

**LA GRANGE GROUNDWATER  
ALLOCATION**

**A KIMBERLEY SUB-REGIONAL  
ALLOCATION PLAN**

**OVERVIEW OF STAKEHOLDER ISSUES**

Prepared

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For

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<b>1. Introduction.....</b>	<b>1</b>
<b>1.1 Background .....</b>	<b>1</b>
<b>1.2 Regional Water Allocation Plan .....</b>	<b>1</b>
<b>1.3 Sub-Regional Allocation - La Grange Groundwater.....</b>	<b>2</b>
<b>1.4 West Kimberley Irrigated Agriculture Proposal.....</b>	<b>3</b>
<b>2. Stakeholder Issues - La Grange Groundwater Resource.....</b>	<b>3</b>
<b>2.1 Issue Scoping Exercise.....</b>	<b>3</b>
<b>2.2 Perceptions of the Cotton Industry .....</b>	<b>4</b>
<b>2.3 Groundwater-dependent Ecosystems.....</b>	<b>4</b>
<b>2.4 Native Title .....</b>	<b>6</b>
<b>2.5 Cultural Values .....</b>	<b>7</b>
<b>2.6 Impacts on Local Water Users.....</b>	<b>7</b>
<b>2.7 Need for Precautionary Approach .....</b>	<b>8</b>
<b>3. Public Involvement Model.....</b>	<b>9</b>
<b>3.1 Public Involvement Issues.....</b>	<b>9</b>
<b>3.2 Revised Public Involvement Model.....</b>	<b>10</b>
<b>4. Proposed Work Program – La Grange Groundwater Resource .....</b>	<b>15</b>
<b>4.1 WRC Objectives.....</b>	<b>15</b>
<b>4.2 EWRs and EWPs in Western Australia.....</b>	<b>15</b>
<b>4.3 Phases of Groundwater Investigation .....</b>	<b>16</b>
4.3.1 Relationship between WRC and WAI Studies.....	16
4.3.2 Phase 1: Issues scoping.....	18
4.3.3 Phase 2: Identification of values .....	18
4.3.4 Phase 3: Define development.....	18
4.3.5 Phase 4: Environmental water provisions and allocation plan.....	19
<b>References .....</b>	<b>21</b>
<b>Appendix A – List of Interviewed Stakeholders.....</b>	<b>22</b>
<b>Appendix B – Draft Public Involvement Models 1 &amp; 2.....</b>	<b>24</b>
<b>Appendix C – Map of the La Grange sub-region .....</b>	<b>26</b>



## **1. Introduction**

### **1.1 Background**

The Water and Rivers Commission (WRC) is responsible for ensuring the sustainable management of the State's surface and groundwater resources. An important means for meeting this responsibility is through water allocation planning. Through this process the Commission 'allocates' ground and surface water resources to various designated uses in accordance with the established principles of ecologically sustainable development. The beneficial uses or values that water resources support include: ecosystem maintenance; non-consumptive in-stream uses (eg. cultural, recreation, heritage values, educational uses); and consumptive uses (eg. water supply to irrigated agriculture, towns and industry).

The water allocation process includes the preparation of regional and sub-regional allocation plans to:

- define ecological water requirements;
- set the upper limit of water available for consumptive purposes; and
- allocate that water equitably among uses and users.

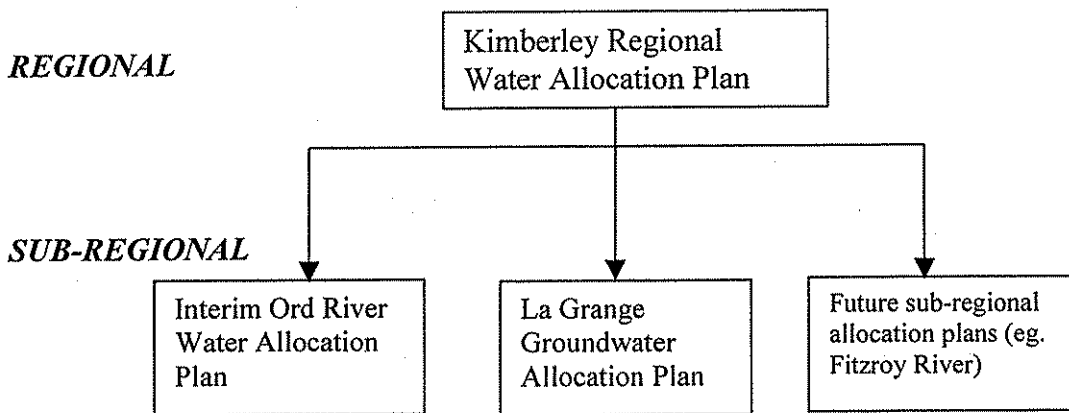
### **1.2 Regional Water Allocation Plan**

In late 1998, the Water and Rivers Commission (WRC) commenced work on a Kimberley Regional Water Allocation Plan. This will be a broad strategic plan establishing a Kimberley-wide (ie. regional) framework to guide water allocation decisions and licensing policy for individual water resources or sub-regions (eg. the La Grange groundwater basin, the Ord River) within the Kimberley. The Commission uses regional allocation plans to determine the priority environmental values and beneficial uses of ground and surface water resources within a particular region.

The Kimberley Regional Allocation Plan will provide a preliminary assessment of the amount of groundwater and surface water development that is considered to be ecologically sustainable after taking account of ecological and social water values. The regional allocation plan will be subject to environmental review by the Environmental Protection Authority (EPA).

As noted above, regional allocation plans provide the framework for subsequent, more detailed investigations, of sub-regions and specific ground and/or surface water resources. Figure 1 displays the relationship between the Kimberley Regional Allocation Plan and the more detailed sub-regional allocation plans.

Figure 1. Water Allocation Planning Hierarchy



### 1.3 Sub-Regional Allocation - La Grange Groundwater

The La Grange groundwater resource is located south of Broome and is a sub-basin of the Canning Basin. A map of the La Grange sub-region is attached as Appendix C. Although current consumptive use of this groundwater resource is low, the resource is currently the subject of feasibility studies by Western Agricultural Industries (WAI) to develop a large-scale irrigated agriculture industry. The La Grange sub-basin covers a large geographic area and our knowledge of its hydrologic processes and their dependent ecological and cultural values is limited. For these reasons, the Commission is undertaking a sub-regional scale allocation study, to investigate and allocate the groundwater resources in the La Grange sub-basin. This will also allow the Water and Rivers Commission to advise the State Government on the acceptability of the West Kimberley Irrigation Proposal with respect to the La Grange groundwater resources.

The emphasis in sub-regional allocation planning is on:

- Establishing ecological water requirements and environmental water provisions to protect water-dependent ecosystems and the social and economic values of water resources;
- Estimating the maximum volume of water available for consumptive uses;
- Establishing monitoring programs to refine ecological water requirements;
- Providing a policy framework for allocation licensing.

The sub-regional allocation plan will be submitted to the Environmental Protection Authority for review.

## **1.4 West Kimberley Irrigated Agriculture Proposal**

Western Agricultural Industries Pty Ltd (WAI) has proposed development of large-scale irrigated agriculture south and east of Broome using ground and surface water resources. The development would be carried out in two stages. The first stage, which is currently the subject of feasibility studies by WAI, would utilise groundwater from the La Grange sub-basin of the Canning Basin. The second stage, which is still at a pre-feasibility phase, would utilise surface water from the Fitzroy River system.

