

**Pioneer Valley**  
Water Resource Amendment Plan  
Consultation Report  
October 2009

Prepared by:

Water Allocation and Planning

Department of Environment and Resource Management

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October 2009

## Minister's foreword

This report summarises issues raised during the community consultation process that supported development of the *Water Resource (Pioneer Valley) Amendment Plan 2009* and how they were dealt with in preparing the final plan.

The community's contribution to the planning process documented in this report highlights the close relationship between the people of the plan area and the water resources that underpin their social and economic wellbeing. Importantly, their input provided the context and perspective needed to address several complex and difficult challenges in amending the *Water Resource (Pioneer Valley) Plan 2002*.

The most testing of these challenges was dealing with the progressive intrusion of seawater along the coast, which posed a threat to the viability of the broader coastal aquifer and the interests of the many farms and communities reliant on this resource.

Although decisive action was essential, the submissions received on the draft amendment plan reflected an understandable degree of concern about the possible effects of lost access to water. A full review of the submissions against the provisions of the draft plan confirmed that the long-term gains of the strategy would significantly outweigh any short-term costs. With the effects of seawater intrusion already being felt, it was clear that without action, the severity and extent of the problem would rapidly worsen.

Nonetheless, the submissions provided important pointers for revising the amendment plan's provisions—for example, in allowing the restrictions in the seawater intruded area to be phased in over five years. Beyond this, long-term gains will be achieved under a robust water management framework that allows for most groundwater entitlements in the coastal aquifer to convert in part to tradable water allocations.

I would like to acknowledge the contribution made by the many individuals and groups to the development of the amendment plan, most notably through the formal submissions process. All submissions were fully considered and, in some instances, the views expressed in them led to significant changes being made to the amendment plan.

STEPHEN ROBERTSON MP

Minister for Natural Resources, Mines and Energy  
and Minister for Trade

October 2009

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## 1.0 Introduction

This consultation report, a requirement of the *Water Act 2000* (the Act), has been prepared to explain how issues raised during amendment plan development were considered and dealt with.

In preparing an amendment plan for the *Water Resource (Pioneer Valley) Plan 2002*, an important source of community input occurred through the formal submissions that were received following the release of a draft amendment plan (the draft plan). This report focuses on the issues that were raised through that process.

Water resource plans are progressively being prepared for river and aquifer systems throughout the state to provide a sustainable framework for meeting future water needs. In achieving this, plans endeavour to define the availability of water, provide security for existing water users and, where practicable, reverse any environmental degradation that may have occurred.

Water resource plans are subordinate legislation to the Act, which clearly specifies the aspects of water resource management a plan must address, and also lists other factors that can be incorporated into or considered by a plan. The core goals of each water resource plan are expressed as a set of outcomes. Each water resource plan also sets out strategies that must be used to achieve its outcomes.

The issues raised in submissions following the release of a draft plan should be related to these components, or the information that was used to determine them. For example, a submission could question the validity of the technical assessments prepared to support the process, or whether the Minister had adequately considered all the relevant factors specified in the Act.

Although water resource plans provide a legislative framework for ensuring that water is sustainably managed, implementing the specified strategies occurs through resource operations plans that deal with the practical business of putting the strategies into effect.

In developing a resource operations plan, different approaches to implementing the water resource plan can be explored to ensure that water is managed from day to day to deliver the greatest benefit to all sectors of the water-using community and the natural environment. However, the arrangements must be able to demonstrate their consistency with the water resource plan.

The respective functions of the two plans as strategic and operational parts of a single, integrated planning framework are embodied in the Act. While the Minister is responsible for preparing water resource plans, the Chief Executive Officer of the department is responsible for preparing the resource operations plans that implement them.

Although the respective plans deal with common issues, confusion sometimes arises over differences in their scope, and submissions received about one type of plan may relate more properly to the other type.

To ensure that any contribution to the planning process is appropriately considered, submissions should be correctly framed to conform to the parameters set for each type of plan. If an issue raised in a submission does not appear to have been included in a consultation report, the most likely explanation is that it fell outside the required scope of the plan.

### 1.1 Purpose of this report

This report has been prepared by the Minister for Natural Resources, Mines and Energy and Minister for Trade to document the public consultation process carried out during the preparation of the *Water Resource (Pioneer Valley) Amendment Plan 2009*. The report is a requirement of the Act and summarises the issues raised and how they were dealt with.

The report includes:

- a summary of the plan amendment process and overview of the Pioneer Valley plan area (Chapter 1)
- a record of the consultation arrangements and community involvement that supported the development of the plan (Chapter 2)
- a summary of the issues raised during the consultation process and how these issues have been considered in finalising the plan (Chapter 3)

- a summary of the issues that were considered important in finalising the plan that were not raised during the consultation process (Chapter 4)
- a summary of the key changes that were made prior to finalisation of the plan (Chapter 5).

## 1.2 Intent of the Pioneer Valley amendment plan

The amendment plan process was principally initiated to integrate sustainable groundwater management arrangements with the provisions of the existing plan for the management of surface water. These groundwater resources are situated beneath the Pioneer River and Sandy, Sandringham and Alligator creeks catchments. As a result, groundwater management arrangements apply throughout the plan area. The final plan also extends provisions of the initial water resource plan area to provide for the sustainable management and allocation of surface water in the Sandringham and Alligator creeks catchments.

The community in the plan area was consulted extensively throughout the process through the formal provisions of the Act, and through a range of less formal arrangements conducted to maximise public awareness and involvement.

The finalised water resource plan will provide for the allocation and sustainable management of water in the plan area by:

- extending the plan area to include the Sandringham and Alligator creeks catchments
- defining the availability of groundwater in the amended plan area and, where practicable, providing a framework for converting groundwater entitlements to tradable water allocations
- establishing strategies to address seawater intrusion in the coastal aquifer in the plan area
- defining the availability of unsupplemented surface water in the amended plan area and providing for entitlements to be specified in terms of volumetric limit and other conditions
- providing a framework for reversing, where practicable, degradation to natural ecosystems.

The plan does not deal with overland flow water, which is not a significant source of water use in the plan area.

## 1.3 Copies of the Pioneer Valley amendment plan

Copies of the amended plan, explanatory notes and other supporting documents can be accessed at the department's website <[www.derm.qld.gov.au](http://www.derm.qld.gov.au)>.

## 1.4 History of the Pioneer Valley amendment plan development

The Minister's intention to prepare a draft amendment plan for the Pioneer Valley Water Resource Plan was announced on 25 June 2003. A moratorium was notified on activities that would have led to an increase in water use or changed the way water was taken, to ensure that the planning process proceeded from a stable water use base.

The Minister also released an information report about the process to promote an understanding of the issues that would influence the development of a draft plan. Submissions on the process were also invited.

The development of a draft plan was supported by comprehensive community consultation arrangements and the preparation of technical assessments of relevant socio-economic, hydrologic and ecological factors.

The draft plan was released on 9 July 2008, and was accompanied by an overview report that explained the proposed management provisions and summarised the key findings of the technical assessments. Public comment was invited until 5 September 2008, by which time 58 submissions had been received, all of which were considered by the Minister.

The finalised plan was approved by the Governor in Council on 8 October 2009.

## 1.5 Overview of the Pioneer Valley plan area

The Pioneer Valley, in the lower tropics of Queensland's east coast, has an area of 2400 square kilometres and falls mainly within the boundaries of the Mackay Regional Council.

The water resources of the Pioneer Valley were central to the area's early economic growth and continue to play a vital part in sustaining agriculture, industry and the wellbeing of communities throughout the region. The area is also a key service, support and dormitory area for the mining industry in the hinterland. Irrigation, primarily for sugarcane production, is the dominant water use, with more than 75 000 hectares of cane harvested in 2007.<sup>1</sup>

Under the amendment process, the plan area was extended and now includes the catchments of:

- Pioneer River
- Bakers Creek
- Sandy Creek
- Sandringham Creek
- Alligator Creek.

The Pioneer Valley catchments are characterised by highly variable rainfall, with three-quarters of annual falls occurring between December and April. Mean annual rainfall ranges from about 1000 millimetres per annum (mm/a) in Blacks Creek to more than 2000 mm/a in the upper parts of Cattle Creek and Finch Hatton Creek subcatchments.

Groundwater extraction began in 1896 and grew steadily throughout the early part of the 20<sup>th</sup> century. A rapid increase in use and signs of seawater intrusion in the coastal aquifer led to the gazetting of the Pioneer Subartesian Area in 1947, which in 1965 was expanded to include the former Sarina Shire, which has now been incorporated into the Mackay regional government area.

Although management initiatives were introduced under these arrangements, water use continued to rise, which resulted in worsening seawater intrusion in the coastal aquifer that eventually affected 9100 ha of farmland. The risk posed by the progressive advance of sea water into the coastal aquifer was instrumental in the Minister's decision to amend the initial water resource plan.

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<sup>1</sup> CANEGROWERS Annual Report 2008. Available at <http://www.canegrowers.com.au/contact-us/corporate/annual-report.aspx>. Accessed 8 October 2009.

