



Government of **Western Australia**  
Department of **Water**

# **Kimberley** Regional water plan 2010–2030

Strategic directions and actions

*Draft for public comment*

*Looking after all our water needs*

December 2010



# Kimberley regional water plan

Strategic directions and actions 2010-2030

Draft for public comment

*Looking after all our water needs*

Department of Water

December 2010

Department of Water  
168 St Georges Terrace  
Perth Western Australia 6000  
Telephone +61 8 6364 7600  
Facsimile +61 8 6364 7601  
[www.water.wa.gov.au](http://www.water.wa.gov.au)

© Government of Western Australia 2010

December 2010

This work is copyright. You may download, display, print and reproduce this material in unaltered form only (retaining this notice) for your personal, non-commercial use or use within your organisation. Apart from any use as permitted under the *Copyright Act 1968*, all other rights are reserved. Requests and inquiries concerning reproduction and rights should be addressed to the Department of Water.

ISBN 978-1-921736-03-2 (print)

ISBN 978-1-921736-04-9 (online)

Recommended reference citation is: *Department of Water 2010, Kimberley regional water plan: Strategic directions and actions 2010-2030 Draft for public comment*, Department of Water, Perth, Western Australia

### **Plan documents**

A complete set of the Kimberley regional water plan documents listed below can be found at <[www.water.wa.gov.au/kimberley](http://www.water.wa.gov.au/kimberley)>

- Kimberley regional water plan: Strategic directions and action 2010-2030 (this publication)
- Kimberley regional water plan: Supporting detail report

### **Acknowledgements**

The Department of Water would like to thank the following people for their contribution to this Plan: Susie Williams, Meghan Barnes, Robert Cossart, David Munday, Phillip Kalaitzis, Louise Lee, Dianne Abbott and members of the Kimberley Project Team.

### **Disclaimer**

This document has been published by the Department of Water. Any representation, statement, opinion or advice expressed or implied in this publication is made in good faith and on the basis that the Department of Water and its employees are not liable for any damage or loss whatsoever which may occur as a result of action taken or not taken, as the case may be in respect of any representation, statement, opinion or advice referred to herein. Professional advice should be obtained before applying the information contained in this document to particular circumstances.

*This publication is available at our website <[www.water.wa.gov.au](http://www.water.wa.gov.au)> or for those with special needs it can be made available in alternative formats such as audio, large print, or Braille.*

## A message from the Director General

Western Australia's Kimberley region has some of the world's most recognised and intact natural and cultural landscapes. The region's water resources support people, industry, healthy ecosystems as well as social and cultural values.

There is a growing national perception that water resources are plentiful and available for development in northern Western Australia. In reality, the Kimberley is a water-limited environment characterised by northern Australia's wet/dry cycle of water abundance and scarcity, with significant constraints to water resource development. The sustainable management of the Kimberley's water resources is therefore essential to the region's future social, cultural and economic prosperity and development must build on its special characteristics.

The Department of Water has developed this *Kimberley regional water plan: Strategic directions and actions 2010–2030: Draft for public comment* with input from the regional community and stakeholders. The plan provides a strategic vision and approach to guide the sustainable management of the region's water resources and water services to 2030. It is part of Western Australia's comprehensive water resource planning framework.

I thank the Kimberley community and stakeholders for their contribution to this plan and encourage all who have an interest in the region's water resources to read the plan and provide comments on any of its aspects to the Department of Water. All comments will be considered and where appropriate, will be used to improve the plan.

For a deeper understanding of the issues and proposed solutions, I refer you to the *Kimberley regional water plan: Supporting detail* report.

Maree De Lacey  
A/Director General  
Department of Water  
Western Australia



# Contents

A message from the Director General .....	iii
Contents .....	v
Aboriginal recognition .....	vii
1 Introduction.....	1
1.1 The shared vision .....	1
1.2 Purpose of the regional water plan.....	1
1.3 How we have developed this Plan .....	3
1.4 Water reform.....	5
1.5 The role of the Department of Water.....	6
2 Background .....	7
2.1 Overview of the regional climate .....	7
2.2 Overview of water resources and dependent values .....	8
3 Water use.....	13
3.1 Existing water use.....	13
4 Future trends .....	20
4.1 Growth in water demand .....	21
4.1 Water demand vs water availability.....	25
4.2 Threats to water resources.....	27
4.3 Community-identified water management issues .....	28
5 Strategic objectives .....	32
5.1 Strategic objective 1 .....	32
Position statements .....	32
Overview/explanation .....	32
5.2 Strategic objective 2 .....	34
Position statements .....	35
Overview/explanation .....	35
5.3 Strategic objective 3 .....	37
Position statements .....	37
Overview/explanation .....	37
5.4 Strategic objective 4 .....	38
Position statements .....	38
Overview/explanation .....	39
5.5 Strategic objective 5 .....	42
Position statements .....	43
Overview/explanation .....	43
5.6 Strategic objective 6 .....	44
Position statements .....	44
Overview/explanation .....	45
6 Strategies and actions to achieve the shared vision.....	47
7 Delivering the regional water plan .....	62
Appendices.....	63

Glossary .....	69
Volumes of water .....	71
References .....	72

## Appendices

Appendix A — Invitation to make a submission .....	63
--	----

## Figures

Figure 1	State water planning framework (with Kimberley examples) .....	3
Figure 2	Area covered by the Kimberley regional water plan, showing six subregions .....	4
Figure 3	Mean annual rainfall in the Kimberley (1961-1990) .....	7
Figure 4	Proclaimed surface water management areas .....	9
Figure 5	Canning-Kimberley groundwater area .....	11
Figure 6	Major towns in the Kimberley and their estimated domestic water use .....	16
Figure 7	Public drinking water source areas in the Kimberley .....	18
Figure 8	Future water demand scenario projections (Thomas 2008) .....	26
Figure 9	Integrated land and water planning via the proposed Better urban water management (WAPC 2008) framework .....	40

## Tables

Table 1	Estimated Kimberley water use by sector in 2008 (Thomas 2008) ..	13
Table 2	Stakeholder-identified water management issues in the Kimberley region .....	29



## Aboriginal recognition

The Kimberley has a strong extant and evolving cultural heritage that defines the region. Aboriginal people make up nearly half the current Kimberley population and a much higher percentage of the long-term resident population. Aboriginal people have significant custodial responsibilities for land and waters in the Kimberley and have legally recognised Native Title rights and land holdings over a significant proportion of the region.

Aboriginal people have reiterated their dependence on Kimberley water as central to their lives, culture and sustenance. The local people's dependence is rooted deeply in the water cycle – both of surface water and groundwater – with wet season flushing, dry season pools, floodplains, groundwater-dependent ecosystems and surface water/groundwater interactions all being critical.

With increased recognition of Indigenous interests in the land and waters of the Kimberley, Aboriginal people will play an important role in the future management of the region's water resources. Aboriginal people are becoming more involved at all levels of planning, management, research and on-ground monitoring.

It is within this context that the Department of Water has worked with a range of Aboriginal groups to engage local people in the planning and management of water resources in the Kimberley. We have built strong relationships with community groups and organisations to assist water management activities. We are committed to providing ongoing support for both internal and external Indigenous projects, processes and local structures through which there are strong water management objectives.

The Department of Water acknowledges the important role of Aboriginal people in the management of the Kimberley's water resources and welcomes the opportunity to continue strengthening partnerships and supporting the aspirations of Aboriginal people in water management.





# 1 Introduction

---

*“Talking about water. Don’t matter who you are – human, bird... It’s all important to us.” – Frank Sebastian, Yawuru traditional owner (Kimberley Water Forum 2008)*

---

There is a renewed national perception that water resources are abundant and available for development in northern Australia. At the same time, people recognise the unique and significant ecological and cultural value of waterways and water resources in northern Australia and Western Australia’s Kimberley region, which is the subject of this *Kimberley regional water plan: Strategic directions and actions 2010–2030: Draft for public comment* (the Plan).

These views present a challenge for water managers in carefully balancing the growing demand for water resource development with community expectations for protection of water-dependent values.

The Kimberley experiences a wet-and-dry-season cycle of water abundance and scarcity typical of much of northern Australia, but overall remains a water-limited environment. The region’s water resources support people, industry and many ecological and social/cultural values that are not yet fully understood. Even though water use across the region is currently low-level (other than the Ord irrigation area), in time it is expected to increase with an anticipated growth in economic development.

The six key strategic objectives of this Plan will guide the complex water management decisions of the Kimberley.

## 1.1 The shared vision

The shared vision for water in the Kimberley region is:

***The high-value water-dependent ecological and cultural features of the Kimberley region are maintained while ensuring sustainable management of appropriate water resource development.***

## 1.2 Purpose of the regional water plan

---

*Outside forces will influence what happens here. For the region, strong plans will help.” – Anon (NOTPA stakeholder review 2007)*

---

The Plan provides the strategic direction for water management in the Kimberley region to 2030. It addresses issues around water resource demand and future projections, taking a whole-of-water-cycle approach.

The Plan has been written to:

- provide a clear Department of Water position on strategic issues in the Kimberley, having considered a broad range of stakeholder input
- help prioritise the work of the department and other relevant organisations where appropriate, and to resolve some of the strategic issues
- consult with the community and other interested parties on these two points before the Plan is finalised.

Specifically, the Plan:

- sets a vision for water policy, planning and management
- examines broad social, economic, cultural and environmental characteristics that will influence future water management
- assesses the region's likely water availability and future water demands
- engages regional stakeholder groups to determine priority actions to improve water resource and water service management
- identifies and sets out strategic policy and position statements on key issues.

This Plan comprises two reports: *Strategic directions and actions 2010–2030* and a *Supporting detail* report.

*Strategic directions and actions 2010–2030* (this document) charts a course through the major challenges facing the Kimberley. The *Supporting detail* report looks at the region in detail and provides background information on how the Plan was put together, including the community and stakeholder engagement process. The *Supporting detail* report is based on information contained in discussion papers covering the six subregions: Kimberley, La Grange, North Kimberley, Ord catchment, Desert and Fitzroy.

This Plan is part of a series of nested planning and policy activities undertaken by the department and affiliated organisations throughout Western Australia. These are shown in the state's water planning framework (Figure 1).

The *Strategic directions and actions 2010–2030* and *Supporting detail* report are available on the department's website <[www.water.wa.gov.au](http://www.water.wa.gov.au)> *Water regions* > *Kimberley* > *Publications*.

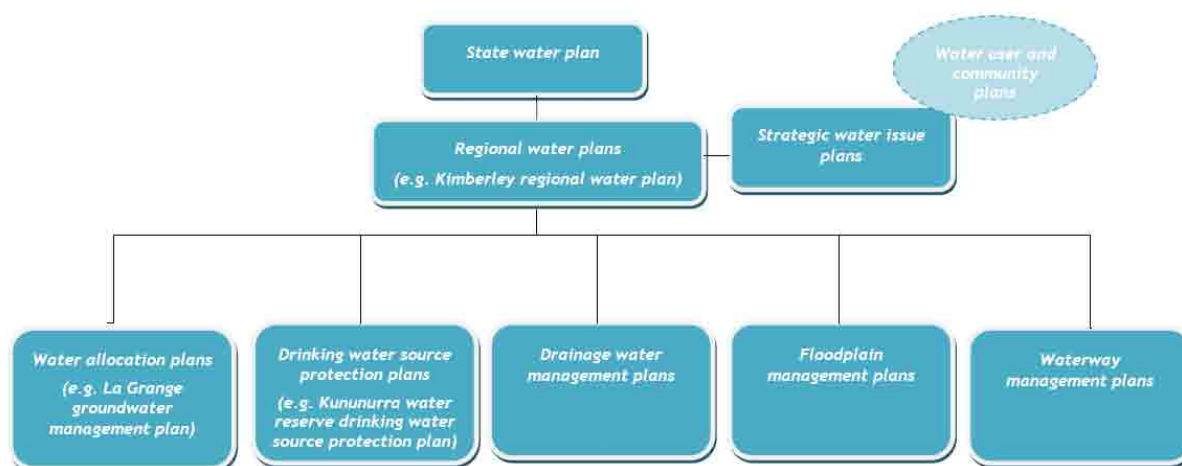


Figure 1 State water planning framework (with Kimberley examples)

## 1.3 How we have developed this Plan

*"We have our stories and our songs for the water, about the water."* – Mary Tarran, Yawuru traditional owner (Kimberley Water Forum 2008)

### 1.3.1 Area covered by the Plan

The Kimberley region is bounded by the Indian Ocean to the north-west, Northern Territory to the east and the Great Sandy Desert to the south, covering an area of approximately 425 000 km<sup>2</sup>. The region was divided into six subregions for the purpose of developing this Plan (Figure 2).

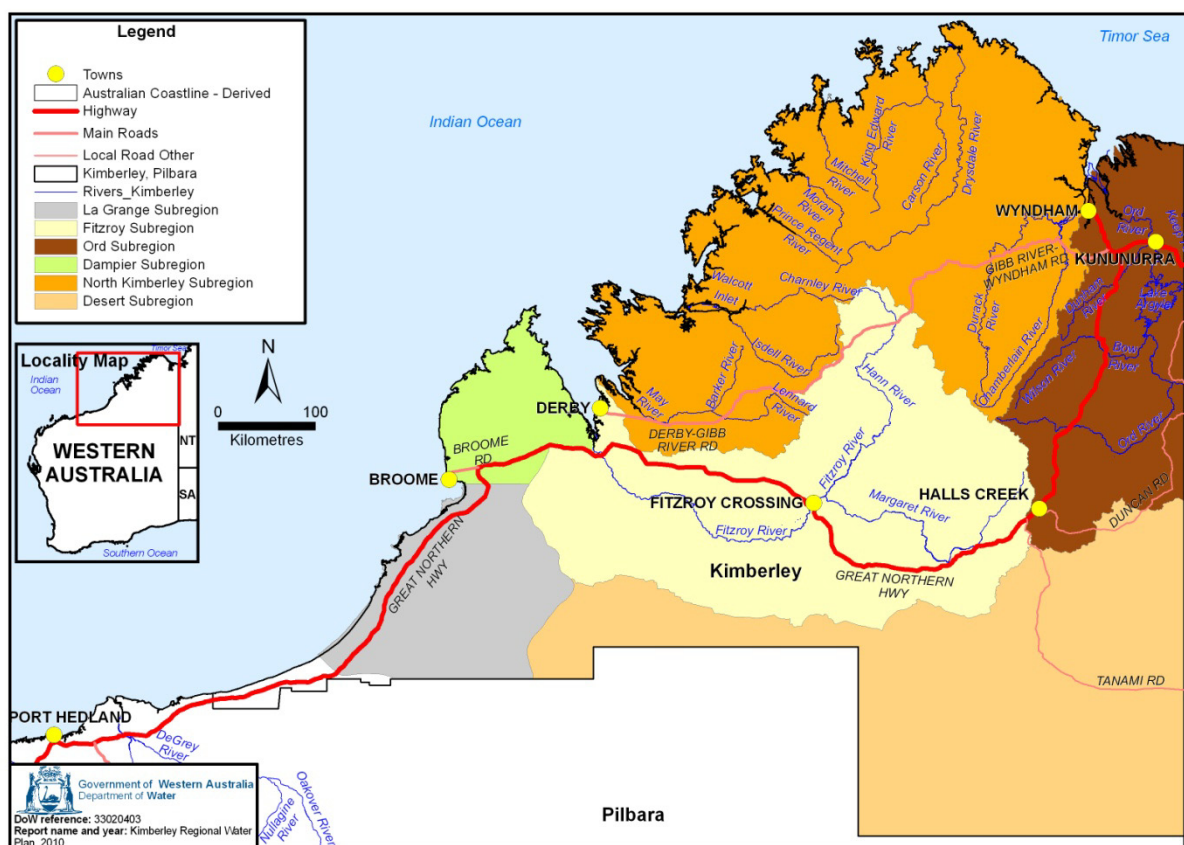


Figure 2 Area covered by the Kimberley regional water plan, showing six subregions

### 1.3.2 The approach

The department has received a clear message from the Kimberley community and regional stakeholders to build on, support and acknowledge existing projects and processes. This is a critical principle underpinning the approach to this Plan and water resource management in the Kimberley.

Community and regional stakeholders also indicated they needed training, education and capacity to engage in water planning and management. In recognition that water planning is not a stand-alone process or a means to an end, the department has provided a framework (see page 3) to strategically link and progress broader integrated water management outcomes across the community, industry and government sectors.

To better liaise with stakeholders to identify regional issues, scoping and consultation was carried out in the six subregions. Subregional discussion papers were developed for ongoing use as reference material and presented to people in the subregions.

These are available on the department's website <[www.water.wa.gov.au](http://www.water.wa.gov.au)>

<[www.water.wa.gov.au](http://www.water.wa.gov.au)> Water regions > Kimberley > Publications.