The area being investigated for potential irrigated agriculture locations extends from south-west of Fitzroy Crossing, south of Derby and Broome and reaching as far south as Anna Plains Station. While WAI has identified a range of crops of interest (eg. sugar cane, leucaena, exotic hardwoods, hemp, viticulture, freshwater aquaculture) the primary focus to-date has been on the potential for cotton production. Cotton trials are currently being conducted at Shamrock Gardens.

In 1998, a Memorandum of Understanding (MOU) was signed between the State and WAI. The MOU covers the feasibility study into the use of groundwater and a pre-feasibility study into the use of surface water for the WAI project. It sets forth a range of studies to be undertaken by WAI as part of its feasibility studies including an assessment of sustainable groundwater yield. Under the terms of the MOU, WAI has been granted a groundwater well licence to explore and investigate the Canning Basin for groundwater.

## **2. Stakeholder Issues – La Grange Groundwater Resource**

### **2.1 Issue Scoping Exercise**

As the first step in the water allocation process, the Water and Rivers Commission conducted an issue scoping exercise with stakeholders. The term 'stakeholder' is used to describe any person, persons or groups of people that have a distinctive interest or stake in an issue. Within 'the public' there are many publics or stakeholders with shifting affiliations, interests and alliances. Stakeholders can include: decision-makers or State, Federal and local government agencies; organised interest groups; project proponents; and directly affected individuals.

Those individuals interviewed as part of this process are listed in Appendix A. The objectives of the scoping exercise were to:

- Inform stakeholders of the Commission's allocation planning process;
- Identify issues to be addressed in the La Grange Groundwater Allocation Plan;
- Refine the scope of technical studies; and
- Identify opportunities and the most appropriate means for further community involvement.

The following section provides an overview of those issues related to groundwater allocation in the La Grange sub-basin raised by one or more stakeholders during interviews. The issues described below should not be interpreted as necessarily being consensus stakeholder views. With respect to many of the issues a range of perspectives emerged from the discussions with stakeholders. During interviews, some stakeholders raised additional issues that, while related to the WAI irrigated agriculture proposal, were not linked to water resource management. Those issues, such as biotechnology and local employment opportunities, are not included in this document.

## **2.2 Perceptions of the Cotton Industry**

As an industry, cotton farming was viewed by many stakeholders as having a poor environmental record, the predominate concern being the historically heavy industry reliance on chemicals (eg. endosulfins) through the application of pesticides and fertilisers. With respect to water resource management, the potential for chemical contamination of groundwater resources was the number one concern. Any potential for chemical exposure of residents and fauna near areas of cotton production due to aerial spraying of pesticides was also raised as an issue. Some of those interviewed noted the history of cotton production in the Kimberley, most notably the fact that a cotton industry had been established in the Ord in the 1960s and early 1970s but folded due to problems with insect pests. It was also noted that cotton production is once again being trialed in the Ord.

Commenting on the new approach to irrigation being proposed by WAI, a number of stakeholders indicated that 'in theory' it appeared promising and more environmentally friendly than past practices. However, they were cautious regarding the perceived unproven nature of the new approach to irrigation. This highlighted the importance of the feasibility studies and testing in demonstrating the viability and environmental acceptability of the approach prior to the establishment of any large-scale cotton operation in the area.

## **2.3 Groundwater-dependent Ecosystems**

Stakeholders indicated that the linkages between cotton production and the La Grange groundwater area would need to be investigated from several perspectives. There were questions regarding the ecologically sustainable limits of groundwater withdrawal to meet the needs of the cotton proposal as well as existing (eg. domestic supply, pastoral operations, environmental features) and possible future land uses in the area. Concerns were expressed about the potential for groundwater withdrawal for irrigation purposes to negatively impact on groundwater-dependent environmental values. Water quality was another major issue, with some concern that fertilisers and pesticides used by the cotton industry would eventually reach the water table and result in contamination.



The vegetation system in the area under consideration for irrigated cotton is primarily Pindan. It is composed of acacia thicket and low trees. Many stakeholders commented that our existing scientific understanding of this system is poor. One example offered was that the degree of dependence of the dominant eucalyptus in this area on groundwater is currently unknown. Stakeholders tended to believe that the coastal areas west of the highway contained greater ecological values than the areas east of the highway. However, this did not mean that significant ecological values were not present on the east side but that they may not yet have been identified. Concern was expressed that because the terrestrial ecology of the area has not been previously studied there could be a tendency to dismiss the Pindan vegetation as desert. Requests were made for a biodiversity study to evaluate the flora and fauna values of those areas that would either be cleared by the cotton proposal or are dependent on the groundwater resources for their survival. The extent to which the belts of Saltwater Paperbark (*Melaleuca acaciodes*) found between the Pindan and coastal grassland communities are dependent on groundwater was also identified as needing investigation.

The possibility that stygofauna may exist within the La Grange aquifers was also raised. Stygofauna are small subterranean aquatic fauna that have been found in some aquifers in the Pilbara Region. Recent research, particularly in the Exmouth and Millstream areas, indicates that stygofauna communities are vulnerable to large drawdowns of groundwater tables due to water abstraction, and to changes in water quality due to salinity or contaminants. Determining whether or not subterranean ecosystems are present in the La Grange aquifers and the extent of potential impact were identified as questions requiring investigation.

### **Proposed System 7 Nature Conservation Area**

The Department of Conservation and Land Management has plans to establish a System 7 Nature Conservation Area (vested in the NPNCA) which would include the Mandora Marsh. The area is to the north-east of the Sandfire Roadhouse (Great Northern Highway – east of Eighty Mile Beach) and extends northward to include part of Anna Plains and east into the Great Sandy Desert. The proposed conservation reserve includes a complex spring system and inland mangroves both of which are groundwater dependent. While only limited research has been conducted in this area, the potential exists for relic species (eg. fish) to be discovered due to the isolation of this ecosystem. Concern was expressed about any potential for impacts on this unique ecosystem due to changes to the groundwater system (eg. drawdown effects) on which it relies.

### **Coastal Ecosystems**

The linkages between the La Grange groundwater resources and the coastal ecosystems of Ramsar-listed areas such as Roebuck Bay and Eighty Mile Beach were viewed as needing careful assessment. Roebuck Bay is an important feeding ground for migratory water birds in the hundreds of thousands and supports one of the richest known benthic invertebrate faunas in the world (Piersma et al. 1998). Further to the south, Eighty Mile Beach and Mandora Marsh perform a similar function. The Ramsar-listed wetland of

Eighty Mile Beach extends from Cape Keraudron to Cape Missiessy, a 220 km section of coastline. It supports the largest-known Australian populations of eight species of migratory shore birds.

The potential for changes to the saltwater interface due to groundwater extraction was identified as an issue needing investigation. It was noted that previous research (Semeniuk 1983) suggests that an important linkage between coastal mangrove communities and fresh water from aquifers may exist. The potential impact of groundwater usage on coastal ecosystems such as sponge gardens and seagrass beds was identified as another topic requiring investigation.

The local pearling industry relies on wild stock from Eighty Mile Beach. Given the sensitivity of oysters to environmental change, the potential for the valuable pearling industry to be negatively impacted was raised as an issue requiring study.

The Mandora Marsh and Eighty Mile Beach are part of the same Ramsar listing. It was noted by CALM that some consideration is being given to having a marine park declared over the Eighty Mile Beach area.