## 2.0 Consultation and submissions on the draft Pioneer Valley amendment plan

### 2.1 Consultation

A communication and consultation strategy was developed to raise awareness of the water planning process, to promote public involvement and to provide two-way feedback through the department between the Minister and the community.

The following avenues for community involvement were available:

- a community reference panel appointed by the Minister (section 2.2)
- public meetings and information sessions (section 2.3)
- stakeholder meetings
- a formal submissions process (section 2.4).

Through these arrangements, the following sectoral interest groups and organisations made contributions to the process:

- primary producers
- peak industry bodies
- water users
- conservation groups
- local authorities
- water service providers
- government agencies
- traditional owners
- natural resource management groups
- tourism and recreation groups.

### 2.2 Community reference panel meetings

Under the Act, a community reference panel must be formed to provide advice about matters relevant to preparing a draft water resource plan or amendment plan. The panel must include representatives from economic, cultural and environmental interests in the plan area. The panel advises the Minister on water-related issues, community aspirations and through the department facilitates two-way feedback between the Minister and the community. However, panels do not play a decision-making part in developing a draft plan. Rather, the Minister considers the panel's views and advice in conjunction with feedback from the wider community and the findings of the technical assessments.

The panel was appointed by the Minister on 17 December 2003. Nominees were evaluated against the specified criteria by a committee comprising representatives of the Mackay-Whitsunday Natural Resource Management Group, the Whitsunday Regional Economic Development Corporation, government and an independent chair. The Minister selected panellists based on the committee's recommendations.

The 17 panellists represented:

- Mackay Sugar Limited
- Mackay Water
- Australian Canefarmers Association
- Mackay Conservation Group
- CANEGROWERS
- Queensland Commercial Fishermen's Organisation
- traditional owners—the Yuibera People
- Sunfish
- Pioneer Valley Groundwater Consultative Committee
- Eton Water Supply Scheme
- Sarina Shire Council, Mirani Shire Council and Mackay City Council (these have now been amalgamated to form the Mackay Regional Council)
- state government agencies.

The panel met on ten occasions between March 2004 and July 2008.

## **2.3 Public meetings**

While formal consultations centred on the community reference panel, public meetings were also held across the plan area to foster broader community involvement and input. These meetings were held in Pinnacle, North Eton, Bakers Creek, Walkerston and Mirani between 15 and 17 July 2008, following the release of the draft plan.

These public meetings allowed water users, the general public, community members and other interested parties to:

- be briefed by departmental staff on the water planning process and the draft plan
- understand the objectives of the proposed outcomes of the plan
- provide comment on the draft plan
- be advised on how to lodge a formal written submission.

In addition, meetings were held with stakeholder groups to ensure that special interests were represented.

## **2.4 Submissions**

Formal submissions were invited at the start of the process and again on release of the draft plan. A total of five submissions were received in the initial round and another 58 on release of the draft plan. These submissions provided constructive input that contributed to the refinement of the draft plan prior to its finalisation.

The Pioneer Valley plan project team validated and catalogued all properly made submissions, which were then considered by the Minister. Chapter 3 summarises the main issues raised in the submissions and how they were assessed and dealt with. Appendix A shows how issues were categorised and the number of submissions that fell into each category. Issues identified as requiring action by the department, although they were not raised in the submissions, are summarised in Chapter 4. The changes made to the plan prior to its finalisation are discussed in Chapter 5.

## 3.0 Submissions—issues raised and outcomes

### 3.1 Draft plan provisions for the seawater intruded area

#### 3.1.1 What the draft plan needed to consider

Under the *Water Act 2000*, the Minister must plan for the allocation and sustainable management of water to meet the state's future needs. To meet these obligations, the Act provides for the Minister to prepare water resource plans for any part of the state.

A water resource plan must address groundwater management where there is a risk to the outcomes of an existing plan, the availability of water for existing entitlement holders, the needs of the natural environment or water quality.

The amendment plan process was triggered to address the risk associated with seawater intruding into the coastal aquifer arising from excessive groundwater use.

In line with the 2004 National Water Initiative, the planning process must also be mindful of the following priorities:

- connected surface water and groundwater systems to be managed as a single resource
- to establish clear pathways for the return of all systems to environmentally sustainable levels of extraction
- to return over-allocated or overused systems to sustainable levels of extraction.

In addition, under the national agenda as reflected in the Act, water entitlements should be clearly specified in terms of the volume that can be taken and the conditions that must prevail for water to be taken. Wherever possible, there is a clear preference for entitlements to be held by end users as tradable allocations, which are titled assets separated from the land to which they were formerly attached.

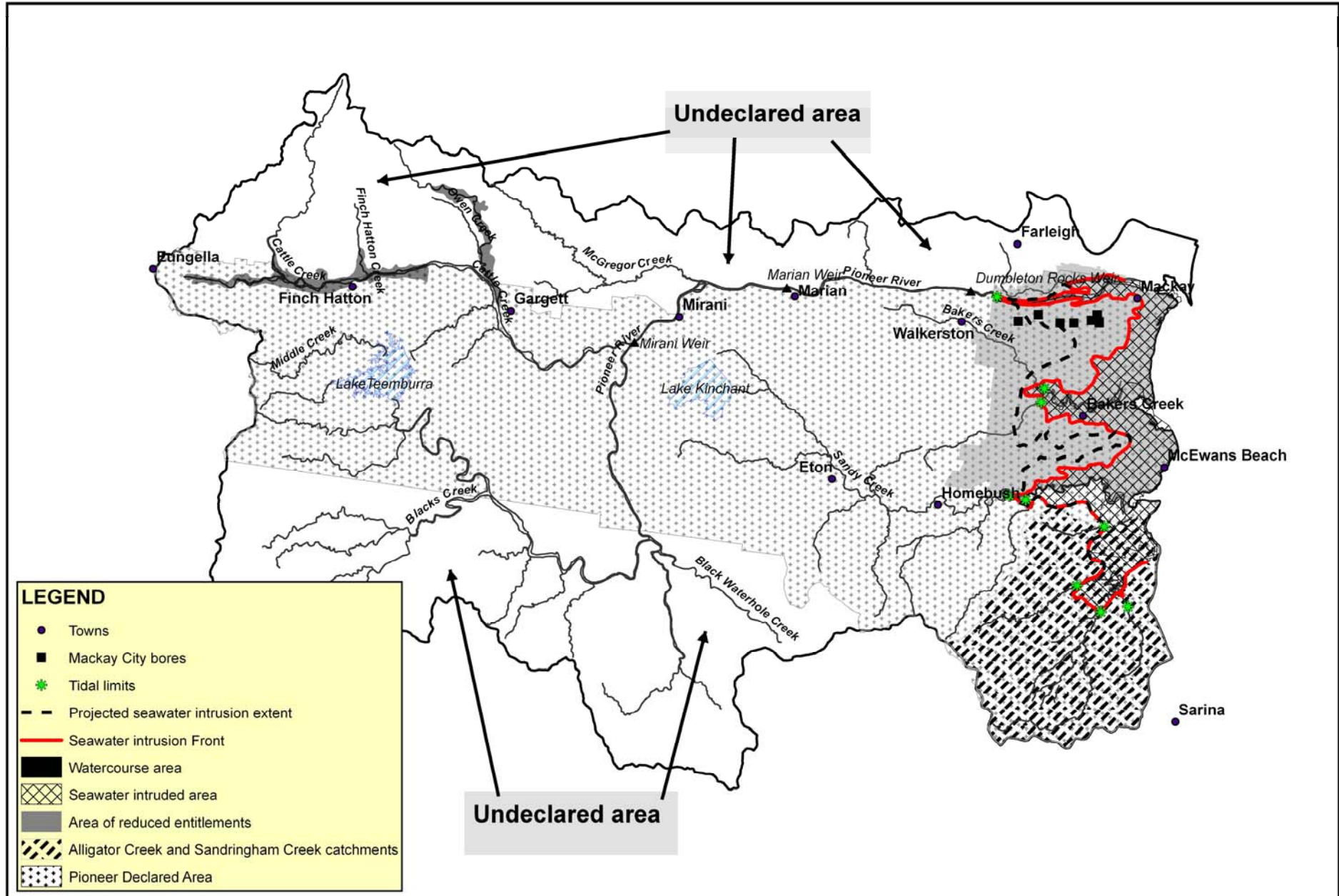
#### 3.1.2 Background

A high level of irrigation development relying on groundwater extractions, particularly along the coastal margin of the plan area, has resulted in the progressive intrusion of sea water into the coastal aquifer. Technical assessments that supported draft plan development confirmed a direct correlation between the amount of groundwater pumped from this part of the aquifer and increased salinity of the groundwater.

For planning purposes, the *seawater intruded area* of the coastal aquifer (Figure 1) was defined as the part where groundwater salinity, measured by electrical conductivity, exceeded 1500 micro Siemens per centimetre ( $\mu\text{S}/\text{cm}$ ). It comprises an area along the coast between the tidal limits of the Pioneer River and Alligator Creek (Figure 1).