The discussion papers and resulting input were the foundation for the Plan and the Supporting detail report. Through the subregional analysis of issues and discussions with stakeholders, six key strategic objectives (described in Chapter 5) were identified:

#### **STRATEGIC OBJECTIVES**

- 1. *Understand Kimberley water resources and water systems***
- 2. *Enable water development that is appropriate to the Kimberley***
- 3. *Match management arrangements with resource type and development pressures***
- 4. *Sustain and grow Kimberley towns and communities***
- 5. *Protect the region's water-dependent values***
- 6. *Engage regional people in management of regional water resources***

## **1.4 Water reform**

---

*“The price of water needs to reflect its value accurately... so as to limit use. People will appreciate it more.”* – Horticulturalist (NOTPA stakeholder survey 2007)

---

Water reforms, at both the state and national level, are introducing significant changes to how Western Australia manages and plans for its water resources. Western Australia has set a reform agenda consistent with the National Water Initiative (NWI) (Council of Australian Governments 2004), which includes new legislation for water resource management, a new system of water entitlements and the establishment of statutory-based water allocation plans. For further details on the NWI, refer to the *Intergovernmental agreement on a National Water Initiative* at <[www.nwc.gov.au](http://www.nwc.gov.au)>.

Other key features of the water reforms include establishing water markets to facilitate trading; promoting more profitable and flexible water use; increasing security for investment in the water industry; and improving water accounting, water planning (including allocation and environmental outcomes) and water use efficiency measures (Government of Western Australia 2007). The region is already benefitting from these improvements in water management.

It is proposed that new state water resources management legislation and water services legislation be drafted to encompass these water reforms.

---

**Key message: National and state water reforms are driving water management changes in Western Australia.**

---

## 1.5 The role of the Department of Water

The sustainable management of the state's water resources is the responsibility of the Minister for Water with the support of the Department of Water. Established in 2005, the department is responsible for guiding decisions about water resource use and management, managing the state's surface water and groundwater resources, protecting the health of waterways, and ensuring adequate and efficient water services. The department does this through investigation, planning, and regulation and management of the state's water resources. It is accountable for:

- investigating and assessing water resources
- providing security of water use for the environment and communities
- policies for water service provision (including for Indigenous communities)
- licensing water extraction
- drinking water source protection
- planning for drainage, floodplains and water allocation
- protection and management of waterways
- implementing water reform.

The department has links with many other state government agencies with an interest in the Kimberley's water management. In addition, many Aboriginal groups and non-government and private-sector organisations contribute to water resource management in the region. Among them are peak industry bodies representing diverse interests including the environment, agriculture, horticulture, mining, plantation farming, recreational fishing, tourism, land development, sport and recreation, and aquaculture.

---

**Key message: The Department of Water works with key stakeholders to guide decisions about the sustainable management of water in the Kimberley.**

---



## 2 Background

### 2.1 Overview of the regional climate

The Kimberley has been described as a water-limited landscape (CSIRO 2009a), despite common public perceptions of abundant water resources. Hot climatic conditions lead to high evaporation rates that exceed mean annual rainfall, resulting in the water-limited climate that characterises most of northern Australia (CSIRO 2009b). Rainfall during the wet season is generally prolonged and widespread, resulting in high peak surface-water flows and extensive flooding. Rainfall can also be locally intense due to cyclonic activity. While seasonal rainfall is high, it is variable from year to year and generally limited to the wet season during December to March.

Elements of the Kimberley water cycle are strongly interrelated, with a complex relationship between water resources, climate and landscape. The Kimberley takes in part of northern Australia's monsoonal tropics as well as its arid central desert area, resulting in a highly variable climate both spatially and seasonally. There is a strong rainfall gradient from north to south with average annual rainfall ranging from 1500 mm in the north to 350 mm in the south (Figure 3).

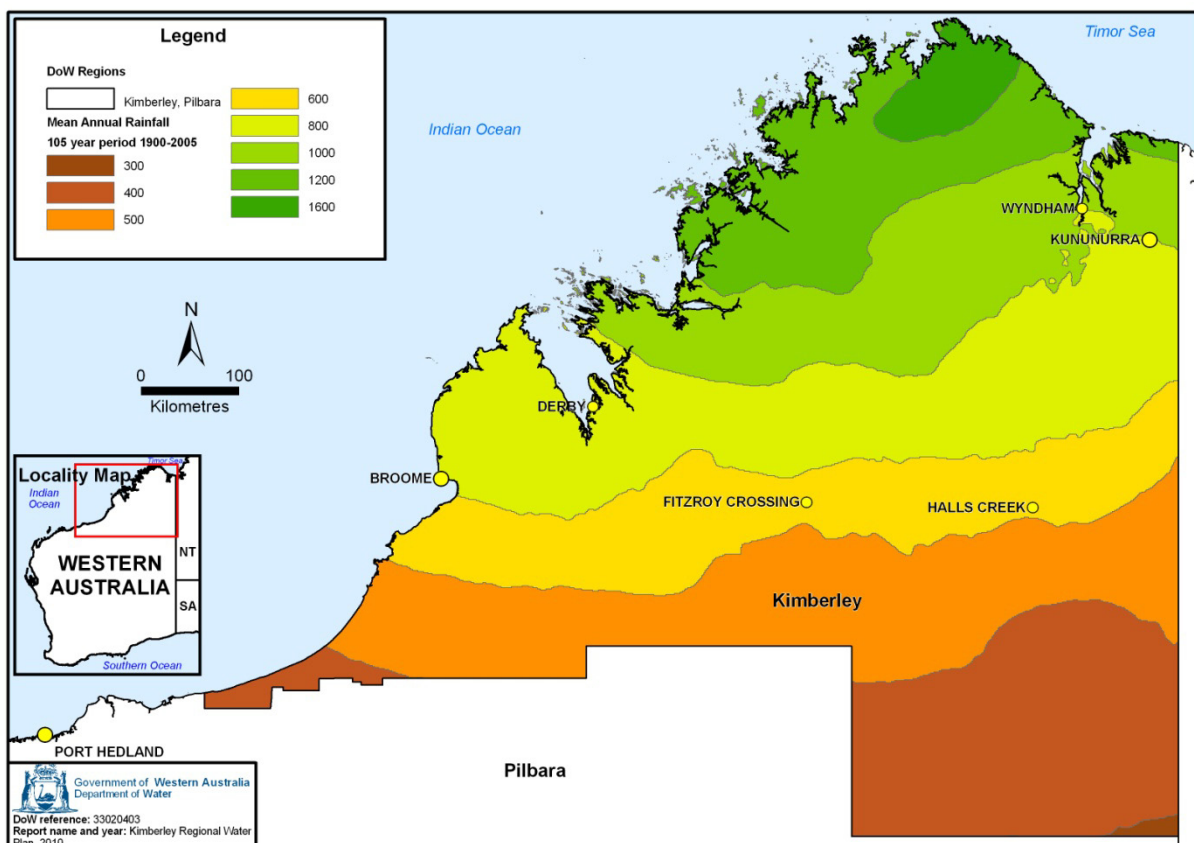


Figure 3 Mean annual rainfall in the Kimberley (1961-1990)(BOM 2010)

Hot and humid conditions characterise the summer wet season with most rain falling near the coast. The dry season falls between May and October and is typified by high-pressure systems bringing cool easterly winds and dry weather (Kimberly Development Commission 2009a).

---

**Key message: The Kimberley has a severe wet/dry climate with a major rainfall gradient from north to south and very high evaporation, which results in a water-limited environment.**

---

## 2.2 Overview of water resources and dependent values

Water resources in the Kimberley include surface water and groundwater resources and possible alternative water sources for urban areas such as recycled water and desalination opportunities.

The harnessing of water resources in the Kimberley for storage and use has been debated and investigated extensively since the 1950s. Whilst knowledge of groundwater resources in the Kimberley is limited, the resource as a whole is considered to be highly variable with strong potential when weighed against the challenges of surface water storage and capture options in a climate with high evaporation and water limitations for a large part of the year.

### 2.2.1 Surface water resources

---

*“We need and want to understand the issues affecting our river.” – Travis Fazeldean, Walmajarri man (Kimberley Water Forum 2008)*

---

The Kimberley has an extensive river and stream network influenced primarily by tropical monsoonal rainfall. It is home to more than 100 rivers and many more creeks and streams. They exhibit highly seasonal flow conditions as a result of being located at the southern edge of the global monsoon system. There are very few examples of perennially flowing rivers, most drying to a series of pools (some fed by groundwater) during the dry season. Where these semi-perennial watercourses exist, they are considered to be vital assets due to their unique flow and ability to support valuable ecological assemblages. Waterways in most of the Kimberley remain unmodified, with the exception of the Ord River catchment.

The Kimberley has two of Western Australia’s largest rivers – the Fitzroy River (700 km long) and the Ord River (588 km long) – and many high-conservation-value waterways, from Sturt Creek in the Desert subregion to a large number of classified Wild Rivers in the region’s north. The flow regimes of these rivers support industry, local communities and their customary economies, and significant ecological and cultural values.

**Key message: Surface water in the Kimberley is highly seasonal and is already being used to support industry, local communities and other significant economic, ecological, social and cultural values.**

There are three proclaimed surface water management areas in the Kimberley, those of the Ord River, Fitzroy River, and King River (Figure 4).

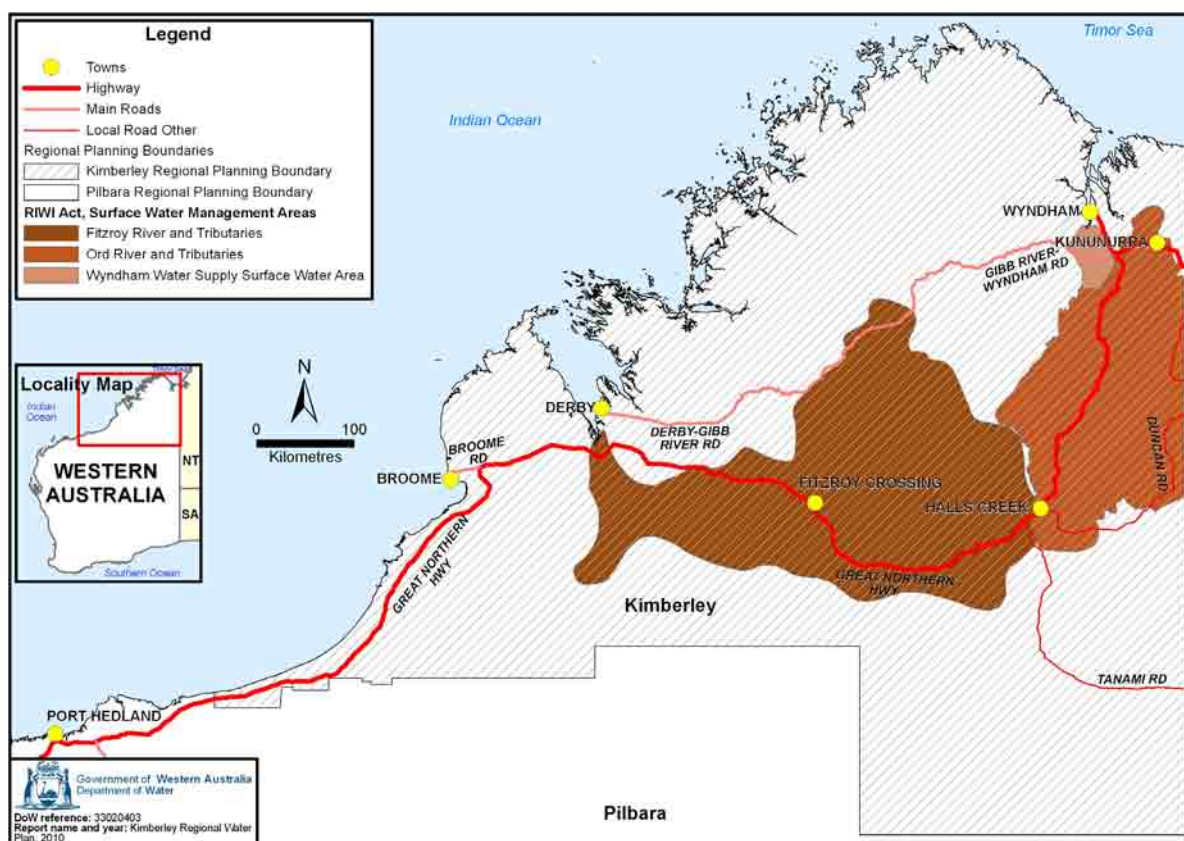


Figure 4 Proclaimed surface water management areas

## 2.2.2 Groundwater resources

*“The big water, the mother of water, kurtany, keeps the water level. It keeps it [the water] alive. Same like the mother of a human being. That’s the mother of the water level. The water is from the pukarrikarra – it’s underneath. The water underneath doesn’t live free – it travels underneath, from the high country to the sea.”* – John Dudu Nangkiriny (Karajarri Traditional Owner) from an interview conducted by Sarah Yu at Linyirrkartiny 29 August 1998 (Yu 2000)

Groundwater is characterised by an extensive network of aquifers in which water quality and quantity vary significantly. Groundwater is susceptible to saltwater intrusion near coastal unconfined systems, highly saline in the deeper confined aquifers near coastal areas and of variable quality at depth inland.

There are three main sedimentary basins in the Kimberley (Figure 5): the Ord-Victoria and Bonaparte basins in the east and the Canning Basin in the west. These basins together with important surface water interactions support a wide range of water-dependent values.

Between these basins are the Halls Creek, Kimberley and Tanami fractured rock provinces, which consist of complex fractured rock aquifers that have limited, highly variable, and largely low-yielding water supplies. Fractured rock aquifers are generally difficult to define until detailed investigations are undertaken.

Some coarse-scale hydrogeological work has been undertaken over the years to identify key groundwater resources in the Kimberley. However, there are large spatial gaps in rainfall data across the region, which is critical to determining recharge rates and thus understanding sustainable yields.

More detailed work to identify aquifer potential has been carried out for some resources, such as the La Grange groundwater area, with further work required on throughflow, recharge and local water movement. Groundwater resources in the region, such as those in the Canning Basin, are reported to have strong potential for use, but these estimates are based largely on inferences from geological data. Development of these resources should proceed with caution while further investigations of local and widespread impacts of abstraction are undertaken.

The whole of the Kimberley is a proclaimed groundwater resource under the *Rights in Water and Irrigation Act 1914*. Three groundwater areas define the region's major groundwater resources and these are the Broome, Derby and Canning-Kimberley (which includes the La Grange groundwater area) (Figure 5). Where water use is high or increasing, the department develops water allocation plans to manage groundwater abstraction. These plans are available on our website <[www.water.wa.gov.au](http://www.water.wa.gov.au)> Water regions> Kimberley> Publications.

---

**Key message: Groundwater is a key water asset in the Kimberley but development of these resources should proceed with caution as their assessment requires further investigation.**

---



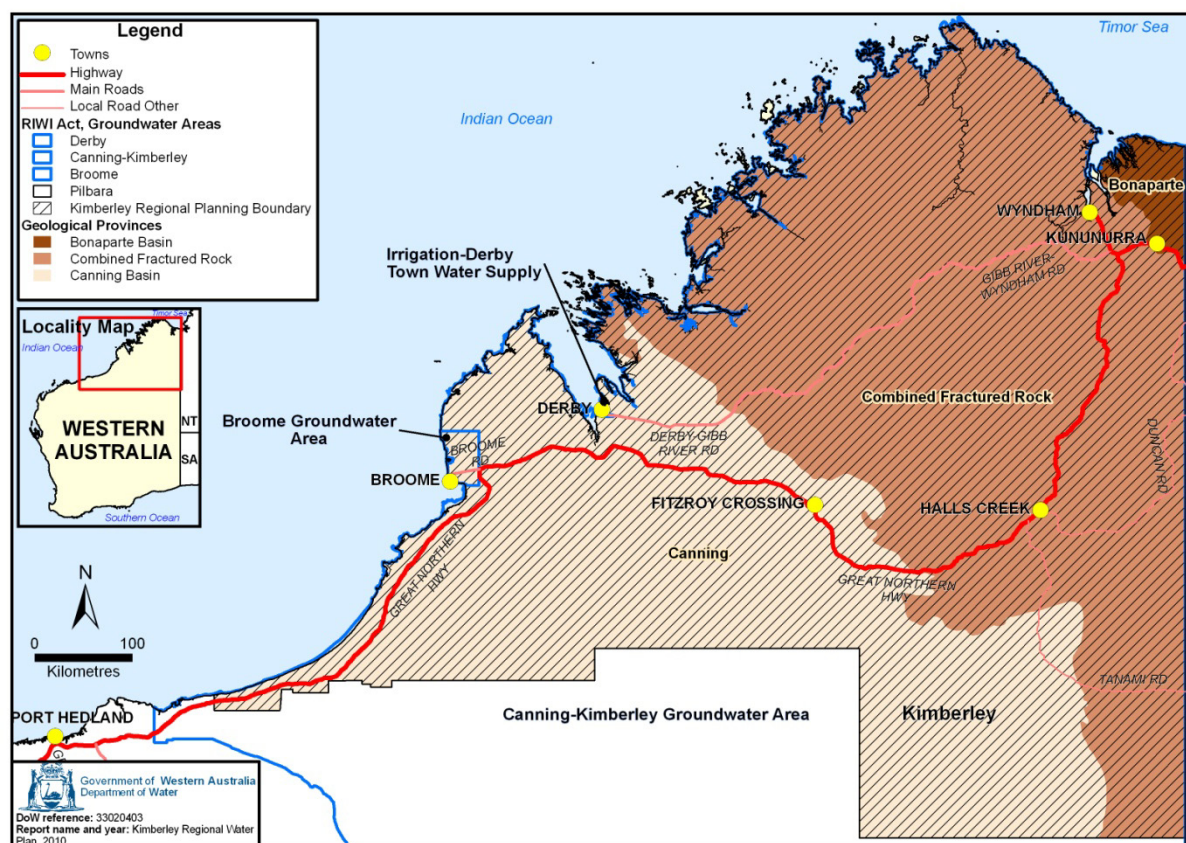


Figure 5 Canning-Kimberley groundwater area

### 2.2.3 Natural values

The Kimberley's wetlands and waterways are unique ecosystems with special aesthetic and conservation value. These water-dependent systems are driven by high inter- and intra-annual variation in rainfall and flow such that waterholes, river pools, marshes and cave systems are vital to the existence of many mammals, birds, fish, reptiles, amphibians and invertebrates.