## 2.4 Native Title

The ground and surface water resources of the Kimberley are part of the traditional country of Aboriginal peoples. Many of these resources are currently the subject of native title claims.

Karajarri people have lodged a native title claim over a large area of vacant Crown land in the Canning Basin including a large portion of the La Grange sub-region.

In the Federal Court, Justice Lee's finding on the Miriuwung-Gajerrong claim in the Ord catchment held that native title is a 'root' title, from which arise all other native title rights and interests. The consequence of this finding is that there can be no 'partial' extinguishment of native title. Justice Lee also found that native title rights and interests include a right to trade in resources, a right to receive a portion of any resources taken by others, and a right to maintain and protect places of importance under traditional laws, customs and practices. The State has lodged an appeal against the decision in the High Court.

Prior to the Court's determination of native title in the Miriuwung-Gajerrong claim, a consent determination of the Karajarri people's native title over the Shamrock and Nita Downs pastoral leases was being formulated. Following the Miriuwung-Gajerrong ruling, negotiations were reopened with the State over the content of the consent determination. However these negotiations have since ceased and the Karajarri native title claim is currently proceeding through the Federal Court process.

The implications of Justice Lee's findings and successful native title claims for water allocation and resource management in the Kimberley Region are unclear.

## **2.5 Cultural Values**

The need to assess and protect the Aboriginal cultural values of the area was highlighted. Of particular concern are those values associated with water resources such as seasonal water holes and soaks (jila). This was cited as an example of the close linkages between the ecology of the area and Aboriginal cultural values. The important role of groundwater as a life force in the spiritual beliefs of the local community was raised in discussions with representatives from the Bidyadanga Aboriginal community.

Local Aboriginal people, such as those from the nearby Bidyadanga community as well as Aboriginal groups from as far away as South Australia, travel through the La Grange groundwater area for traditional law business. Questions were asked regarding how the WAI proposal would affect access to these areas and the cultural/environmental values of these places.

The potential impact of clearing native vegetation for irrigated cotton was also raised, the issue being any loss of habitat for indigenous fauna and reduction in traditional food sources for local Aboriginal people.

## **2.6 Impacts on Local Water Users**

A number of issues were raised pertaining to how the WAI proposal would affect the groundwater usage of local station owners/operators (eg. Frazier Downs, Thangoo Station, Anna Plains and Shamrock Gardens), coastal tourism operators (eg. Ecobeach), and the Bidyadanga community near La Grange Bay.

These issues were:

- The potential negative impact on local area bores (stock and drinking water) through increased salinity or drawdown effects.
- The potential for pesticides and fertilisers to leach into the groundwater and affect local stock and drinking water resources.
- The availability and suitability of groundwater for other existing or future agricultural activities in the area such as horticulture.

Some stakeholders were concerned that the WRC would allocate to WAI all the currently unallocated groundwater up to the sustainable limit. It was argued that the WRC should consider the potential for other agricultural activities, such as other forms of horticulture and aquaculture, to establish in the area at some point in the future. Such future activities would also require access to suitable quality groundwater and should not be precluded by WRC groundwater allocations to the WAI proposal.

The community of Bidyadanga is located in a low lying area to the west of the WAI proposal. In addition to concerns about effects on drinking water quality (ie. salinity and chemical contamination), they expressed fears of possible chemical run-off in surface water due to cyclonic events or if aerial spraying was employed by farmers for pest control.

## **2.7 Need for Precautionary Approach**

A number of stakeholders advocated the application of the precautionary principle in the WRC's and the EPA's consideration of the environmental acceptability of the WAI cotton proposal. In doing so they emphasised the limited degree of existing knowledge of the groundwater-dependent ecosystems in the La Grange basin and the linkages between the La Grange groundwater and coastal ecosystems.

Concerns were expressed regarding how decision-makers would be able to assess the long-term impacts on the groundwater resource and its dependent values. The variability of rainfall patterns in the area and the length of the historical record for the area were viewed as potential constraints in determining baseline hydrologic conditions. A number of stakeholders commented that there is no such thing as a 'normal' wet season. Seismic data from previous oil exploration work in the area were suggested as a possible source of data on groundwater conditions.

Questions were raised as to how the WRC would be able to stop or wind back the cotton industry once it had become established if unpredicted negative impacts occurred. Some stakeholders speculated that if a cotton industry became established, for economic development reasons it would be politically difficult for the WRC to control the industry by reducing its allocation or through additional conditions on its licence. Along similar lines, some concerns were voiced that the State Government might trade off environmental protection in return for new cotton industry jobs.

The importance of the WRC establishing an on-going monitoring program if a groundwater licence is given to WAI was also raised. Similarly, there was an identified need for a clear statement of the criteria and control mechanisms that would be imposed should the cotton proposal proceed. Some stakeholders questioned whether any conditions imposed on WAI as part of any approval process (ie. EPA and/or WRC) would also apply to other cotton farmers who might subsequently establish in the area. Stakeholders concerned about this issue wanted to see conditions placed on other cotton farmers similar to those placed on WAI.

The duration of groundwater licences and the ability to on-sell water rights were also raised as issues. The concern was that a long-term license for groundwater extraction would make adaptive management difficult by limiting the opportunities to revise licence conditions if monitoring demonstrated a detrimental impact on ecological and/or cultural values.

### **3. Public Involvement Model**

#### **3.1 Public Involvement Issues**

The following describes the issues raised by stakeholders regarding current and future public involvement with respect to the La Grange groundwater resources and WAI's West Kimberley Irrigation Project.

##### *Integrate Consultation for WRC Allocation Plan and WAI Proposal*

A number of stakeholders commented that it would be desirable if the consultation processes for the two separate planning processes (ie. WAI's feasibility studies and WRC's La Grange Groundwater Allocation Plan) could be integrated into one process. Given that there are common issues of interest in the work being undertaken by the WRC and that of WAI, a single consultative process was viewed by some stakeholders as being more efficient and informative for the stakeholders.

A counter position was also put forward by some stakeholders. They believe that an integrated process would lead to community confusion over the role and responsibilities of the Water and Rivers Commission versus those of Western Agricultural Industries (WAI).

##### *Local Knowledge*

It was noted that the local Aboriginal people have considerable knowledge of the water resources in the La Grange groundwater area. This knowledge could contribute to the technical studies being undertaken for the WAI proposal and WRC's sub-regional allocation plan. It was also suggested that the local Karajarri people could play a monitoring role. Any site visits by technical experts such as hydrologists would need to respect local Aboriginal protocols and consent.

##### *Form of Communication*

The importance of presenting information to Aboriginal communities in a suitable form and manner was highlighted. The use of physical models in discussions with the community was encouraged. The funding of an individual with appropriate skills (eg. language) to translate the results of the technical studies into a form suitable for further discussion within the Aboriginal community was requested.

##### *Shortage of Information*

Some stakeholders indicated that there had been insufficient information provided by either the proponent (WAI) or the Government Project Co-ordinating Committee to other stakeholders regarding the WAI proposal. Despite several information seminars, some stakeholders believed it was still too difficult to judge the acceptability of the WAI

proposal because little was known about it and the approach being proposed for irrigation, while encouraging, was unproven.