The landward boundary of the seawater intruded area is referred to throughout this report as the *seawater intrusion front*. The aquifer area along the coastline but east of the coastal hills between Walkerston and Homebush comprises the broader *coastal aquifer*. The coastal aquifer is partially connected to the more elevated inland aquifer area that lies beyond, and which has distinct hydrologic differences.

Figure 1—Pioneer Valley plan area



### 3.1.3 Draft plan provisions

Increasing groundwater salinity produced by seawater intrusion poses a risk to the security of existing users' entitlements, water quality and the natural environment. The provisions in the draft plan were primarily developed to ensure that the seawater intrusion front is held at its current position.

As a result, the provisions focused on water entitlement access within the seawater intruded area, where extractions most strongly correlate with rising salinity, and to a lesser extent in the area immediately beyond it.

The uncertainty associated with specifying a water entitlement combined with the risks to the outcomes of the amendment plan from ongoing use in the area affected by seawater intrusion precluded the possibility of licences in the seawater intruded area converting to water allocations. Entitlements in this area would therefore remain as licences and would not be accessible.

However, in the area immediately to the west of the seawater intruded area, the conversion of licences to water allocations was feasible, although not at the full nominal volume of the original entitlement. Instead, part of the original nominal entitlement would convert to a water allocation, with the remainder continuing to be held as a licence that would be known as the *complementary component*. The announced allocation for the complementary component would be set at zero and therefore water would be inaccessible under this part. Under the draft plan, the provisions were to come into effect on completion of an amended resource operations plan.

The draft plan provided for the announced entitlements for both types of licence—those in the seawater intruded area and the complementary component to the west of the seawater intruded area—to be subject to review at five-year intervals after commencement of the amended resource operations plan. The method for developing the review was provided for in the draft plan.

A second implementation option was canvassed in the overview report that accompanied the draft plan. This option (option 2) proposed that existing licences in the coastal aquifer to the west of the intrusion line would convert to water allocations with annual volumetric limits expressed as a percentage of the existing nominal entitlement. Water licences in the seawater intruded area would be cancelled.

### 3.1.4 Nature of the issue

Reduced access to water in the coastal aquifer was of concern for a large number of submitters. While seawater intrusion was regarded as a real and pressing problem, many submitters believed the abrupt cessation of water use in the seawater intruded area would have severe consequences for water users.

Option 1 was preferred in submissions that commented on the proposed implementation approaches, while there was no support for option 2.

Revising option 1 to include a phase in of entitlement reductions in the seawater intruded area was suggested as a way of allowing users to adapt to change and seek alternative sources of water. Through the review process, there would also be the potential for some water to be accessed in the event of satisfactory aquifer recovery.

Some submitters believed water users in the seawater intruded area should be allowed ongoing access to 20 megalitres per annum (ML/a). A single submission called for entitlement volumes to reflect soil and climatic factors throughout the plan area.

### 3.1.5 How the issue was assessed

Options for managing the seawater intruded area were assessed for consistency with the following requirements:

- effectiveness in halting seawater intrusion
- ease and effectiveness of implementation
- maximising access to available water without promoting further seawater intrusion
- minimising the impacts on affected water users.

A review of relevant factors confirmed that reduced access to groundwater, particularly in the seawater intruded area, was essential if the seawater intrusion front was to be held in check. However, scope was identified for allowing a more flexible implementation schedule and allowing some access to water in the intrusion area, subject to strict safeguards.

### **3.1.6 The finalised plan**

The final plan has been amended to allow provisions for the seawater intruded area to be phased in over five years, commencing in the current 2009–10 water year using the existing announced allocation framework.

Once the reduction has been achieved, bores able to access water with an electrical conductivity of less than 1500  $\mu\text{S}/\text{cm}$  will be allowed to pump up to 20 ML/a, provided an electrical conductivity meter and data logger are installed.

## **3.2 Phased implementation of provisions in the seawater intruded area**

### **3.2.1 What the draft plan needed to consider**

While a water resource plan provides an overall framework for allocating and sustainably managing water, the strategies for achieving the plan's specified outcomes are implemented under a resource operations plan. The strategies may include criteria for adjusting existing water entitlements to achieve plan outcomes. A water resource plan must include a schedule of proposed implementation arrangements.

### **3.2.2 Background**

As discussed throughout this document, seawater intrusion is a major problem in coastal parts of the Pioneer Valley. The hydrologic assessment that supported draft plan development confirmed that the seawater intrusion front would continue to advance into the coastal aquifer (Figure 1) if past levels of groundwater use were allowed to continue.

### **3.2.3 Draft plan provisions**

The draft plan's provisions for groundwater management were primarily developed to ensure that the seawater intrusion front was held in its current position. To support this outcome, access to groundwater taken under licences in the seawater intruded area would not be allowed, while in the adjacent coastal aquifer, restrictions were to apply (Figure 1).

Under the implementation arrangements, these measures were to take effect on finalisation of the amended resource operations plan.

### **3.2.4 Nature of the issue**

The submissions reflected a widespread view that implementation would occur too swiftly for water users to adjust to the changes and that the effects on their operations would be excessive. Submissions called for the provisions to be phased in over a longer period to give water users time to adapt to change.

### **3.2.5 How the issue was assessed**

A review of the provisions confirmed that although the restrictions were essential for dealing with the ongoing risk of seawater intrusion, a more flexible implementation approach could be accommodated.

### **3.2.6 The finalised plan**

The final plan provides for the restrictions in the seawater intruded area to be phased in over five years, beginning in the current 2009–10 water year. In the broader coastal aquifer, the respective restrictions will come into effect on finalisation of the resource operations plan.

### **3.3 Review of water licences in the coastal area**

#### **3.3.1 What the draft plan needed to consider**

Water resource plans are primarily prepared to ensure that the state's water is sustainably managed to meet future needs. The sustainable management goals for each plan are specified as a set of outcomes, supported by complementary strategies that will be put into effect when the plan is implemented under a resource operations plan.

The key challenge in developing sustainable management provisions for groundwater in the plan area was to establish strategies supportive of the outcomes associated with addressing seawater intrusion in the coastal aquifer. The effectiveness of an implemented water resource plan in achieving its goals is assessed through the monitoring program conducted under the resource operations plan.

#### **3.3.2 Draft plan proposal**

Informed by the monitoring program that will be implemented under an amended resource operations plan, the response of the coastal aquifer to the draft plan's strategies for dealing with seawater intrusion was to be reviewed at five-year intervals.

In instances where salinity levels in the seawater intruded area, measured as electrical conductivity, consistently decreased and fell below a threshold of 1500  $\mu\text{S}/\text{cm}$ , the seawater intrusion front was more than 1000 m from a bore, and fresh water levels remained high, the review process provided for water users to be allowed limited access to water. For this to occur, the chief executive would need to be satisfied that the specified criteria were met, that the level of water use could be sustained over the long term and that allowing access would be consistent with overall planning goals.

#### **3.3.3 Nature of the issue**

The five-year review period was viewed by submitters as lacking the flexibility needed to respond to changing aquifer and seasonal conditions. An annual review, or a review of water availability following large recharge events, was preferred.

#### **3.3.4 How the issue was assessed**

The five-year review cycle was considered most suitable because of the following considerations:

- the ten-year life of the plan
- the lag in aquifer responsiveness and the time in which trends are likely to become evident
- monitoring and reporting constraints.

#### **3.3.5 The finalised plan**

The five-year review provisions are unchanged. The review process will be set out in detail under the amended resource operations plan.

### **3.4 Adjusting entitlements to achieve plan outcomes**

#### **3.4.1 What the draft plan needed to consider**

Water resource plans are prepared, among other things, to define the availability of water in a plan area and provide a framework for sustainably managing water and how it is taken. A draft plan must specify the outcomes that will be associated with these sustainability criteria and the strategies, based on the best available science, that will be used to achieve the outcomes. The strategies may include criteria for adjusting existing entitlements to achieve plan outcomes. Among the factors the Minister must consider in preparing a water resource plan is the public interest.

### 3.4.2 Background

Under the National Water Initiative, adjustments to entitlements must occur where the water resource planning process establishes that river or groundwater systems are over-allocated and/or overused, so that environmental and other public benefit outcomes are met.

Moreover, the initiative specifies that entitlement holders will bear the risks of any reduction or reduced reliability where the consumptive pool of water is reduced because of:

- seasonal or long-term changes in climate
- periodic natural events such as bushfires and drought.

In addition, the initiative specifies that where reductions result from improvements in the knowledge of a water system's capacity to sustain particular extraction levels, the risks are to be borne by users until 2014.

These provisions, principally implemented in Queensland under the Act, are part of an integrated national strategy structured to ensure that communities derive the maximum benefit from their finite water resources. To offset the effects of any reductions that may be necessary, complementary parts of the initiative are intended to provide the water-using community with the means to adjust to change. This might include, for example, water users buying water allocations that are created under the planning process, or accessing water that may become available from alternative sources, such as recycling.

