraw, vulnerability mapping and aquifer classification systems.

The sections below analyse how the jurisdictions have implemented each of these elements, using representative examples.

### **6.1 Reservation of special areas**

All jurisdictions allow for the reservation of special areas for groundwater protection. The jurisdictions generally provide for a minister or the Governor to designate stressed areas, or

areas for which close management is necessary. These areas are known by different names—“water management areas” in the ACT and NSW, “water control districts” in the NT; areas subject to a water use plan in Queensland; “prescribed wells areas” in SA; “groundwater areas” in Tasmania, “water supply protection areas” in Victoria, and “proclaimed areas” and “Underground Water Pollution Control areas” in Western Australia. The Commonwealth provides for “water resource plan areas”, which must be set so as to align as closely as possible with areas designated under State water management laws.

In some cases, risks to water quality are an explicit trigger for declaring a stressed area. For example, in Queensland a minister prepares a water use plan for an area in which there are risks that water use may cause deteriorating water quality.

The designation of these areas enables closer management through the development of plans that regulate water allocation or use (for example, NSW, Qld, SA, Tas and Vic), the identification of beneficial uses (for example, NT) or the closer regulation of potentially polluting activities (for example, WA).

All jurisdictions allow for the reservation of public water supply areas, although some jurisdictions use their Land-Use Planning Frameworks for this purpose (for example, ACT, NT). Crown land reserves may also be declared to cover public water supply areas, or planning schemes may provide for special zones to cover water supply areas. In the jurisdictions which use their Groundwater Management Frameworks to designate such areas, they are known as “special areas” in NSW and Victoria, “catchment areas” or “water reserves” in Queensland and Western Australia, and “water protection areas” in South Australia.

The designation of these areas for public water supply generally leads to additional controls on taking and using water, and on activities that may harm water quality. For example, in Western Australia, by-laws prohibit discharging polluted water to a metropolitan catchment area or water reserve, and leaving a substance in the area which is likely to pollute it.

#### **Box 6.1: Reservation of special areas**

**General Findings:** The jurisdictions provide well for the reservation of special areas for groundwater protection, both in the cases of stressed areas, where water quality may be at risk due to groundwater use, and also in the case of public water supply areas.

**Framework Table Reference (Appendix A):** rows 8-10 of each Groundwater Management Framework Table.

## **6.2 Management plans**

All jurisdictions provide for management plans or some form of management mechanism to govern water allocation and use, taking account of potential water quality impacts. Many jurisdictions provide for these water management plans in the context of higher-level regional or state-wide natural resource management plans, which may be either statutory or policy documents.

### **(a) Management plans at the State level—state-wide and regional plans**

There is significant variation in the States' higher-level regional and state-wide plans. They include:

- (i) State-wide non-statutory policy documents, which focus on natural resources management, groundwater, groundwater quality, or GDEs (for example, the *Our Water Our Future* policy document in Victoria, and NSW's suite of non-statutory groundwater policy documents, which are intended to be consistent with the Groundwater Guidelines). NSW has adopted a GDE policy, which specifically addresses the water quality requirements of GDEs;
- (ii) State-wide statutory plans, which deal with natural resources management generally or water in particular, for example, the NSW State Water

Management Outcomes Plan, the SA State NRM Plan, the WA State Water Plan and the WA Water Strategy; and

- (iii) regional catchment plans, natural resource management plans or water strategies, for example, catchment action plans in NSW, regional NRM plans and the River Murray Act Implementation Strategy in SA, and regional catchment strategies and Sustainable Water Strategies in Victoria.

These types of plans generally consist of objectives or targets, an assessment of resource condition (including groundwater quality, where relevant), monitoring programs, and implementation plans. In some cases, they use market incentives. For example, in SA, a regional NRM plan may set out management practices designed to protect aspects of natural resources (such as groundwater quality), which, if adopted, entitle a person to a refund of a natural resources management or water levy. Victoria's *Our Water Our Future* policy document refers to investigating tradeable permits for saline discharge.

Generally, where local-level water management plans exist in a framework of higher-level State or regional plans, the lower-level plans must be consistent with some or all of the higher-level plans (for example, water management plans in NSW). Local-level water management plans must sometimes also be consistent with documents setting out beneficial uses and values and water quality objectives (for example, NSW, Tas).

**(b) Management plans at the State level—local water plans**

At the local level, all States use water management plans under different names: management plans in NSW and WA; water allocation plans in the NT and SA; water use plans, water resource plans and resource operations plans in Queensland; water management plans in Tasmania; and management plans and special area plans in Victoria. The ACT uses a “Water Management Areas Determination” and “Available Water Determination”, which, when taken together, are sometimes called the ACT’s “water sharing plan”.

It is common for the legislation providing for water management plans to set out ways in which a plan must, or may, provide for water quality issues. This can be through:

- (i) general statements such as the plan “may contain provisions with respect to the preservation and enhancement of the quality of water” (for example NSW);
- (ii) a requirement to identify the causes of water quality degradation (NSW) or the water quality required by ecosystems (for example SA), or the likely effect of the plan on water quality (for example SA, Tas);
- (iii) water sharing or allocation aspects of a plan which protect or enhance water quality, or restore or rehabilitate water sources or dependent ecosystems, or which require these matters to be considered (for example NSW, Qld, SA, Vic);
- (iv) a plan specifying situations in which approval is required for certain activities or developments (for example NSW), or specifying standards and objectives for water use practices in order to avoid deteriorating water quality (for example, Qld); and
- (v) a plan specifying conditions that must be applied to authorisations to take water (for example, management plans in Victoria), or matters that a decision-maker must consider in granting a water authorisation (for example, management plans in WA).

Even where a water management plan is not expressly empowered to deal with water quality, it may be possible to express water quality concerns through

concepts such as allocating groundwater within the “sustainable yield” (for example, NT).

Local-level water management plans generally reflect the key elements suggested in the Groundwater Guidelines. They generally provide for surface water-groundwater interaction, although sometimes not explicitly in relation to water quality. For example, in SA, if taking and using water from one water resource (surface water or groundwater) is likely to have a detrimental effect on the quality of water that is available from another water resource (surface water or groundwater), the plan for the first resource must take into account the needs of persons and ecosystems dependent on the second resource and may include provisions to reduce those effects (see also NSW, Qld and Tas provisions). Where there are no explicit provisions in relation to surface water-groundwater interaction, plans may still be required to consider this matter under case-by-case guidelines issued to guide the development of a plan (for example, in Victoria).

Monitoring programs and reviews are also commonly included in relation to water management plans. In relation to monitoring, for example, a plan may be required to specify the monitoring that must be carried out to ensure that the objects of the plan are achieved (for example, in WA). Reviews occur in the form of regular internal reviews, and review by expert panels or advisory committees (for example, see NSW State Water Management Outcomes Plan and NT water allocation plans).

Local-level water management plans almost always must be developed with public consultation, using public submissions, consultative groups, panels and committees, and public meetings. It is less common to require extensive inter-agency consultation in relation to a water management plan, separate from public consultation. Where this is required, it is generally expressed to be a requirement to consult agencies that are likely to be affected by the plan (see, for example, SA, NSW, Vic and WA). Unusually, in NSW, the agreement of another public agency is required to make a local water management plan.

The exceptions to the generally thorough implementation of the Groundwater Guidelines in relation to management plans is the almost complete absence of provision for market incentives within such plans, and the fact that “component studies” are rarely required before a plan is prepared. In relation to market incentives, however, it may be argued that the nature of the plans—primarily relating to water quality in the context of water allocation and use—provides fewer opportunities to implement market incentives than does an Environment Protection Framework, for example. Generally speaking, there are few requirements to collect new water information to support the development of a plan. Rather it appears that the information required to develop a plan seems to be provided for through general investigation programs (see below, section 6.6).

Local-level water management plans may have force in a number of ways, including through legislative requirements that:

- (vi) authorisations to take water, drill a bore or discharge waste not be granted in contravention of a plan (see, for example, NSW, NT, Qld), or must be granted subject to conditions specified in the plan, or subject to the plan generally (for example, NSW, SA, Tas);
- (vii) a decision-maker, in granting an authorisation to take groundwater or drill a bore, must have regard to a relevant plan (see, for example, WA); or
- (viii) a person exercising a particular function which may affect water resources to which a plan relates, must do so consistently with the applicable plan (see, for example, Tas).

Less commonly, some legislative provisions allow a plan to have a direct effect on water users. For example, in Queensland, a penalty applies to a person who uses water in a water use plan area contrary to a water use plan. In SA, in some circumstances, it is an offence to take groundwater in a way which contravenes an

applicable water allocation plan. (Compare the direct effect of water resource plans under the Commonwealth Water Act, section (c), below.)

**(c) Management plans at the Commonwealth level**

The introduction of the Commonwealth Water Act signifies a significant change in water planning in the Murray-Darling Basin. The Water Act provides for water resource plans, which apply to water resource plan areas that are determined by the MDBA, and the Basin Plan, which applies to the whole Murray-Darling Basin.

The Water Act sets out numerous prescriptive requirements which the Basin Plan must meet. Significantly, the purposes of the Basin Plan are primarily environmental, and only secondarily related to social and economic outcomes. Among other things, the Basin Plan must describe the condition of the Basin water resources (a term which is defined to include groundwater and associated ecosystems), risks to Basin water resources, and a salinity and water quality management plan that includes targets and objectives. However, the Basin Plan may not directly regulate water pollution. There is no Basin Plan currently in effect—the MDBA aims to have the first Basin Plan in place in 2011.<sup>10</sup>

Water resource plans are generally prepared by the Murray-Darling Basin States. However, for the purposes of the Commonwealth Water Act, their plans must meet the requirements of the Basin Plan in order to be accredited. While no Basin Plan is yet in effect, the Commonwealth Water Act allows the Basin Plan to set prescriptive requirements for water resource plans. Indeed, the Basin Plan *must* set requirements for water resource plans in relation to a list of subject matters set out in the Water Act, including water quality and salinity objectives for the water resource plan area.

The Basin Plan and water resource plans are directly legally binding on Commonwealth agencies, State agencies, water entitlement holders and other persons. The MDBA is responsible for enforcing these plans.

The influence of the Commonwealth in water resource planning signifies a significant future shift in how the Basin States formulate their plans. This shift will take place over the next decade or so, as the Basin States' interim and transitional water resource plans expire, and they are required to have water resource plans that are consistent with the Basin Plan.

The Water Act provisions in relation to the Basin Plan and water resource plans are generally consistent with the intent of the National Water Initiative (NWI), which applies throughout Australia. The NWI encourages the jurisdictions to develop statutory water plans to deliver environmental and other public benefit outcomes, including water quality outcomes in surface and groundwater systems, to protect water sources and their dependent ecosystems.

In relation to the Great Artesian Basin, the Commonwealth, Queensland, South Australia, New South Wales and the Northern Territory have agreed a strategic framework for “responsible groundwater and related natural resource management”. The Great Artesian Basin (GAB) Strategic Management Plan contains strategies for protecting groundwater quality, including maintaining bore casings and headworks and developing groundwater pollution and contamination management planning practices for Basin recharge zones.

<sup>10</sup>

See Murray-Darling Basin Authority, *The Basin Plan: A Concept Statement* (June 2009) p.12, available at <http://www.mdba.gov.au/files/publications/basin-plan-concept-statement.pdf>, viewed 11 August 2009.

### Box 6.2: Management plans

**General Findings:** The jurisdictions generally implement the Groundwater Guidelines in relation to groundwater management plans very well. There are numerous different types of management plans in use, at different geographical levels, throughout the jurisdictions. Each of these may deal with groundwater quality in different ways, for example, affecting authorisations to take groundwater, or setting objectives and implementation plans in relation to groundwater quality. It is likely that the Basin Plan under the Commonwealth Water Act, will, over time, significantly change the form and enhance the legal effect of local water management plans for groundwater resources in the Murray-Darling Basin.

**Recommendation:** A future revision of the Groundwater Guidelines should take account of the greatly expanded Commonwealth influence on groundwater management planning, which occurs through the Basin Plan under the Commonwealth Water Act, and the requirements that the Basin Plan will set for water resource plans at the local level.

**Framework Table Reference (Appendix A):** see rows 11-18 of each Groundwater Management Framework Table.

## 6.3 Controls on extraction

The Groundwater Guidelines encourage the integrated consideration of groundwater allocation and use, and groundwater quality.

The States' Groundwater Management Frameworks allow for the consideration of allocation and quality together, as follows:

- (a) Groundwater quality may be a mandatory or discretionary consideration in making a decision in relation to both an authorisation to take groundwater, and also sometimes an authorisation to use the water taken. This applies to the decision to grant an authorisation and also the conditions to impose on it.

Some jurisdictions explicitly provide for decision-makers to consider groundwater quality impacts in relation to authorisation decisions (see, for example, NSW, NT, SA, Vic). More commonly, decision-makers may consider groundwater quality as part of considering a larger matter, such as protection of "the environment" (ACT, NSW, WA, Vic), harm to the water resource (NSW), "sustainable yield" (ACT), or the effects on "natural ecosystems" (Qld). Decisions as to authorisations are also often guided by groundwater management plans, which may make provision for groundwater quality matters (see above, section 6.2).

- (b) Other methods of restricting groundwater extraction may be used to protect groundwater quality, such as:
  - (i) a permanent limit on the amount of groundwater available to be extracted (see, for example, Commonwealth sustainable diversion limits under the Basin Plan, and water management plan provisions of many States);
  - (ii) a temporary limit on the amount of groundwater available to be extracted to protect groundwater quality or GDEs (see, for example, NSW embargoes on specific types of water approvals, and temporary water restrictions to protect aquifer water quality; moratorium notices in Queensland; directions of the SA Environment Minister; and water restrictions in Tasmania);
  - (iii) a direction to a bore owner or occupier to take action in relation to their bore, to protect groundwater quality (see, for example, ACT, Qld, Tas, Vic and WA); and
  - (iv) a notice prohibiting the taking of groundwater which is of a dangerously poor quality (see, for example, ACT, NT, Qld, SA, Tas and WA).



Typically, these methods of restricting groundwater extraction are supported by strong provisions which impose penalties for contraventions.

### Box 6.3: Controls on extraction

**General Findings:** Generally, the Groundwater Management Frameworks of the jurisdictions link groundwater extraction to groundwater quality very well, by: (1) providing for decision-makers to consider groundwater quality when they consider an authorisation to take groundwater; and (2) empowering decision-makers to limit groundwater extraction temporarily or permanently, or to require bore owners to take specified actions to protect groundwater quality.

**Recommendation:** A future revision of the Groundwater Guidelines should reflect the ways of linking groundwater extraction with groundwater quality considerations, which appear in modern Australian legislation, regulation and policy. It could also investigate the related concept of setting aside water for environmental purposes related to protecting groundwater quality, which may be possible, though it is often not explicit, in the jurisdictions' legislation, regulation and policy.

**Framework Table Reference (Appendix A):** see rows 22-24 of each Groundwater Management Framework Table.

## 6.4 Well construction measures and other well-related measures

The Groundwater Guidelines suggest that jurisdictions apply measures such as driller licensing, rules for bore construction, operation, maintenance and abandonment, and measures to control the disposal of waste via wells.

The foundations of the States' implementation of these aspects of the Groundwater Guidelines are legal requirements for a person to hold an authorisation to construct a bore for certain types, or all types of bores—a matter which the Groundwater Guidelines do not discuss. Although the relevant provisions of State legislation rarely explicitly require a decision-maker to consider the groundwater quality impacts of a proposed bore (see, for example, Vic), a decision-maker may consider groundwater quality under a more general provision. For example, the legislation may provide that a decision-maker may:

- (a) have regard to anything it considers relevant or thinks fit (see, for example, ACT, NSW, SA, Tas);
- (b) consider material supplied by the applicant, which assesses the likely impact of the bore (NSW); or
- (c) consider whether the bore would result in environmental harm (Tas), or whether it is “environmentally acceptable” (WA).

Bore drillers are licensed in all jurisdictions.<sup>11</sup> Depending on the precise legislative provisions, it may be possible to apply conditions to a driller's licence in relation to protecting groundwater quality.

Relatively few jurisdictions apply standard rules to the full range of activities relating to bores—construction, operation, maintenance and abandonment or decommissioning. Rather, they tend to impose requirements to only some of these activities. The following are examples of such rules:

- (a) the NT imposes rules on the construction of domestic wells, and requires the owner or occupier of a bore that is no longer in use to ensure that it is properly plugged, sealed off or backfilled;

<sup>11</sup>

For general information, see Australian Drilling Industry Training Committee, “National Well Drillers' Licensing System”, <http://www.aditc.com.au/drillers-licensing>, viewed 14 August 2009.

- (b) Queensland requires bores to be constructed and decommissioned in accordance with specified publications, which set out minimum requirements;
- (c) South Australia and Tasmania both impose enforceable legal requirements that wells be “properly maintained”, and SA requires a person to hold an authorisation to seal a well;
- (d) Victoria requires bore construction and decommissioning to be in accordance with “best practice”; and
- (e) at the supra-State level, the GAB Strategic Management Plan encourages the GAB States to establish codes of practice for the construction, operation and maintenance of bores.

It may be possible to apply relevant rules through conditions on a licence to construct a bore (see, for example, row 25, Vic Groundwater Management Framework Table), or through a groundwater management plan which can impose conditions on licences to construct bores (see, for example, rows 27 and 36, NSW and WA Groundwater Management Framework Tables).

These measures are also supplemented by powers that exist in some States to require an owner or occupier of a bore to take action in relation to the bore to prevent pollution (see above, section 6.3).

Some jurisdictions provide for specific authorisations to dispose of waste via a bore or to deliberately recharge groundwater (see, for example, NT, Tas and Vic), whereas others deal with this under general environment protection legislation (see, for example, Qld).

#### **Box 6.4: Well construction measures and other well-related measures**

**General Findings:** The Groundwater Management Frameworks of the jurisdictions all impose requirements in relation to licensing bore drillers, and in relation to authorisations to construct either all, or some types of bores. However, few jurisdictions apply “default” standard rules to the full range of activities relating to bores—construction, operation, maintenance and abandonment or decommissioning. In some cases, these matters may be dealt with through other means (including conditions on authorisations and management plans), but this may risk an ad-hoc and inconsistent approach.

**Recommendation:** The Groundwater Guidelines should retain a focus on the need to protect groundwater by regulating the construction, operation, maintenance and abandonment or decommissioning of bores.

**Framework Table Reference (Appendix A):** see rows 25-29 and 36-38 of each Groundwater Management Framework Table.

### **6.5 Water supply and the protection of public water supply wells**

The Groundwater Guidelines emphasise the importance of protecting public water supply wellfields, and note that “[t]he contamination prevention measures provided in present groundwater legislation do not provide adequate protection for water supply wells”: p.25.

The jurisdictions have implemented the public water supply protection aspects of the Groundwater Guidelines to differing degrees. Water suppliers do not uniformly have powers to control activities that may contaminate water supply bores, although these powers are frequently given to public health officials and ministers. Conversely, the obligations of water suppliers to monitor the quality of raw groundwater sources and up-gradient areas, and to report and respond to contamination also differ widely between jurisdictions.

In relation to powers to control activities that may contaminate water supply bores, some Groundwater Management Frameworks empower water suppliers, public health officials or ministers to control activities that pollute a drinking water supply (see, for example, NSW, Qld, SA, Tas and Vic). In some jurisdictions, designating a water supply protection area (by

various different names) means that specified potentially polluting activities are prohibited in that area without approval (see, for example, NSW), or that by-laws may be developed to regulate potentially polluting activities (see, for example, Qld and WA). It may also be an offence to pollute a borefield that is used for drinking water supply (see, for example, NT and Qld).

In other jurisdictions, controlling land use and development through Land-Use Planning Frameworks is the primary way, or a significant way, to protect public groundwater supply areas (see, for example, ACT and WA).

Water suppliers' obligations in relation to contamination include the following:

- (a) to develop and implement plans about protecting groundwater, or a risk-based management plan (see, for example, Qld, Tas, Vic and WA);
- (b) to conduct monitoring: in accordance with the Australian Drinking Water Guidelines (see, for example, ACT); or in response to a notice from a public health official (see, for example, NSW, Tas and Vic);
- (c) to develop incident response procedures and emergency plans or management plans in relation to water supply contamination (see for example, ACT, Qld and Tas); and
- (d) to notify a specified public health official of a contamination incident, and provide an associated written report (see for example, ACT, NSW, NT, Qld, Tas and Vic).

Overall, implementation of this aspect of the Groundwater Guidelines is variable, though some jurisdictions have very good implementation, and others plan to introduce new legislation to address gaps (see, for example, SA and WA).

#### **Box 6.5: Water supply and the protection of public water supply wells**

**General Findings:** The jurisdictions have implemented the public water supply protection aspects of the Groundwater Guidelines to differing degrees. Water suppliers do not uniformly have powers to control activities that may contaminate water supply bores, although these powers are frequently given to public health officials and ministers. The obligations of water suppliers to monitor the quality of raw groundwater sources and up-gradient areas, and to report and respond to contamination also differ widely between jurisdictions. This is a rapidly changing area, with some jurisdictions planning to overhaul their legislation.

**Recommendation:** The Groundwater Guidelines should retain a focus on public water supply aspects of groundwater quality protection.

**Framework Table Reference (Appendix A):** see rows 30-35 of each Groundwater Management Framework Table.

## **6.6 Gathering groundwater information**

### **(a) Strategic assessment of groundwater resources**

The jurisdictions do not explicitly mandate a “strategic assessment” of groundwater resources which includes each of the elements suggested by the Groundwater Guidelines, being the magnitude and quality of a resource, recharge and discharge zones, interaction between surface water and groundwater, environmental demands and consumptive demands. Rather, the jurisdictions provide, in more general terms, for collecting information about groundwater resources through both their Groundwater Management Frameworks and also their Environment Protection Frameworks, both of which are addressed in this section. For example, they:

- (i) state that an object of an act (more often an environment protection act rather than a groundwater management act) is to provide for collecting information in relation to the environment generally, or water resources

specifically (for example, the “monitoring and reporting of environmental quality” (ACT); or “the collection, collation, analysis and dissemination of information about Australia’s water resources” (Cth);

- (ii) create an entity with the specific task of assessing the condition of “the environment” or “natural resources”, including water (for example, the Commissioner for the Environment in the ACT, the National Land and Water Resources Audit at the Commonwealth level, the NRM Council in SA, and the Commissioner for Environmental Sustainability in Victoria);
- (iii) grant a minister, the EPA or another entity the function of reviewing the condition of water resources or collecting information in relation to water management (see, for example ACT, NSW, SA, Tas), sometimes specifically for the purpose of assessing whether environmental quality objectives are being achieved (for example NSW, Qld, Vic); and
- (iv) provide for State of the Environment reporting (see, for example, ACT, Cth, NSW, SA, Vic).