There are many water sites and processes that are internationally, nationally, regionally and locally important because of the aquatic communities and/or species they contain or support. These water-dependent assets include Ramsar sites, groundwater-dependent ecosystems, migratory bird habitats and threatened ecological communities and are listed in Appendix C in the *Supporting detail* report.

Many of the high-conservation-value aquatic ecosystems have been poorly studied and sampled. A comprehensive assessment has not been undertaken of the values, condition of, or threats to aquatic ecosystems. This is particularly true for poorly studied ecosystems such as the groundwater-dependent subterranean ecosystems of karstic aquifers (west and east Kimberley) and fractured rock aquifers (central Kimberley) that contain significant stygofauna communities, many of which comprise unique short-range endemic species.

The lack of data and gaps in knowledge for these systems calls for more research and community engagement to help in identifying these values.

The Australian Government is currently assessing a large portion of the north and west Kimberley for National Heritage listing, in recognition of its world-renowned natural landscapes and cultural heritage values, many of which are associated with water.

---

**Key message: The lack of inclusion of many of the Kimberley's high-value ecosystems into national and international listings stems from the low level of knowledge about these systems.**

---

Aquatic values depend on natural processes to maintain critical assemblages. These include healthy habitats and vegetation communities; river flow regimes that have variability and extremes in both droughts and floods; sustained flow durations; water quality; and a balanced nutrient cycle.

---

**Key message: Through strong community engagement in planning, water values will be identified; and by sound monitoring and management, water-dependent values will be maintained.**

---

## 2.2.4 Cultural and social values

Little detail about cultural values at a regional scale is documented, although much locally recorded cultural information and knowledge is held with local people.

There are many and varied types of water use by Aboriginal people embedded in strong cultural traditions and contemporary cultural practices. Water is a feature in Indigenous mythologies with 'water snakes' or 'rainbow serpents' being a dominant creation theme (Toussaint et al. 2005).

As well as ancestral relationships to water, Aboriginal people have complex existing custodial responsibilities for the care, use and maintenance of water sources. Persistent or more permanent water sources are important during dryer times of the year for food, water and retreat (Yu 2000). These persistent sources are essential refugia for water-dependent species of value to Aboriginal people for food or ceremonial use (Toussaint et al. 2005). A growing body of knowledge is being documented that focuses on cultural values, cultural dependencies (both traditional and contemporary) and future aspirations for management of water.

These water sources and values will continue to be recognised in planning and management.

---

**Key message: Water in the Kimberley has important cultural and social values which will continue to be understood and recognised in planning and management.**

---

## 3 Water use

### 3.1 Existing water use

Water use in the Kimberley is sourced from surface water and groundwater. Outside of the Ord irrigation area, water for town water supplies, remote community water supplies and pastoral use is mostly sourced from groundwater.

The availability of surface water for commercial use depends on capture and storage, which requires engineering solutions and investment. Storage efficiencies are difficult to achieve given the very high temperatures and evaporation rates in northern regions. The most significant opportunity for water use and development is the investment in storage infrastructure on the Ord River.

Approximately 428 000 ML of water was used in the Kimberley in 2008 (Table 1). By far, the region's greatest water use is for irrigated agriculture, including a range of food crops as well as sandalwood and some irrigated cattle fodder. Over 80 per cent of total irrigated water use across the region is used in the Ord River irrigation scheme.

Mining and industrial use is the next largest water user, although small compared with irrigation use (Table 1). There is a smaller estimated amount of water used for livestock and domestic purposes (self-supplied use) outside of the major towns. The remaining amount is for domestic household use in towns, power generation, and general commercial use.

*Table 1 Estimated Kimberley water use by sector in 2008 (Thomas 2008)*

<b>Sector</b>	<b>Total (ML/y)</b>	<b>Per cent</b>
Irrigation (pasture, crop, horticulture)	350 474	82
Industrial (general industrial, mining and mineral processing, power-thermal)	39 757	9
Rural (livestock, domestic, aquaculture, unspecified)	22 222	5
Domestic (public water supply to households)	11 368	3
Commercial/industrial (general commercial, parks and gardens)	3 876	1
<b>Total</b>	<b>427,697</b>	<b>100</b>

*1,000,000 litres (L) = 1000 kilolitres (kL) = 1.0 megalitres (ML) = 0.001 gigalitres (GL)*

The department licenses all abstraction and diversion from groundwater sources and major surface water systems where a requirement for management has been identified. Approximately 80 per cent of water used is currently sourced from surface water and 20 per cent from groundwater. Licensing is undertaken in all water management areas proclaimed under the *Rights in Water and Irrigation Act 1914*.

---

**Key message: The department has a robust process of licence assessment that provides for public input and in some catchments and groundwater areas, this is guided by local water allocation plans. Water use is licensed even where a water allocation plan is not in place.**

---

### 3.1.1 Irrigated agriculture

Irrigated agriculture in the Kimberley has developed around specific nodes of infrastructure, services and resource availability because of significant government investment in certain areas. Commercial water use in the Kimberley has been dominated by surface water diversion from the Ord River system for irrigation of a range of crops including horticulture and agroforestry. Agriculture and forestry represent the greatest water users in the region, accounting for about 82 per cent (350 474 ML/year) of annual water use. Agriculture and forestry contributed approximately 1.5 per cent to the Gross Regional Product in 2007–08 (Kimberly Development Commission 2009a).

Agroforestry is a growing industry in the region, with major sandalwood expansions in the Ord irrigation area and trials of native species and timber plantations occurring in parts of the West Kimberley.

Irrigated agriculture in the West Kimberley includes horticultural use around the Broome and La Grange groundwater areas and some irrigated pasture production through pastoral diversification. A small-scale horticultural industry around Broome and Derby includes the production of mangoes, bananas, vegetables, turf, cut flowers, and plants for landscaping. Many of these industries rely on groundwater and trickle or sprinkler irrigation techniques.

### 3.1.2 Pastoral water use

---

*“Pastoralism is as much a way of life as it is a livelihood.” – Anon (NOTPA stakeholder survey 2007)*

---

Livestock and domestic water use for standard pastoral practices on the rangelands is not required to be licensed under current legislation nor will it require licensing under proposed new legislation. This use is, however, managed by being considered when allocation limits are set for different water resources.



There are existing irrigation enterprises on pastoral properties for production of fodder crops to augment cattle feed; these use large centre-pivot irrigation techniques. Pastoral businesses in the Kimberley are diversifying their activities to better sustain their operations. Diversified activities commonly include tourism enterprises, horticultural activities, intensified cattle feedlots or irrigated fodder crops to support cattle production. Some of these irrigated pastoral enterprises represent significant water use for the region.

### **3.1.1 Mining and industry**

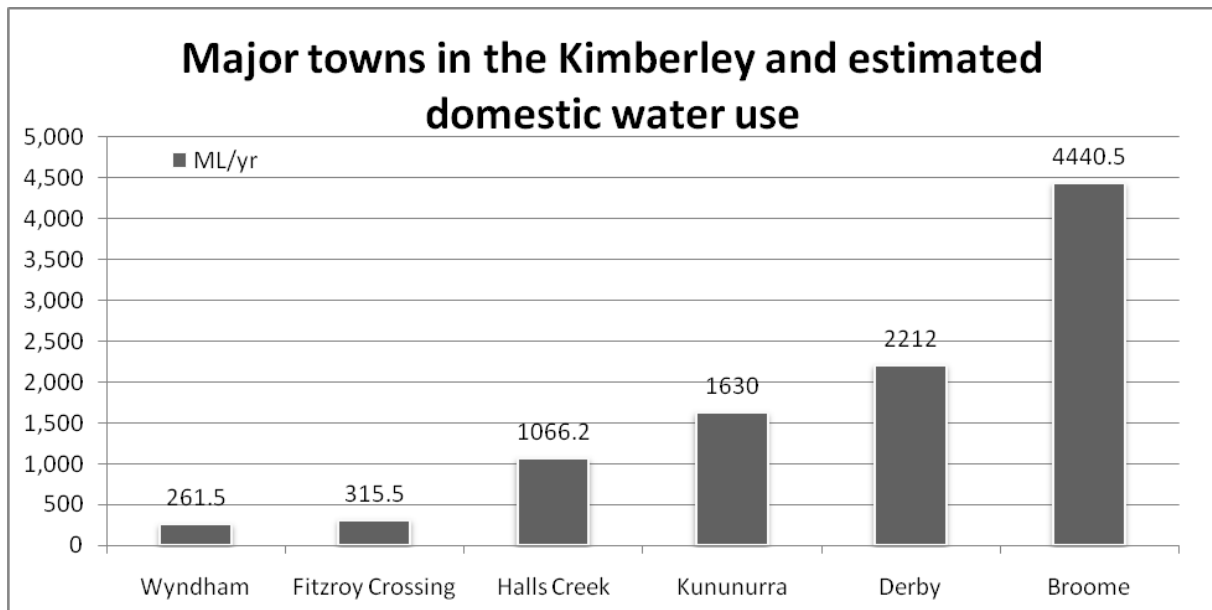
Industrial use, primarily mining, used about 33,400 ML in 2008 (Thomas 2008). This is only about eight per cent of licensed water use, even though these activities constitute the region's most significant economic contribution – representing up to 63 per cent of Gross Regional Product in 2007–08 (Kimberly Development Commission 2009b). This includes five major mines across the region for diamonds, gold, lead, zinc and nickel, with some extensive exploration activity occurring.

The power generation, manufacturing and steel fabrication industries also use a small amount of water. These industries represent very low overall water use compared with irrigation and mining. A hydro power station is located on the Ord River. The water release rules associated with the power station are complex given the competing needs of irrigation demand and environmental requirements at times when releases for power generation are not required and the impacts of such releases on power generation capabilities. Further expansion of the irrigation area requires careful management and planning. Further information is available in the Ord River water management plan (Department of Water 2006).

The Kimberley has a small, emerging aquaculture industry with growth aspirations. Only a small amount of licensed freshwater use is associated with this industry and some other in situ facilities use salt water (which do not require licensing).

### **3.1.2 Town and community domestic water supplies**

There are six major towns in the Kimberley: Kununurra, Wyndham, Halls Creek, Fitzroy Crossing, Derby and Broome (Figure 6). Domestic household water use is around 340 kL per person per year, and amounts to about three per cent of water used in the Kimberley.



**Figure 6** Major towns in the Kimberley and their estimated domestic water use

Groundwater is the only economically viable water supply option for many towns and Indigenous communities in the Kimberley. Halls Creek, Fitzroy Crossing, Derby, Broome and Kununurra all obtain their public water supply from a borefield located near each townsite, operated by the Water Corporation. Public and private water supplies in and around these town centres totally depend on groundwater for drinking water, domestic use, agriculture, small-scale horticulture and livestock watering. Wyndham receives its town water supply from Mooloolah Dam

The overall total of domestic water supplied by the Water Corporation (as the key water service provider in the Kimberley) is about 11,300 ML per year (Thomas 2008), a relatively small volume compared with irrigation and mining. In many parts of the Kimberley, secure supplies are in place for existing settlements; however, some towns, such as Halls Creek, are facing water supply issues. Broome and surrounds is experiencing rapid growth pressure and its water supply must be managed carefully due to susceptibility of the groundwater resource to salinisation. There is a clear imperative to use water wisely in the region and in some cases to find new sources in order to sustain growth and development. To raise awareness of these issues, implementation of water efficiency measures and education programs across the region are important.

The Department of Water protects and manages drinking water sources in the Kimberley region using a combination of legislative and non-legislative mechanisms, including proclamation of public drinking water source areas; production of guiding documents including the department's water quality protection notes; and preparation and implementation of drinking water source protection plans.

---

**Key message: Domestic water supply for towns and communities requires detailed planning and management to secure its quality and availability.**

---

Seven protection plans have been developed for the Kimberley region including Broome, Camballin, Derby, Fitzroy Crossing, Halls Creek, Kununurra and Wyndham – Moochalabra Dam. The plans detail the requirements for protecting the water source, such as specifying compatible land uses, protection zones and prohibiting certain activities. Public drinking water source areas in the Kimberley region are shown in Figure 7.

Water source protection plans have been developed for many of the remote communities to assist with future land-use planning and water source protection. Any future land and infrastructure development in these communities should not endanger the integrity of drinking water supplies. The Department of Water is working with state agencies, including the departments of Housing and Planning, to extend this water planning service to all Indigenous communities.

The level of delivery of essential services to Indigenous communities as compared with non-Indigenous towns in Western Australia is being addressed through the Council of Australian Governments (COAG) Intergovernmental National Indigenous Reform Agreement to 'close the gap' in Indigenous life outcomes. The connection of dwellings to water and sewerage services that meet appropriate regulatory standards is a significant progress measure under this agreement.

Most large towns such as Broome and Kununurra fall within controlled areas under the *Water Services Licensing Act 1995* (WA). Residents in these towns enjoy water and sewerage services that comply with set standards (pressure, flow and continuity of service) in operating licenses issued by the Economic Regulation Authority.

There are approximately 200 or more Indigenous communities across the Kimberley. Town-based Indigenous communities are generally connected to state utility providers such as the Water Corporation as a function of their proximity to mains supplies. In these cases it is generally the responsibility of the community, with the assistance of the Department of Housing's Remote Area Essential Services Program (RAESP), to maintain community infrastructure. However a Town Reserves Regularisation Program, jointly managed by the Department of Housing and the Water Corporation, is underway to progress infrastructure upgrades to town-based communities and ensure that residents in these areas can benefit from the same standards of safety and reliability found in the adjoining towns.

Away from the major towns, several large Indigenous communities operate as service hubs. Despite being considerably larger than some 'mainstream' towns, they are not currently connected with a licensed water service provider. These hub communities along with other remote Indigenous communities (generally with populations over 50 people) are also serviced by the Department of Housing's RAESP. The Department of Water is working with other state agency partners to bring services in these communities into line with the regulatory and licensing

standards applied to comparable mainstream towns. The balance of small communities under 50 people (approximately 155 in total) are generally 'self-supplied' in terms of water services. Service delivery models for these communities are being investigated through the COAG Indigenous reform agenda.