### 3.4.3 Draft plan proposal

To ensure that the groundwater management framework was sufficiently robust to hold seawater intrusion in check, the draft plan proposed restricting access to groundwater in the coastal aquifer. In the seawater intruded area, entitlements were to remain as licences, with announced entitlements set at zero for at least five years after the plan's implementation. In the coastal aquifer to the west of the seawater intrusion front, entitlements were to convert in part to tradeable water allocations, with the remainder to be held as a licensed, complementary component with the announced entitlement set at zero.

### 3.4.4 Nature of the issue

Submitters believed water users should be compensated to redress the effects of reduced access to water, including reduced crop yields, redundant irrigation works and farm equipment and lower property values. Other submitters believed the necessary reductions in use should be shared by all groundwater users, perhaps through the introduction of entitlements expressed in terms of a standardised per-hectare volumetric allowance across the plan area, or that water users in the seawater intruded area should be allowed access up to 20 ML/a of water. In calling for the broader groundwater-using community to share in the restrictions, some submitters questioned the assumption that the coastal and more inland aquifers were only partially connected.

### 3.4.5 How the issue was assessed

Water resource plans are concerned with providing a framework for sustainably managing water resources in an area. Central to developing a draft plan is an assessment of water availability patterns and how these can best be managed to support the range of consumptive and non-consumptive uses reliant on the resource.

Where the need arises for existing entitlements to be adjusted, under the Act and consistent with the National Water Initiative, there is no basis for compensation to be paid to water users—unless adjustment occurs during the ten-year life of an existing plan. Moreover, the financial losses associated with rising salinity would, in the long term, eclipse possible losses associated with water access restrictions. The effects of seawater intrusion would become increasingly acute, ultimately affecting a significant part of the coastal aquifer to the west of the current position of the seawater intrusion front.

In the absence of strict controls in the seawater intruded area, there would have been an unacceptable risk of seawater continuing to progress inland, causing widespread harm to the interests of an increasing number of water users in the coastal aquifer. This would not have met the public interest considerations specified in the Act.

A review of the hydrologic assessment confirmed that the coastal and more elevated inland parts of the aquifer were only partially connected and had distinct hydrologic differences. Applying access restrictions to the inland area would have been of little benefit to the plan strategy because every 20 litres saved in the higher country would produce less than 1 litre of flow at the coast.

The revised provisions allow for a five-year phase in of restrictions, with a periodic review of water availability and the potential for up to 20 ML/a to be accessed by users in the seawater intruded area. This will reduce the magnitude and likelihood of business interests being harmed by seawater intrusion, which would otherwise threaten the viability of agriculture throughout the coastal aquifer at an unacceptable cost to the broader water-using community.

It was concluded that the proposed provisions would serve the public interest at the highest level possible.

### **3.4.6 The finalised plan**

The provisions for implementing water access restrictions in the seawater intruded area have been revised. The restrictions will be phased in over five years, starting in the current water year, rather than being introduced in full on finalisation of the amended resource operations plan.

Under the finalised plan, the components of water licences that convert to water allocations in the non-intruded part of the coastal aquifer will have a nominal volume of at least 20 ML/a.

## **3.5 Water trading**

### **3.5.1 What the draft plan needed to consider**

A draft water resource plan may provide for existing entitlements to convert to tradeable water allocations, subject to performance indicators being specified for water allocation security objectives and environmental flow objectives.

### **3.5.2 Background**

Conversion of existing entitlements to tradeable water allocations in areas of high demand where additional supplies may not be available is a key objective of the National Water Initiative.

Water trading has demonstrated its effectiveness in meeting demand in many parts of the state by creating a market for surplus water made available from unused or partially-used entitlements or through efficiency improvements. However, for an entitlement to convert to a water allocation it must be possible for its attributes to be clearly specified in terms of the nominal volume that is likely to be available over time, secured against complementary security criteria supportive of the draft plan's general and ecological outcomes.

Under water resource plans, the necessary attributes, specified as water allocation and environmental flow objectives, ensure that the original attributes of each allocation are preserved if the entitlement is moved to a new point at which water is taken, or is subdivided or amalgamated. Rules, tested against the hydrologic model, are set out in the resource operations plan to specify the extent to which a water allocation can be confidently moved from one point to another, or changed in other ways.

### **3.5.3 Draft plan proposal**

The draft plan provided for the majority of groundwater entitlements in the plan area to convert to water allocations, excluding those in the seawater intruded area, where entitlements were to remain as licences with an announced entitlement volume set at zero. Under the proposed framework, groundwater trading would be established in coastal areas not intruded by seawater, in the fractured rock aquifers of the Mt. Vince area and in the more highly developed alluvial aquifers inland of the coastal area.

### **3.5.4 Nature of the issue**

Some submitters believed entitlements in the seawater intruded area should be converted to tradeable water allocations. They argued that extractions in the seawater intruded area would cease if these entitlements were traded to a sustainable point of take, enabling the entitlement holders to be reimbursed for their lost access.

Some submitters questioned the merits of water trading and raised concerns about separating water entitlements from land and the movement of water from one bore to another bore. It was argued that water trading would not mitigate the impact of the plan on users in the seawater intruded area because water would not be able to be traded into the coastal aquifer to allow pumping in the area to continue.

### **3.5.5 How the issue was assessed**

Trading entitlements out of the seawater intruded area was not a practicable option since an entitlement can only convert to a water allocation if water availability can be adequately defined at the original point where an entitlement is taken.

Under the Act, water allocations can only be created where water allocation security objectives and environmental flow objectives, with clearly specified performance indicators, can be established. These attributes provide definitive information about an allocation, ensuring that the holder—or any potential buyer—has long-term confidence about the availability of water. Therefore, for an allocation to be created, it has to be demonstrated that the water in question could be taken over time at the specified level of performance at the original location. In the seawater intruded area, this level of confidence could not be assured, because the modelling indicated that worsening seawater intrusion would constantly diminish performance.

Moreover, the effects of creating an allocation in one area cannot be detrimental to the performance of entitlements in another. The modelling also confirmed that continuing access to entitlements in the seawater intruded area would lead to worsening salinity and severely diminish the performance of entitlements elsewhere in the coastal aquifer.

Similarly, if entitlements from the seawater intruded area were traded to other areas, impacts would be felt by entitlements in the second area, since the water resources available at any time would need to be shared among more users.

In summary, the proposal to trade entitlements out of the seawater intruded area was not feasible because it could not meet a range of fundamental requirements set out in the Act.

Establishing frameworks to allow the trading of water allocations where the fundamental requirements are met is a priority of both the Act and National Water Initiative. The amended resource operations plan will state the permitted and prohibited changes to the location of take on water allocations. These will be developed by pre-testing their effects to ensure there is no detriment to water allocation security objectives or environmental flow objectives.

### **3.5.6 The finalised plan**

The plan's provisions are unchanged.

## **3.6 Economic and social technical assessment**

### **3.6.1 What the draft plan needed to consider**

In planning for the allocation and management of water to meet the state's future needs, the Minister must consider a broad range of values, including those associated with the economy of the plan area, and any technical economic and social assessments prepared to support plan preparation.

### **3.6.2 Background**

The development of the draft plan was informed by two economic assessments: a stage 1 baseline economic and social assessment report that summarised the current economic and social conditions in the catchment, while a stage 2 report examined the ramifications of the four possible management scenarios detailed below:

- current restrictions scenario—continued management under the restriction regime that applied in the 2003–04 water year
- full use of entitlement scenario—demand met solely from groundwater extractions with no allowance for the contribution of rainfall
- climate-moderated full use of entitlement scenario—up to full entitlement use with allowance given for the contribution made to water demand by rainfall
- sustainable use scenario—extractions that are adjusted through water sharing rules to recognise groundwater storage levels during critical dry years, with full use of entitlements in inland areas and partial conversion of entitlements to water allocations in the coastal area to address seawater intrusion.

The assessments considered the relative short- and long-term costs and benefits associated with each scenario to identify the approach that provided the greatest overall gain at the least cost.

### 3.6.3 Draft plan provisions

The draft plan's provisions were based on the sustainable use scenario (scenario 4), which concluded that the greatest economic and social gains would be achieved by sustainably managing groundwater to promote long-term equity and productive stability throughout the inland and coastal aquifer areas.

### 3.6.4 Nature of the issue

Concerns about the economic consequences of reduced access to water in the seawater intruded area were raised in the submissions. Although there was general support for the outcomes specified in the draft plan, there was a wide-held view that the loss of access to groundwater in the seawater intruded area would impact on the viability of affected water users.

Individual and industry submitters also expressed the view that in developing the draft plan, the real economic costs of lost access to water in the seawater intruded area had not been adequately assessed.

In particular, there was a view that the scope of the stage 2 economic and social assessment was too narrow because the cost analysis had focused on the potential loss of production that would arise if seawater intrusion continued, rather than the costs that would be felt by lost access to groundwater.

The submitters also believed that the adverse effects for land values arising from lost production, and losses associated with redundant irrigation works and farm equipment had not been accounted for. The submitters were also concerned that the provisions would have adverse consequences for the viability of Mackay Sugar and would harm the interests of the community at large.