Some jurisdictions provide for water assessment programs with greater specificity, for example:

- (i) the ACT EPA and the NT Controller of Water Resources must ensure that a continuous program of assessing water resources is carried out;
- (ii) the Queensland Water Minister must regularly measure water quality, collect information on the water requirements and impacts of water management on natural ecosystems, and collect information about future water requirements;
- (iii) in Victoria, the Water Minister must undertake three types of formal water assessments: a continuous program of assessment of water resources (which must specifically cover water quality and the current and historic condition of aquifers), a program of 15-yearly water resources assessments, and Sustainable Water Strategies, which deal with threats to water quality. Further, the Victorian EPA is to:
  - (A) ensure that monitoring of groundwater quality is adequate to assess compliance with the Groundwaters State Environment Protection Policy, and that relevant agencies assess ambient groundwater quality; and
  - (B) assess the adequacy of the groundwater pollution monitoring program; and
- (iv) the Bureau of Meteorology has the function of collecting, holding, managing, interpreting and disseminating water information, and also undertaking and commissioning investigations to enhance understanding of Australia’s water resources (Cth).

These functions are generally accompanied by powers to install monitoring bores and related infrastructure, and sometimes powers to require a person to provide information in relation to water (see, for example, Qld and Cth).

In some cases, legislation and policy specifically refer to collecting information on the impacts of climate change on water resources (see, for example, SA’s *Water for Good* policy, and the Basin Plan at the Commonwealth level).

Further, at the Commonwealth and supra-State level, national policies emphasise the importance to groundwater management of an adequate information base. The Commonwealth Water Act and Water Regulations empower the Bureau of Meteorology to collect water information from over 200 different entities around Australia, and the GAB Strategic Management Plan provides for a strategy to monitor groundwater quality. Significantly, the Basin Plan under the

Commonwealth Water Act must not only identify the risks to the condition of the Basin water resources posed by climate change, but also “the limitations on the state of knowledge on the basis of which estimates about matters relating to Basin water resources are made”. This is particularly relevant to groundwater quality, given generally low levels of data.

**(b) Particular groundwater information and analysis**

The Groundwater Guidelines specifically mention carrying out monitoring of critical overdraw of groundwater, vulnerability mapping, and aquifer classification systems. Relatively few jurisdictions specifically provide for all of these measures, in addition to the general types of assessments outline above, at section 6.6(a). Those that do provide for these measures do so in the following way:

- (i) the Basin Plan under the Commonwealth Water Act must identify the risk posed by the taking and use of water to the continued availability of the Basin water resources;
- (ii) the NSW Groundwater Quality Protection Policy, which is a non-statutory policy, provides for vulnerability mapping and aquifer classification. It states that aquifer classification has been used to determine the priority for developing groundwater management plans. The most recent NSW State Water Management Outcomes Plan (now expired) also provides for aquifer water quality vulnerability zones and associated measures to protect against significant changes to groundwater quality, such as water quality criteria for monitoring bores, which can trigger a change in the extraction rate for licensed bores if quality is threatened;
- (iii) in Queensland, the Environmental Protection (Water) Policy requires that in developing and implementing plans about protecting groundwaters, vulnerability maps and aquifer classification systems be considered for inclusion;
- (iv) SA has committed to developing a Stressed Resources Methodology to identify groundwater that is at risk of stress and to expanding the groundwater monitoring network accordingly. The concept of groundwater quality vulnerability, though not the terminology of “vulnerability mapping”, is used in the context of risk assessment for drinking water quality;
- (v) Victorian statutory policy contains reference to a hydrogeological information system that clearly defines aquifers and their vulnerability to pollution; and
- (vi) WA classifies aquifers used for drinking water according to three different “priority classifications”, and classifies groundwater resources generally into “level of use categories”.

### Box 6.6: Gathering groundwater information

**General Findings:** The jurisdictions (including the Commonwealth) provide for the assessment of groundwater resources through granting an entity a function related to assessing the condition of the environment or natural resources, State of the Environment reporting, and in some cases, specific water or groundwater quality assessment programs. Relatively few jurisdictions provide formally for specific programs such as monitoring critical overdraw, aquifer classification and vulnerability mapping.

**Recommendation:** A future revision of the Groundwater Guidelines should reflect the introduction of the Commonwealth Water Act, which has seen a significant increase in the legislative focus on gathering information relating to water resources at the Commonwealth level, through the Bureau of Meteorology and the MDBA. It should also reflect emerging concerns about the impact of climate change on groundwater quality and associated GDEs.

**Framework Table Reference (Appendix A):** see rows 39-43 of each Groundwater Management Framework Table and row 8 of each Environment Protection Framework Table.

## 7. Environment Protection Framework

The Groundwater Guidelines suggest that environment protection legislation, regulation and policy should provide for implementing the waste hierarchy (in brief—reduce, re-use, recycle), environmental impact assessment, licensing of contaminants and point sources, monitoring requirements, contingency measures and controls over diffuse-source pollution.

Another key element of the Groundwater Guidelines—the water quality protection objectives and beneficial uses—is also generally dealt with through the jurisdictions’ Environment Protection Frameworks, and is discussed in this section.

### 7.1 Water quality protection objectives and beneficial uses

All jurisdictions have provided for the concepts of water quality protection objectives and beneficial uses in their legislation, regulation and policy, though they do so in different ways. Section 4.4, above, discusses the ways in which the jurisdictions reflect beneficial uses as an “underlying principle” of each of their Groundwater Management, Environment Protection, and Land-Use Planning Frameworks. This section discusses how the Environment Protection Framework of each jurisdiction defines and identifies beneficial uses and values, how they apply criteria, the monitoring program used in relation to beneficial uses and values, and enforcement of the criteria.

#### (a) Defining beneficial uses and environmental values

The jurisdictions use different terminology in relation to “beneficial uses”, as they are known under the Groundwater Guidelines. The ACT, NSW, Queensland, SA, Tasmania and WA use the term “environmental values” or “protected environmental values”; whereas the NT, Victoria, and some NSW policy documents use the term “beneficial uses”.

The environmental values and beneficial uses for which the jurisdictions provide also tend to vary slightly. Taking them together, the jurisdictions provide for the following environmental values or beneficial uses for groundwater or water generally (in the latter case, the list excludes those that are specific to surface water):

- Agriculture / Parks and gardens (NT, Qld, SA, Tas, Vic)
- Aquaculture (NT, NSW, Qld, SA)
- Buildings and structures (Vic)
- Cultural and/or spiritual values (NSW, NT, Qld, SA)
- Discharge – treated wastewater (ACT)
- Discharge – stormwater (ACT)

Domestic water supply / public water supply / water storage (ACT, NSW, NT, Qld, SA, Tas, Vic)  
 Environment / Ecosystems (NT, NSW, Qld, SA, Tas, Vic)  
 Industry (NT, NSW, Qld, SA, Tas, Vic)  
 Irrigation water supply (ACT, NSW, Tas)  
 Recreation / Aesthetics (NSW, Qld, SA, Tas, Vic)  
 Waterscape (ACT)  
 Stock water supply (ACT, NSW, NT, Tas, Vic)

Some jurisdictions further sub-divide beneficial uses or environmental values based on the level of “disturbance” of the water source (see, for example, Qld) or the particular “segment” (a term which describes the ambient level of total dissolved solids— see, for example, Vic).

## **(b) Identifying beneficial uses and environmental values**

Having defined the range of environmental values or beneficial uses, the jurisdictions’ legislation, regulation and policy identifies them for particular groundwater sources in different ways, for example by:

- (i) allocating them to particular categories of catchments—conservation, water supply and drainage and open space catchments (ACT) or to particular aquifer “segments” based on the general water quality in the aquifer (Vic);
- (ii) using a non-statutory public consultation process for individual water bodies (NSW), or providing a statutory process for identifying environmental values for particular bodies of water (NT, Qld, SA, Tas); and
- (iii) applying the same default beneficial uses or environmental values to all groundwater in the jurisdiction (Qld, SA).

It is notable that while most jurisdictions provide a process for identifying beneficial uses or environmental values for both groundwater generally, and also for particular groundwater bodies, in some jurisdictions one of these approaches is favoured over the other. For example, the NT and WA have set beneficial uses or environmental values for some groundwater bodies, but not for groundwater throughout the jurisdiction. Conversely, Qld and SA apply the same beneficial uses or environmental values throughout the jurisdiction, and have not identified specific beneficial uses or environmental values for particular aquifers. It appears that Tasmania has not identified protected environmental values for any groundwaters.<sup>12</sup>

Neither of these forms of implementation fully meets the intention of the Groundwater Guidelines. Under the Guidelines, beneficial uses and values should be defined comprehensively, and tailored to the circumstances of particular aquifers, for example their size, vulnerability, uses, existing quality, and dependent environmental features.

Over time, beneficial uses and environmental values may be applied in a more tailored and comprehensive way in the Murray-Darling Basin States through the Basin Plan under the Commonwealth Water Act, which sets requirements for water resource plans at local levels. One type of requirement which must be included in the Basin Plan is a requirement as to water quality objectives for water resource plan areas.

## **(c) Criteria**

Under the Groundwater Guidelines, narrative or prescriptive “criteria” flow from beneficial uses or environmental values identified for groundwater bodies. These criteria are used to guide decision-makers dealing with potentially polluting activities.

<sup>12</sup>

Department of Environment, Parks, Heritage and the Arts Environment Division, *Review of the State Policy on Water Quality Management 1997: Discussion Paper* (October 2008), p.51, available at <http://www.environment.tas.gov.au/file.aspx?id=3719>, viewed 13 August 2009.

Criteria may be applied at the boundary of a zone of discharge, at the boundary of the property upon which a contaminant is discharged, or at the point of discharge.

As with beneficial uses and environmental values, the terminology used to describe the concept of “criteria” in the Groundwater Guidelines varies throughout Australia. The ACT refers to “ambient environmental standards” (which do not appear to apply to groundwater); the Commonwealth Water Act refers to “water quality objectives” and “water quality targets”; NSW uses “numerical criteria” or “trigger values”; the NT uses “quality standards”, “criteria”, or “water quality guidelines”; Queensland uses “water quality guidelines”; SA and WA use “criteria”; Tasmania uses both “water quality guidelines” and “water quality objectives” and Victoria uses “objectives”.

Overall, the jurisdictions use prescriptive numerical, rather than narrative criteria, with the exception of Victoria, which uses a mix of both. The jurisdictions rarely explicitly state the point of application of the criteria. Queensland, South Australia and Victoria appear to apply criteria to the whole of a groundwater body, except for a designated attenuation zone. Victoria also provides for “groundwater protection zones”, in which more stringent objectives apply, but it appears that no such zones have yet been set. In Victoria, notwithstanding a particular objective, groundwater quality is to be maintained as close as practicable to background levels.

**(d) Monitoring and review**

Most jurisdictions (except for NSW, which does not use a statutory process for beneficial uses and values, and the NT) provide for regular reviews of the key instrument in relation to beneficial uses or environmental values, at intervals of 5, 7 or 10 years, or at an unspecified interval.

Some jurisdictions explicitly require a review to consider whether the instrument is effective to secure the objects of the relevant legislation (SA), or to consider the effectiveness of the implementation of the instrument (Vic). Only Victoria explicitly requires a review of the relevant instrument to consider the effectiveness of the groundwater pollution monitoring program.

**(e) Implementation and enforcement**

The regime of beneficial uses or values and criteria is used in the following ways:

- (i) direct implementation via enforceable conditions on water-related authorisations (see, for example NT, Vic);
- (ii) direct implementation on the basis that contravening applicable criteria may constitute an offence (see, for example NT, SA, Tas and WA);
- (iii) a factor which must be considered when a decision-maker determines whether to grant an environment protection authorisation in relation to a potentially polluting activity (see, for example, NT and WA), or when a decision-maker carries out other environment protection-related functions (see, for example, Qld and Vic); and
- (iv) a factor which a decision-maker may consider, but which they are not bound to consider (in NSW).



### Box 7.1: Water quality protection objectives and beneficial uses

**General Findings:** The jurisdictions generally implement the concepts of beneficial uses or environmental values well, although they tend not to determine them on an aquifer-specific basis, as was the intention of the present Guidelines. The application of criteria, and monitoring programs for the implementation of beneficial uses and values, tend not to be specified in detail. Beneficial uses and environmental values are used, and may be enforced, in the context of conditions on authorisations to take water and to undertake potentially polluting activities, and also in relation to pollution offences. They are also used as mandatory or discretionary considerations for decision-makers. The terminology used in relation to beneficial uses and values and criteria varies widely across the jurisdictions.

**Recommendation:** A future revision of the Groundwater Guidelines should consider the expanded list of beneficial uses/environmental values used by current legislation, regulation and policy, which goes beyond the five classes set out in Appendix II of the Groundwater Guidelines. It may also assist the jurisdictions to set out examples from current legislation, regulation and policy, of the ways in which criteria may be implemented or enforced.

**Framework Table Reference (Appendix A):** see rows 9-15 of each Environment Protection Framework Table.

## 7.2 Waste hierarchy

The Groundwater Guidelines includes, as an environment protection measure for the benefit of groundwater protection, strategies based on the “waste hierarchy”. Under the waste hierarchy, actions are approached in the following order according to decreasing desirability: waste avoidance, waste re-use, recycling or waste reclamation, waste treatment to reduce potential degrading impacts, and waste disposal.

The Environment Protection Frameworks of the jurisdictions approach and adopt the waste hierarchy in different ways, by:

- (a) adopting special waste minimisation legislation (see, for example ACT, Cth in relation to oil waste, NSW, SA, Vic and WA), which typically includes some or all of the following:
  - (i) legislative objects which include the waste hierarchy;
  - (ii) enforceable waste management plans, schemes or covenants for industry, which generally set out waste reduction targets, related actions and monitoring arrangements; and
  - (iii) provision for a state strategy to minimise waste.
- (b) including the waste hierarchy as an object of the general environment protection legislation (see, for example, NSW, Qld, SA, Tas, Vic and WA), and implementing it through the measures listed above and the following measures:
  - (i) conditions on authorisations required to undertake potentially polluting activities;
  - (ii) a direction to a polluter to carry out remedial works, including a plan of action to minimise pollution or waste;
  - (iii) requiring a decision-maker to consider the waste hierarchy generally in making environmental management decisions;
  - (iv) requiring a proponent undertaking EIA to demonstrate that the project reflects the waste hierarchy; and

- (v) waste-related levies, which fund waste minimisation initiatives.

### Box 7.2: Waste hierarchy

**General Findings:** The jurisdictions have generally implemented the waste hierarchy well, using specific waste legislation as well as general environment protection legislation. Although not specific to groundwater, the measures adopted seem likely to reduce groundwater pollution in the long term.

**Recommendation:** A future revision of the Groundwater Guidelines may assist the jurisdictions by providing some examples as to how the waste hierarchy has been adopted.

**Framework Table Reference (Appendix A):** see row 16 of each Environment Protection Framework Table.

## 7.3 Licensing of point sources and discharges in protected areas

The jurisdictions' Environment Protection Frameworks each require certain potentially polluting activities (and in some cases, the construction of works for the activities) to be authorised if they are carried out at a particular intensity or are of a particular size. The types of activities which require an authorisation differ slightly between the jurisdictions, but generally reflect those set out in Appendix I of the Groundwater Guidelines.

Some legislation requires activities which have a particular impact, regardless of the type of industry, to have an environmental authorisation. For example, at the Commonwealth level, authorisation is required for activities that have, will have, or are likely to have a "significant impact" on a protected matter. In Victoria, an authorisation is required for "an activity which creates a state of potential danger to the quality of the environment or any segment of the environment", where "environment" is defined to include waters, which is in turn defined to include groundwater.

Groundwater quality may be considered in the grant of an environmental authorisation by:

- (a) requiring or empowering the decision-maker to consider the instruments which set out beneficial uses or environmental values of groundwater (see, for example, ACT, NSW, NT, SA);
- (b) requiring the decision-maker to consider the potential for the activity to cause "environmental harm" or "pollution", terms which encompass impacts on groundwater (see, for example, ACT, NSW);
- (c) empowering the decision-maker to impose conditions on the authorisation, such as conditions which require the holder to comply with discharge standards, an industry standard or code of practice (ACT, Cth), management plans or audits (NSW), financial assurances (see, for example, NSW and SA), or environment improvement programmes (see, for example, SA).

Some jurisdictions provide for categories of activities, which are subject to varying degrees of control (see, for example, ACT and Tas). For example, in the ACT, carrying out a "class B activity" requires an environmental protection agreement. An environmental protection agreement may require the proponent to meet progressively higher standards to minimise or eliminate environmental harm.

In addition to environmental authorisations issued under general environment protection legislation, authorisations are also issued under legislation relating to specific subject matters, such as mining, quarrying, pesticides, hazardous chemicals, petroleum, dangerous goods, agricultural chemicals, geothermal energy and greenhouse gas sequestration and storage. They generally allow decision-makers to consider groundwater quality in the same ways as described above. In the context of resources industries, however, there is also a strong focus on:

- (a) environmental management plans or other plans for operations, which may require a proponent to describe the environmental values likely to be affected by mining activities and propose ways to protect or enhance them (see, for example, Qld, SA, Vic and WA);
- (b) site rehabilitation, which may require a proponent to propose objectives for progressive and final rehabilitation (see, for example, Qld and Vic). Rather than imposing default standards for rehabilitation, the legislation tends to require a rehabilitation plan to be approved, allowing standards to be set on a case-by-case basis;
- (c) providing financial securities or bonds (for which all jurisdictions provide); and
- (d) requirements to maintain insurance policies in relation to damage arising from environmental damage, sometimes specifically damage by “seepage” (see NT).

Some jurisdictions impose standard conditions in relation to groundwater in the minerals context (see, for example, Vic and Qld). For example, Queensland’s Exploration and Mineral Development Code requires the holder of an environmental authority to take specific action in relation to spills of hazardous contaminants, releasing wastewater to groundwater, isolating non-artesian aquifers from other water-bearing strata, and decommissioning drill holes according to specified standards.

Some resources legislation tends to take a risk-based approach to environmental damage and pollution risks that may arise from resources activities. This is particularly evident in Victorian petroleum, geothermal energy, and greenhouse gas sequestration legislation, and in Western Australian petroleum legislation, which require a risk-based approach to operations plans and environmental management plans, respectively.

Some resources legislation also provides for general environmental duties, such as a duty to carry out petroleum activities with “due care for the environment” (see, for example, SA).

Some jurisdictions use their Environment Protection Frameworks to impose more stringent requirements in relation to activities in protected areas. This includes, for example, water supply areas in the ACT and NSW, Commonwealth reserves, conservation zones, and Ramsar wetlands (Cth), “chemical control areas” in the NT, “water protection zones” in SA; “groundwater protection zones” in Victoria, and State forests and other parks and reserves in WA. In most jurisdictions, however, Land-Use Planning Frameworks are the primary way of regulating activities in protected areas.

### **Box 7.3: Licensing of point sources and discharges in protected areas**

**General Findings:** The general environmental protection legislation in all jurisdictions requires certain activities that are potentially polluting (and in some cases, the construction of works for the activities) to be authorised, usually if the activities are carried out at a particular intensity or are of a particular size, or if they have a particular level of impact. Special legislation is used for issuing authorisations in relation to mining, quarrying, pesticides, hazardous chemicals, petroleum, dangerous goods, agricultural chemicals, geothermal energy and greenhouse gas sequestration and storage.

**Recommendation:** A future revision of the Groundwater Guidelines could be updated to consider authorisations that apply to new industries such as geothermal energy and greenhouse gas sequestration and storage.

**Framework Table Reference (Appendix A):** see row 17 and 20 of each Environment Protection Framework Table.

## **7.4 Environmental impact assessment**

The jurisdictions all provide for some form of EIA, though they do so in different ways, and apply different triggers to a requirement for impact assessment. EIA assists decision-makers to determine whether a project may proceed, and if so, on what conditions. “Accredited assessment” measures are in place to reduce duplication in cases where

assessment is required at both the Commonwealth and State levels (see row 18, Cth Environment Protection Framework Table).

EIA may be required for:

- (a) particular types of developments, such as development proposals in the “impact track” in the ACT (which includes proposals with the potential to have a significant impact on an environmental value, and certain specific types of developments); “designated developments” such as petroleum works and concrete works in NSW; and “assessable development” requiring impact assessment under a planning scheme in Queensland;
- (b) developments which have a particular level of impact, such as actions which are likely to have a significant impact on a matter of national environmental significance, for example, the ecological character of a declared Ramsar wetland, a declared World Heritage property or a listed threatened species (see Cth); or proposals which are likely to have a “significant effect” on the environment in WA; and/or
- (c) developments which a decision-maker determines should be subject to EIA (see, for example, ACT, NSW, NT, Qld, SA, Vic – only in relation to public works).

Different levels of assessment are generally available to carry out the EIA – assessment on preliminary information, public environment report, environmental impact statement, and public inquiry (see, for example, Cth, SA and WA). The process also generally involves public exhibition and submissions.

The jurisdictions generally guide a proponent as to the required contents of an environmental impact statement (**EIS**), either on a case-by-case basis (see, for example, NT), or under published guidelines or regulations (see, for example, Qld, Tas and WA). For example, in Queensland, the proponent must prepare an EIS that includes a series of matters that are specific to groundwater, including its vulnerability to pollution, the possible impacts of the project on groundwater, and practical measures to protect or enhance relevant environmental values. Tasmania requires a proponent to demonstrate that the proposal is consistent with the instrument which sets out environmental values for groundwater. Documents relevant to EIA in WA mention water quality and the effects of water quality on stygofauna as matters which a proponent should consider in some circumstances.

Some jurisdictions require the relevant decision-maker to consider a list of factors when preparing an assessment report. For example, in Queensland, the decision-maker must consider “standard criteria”, which include: the instrument setting out beneficial uses and values for groundwater, the character, resilience and values of the receiving environment; and best practice environmental management.