### ***Credibility of Technical Studies***

Some concerns were expressed about the credibility of any technical studies conducted by consultants contracted by WAI. Because of the existence of a Memorandum of Understanding (MOU) between WAI and the State government, some stakeholders expressed concerns about the credibility of any studies conducted by State government agencies including the Water and Rivers Commission. While the MOU does not give either State government or individual State agency (eg. WRC and DEP/EPA) approval to the WIA proposal, some stakeholders still perceived the MOU as tacit State government approval. A number of stakeholder groups requested that they be given the opportunity to contribute to the terms of reference for any technical studies conducted or contracted by WAI or WRC.

### ***Need for Local and Non-Governmental Input***

Many of the stakeholders perceived that the primary information flow regarding the WAI proposal has been between WAI and Perth-based State government agencies via the Project Co-ordinating Committee chaired by the Department of Resources Development. A need was identified for greater local (ie. sub-regional) and non-government agency input to the WAI feasibility studies and the WRC's allocation planning for the La Grange Basin.

## **3.2 Revised Public Involvement Model**

In an earlier draft of this report, two possible public involvement models were identified. These two models are contained in Appendix B. One of the models would have linked the public involvement processes of the Water and River Commission's groundwater allocation process with those undertaken by WAI in its feasibility studies. The other model proposed establishment of a public involvement process for the Commission's allocation studies that would be separate from the public consultation to be conducted by WAI.

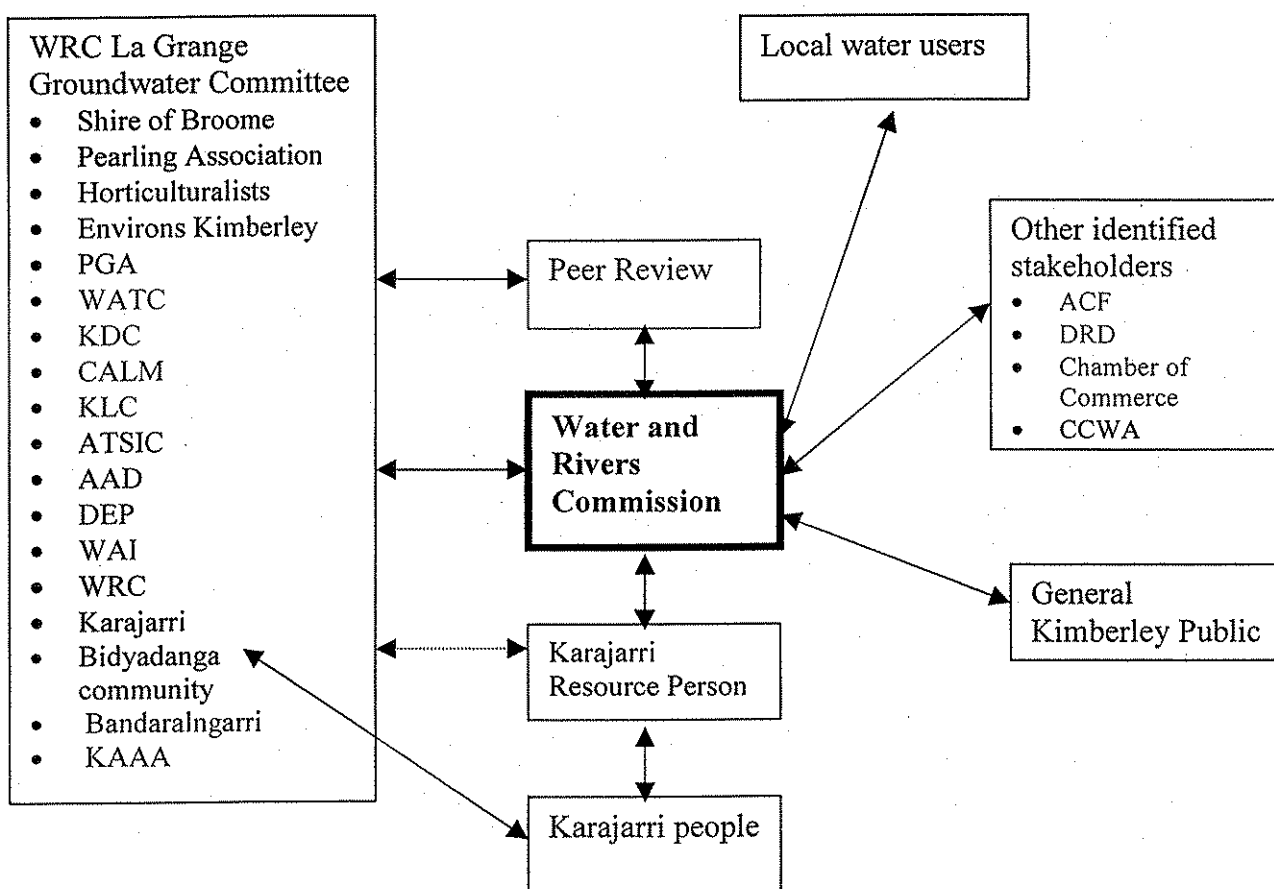
These two models were canvassed with stakeholders in March 1999 and attracted numerous comments regarding their relative merits. Issues raised by stakeholders included:

- The need for a clear separation of WRC's water allocation process and WAI's irrigated cotton feasibility studies.
- The roles and responsibilities of a stakeholder-based committee (ie. consultative versus advisory versus decision-making).
- Methods of selecting La Grange Groundwater Committee members and a chairperson.

- The extent to which a stakeholder-based committee should focus only on water allocation issues.

On the basis of comments received from stakeholders, the Water and Rivers Commission has developed a revised Public Involvement Model for the La Grange Groundwater Allocation Planning Process (Figure 2).

**Figure 2.** Revised WRC Public Involvement Model



Legend:

WRC:	Water and Rivers Commission	AAD:	Aboriginal Affairs Department
PGA:	Pastoralists and Graziers Association	ATSIC:	Aboriginal & Torres Strait Islander Commission
DEP:	Department of Environmental Protection	CALM:	Department of Conservation and Land Management
KLC:	Kimberley Land Council	WAI:	Western Agricultural Industries
KDC:	Kimberley Development Commission	ACF:	Australian Conservation Foundation
DRD:	Department of Resources Development	WATC:	Western Australian Tourism Commission
CCWA:	Conservation Council of WA	KAAA:	Kimberley Aboriginal Aquaculture Assoc.

As shown in Figure 2, the main features of this model are:

- **Separate WRC Public Involvement Process** - The revised model involves a separate Water and Rivers Commission public involvement structure for its La Grange Groundwater Allocation Plan. The public involvement processes for the WRC's allocation planning and WAI feasibility studies of its irrigated cotton proposal would not be integrated. While the Water and Rivers Commission would use the public involvement structure shown in Figure 2, WAI would formulate its own public involvement strategy and structure for its proposal.
- **Local Stakeholder Committee** - The WRC La Grange Groundwater Committee shown in Figure 2 would provide a medium for on-going discussions between WRC and locally based stakeholders regarding water allocation issues. The Committee's work would focus on La Grange groundwater allocation and related water issues. The Committee consists of locally based stakeholders (Government and non-government) with a significant interest in water issues. The Committee would provide comment and advice to the Water and Rivers Commission on water allocation issues associated with the La Grange groundwater area. The Committee would not have formal decision making powers. In the revised model, WAI, the Department of Environmental Protection, and the Bidyadanga community have been added as members of the WRC La Grange Groundwater Committee. Committee meetings would be held in Broome to minimise travel costs for Committee members.