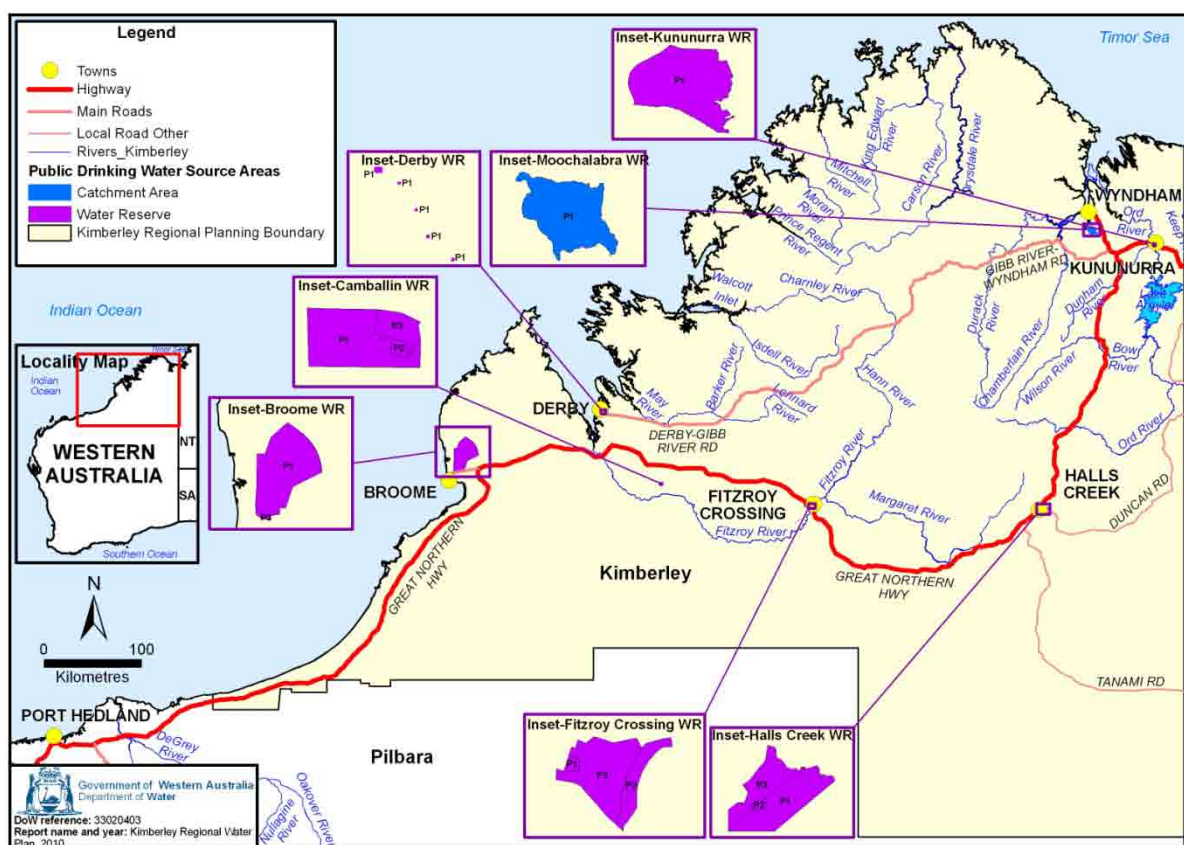


Figure 7 Public drinking water source areas in the Kimberley

**Key message:** The Department of Water is working with other state agency partners and the state Aboriginal Affairs Coordinating Committee to bring services to remote communities (with populations of over 50 people) into line with the regulatory standards applied to comparable mainstream towns, and to progress the licensing of service providers.

### 3.1.3 Social and recreational uses

*“That water bring you feed... and medicine.” – Anon (Kimberley Water Forum 2008)*

Water availability remains one of the key limiting factors for habitation and use of Kimberley landscapes. Knowledge of permanent, accessible water sources guided

Aboriginal peoples' passage through country, as well as the activities of early explorers and settler pastoralists.

Tourism and local recreational activities are commonly centred around permanent fresh water. Most accessible waterholes and stretches of river along the main transport routes (e.g. the Great Northern Highway) are very heavily visited by locals and tourists alike, such as Mary Pool and various river crossings along the Gibb River Road. In the very hot and dry landscape of the Kimberley, accessible waterways become an obvious attraction and valuable natural resource.

Many Kimberley communities have been established with proximity to water for purposes of domestic supply, amenity and recreation. Local waterholes and permanent pools are critical social and recreational resources for the region's inland towns and settlements. Fresh water is a particularly important feature in the Kimberley due to the lack of access to, and settlement on, the remote and rugged coastline. When the landscape dries out in the dry season, local water features become recreational nodes for fishing, swimming, boating and socialising. These natural waterways are particularly important to people in these often remote locations with limited access to other forms of recreation, infrastructure and entertainment.

## 4 Future trends

---

*“Enable more small/medium scale enterprises to build an industry rather than having one big player dominate.” – Anon (NOTPA stakeholder survey 2007)*

---

A sustainable water management regime in the Kimberley region must:

- accommodate the constraints of a water-limited environment and variable climate
- promote the wise and careful use of available water resources
- manage the increasing competition for available water resources
- support appropriate regional development that aligns with the region’s special characteristics
- consult and communicate effectively with interested parties
- maintain the integrity of the region’s natural and cultural heritage
- be able to account for all water extraction
- maintain the health of water-dependent ecosystems.

With growing recognition of the constraints to water resource development and better engagement with regional communities, the discussion about water use in the Kimberley is changing. No longer is the Kimberley considered an uninhabited frontier for ‘imported’ development aspirations. Traditional Owners are now gaining legal and custodial recognition and the existence of a long-term pastoral industry and its changing vision is also recognised. Growing industries such as irrigated agriculture and agroforestry are key water users and their roles in water resource development and management in the region are being strengthened.

There is much discussion among Kimberley communities about the future people want to see in regard to regional industry and water resource development. Feedback from stakeholder and community forums indicates that regional people want to see development appropriate to the region’s socio-economic character as well as its climate, landscape and resource constraints (DAFWA 2007; Hill et al. 2006; Ellison 2009). The regional community is committed to using good baseline information and analysing lessons from history to inform strong planning and consultation. People want to see recognition of the inter-relationship between social, cultural, ecological and economic elements as well as issues of scale and regional appropriateness when considering development futures.

## 4.1 Growth in water demand

---

*“Irrigated agriculture does not have to be big and scary. It has many different forms and if adapted locally and managed well, it will be a positive contributor to the North West regions.”* – Chris Ham, Department of Agriculture and Food (Kimberley Water Forum 2008)

---

The most significant immediate increase in demand for water is associated with the Ord expansion project <[www.dsd.wa.gov.au](http://www.dsd.wa.gov.au)>. The Australian and state governments have invested significantly in expanding the Ord River Irrigation Area (ORIA).

### **Ord River Irrigation Area**

The Ord River irrigation scheme is a collection of engineering structures that delivers water. It is the regulation of the Ord River that makes surface water available in the quantities required for irrigated agriculture.

The expansion of the Ord River Irrigation Area (ORIA) has been progressing since Stage 1 of the development began in the 1960s and 1970s. This stage included construction of its major water supply and drainage infrastructure. This provided for irrigation of the current 14 500 ha of agricultural land, underpinning the development of the town of Kununurra.

The existing irrigated farmland has been used for a variety of agricultural uses which varies with market demand and includes mangoes, citrus, rice, watermelons, pumpkin, chickpeas, sandalwood and chia.

The Ord-East Kimberley Expansion Project will increase the size of the ORIA to about 22,000 ha of agricultural land, starting with the release of 8,000 ha. The Department of Water has already put in place the *Ord River surface water management plan* (DoW 2006) that sets out the availability of water for existing use as well as the expansion, with another 400 GL per year available in the Weaber Plains area and 115 GL per year downstream at Mantinea. These amounts are in addition to the 335 GL per year currently licensed for the existing irrigation area and the 15 GL per year allocated to riverside pumpers. The management plan also makes provision for environmental water requirements as well as release requirements for the existing hydro-power (which currently provides power to the townships of Kununurra, Wyndham and the Argyle diamond mine).

Major dam infrastructure on the Ord River provides significant opportunities for growth in surface-water-fed irrigation. This infrastructure and the current Ord expansion process represents significant investment in regional water-reliant development. The state government is guiding all major horticultural development into this area as well as other areas such as the Gascoyne, and investigating options in the Pilbara.

Significant research has identified issues around groundwater levels, salinity risk, water quality and environmental water requirements. These issues are key priorities for future water management in the Ord.

The Department of Agriculture and Food WA has identified the La Grange groundwater area as a key area for future horticultural development. The Department of Water has released the *La Grange groundwater allocation plan* (DoW 2010) which sets out sustainable abstraction limits and management guidelines to sustainably manage this growth.

---

**Key message: As new industries emerge in the Kimberley, it is important to establish best practice irrigation and water use efficiency techniques in partnership with industry practitioners.**

---

The agroforestry industry is also growing in the Kimberley, with a strong presence in the Ord River catchment, a project in the Dunham River catchment and some smaller enterprises and trials in the West Kimberley. Over 40 per cent of land in the ORIA is now used for Indian sandalwood production, with estimates of over 50 per cent of land being planted out by 2010. There is significant research being undertaken into water efficiency measures by sandalwood producers including trickle irrigation, tailwater return, more water-efficient host species, best practice production (e.g. soils) and more targeted watering.

Some of the key constraints to development of industries and water resources are economic viability, power supply, transport costs, availability of a skilled workforce and land tenure. While it is estimated there is enough water to cater for current and projected demands in the key resource areas, careful management is still required. There remain some recognised constraints around water storage and delivery.

#### **4.1.1 Pastoral diversification**

The many emerging proposals for further irrigation development on pastoral lands is a key growth sector for water resource development in the Kimberley and represents a significant increase in potential water use (Thomas 2008; CSIRO 2009c).

Any change in land use from extensive rangelands pastoralism represents a significant departure from pastoral lease conditions and thus requires a pastoral diversification permit. Through that process, Native Title and other land-use impacts are assessed and subsequent water licences and other approvals are sought.

Irrigated horticulture and fodder production projects require water licences for their operation and some amount to large volumes of water use. Opportunities for best-practice water use exist in these new pastoral irrigation industries and large volumes of water use need to be guided by detailed operating strategies.



#### **4.1.2 Mining and mineral processing**

The Kimberley has significant mineral resource potential and this sector is expected to expand in the future (even though recent global downturns have generally slowed mining expansion in Western Australia). As global economies and mining industries recover, this will lead to an increase in water use associated with extraction, processing, dust control and on-site domestic supply. It may also have flow-on effects for town-site expansion as state and local governments encourage the use of localised workforces rather than fly-in fly-out arrangements through investment in infrastructure and services and a review of local industry participation throughout regional Western Australia

Industry growth is relatively slow compared with the Pilbara region where more established infrastructure and industry services exist (ports, transport, energy, etc.). The Chamber of Minerals and Energy of Western Australia suggests around 10 to 125 per cent growth in the mining and mineral processing industry in the Kimberley by 2020 (CME 2008; pers. comm. 2010). Some of the key areas of focus for the industry are the increased cost of water, water use efficiency and better future planning for water resources.

Demand projections (Thomas 2008) indicate that in many parts of the Kimberley there is steady growth in industry as well as domestic supply for growing populations. Despite this, some significant constraints to developing industries remain, such as high costs of labour, materials, workforce and distance to services.

#### **4.1.3 Industry and petroleum development**

Industry growth is likely to accelerate over coming years, driven principally by projects such as the development of the Browse Basin gas resource, in particular, the on-shore gas processing and export from the proposed LNG precinct being established by the state government with federal government support.

The Northern Development Taskforce < [www.dsd.wa.gov.au/7925.aspx](http://www.dsd.wa.gov.au/7925.aspx) > has undertaken feasibility studies into four possible locations, with a decision on the most feasible location nominated by the state government as James Price Point on the Dampier Peninsula. The Kimberley Land Council has led consultation with Native Title claimants and Indigenous communities about the proposed location. The Department of State Development is currently, and will continue to lead and oversee the impact assessment process. This is being undertaken by way of a Strategic Assessment Report which will be assessed concurrently by the state (EPA) and the Commonwealth (DEWHA – or its equivalent) under the state's *Environmental Protection Act 1986* and Commonwealth's *Environmental Protection and Biodiversity Conservation Act 1999* respectively. The Strategic Assessment Report is due to be released for public comment in late 2010.

A project scoping study <[www.dsd.wa.gov.au/documents/000014.John.Gill\(1\).pdf](http://www.dsd.wa.gov.au/documents/000014.John.Gill(1).pdf)> has identified some key water management issues, primarily groundwater abstraction and contamination risks. Water will be required for construction, operation of the facility and domestic supply for the local workforce. Any water use will require

licensing by the Department of Water and therefore impacts will be assessed and managed through this mechanism.

#### **4.1.4 Domestic water supply**

The Water Corporation, as the region's primary water service provider, is responsible for ensuring sustainable and secure domestic water supply for large towns. The corporation carries out a range of planning and investigative work to ensure ongoing high-quality water supplies – in the context of population growth and changing town needs. It is important to acknowledge that water supplies are limited and innovative solutions are required to accommodate growth in the region.

The Water Corporation carries out regular source reviews to determine the adequacy of supply against projected growth. Many towns in the Kimberley are experiencing population growth and thus increased domestic water demand.

Due to Broome's significant projected growth in population, the Water Corporation has recently expanded the town water supply borefield. Halls Creek is also facing a steady increase in population pressure and, as such, the corporation's recent addition of a new borefield about 2 km from the existing water supply network will ease housing pressures.

#### **4.1.5 Indigenous aspirations for commercial water use**

In recent years much discussion has centred around how to enable Aboriginal people to access water for commercial use, and to benefit from water in a sustainable economy (NAILSMA 2009a).

Aboriginal people are concerned about the pace of water reform across the country and the possible implications for the future rights and interests of Native Title holders (NAILSMA 2009b). Aboriginal people have aspirations for involvement in water management decisions and for access to water for possible economic futures.

The department's current water licensing and allocation planning processes and supporting policies provide clear pathways for access to water for commercial use by Aboriginal people.

---

**Key message: In recognition of issues raised by Aboriginal people, the Department of Water is continuing to support a dialogue with key groups around the implications of water reform and ways to enable better access to water for commercial enterprise.**

---

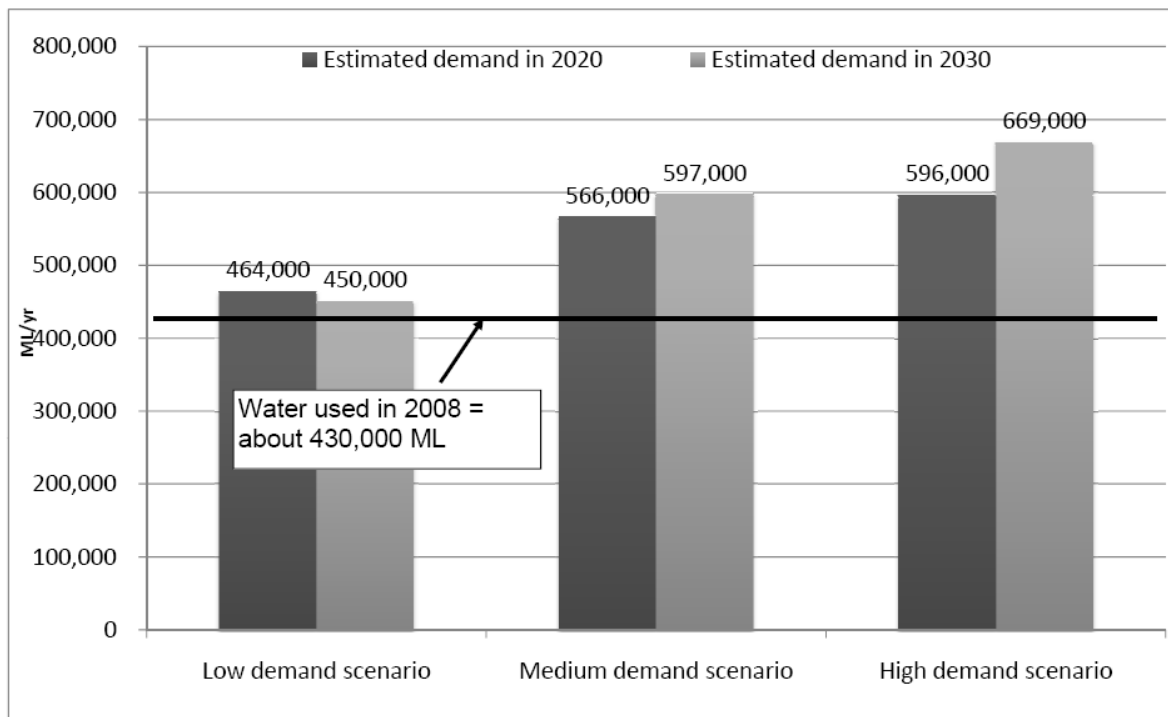
Existing water management systems protect water for the environment and water used for traditional cultural purposes. The understanding and use of existing water management instruments will assist commercial development and complement

emerging management options, such as water markets, and support new approaches to water management that Indigenous communities may wish to define and explore.

## 4.1 Water demand vs water availability

Northern Australia has been described as a water-limited environment (Northern Australia Land and Water Taskforce 2009; CSIRO 2009a). Water demand trends and projections have been analysed for the Kimberley (Thomas 2008) based on population growth and regional demand drivers. The region's key drivers of demand for water have been identified as a steady growth in population; maintenance of a strong pastoral industry; and significant growth in irrigated agriculture, service industries, mining/petroleum and energy industries. In particular, opportunities for resource development are likely to expand in the future and access to water for processing, dust control and onsite domestic use will be important.

Three demand projection scenarios were modelled (low, medium and high demand), using 2008 data and future predictions, for the years 2020 and 2030 (Figure 8). The modelling showed large growth in water demand in the Kimberley except for the low-demand scenario projection category. In the low growth scenario, water use declines after about 2020 based on the economic modelling (Thomas 2008).



**Figure 8** Future water demand scenario projections (Thomas 2008)

Scenario projection modelling is constrained by the amount of data available for the region, so is only indicative of future demand possibilities. Changing climate scenarios were also factored into this analysis and found to have a negligible impact on water availability in the Kimberley, based on current knowledge and modelling capabilities. This finding is consistent with the recent Northern Australia Sustainable Yields project (CSIRO 2009a), in which climate is not anticipated to affect northern Australia as severely as southern Australia, with increases in average rainfall in the short to medium term (15 years) before returning to a drying trend.