In addition to EIA that applies to specific developments, some jurisdictions also provide for strategic environmental assessment in relation to policy matters or plans, rather than in relation to an individual development (see, for example, ACT and Cth). Such assessment may assist in dealing with diffuse sources of pollution, which would not otherwise be subject to environmental controls.

#### **Box 7.4: Environmental impact assessment**

**General Findings:** All jurisdictions provide for EIA, though they use different triggers for assessment, and provide for different levels of assessment. Some jurisdictions which guide proponents as to the factors which they must consider in preparing EIA documents specifically mention groundwater quality and GDEs. A higher-level variant of EIA—strategic impact assessment—is in its early stages of development and may prove useful in dealing with diffuse sources of pollution.

**Recommendation:** A future revision of the Groundwater Guidelines should investigate and discuss the potential for a relatively new and developing technique, strategic impact assessment, to assist in groundwater quality protection.

**Framework Table Reference (Appendix A):** see row 19 of each Environment Protection Framework Table.

### **7.5 Monitoring requirements**

The Groundwater Guidelines emphasise the importance of monitoring to ensure that groundwater contamination is controlled and to enforce compliance with legislative requirements.

The jurisdictions' Environment Protection Frameworks provide for monitoring in numerous ways, including through a requirement imposed on:

- (a) an environmental authorisation (see all jurisdictions);
- (b) various binding agreements made between State EPAs and persons undertaking potentially polluting activities (for example, environmental protection agreements in the ACT); and
- (c) contingency measures, which are imposed to direct a person to remedy pollution or environmental harm (for example, environment protection orders in the ACT and SA, remediation determinations at the Commonwealth level, prevention notices in NSW, and pollution abatement notices in Victoria).

Some jurisdictions also include monitoring in the objects of their general environment protection legislation. For example, the objects of the NSW Protection of the Environment Operations Act include reducing risks to human health and preventing the degradation of the environment through mechanisms that promote “the monitoring and reporting of environmental quality on a regular basis”. Queensland’s Environment Protection Act includes, in a “phase” through which the objects of the Act are to be achieved, “monitoring the impact of the release of contaminants into the environment”.

#### **Box 7.5: Monitoring requirements**

**General Findings:** The jurisdictions implement monitoring requirements through numerous instruments under their Environment Protection Frameworks, including conditions on authorisations, agreements with State EPAs, and directions to remedy pollution or environmental harm. The legislation provides for imposing monitoring requirements, but does not include detailed considerations as to monitoring points, frequency, etc.

**Framework Table Reference (Appendix A):** see row 21 of each Environment Protection Framework Table.

### **7.6 Contingency measures**

The Groundwater Guidelines suggest that groundwater protection should include legislative requirements in relation to cleaning up contaminated groundwater. The Guidelines note that legislation in Victoria and Western Australia includes considerable powers in relation to clean-up.

The jurisdictions all generally provide well for contingency measures, using methods which are generally common across jurisdictions, although the terminology used is quite different. Commonly used terms for such measures are: environment protection orders or directions, remediation orders, clean-up notices or orders, prevention notices, prohibition notices, and pollution abatement notices.

These types of measures are used to order a person to comply with the terms of legislation or instruments under the legislation (for example, an authorisation or an instrument setting out beneficial uses or environmental values); to order remediation or clean-up of pollution; or to order a person to cease or modify activities that are causing pollution.

In some cases, an order or notice may be given to a person who the EPA believes has contravened or is contravening a requirement, or to the occupier or owner of land on which such an activity is occurring (see, for example, ACT and NSW).

Some jurisdictions also provide for contingency measures under separate legislation or regulation relating to contaminated land and pesticides. Separate land contamination legislation has the advantage that it may cover historical pollution, and pollution that is caused by activities that are not required to be licensed under general environment protection legislation (see, for example, see SA).

Contingency measures in relation to contaminated sites may require immediate remediation and longer-term management. They may also relate to pollution over wider areas.

- (a) in NSW, a person may be served with a management order in relation to land which has been declared to be “significantly contaminated land”, directing the person to submit a plan of management or carry out specified actions, which may include remediation and monitoring the effectiveness of remediation. In NSW, a hierarchy applies to the standard of remediation, in decreasing order of preference: clean-up so that natural background water quality is restored; clean-up to protect the relevant environmental values of groundwater, and human and ecological health; and clean-up to the extent practicable;
- (b) in Victoria, a person may be served with a notice to take clean-up and ongoing management measures, in response to pollution, the dumping of industrial waste or a potentially hazardous substance, or a likely environmental hazard caused by those substances. Such a notice may specify any condition, requirement, restriction, performance standard or level that the EPA thinks fit. Similarly, closure notices in WA require ongoing monitoring or specified management in relation to premises that were the subject of an environmental authorisation, after the authorisation expires; and
- (c) in SA, the EPA may declare a “special management area” if it has reason to believe that site contamination exists in a wide area, as a result of the same kind of, or related, activities. The EPA may then endeavour to conclude one or more environment performance arrangements or voluntary arrangements in relation to assessing and remediating the area.

Contingency measures directed at a particular polluter or polluted site are generally supplemented by powers of the EPA or another entity to take action to prevent pollution or environmental harm, or clean up pollution and rectify environmental harm, and to recover the costs of doing so from a appropriate person (see, for example, Cth, NT and WA).

### **Box 7.6: Contingency measures**

**General Findings:** The jurisdictions have a large number of tools available to them to direct a person to clean up pollution or contaminated land, rectify environmental harm, or cease or modify an activity which is polluting or causing environmental harm.

**Recommendation:** A future revision of the Groundwater Guidelines should be updated to reflect the fact that stronger contingency measures are now available in all jurisdictions.

**Framework Table Reference (Appendix A):** see row 22 of each Environment Protection Framework Table.

## **7.7 Controlling diffuse sources**

Since the publication of the Groundwater Guidelines, the jurisdictions have introduced a significant number of legislative, regulatory and policy tools to deal with diffuse sources of pollution, though it is not suggested that they are sufficient to address pollution, nor that they have been comprehensively implemented across the nation. These tools tend to focus on market incentives to deal with diffuse source pollution. For example, the following tools are now available:

- (a) offences in relation to discharging polluted stormwater (see, for example, ACT) and codes of conduct which apply to stormwater pollution control (see, for example, SA);
- (b) enforceable obligations in relation to a person who uses certain chemical products to take all measures that are reasonable and practicable to ensure that the use does not result in harm to the environment (see for example, NT);
- (c) a non-statutory Diffuse Pollution Strategy in NSW, which includes developing and implementing best management practice guidelines and standards, identifying pollution hotspots, and delivering incentives to landholders to undertake best management practices in pollution hotspots;
- (d) NSW proposals to implement a salinity control credit trading scheme, taxation incentives, levies and subsidies, and a business development program directed at dealing with salinity (see, for example, NSW);
- (e) the power to make land management agreements that address land degradation (a term which includes declining water quality) on land in Queensland which is covered by pastoral leases and some protected areas (see also, WA); and
- (f) the application of best practice environmental management guidelines to activities that have the potential to be diffuse sources of groundwater pollution (see, for example, Victoria).

Several jurisdictions have adopted policies which deal with the potential impacts of aquifer acidification in coastal areas containing acid sulfate soils (see, for example, Cth, NSW, Qld and SA).

Note also that developing techniques of strategic impact assessment (see section 7.4 above) have the potential to help control diffuse source pollution.

### Box 7.7: Controlling diffuse sources

**General Findings:** The jurisdictions have developed the tools available to address diffuse source pollution since the Groundwater Guidelines were published, and now emphasise the use of market incentives and “best practice management”. However, the tools available do not capture a complete range of potentially problematic activities, nor are they available in all jurisdictions.

**Recommendation:** A future revision of the Groundwater Guidelines should retain a focus on diffuse sources of pollution, but should provide further detail on the types of modern tools available to address diffuse sources, both in Australia and also (given the need for further development of this area in Australia) overseas. It should also discuss the issue of acid sulfate soils, which many jurisdictions now address.

**Framework Table Reference (Appendix A):** see row 23 of each Environment Protection Framework Table.

## 8. Land-Use Planning Framework

The Groundwater Guidelines regard land-use planning options as “a principal means of providing protection for groundwater resources”: p.43. The Guidelines suggest that the following key elements are useful in this respect:

- (a) appropriate zoning, and a land-use risk matrix to judge the compatibility of land uses with water quality protection;
- (b) protection for water supply protection areas and groundwater recharge zones;
- (c) controls on developments, and other “risky” matters for groundwater contamination, such as vegetation clearing, runoff, and the use of sewage effluent; and
- (d) ways to manage the risks of developments which are permitted.

The Guidelines also encourage the use of particular measures in the development and administration of planning measures—interagency coordination, public consultation, monitoring and review, and enforcing land-use planning measures.

The States’ Land-Use Planning Frameworks are still generally regarded as a key way to control pollution, land degradation, and water quality deterioration.<sup>13</sup> With the exception of the smaller jurisdictions, these Land-Use Planning Frameworks generally consist of:<sup>14</sup>

- State-level or regional statutory plans or policies (here called “**State plans**”), which set out policies in relation to particular subject matters, apply standard requirements to lower-level plans, or less commonly, control development directly. State plans include the National Capital Plan and Territory Plan in the ACT; State environmental planning policies, and a Standard Instrument for Local Environmental Plans in NSW; the NT Planning Scheme in the NT; State planning policies and state planning regulatory provisions in Queensland; the Victoria Planning Provisions in Victoria; and State Planning Policies in WA; and
- regional or local-level planning schemes (here called “**planning schemes**”), which directly regulate development at the local level. Planning schemes include: local environmental plans in NSW; planning schemes in Queensland, Tasmania and Victoria; development plans in SA; and region planning schemes, local planning schemes and planning control areas in WA.

<sup>13</sup> See, for example, Gerry Bates, *Environmental Law in Australia* (6<sup>th</sup> ed., 2006), p.267. Note that the Commonwealth does not have legislative power over land-use planning.

<sup>14</sup> Note that this Review deals with catchment action plans and other similar plans within the Groundwater Management Frameworks, however, these could also be considered a part of Land-Use Planning Frameworks.



NSW also has a series of non-statutory groundwater policies which focus particularly on land-use planning. SA's Planning Strategy is another policy which does not have legal effect in terms of affecting rights or liabilities.

Developments, and sometimes uses of land, are assessed against the requirements of planning schemes, which themselves are guided by State plans (though not necessarily always subject to them).

If a development requires consent to proceed (a matter that is generally determined by the applicable planning scheme, or in some cases, a state-wide policy), in some jurisdictions a decision maker must consider environmental effects generally, which may include groundwater quality impacts in (see, for example, NSW, Qld, Vic). For example, in Victoria, a decision-maker must consider the "significant" environmental effects of a proposed development; in NSW, a decision maker is to have regard to, among other things, "the likely impacts of that development, including environmental impacts on both the natural and built environments".

In addition to general planning legislation, regulation and policy, Land-Use Planning Frameworks can include legislation, regulation and policy in relation to native vegetation, and management of Crown land (that is, land that is not private land). Crown land management may be a significant influence on groundwater protection in some states where the majority of and in the State is Crown land (for example QLD and WA)

**Framework Table Reference (Appendix A):** see rows 5, 8, and 23 of each Land-Use Planning Framework Table.

## 8.1 Land zoning and land-use risk matrices

Planning schemes generally provide for land zoning to indicate the suitability of land for particular uses, prohibit inappropriate uses (except in Queensland, where no use or development is prohibited), and grant a discretion to the relevant decision-maker to decide whether a use is permissible. In this way, land which overlies vulnerable groundwater bodies may be zoned in such a way that potentially polluting activities are prohibited, or permitted subject to conditions. However, Land-Use Planning Frameworks do not specifically require zoning to reflect groundwater conditions.

This Review found only one reference in States' Land-Use Planning Frameworks to a "land-use risk matrix" which would require zones to be applied based on land suitability, and that occurred only in a non-statutory policy. The NSW Groundwater Quality Protection Policy promotes using a risk assessment for new developments, based on three variables: the threat factor; the vulnerability of the groundwater system; and the beneficial use or environmental values of the groundwater system, including GDEs.

However, in several cases, in considering whether to grant an authorisation for a use or development, the following matters which are closely related to the suitability of the land and underlying groundwater are relevant:

- (a) in the NT, "the land's suitability for the purposes of the proposed development and the effect of development on that land";
- (b) in Queensland, the provisions of the Acid Sulfate Soils State Planning Policy, which affects the assessment of development applications involving excavation; and
- (c) in the ACT, a pattern of development which reflects "land capability constraints", including "geotechnical factors" and drainage.

Further, in some jurisdictions, planning schemes:

- (a) must give effect to an objective "to provide a planning framework which fully considers land capability" (Tas);
- (b) set out zones based on "broadly similar natural values" (Tas); and

- (c) provide for “land capability assessment” or considering the capacity of the land in relation to particular developments, and prevent inappropriate development in areas affected by groundwater salinity (Vic – these provisions are part of all planning schemes).

#### **Box 8.1: Land zoning and land-use risk matrices**

**General Findings:** Although the jurisdictions’ Land-Use Planning Frameworks rarely explicitly use the concept of a land use-risk matrix, zoning provisions and considerations relevant to granting a planning authorisation refer to land capability and suitability in ways which may protect groundwater.

**Recommendation:** In considering a future revision of the Groundwater Guidelines, it may be useful to consider the utility and practicality of the concept of a land-use risk matrix, and the likely reasons for low levels of implementation.

**Framework Table Reference (Appendix A):** see rows 8-10 of each Land-Use Planning Framework Table.

## **8.2 Protection for drinking water sources and recharge zones**

The jurisdictions protect drinking water sources and groundwater recharge zones in various ways, although they do not uniformly do so. Examples of land-use planning methods to protect water supplies and recharge zones include:

- (a) using codes for development, which identify planning, design and environmental controls for differing land uses, development types, zones, and precincts in the ACT. For example, the Water and Catchment General Code has the objectives of protecting and conserving water quality and ensuring that catchment uses are consistent with maintaining the water quality of the supply;
- (b) applying zones which are designed for water supply areas, or designations which may be used for that purpose, such as water management zones in the NT, the purpose of which is to “restrict development within a water catchment area or other area providing surface or ground water for public supplies”; environmental management zones in Tasmania; and planning control areas in WA;
- (c) requiring planning schemes to deal with a catchment or recharge area as a core matter (see, for example, Qld);
- (d) using groundwater management plans as a vehicle for wellhead protection zones (see, for example, NSW);
- (e) requiring planning schemes to be consistent with declarations of catchment areas under water legislation, or with instruments setting out the beneficial uses or environmental values (which include potable supply) of groundwater (see, for example, Qld, SA and WA);
- (f) lowering the trigger for assessing developments, or referring matters to other agencies, if they are proposed to be carried out in water supply areas (see, for example, SA and Vic); and
- (g) providing for the reservation of Crown land for purposes relate to water supply (see, for example, NT)

At the supra-State level, the GAB Strategic Management Plan provides for: developing a “groundwater protection strategy for Basin recharge zones”, which would seek to ensure that “recharge zones are identified and protected from inappropriate land uses or land use change through land use planning mechanisms”; and developing and implementing “a monitoring schedule for water levels and quality in recharge zones”.

### **Box 8.2: Protection for drinking water sources and recharge zones**

**General Findings:** The jurisdictions protect groundwater supplies and recharge zones through their Land-Use Planning Frameworks in various ways, including through zoning, linking planning schemes with elements of the Groundwater Management Framework, and provisions in relation to assessing proposed developments.

**Recommendation:** A future revision of the Groundwater Guidelines may assist the jurisdictions by providing some examples of the mechanisms used to protect drinking water sources and recharge zones.

**Framework Table Reference (Appendix A):** see rows 5, 11 and 12 of each Land-Use Planning Framework Table and row 27 of the Commonwealth Environment Protection Framework Table.

## **8.3 Controls on particular developments and risky activities**

### **(a) General controls on potentially polluting developments**

At the Commonwealth level, the National Strategy for ESD states that Governments will work to ensure that development decisions which impact on water resources are based on acceptable water quality criteria, with efforts focused on minimising pollution.

A planning scheme may determine that developments which have the potential to cause groundwater pollution are either prohibited or subject to assessment and consent, taking into account specified considerations.

Controls on risky activities often are imposed throughout a jurisdiction using State policies or regulations (see, for example, NSW, Qld, SA, Vic and WA). For example:

- (i) In NSW, some particularly risky developments are regulated under State environment planning policies. The NSW State environment planning policies that deal with mining and petroleum and with intensive agriculture provide that these activities generally require consent to proceed. In the case of mining or petroleum developments, the decision-maker must consider conditions to ensure that impacts on significant groundwater resources are avoided, or are minimised to the greatest extent practicable. In the case of intensive agriculture, the decision-maker must consider the potential for the pollution of groundwater.
- (ii) In SA, regulations generally categorise potentially polluting developments as “activities of environmental significance” or “activities of major environmental significance”, which must be referred to the SA EPA.
- (iii) In WA, the state-wide Water Resources Policy, which must be considered in the preparation of a planning scheme, states that planning schemes and developments should aim to prevent, or, where appropriate, ameliorate any adverse effects on water quality. Further, at a minimum, proposed development should aim to maintain water quality.

Where a development is permitted with the consent of a planning authority, the risks that the development poses to groundwater quality may be dealt with through conditions on a planning authorisation. Where a development does not require consent, some jurisdictions apply codes to the undertaking of that development (see, for example, Qld), which may be relevant to controlling groundwater quality impacts.

### **(b) Land clearing**

Land clearing is generally dealt with either through general planning legislation, or special native vegetation legislation, or both. Groundwater quality—particularly

groundwater salinity—is commonly an explicit consideration in relation to vegetation clearing (see, for example, NSW, NT, SA, Vic and WA). For example:

- (i) in NSW, the Native Vegetation Act does not permit clearing in rural areas unless it will improve or maintain environmental outcomes, calculated using a formal “Assessment Methodology”, which includes the salinity impacts of clearing;
- (ii) the NT Land Clearing Guidelines, which are relevant to considering clearing under the NT Planning Scheme, urge caution in clearing areas with “seasonally waterlogged soils”, and seepage zones must not be cleared; and
- (iii) the SA “principles of clearance of native vegetation” and the WA “clearing principles” must be considered in consents to clear vegetation in these jurisdictions, respectively. Both sets of principles state that native vegetation should not be cleared if this is likely to cause deterioration in the quality of underground water.

At the Commonwealth level, the Native Vegetation Policy urges Governments to ensure that planning for vegetation management takes into account environmental values and the desirability of improving water quality at the landscape scale.

#### (c) **Stormwater runoff and effluent**

Planning schemes may provide for decision-makers to consider stormwater runoff and effluent issues (see, for example, ACT, Qld, Vic and WA). For example, codes that apply to some types of zones under the ACT’s Territory Plan require a proponent of a development to provide evidence of a modelled 40% to 60% reduction in average annual stormwater pollutant load of several water quality parameters, compared to an urban catchment with no water quality management controls. In Victoria, urban run-off management objectives include minimising increases in stormwater run-off and protecting the environmental values and physical characteristics of receiving waters from degradation by urban runoff.

Conditions of a planning authorisation may also require the proponent to take measures in relation to stormwater runoff and effluent.

Some planning schemes encourage using sewage effluent (see, for example, SA and Vic), but the risks of using effluent are generally primarily regulated by Environment Protection Frameworks.

#### **Box 8.3: Controls on particular developments and risky activities**

**General Findings:** Land-Use Planning Frameworks use State plans, planning schemes, and conditions on planning authorisations to apply various controls to potentially polluting developments, land clearing and runoff production. While there are particularly valuable examples of such measures, they do not appear to be uniformly applied across the jurisdictions. However, some jurisdictions may rely on the discretion exercised by a planning decision-maker to refuse a development, or to apply suitable conditions.

**Recommendation:** The Groundwater Guidelines should retain a focus on the importance of Land-Use Planning Frameworks to control risky developments.

**Framework Table Reference (Appendix A):** see rows 13-17 of each State Land-Use Planning Framework Table and row 25 of the Commonwealth Environment Protection Framework Table.

### **8.4 Measures related to the development and administration of planning tools**

Land-Use Planning Frameworks frequently use referral provisions in relation to development applications. The following referral entities are particularly relevant to assessing the groundwater quality impacts of a proposed development: water corporations,

State EPAs, health officials, catchment management organisations, and ministers who have responsibilities in relation to water or the environment. A list of referral entities may appear in planning regulations or a State plan (see, for example, ACT, NT, Qld, SA, Vic) or in planning schemes (see, for example ACT, NSW, Tas, Vic). Alternatively, a referral agency may be any agency that “has a direct interest in the matter” (SA), or a combination of these.

A referral of a proposed development enables an entity with functions relevant to the proposal to provide comments on whether the development should proceed, and on what conditions. The legal effect of these comments varies, depending on the jurisdiction. A single jurisdiction may provide for referral comments to have different legal effect in different circumstances:

- (a) in some cases referral comments must be considered by the planning decision-maker, but are not binding (see, for example, NT, Qld, SA and Vic);
- (b) in other cases, referral comments are binding, which means either that a proposed development may not go ahead unless the referral entity agrees, or that the referral entity has the power to require conditions to be imposed on the proposed development (see, for example, NSW, NT, Qld, SA and Vic); and
- (c) in a small number of cases, referral comments are binding, unless the planning decision-maker is satisfied in relation to several specified matters, for example, that the proposed development is consistent with the planning scheme (see, for example, ACT).

The following referral requirements are particularly relevant in the groundwater quality context: under the present NT Planning Scheme, several uses and developments in special zones require that the Controller of Water Resources be satisfied that the proposed wastewater management system is appropriate; in SA, an “activity of environmental significance” must be referred to the SA EPA.

Land-Use Planning Frameworks also commonly provide for certain entities to make submissions on a State plan, a planning scheme or an amendment to a planning scheme (see, for example, ACT, NT, SA, Vic and WA). In SA, a regional NRM board has functions in relation to ensuring that catchment management and water allocation plans (which also deal with water quality – see above, section 6.2(b)) are consistent with planning schemes, and that planning schemes promote natural resources management objects and policies. In WA, the Western Australian Planning Commission may refer a proposed State plan to the EPA to undertake an environmental review of the proposal, and the EPA may instruct a local council to undertake an environmental review of a planning scheme.