Activities that could be undertaken by the Committee include:

- Reviewing terms of reference for technical studies by WAI or WRC
- Input to the selection of consultants
- Input to the selection of a peer reviewer(s) and defining their terms of reference
- Liaison with peer reviewer and consultants doing technical investigations
- Review of draft study findings.

The Water and Rivers Commission will invite each of the stakeholders listed in the proposed WRC La Grange Groundwater Committee to nominate a representative to sit on the Committee. At the initial meeting of the WRC La Grange Groundwater Committee, the issues of Committee chairperson and additional Committee members will be explored. In advance of this first meeting, members of the Committee will be asked to nominate candidates for the position of chairperson. It is important that the chairperson be acceptable to all stakeholders. If the Committee cannot achieve consensus on the chairperson, then the WRC will chair the Committee. Similarly, additional stakeholders will be added to the Committee only on the basis of consensus within the Committee.

As with other components of the public involvement model, the WRC will periodically evaluate the performance of the WRC La Grange Groundwater



Committee. This will be achieved through liaison with other stakeholders. Adjustments to the functioning of the Committee would be made as required. This review mechanism reflects the dynamic and evolving nature of public involvement processes.

The scope of interest of the Water and Rivers Commission is limited to groundwater allocation and related issues. However, during the scoping exercise, many stakeholders raised additional issues in relation to WAI's irrigated agriculture proposal. These included non-water related issues such as economic and land use planning issues and local employment opportunities. The Water and Rivers Commission believes there is a need for these non-water issues to be explored with the community. However, the Commission's allocation planning process is not the appropriate mechanism as it falls outside the agency's area of responsibility.

- **Peer Review** - The use of a peer review mechanism to ensure the credibility of any technical studies. A peer reviewer is an independent person or agency that is asked to provide a third party expert opinion on certain aspects of a study. The peer reviewer has no decision making role in the study but provides the study team's technical experts as well as any steering committees with an additional expert opinion.

For a peer review process to be most effective, the peer reviewer must:

- Be an acknowledged expert in the field on which they are being asked to provide comment;
- Have no vested interest in the study outcomes; and
- Be acceptable to all parties to the study.

Peer reviewers are typically asked to provide comment at one or more points in the study process. It is recommended that the peer reviewer be asked to comment on:

1. The technical study methodologies prior to their implementation; and
2. Draft technical study findings.

It is unlikely that any one individual could fulfil the peer review role for all the technical studies. The WRC would ask the Land and Water Resources Research Development Committee (LWRRDC) to nominate some individuals as possible peer reviewers. Based in Canberra, the LWRRDC was established by the Commonwealth Government in 1990 to identify and fund research and development initiatives promoting the principles of sustainable development. Other possible sources of peer reviewers include private sector consultants, CSIRO and university research centres. The Centre for Indigenous Natural and Cultural Resource Management or the CRC for Tropical Savannas at Northern Territory University are also possible sources of peer reviewers. The peer reviewers would need to be remunerated for their services.

- **Karajarri Resource Person** - The introduction of a resource person to translate technical information into a suitable form for the local Aboriginal community and to

facilitate discussions between the community, the Water and Rivers Commission, and WAI. The Aboriginal community of Bidyadanga is located on La Grange Bay, west of the area being investigated by WAI for future irrigated cotton production. Discussions with senior Karajarri people living in Bidyadanga and the Kimberley Land Council (KLC), identified the importance of presenting the technical findings of investigations undertaken by WRC and WAI and their consultants in a form suitable for the local community.

To facilitate communication and the informed participation of traditional owners, a resource person would be employed to work with the local community and liaise with the WRC La Grange Groundwater Committee, WRC and WAI. Ideally, the person would have appropriate qualifications in environmental science and live in Bidyadanga. Funding for this contracted position would come from WAI and State Government, with the KLC participating in the selection of the resource person along with the funding agencies. The resource person for the Karajarri people would sit on the WRC La Grange Groundwater Committee as an observer. The interests of the Karajarri native title claimants would be represented on the Committee by the Kimberley Land Council and ATSIC representatives. As shown in Figure 2, the Bidyadanga community would be asked by WRC to nominate a representative to sit on the WRC La Grange Groundwater Committee.

- **Local Water Use Survey** - There are several pastoral and horticultural properties in the immediate area such as Thangoo Station, Anna Plains Station and Shamrock Gardens. There are also a small number of tourism operations along the coast (eg. Ecobeach). As described in the work program (Section 4), a survey of local groundwater usage and projected future water needs will be conducted in the area covered by the La Grange groundwater resource. This will require direct liaison between WRC and the owners/managers of pastoral, horticultural and tourism properties in this area.
- **Other Identified Stakeholders** - As shown in Figure 2, the scoping exercise identified a number of additional stakeholders that have not been included in the WRC La Grange Groundwater Committee but have shown interest in the Allocation Plan. This includes State and national interest groups (eg. WA Conservation Council, Australian Conservation Foundation), State government agencies (eg. Department of Resources Development) and local groups interested in economic development issues (eg. Chamber of Commerce). The WRC will keep these stakeholders informed of the progress of the La Grange allocation studies as well as the Kimberley Regional Allocation Study through the periodic release of a newsletter. The newsletter will highlight the status of the La Grange allocation work and notify stakeholders regarding the release of any draft or final reports for comment. The WRC's project manager will also be available for direct liaison with these stakeholders as desired. These stakeholders will be encouraged to provide comment on any documents produced by the WRC as part of the allocation studies.

- **The Broome – La Grange Public** – A newsletter distributed through stakeholder organisations and community facilities such as the Shire offices and public libraries will be used to inform the general public in the Broome area of the study's progress and outcomes. Media releases to local media outlets (ie. newspapers and radio) in the Broome area will also be used to broaden the area of coverage. When the La Grange Allocation Plan has been submitted to the EPA for its consideration, there will be a formal public submission period seeking public comment on the draft plan.

#### 4. Proposed Work Program – La Grange Groundwater Resource

##### 4.1 WRC Objectives

The Water and Rivers Commission, through the development of a sub-regional allocation plan for the groundwater resources of the La Grange Basin, will:

- Establish scientific criteria, ecological water requirements and environmental water provisions to protect water-dependent ecosystems and the social and economic values of the groundwater resource;
- Provide a policy and principles framework for allocation licensing;
- Estimate the maximum water available for consumptive uses (eg. irrigated cotton); and
- Establish monitoring programs to ensure compliance with environmental water provisions and to refine ecological water requirements.

##### 4.2 EWRs and EWPs in Western Australia

An important component of sub-regional allocation planning is the establishment of ecological water requirements (EWRs). EWRs are descriptions of the water regimes needed to sustain the ecological values of water-dependent ecosystems at a low level of risk. Water-dependent ecosystems are those parts of the environment (the species composition and natural ecological processes) determined by the permanent or temporary presence of flowing or standing water. The in-stream area of rivers, riparian vegetation, springs, wetlands, floodplains and estuaries are all water-dependent ecosystems. EWRs are developed through the application of scientific methods and techniques and/or through the application of local knowledge based on many years of observation.