The northern regions also have certain characteristics (economic, social and environmental) that will continue to influence potential development. This makes water demand predictions more difficult and in some situations uncertain.

Estimations of future water availability show that water resources are sufficient to accommodate predicted medium-term growth trends, if a cautious approach to water management is adopted and targeted management strategies are established. Competition for available water is likely to increase as demand grows, and monitoring and regulation will be required to ensure water allocation is consistent with legislation and that water resources are not over depleted.

Despite some of the constraints to water resource development in northern Australia, water availability is not the main limiting factor to development in some parts of the Kimberley. It is more constrained by economic viability, power supply, transport costs, lack of infrastructure, skilled workforce, and land tenure (Northern Australia Land and Water Taskforce 2009).

Significant resource investigations are still required to further establish the reliability and extent of some of the Kimberley's water resources. The challenge will be to establish strong evidence-based management regimes that are relevant to the northern environment.

---

**Key message: Generally, sufficient water is available in the Kimberley for current projected demand, however there are some areas of concern and resource development and management requires robust planning and better information.**

---

## 4.2 Threats to water resources

Population growth and economic expansion in the region will result in increasing urban residential development, more intensive industrial and mining activity, pastoral diversification and changes in agricultural production. Risk associated with these activities will continue to be managed by the department.

Human activities have significantly altered water regimes and diminished water quality in some (but only few) Kimberley river catchments. There are multiple risks to water available for consumptive use and risks to water-dependent values, including:

- insufficient quantities of scheme water being available for towns, particularly some remote communities and coastal areas where saline intrusion is a risk to water quality
- increased water demand in hotspot areas and decreased supply reliability
- alteration of natural flow regimes, resulting in unacceptable impacts on water-dependent ecological and cultural values
- cumulative impacts of multiple developments and diffuse catchment-scale land-use impacts, particularly from infrastructure development such as roads and bridges, and wider impacts such as uncontrolled grazing and fire
- uncontrolled livestock and feral animals accessing rivers and wetlands, increasing weed invasion and erosion
- increasing uncontrolled visitor numbers at permanent river pools and wetlands
- over-abstraction in localised areas leading to impacts on groundwater-dependent values
- nutrients and pollutants contaminating water sources
- degradation of wetlands, waterways and groundwater-dependent ecosystems.

## 4.3 Community-identified water management issues

The key water management issues identified by the community became apparent during various projects, consultations and community forums (Table 2). This process included a major collaborative water forum and some smaller subregional forums that were built on existing events and processes. Given the distances that stakeholders needed to travel to come together, and given the capacity of people in the Kimberley to be involved in many intersecting planning processes, this planning work was targeted at existing forums and integrated opportunities for community input over a couple of years, also drawing from many previously identified issues.

Table 2 lists the water management issues identified during the extensive consultation process. It identifies issues across the region and those that are more significant in the La Grange, North Kimberley, Ord catchment, Dampier Peninsula, Desert and Fitzroy catchment subregions, with reference to the strategic objectives explained in Chapter 5 of this Plan. Further information is available on the issues in the *Supporting detail* report.

**Table 2**      *Stakeholder-identified water management issues in the Kimberley region*

<b>Issue</b>	<b>Reference to Strategic objective (sections 5 &amp; 6)</b>
<b><i>Significant issues in the Kimberley region</i></b>	
Protection of groundwater from over-abstraction and water quality deterioration	Strategic objective 3
Unsatisfactory drinking water supply and service delivery arrangements for remote communities (i.e. Indigenous communities, pastoral settlements, tourism operations and mining camps)	Strategic objective 4
How will water be allocated in the future?	Strategic objective 3
What role will Aboriginal people and stakeholders have in water resource development?	Strategic objectives 3 & 6
Lack of water licensing information to community (poor understanding of management process)	Strategic objective 6
Low level of knowledge about groundwater	Strategic objective 1
Increases in tourism and pastoralism have detrimentally impacted some waterways	Strategic objectives 3 & 5
Restricted public access to rivers due to tenure restrictions, fences, and weed encroachment	Strategic objective 6
Lack of integrated strategies to recognise and protect high-conservation-value waterways	Strategic objectives 5 & 6
Erosion of riverbanks by road maintenance, uncontrolled grazing and increased fire activity	Strategic objective 3 & 4
Indigenous access to water for commercial purposes	Strategic objectives 2 & 3
Will water 'barons' be created through water markets?	Strategic objective 3
<b><i>Significant issues specific to the La Grange subregion</i></b>	
Ensuring water allocation limits are sustainable	Strategic objective 1 & 3
Protection of groundwater-dependent ecosystems with community involvement	Strategic objectives 1, 5 & 6

Ensuring sustainable water use with growth of irrigated horticultural enterprises	Strategic objective 3
<b>Significant issues specific to the North Kimberley subregion</b>	
Water use needs to be carefully managed to protect high-conservation-value aquatic ecosystems in the North Kimberley	Strategic objective 3 & 5
Weeds, feral animals and fire management impact on waterway condition, public access and regional values	Strategic objective 5
Tourism access to waterways is increasing in the North Kimberley and subsequent impacts require management	Strategic objective 5
<b>Significant issues specific to the Ord catchment subregion</b>	
Incorporating values and criteria associated with Ramsar classification in the management of the Ord River	Strategic objectives 3 & 5
Continue to ensure that ecological requirements of the Ord River system are being met	Strategic objective 3
Lack of an integrated water quality/quantity management framework for the catchment to set water quality/quantity targets, deal with on-farm practices, groundwater levels and salinity, drainage and erosion	Strategic objective 3
Ensuring the Ord expansion uses the available water in the most efficient way	Strategic objective 4
Ensuring that all current agreements and plans are revised should there be any further expansion beyond Stage 2 of the Ord irrigation scheme	Strategic objective 3
Ensuring that key commitments and requirements of the <i>Ord Final Agreement</i> relating to water management principles are met	Strategic objective 3
Ensuring sustainability of water use in mining and irrigation developments	Strategic objective 3
Ensuring appropriate 'siting' and assessment of infrastructure development	Strategic objective 3
<b>Significant issues specific to the Dampier Peninsula subregion</b>	
The oil and gas development cannot impact adversely on the water resource and dependent plants and animals	Strategic objective 3 & 4



Remote communities need to have safe and reliable water supplies	Strategic objective 4
Knowledge of the groundwater resources and their dependent ecosystems is limited and important given the increase in pressure (tourism, horticulture, industry, etc.)	Strategic objectives 1 & 4
<b><i>Significant issues specific to the Desert subregion</i></b>	
Water use for mineral exploration and extraction must be sustainably managed	Strategic objective 3
Catchment management and planning by Traditional Owners is important for healthy waterway management (issues include weeds, water quality and tourism)	Strategic objectives 5 & 6
Cultural maintenance of water sites – for healthy waterways the appropriate people need to access and visit water sites and speak the right language	Strategic objective 6
<b><i>Significant issues specific to the Fitzroy catchment subregion</i></b>	
No more dams on the Fitzroy River so that natural flows and ecology are maintained	Strategic objective 2
Camballin barrage presents a barrier to fish migration and has changed river morphology and resulted in higher erosion impacts	Strategic objective 5
Water should not be transferred outside the catchment	Strategic objective 2
Lack of understanding of the connection between groundwater and surface water along the Fitzroy River	Strategic objective 1
Scale and type of agricultural developments should be appropriate to the environment and regional character	Strategic objective 2
Weeds and erosion have severely degraded parts of the riparian zone along the Fitzroy River	Strategic objective 5
Increase in mining exploration and activity has unknown impact on the waterways	Strategic objectives 1 & 3

## 5 Strategic objectives

This Plan has been designed to guide the Kimberley towards integrated and sustainable water resource management to 2030. Through the scoping of all key issues (current and emerging) and then checking with the community (Table 2), the following six strategic objectives have been derived. They cover all the major water-related issues that will challenge water resource management in the Kimberley into the future.

### 5.1 Strategic objective 1:

#### ***Understand Kimberley water resources and water systems***

---

*“We need to know much more about how the water works in our regions. To do this we need to develop collaborative research that respects culture and history, and encourages connections between people and country.” – Sarah Yu, anthropologist (Kimberley Water Forum 2008)*

---

#### **Position statements**

- Information will be gathered to understand water resources (both surface water and groundwater) to support management decisions now and into the future.
- Water resource investigations, assessment and monitoring will be focused on areas where water resource and land development are priorities for state or regional development.
- Information collected by water stakeholders needs to complement and support water resource outcomes.
- Water resource information and data is available to help water users and managers make sound adaptive management decisions.
- Mechanisms to encourage collaboration for data collection and sharing should be encouraged.

#### **Overview/explanation**

The Department of Water’s future planning and management of water resources needs to be based on the best-available science and information. A whole-of-water-cycle understanding of the region’s water resources is needed to support the appropriate level of management and regional development. As demand and competition for water increases, there is a corresponding need to better understand the water systems – predominantly how much water is available for consumptive use, the environmental systems dependent on that water, and how land-use activities affect water resource health and availability.

Such data and information forms the basis of water resource planning, facilitates better decision making, and sets a new management framework of goals and objectives. Public access to data and water information is critical in building community and industry capacity to better manage water use and contribute to decisions about water management.

There is a need to understand the state of water resources in the Kimberley and how they function, how they are being used, what the demands are now and in the future, how they are being affected by land-use changes and a variable climate, and how they are responding to a determined management approach. These investigations can range from short- to long-term and it is critical to understand how these issues interrelate.

A small amount of data has been collected since the 1950s, such as flow, rainfall and some limited water quality data in the Ord and Fitzroy river catchments. Outside of the Ord and Fitzroy river systems, major population centres and large mining developments, water resource information is limited. The largest amount of water information collected over time has been surface water data from the department's river gauging network, providing information for water resource management and supporting the Bureau of Meteorology's flood warning system.

The department has strong hydrographic expertise and capacity, with a traineeship program that will continue to build on this. Strengthening the quality assurance of existing data, building the state's technical capacity, improving public access to water information products and linking with national water data standards (for alignment with the National Water Initiative) are priorities for the department.

Cooperation in water resource monitoring and management (including waterways) with the Northern Territory is needed. For instance, much of the Keep River catchment lies in the Northern Territory, while the waterway is predominantly used by people living in Western Australia (Kununurra). Inter-state cooperation in monitoring and management is expected to improve as a consequence of the Ord River Irrigation Area (ORIA) expansion.

A better understanding of groundwater resources, especially where there appears to be opportunities for further development, would be a priority, as would further investigation of surface water-groundwater interactions. There are still major gaps in groundwater knowledge, which reflects the situation across northern Australia where groundwater resources are, on the whole, poorly known (NWC 2009). Groundwater data is collected via surveys of licensed bore usage as well as hydrogeological studies associated with the department's licensing assessment and monitoring process. The data is used mainly for monitoring purposes in high-water-use areas such as around town centres and across the ORIA. Because the Kimberley has a heavy reliance on groundwater, the department is realigning its water information and data collection so that it can better respond to increased groundwater use.

A range of research initiatives support water resource management in the Kimberley such as the Tropical Rivers and Coastal Knowledge (TRaCK) program, those of the Commonwealth-funded National Water Commission and the Northern Australia

Water Futures Assessment. For some of this research, the department is a partner or lead agency, and provides baseline data, knowledge and local capacity to enable the research and make best use of any research outputs. The department views industry and community partnerships as fundamental to progressing our research priorities.

---

**Key message: The department views industry and community partnerships as fundamental to progressing our water research priorities. Building capacity in the community to participate in and guide research is also a priority.**

---

In the Kimberley our priorities for understanding water resources and water systems are to:

- understand changes to climate variability, land-use changes, nutrient loads, and sedimentation for priority river systems
- research water-dependent values to establish water regimes for existing ecological, social, cultural and economic values
- determine development scenarios appropriate to the Kimberley with sustainability criteria established
- investigate long-term trends for both groundwater and surface water systems and water availability scenarios
- continue investigating connectivity between surface water and groundwater resources in priority river systems
- monitor waterways health including understanding ecosystem resilience and climate variability
- map high-conservation-value aquatic ecosystems including groundwater-dependent ecosystems
- continue incorporating Indigenous knowledge into water resource management
- develop a framework for stormwater, flooding and urban water management
- model appropriate water use scenarios (watering requirements for different industries and crops).

## 5.2 Strategic objective 2

***Enable water development that is appropriate to the Kimberley***

---

*“The local people, Indigenous, agriculturalists, environmentalists appear to all support sustainable development [of water].” – Anon (NOTPA stakeholder survey 2007)*

---

## Position statements

- Development of regional economies appropriate to the Kimberley will be supported through water planning.
- Ecological, social and cultural values of waterways will be recognised when assessing new development proposals.
- New water use proposals such as large-scale dams and inter-basin movement of water will require significant assessment against sustainability criteria by whole-of-government and extensive stakeholder and community consultation.
- Regular review of the state of water resources will guide adaptive water management.
- Appropriate water efficiencies should be developed for existing and new industries in the Kimberley (such as the use of tailwater return systems) and reflected through the licensing and allocation planning processes.
- Water use in the region will be optimised for regional development opportunities through fit-for-purpose use, including recycling of water.

## Overview/explanation

Sustainable regional development of the water resource requires robust and integrated planning, based on good water information and science – recognising the water-dependent values that currently sustain people and landscapes. Sustainable development in the Kimberley is as much about building social capacity and amenity as it is about resource and industry development and natural resource management.

There has been a long continuing interest in developing northern Australia. This was the main reason for the early exploration and settlement of the region, while more recent interest has been fuelled by water scarcity in southern Australia and typified by large-scale ideas. Unlike incremental development, large-scale ideas can be difficult to plan for because of complex and integrated impact assessment, development approvals, timeframes and community input. Strategic planning and a better understanding of water resources will put the department in a strong position to deal with such ideas when they emerge in the region, and provide a framework for working through all the elements of assessment and planning.

The dominant discussion around sustainable development is about scale, appropriate economies and regional participation (Hill et al. 2006). The Kimberley currently has large-scale water resource pressure around the Ord expansion and other state development projects such as the proposed oil and gas hub on the Dampier Peninsula where moderate water use is proposed. The Department of Agriculture and Food is also investigating options for the development of horticultural precincts in the Kimberley.

A more strategic approach to horticultural development would assist with integrated land and water planning, providing a focus for resource investigation work and facilitating the entry of smaller developers to the industry. This aligns with community aspirations to have appropriate-scaled development that aims to retain and build regional benefits.

Securing water resources within the state has sometimes involved the physical transfer of water between unconnected water resources or basins. Dating back to the 1960s, numerous ideas for major inter-basin transfers of water from the Kimberley to Perth and the eastern states have been put forward. The most recent proposal resulted in an independent review commissioned by the state government. The review investigated three options to harness water from the Fitzroy and Ord rivers and transport it to Perth to alleviate southern water shortages (Appleyard et al. 2006). The review's key finding was that none of the options presented an economically viable or practical solution to water availability in Perth. It was also determined unlikely that the Fitzroy River could supply a reliable or sustainable source of water to large non-conforming projects without significant surface water storage infrastructure.

Adaptive management is a key principle that has been well-developed through Western Australia's water planning and licensing initiatives. Water allocation plans set the amount of water able to be taken for use and specify the policies that control water use licensing for the area subject to the plan. Licences provide the statutory mechanism for implementation (through the adaptive management process) of audit, amendment, and renewal.

Another aspect of sustainability includes the development and implementation of water use efficiency measures for existing and new developments. Many consumptive uses do not require water of drinking quality (potable water). The use of non-potable water in a fit-for-purpose system is an effective way to reduce pressure on high-quality freshwater resources.

To achieve the big picture of sustainable regional development, a cooperative approach to finding innovative solutions will be required from government, the community and industry. Partnerships in science and innovation between government and industry is an integral part of this approach. Increasingly industry is being expected to optimise water use, maximise sustainable extraction and invest in water management and monitoring. Successful industries will be those that develop strategic plans around their water requirements and its availability. Investing in water infrastructure, science, technology and innovation may also become part of future industry planning.

A recently released report by the Northern Australia Land and Water Taskforce <[www.nalwt.gov.au](http://www.nalwt.gov.au)> confirms that the opportunities for development in northern Australia are somewhat limited by water availability. It also found that plenty of regionally appropriate development opportunities existed for locally driven enterprise, particularly around building on the existing pastoral industry and investigating unknown groundwater resources for appropriate-scale irrigation development (Northern Australia Land and Water Taskforce 2009).

## 5.3 Strategic objective 3

### ***Match management arrangements with resource type and development pressure***

---

*“We need to know: where is the water? How is it used? How does it impact the environment and people? We need to work out how to find the balance; to set the quotas and ratios.” – Pat Dodson, Yawuru Traditional Owner (Broome Groundwater School, May 2010)*

---

#### **Position statements**

- Water resource management will be at an appropriate level to manage the level of use sustainably.
- Water allocation plans will be developed in priority areas based on reliable science, using a precautionary and risk-based approach where data is limited and are the appropriate means of managing water demand across competing users.
- Water licensing will manage water take and use.
- Water allocation plans may be developed where demand is increasing to manage consumptive use.
- Adaptive water resource management will continue to involve effective stakeholder, Indigenous and community consultation.
- Water planning in the Kimberley will continue to support existing processes through engagement and capacity building.