Public consultation provisions are generally mandatory in relation to development applications and proposed planning schemes or amendments to planning schemes, with the exception of NSW, where they are discretionary. Public consultation provisions also commonly apply to State plans (see, for example, NT, Qld, SA and WA). Forms of public consultation include written submissions, public meetings and public hearings.

Planning schemes and State plans are subject to different forms of monitoring and review requirements, including requirements to:

- (a) keep State plans or planning schemes under “constant” review or “regular and periodic review” (see, for example, ACT, NSW and WA);
- (b) report annually on the implementation of a State plan (see, for example, SA); and
- (c) review planning schemes or State plans at 5- or 8-yearly intervals (see, for example, Qld, SA, Tas and WA).

However, few jurisdictions specifically require a review to consider whether a planning scheme has achieved the desired environmental outcomes (see, for example, Qld).

**Box 8.4: Measures related to the development and administration of planning tools**

**General Findings:** The jurisdictions generally use strong public consultation and referral provisions in their Land-Use Planning Frameworks, enabling agencies and entities with functions relating to health, catchment management, water, and the environment to provide comments or impose requirements in relation to planning authorisations. However, requirements to monitor and review planning tools tend to be less robust, and rarely explicitly require a review of the effectiveness of the tool in the context of environmental protection.

**Recommendation:** A future revision of the Groundwater Guidelines should highlight examples of effective monitoring and review provisions, and provisions which encourage planning tools to align with elements of Groundwater Management Frameworks.

**Framework Table Reference (Appendix A):** see rows 18-21 of each Land-Use Planning Framework Table.

## CHAPTER 4: KEY FINDINGS BY JURISDICTION

### 1. Introduction

This Chapter sets out a brief summary of key points in the implementation of the Groundwater Guidelines in each jurisdiction. In each case, this is followed by diagrams which summarise how each Groundwater Management Framework, Environment Protection Framework and Land-Use Planning Framework reflects the Guidelines.

For a detailed description of how each jurisdiction implements the Groundwater Guidelines, see Appendix A.

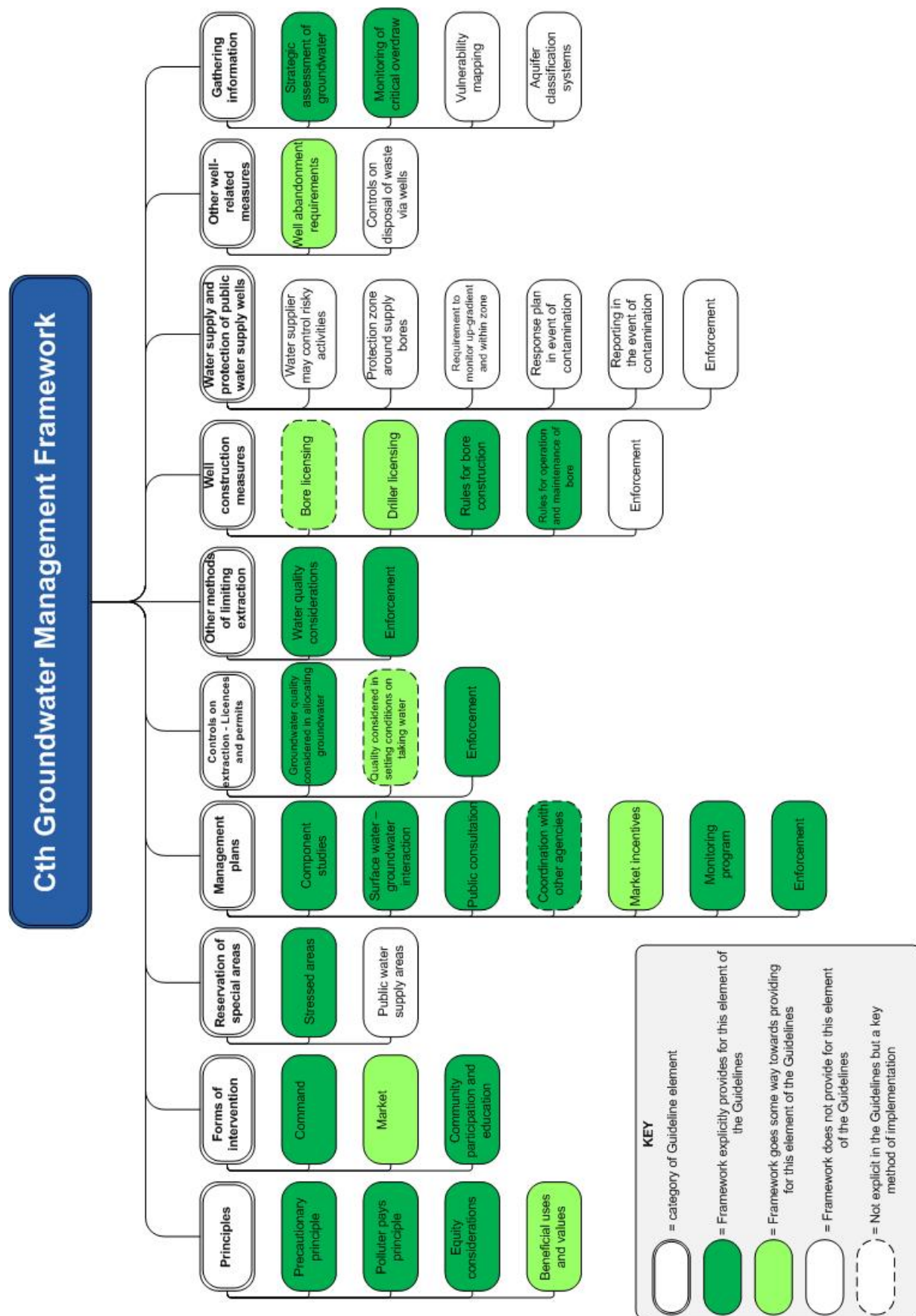
### 2. Commonwealth

The regulatory framework for protecting groundwater in Commonwealth legislation, regulation and policy generally implements the Guidelines well. The nature of Commonwealth implementation is, however, significantly different from that of the States, given its different legislative responsibilities.

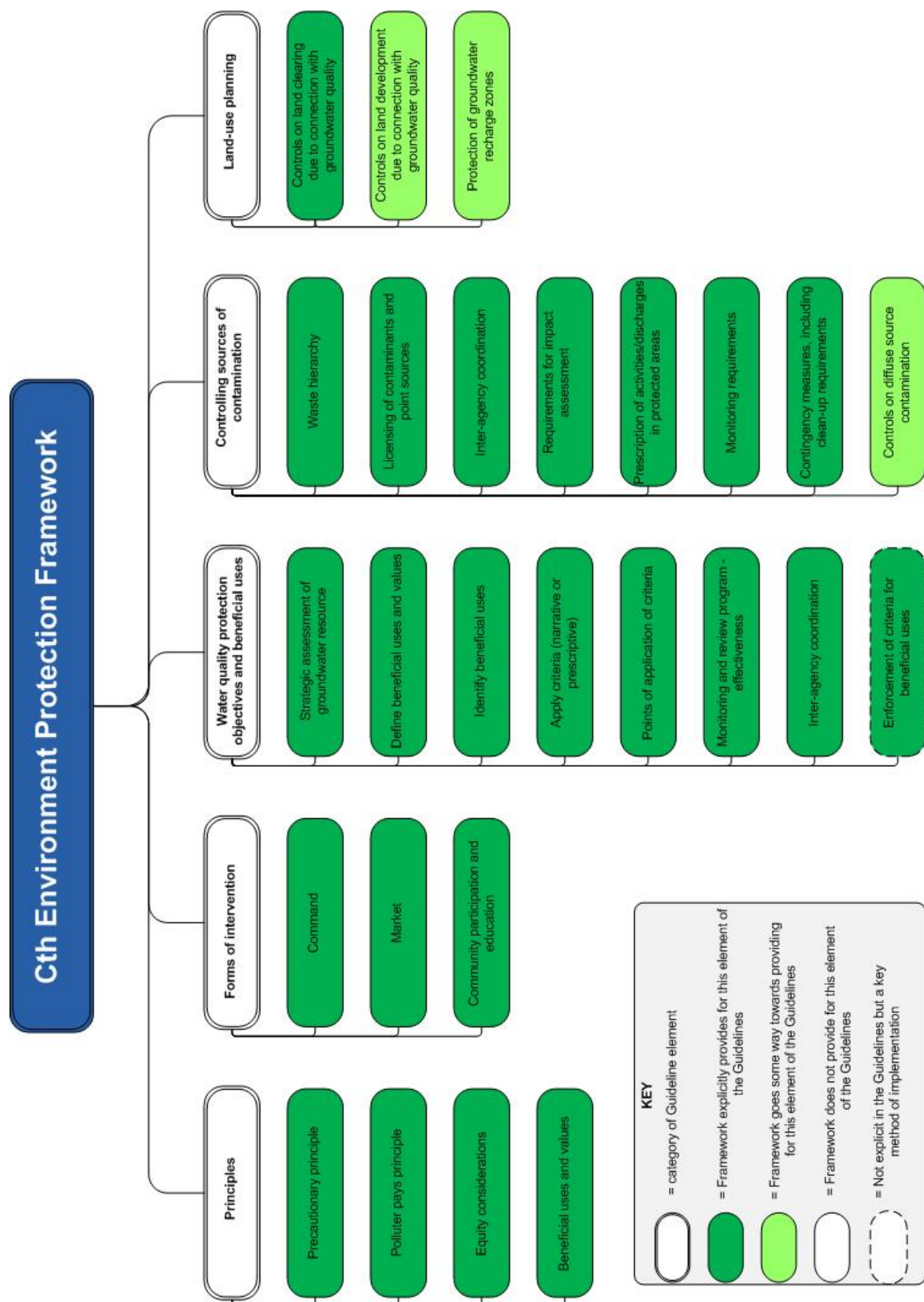
The Commonwealth has implemented the Guidelines in the following key ways:

- (a) through the Commonwealth Water Act requiring that the water quality and salinity management plan component of the Basin Plan for the MDB be prepared having regard to the NWQMS (rows 16 and 17, Commonwealth Groundwater Management Framework Table);
- (b) through the GAB Strategic Management Plan (prepared in coordination with the GAB States), which provides for many aspects of groundwater quality protection, and which is implemented by the signatory States; and
- (c) through the National Environment Protection (Assessment of Site Contamination) Measure, which includes a guideline on the risk-based assessment of groundwater contamination, and which each State implements.

Recent Commonwealth legislation, regulation and policy emphasise the importance of water-dependent ecosystems, indigenous uses of water and collecting groundwater information (see, for example, the Commonwealth Water Act), and strategic assessment (see for, example, the Environment Protection Biodiversity Conservation Act). These developments should be reflected in a future revision of the Groundwater Guidelines.







### 3. Australian Capital Territory

#### 3.1 Implementing the Guidelines – key areas of strength

The regulatory framework for protecting groundwater in the ACT generally implements the Guidelines well. Although ACT legislation, regulation and policy generally do not focus on groundwater, they provide a system for protecting groundwater quality, should the ACT choose to exploit this resource to a higher degree. Areas of particular strength are:

- (a) protecting drinking water quality (noting that the ACT does not presently use groundwater for public water supply).<sup>15</sup> This includes developing Strategic Water Quality Improvement Plans, and formal information exchange with catchment agencies in relation to water quality impacts in catchments (row 33, ACT Groundwater Management Framework Table);
- (b) establishing a regulatory basis for market instruments that could be used in the groundwater quality context, such as tradeable permit schemes and “bubble licence schemes” (row 6, ACT Environment Protection Framework Table);
- (c) controlling stormwater quality, by requiring developments within particular planning zones to provide modelled studies of pollutant loads (although the focus tends to be on surface water) (row 15, ACT Land-Use Protection Framework Table); and
- (d) providing a comprehensive referral system for developments (row 18, ACT Land-Use Protection Framework Table).

#### 3.2 Opportunities for further implementation of the Guidelines

Some aspects of the ACT regulatory framework provide further scope to implement the Guidelines. Matters to consider include:

- (a) clarifying the application of ambient environmental standards to groundwater,<sup>16</sup> and where relevant, using environmental values and ambient environmental standards in the Groundwater Management Framework, to ensure decision-making about water allocation considers water quality; and
- (b) enhancing the legislative, regulatory and policy framework for groundwater quality monitoring (see rows 39 to 43, ACT Groundwater Management Framework Table).

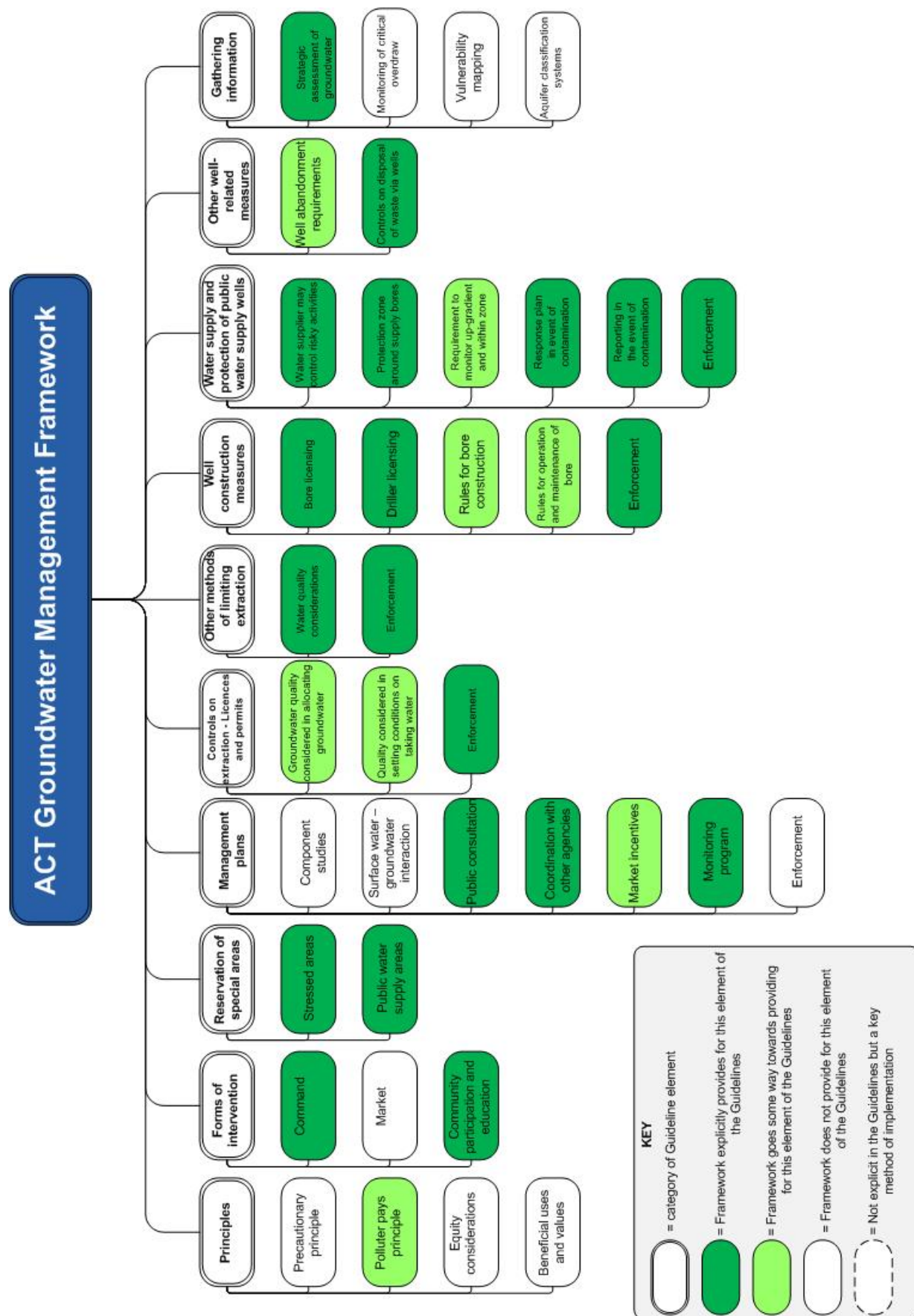
#### 3.3 Beyond the Guidelines – innovative regulatory responses

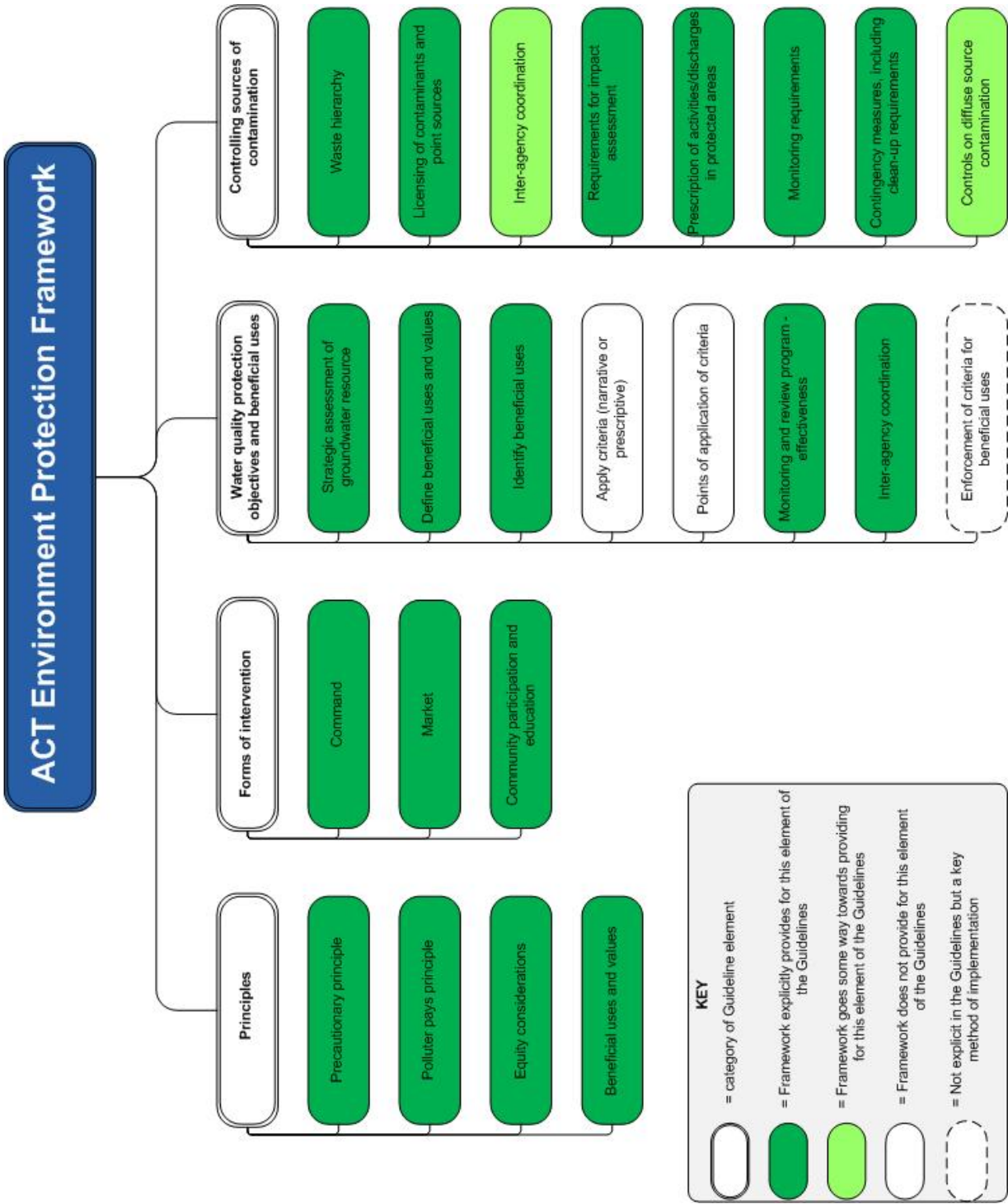
Some aspects of the ACT regulatory framework for groundwater present ways of protecting groundwater quality which go beyond the requirements of the Guidelines, and provide material to consider in a future revision of the Guidelines. Such measures include:

- (a) establishing licenses for groundwater recharge activities under the Water Resources Act (row 38, ACT Groundwater Management Framework Table); and
- (b) providing for strategic environmental assessments of major policy initiatives, as well as assessments of the environmental impacts of individual developments (row 19, ACT Environment Protection Framework Table).