Consistent with the 'National Principles for the Provision of Water for Ecosystems' (ARMCANZ/ANZECC 1996), the Water and Rivers Commission has established a *Draft Environmental Water Provisions Policy for Western Australia*. The draft policy defines Ecological Water Requirements (EWRs) as:

*'the water regimes needed to sustain the ecological values of water dependent ecosystems at a low level of risk.'*

By comparison, Environmental Water Provisions (EWPs) are the water regimes determined by the Water and Rivers Commission to be satisfactory to maintain the ecological and in-situ (ie. non-consumptive) socio-economic values (eg. educational, cultural, recreation) of a water-dependent system. While EWRs are the key consideration in the establishment of Environmental Water Provisions (EWPs), they are not the only consideration. In particular the identification of water-dependent Aboriginal cultural values and their associated water requirements will play a significant role in the determination of the EWPs for the La Grange groundwater area.

The assigned EWPs for a water resource (eg. river basin, aquifer) are the outcome of water allocation decisions that may involve some trade-offs among competing ecological, social and economic objectives and values.

### **4.3 Phases of Groundwater Investigation**

#### **4.3.1 Relationship between WRC and WAI Studies**

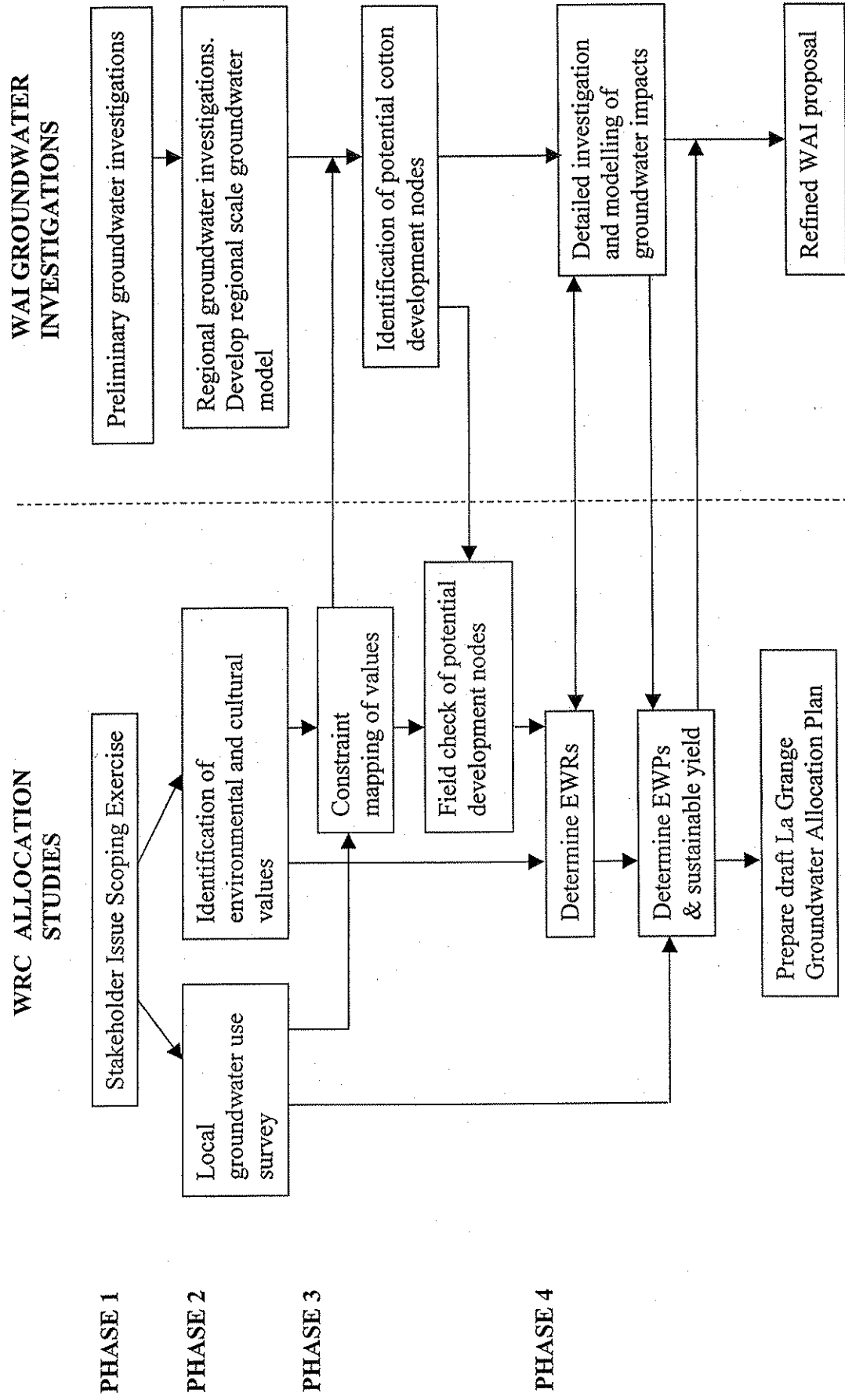
The Water and Rivers Commission has developed a work program leading to the formulation of a sub-regional allocation plan for the La Grange groundwater resource. As shown in Figure 3, in parallel to this WAI will be conducting a groundwater investigation program. The groundwater investigation program will be designed to meet the needs of the WRC's La Grange Groundwater Allocation Plan as well as WAI's own assessment of its development proposal. In situations in which a single large development proposal underpins the timing for a sub-regional allocation plan, it is the Commission's policy to have the proponent undertake and/or fund much of the groundwater investigations. This avoids the situation of the State Government paying for the studies to evaluate the feasibility of a private proponent's proposal. The La Grange groundwater resource is such a case with WAI being the proponent. Over the course of WAI's groundwater investigations, the WRC will continue to monitor and review the approach taken, and the outcomes of all groundwater studies by WAI and its consultants.

Figure 3 shows the relationship between studies that will be undertaken by WRC and its consultants and those of WAI and their consultants. The work by the Water and Rivers Commission will focus on the identification of groundwater-dependent ecosystems and cultural values. This will lead to the determination of ecological water requirements (EWRs) and environmental water provisions (EWPs).

The WAI studies shown in Figure 3 are only those pertaining to groundwater investigations. It does not include other investigations that WAI may undertake in preparation of its irrigated cotton proposal for assessment by the Environmental Protection Authority and the State Government (eg. economic analyses, social impact studies).

As described below, the work program includes four phases of investigations. Currently both WRC and WAI are undertaking Phase 1 activities.

Figure 3. Proposed Work Programs (La Grange Groundwater Resource)



#### **4.3.2 Phase 1: Issues scoping**

The primary activity undertaken by the Water and Rivers Commission in Phase 1 has been the scoping exercise. This was used to identify water-related stakeholder issues in relation to the La Grange groundwater resource and WAI's irrigated horticulture proposal. In response to stakeholder comments, a public involvement structure has been proposed (Figure 2) to facilitate local community input to the WRC's La Grange Allocation Plan.

WAI's activities in Phase 1 have focused on preliminary groundwater investigations, primarily utilising data from existing sources such as oil and gas exploration bores in the study area. WAI has also undertaken a limited pump testing program to help understand the physical characteristics of the aquifer and groundwater flows in it. This data is being used to gain a general understanding of the dynamics of the groundwater resource.

#### **4.3.3 Phase 2: Identification of values**

In Phase 2, WRC's investigation will focus on:

- Identifying those significant ecological values supported by La Grange groundwater that are sensitive to changes in the groundwater regime. This will be achieved through the use of existing data sources (eg. remote-sensing maps, previous studies) and some on-ground reconnaissance work.
- Identifying the groundwater-dependent cultural values of the area (eg. local springs). Due to the close relationship that exists between the ecological values and the Aboriginal cultural values of the area, these studies will be integrated and include consultation with the Bidyadanga community. As above, this will rely heavily on desk-top analysis of existing data sources.
- A survey of local groundwater usage and projected future water needs.