### 3.6.5 How the issue was assessed

The draft plan adopted the sustainable use scenario (scenario 4) approach because the stage 2 economic assessment demonstrated it had the potential to maximise long-term economic benefits for the whole coastal aquifer at minimum cost in the short term.

This goal could only be achieved by holding the seawater intrusion front at its present position by halting water use in the seawater intruded area. A strategy that allowed the seawater intrusion front to advance further inland would have seen the salinity impacts that now affect the seawater intruded area being felt across an increasing proportion of the coastal aquifer. If this were to eventuate, the economic costs to the extended area would have been significant and possibly irreversible.

Moreover, water use and other data suggest that irrigators in the seawater intruded area are adjusting their operations to account for the effects of salinity. Therefore, many of the costs associated with lost access to water may have already occurred because irrigators appear to be using less groundwater to address the declining crop yields that result from salinity.

In the non-intruded part of the coastal area, groundwater usage data indicates that at the sub-area level in seven of the past nine years, use in the coastal area did not exceed the proposed reductions of 55 per cent and 60 per cent. Announced allocations of 50 per cent have been in place for the coastal area since the 2005–06 water year.

Marsden Jacob Associates, the economic consultants commissioned to produce the stage 2 economic assessment, were asked to review and comment on the submissions concerning the economic assessment and economic impacts of the draft plan.

The Marsden Jacob Associates questioned several aspects about the use of the economic data that had informed the views expressed in the submissions. The following points were of note:

1. While the stage 2 assessment of costs and benefits was based on the water use levels allowed in the seawater intruded area under the management arrangements current during draft plan preparation, most submissions assessed losses against the high usage levels of the past that had proved unsustainable. The reviewer commented: “These losses were often calculated against historical use (often conjunctive), which includes groundwater use that has resulted in seawater intrusion.”
2. While the department’s stage 2 assessment had been based on localised factors specific to the seawater intruded area and the adjacent coastal aquifer, the values adopted in the submissions were more generic to the plan area as a whole. This tended to overestimate the value of irrigated sugar cane in the coastal zone, where water use is comparatively low and soil types untypical of other parts of the plan area. Marsden Jacob Associates commented that in the seawater intruded area: “...the differences in profit between dryland and irrigated production are minimal. Using WRP-wide average values will tend to overstate any losses attributable to restricted groundwater use.”
3. It was also noted that usage data for the seawater intruded area indicated that growers in the seawater intruded area have been limiting the use of groundwater, with only 1800 ML of a total of 4800 ML of entitlement having any metered use since 1999. The reviewer commented that low usage levels may have been in response to the effects of saline water on crop quality.
4. Simulations of losses arising from ‘production foregone’ by water restrictions had not accounted for several important factors. These included: “the impact of salt concentrations on cane yields; economies of scale; regional variations... (e.g. soil types) and differences in cost structures between regions...”
5. The costs associated with lost access to water were based on production values achieved by irrigating sugar cane with water of much higher quality than that available in the seawater intruded area. The reviewer commented: “the costs associated with seawater intrusion do not appear to be incorporated into any of the calculations in any of the submissions reviewed.”
6. Several submitters had calculated anticipated financial losses by adding together reduced land values and lost production. This was, in effect, double counting because agricultural land values are directly related to the present value of the future profit stream and should already account for the effects of seawater intrusion. The reviewer noted that if groundwater availability improved under the strategy, these effects would be felt only in the interim.

Had seawater intrusion not been addressed, the impacts for environmental, economic, industrial and community goals would have been far-reaching.

### **3.6.6 The finalised plan**

In respect of their linkages to the stage 2 economic and social assessment, the plan’s provisions are unchanged.

## **3.7 Future water supplies and alternative water sources**

### **3.7.1 What the draft plan needed to consider**

In developing the plan, the Minister needed to consider how the area’s groundwater resources could be best managed to sustain the area’s future water requirements. In doing so, consideration needed to be given to existing entitlements, existing levels of water use and the current condition of the area’s groundwater resources.

### **3.7.2 Background**

A water resource plan provides for the sustainable management of an area’s water resources. Under section 38 of the Act, key purposes for which the Minister may prepare a water resource plan may include:

- defining the availability of water for any purpose
- providing a framework for sustainably managing water and the taking of water
- identifying priorities and mechanisms for dealing with future water requirements

- providing a framework for establishing water allocations
- providing a framework for reversing, where practicable, degradation that has occurred in natural ecosystems.

The final plan contains strategies relevant to all of the above key purposes.

The water resource planning process is complementary to a range of other measures that, in concert, are designed to ensure that the region's future water needs can be sustained. The Queensland Government is currently developing a regional water supply strategy for the Mackay-Whitsunday region. This strategy will identify both supply and demand management options that will need to be implemented over the next 50 years in order to sustain the area's future water supply needs.

The initial water resource plan identified the potential for 4000 ML/a of water to be made available from Sandy Creek as unsupplemented water during periods of high flow. This reserve was to be made available to help relieve pressure on aquifers in the coastal area. In addition, SunWater holds an unused high-priority water allocation in the Pioneer Water Supply Scheme, initially created for urban and industrial purposes. Like other supplemented water allocations in the Pioneer River and Eton water supply schemes, this water has the potential to be traded under provisions of the resource operations plan to meet demand.

### **3.7.3 Draft plan provisions**

Groundwater in the coastal aquifer is considered to be over-allocated and fully allocated elsewhere. Accordingly, there is no opportunity for additional groundwater to be made available to meet future requirements. As discussed elsewhere in this report, the only exception will be for stock and domestic uses in designated parts of the plan area. However, the introduction of water trading is intended to play a central part in promoting efficiency and meeting future demand, particularly through the movement of water allocations to high-value uses.

### **3.7.4 Nature of the issue**

Concerns were expressed in the public submissions that the draft plan had not considered options for the provision of future water supplies.

Some submitters suggested that the demand for groundwater could fall when the Mackay Water Recycling Project, managed by the Mackay Regional Council, came into effect. Several submitters believed water users facing entitlement reductions should be treated differently to those who could access recycled water.

Substituting alternative supplies for groundwater in the coastal aquifer was suggested as a way of offsetting access reductions. A single submitter believed alternative supplies would be more attractive if supplemented water allocations were cheaper.

Possible alternative sources that were suggested comprised:

- the Mackay Water Recycling Project
- water potentially made available through improvements to, or extensions of, the Pioneer Valley and Eton water supply schemes
- artificial aquifer recharge.

### **3.7.5 How the issue was assessed**

A review of the hydrologic assessment confirmed that beyond the unallocated water reserves specified in the initial plan, there was not scope for additional water to be made available under the amendment plan.

The sustainability and viability of options to provide additional water supplies to the plan area are being considered as part of the development of the Mackay-Whitsunday Regional Water Supply Strategy. The strategy will consider options including, but not limited to, preferred approaches for using the unallocated water identified in the initial water resource plan. The strategy may also examine water sources other than those dealt with by the final plan. This could include resources outside of the plan area or options such as recycling and desalination.

Artificial aquifer recharge is not a viable option in the Pioneer Valley. This is due to both the limited

availability of a water supply with which to perform recharge and the structure and hydrology of the aquifer, which preclude the establishment of effective recharge arrangements.

The potential to obtain any available water allocations, including supplemented entitlements managed in the plan area's two water supply schemes, is subject to normal commercial arrangements. Rules set out in the resource operations plan will determine the extent to which allocations can be relocated and changed in other ways—for example, a change in purpose.

While water allocation sales and purchases are subject to normal market considerations, charges associated with water supplied from supplemented water supply schemes are determined by National Water Initiative pricing principles. Subject to these factors, groundwater users could buy any surface water allocations that may be available. However, for substitution to occur, buyers would also need to ensure that satisfactory arrangements were concluded to enable supplies to be diverted from an allowable point of take to a bore property.

The final plan recognises entitlements as they currently exist. The planning process does not attempt to 'level the playing field' when decisions about the factors for conversion to water allocations are made. This has meant that a uniform conversion rate is applied to all users in a sub-area. It is the Minister's view that any levelling of the playing field is best addressed through a market-based trading system as opposed to government rather arbitrarily picking winners and losers in the levelling process. Such an approach treats all existing entitlements as being equal rather than some being assigned a higher level of importance than others.

### **3.7.6 The finalised plan**

The plan's provisions are unchanged.

## **3.8 Management of stock and domestic bores**

### **3.8.1 What the draft plan needed to consider**

In most circumstances, provisions of the Act enable landholders to access groundwater for stock and domestic uses without a licence being required. However, special provisions may be needed under a water resource plan to address the effects of subdivisions for residential development or resource sustainability factors such as seawater intrusion.

### **3.8.2 Background**

In most parts of Queensland, there is no requirement for groundwater taken for stock or domestic purposes to be licensed. The volume of water taken for stock requirements is determined by the normal stock carrying capacity of a property. Water taken for domestic uses is limited to household needs, including irrigating a domestic garden of no more than a quarter of a hectare.