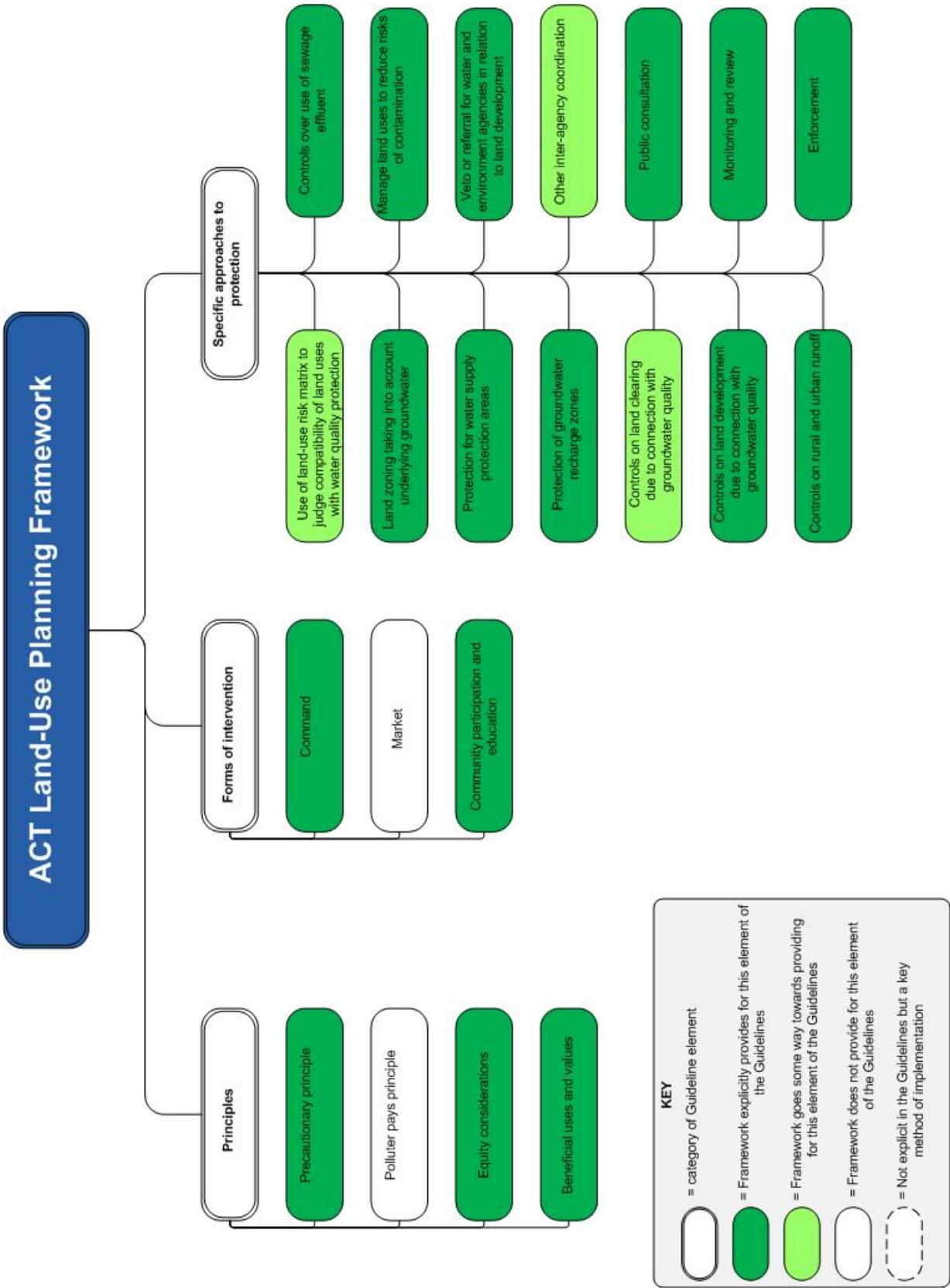
<sup>15</sup> The ACT *Water Source Options Report* identifies options for new water sources for the ACT by way of a shortlist, which does not include groundwater. The Report states: “[g]roundwater resources in the ACT are... so small they cannot be considered as an alternative urban water supply source.”: App.1 p.30 (See *Options for the Next ACT Water Source* (ActewAGL, 2004), available at <http://www.actew.com.au/FutureWaterOptions/Reports2005.aspx>, viewed 30 July 2009).

<sup>16</sup> Whether environmental values and ambient environmental standards apply to groundwater is presently unclear, since some relevant instruments use terminology specific to surface water: see rows 9-15, ACT Environmental Protection Framework.









## **4. New South Wales**

### **4.1 Implementing the Guidelines – key areas of strength**

The regulatory framework for protecting groundwater in NSW generally implements the Guidelines very well, although it has taken a significantly different approach to other jurisdictions in relation to the beneficial use principle. NSW has adopted community-driven water quality objectives through non-statutory policy, which is not intended to be enforceable directly. Particular areas of strength within the NSW regulatory framework include:

- (a) directly translating the Guidelines into the formal NSW State Groundwater Policy. This allows concepts such as vulnerability mapping and aquifer classification to operate within the support (and perhaps the added stability) of a formal policy framework, which this Review has found to be relatively rare;
- (b) strongly connecting water quality considerations to water sharing decisions through the NSW State Groundwater Policy, and the provisions of the Water Management Act, which provide for the State Water Management Outcomes Plan and management plans for particular water sources (rows 11 to 18, NSW Groundwater Management Framework Table);
- (c) using overarching “water management principles”, which include principles in relation to protecting and enhancing water quality and minimising cumulative impacts, to guide the exercise of every function under the Water Management Act (rows 5, 11, 17, 19, 23, 25, 40, NSW Groundwater Management Framework Table);
- (d) strongly connecting land use and water management, by enabling water management plans directly to control developments (row 5, NSW Land-Use Protection Framework Table); and
- (e) establishing a regulatory basis for market instruments such as tradeable emissions schemes and green offsets in the Environment Protection Act (row 6, NSW Environment Protection Framework Table).

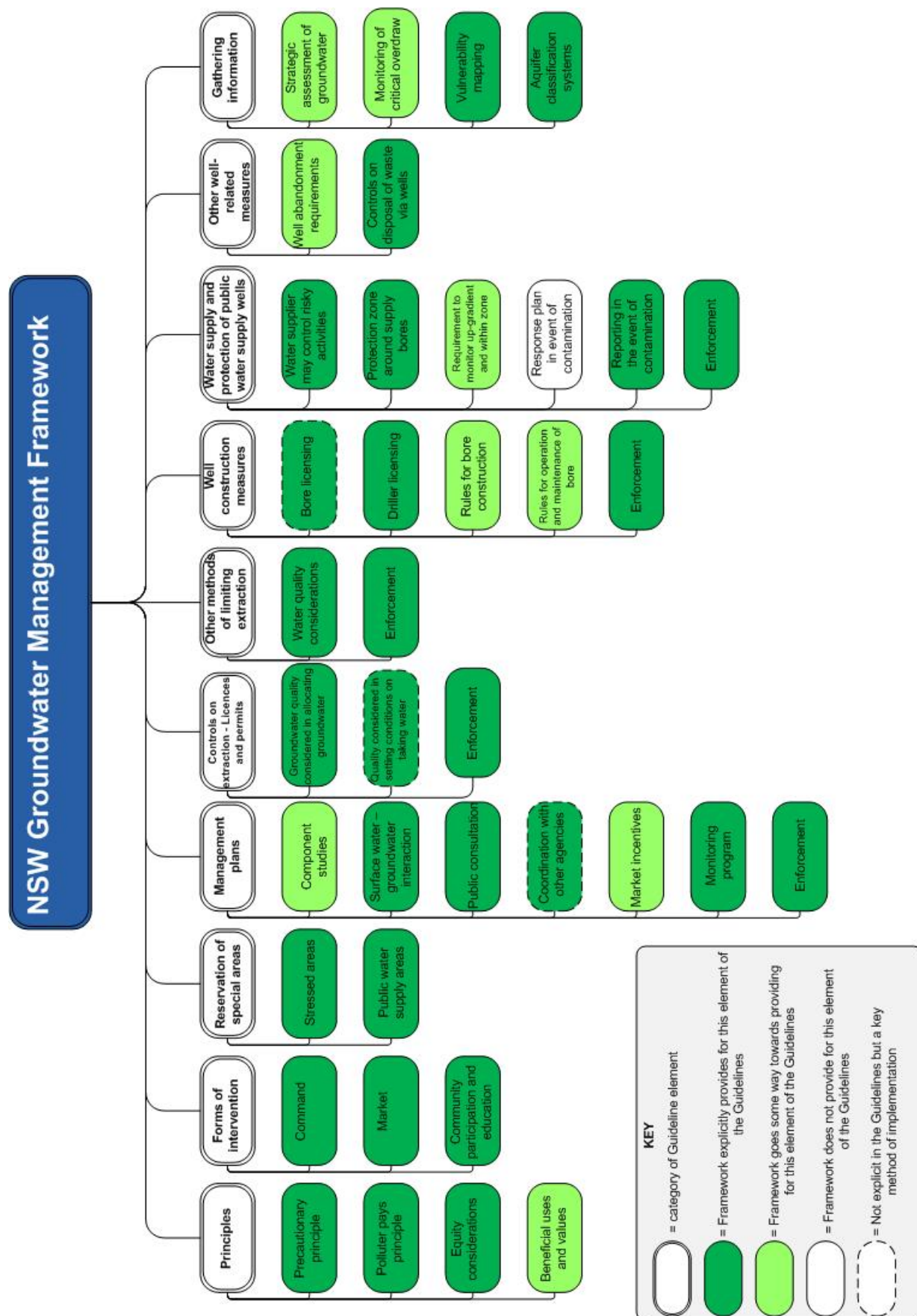
### **4.2 Opportunities for further implementation of the Guidelines**

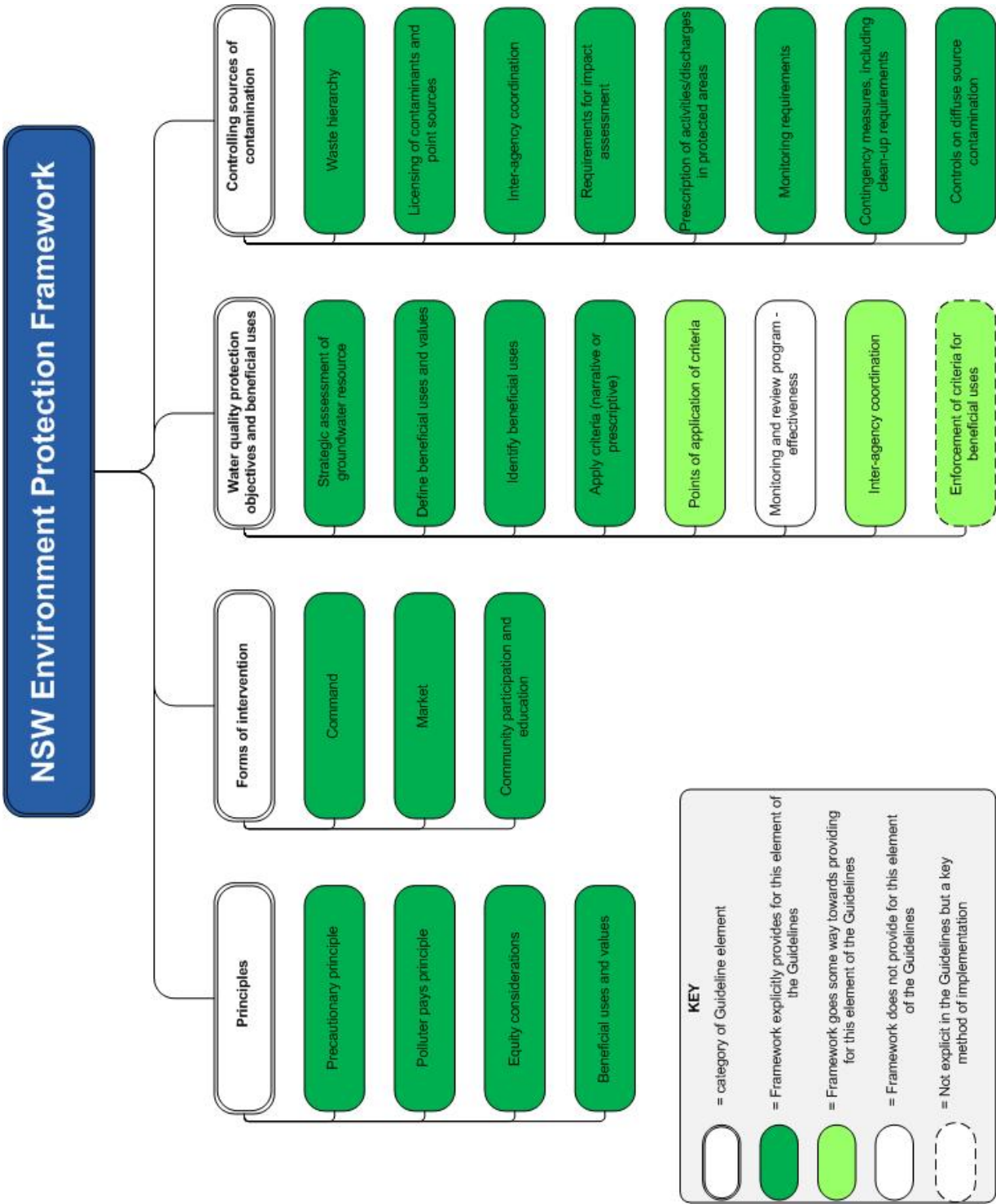
Some aspects of the NSW regulatory framework provide further scope to implement the Guidelines. Matters to consider include: the need for a formal program or structure for reviewing the community-based water quality objectives and evaluating their effectiveness; and the need to provide more regulatory or policy detail in relation to groundwater quality monitoring. It is also noted that a key regulatory document which uses the water quality objectives—the State Water Management Outcomes Plan—is no longer in effect.

### **4.3 Beyond the Guidelines – innovative regulatory responses**

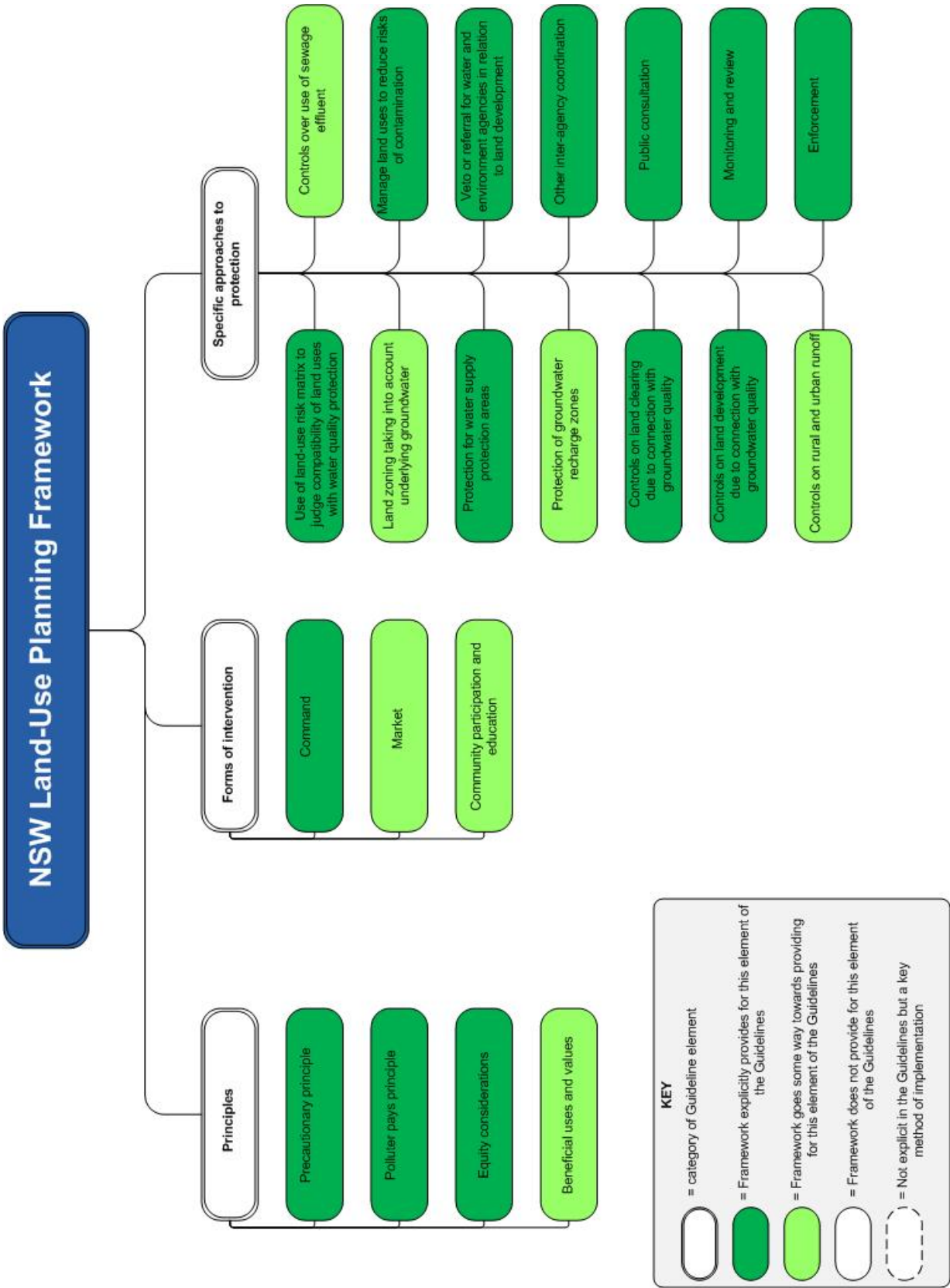
Some aspects of the New South Wales regulatory framework for groundwater present ways of protecting groundwater quality which go beyond the requirements of the Guidelines, and provide material to consider in a future revision of the Guidelines. Such measures include:

- (a) regulating “aquifer interference activities” (for example, sand mining) which may have an impact on groundwater quality, but which would not otherwise be controlled within a bore licensing or water allocation system (row 6, NSW Groundwater Management Framework Table);
- (b) introducing a state-wide policy on GDEs, which recognises the need to consider water quality (row 11, NSW Groundwater Management Framework Table); and
- (c) introducing a state-wide policy on diffuse pollution, focusing on market instruments such as incentives for best management practices, while simultaneously formally recognising the need to strengthen environmental legislation to address diffuse pollution (rows 6 and 23, NSW Environment Protection Framework Table).









## **5. Northern Territory**

### **5.1 Implementing the Guidelines – key areas of strength**

The NT generally implements the key elements of the Guidelines. Particular areas of strength include:

- (a) strongly integrating the protection of beneficial uses between Groundwater Management, Land-Use Planning and Environment Protection Frameworks, by explicitly requiring decision-makers to consider the applicable beneficial uses and quality criteria in relation to each of the following matters:
  - (i) water licences (row 19, NT Groundwater Management Framework Table);
  - (ii) environment protection licences (row 15, NT Environment Protection Framework Table); and
  - (iii) development applications (row 11, NT Land-Use Protection Framework Table).
- (b) using strong yet flexible “command” regulation to impose a general environmental duty to take all measures that are reasonable and practicable to prevent or minimise pollution or environmental harm, with supporting codes of practice (row 5, NT Environment Protection Framework Table);
- (c) establishing general environmental duties, as well as licensing requirements, in the context of mining and other resources operations (row 5, NT Environment Protection Framework Table); and
- (d) providing for automatic licence conditions that protect beneficial uses (row 15, NT Environment Protection Framework Table).

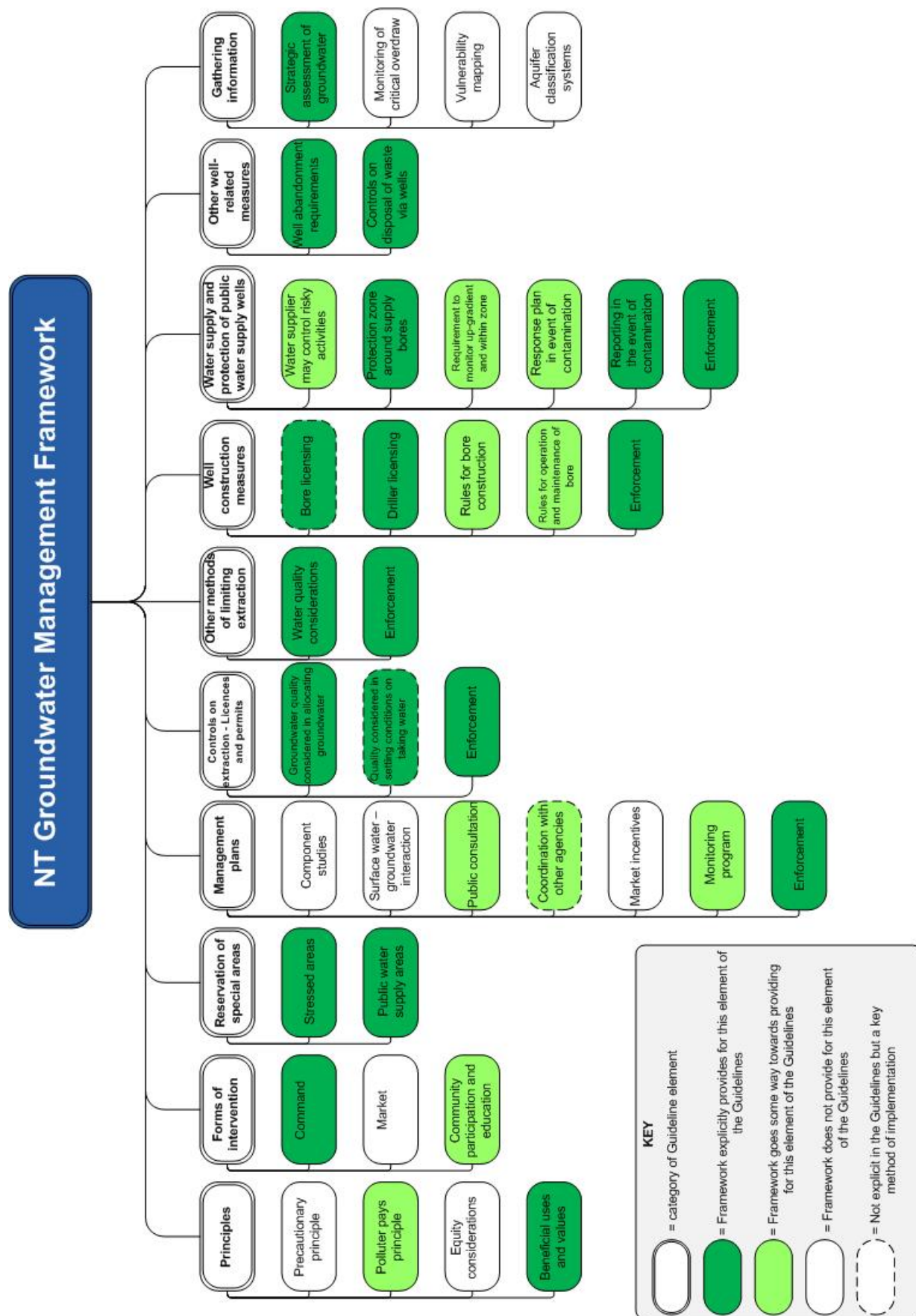
### **5.2 Opportunities for further implementation of the Guidelines**