#### **Overview/explanation**

Water reform is supporting transformation of the administration of water licences, compliance, water resource planning, and policy development. As new legislation comes into effect, there will be a need to modify licensing systems and procedures as well as a need to raise stakeholder awareness.

Allocation plans, policies and licensing practices outline how much water is available for use from a particular water resource or management area and how it should be accessed. This management framework has and will continue to provide the key mechanism for securing water resources in the Kimberley region.

Four allocation plans have already been prepared for the Kimberley: *Derby groundwater management plan* (WAWA 1992), *Broome groundwater management plan* (WAWA 1994), *Ord River water management plan* (DoW 2006) – a technical update is in preparation – and the *La Grange groundwater allocation plan* (DoW 2010). A review of the technical information associated with the Broome and Derby groundwater areas is underway, which will lead to reviews of these older water allocation plans.

The level of detail required for each water allocation plan depends on the resource's size and its current and/or future demands. The Department of Water prioritises planning for any highly allocated and used resource that has many competing demands, as opposed to one that has low use and low competition.

Some focus areas in the Kimberley with increasing water demand include:

- Ord River (surface water)
- La Grange (groundwater)
- Dampier Peninsula (groundwater)
- Broome groundwater area (groundwater)
- Fitzroy River (surface water and groundwater)

The department has established an approach for each of these areas, based on the level of risk, to secure water resources for users and the environment. A range of management responses can be applied including allocation planning, resource investigation, developing licensing policies or putting in place a cross-agency integrated approach to management.

Water allocation plans aim to balance water demands and competing interests while sustaining water supplies and water-dependent values into the future. Input from a wide range of stakeholders is sought to assist in balancing management priorities.

## 5.4 Strategic objective 4

### ***Sustain and grow Kimberley towns and communities***

---

*“Need to understand the growth pressures and scenarios as important factors and apply them equally to land-use, water resource and conservation planning.” – Kelvin Barr, Kimberley Development Commission (Kimberley Water Forum 2008)*

---

#### **Position statements**

- Towns and communities have access to reliable, good quality and safe drinking water now and in the future.
- Progressive improvement to water services for remote communities will be pursued.
- Appropriate water sources need to be identified to support town and community growth to allow timely development.
- To ensure viable projects land planners should consider and address water issues early in the planning process.



- Town and community planning and design should incorporate water sensitive urban design, water use efficiency, recycling, floodplain management and fit-for-purpose use.

## Overview/explanation

### *Urban water management*

Maintenance of water quality will be crucial as populations increase, both in towns and remote settlements across the Kimberley. Higher population growth and demand for water quality will include not only the towns and Indigenous communities, but also remote outstations. Securing potable water supplies which service towns and remote communities, or establishing water treatment plants would secure domestic water supplies.

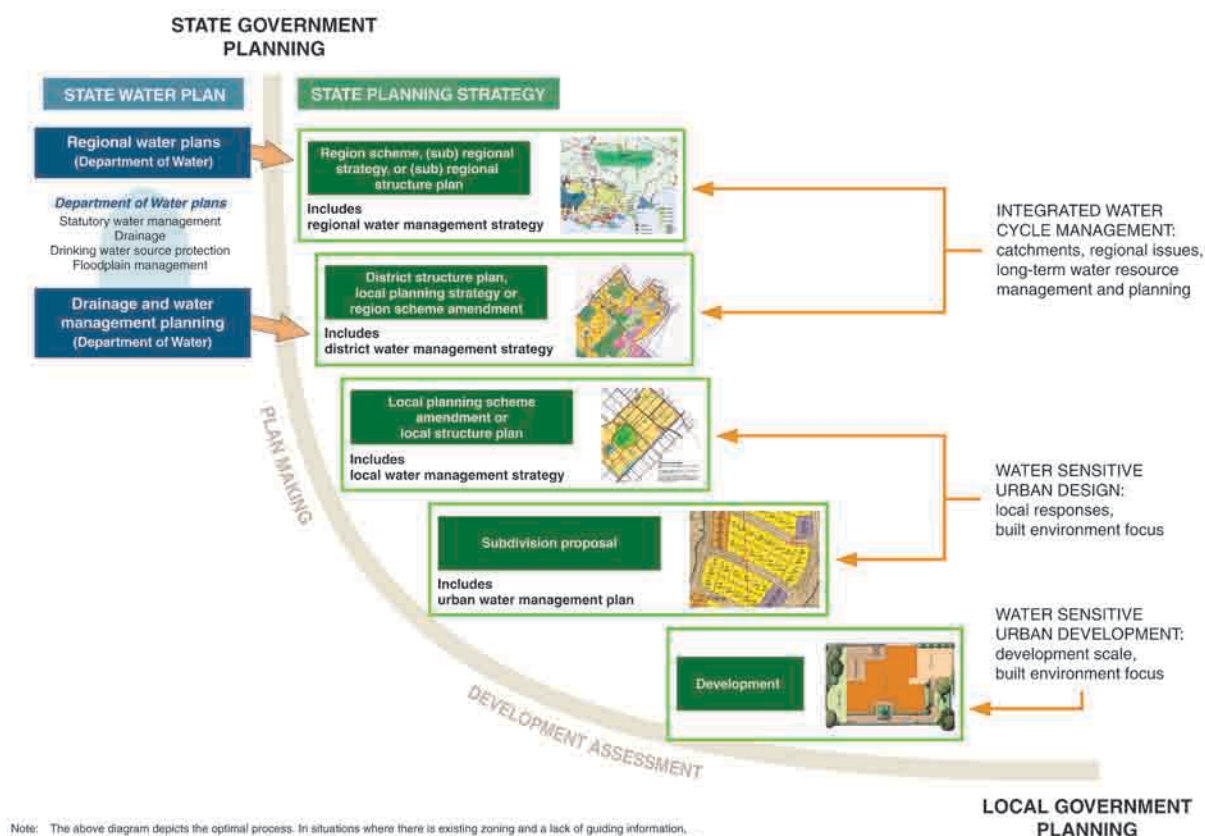
Urban development brings with it many water resource management challenges. All levels of government and water utilities are now working toward integrated total-water-cycle management. This will be the most effective way to achieve more efficient use of water and better outcomes for both the environment and urban communities.

The urban water cycle should be managed as a single system in which all urban water, such as groundwater, stormwater, wastewater, floodwater, wetlands and watercourses, are recognised as a valuable potential resource. Water use efficiency, re-use and recycling are integral components of total-water-cycle management.

*Better urban water management* (BUWM) (WAPC 2008) guides the implementation of *State planning policy no. 2.9: Water resources* (Government of Western Australia 2006)<sup>1</sup> and has been adopted as the state policy approach to integrating land and water planning and working towards water sensitive urban design (Figure 9). This approach was collaboratively developed by State and Commonwealth agencies.

---

<sup>1</sup> This policy is being reviewed in 2010.



**Figure 9** Integrated land and water planning via the proposed Better urban water management (WAPC 2008) framework.

Source: *Better urban water management* (WAPC 2008).

*Better urban water management* is designed to facilitate better management and use of water resources by ensuring the total water cycle is considered at each stage of the planning system. The document intends to assist regional, district and local land-use planning, as well as subdivision phases of the planning process. The document is to be used by all stakeholders and decision makers and has statewide application for new urban, commercial, industrial and rural-residential developments.

### *Community drinking water supply*

Provision of reliable water services is currently inconsistent across Kimberley communities. Major towns have well-established service provision for drinking and domestic water through the Water Corporation and associated reliability and quality of supply.

Growing urban development in many of the Kimberley's major towns means a commitment to securing and protecting public water supplies is crucial. Threats include activities that contaminate surface water runoff and pollutants leaking into groundwater. See Section 3.1.4 for further information on town and community domestic water supplies.

---

**Key message: The protection of drinking water sources in smaller remote communities is enhanced by various mechanisms such as the water quality protection notes (numbers 9,41 and 89) produced by the Department of Water.**

---

The Department of Planning publishes State Planning Policy 3.2: Planning for Aboriginal communities and community layout plans that include measures to protect drinking water sources.

The Western Australian Planning Commission is responsible for the Planning for Aboriginal Communities project and is guided by State Planning Policy 3.2. The community layout plans and SSP 3.2 are available at;  
[www.planning.wa.gov.au](http://www.planning.wa.gov.au)>Plans and policies>Regional planning>Planning for Aboriginal communities

### *Wastewater*

Wastewater is integral to managing the urban water cycle. Septic tanks contribute both nitrogen and phosphorus to groundwater and in some instances can fail, creating a health hazard. The connection of deep sewerage to urban areas provides the opportunity to better treat and manage this effluent through wastewater treatment plants. On average 30 per cent of reticulated water is processed through these plants, providing an opportunity for re-use where the technology and infrastructure is available. Treatment plants will continue to be upgraded to reduce nutrients entering the natural environment and to enable treatment and greater re-use of this water.

### *Water recycling and efficiency*

Treated water from wastewater treatment plants can be used for watering parks and ovals, agriculture, and urban situations via a dual reticulation system (for domestic gardens). These opportunities are explored through the *Better urban water management* planning process.

Tighter water-use efficiency requirements are being applied to new developments and water conservation and efficiency plans are being developed between the department and local governments to further improve efficiency measures.

The state government has introduced water efficiency measures across Western Australia. Many people perceive that abundant water is available in the state's north and believe that no water use restrictions or efficiencies should be in place. However, some existing constraints to reliable town water supplies in some parts of the Kimberley, such as Halls Creek, make the wise use of water as critical in this region as elsewhere. Furthermore, scheme water is treated to drinking water standards and delivered to households through maintained infrastructure. This makes it expensive to deliver, particularly for garden watering, and thus water efficiency measures are required.

Technology for water recycling and re-use is a key area for research and development in Australia given water resource constraints. There will be possible applications for water recycling in the Kimberley in the future, given the limitations on domestic supply and intermittent and inconsistent use in some small communities.

### *Floodplain management*

Many Kimberley communities are at risk of flooding at certain times of the year. The department has an established network of monitoring stations that help to provide critical flood-related data to emergency response groups in the Fitzroy catchment. It does, however, require upgrading and expanding so that a fully automated system is available for the department's information on floodplains and the Bureau of Meteorology's flood warning system. The department is committed to the regional flood emergency response plan by providing data and analysis in response to flood events. Real-time river levels are available only for the Fitzroy River. This is part of an inter-agency and Bureau of Meteorology response plan for flood events at state, regional and local levels.

### *Drainage*

Stormwater management and drainage is important for any new subdivisions, town expansions and community layout planning. Historically, the primary focus of urban drainage systems has been to reduce local flooding by channelling stormwater to waterways, wetlands or basins. It has now been clearly recognised that future drainage planning needs to have multiple objectives. As such, drainage water should be seen as a valuable resource and part of the urban water cycle. While flood protection remains a primary focus, consideration must also be given to the impacts of drainage on wetlands, groundwater systems, groundwater-dependent ecosystems and receiving waterbodies, while providing liveable and appropriate communities.

The *Stormwater management manual for Western Australia* guides the implementation of best-practice urban stormwater management and water sensitive urban design (DoW 2004–07). However, stormwater management in Kimberley towns is particularly challenging during wet season storms with very large volumes to control in very limited time. The nature of stormwater in the region (eg. large volumes, large sediment loads) challenges most planning and requires very specific infrastructure designed to handle it. Better stormwater management guidelines are required for this region.

## 5.5 Strategic objective 5

### ***Protect the region's water-dependent values***

---

***"That water bring you feed... and medicine."*** – Anon (NOTPA stakeholder survey 2007)

---

## Position statements

- The health of the region's water-dependent ecosystems and natural ecological processes should be maintained.
- To maintain water-dependent values, the limits (thresholds) of acceptable change should be identified and maintained through appropriate flow regimes.
- Given mixed land ownership, land use and development pressures, the department will undertake a collaborative approach to waterways management.
- Catchment groups, the community and stakeholders are essential for on-ground action to support waterways management.
- Non-exploitive values such as Indigenous heritage and cultural tourism are important sources of economic growth and diversity.

## Overview/explanation

The Kimberley has internationally recognised natural and cultural values that are particularly significant to Aboriginal people and important to the broader regional and Australian community. Water and land use affect the health, function and value of these natural assets, some of which are well studied and some that are not. The impact of use can be almost immediate or long- term (in some cases taking many decades to manifest).

Most water resource assets in the Kimberley are pristine, or in a reasonable state of health, and support a broad diversity of ecological, social, economic and cultural values. A focus on good planning and management prevents the erosion of these values, and negates the need for costly recovery and restoration work.

---

**Key message: Remoteness of water-dependent ecosystems does not necessarily mean they are in a pristine state..**

---

Much of the discussion about water-dependent values is prefaced by the need to maintain natural (or near-to-natural) flow regimes to support existing social, cultural and ecological values. Tropical river systems have naturally high variability in flow regimes and predictions about the changing climate suggest greater variability in the Kimberley region in the future. More research into critical thresholds and the resilience of systems to flow variability is required to understand the limits of acceptable water use.

Discussion around this issue has largely been generated by intermittent ideas over the years for more large-scale dams in the Kimberley. The Fitzroy River has been the subject of many of these concepts and there has been an equally enthusiastic Kimberley community response against these proposals, supported by economic feasibility studies that question their viability. Suggestions for more large-scale dams will inevitably provoke opposition from community groups and key stakeholders.

There are also relatively few opportunities for the siting of more large-scale dams in the Kimberley. Water and land planning and licensing are the main mechanisms for protecting social, cultural, and ecological water-dependent values. Research into ecological and cultural values is becoming more readily available for targeted areas in the Kimberley and this greatly assists in water planning. Through licensing and allocation planning, the department seeks all available knowledge, and often commissions further research on water-dependent values to inform decisions about water use.

The focus of economic development has tended to be confined to the exploitive values of pastoral diversification, horticulture and resource development, however, non-exploitive values such as Indigenous heritage and cultural tourism are important sources of economic growth and diversity.

## 5.6 Strategic objective 6

### ***Engage regional people in management of regional water resources***

---

*“Water planning means training young people.” – Yiriman (Kimberley Water Forum 2008)*

---

#### **Position statements**

- Provision of appropriate information to water users and the wider community should support and educate the community about water issues affecting them and provide a sound platform for community engagement and discussion.
- Knowledge and action by regional people is a valuable contribution to water resource management.
- The Kimberley community will be engaged in water management.
- Effective participation in water management requires strong community capacity underpinned by good knowledge and education.
- Good community relationships will be fostered to provide opportunities to resolve issues through advice, negotiation and recommendations on policy, planning and conflict resolution matters.
- Water users and the wider community will understand how they can participate in water management.
- Water resource management is reliant on strong partnerships to achieve sustainable outcomes.
- The role of the department in providing access to appropriate information which informs and educates the Kimberley community will raise awareness of the water issues in the Kimberley and inform future decisions.

## Overview/explanation

The Department of Water is committed to improving engagement with the Kimberley community in all aspects of water resource management. The future in water resource management presents many challenges associated not only with water resource condition, but also with community expectations and demands. Communities, industry groups, key stakeholder groups and individuals are very keen to be involved in water resource management and planning. Ensuring that participants have the opportunity to exchange views promotes debate and encourages participation.

Typically this involvement is in response to resolving both local and regional issues. Knowledge of the statutory framework and community access to relevant information is fundamental to effective water resource management but is very limited in the Kimberley. The future of environmental and water resource management is driving water reforms and the department will continue to ensure the community and stakeholders are engaged in these processes and kept well-informed.

Participation of stakeholders in the identification of cultural, environmental and social values of water resources will be important to future planning. Wide stakeholder engagement will be essential to ensure that the views of the wider community are adequately represented.

The Kimberley has a relatively small and dispersed population, most of which is categorised as 'very remote' (Larson & Alexandridis 2009). In addition to the permanent Aboriginal population, many of whom speak English as a second language, there is a relatively young (by national standards) and mobile non-Aboriginal population. Basic infrastructure such as good-condition roads and communications (i.e. access to internet) is limited.

These characteristics present many challenges to the capacity for meaningful engagement. This means that building on, supporting, integrating and acknowledging existing projects and processes is important – and is an approach the Department of Water has developed for our work in the Kimberley.

Accessing the region's range of people has required us to respond to regional opportunities and fit in with forums such as Land Conservation District Committee meetings, Native Title processes, irrigator networks, catchment groups, ranger activities, broader natural resource management forums, and existing planning processes such as Department of Planning strategies, Indigenous Protected Areas planning and cross-jurisdictional processes (across northern Australia).

People need information about how best to look after water resources, and also to understand why water management processes exist (such as licensing and allocation planning). The department works to align programs wherever possible internally and externally to support building a common understanding of water resource management.

Community feedback during discussions about resource management in the Kimberley highlights the inter-relatedness of cultural, ecological, social and economic drivers for Kimberley people, and the need for education around these factors.