### **3.8.3 Draft plan provisions**

Comprehensive provisions were set out to protect the groundwater resource from the effects of growth in stock and domestic use and seawater intrusion. However, usage levels were not to be metered.

New access to groundwater in the seawater intruded area would not be allowed. Three management areas were proposed to ensure that stock and domestic use was managed to reflect local conditions.

The areas and the respective management arrangements for each were:

- Domestic area A. This comprised the larger, southern and western part of the plan area. No restrictions to accessing groundwater for stock and domestic purposes were proposed.
- Domestic area B. In this area, in the north-eastern third of the plan area, existing and new bores would be allowed, but only for existing parcels of land, including those that had been created through a subdivision that had been registered before 28 June 2008. The plan provided for some exceptions where a subdivision occurred as a result of land being acquired by a constructing authority under provisions of the *Acquisition of Land Act 1976*.
- Domestic area C. This comprises local government service areas, where reticulated water supplies are available. Under the draft plan, new stock and domestic bores would not be allowed.

Monitoring and measurement of stock and domestic use was not proposed for any part of the plan area, although bore work must be undertaken by licensed drillers who are required to report to the department on all work they undertake.

### **3.8.4 Nature of the issue**

The absence of metering requirements for stock and domestic use was of concern in some submissions. The submitters believed it was inequitable that water taken for irrigation was metered while stock and domestic usage was not.

### **3.8.5 How the issue was assessed**

The provisions set out in the draft plan were comprehensively developed to ensure that stock and domestic access to groundwater was regulated to reflect local conditions and availability of supplies. Although there are many stock and domestic bores throughout the plan area, the volume of water taken from them represents only a fraction of overall extractions, and this has been allowed for in assessing overall water availability in the plan area.

Metering is not considered necessary as the entitlement is not volumetric—that is, compliance is based on the use of water and not volume. It should also be noted that the chief executive has the power under the Act to restrict outdoor domestic uses during critical dry years.

### **3.8.6 The finalised plan**

The effect of the provisions is unchanged, although they have been clarified (see section 4.1).

## **3.9 Community consultation process**

### **3.9.1 Requirements of the Act**

When intention to prepare or amend a water resource plan is announced, the Minister must establish a community reference panel to provide advice about relevant matters. Selected from nominations, the panel must include representatives of cultural, economic and environmental interests in the plan area.

Submissions on the proposed draft plan are invited at the outset of the process and again following release of the draft plan. The Act specifies that in both instances a period of no less than 30 business days must be allowed for submissions to be made. All properly-made submissions must be considered before the plan is finalised and a community consultation report, setting out the issues that arose, and how they were considered and dealt with, must be prepared following the plan's finalisation.

### **3.9.2 Draft plan preparation**

A community reference panel was formed after nominations from the relevant interest groups were evaluated. In addition, meetings were held with stakeholders, industry bodies and other interest groups to provide information on the process and a two-way feedback loop between the community and the Minister.

### **3.9.3 Nature of the issue**

Submitters believed the consultation period allowed for comment on the draft plan was too short and inconveniently timed. There was also a view that irrigators and members of the broader community had not been adequately involved in the planning and consultation processes.

### **3.9.4 How the issue was assessed**

The consultation process exceeded the statutory requirements set out in the Act. Submissions on the draft plan were allowed for 43 working days rather than the 30 working-day minimum specified in the Act. Five public meetings were held and separate meetings held with key industry groups, regional organisations and traditional owners. The number of submissions received on the draft plan, the breadth of the issues they covered, and the revisions to the plan made in response to them, were considered to provide a direct measure of the effectiveness of the consultation process.

### **3.9.5 The finalised plan**

The consultation process was considered to have adequately informed the draft plan preparation and finalisation.

## **3.10 Data, the groundwater model, monitoring and reporting**

### **3.10.1 What the draft plan needed to consider**

When developing a draft water resource plan or amending an existing one, the Minister must consider any technical assessments that are prepared to support the process. Hydrologic and ecological assessments, developed from the best available science, are used to consider how flow patterns supported natural ecosystems before water resource development occurred. From this, possible water allocation and management approaches are simulated so that the most suitable option can be identified for securing consumptive water needs and providing for ecological and other non-consumptive values. This enables a set of outcomes for sustainable resource management and a complementary set of supportive strategies for achieving the outcomes to be specified.

### **3.10.2 Background**

Hydrology, the study of water as it moves through the landscape, is fundamental to learning about the relationship between flows and the environment so that consumptive water needs can be managed appropriately. For the water resource planning process, hydrologic assessment relies substantially on mathematical modelling of stream and groundwater flows.

To support the amendment plan process, the department's water assessment group adapted the Integrated Quantity Quality Model (IQQM), a computerised hydrologic model specifically designed for Australian conditions, to provide information on surface flows in the plan area.

The model was used in conjunction with the MODFLOW groundwater model and the MODHMS model, which enabled the effects of underground interactions, including seawater intrusion, to be included in the assessment.

### **3.10.3 Draft plan proposal**

In developing the management framework proposed in the draft plan, all relevant technical data, including the hydrologic and other assessments, was considered. This work has been published in support of the draft plan.

### **3.10.4 Nature of the issue**

The public submissions raised concerns about the data, modelling, monitoring and reporting elements of the draft plan. There was a view that the groundwater modelling had not allowed for important factors such as recharge from private dams and irrigation drainage; nor did the model accurately reflect changes in entitlement usage arising from altered land use, including urban development. Submitters raised concerns that the seawater intrusion model had not considered water quality conditions, which had not improved despite reduced usage in recent years. Submitters also believed the models were not based on sufficient data.

A case was made for the draft plan's monitoring provisions to be expanded to better assess the effects of seawater intrusion and inform the five-year review. More observation bores were needed at strategic locations to measure electrical conductivity and groundwater levels up to 5 km from the seawater intrusion front.

### **3.10.5 How the issue was assessed**

#### **Data and the groundwater model**

The models, developed using the best available data and the best available software, were considered the most appropriate tools for accurately simulating aquifer behaviour.

The seawater intrusion front was mapped by data taken from 97 production and monitoring bores. The assessment was also supported by sampling data collected in 2004 and 2006. The assessment accounted

for rainfall, recharge from streams, irrigation drainage, inputs from other sources such as irrigation channels, discharge to streams and the effects of in-stream and on-farm storages and water extractions.

To account for water usage, the management scenarios considered under the assessment process allowed for the use of each existing entitlement as a proportionate share of the water seasonally available in each sub-area, irrespective of current levels of usage. Entitlement data was validated prior to plan finalisation to ensure that all licence cancellations and changes were fully accounted for. Water usage data used in the groundwater model simulations for the final plan used this updated entitlement list.

### **Monitoring and reporting**

The data available from the existing groundwater monitoring network is comprehensive and appropriate for planning purposes. The extent of the existing network and the comprehensive inclusion of other hydrologic factors represented the best available science.

The monitoring program implemented under the amended water resource plan will be based on the same network. Any case for expanding the network would become evident through ongoing evaluation of the data generated by the monitoring program, ensuring that the returns from potential improvements to the network were maximised.

### **3.10.6 The finalised plan**

Data on entitlement volumes and performance statistics were updated in schedule 5 and 6 of the plan to reflect the licences that existed in the plan at the time the plan was finalised and changes made to the sub-area boundaries. Other provisions related to this matter are unchanged.

## **3.11 Consistency with the National Water Initiative**

### **3.11.1 What the draft plan needed to consider**

In preparing a water resource plan, the Minister must consider, among other things, national, state and regional priorities for promoting sustainable development. This includes the National Water Initiative, of which Queensland is a signatory.

### **3.11.2 Draft plan proposal**

The requirements of the Act as applied to the process, and the provisions of the draft plan were consistent with the national agreement and subsequent policy position statements.

### **3.11.3 Nature of the issue**

A view was expressed that the plan did not attain the following goals for water planning specified by the National Water Commission in April 2008:

1. to improve our knowledge of groundwater-surface water connectivity, with significantly connected systems to be managed as one integrated resource
2. to increase inputs from socio-economic analyses and incorporate consultation to improve the quality of decisions and build community confidence in the fairness of outcomes
3. to be better integrated with regional natural resource management planning and urban water supply planning
4. to improve monitoring and compliance of water use.

### **3.11.4 How the issue was assessed**

The relevant principles were evident in the draft plan, which was developed to provide an integrated framework for sustainably managing water resources to meet consumptive and non-consumptive needs in the area.

1. Management of surface water and groundwater as a single resource was recognised in the general and ecological outcomes, while the importance of groundwater discharge in maintaining baseflow was addressed in a range of environmental flow objectives.

The linkages between surface water flows and aquifers in the upper part of the catchment were

recognised in provisions requiring groundwater beneath and adjacent to watercourses to be managed as if it were surface water. The groundwater flow models were calibrated to simulate groundwater and surface water exchanges.

2. The stage 1 and stage 2 economic and social assessments provided the Minister with the high-level inputs needed to inform the planning process in the following way:
  - the stage 1 assessment provided important baseline information about the relationship between the plan area's water resources and its communities.
  - the stage 2 assessment, developed in consultation with the community reference panel, provided a comprehensive analysis of the costs and benefits associated with a range of management approaches.