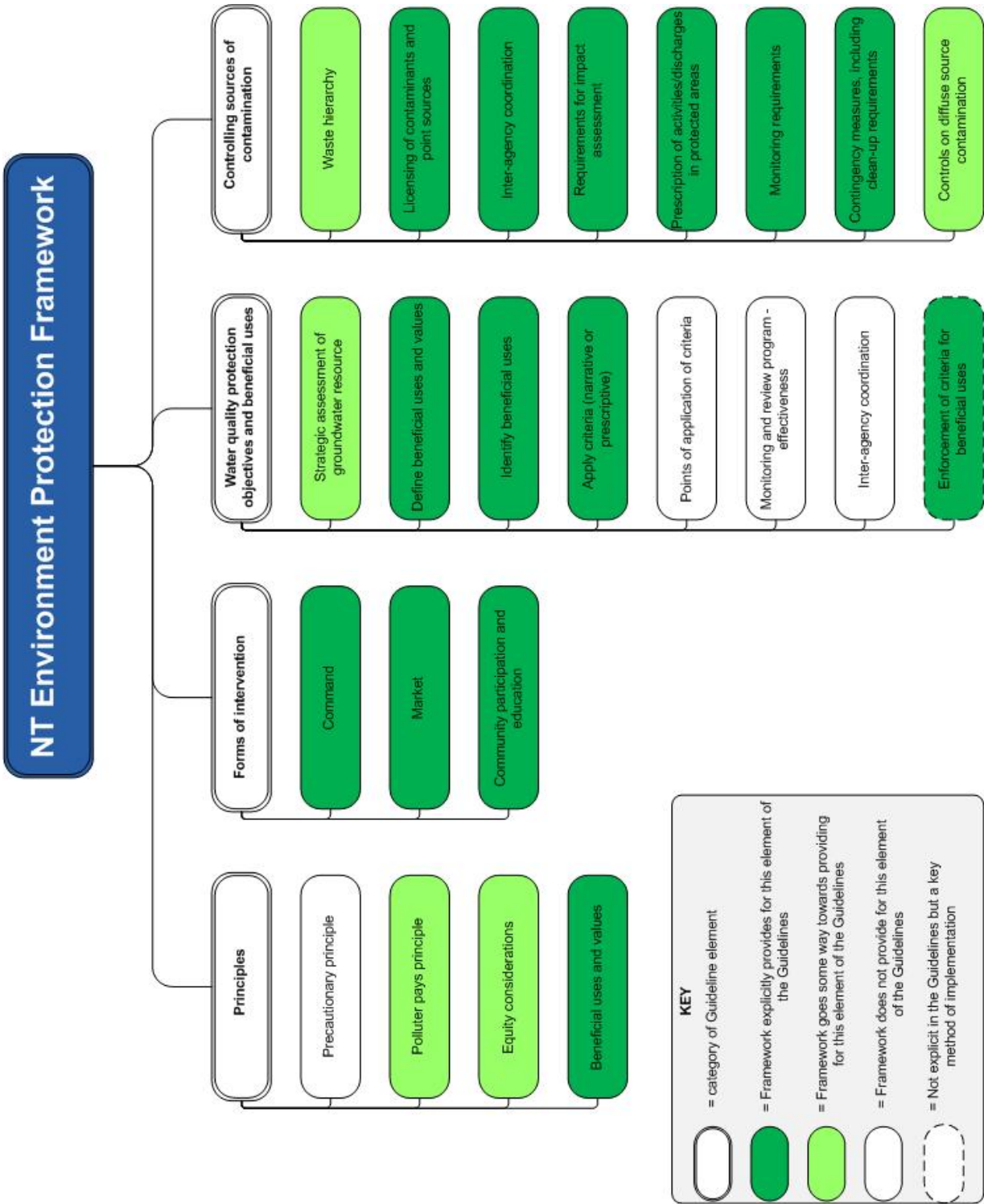
Some of the principles underlying the Guidelines (the precautionary principle, polluter pays principle, and equitable considerations) could be further developed in NT legislation, regulation and policy. The NT could pursue further implementation of the Guidelines through introducing quality-related considerations in relation to water allocation plans, enhancing the powers and duties of drinking water suppliers in relation to supply borefields, and gathering information related to groundwater quality. The NT may also consider more detailed provisions in relation to criteria for beneficial uses and control of diffuse sources.

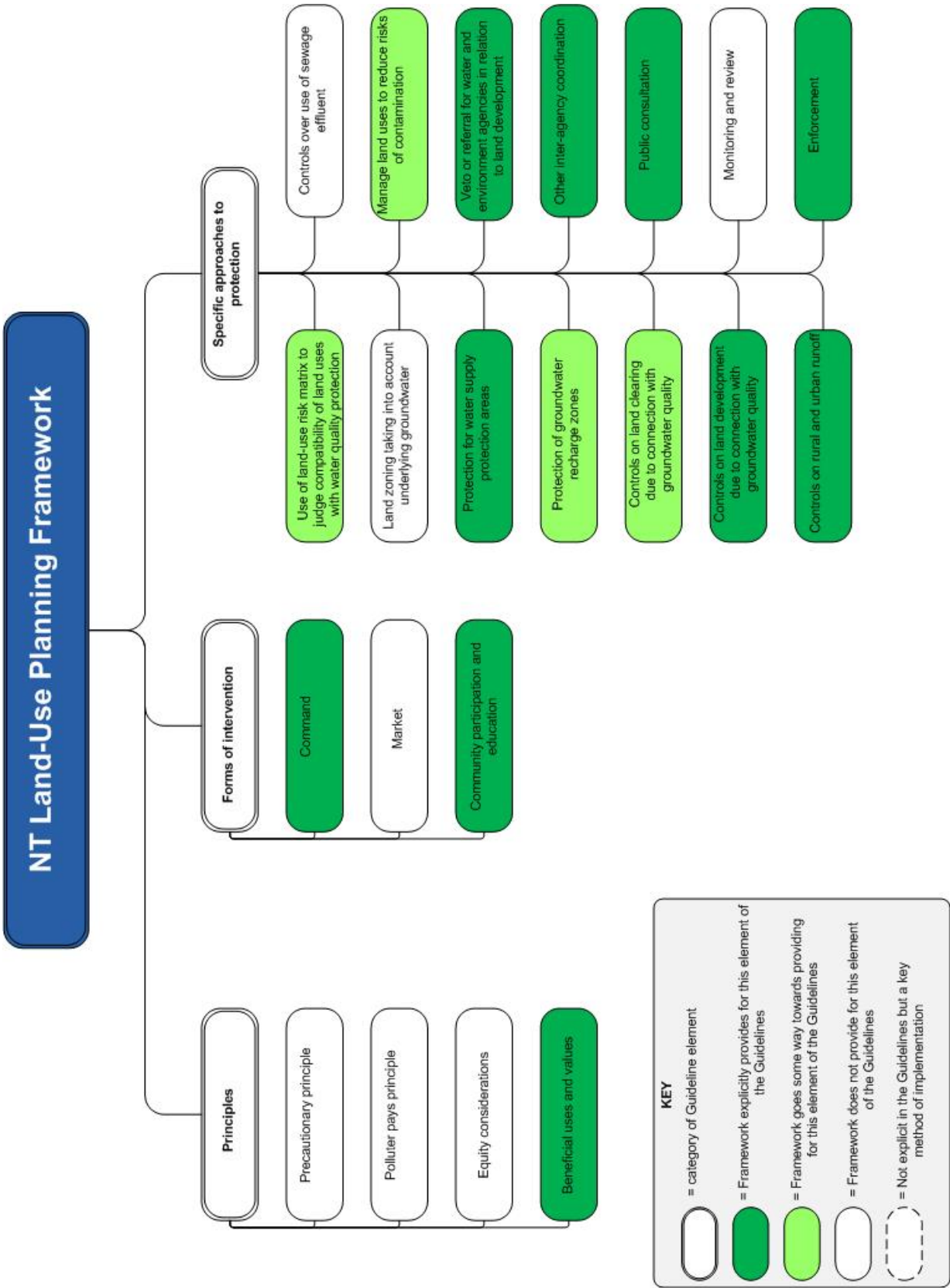
### **5.3 Beyond the Guidelines – innovative regulatory responses**

Some aspects of the NT regulatory framework for groundwater present ways of protecting groundwater quality which go beyond the requirements of the Guidelines, and provide material to consider in a future revision of the Guidelines. Such measures include:

- (a) requiring the decision-maker in relation to water licences to publicise information on how water quality is considered in relation to a licence to take groundwater—this provides a strong incentive to consider water quality rigorously in such decisions (row 19, NT Groundwater Management Framework Table);
- (b) establishing a licensing structure for groundwater recharge activities (recharge licences under the Water Act), which involves considering groundwater quality (row 39, NT Groundwater Management Framework Table); and
- (c) providing for market incentives in the context of environment protection licensing by reducing or waiving fees for licence holders who demonstrate best practice and environmental performance beyond regulatory requirements (row 6, NT Environment Protection Framework Table).









## 6. Queensland<sup>17</sup>

### 6.1 Implementing the Guidelines – key areas of strength

Queensland's regulatory framework for protecting groundwater generally implements the Guidelines very well. Particular areas of strength include:

- (a) strong monitoring and reviewing provisions in relation to water resource plans, water use plans, and resource operations plans, which encompass water and natural ecosystem monitoring; periodic reporting; and assessing the effectiveness of a water resource plan in achieving its outcomes (row 17, Qld Groundwater Management Framework Table);
- (b) provisions relating to protecting drinking water supplies, and requiring a drinking water service provider to have a risk-based drinking water management plan (rows 30-35, Qld Groundwater Management Framework Table);
- (c) strongly linking environmental values and quality objectives to the making of environmental management decisions (row 4, Qld Environment Protection Framework Table);
- (d) detailed requirements to take account of environmental values and groundwater quality impacts in the generic terms of reference for preparing an environmental management plan as part of the EIA process (row 19, Qld Environment Protection Framework Table); and
- (e) specific bore construction standards that exceed the national standards (see row 27, Qld Groundwater Management Framework Table)..

### 6.2 Opportunities for further implementation of the Guidelines

Some aspects of Queensland's regulatory framework provide further scope to implement the Guidelines. This is the case in relation to the use of market instruments and economic incentives, requirements for the strategic assessment of groundwater resources (row 8, Qld Environment Protection Framework Table), and monitoring the effectiveness of the Environment Protection Policy, which provides for environmental values for groundwater (row 13, Qld Environment Protection Framework Table).

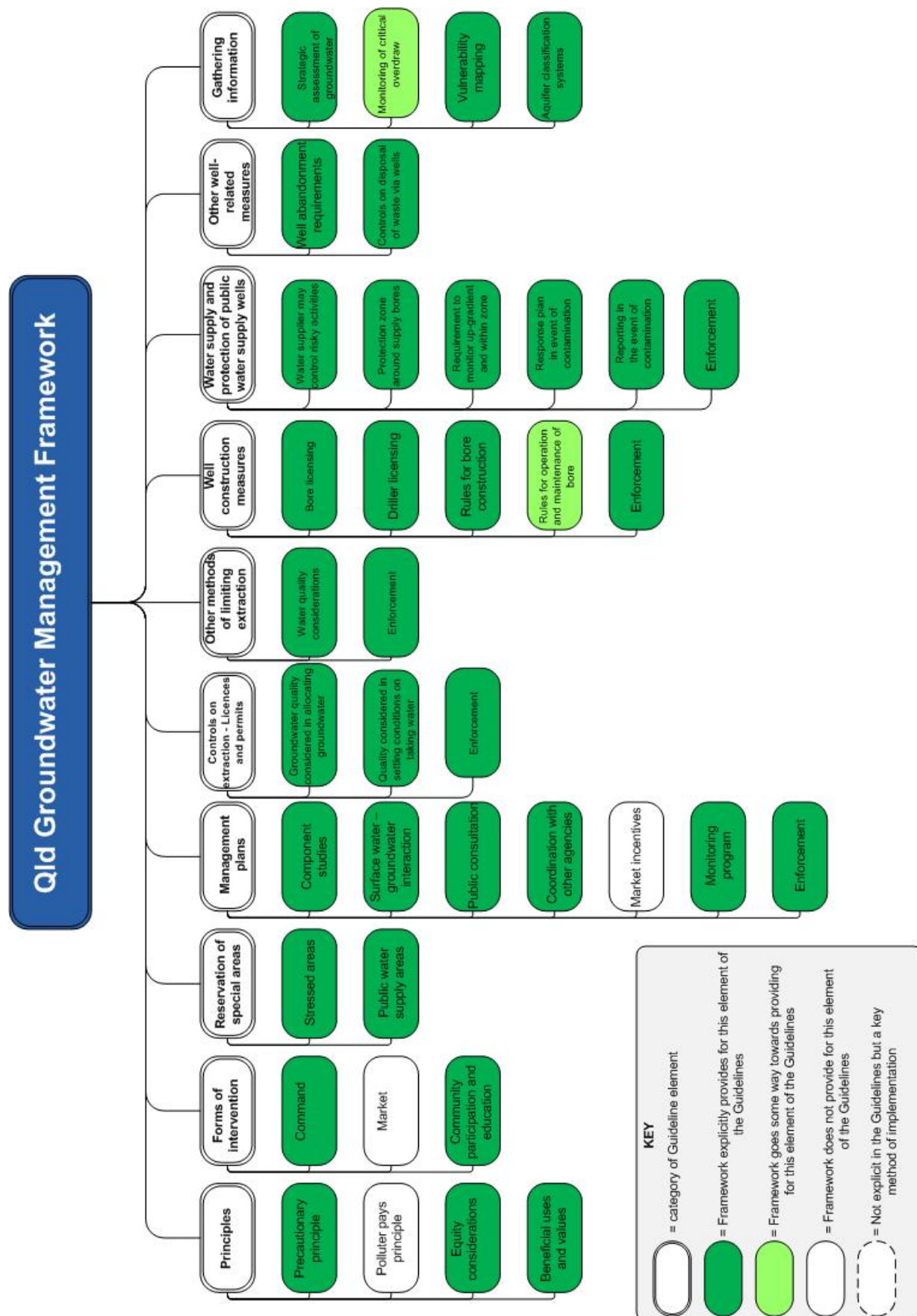
### 6.3 Beyond the Guidelines – innovative regulatory responses

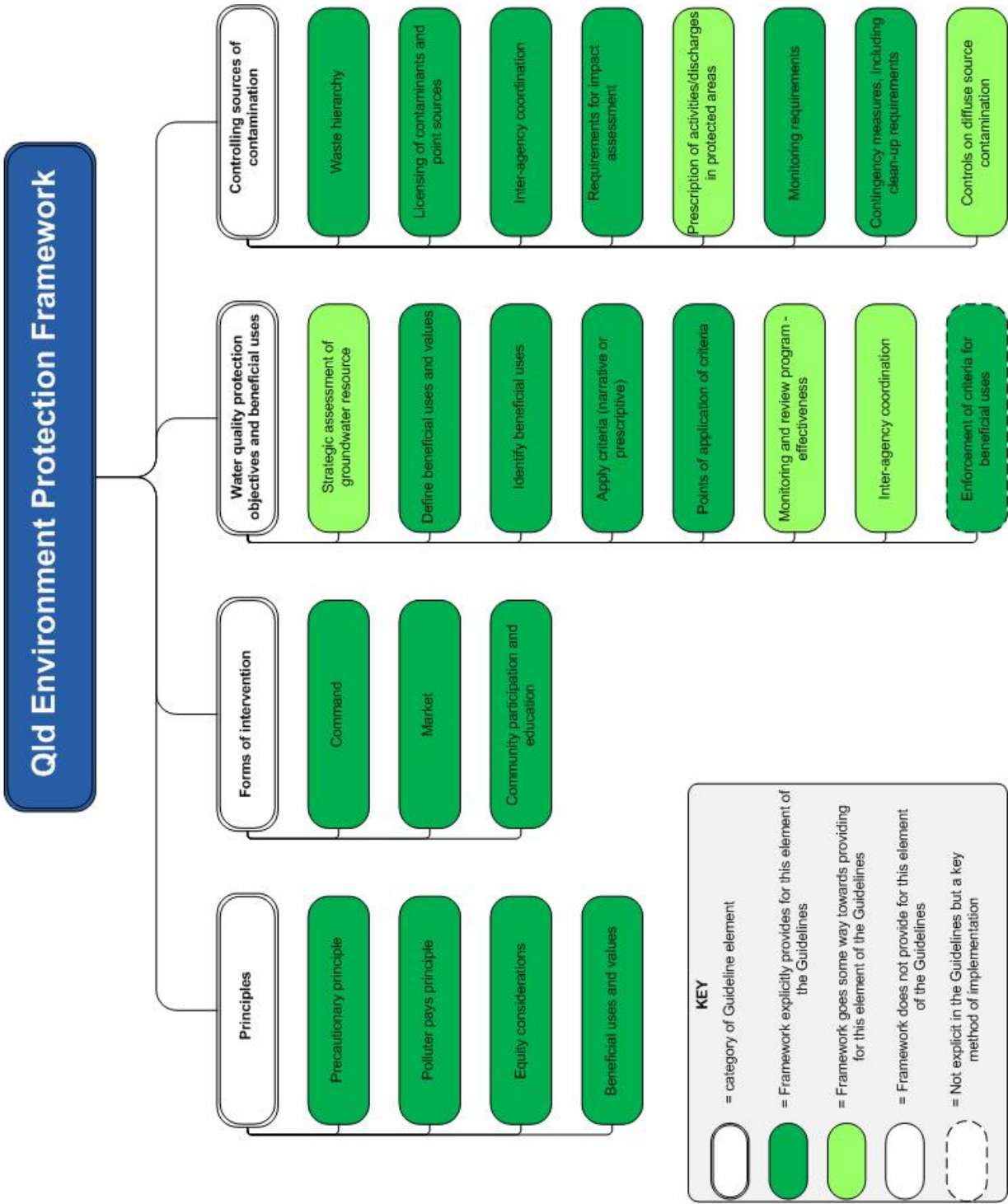
Some aspects of the Queensland regulatory framework for groundwater present ways of protecting groundwater quality which go beyond the requirements of the Guidelines, and provide material to consider in a future revision of the Guidelines. Such measures include:

- (a) including as a protected environmental value, the cultural and spiritual values of a water, means "places, objects, or uses, in or near the water, that have anthropological, archaeological, historic, sacred or scientific significance or value" (row 10, Qld Environment Protection Framework Table);
- (b) the concept of "best practice environmental management", which is relevant to environmental management plans for mining activities, and to numerous other activities, since it is included in "standard criteria" which are used for many environmental decisions (rows 17 and 18, Qld Environment Protection Framework Table); and
- (c) a State Planning Policy for acid sulfate soils, which deals with the impacts of groundwater extraction on the release of acid and associated metal contaminants, and which is implemented through planning schemes (row 9, Qld Land-Use Protection Framework Table).

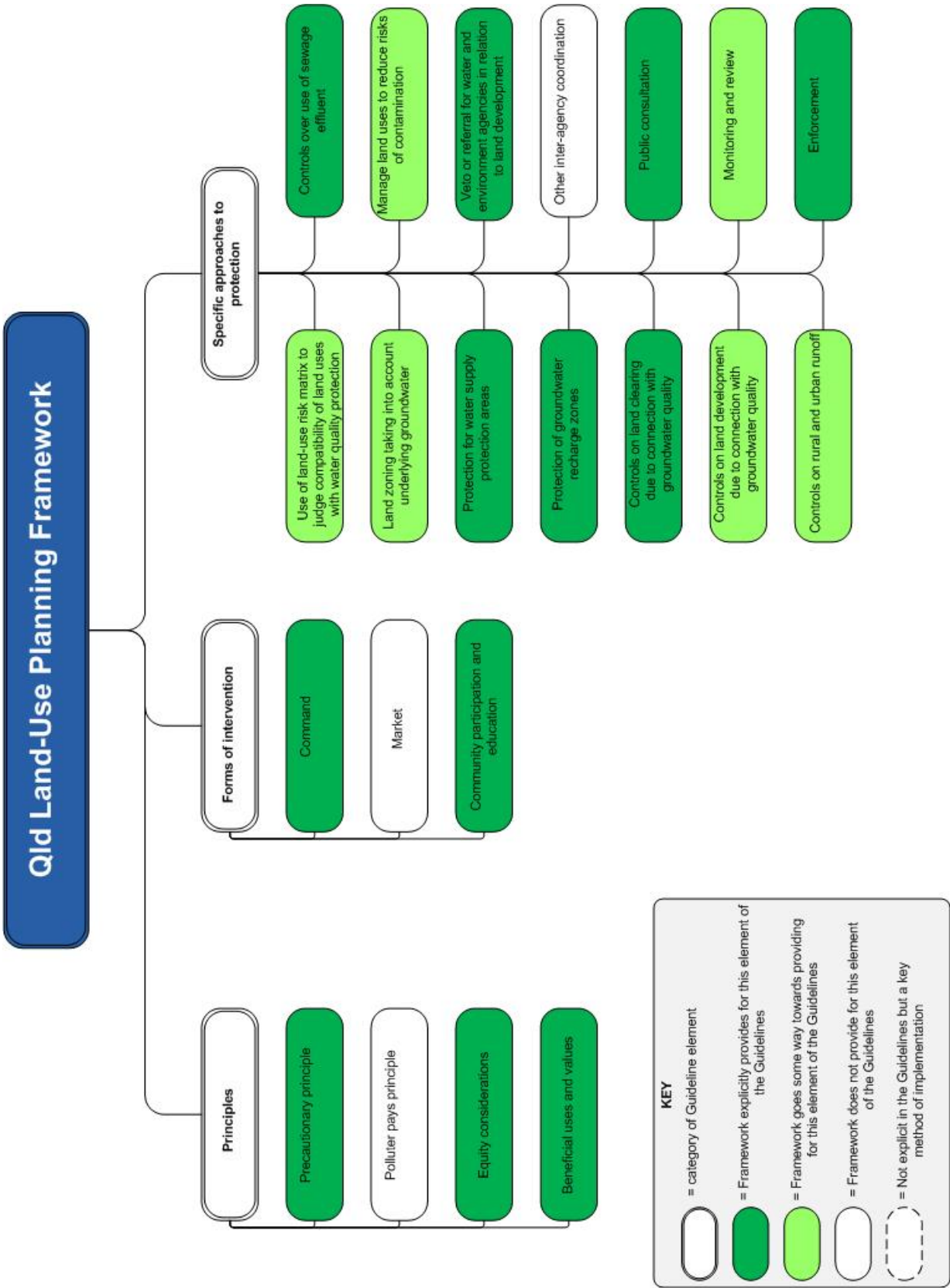
<sup>17</sup>

This section is correct to July 2009. After the writing of this report, the *Integrated Planning Act 1997* (Qld) was replaced by the *Sustainable Planning Act 2009* (Qld), and the *Environment Protection (Water) Policy 1997* (Qld) was replaced by the *Environment Protection (Water) Policy 2009* (Qld).