Clearly, engagement in water planning and management requires education and better information. A successful pilot waterways education program is being delivered to community groups to provide education, training and employment opportunities. The process also provides a meaningful mechanism for engagement in water planning, research and regional water partnerships.

Growing interest in Kimberley water resources saw the formation of a partnership between five key regional organisations in early 2008: the Department of Water, Kimberley Land Council, Environs Kimberley, the Department of Agriculture and Food and Tropical Rivers and Coastal Knowledge (TRaCK), which in March 2008 held a Kimberley Water Forum to share information among regional people. This forum marked formal initiation of the regional planning process and provided a strong foundation for community partnership, engagement and ongoing communication.



## 6 Strategies and actions to achieve the shared vision

---

*“Action without planning is a nightmare. Planning without action is a daydream.”*

– Jack Burton, pastoralist (Kimberley Water Forum 2008)

---

The following table outlines strategic actions, recognised by the Department of Water, to support the stated objectives. These actions focus on areas where the most significant gains can be made during the next five years. They are included to provide focus and direction for meeting our strategic objectives in water management. There is a strong emphasis on forming alliances and partnerships with other agencies, industry, Aboriginal groups, water service providers, local government and other interested and affected parties to support joint actions. As such, some of the actions may be facilitated by agencies other than the department.

All of the actions relate to the Kimberley region, and provide a broader strategic approach to water resource management activities. Actions have been grouped under the six strategic objectives described in the previous section. Each objective has a desired outcome, and lists the strategies and actions to achieve the desired outcome. The timing of actions that rely on new water legislation being enacted may have to be adjusted depending on the enactment date.

The timing of the actions is grouped under: short term (S) – up to two years; medium term (M) – two to five years; long term (L) – more than five years. The starting point is 2011. It needs to be noted that many of the actions are already being implemented and will be ongoing in nature. Some will be implemented on an ‘as needed’ basis.

Additional support and funding will be required to achieve full implementation of many of the actions. While the department has not undertaken detailed costing for each action, actions will be integrated (where appropriate) into the department’s annual business planning cycle with most actions funded under existing programs. Any unfunded or partly funded actions will be subject to specific funding proposals as part of the department’s normal business planning cycle.

## Strategic objective 1: *Understand Kimberley water resources and water systems*

**Desired outcome:** Sound adaptive management decision making

### Strategies and actions to achieve the desired outcome

Strategy no.	Strategy	Action no.	Actions	Timing
1.1	<b>Increase scientific understanding of water resources and systems</b>	1.1.1	Prioritise the Kimberley's resource investigation needs through environmental scanning, and analysis of demand projection and risk	S
		1.1.2	Carry out an analysis of knowledge needs in the Kimberley to better guide external and internal research	S
		1.1.3	Seek to fill the knowledge gaps identified in 1.1.2 through community, research, and industry partnerships	M
		1.1.4	Identify potential development areas where surface water and groundwater resources are connected and investigate: <ul style="list-style-type: none"> <li>• processes by which the interactions occur</li> <li>• flow relationships to better characterise systems</li> <li>• aquatic ecology dependencies</li> <li>• groundwater-dependent ecosystems</li> <li>• effects on water quality</li> </ul>	M
		1.1.5	Collate all available forms of groundwater and surface water resource data, and make them available for future resource assessment via the department's Water Information database, including: <ul style="list-style-type: none"> <li>• departmental surface water network</li> <li>• licence audit information</li> <li>• hydrogeological reports</li> <li>• regional bore-logs</li> </ul>	S

		1.1.6	Review water information knowledge in the region (groundwater monitoring network and surface water gauging network) to realign collection of water information with priority needs and areas of increasing water demand/use.	M
		1.1.7	Seek funding to investigate groundwater resources in priority areas of the Kimberley such as the Dampier Peninsula	S
		1.1.8	Engage actively and strategically with external research initiatives such as Tropical Rivers and Coastal Knowledge, Northern Australia Water Futures Assessment and the National Water Commission to drive research priorities	S
		1.1.9	Support further research into ecological and cultural values for baseline information to determine environmental water provisions	As needed
1.2	<b>Understand threats and impacts on water resources</b>	1.2.1	Develop a targeted investigation and monitoring framework to understand threats to and impacts on priority water resource systems, covering: <ul style="list-style-type: none"> <li>• water use</li> <li>• land use – working closely with Department of Planning (DoP)</li> <li>• water re-use and recycling</li> </ul>	S
		1.2.2	Improve public access to water resource monitoring data and knowledge, in a user-friendly manner	S
1.3	<b>Understand urban and industry water resource demand and use</b>	1.3.1	Develop an investigation and monitoring program to better understand priority surface water and groundwater allocation areas to help manage closer to allocation limits	S

	1.3.2	Identify trends in urban and industry water use and growth areas to help establish priorities for developing water allocation plans	M
	1.3.3	Work with WAPC and DoP to identify water requirements for their land and housing supply issues for Broome, Derby, Kununurra, Fitzroy Crossing and Halls Creek.	Ongoing

## **Strategic objective 2: *Enable water development that is appropriate to the Kimberley***

**Desired outcome:** Government, industry and the community accept that managing water resources is fundamental to regional development within the context of a sustainable water future.

### **Strategies and actions to achieve the desired outcome**

Strategy no.	Strategy	Action no.	Actions	Timing
2.1	<b>Be involved in strategic regional planning</b>	2.1.1	Progress strategic development of the Ord expansion through the Ord Working Group and legislative processes and adapt management to new knowledge and best practice	M
		2.1.2	Use findings from a range of studies (Northern Australia Water Futures Assessment, Northern Australia Irrigation Futures, Northern Land and Water Taskforce, Tropical Rivers and Coastal Knowledge etc.) to consider principles for appropriate and sustainable regional development	S
2.2	<b>Encourage water sensitive industries</b>	2.2.1	Align agriculture and water resource management focusing on current and future water needs and quality management to address: <ul style="list-style-type: none"> <li>land-use zoning</li> <li>horticultural precinct</li> </ul>	M

		planning <ul style="list-style-type: none"> <li>• irrigated agriculture</li> <li>• plantation forestry</li> <li>• industry best practice and standards</li> <li>• pastoral diversification</li> </ul>	
		2.2.2 Actively contribute to aligning developments of the Ord expansion with the water resource management framework already developed for the Ord by: <ul style="list-style-type: none"> <li>• working with the new service provider</li> <li>• advising the Community Reference Panel and the Department of Regional Development and Lands on water resource management expectations</li> </ul>	M
		2.2.3 Assess the water resource impacts associated with the oil and gas development on the Dampier Peninsula to ensure they are managed appropriately	M
		2.2.4 In partnership with industry, investigate options for use of non-potable water in fit-for-purpose systems and where drinking quality water is not required	As needed
		2.2.5 Consider smaller-scale water transfers within the region when social benefits are clearly demonstrated and sustainability outcomes assured	As needed
2.3	<b>Progress the integration of land and water planning at regional and local levels of government</b>	2.3.1 Strengthen working partnerships with the DoP, DSD, DAFWA, DRDL and local government to integrate land-use planning and water resource planning addressing: <ul style="list-style-type: none"> <li>• rural and urban areas</li> <li>• state, regional and local development needs</li> </ul>	M

		2.3.2	Integrate land and water planning through: <ul style="list-style-type: none"> <li>• NRM partnerships</li> <li>• regional planning activities</li> <li>• regulatory processes</li> </ul>	M
		2.3.3	Work with DAFWA to guide the development of horticultural precincts so water resource development is sustainable	M
		2.3.4	Work with agencies (e.g. DAFWA, Pastoral Lands Board) and pastoralists to improve the pastoral diversification process and ensure water use and aquatic ecosystem health is considered early in project development.	S
2.4	<b>Strengthen integrated sustainability criteria for water resource development</b>	2.4.1	In consultation with industry, community and agencies, develop sustainability criteria (including a risk analysis) and a framework for assessing large non-conforming development proposals	As needed
		2.4.2	Work with industry and agencies to establish best-practice water use (including efficiency, quality and nutrient impacts) for emerging industries	S

### **Strategic objective 3: *Match management arrangements with resource type and development pressure***

**Desired outcome:** Greater scope for business planning and management activities.

#### **Strategies and actions to achieve the desired outcome**

Strategy no.	Strategy	Action no.	Actions	Timing
3.1	<b>Base water allocation on sound science and latest information</b>	3.1.1	Implement water allocation plans for: <ul style="list-style-type: none"> <li>• <i>La Grange groundwater allocation plan (2010)</i></li> <li>• <i>Ord River water management plan (2010 – in prep.)</i></li> </ul>	M M

		3.1.2	Undertake a review of the: <ul style="list-style-type: none"> <li>• <i>Broome groundwater management plan</i> (1994)</li> <li>• <i>Derby groundwater management plan</i> (1992)</li> </ul>	S S
		3.1.3	Develop, update and implement water allocation plans for emerging priority areas, depending on demand pressure: <ul style="list-style-type: none"> <li>• Dampier Peninsula</li> <li>• Fitzroy River</li> </ul>	S M
3.2	<b>Account for environmental requirements</b>	3.2.1	Determine water needs for surface water and groundwater-dependent systems to facilitate scientifically based decision-making in the priority areas of: <ul style="list-style-type: none"> <li>• coastal wetlands and groundwater-dependent wetlands and springs along the West Kimberley coast (La Grange and Dampier Peninsula)</li> <li>• ecosystem processes that sustain the water-dependent values of the Fitzroy River</li> </ul>	M
		3.2.2	Determine ecological water requirements for other high-risk water systems on a priority basis	As needed
		3.2.3	Manage ecological water requirements for established systems such as the Ord River	Ongoing
3.3	<b>Strengthen adaptive management (through licensing and planning)</b>	3.3.1	Assess and manage the water management implications of the Ord expansion in line with the current <i>Ord River water management plan</i> (2006)	Ongoing
		3.3.2	Develop and establish licence conditions which: <ul style="list-style-type: none"> <li>• demonstrate efficient water use practices</li> <li>• protect water-dependent values</li> <li>• protect other water users</li> </ul>	S

		3.3.3	Scope a process to proclaim all surface water catchments in the Kimberley to allow for better regulation and management of surface water use	S
		3.3.4	Strengthen the incorporation of surface water and groundwater evaluation and monitoring programs into water use decision-making	S
3.5	<b>Streamline licensing practices</b>	3.5.1	Keep licensing, assessment and compliance practices up-to-date with legislative requirements, plans and policies	S
		3.5.2	Maintain a risk-based approach to licence assessment (based on complexity, scale of use and risk to the resource)	Ongoing
3.6	<b>Develop a policy on Indigenous access to water for commercial use</b>	3.6.1	Define Indigenous access to water for commercial and non-commercial purposes through policy that reflects water legislation reform and input from Aboriginal stakeholders	S

#### **Strategic objective 4: *Sustain and grow Kimberley towns and communities***

**Desired outcome:** Government and water utilities take an integrated approach to water service management and delivery for strong and healthy communities.

#### **Strategies and actions to achieve the desired outcome**

Strategy no.	Strategy	Action no.	Actions	Timing
4.1	<b>Drive improvement of water services and source protection in remote communities</b>	4.1.1	Work with the state Aboriginal Affairs Coordinating Committee and state agency partners to progress COAG commitments to 'close the gap' in water and wastewater service delivery to Indigenous communities	S



		4.1.2	Support the state's water reform agenda through the development of policy and service standards for the delivery of water services to remote communities	S
		4.1.3	Conduct an audit of water service providers in remote communities and determine suitable policy directives for both allocation and water service supply licensing	S
		4.1.4	Work with state agency partners to expand the existing program of developing drinking water source protection plans for remote Indigenous communities, to ensure protection of drinking water supplies and guide new land or infrastructure development	S
		4.1.5	Encourage further research and innovative solutions for the development of appropriate technology for self-supplied community water systems	ongoing
4.2	<b>Protect and develop drinking water sources</b>	4.2.1	Implement water source protection plans for Broome, Camballin, Derby, Fitzroy Crossing, Halls Creek, Kununurra and Wyndham – Moochalabra Dam	S
		4.2.2	Work with a range of stakeholders to assist with protecting drinking water source areas, through planning and compliance	Ongoing
		4.2.3	Develop five-year plans for supply of domestic water to the towns of Halls Creek and Broome	M
		4.2.4	Develop 20-year plans for supply of drinking water to Broome, Wyndham, Derby and Kununurra	M
		4.2.5	Publish contingency plans for towns where there is a risk of supply not meeting demand, in partnership with the Water Corporation	As needed

		4.2.6 Drive best-management practice in drinking water source protection areas where there are mixed land uses	Ongoing
4.3	<b>Manage flood risk</b>	4.3.1 Undertake a review of where floodplain mapping is required and schedule floodplain mapping for priority areas.	S
		4.3.2 Department of Water to make data and information available to support the development and implementation of a flood response plan for the region, which will : <ul style="list-style-type: none"> <li>investigate the data/information needed to support flood warning systems should they be required</li> <li>assess requirements for flood monitoring systems for remote communities (such as Oombulgurri and Kalumburu)</li> <li>provide advice on how existing arrangements for flood response may be improved</li> </ul>	M
		4.3.3 Maintain the surface water gauging network in the Fitzroy catchment to support the current flood warning service	Ongoing
4.4	<b>Realise the potential of wastewater</b>	4.4.1 Promote urban wastewater treatment (possible re-use) to better manage water quality, health and re-use options in the priority areas of: <ul style="list-style-type: none"> <li>Broome</li> <li>Kununurra</li> </ul>	Ongoing
4.5	<b>Encourage water sensitive communities</b>	4.5.1 Develop supporting advice to implement water sensitive urban design principles pertinent to the Kimberly	S
		5.4.2 Review the <i>Stormwater management manual for Western Australia</i> to address high flow, high sediment systems typical of Kimberly towns	S

	4.5.2	Require proponents of land planning proposals to submit water sensitive urban design elements as part of their water management strategies/plans required by <i>Better urban water management</i> (WAPC 2008)	as needed
--	-------	---	-----------

### Strategic objective 5: *Protect the region's water-dependent values*

**Desired outcome:** The broad diversity of environmental, social, and cultural values are supported.

#### Strategies and actions to achieve the desired outcome

Strategy no.	Strategy	Action no.	Actions	Timing
5.1	<b>Assess and maintain water resource health and values</b>	5.1.1	Strengthen existing frameworks for assessing environmental, social and cultural values of water resources covering: <ul style="list-style-type: none"> <li>• environmental water needs</li> <li>• groundwater-dependent systems</li> <li>• waterway and wetland values and threats</li> <li>• biodiversity assets</li> <li>• Indigenous values</li> </ul>	Ongoing
		5.1.2	Develop an integrated water quality management plan for the Ord River	S
5.2	<b>Identify water-dependent values in the region</b>	5.2.1	Work with the Northern Australia Water Futures Assessment process to identify and drive research into ecological and cultural assets	M
		5.2.2	Partner with Tropical Rivers and Coastal Knowledge and other research initiatives to guide external research priorities	M
		5.2.3	Work with community groups to identify water-dependent values in the region	Ongoing

		5.2.4	Pursue research opportunities to gain a better understanding of groundwater-dependent ecosystems in the region	Ongoing
		5.2.5	Develop integrated strategies to recognise and protect high-environmental-value waterways	Ongoing
5.3	<b>Develop collaborative waterway management arrangements</b>	5.3.1	Work in partnership to achieve waterway management outcomes, with groups such as: <ul style="list-style-type: none"> <li>• landholders</li> <li>• irrigators and farmers</li> <li>• Traditional Owners</li> <li>• local government authorities</li> <li>• other agencies (Department of Environment and Conservation, Department of Fisheries, Department of Agriculture and Food)</li> <li>• tourism operators</li> </ul>	Ongoing
		5.3.2	Set management objectives for priority waterways and other dependent ecosystems	As needed

### **Strategic objective 6: *Engage regional people in management of regional water resources***

**Desired outcome:** Best water resource management practice through open exchange of information, knowledge and working in partnership with stakeholders and the wider community.