A more detailed description of these activities will be formulated as the terms of reference for this work are developed. It will be important for the WRC La Grange Groundwater Committee to be established by the start of Phase 2 so that its members can comment on the terms of reference for these studies.

WAI will carry out further groundwater investigation work in Phase 2 to assist in the development of a regional scale groundwater model for the La Grange groundwater resource. This investigation work will involve some carefully sited investigation drilling and pump testing to obtain information not available from the review of existing boreholes.

#### **4.3.4 Phase 3: Define development**

To-date only a general area of investigation has been defined for WAI's irrigated cotton proposal. Phase 3 will focus on WAI defining specific locations within their study area as

possible nodes for cotton production. This will be achieved through a constraint mapping exercise utilising Phase 2 information on environmental and cultural values. The constraint mapping exercise will identify those locations within the study area that would either be clearly unacceptable sites for irrigated agriculture or which would require a very high level of environmental management.

As part of this work, field inspections of possible cotton production nodes will be conducted by WAI and WRC. These inspections would identify any site-specific environmental or social constraints that had not been identified in Phase 2. As part of this exercise, the Bidyadanga community will be approached to participate in the field inspections.

On the basis of the constraint mapping exercise and associated field inspections, WAI will refine their proposal to identify specific candidate locations for irrigated agriculture within the study area.

#### **4.3.5 Phase 4: Environmental water provisions and allocation plan**

In Phase 4 site-specific environmental investigations will be conducted by WRC to determine the ecological water requirements (EWRs) for the groundwater-sensitive components of the ecosystem. A fundamental aspect of the approach applied in Western Australia is that EWRs are determined *first* based on the best scientific information available, before divertible yields are assessed in detail.

On the basis of the EWRs set by the Water and Rivers Commission, WAI will conduct detailed site-specific groundwater investigations and modelling to determine the amount of water potentially available for consumptive use (eg. irrigated agriculture). This work will be reviewed by the WRC's groundwater experts. Adjustments to proposed groundwater extraction regimes will then be made to minimise impacts.

Having determined the ecological water requirements (EWRs) and gained a fuller understanding of the groundwater system through the detailed modelling, the WRC will then set the environmental water provisions (EWPs) for the resource. Through the setting of EWPs, the Commission will determine the quantity and quality of groundwater needed to support not only groundwater-dependent ecosystems (EWRs) but other valued in-situ (ie. non-consumptive) uses of the resource (eg. Aboriginal cultural values). As mentioned earlier, the assigned EWPs may involve some trade-offs among competing ecological, social and economic objectives and values. To the extent possible, trade-offs will be avoided but, if required, they would occur through a transparent decision making process with input from stakeholders.

On the basis of the EWPs and the detailed groundwater investigations, the Water and Rivers Commission will determine the potential environmentally sustainable yield from the groundwater resource. This will allow the Commission to determine the quantities of

groundwater available for consumptive uses (the sustainable diversion volumes) such as irrigated agriculture, after first allowing for EWPs.

This work would form the basis for adoption, by the Water and Rivers Commission, of a compatible water allocation licensing policy for managing the consumptive water use in the study area.

The Commission would also determine the monitoring regimes required to ensure compliance with the EWPs. All licensed allocations for consumptive use will be conditional on compliance with the EWPs. Thus if actual use causes a breach of any of the EWP criteria, extraction will have to be reduced or modified as required to ensure compliance.

The EWRs and EWPs would be reviewed as additional information became available from future monitoring and research.



## References

ARMCANZ/ANZECC. (1996). *National Principles for the Provision of Water for Ecosystems*. Sustainable Land and Water Resources Management Committee on Water Resources. Occasional Paper SWR No. 3.

Piersma, T., Pearson, G. & Lavaleye, M. (1998). The teeming mud of Roebuck Bay. *Landscape* 13(4), 16-22.

Semeniuk, V. (1983). Mangrove distribution in northwestern Australia in relationship to regional and local freshwater seepage. *Vegetatio* 53, 11-31.

## Appendix A – List of Interviewed Stakeholders

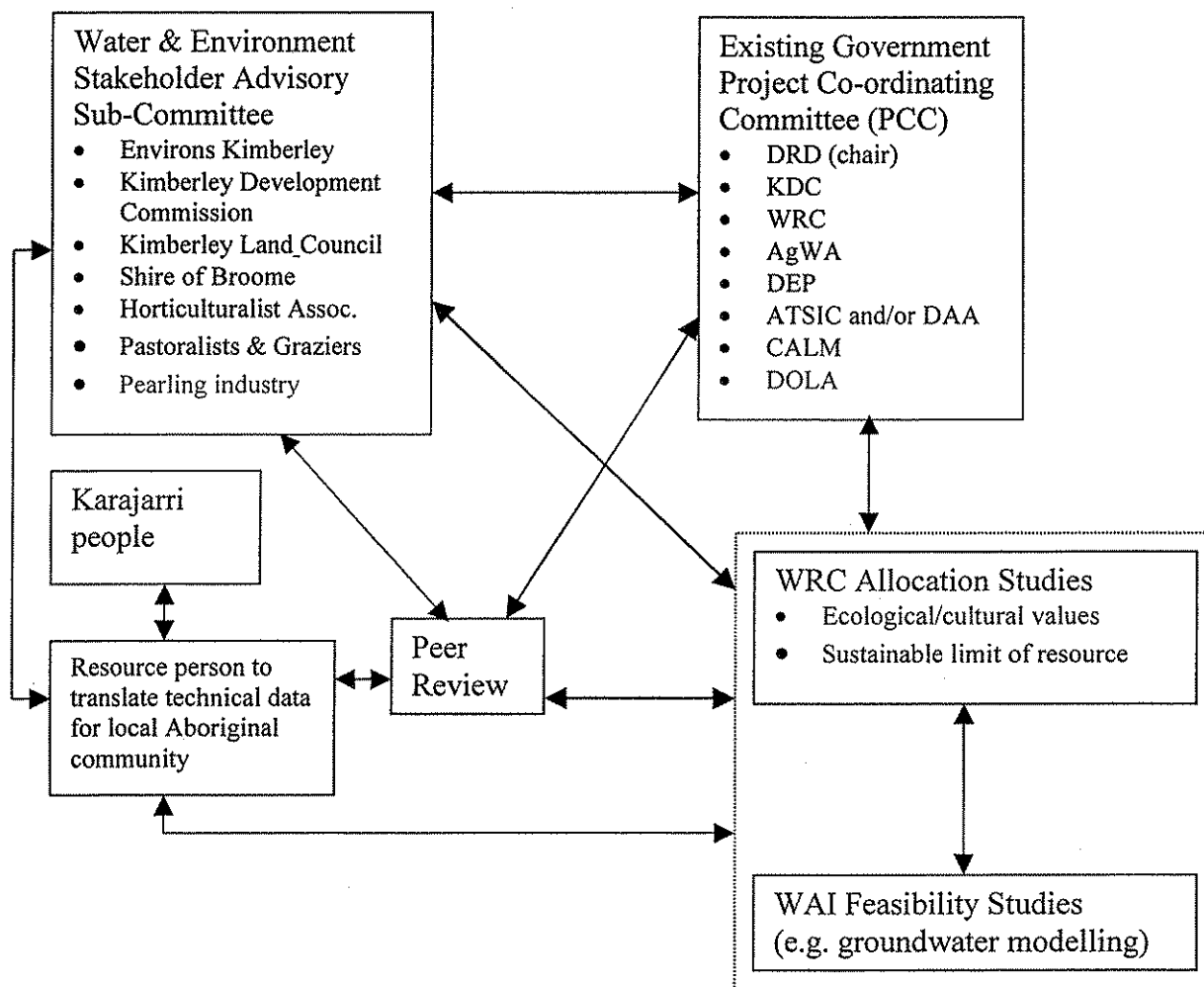
Ross MacCulloch	WA Tourism Commission (Kimberley)
John Grey	Thangoo Station
Ruth Webb-Smith	Pastoralist and Graziers Association
Maria Mann	Environs Kimberley
Trish Lowe	Environs Kimberley
Finn Pedersen	Environs Kimberley
Tim Fisher	Australian Conservation Foundation (ACF)
Rachel Siewert	Conservation Council of WA
Mark Horstman	Kimberley Land Council – Land & Sea Unit
David Lavery	Kimberley Land Council (Broome)
Bevan Stott	Kimberley Land Council (Kununurra)
John Dudu	Bidyadanga
Mervyn Mullardy	Bidyadanga
Edna Hopiga	Bidyadanga
Wittadeng Mullardy	Bidyadanga
Dora Possum	Bidyadanga
Celia Bennett	Bidyadanga
Elsie White	Bidyadanga
Donald Gray	Bidyadanga
Mick Buckley	WA Pearl Producers Association
Tim Willing	CALM (Broome)
Gordon Graham	CALM (Kimberley)
Brett Jago	Water Corporation (Kununurra)
Greg Taylor	Water Corporation (Broome)
Greg Powell	Shire of Broome
Stewart Gunning	Kimberley Aboriginal Pastoralists Association (KAPA)
Tim Finlay	Fisheries WA
Jack Burton	Kiltore Station
John Logan	Western Agricultural Industries (WAI)
Ivan McLeod	WAI
Richard Elsey	Department of Resources Development
April Owen-Smith	Department of Resources Development
Danny Fife	Shamrock Gardens / Horticulturalists Association
George Gardiner	H.G. Gardiner & Associates
Peter McCosker	Ord Development Council
Andrew Kelly	Ord Irrigation Cooperative
Jeff Gooding	Kimberley Development Commission
Jon Berry	Kimberley Development Commission
Kevin Puertollano	ATSIC (Broome)
Alex Dann	ATSIC (Broome)
Alan Beattie	ATSIC (Broome)
Phil Andrew	Shire of Derby-West Kimberley
Robert Manning	Shire of Derby-West Kimberley
Joe Sherrard	Agriculture WA (Kununurra)