## **7. South Australia**

### **7.1 Implementing the Guidelines – key areas of strength**

South Australia's regulatory framework for protecting groundwater generally implements the Guidelines very well. Particular areas of strength include:

- (a) adopting the principles underlying the Guidelines (the polluter pays principle, etc). For example, persons exercising functions under particular acts (such as the NRM Act) must have regard to these principles in exercising their functions, which include making natural resource and water allocation plans (rows 1-3, SA Groundwater Management Framework Table);
- (b) using and further developing market measures in relation to groundwater quality, including: management agreements under the River Murray Act, which may provide incentives to landowners to enhance groundwater (row 6, Groundwater Management Framework Table); and environmental performance agreements under the Environment Protection Act (row 3, SA Environment Protection Framework Table);
- (c) adopting flexible yet strong "command" options, including: a general duty on well owners to ensure that wells are properly maintained (rows 23 and 28, SA Groundwater Management Framework Table); and a general duty on every person to take "all reasonable and practicable measures" to prevent or minimise environmental harm when undertaking an activity that pollutes, or might pollute, the environment (row 3, SA Environment Protection Framework Table); and
- (d) adopting a detailed and legally robust framework for environmental values and criteria (rows 5 and 15, SA Environment Protection Framework Table).

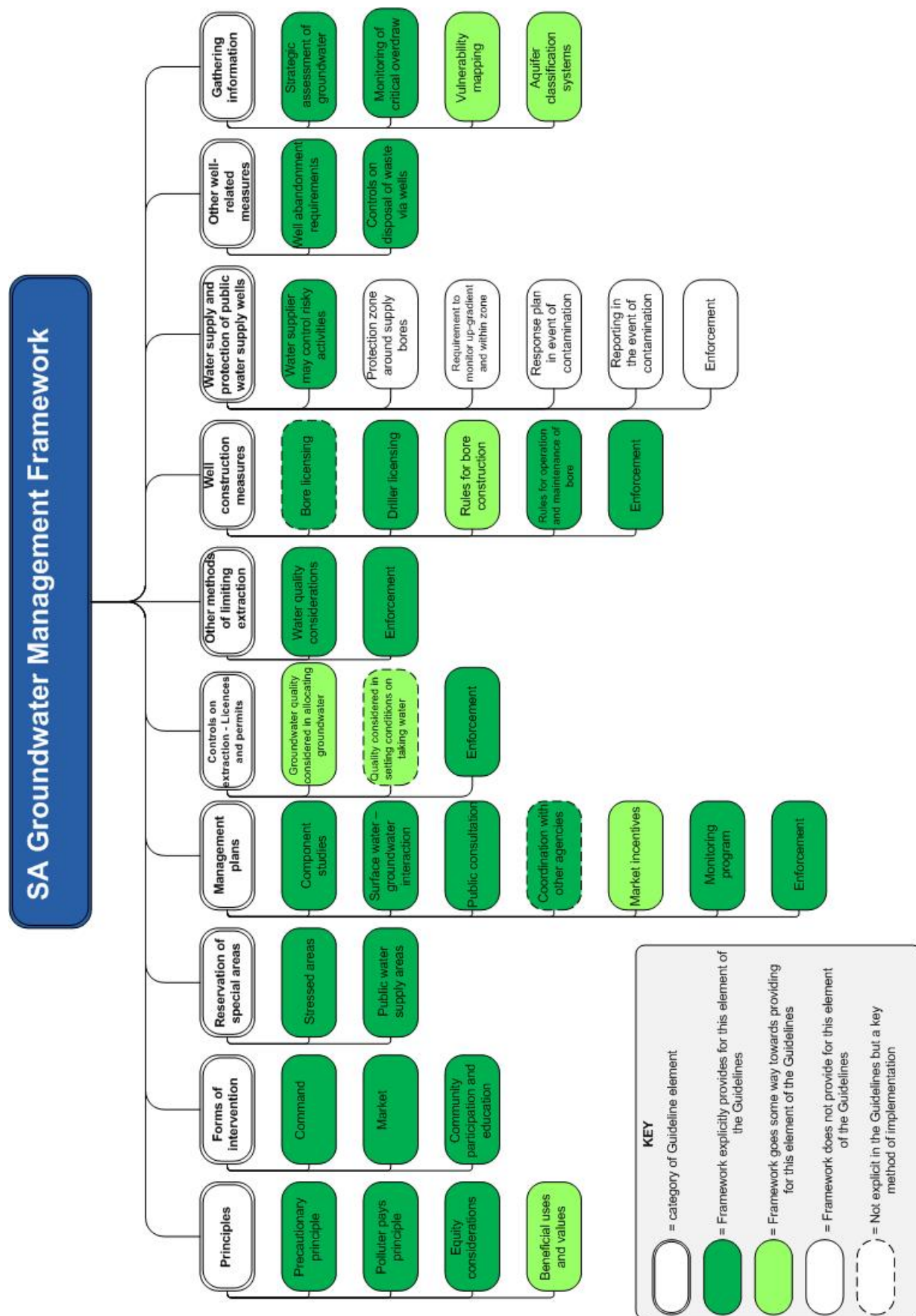
### **7.2 Opportunities for further implementation of the Guidelines**

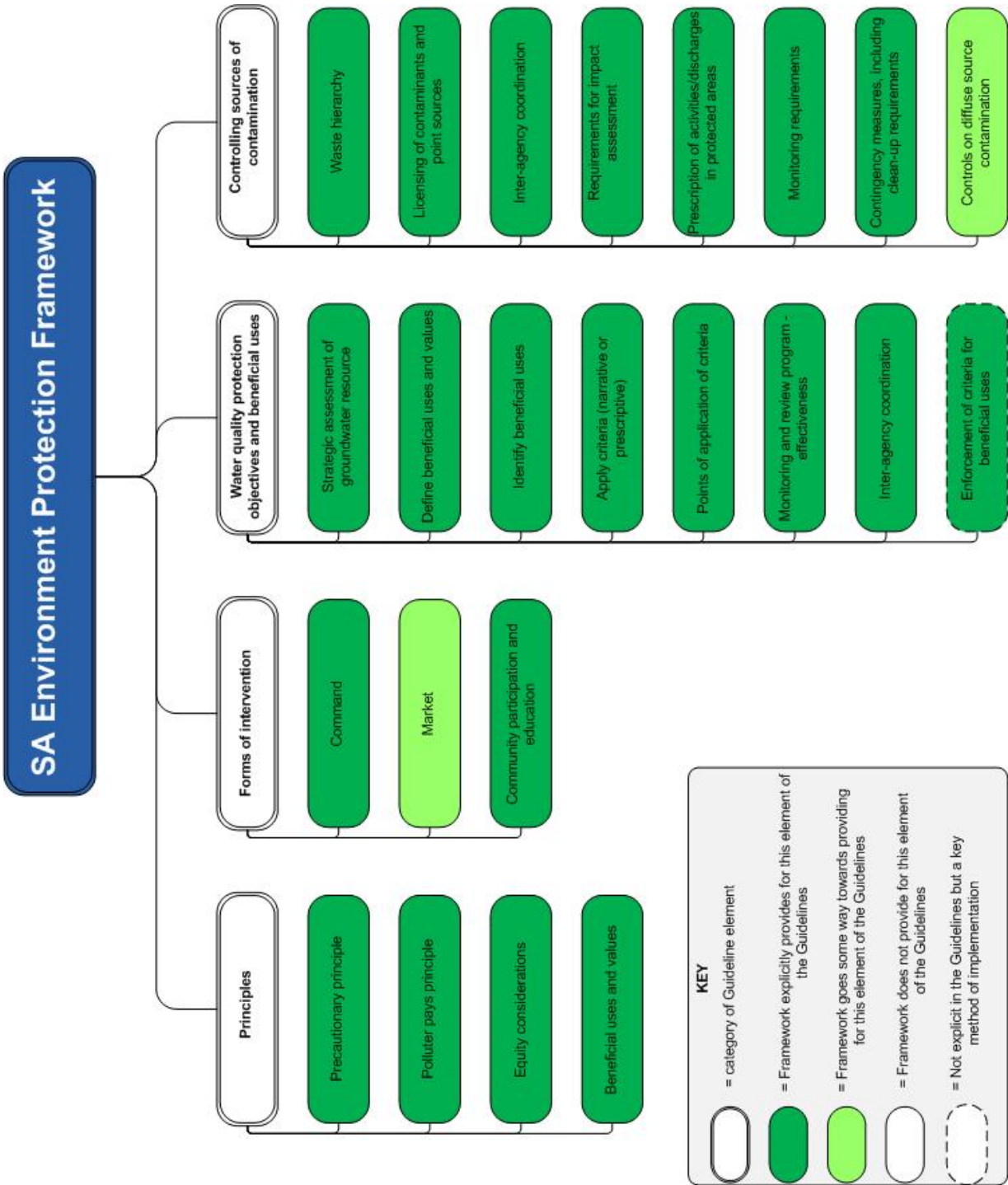
Some aspects of South Australia's regulatory framework provide further scope to implement the Guidelines. This is most notably the case in relation to drinking water supply protection. South Australia is presently awaiting the introduction of a Safe Drinking Water Bill, which will remedy existing gaps in the framework, and allow water suppliers more proactively to manage water quality, through risk management plans and monitoring plans (rows 31 to 35, SA Groundwater Management Framework Table).

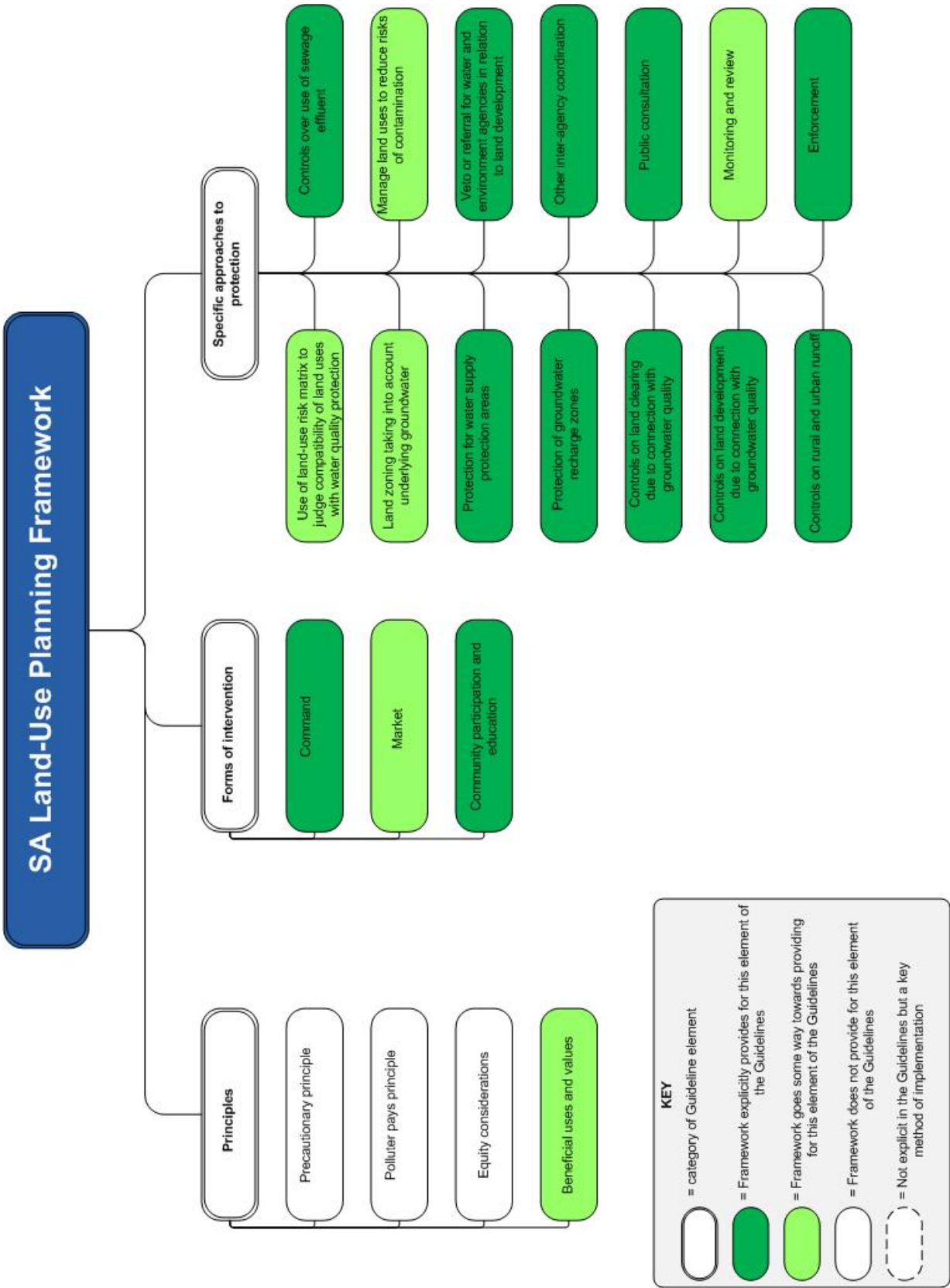
### **7.3 Beyond the Guidelines – innovative regulatory responses**

Some aspects of the South Australian regulatory framework for groundwater present ways to protect groundwater quality which go beyond the requirements of the Guidelines, and provide material to consider in a future revision of the Guidelines. Such measures include:

- (a) providing explicitly for water allocation plans under the NRM Act to assess the quality of water needed by both surface water and groundwater dependent ecosystems (row 12, SA Groundwater Management Framework Table);
- (b) providing explicitly for connected water resources, which affect each other in terms of quality, within water allocation plans under the NRM Act (row 13, SA Groundwater Management Framework Table);
- (c) adopting an enforceable code of practice in relation to aquifer water storage and recovery schemes (row 38, SA Groundwater Management Framework Table);
- (d) introducing a "cultural and spiritual" environmental value (row 10, SA Environment Protection Framework Table); and
- (e) allowing for groundwater remediation over wide areas ("special management areas"), in addition to site-specific requirements (row 22, SA Environment Protection Framework Table).









## **8. Tasmania**

### **8.1 Implementing the Guidelines – key areas of strength**

Tasmania's regulatory framework for protecting groundwater generally implements the Guidelines well. Particular areas of strength include:

- (a) protecting drinking water supplies, and requiring a water supplier to have a risk-based Drinking Water Management Plan to deal with issues such as monitoring, testing and incident responses (rows 30-35, Tas Groundwater Management Framework Table);
- (b) strong provisions for considering groundwater quality impacts in relation to a decision to grant a groundwater licence and relevant conditions to be applied; and a decision to grant a permit to construct a bore (rows 19 and 20, Tas Groundwater Management Framework Table); and similarly, detailed requirements to take account of groundwater quality impacts in the guidelines for preparing an environmental management plan as part of the EIA process (row 19, Tas Environment Protection Framework Table); and
- (c) protecting groundwater under the State Policy on Water Quality Management, which includes detailed provisions on how to determine an attenuation zone, and explicitly recognises the potential for poor quality groundwater to affect surface water (row 12, Tas Environment Protection Framework Table).

### **8.2 Opportunities for further implementation of the Guidelines**

Some aspects of Tasmania's regulatory framework provide further scope to implement the Guidelines. Matters to consider include:

- (a) using the State Policy mechanism to identify protected environmental values for groundwaters (row 10, Tas Groundwater Management Framework Table); and
- (b) improving inter-agency coordination in the Land-Use Protection Framework Table (noting that this was also a recommendation of a recent review into Tasmania's planning system).<sup>18</sup>

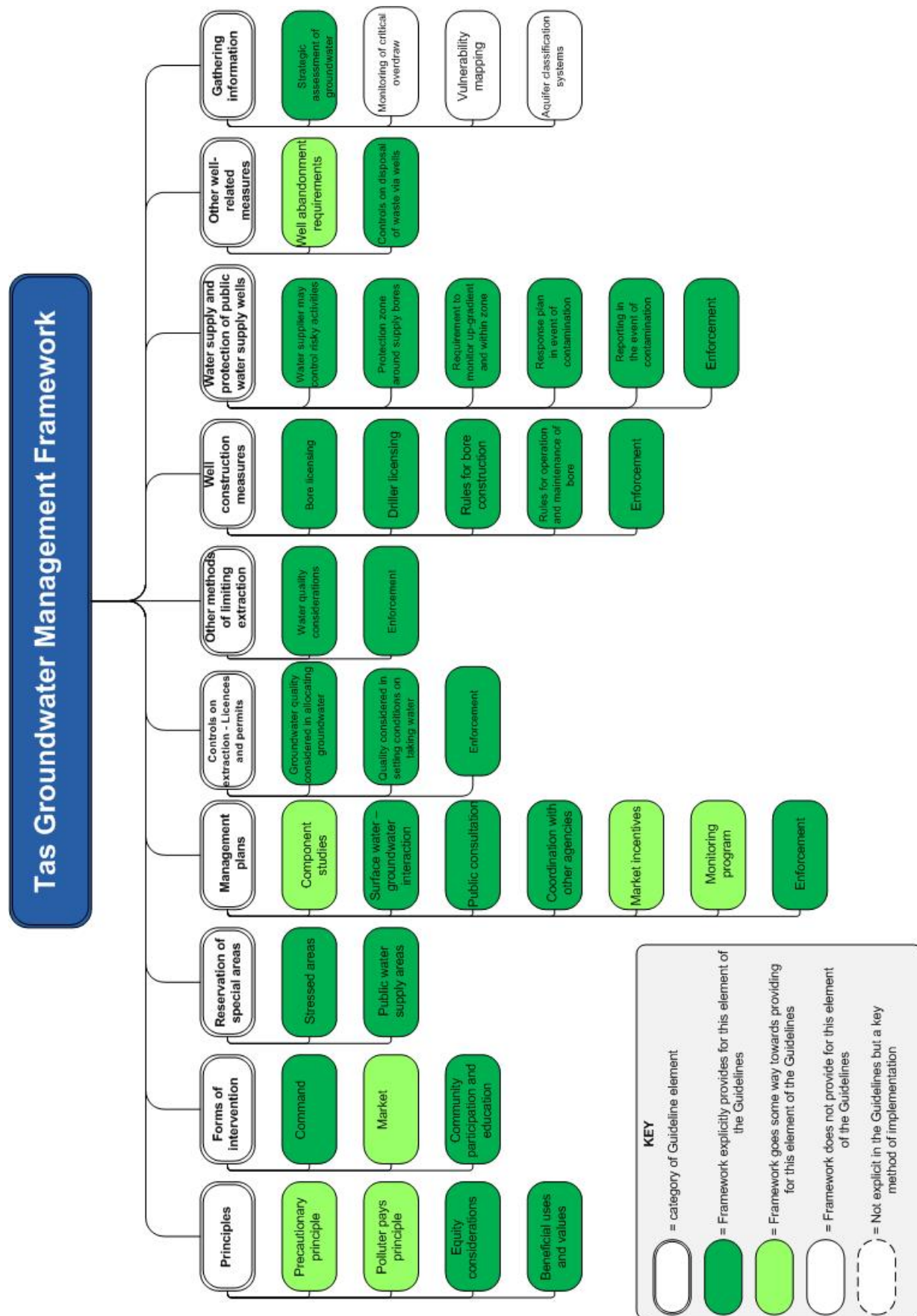
### **8.3 Beyond the Guidelines – innovative regulatory responses**

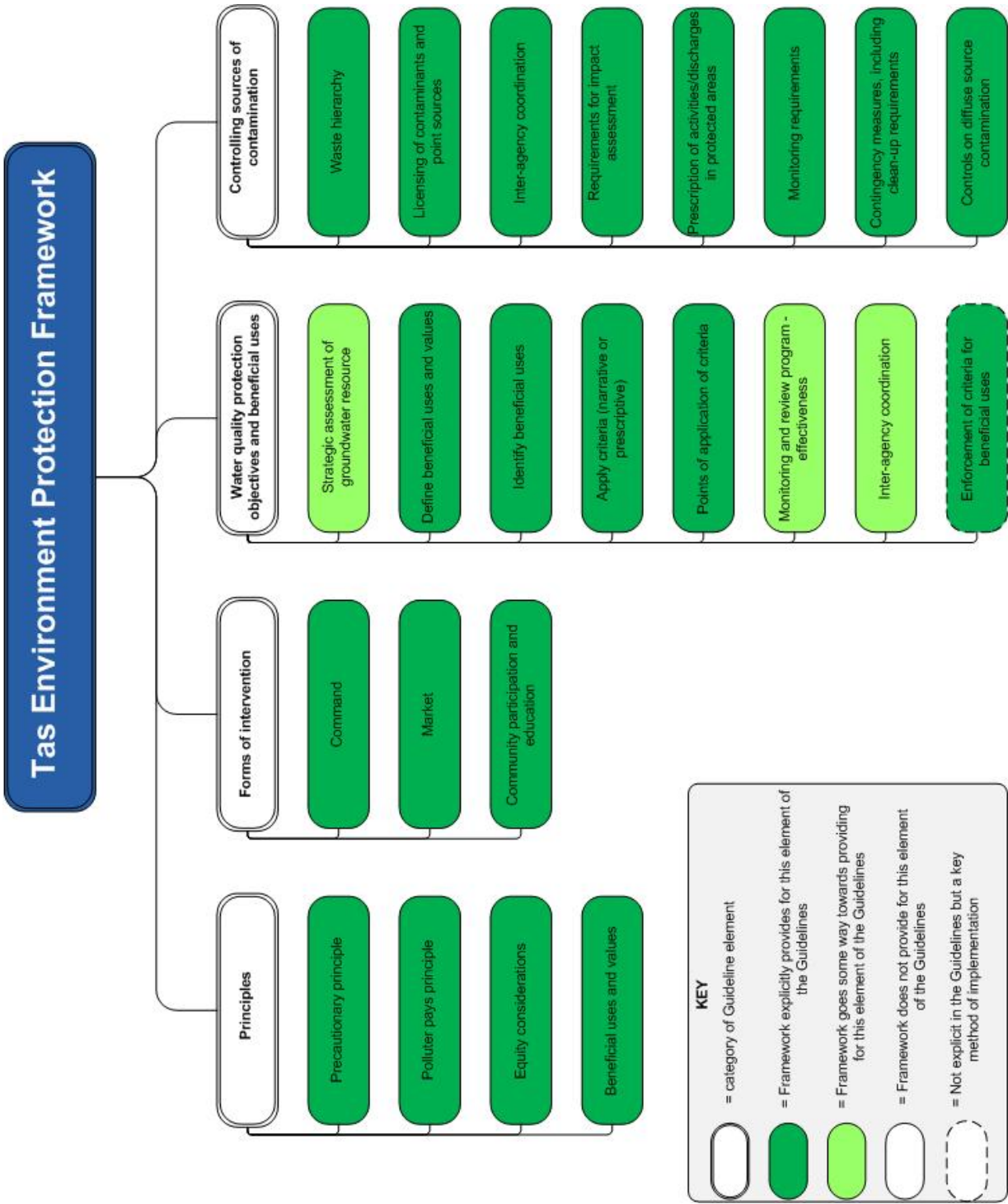
Some aspects of the Tasmanian regulatory framework for groundwater present ways to protect groundwater quality which go beyond the requirements of the Guidelines, and provide material to consider in a future revision of the Guidelines. Such measures include:

- (a) the concept of "best practice environmental management", which is relevant to setting an attenuation zone in relation to a polluting activity, and to the EIA process (see generally, Tas Environment Protection Framework Table); and
- (b) clear and strong legislative links between environmental values, which may be established under the State Policy on Water Quality Management, and both:
  - (i) the Groundwater Management Framework Table, for example water management plans which provide for the allocation of water, through generic principles for preparing water management plans (row 11); and
  - (ii) the Land-Use Protection Framework Table, since a planning scheme must be prepared in accordance with the State Policy. If a State Policy is inconsistent with a provision of a planning scheme, the former prevails, and the planning scheme must be amended to remove inconsistency (row 4).