The review of the submissions that related to the economic and social assessments confirmed the validity of the preferred approach. The adopted approach will build community confidence by demonstrating that the outcomes will bring the most fair and equitable long-term benefits possible at the least cost.

3. While water resource plans generally deal with naturally-occurring water within defined catchment boundaries, their provisions are likely to be a consideration under state government regional planning priorities. The Mackay–Whitsunday Regional Water Supply Strategy is concerned with managing water for maximum social and economic output and recognises the limitations that can arise when water supply arrangements are constrained within catchment boundaries that are defined by the accident of hydrology, rather than economic and social factors. In this respect, the strategy will consider growth and demand requirements in the plan area, but as an integral part of the regional economy.
4. The monitoring and reporting requirements that will be implemented under the amended resource operations plan will be comprehensive and thorough. In particular, they will be structured to assess the effectiveness of the implemented water resource plan in dealing with seawater intrusion in the coastal aquifer. Metering and other monitoring requirements will ensure that the plan's water sharing rules are correctly observed and complied with.

### **3.11.5 The finalised plan**

The plan's provisions are unchanged and remain consistent with requirements of the Act and the National Water Initiative.

## **3.12 Unsupplemented surface water licences**

### **3.12.1 What the draft plan needed to consider**

In dealing with unsupplemented surface water management in the Sandy, Sandringham and Alligator creeks catchments, the draft amendment plan needed to ensure consistency with provisions of the initial plan.

### **3.12.2 Background**

The initial water resource plan set out a process for converting area-based licences to volumetric entitlements.

### **3.12.3 Draft plan provisions**

The area-based entitlement conversion process of the initial plan was to be used to establish volumetric nominal entitlements for similar entitlements in the Sandy, Sandringham and Alligator creeks catchments. A number of licences in these catchments were linked to water supplied by the Eton Water Supply Scheme. The plan contains provisions to remove conditions that linked groundwater with supplemented surface water from the scheme. The conversion factors proposed for the three catchments along with new water sharing rules and metering requirements were to be implemented under the amended resource operations plan.

### **3.12.4 Nature of the issue**

A submission was received, supportive of the unsupplemented surface water provisions for the extended plan area.

### **3.12.5 How the issue was assessed**

The view expressed in the submission, in the absence of any submissions expressing concern about the provisions, was considered to indicate acceptance of the proposed approach.

### **3.12.6 The finalised plan**

The plan's provisions are unchanged.

## **3.13 Continued effect of the moratorium**

### **3.13.1 What the draft plan needed to consider**

Under the Act, in planning for the allocation and sustainable use of water to meet the state's future needs, the Minister must address the protection of natural ecosystems and the security of supply for existing water users.

To ensure that water resource planning proceeds from a stable base, the Act provides for the Minister to notify a moratorium on activities that would increase the volume of water that is taken or change the way it is taken.

### **3.13.2 Background**

A moratorium on issuing new entitlements and other activities that would have led to an increased take of groundwater, or surface water in the extended plan area, was notified on 25 June 2003, and amended on 29 September 2005 and 28 June 2008. The provisions did not apply to applications to amalgamate or subdivide entitlements or for existing licences to be reinstated. The Act provides for the effect of a moratorium to be continued under a water resource plan until the plan is implemented under a resource operations plan.

### **3.13.3 Draft plan provisions**

The draft plan provided for the effects of part of the moratorium notice to be continued. Under the provisions, applications for groundwater licences and surface water licences in subcatchment 13 or 14 would not be accepted until the resource operations plan had been amended.

### **3.13.4 Nature of the issue**

A submitter believed the moratorium should be lifted throughout the plan area so that water resource development could continue.

### **3.13.5 How the issue was assessed**

The relevant parts of the moratorium were retained to enable future arrangements to be properly dealt with under the implementation provisions to be set out in the amended resource operations plan.

### **3.13.6 The finalised plan**

Although the plan's provisions are unchanged, they have been reworded for improved clarity.

## **3.14 The plan area boundary**

### **3.14.1 Requirements of the Act**

Under the Act, a draft water resource plan must contain a map of the proposed plan area. The exact location of the plan area boundary is held in digital electronic form by the department and is accessible by the public on request.

### **3.14.2 Draft plan provisions**

The draft plan included three maps. One showed the plan area in full; the second showed the surface water subcatchments; the third showed groundwater sub-areas.

### **3.14.3 Nature of the issue**

A submitter asked for part of the plan area to be removed on the basis that the provisions were delaying building and infrastructure projects in an area of low groundwater use. Another submitter argued that proposed restrictions should not apply to a group of bores on the western edge of the coastal aquifer on the basis that hydrology in the area differed from that in the broader aquifer. The submission was interpreted as a request for the property to be excluded from the relevant sub-area.

### **3.14.4 How the issue was assessed**

The Pioneer Valley plan area and internal boundaries were accurately defined to reflect natural surface drainage characteristics and groundwater hydrology and connectivity.

### **3.14.5 The finalised plan**

The plan area and internal boundaries have not been changed to reflect the submissions. Other changes have been made to groundwater sub-area boundaries to better reflect existing entitlements (see section 4.4).

## **3.15 The effect of drains or excavations on seawater intrusion**

### **3.15.1 What the draft plan needed to consider**

When preparing a water resource plan, the Minister must consider the effects that taking or interfering with water not covered by the draft plan will have on water covered by the draft plan.

### **3.15.2 Background**

The draft plan's provisions for groundwater in the coastal aquifer were principally concerned with establishing a management framework that would hold the seawater intrusion front in its current position. It did not deal with secondary practices, such as the excavation of drains, and their possible implications for seawater intrusion.

### **3.15.3 Draft plan provisions**

Under the draft plan, bore works and associated infrastructure were to be classed as assessable development under the *Integrated Planning Act 1997*, while stock and domestic works were to be subject to a self-assessment code provided for under that Act. Drainage works in the coastal aquifer were not to be subject to these provisions.

### **3.16.3 Nature of the issue**

A concern was expressed that deep drains interfering with the watertable in the coastal area may have provided a path for seawater intrusion.

### **3.16.4 How the issue was assessed**

Following a review, it was concluded that seawater entering drains in estuarine and coastal areas is causing elevated salinity in some areas around Mackay city and that new drains had the potential to contribute to rising salinity in the coastal aquifer. The drains were observed to be allowing high tides to penetrate further inland than otherwise would have been the case. It was noted that some drains were also intercepting groundwater that would otherwise contribute to maintaining the position of the seawater intrusion front.

### **3.16.5 The finalised plan**

Under the final plan, drains or excavations with a capacity of 2 ML or more will be classified as assessable developments under provisions of the *Integrated Planning Act 1997*. The provisions, which will not be retrospective, will reduce the potential for drains and other excavations to contribute to seawater intrusion.

## **3.16 Use of seawater affected bores**

### **3.16.1 What the draft plan needed to consider**

Among the factors set out in the Act that must be considered in preparing a water resource plan, are the public interest and the use of water authorised under section 20 of the Act.

### **3.16.2 Draft plan provisions**

In developing the draft plan, the public interest was considered to be best served by curtailing groundwater extractions in the seawater intruded area to hold the seawater intrusion front in its current position. Under the draft plan provisions, groundwater users in the seawater intruded area would be allowed to take water for stock and domestic purposes from existing bores.

Taking groundwater for other uses in the seawater intruded area was to be subject to the general restrictions set out in the draft plan.

### **3.16.3 Nature of the issue**

A single submitter was concerned that a school in the seawater intruded area would not be allowed to continue taking groundwater under the provisions.

Another submitter believed groundwater in the seawater intruded area should be available for fire-fighting and to support on-farm needs like stock watering, mixing chemicals, pre-watering of new crops and washing down equipment. The submitter also believed groundwater should be accessible for domestic use during exceptionally dry periods.

### **3.16.4 How the issue was assessed**

Under the draft plan, taking groundwater for stock and domestic purposes was to be authorised subject to a notification process and existing stock and domestic bores could be replaced. Allowing for the small volume of groundwater use proposed for the school, subject to specified criteria being met, was considered to be comparable with allowing for continuing stock and domestic usage.

Section 20 of the Act authorises the taking of groundwater for emergency situations for a public purpose or fire fighting. The draft plan does not affect these provisions.

### **3.16.5 The finalised plan**

Under the final plan, small-scale use in the seawater intrusion area, including the existing licensed take by the school will be authorised. Should salinity rise above the critical level, usage must be restricted to showering and flushing toilets. The continued use of water in the seawater intruded area will be subject to provisions that are to be phased in during the next five years.

Use for stock and domestic purposes from existing bores will continue to be authorised although new bores will not be allowed.

## **4.0 Issues not raised in submissions**

### **4.1 Calculation of volumetric limits when granting water entitlements**

#### **4.1.1 Draft plan proposal**

In providing for groundwater management arrangements to be extended to all parts of the plan area, the draft plan set out a process for issuing volumetric licences to existing users (Figure 1). The proposals for establishing nominal volumes for entitlements were based on considerations such as the capacity of existing works, the number of hours of pumping that had been customary and the volume of water associated with the type of use.