#### **Strategies and actions to achieve the desired outcome**

Strategy no.	Strategy	Action no.	Actions	Timing
6.1	<b>Effectively involve and educate the community</b>	6.1.1	Maintain a flexible framework for community involvement to facilitate: <ul style="list-style-type: none"> <li>• input into water reform</li> <li>• partnership waterways projects</li> <li>• ongoing implementation of plans</li> <li>• input to licensing decisions</li> </ul>	Ongoing

		<ul style="list-style-type: none"> <li>regional participation in Department of Water business</li> </ul>	
		6.1.2 Instigate communication plans that will enhance the exchange of information and foster shared initiatives with the community	As needed
		6.1.3 Develop project-based communication strategies and ongoing regional communication (i.e. Kimberley E-Bulletin)	Ongoing
		6.1.4 Develop simple information brochures outlining legislative licensing requirements to raise community understanding (ensure educational materials are translated and presented appropriately for Aboriginal people)	S
		6.1.5 Develop educational materials for waterway management in partnership (e.g. Kimberley Land Council, Tourism WA, Department of Environment and Conservation)	M
		6.1.6 Seek funding for the continuation of the successful Waterways Education program jointly developed by the Department of Water and the University of Western Australia	S
		6.1.7 Provide forums for the exchange of ideas and issues relating to water allocation and management	Ongoing
6.2	<b>Implement the Kimberley regional water plan</b>	6.2.1 Liaise with lead agencies and key stakeholders regarding implementation of the <i>Kimberley regional water plan</i>	S
		6.2.2 Disseminate annual report card on the status of actions in the <i>Kimberley regional water plan</i> to community and stakeholders	Annually
		6.2.3 Undertake a review of actions in the <i>Kimberley regional water plan</i> by 2015	2015

6.3	<b>Successfully involve the Indigenous community</b>	6.3.1	Develop partnerships with Aboriginal groups and organisations to incorporate traditional knowledge into water resource management	Ongoing
		6.3.2	Continue discussions with Aboriginal people and groups about their aspirations for water, through existing groups (e.g. Kimberley Land Council, Indigenous Water Policy Group)	Ongoing
		6.3.3	Pursue an increase in Aboriginal employment in water resource management, planning and policy development	Ongoing
6.4	<b>Undertake strategic involvement in natural resource management (NRM)</b>	6.4.1	Engage with regional stakeholders to ensure the strategic delivery of NRM in the region and on-ground delivery in the priority areas of: <ul style="list-style-type: none"> <li>• waterways health</li> <li>• ecological water requirements</li> </ul>	Ongoing
		6.4.2	Provide extension activities for catchment groups and the broader community to improve understanding of waterways management and evolving best management practice options	Ongoing
		6.4.3	Support integrated catchment management planning for the Fitzroy catchment to guide land-use activity with appropriate capacity development and training, to lead to more detailed water planning	M
6.5	<b>Encourage and develop partnerships for effective water resource management</b>	6.5.1	Establish protocols for partnership arrangements with stakeholder groups	As needed

	6.5.2	Investigate and support links between catchment groups and water resource management groups to achieve a more efficient service and a more effective outcome for both businesses	Ongoing
	6.5.3	Continue to work with industry to provide a pathway for the department to align industry best practice with water licensing conditions	Ongoing
	6.5.4	Work in partnership with traditional owners and other regional partners (tourism and pastoral) to assess, monitor and protect waterways	Ongoing
6.6		<b>Build capacity, at an inter-agency level, to better facilitate stakeholder engagement</b>	
	6.6.1	Explore and develop strategic alliances with other government agencies such as the Department of Agriculture and Food, Department of Environment and Conservation and Department of Planning, to clarify the relationship between the agencies and enhance program synergies and stakeholder engagement	Ongoing

## 7 Delivering the regional water plan

The *Kimberley regional water plan* has been developed with input from the Kimberly community with a view to setting the long-term strategic direction for water management. It provides a strategic vision to 2030 and an action plan to guide water management and planning in the Kimberley.

Implementation of the Plan is an ongoing process in which strategies and actions are modified over time to reflect lessons learned from experience and changes in resource conditions, knowledge, climate, technologies and community values. The implementation phase will include monitoring the status of the Plan's actions, as well as its effectiveness in meeting its objectives.

Given the Kimberley is experiencing significant growth and ongoing interest in the development of its water resources, this Plan's actions will be reviewed in 2015, with a full review to be undertaken in 2020. The review process will be repeated in 2025 and 2030 respectively.

Completed actions will be acknowledged and removed, uncompleted actions will be continued and new actions may be added at each review point. This will maintain a rolling five-year analysis of the success or otherwise of the Plan for water resource management in the Kimberley.

The full reviews in 2020 and 2030 will also ensure the Plan's objectives remain relevant to the region as environmental and social conditions change, communities grow and our scientific understanding of the whole water system improves.

The Department of Water will coordinate the actions but some actions go beyond the department's immediate responsibility and the plan outlines an integrated, cross-organisational approach to water resource management.

The department will manage the Plan's implementation by:

- engaging in ongoing consultation and partnerships with lead agencies and key stakeholders regarding implementation of the actions and their periodic review
- preparing and disseminating within the community, an annual report card on the status of actions (the first report card will be available on the department's website 12 months after the final plan is released)
- managing public reviews of the Plan.

The Department of Water encourages all key stakeholders and the wider community to actively participate in the implementation and review of the *Kimberley regional water plan*.



# Appendices

## Appendix A – Invitation to make a submission

The department welcomes any comments you may wish to make on any aspect of the plan and supporting detail. To ensure your comments or submissions are fully considered, please indicate which report you are referring to:

- *Kimberley regional water plan: **Strategic directions and actions 2010–2030***
- or
- *Kimberley regional water plan: **Supporting detail***

This template is provided to simplify and help you present your submission to the plan. It is available electronically on our website at [www.water.wa.gov.au](http://www.water.wa.gov.au)

### Confidentiality

If you wish your response to remain confidential, clearly print on the top of each page of your submission the word '**confidential**'. This will ensure your name and details are not disclosed. Requests for access to original submission will be determined in accordance with the *Western Australian Freedom of Information Act 1992*.

All submissions will be considered in the preparation of the final plan and a *Statement of response* will accompany the final plan, identifying all the key and pertinent issues raised.

Please enter your comments, where applicable, in the boxes below. Attach additional information as you feel appropriate.

After you have entered your comments, save this file in Word format and email it to the Department of Water at [kimberleyregionalplan@water.wa.gov.au](mailto:kimberleyregionalplan@water.wa.gov.au) or send it to the address below:

**Project leader: Kimberley regional water plan**  
**Department of Water**  
**PO Box 625 Kununurra WA 6743**

Please submit comments by 5pm, 28 February 2011.

Your details		
Title:	Name:	
Position:	Organisation:	
Postal address:		
Suburb:	State:	Postcode:
Telephone:	Email address:	

Kimberley regional water plan – Strategic directions and action 2010-2030 comments
<b>1 Introduction</b>
<b>2 Background</b>
<b>3 Water use</b>
3.1 Existing water use
3.1.1 Irrigated agriculture
3.1.2 Pastoral water use
3.1.3 Mining and industry
3.1.4 Town and community domestic water supplies
3.1.5 Social and recreational uses
<b>4 Future trends</b>
4.1 Growth in water demand

4.1.1 Pastoral diversification
4.1.2 Mining and mineral processing
4.1.3 Industry and petroleum development
4.1.4 Domestic water supply
4.1.5 Aboriginal aspirations for commercial water use
4.2 Water demand v's water availability
4.3 Threats to water resources
4.4 Community-identified water management issues
<b>5 Strategic Objectives</b>
5.1 Strategic objective 1: Understanding Kimberley water resources and water systems
5.2 Strategic objective 2: Enable water development that is appropriate to the Kimberley
5.3 Strategic objective 3: Management arrangements to match resource type and pressure

5.4 Strategic objective 4: Sustainable and growing Kimberley towns and communities

5.5 Strategic objective 5: Protect the region's dependent values

5.6 Strategic objective 6: Regional people are engaged in management of regional water resources

## **6 Strategic and actions to achieve the shared vision**

Strategic objective 1: Strategic and actions (Please refer to Action number)

Strategic objective 2: Strategic and actions (Please refer to Action number)

Strategic objective 3: Strategic and actions (Please refer to Action number)

Strategic objective 4: Strategic and actions (Please refer to Action number)

Strategic objective 5: Strategic and actions (Please refer to Action number)

Strategic objective 6: Strategic and actions (Please refer to Action number)

## **7 Delivering the regional water plan**

## General comments

### Kimberley regional water plan – Supporting detail comments

#### 1 Introduction

#### 2 Water planning in the Kimberley

#### 3 Process and community involvement

#### 4 Subregional approach and overview

##### 4.1 Ord subregion: overview and future directions

##### 4.2 North Kimberley: overview and future directions

##### 4.3 La Grange: overview and future directions

##### 4.4 Fitzroy: overview and future directions

##### 4.5 Desert: overview and future directions

##### 4.6 Dampier: overview and future directions

General comments

## Glossary

<b>abstraction</b>	The permanent or temporary withdrawal of water from any source of supply, so that it is no longer part of the resources of the locality.
<b>agroforestry</b>	An approach that uses the interactive benefits of combining trees and shrubs with crops and/or livestock. It uses agricultural and forestry technologies to create more diverse, productive, profitable, healthy and sustainable land-use systems.
<b>allocation limits</b>	The amount of water set aside for annual licensed use. Each water resource (aquifer) within a subarea has a set allocation limit and will be amended over time to reflect significant measurement outcomes and sustainability determinations.
<b>aquifer</b>	A geological formation or group of formations that is able to receive, store and transmit significant quantities of groundwater.
<b>bore</b>	A narrow, normally vertical hole drilled in soil or rock to measure water levels and quality or withdraw groundwater from an aquifer.
<b>chia</b>	A species of flowering plant ( <i>Salvia hispanica</i> ) in the mint family, native to central and southern Mexico and Guatemala. Chia is grown commercially for its seed, a food that is very rich in omega-3 fatty acids.
<b>discharge</b>	Water that moves from groundwater to the ground surface or above, such as a spring. This includes water that seeps onto the ground surface, evaporation from unsaturated soil and water extracted from groundwater by plants (evapotranspiration) or engineering works (groundwater pumping).
<b>ecological water requirement</b>	The water regime needed to maintain ecological values of water-dependent ecosystems at a low level of risk. Usually abbreviated to 'EWR'.
<b>environmental water provision</b>	The water regimes that are provided when the water allocation decision-making process takes into account ecological, social, cultural and economic impacts. They may meet the ecological water requirements in part or in full. Usually abbreviated to 'EWP'.
<b>groundwater</b>	Water that occupies the pores and crevices of rock or soil beneath the land surface and below the watertable.
<b>groundwater area</b>	The boundaries that are proclaimed under the <i>Rights in Water and Irrigation Act 1914</i> (WA) and used for water allocation planning and management.
<b>groundwater-dependent ecosystem</b>	An ecosystem that is dependent on groundwater for its existence and health. Usually abbreviated as 'GDE'.
<b>hydrographic</b>	The measurement, description and mapping of surface waters.

<b>licence</b>	A formal permit that entitles the licence holder to ‘take’ water from a watercourse, wetland or underground source.
<b>Ramsar</b>	The Convention on Wetlands (signed in 1971 in Ramsar, Iran) is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.
<b>recharge</b>	Water that infiltrates through the soil to the watertable to replenish an aquifer.
<b>refugia</b>	A protected habitat that protects fauna from environmental forces.
<b>salinity</b>	The measure of total soluble salt or mineral constituents in water. Water resources are classified based on salinity in terms of total dissolved salts (TDS) or total soluble salts (TSS). Measurements are usually in milligrams per litre (mg/L) or parts per thousand (ppt).
<b>salinisation</b>	Excessive salt concentration in soil and water, such as the discharge of saline groundwater on the soil surface.
<b>stygofauna</b>	Any fauna that live within groundwater systems, such as caves and aquifers; or more specifically small, aquatic groundwater invertebrates, though terrestrial air-breathing subterranean animals are also sometimes included. Stygofauna can live within freshwater aquifers and within the pore spaces of limestone, calcrete or laterite, but are also found in marine caves and wells along coasts.
<b>subarea</b>	A subdivision within a surface water or groundwater area, defined for the purpose of managing the allocation of water resources. Subareas are not proclaimed and can therefore be changed internally without being gazetted.
<b>sustainability</b>	Meeting the needs of current and future generations through integration of environmental protection, social advancement and economic prosperity.
<b>throughflow</b>	Water that flows generally below the soil surface or gravels in a dry creek bed.
<b>water efficiency</b>	The minimisation of water use through adoption of best management practices.
<b>water entitlement</b>	The quantity of water that a person is entitled to take on an annual basis in accordance with the <i>Rights in Water and Irrigation Act 1914</i> (WA) or a licence.
<b>wetland</b>	Areas permanently, seasonally or intermittently waterlogged or inundated with water by natural means that may be fresh, saline, flowing or static, including areas of marine water (the depth of which at low tide does not exceed 6 m).



## Shortened forms

CME	Chamber of Minerals and Energy of Western Australia
COAG	Council of Australian Governments
DAFWA	Department of Agriculture and Food Western Australia
DEC	Department of Environment and Conservation
DEWHA	Department of Environment, Water, Heritage and the Arts
DoP	Department of Planning
DoW	Department of Water
DRDL	Department of Regional Development and lands
DSD	Department of State Development
EPA	Environment Protection Authority
IWPG	Indigenous Water Policy Group
KDA	Kimberley Development Commission
KLC	Kimberley Land Council
NAILSMA	Northern Australia Indigenous Land and Sea Management Alliance
NAWFA	Northern Australia Water Futures Assessment
NOTPA	New Opportunities for Tropical and Pastoral Agriculture
NRM	Natural Resource Management
NWC	National Water Commission
NWI	National Water Initiative
ORIA	Ord River Irrigation Area
PLB	Pastoral Land Board
TRaCK	Tropical Rivers and Coastal Knowledge
RAESP	Remote Areas Essential Service Program
WAPC	Western Australian Planning Commission
WAWA	former Water Authority of Western Australia

## Volumes of water

One litre	1 litre	1 litre	(L)
One thousand litres	1000 litres	1 kilolitre	(kL)
One million litres	1 000 000 litres	1 Megalitre	(ML)
One billion litres	1 000 000 000 litres	1 Gigalitre	(GL)

## References

- Appleyard et al. 2006, *Options for bringing water to Perth from the Kimberley: an independent review*, for Department of Premier and Cabinet.
- Australian Government 2004, *Intergovernmental agreement on a National Water Initiative*, Commonwealth of Australia.
- CSIRO 2009a, *Water in Northern Australia: Summary of reports to the Australian Government from the CSIRO Northern Australia Sustainable Yields Project*, CSIRO, Australia.
- 2009b, *Water in the Timor Sea Drainage Division: A report to the Australian Government from the CSIRO Northern Australia Sustainable Yields Project*, CSIRO, Australia.
- 2009c, *Northern Land and Water Science Review – Full Report 2009*.
- Department of Agriculture and Food WA 2007, *Summary of stakeholder survey throughout the West Kimberley and Pilbara regions, benchmarking study by the New Opportunities in Tropical and Pastoral Agriculture program*.
- Department of Water 2006, Ord River water management plan, Department of Water, Government of Western Australia, Water Resource Allocation Planning Series Report No. WRAP 15.
- 2010, La Grange groundwater allocation plan, Water resource and allocation planning series, report no. 25.
- Ellison, C 2009, *Foundations for a Kimberley strategy, report by Hon. Chris Ellison on the consultation process for the Kimberley Science and Conservation Strategy*.
- Government of Western Australia 2007, *Government response to a blueprint for water reform in Western Australia*.
- Hill, R, Golson, K, Lowe, PA, Mann, MK, Hayes, S & Blackwood JE (editors) 2006, *Kimberley Appropriate Economies Roundtable Forum proceedings, convened 11–13 October 2005, Fitzroy Crossing, WA, by the Kimberley Land Council, Environs Kimberley and Australian Conservation Foundation*. Australian Conservation Foundation, Cairns.
- Kimberley Development Commission 2009a, *The Kimberley – an economic profile*.
- 2009b, A Kimberley snapshot.
- Larson, S & Alexandridis, K 2009, *Socio-economic profiling of tropical rivers, Land and Water Australia*, Canberra.
- Northern Australia Indigenous Land and Sea Management Alliance 2009a, *Mary River statement*.
- 2009b, *‘Standing together for water rights’*, North Australian Indigenous experts water futures forum report, NAILSMA Knowledge Series 002/2009 Forum Report.

*Northern Australia Land and Water Taskforce 2009, Sustainable development in Northern Australia*, a report to Government from the Northern Australia Land and Water Taskforce, Department of Infrastructure, Transport, Regional Development and Local Government.

*New Opportunities in Tropical and Pastoral Agriculture 2007, Summary of a stakeholder survey throughout the West Kimberley and Pilbara regions*, Department of Agriculture and Food Western Australia.

Thomas, J. F. 2008 *Water futures for Western Australia 2008-2030. Volume 2: Region Report*, Department of Water, Perth

Toussaint, S, Sullivan, P & Yu, S 2005, 'Water ways in Aboriginal Australia: an interconnected analysis', *Anthropological Forum* Vol. 15, No. 1, 61-74

Water Authority of Western Australia 1992, *Derby groundwater management plan*.  
—1994, *Broome groundwater management plan*.

Chamber of Minerals and Energy of Western Australia 2008, *Developing a growth outlook for WA's mineral and energy industry*.

Western Australian Planning Commission 2008, *Better urban water management*.

Yu, S 2000, *Ngapa Kunangkul: Living Water*, University of Western Australia.





## Department of **Water**

168 St Georges Terrace, Perth, Western Australia  
PO Box K822 Perth Western Australia 6842

Phone: 08 6364 7600

Fax: 08 6364 7601

[www.water.wa.gov.au](http://www.water.wa.gov.au)

6023–100–1210