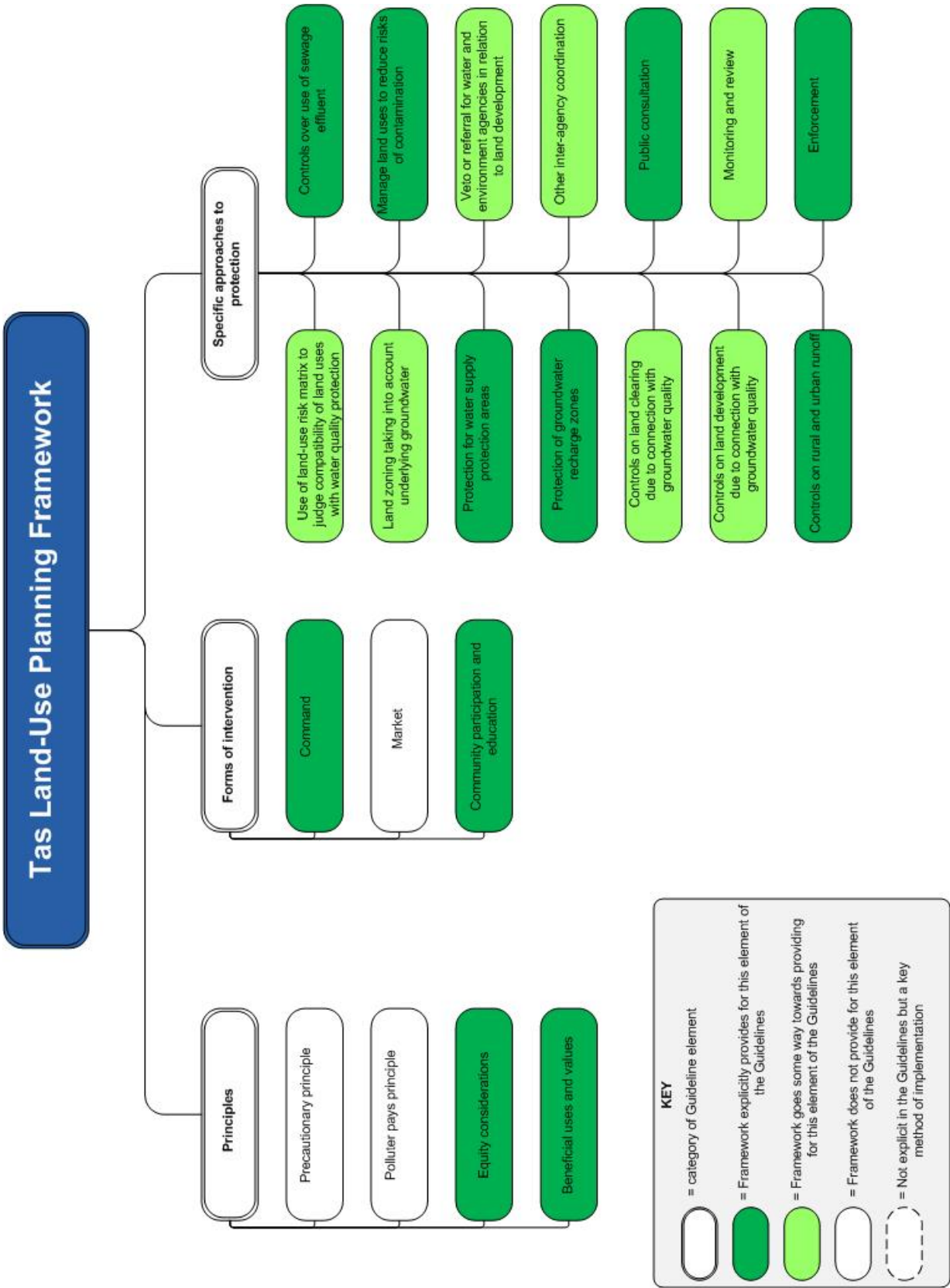
<sup>18</sup>

*Review of the Tasmanian Planning System: Steering Committee Report* (February 2009), p.3, available at [http://www.justice.tas.gov.au/\\_data/assets/pdf\\_file/0019/118090/Planning\\_Review\\_Final\\_Report\\_13\\_2\\_09.pdf](http://www.justice.tas.gov.au/_data/assets/pdf_file/0019/118090/Planning_Review_Final_Report_13_2_09.pdf), viewed 14 August 2009.









## **9. Victoria**

### **9.1 Implementing the Guidelines – key areas of strength**

Victoria's regulatory framework for protecting groundwater generally implements the Guidelines very well. Particular areas of strength include:

- (a) applying public consultation processes throughout the Groundwater Management Framework in the areas of water allocation and planning, each of which may influence groundwater quality (rows 7 and 14);
- (b) providing comprehensively for inter-agency coordination, and for some types of groundwater management plans to be incorporated into environment and land-use plans (rows 15 and 18, Vic Groundwater Management Framework Table; row 18, Vic Environment Protection Framework Table; rows 18 and 19, Vic Land-Use Protection Framework Table);
- (c) explicitly and comprehensively providing for groundwater quality considerations within the water allocation process, including through conditions on authorisations (rows 19 and 20, Vic Groundwater Management Framework Table);
- (d) applying best practice requirements to the construction of bores (row 27, Vic Groundwater Management Framework Table);
- (e) comprehensively considering groundwater quality within the State-standard land-use planning provisions (rows 8 to 22, Vic Land-Use Protection Framework Table);
- (f) imposing on water suppliers detailed requirements in relation to source monitoring and risk management planning (rows 32 and 33, Vic Groundwater Management Framework Table); and
- (g) providing for continuous and long-term water quality assessments, including in relation to attaining water quality objectives (row 39, Vic Groundwater Management Framework Table; row 8, Vic Environment Protection Framework Table).

### **9.2 Opportunities for further implementation of the Guidelines**

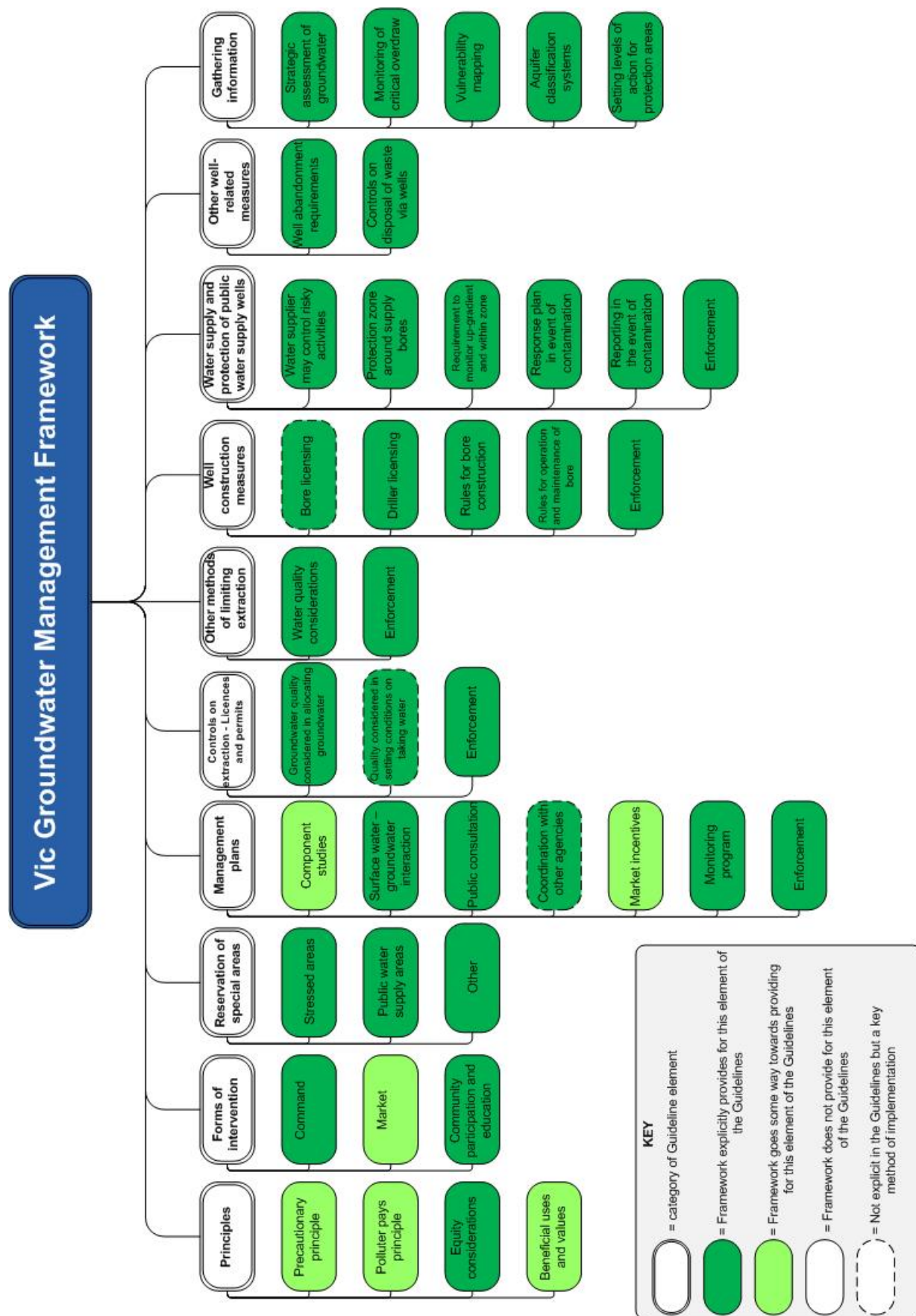
Some aspects of Victoria's regulatory framework provide further scope to implement the Guidelines. Matters to consider include:

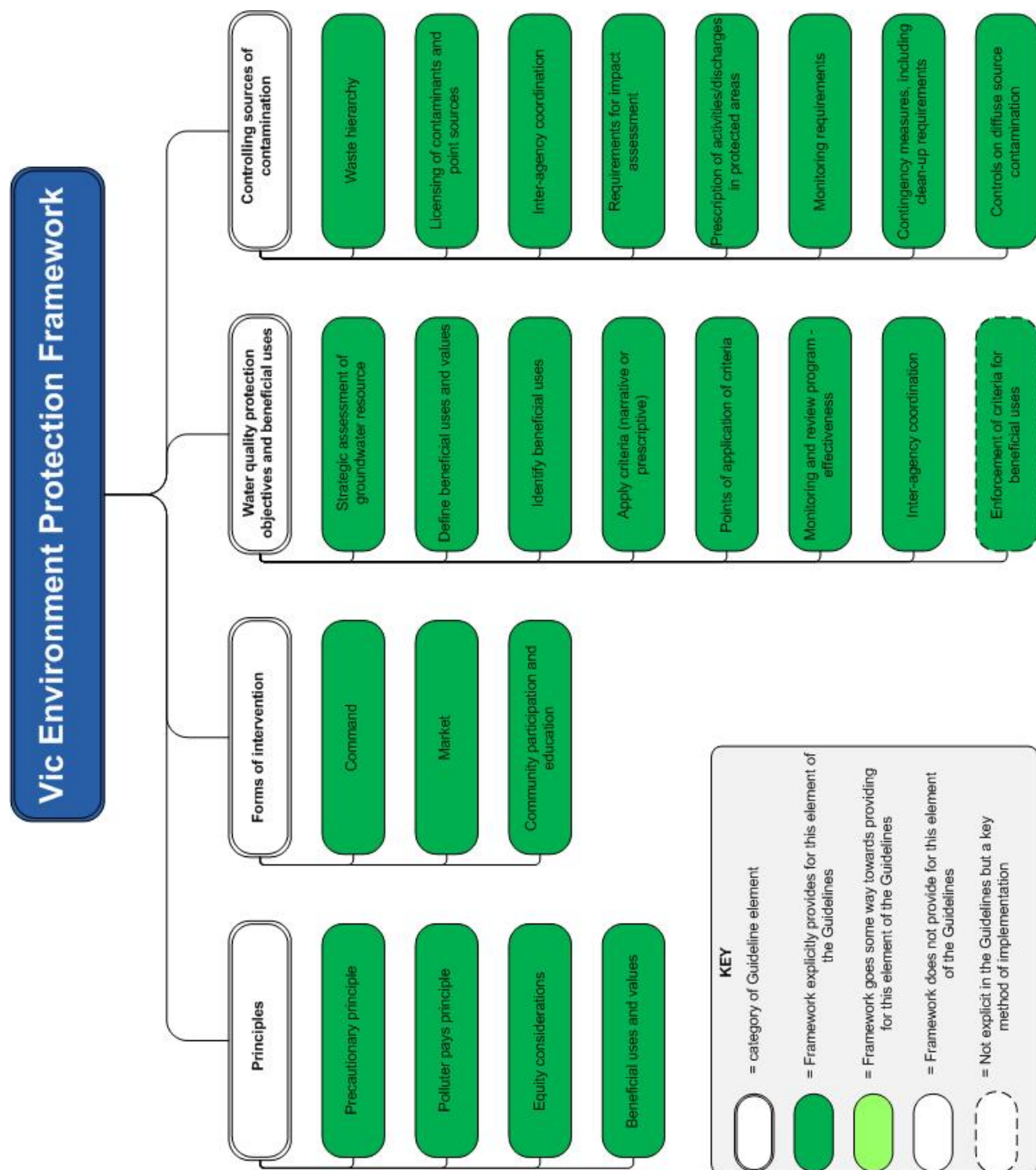
- (a) further implementing the principles underlying the Guidelines within the Land-Use Planning Framework; and
- (b) requiring regular review of the key State-standard planning provisions against the objectives of the planning framework, which include ensuring the sustainable use of land and the maintenance of ecologically processes.

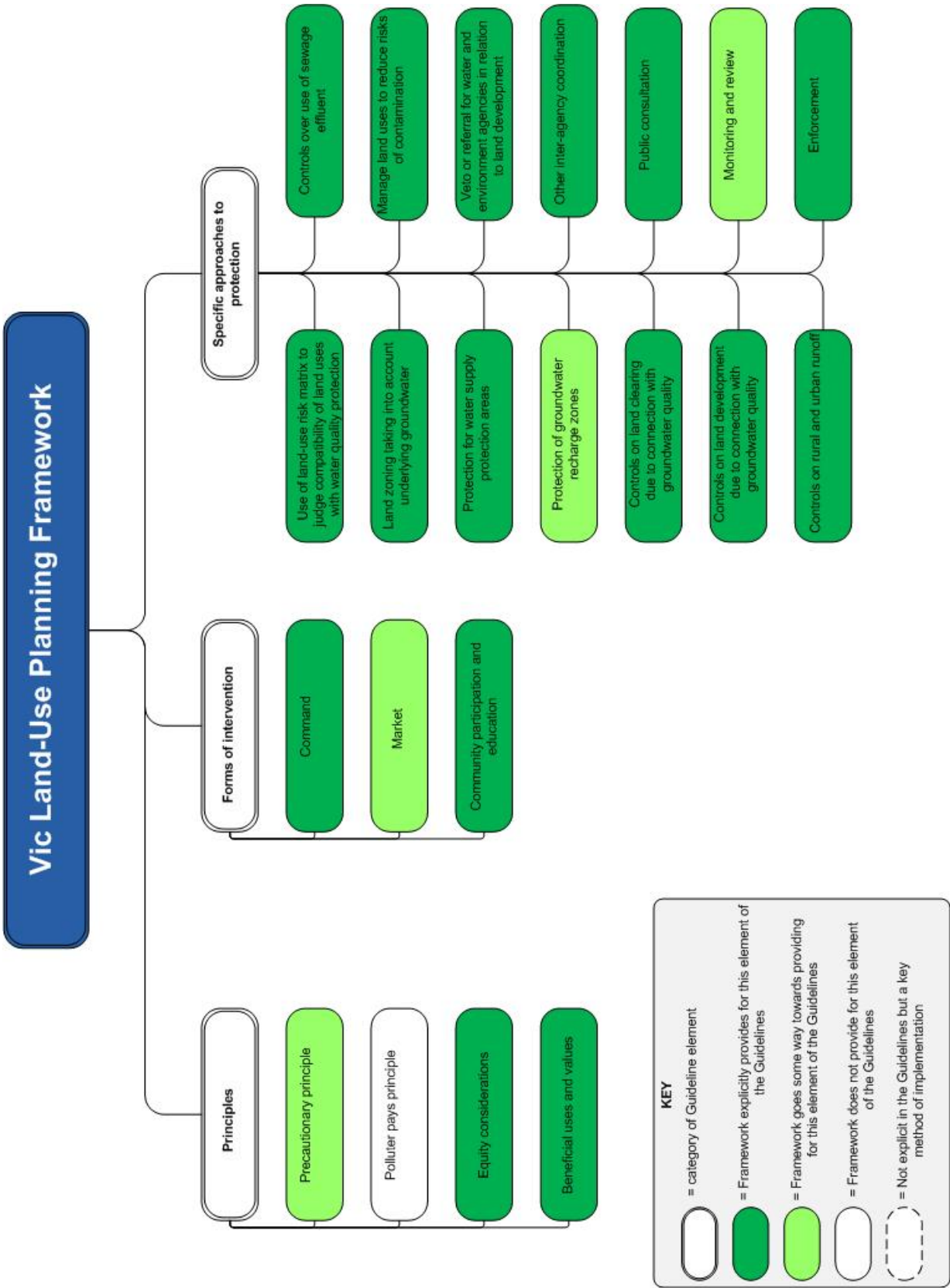
### **9.3 Beyond the Guidelines – innovative regulatory responses**

Some aspects of the Victorian regulatory framework for groundwater present ways to protect groundwater quality which go beyond the requirements of the Guidelines, and provide material to consider in a future revision of the Guidelines. Such measures include:

- (a) requiring licences not only to take groundwater, but also to use groundwater for irrigation, and applying standardised conditions to licences for irrigation water use. These include a requirement for an irrigation and drainage plan, which is aimed at protecting groundwater quality and avoiding salinity (rows 2 and 19, Vic Groundwater Management Framework Table); and
- (b) establishing an environmental water reserve, in which water (including groundwater) is held for environmental purposes, including for the purposes of preserving water quality for dependent ecosystems (row 19, Vic Groundwater Management Framework Table).









## **10. Western Australia**

### **10.1 Implementing the Guidelines – key areas of strength**

The regulatory framework for protecting groundwater in WA generally implements the Guidelines very well, although in relation to groundwater management, it uses a complex framework comprising numerous pieces of legislation. It is intended that this framework undergo wide-ranging reform, although no Bill has yet been introduced. Particular areas of strength within the current framework include:

- (a) adopting strong “command” mechanisms, including a general duty to take all reasonable steps to minimise degradation to a water resource, backed by a power of the Water Minister to give related binding directions (rows 5 and 23, WA Groundwater Management Framework Table);
- (b) establishing strong links between land-use planning and water management in relation to groundwater quality, through the State Water Strategy and State Water Plan (row 11, WA Groundwater Management Framework Table) and State Planning Policies (row 8, WA Land-Use Protection Framework Table);
- (c) adopting a comprehensive regime for considering groundwater quality monitoring requirements in the context of groundwater allocation, through a non-statutory Hydrogeological Reporting Policy (row 19, WA Groundwater Management Framework Table); and
- (d) developing an aquifer classification system in relation to drinking water sources (row 42, WA Groundwater Management Framework Table).

### **10.2 Opportunities for further implementation of the Guidelines**

Some aspects of the regulatory framework in WA provide further scope to implement the Guidelines. The State is yet to explore market mechanisms relating to groundwater quality, although the State Water Quality Management Policy mentions them. Further, although they do not yet apply to groundwater on a state-wide basis, WA legislation provides for environment protection policies to adopt legally binding environmental values. Finally, the WA Land-Use Planning Framework is yet to adopt the principles underlying the Guidelines, such as the precautionary principle and the polluter pays principle.

### **10.3 Beyond the Guidelines – innovative regulatory responses**

Some aspects of the WA regulatory framework for groundwater present ways of protecting groundwater quality which go beyond the requirements of the Guidelines, and provide material to consider in a future revision of the Guidelines. Such measures include:

- (a) a policy which sets out processes for considering the water quality requirements of GDEs (row 4, WA Groundwater Management Framework Table);
- (b) innovative approaches to waste management, which move beyond the principle of waste minimisation, and include product stewardship plans and extended producer responsibility schemes to prevent the generation of potential groundwater contaminants (row 16, WA Environment Protection Framework Table);
- (c) recognition of the need to protect stygofauna by providing appropriate groundwater quality, in the EIA context (row 19, WA Environment Protection Framework Table);
- (d) a risk-based approach to dealing with potential contamination risks through environmental management plans for petroleum activities (row 17, WA Environment Protection Framework Table); and
- (e) providing for the EPA to undertake an environmental assessment of planning instruments themselves – a form of strategic assessment (row 18, WA Land-Use Protection Framework Table).