#### **4.1.2 Reviewing the provisions**

The provisions did not accommodate the full range of conversion criteria that needed to be considered.

#### **4.1.3 The finalised plan**

The conversion provisions have been clarified to allow the chief executive to establish conversion rates by considering documentary evidence of past usage levels rather than by applying the criteria set out in the draft plan. The intent of the change is to ensure that conversion rates are based on historic usage, irrespective of the conversion method used. This section has been relocated in the final plan to section 22B.

## **5.0 Pioneer Valley amendment plan finalisation**

### **5.1 Summary of changes made in finalising the amendment plan**

#### **5.1.1 Continued effect of the moratorium notice**

The final plan (s22D) has been revised to clarify the intention of continuing the effect of the moratorium on new works to take groundwater or surface water in subcatchments 13 or 14. The changes also clarify that the effect will continue and that licence applications will not be accepted until the resource operations plan is amended. This is consistent with the changes made to section 22E.

Section 22D has been revised to make it clear that new stock and domestic bores in the seawater intruded will not be allowed, although replacement bores will be permitted within 10 m of an existing bore.

Section 22D provided for stock and domestic requirements to be met in domestic area B in cases where land was reconfigured by a constructing authority following acquisitions under provisions of the *Acquisition of Land Act 1967*. However, it did not provide for instances where a constructing authority acquisition had occurred without recourse to provisions of the Act. The provisions have been changed to address this.

#### **5.1.2 Granting groundwater licences to take declared water in the watercourse area**

A new section 30A has been included to deal with granting water licences in the watercourse area (Figure 1). The final plan clarifies arrangements for granting water licences for uses other than stock or domestic purposes in the part of the previously undeclared area that occurs in the watercourse area in section 5B. The process for determining the nominal entitlement for a water licence is set out in section 22B.

#### **5.1.3 Amendment of water allocation groups for unsupplemented water allocations**

Schedule 6 of the draft plan set out the process for determining nominal volumes for Class C unsupplemented water allocations in the watercourse area. However, section 45 and schedule 8 of the initial plan had not been amended to reflect this.

Part 2 of schedule 8 shows water allocation groups for groundwater in sub-areas 4 to 16 and section 45 has been corrected.

#### **5.1.4 Daily pumping limits**

The final plan (sections 49C, 49F, 49L and 49T) provides for daily pumping limits to be set, where necessary, for groundwater entitlements in addition to monthly and quarterly limits. This will allow for greater management flexibility in minimising the impact of pumping on baseflow and other ecological values.

#### **5.1.5 Unallocated groundwater**

The draft plan (section 49I) stated that there is no unallocated groundwater in the plan area except for granting licences in the previously undeclared part of sub-areas 1, 2, 3 and 15 and for stock and domestic use. The final plan (section 49H) provides for the granting of water allocations for existing groundwater uses in the previously undeclared part of sub-areas 4 and 6.

#### **5.1.6 Conditions giving effect to the rules**

The draft plan (section 49H) required the chief executive to impose conditions on water entitlements for consistency with plan goals. This has been removed because these provisions are dealt with by section 217 of the Act.

### **5.1.7 Granting water licences**

Provisions relating to granting water licences in the undeclared part of the plan area have been revised in the final plan (section 49J) to make it clear that this will occur under the amended resource operations plan.

### **5.1.8 Annual volumetric limit**

The final plan (section 49N) limits any reductions to the nominal volumes associated with the parts of existing entitlements that convert to water allocations in the coastal aquifer to no less than 20 ML. Water licences that already have nominal entitlements of less than 20 ML will not be reduced on conversion to a water allocations.

Changes have also been made to section 49W of the draft plan, which becomes section 49U, to incorporate the threshold value into the process for estimating the volume of the complementary component that is not converted to a water allocation.

### **5.1.9 Phased implementation of access provisions in the seawater intruded area**

The final plan retains the draft plan management framework for the coastal aquifer, although reduced access to groundwater in the seawater intruded area will be phased in over five years.

Schedule 9C sets out the formula that will be used to determine annual entitlement volumes in the area for each of the five years, while section 49Y provides for these arrangements to be carried forward under the resource operations plan.

Section 49D has been amended to allow groundwater in the intruded area to be taken for public health purposes, as well as under an existing aquaculture entitlement, where salinity is above 1500  $\mu\text{S}/\text{cm}$  or under the phase-in arrangements.

### **5.1.10 Authorisations for stock and domestic purposes**

The final plan has been slightly reworded to clarify the provisions relating to stock and domestic bores. The draft plan proposed a process for owners of stock and domestic bores to notify the department of existing works (section 49ZC of the draft plan). This requirement was not included in the final plan. Sections 49ZD to 49ZG of the draft plan have been simplified and combined into section 49ZB.

### **5.1.11 Minor amendments**

In addition to the minor amendments provided for in the draft plan, section 56 of the final plan provides for minor amendments to be made to the boundaries of domestic areas and the declared watercourse area. These changes include subdivisions and amalgamations of the areas.

A change has also been made to allow amendment of the continued effect of the moratorium provisions set out in section 22D subject to any changes being notified as if they were an amendment of the moratorium notice. The references to the moratorium section of the Act have been renumbered to reflect amendments of the Act.

### **5.1.12 Groundwater sub-areas**

The sub-area boundaries in schedule 2B have been adjusted to reflect changes to groundwater sub-area boundaries where entitlements associated with landholdings crossed sub-area boundaries proposed in the draft plan. As a result, the affected entitlements will not need to be separated into two water allocations.

### **5.1.13 Adjustment of boundary of domestic area C**

Changes have been made to the boundary of domestic area C in schedule 9B to reflect changes to the parts of the Mackay Regional Council area that are serviced by reticulated supplies.

### **5.1.14 Other changes**

Several other minor changes have been incorporated into the finalised amendment plan:

- updated section numbers
- updated section headings for clarity
- section 49ZH of the draft plan has been divided into sections 49R and 49U of the final plan
- restructuring the wording of the plan outcomes
- updated use of the term 'interference' with reference to groundwater
- updated definitions or the inclusion of new definitions in the dictionary in schedule 10
- corrections to minor typographical errors and omissions.

## Appendix A

**Table of issues raised in submissions**

Group Code	Group Title	Issue Code	Issue Title	Sub Issue Code	Sub Issue Title	Number of Submissions
A	Entitlements - Unsupplemented Surface Water					
		1	Unsupplemented Water Licences			
				a	General	1
B	Entitlements - Groundwater					
		1	Urban Use			
				a	Conversions or amendments	3
		2	Rural Use			
				a	Conversions or amendments	57
				b	Security of entitlement and WASOs	11
				c	Land use change	14
		3	Water Trading			
				a	Rules for trading	11
				b	Relocation of water licences	2
		4	Stock and Domestic Bores			
				a	Other	11
C	Groundwater					
		1	Hydrology			
				a	Model	15
				b	Data	7
				c	Seawater intrusion	14

Group Code	Group Title	Issue Code	Issue Title	Sub Issue Code	Sub Issue Title	Number of Submissions
D	Environment					
		1	Seawater Intrusion			
				a	General	30
E	Economic and Social					
		1	Economic			
				a	Water trading	1
				b	Security	10
				c	Land values or farm investment	16
				d	Charges and pricing	4
				e	Compensation	13
				f	General	2
				g	Farm returns or business costs	29
		2	Social			
				a	Community development	2
				b	Fairness and equity	20
		3	Assessment			
				a	Report	1
Group Code	Group Title	Issue Code	Issue Title	Sub Issue Code	Sub Issue Title	Number of Submissions
F	Future Water Supply					
		1	Mackay-Whitsunday Regional Water Supply Strategy			
				a	Support for new supplies	21

Group Code	Group Title	Issue Code	Issue Title	Sub Issue Code	Sub Issue Title	Number of Submissions
				b	Artificial recharge	14
				c	Water use efficiency	13
				d	Waste water reuse scheme	35
G	Monitoring and Reporting					
		1	Water Monitoring			
				a	Water quality	11
H	Process					
		1	Consultation			
				a	Community Reference Panel	11
				b	Stakeholder or community groups	23
				c	State agency	1
				d	Communication strategy	8
		2	Water Resource Plans			
				a	Management options	14
				b	Plan objectives	12
				c	Timeframes	5
				d	Strategies	1
				e	General	1
		3	Resource Operations Plans			
				a	5 year review	16
				b	Water sharing rules	30
				c	Other	3

Group Code	Group Title	Issue Code	Issue Title	Sub Issue Code	Sub Issue Title	Number of Submissions
		4	Current Moratorium			
				a	General	1
I	Other					
		1	Water Service Providers			
				a	General	1
		2	Uncertainties and Climate Change			
				a	General	1
		3	Water Reform Agenda			
				a	General	11
		4	Other Government Department or DERM Work Group			
				a	Water Management and Use	2
		5	Other			
				a	General	8