Tony Brown  
Giz Watson MLC  
Robin Chapple  
Jeff Kite  
Paula Deegan  
Leith Bowyer  
Peter Williams  
Dot Coleman

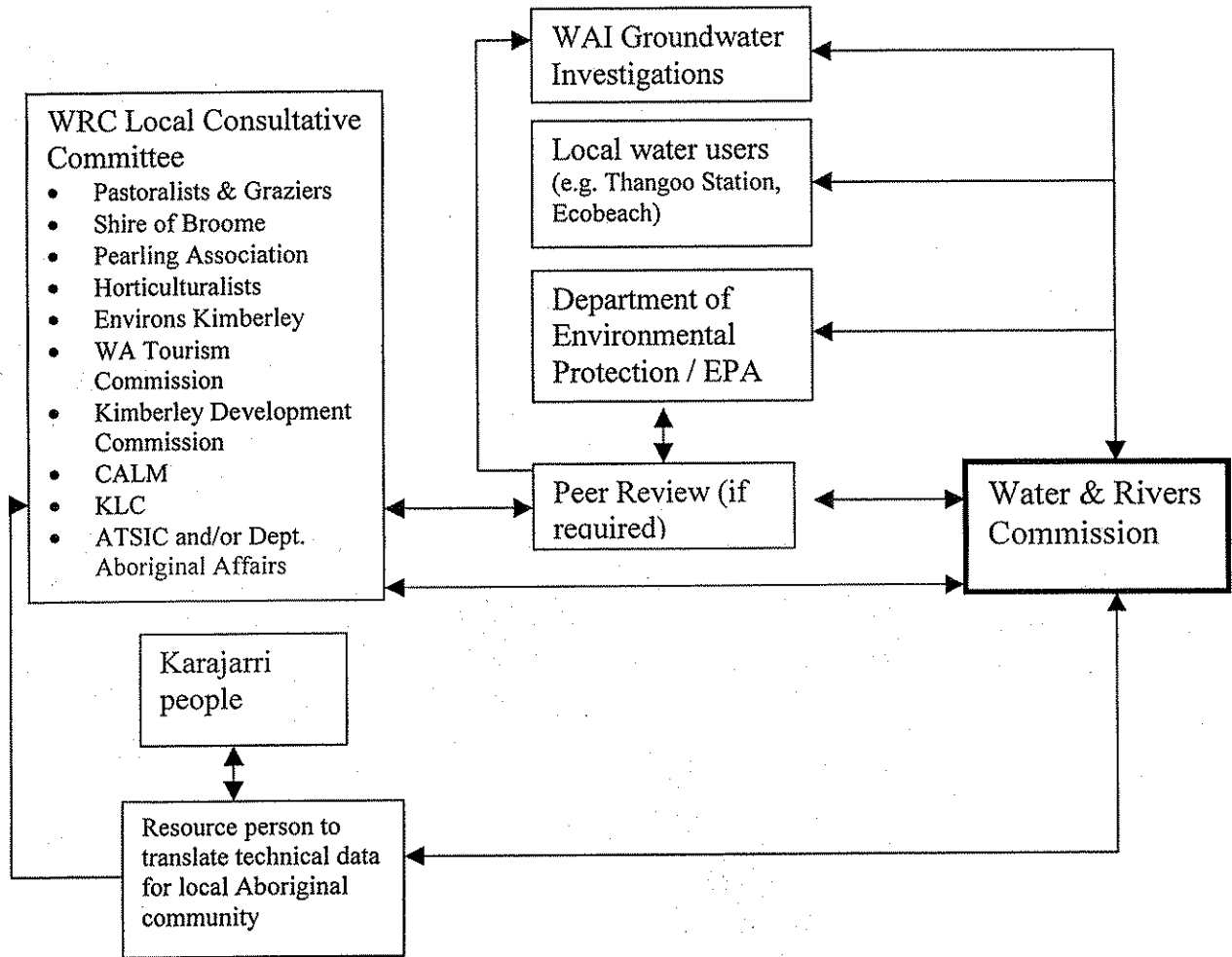
Shire of Wyndham-East Kimberley  
WA Greens  
Rangeways Project  
Water and Rivers Commission  
Water and Rivers Commission  
Water and Rivers Commission (North West Region)  
Water and Rivers Commission (Wild Rivers Program)  
Water and Rivers Commission (Pilbara Region)

## Appendix B – Draft Public Involvement Models 1 & 2

### Model 1 - Integrated Public Involvement Structure



## Model 2 – Separate WRC Public Involvement Structure



Appendix C – Map of La Grange Sub-region

