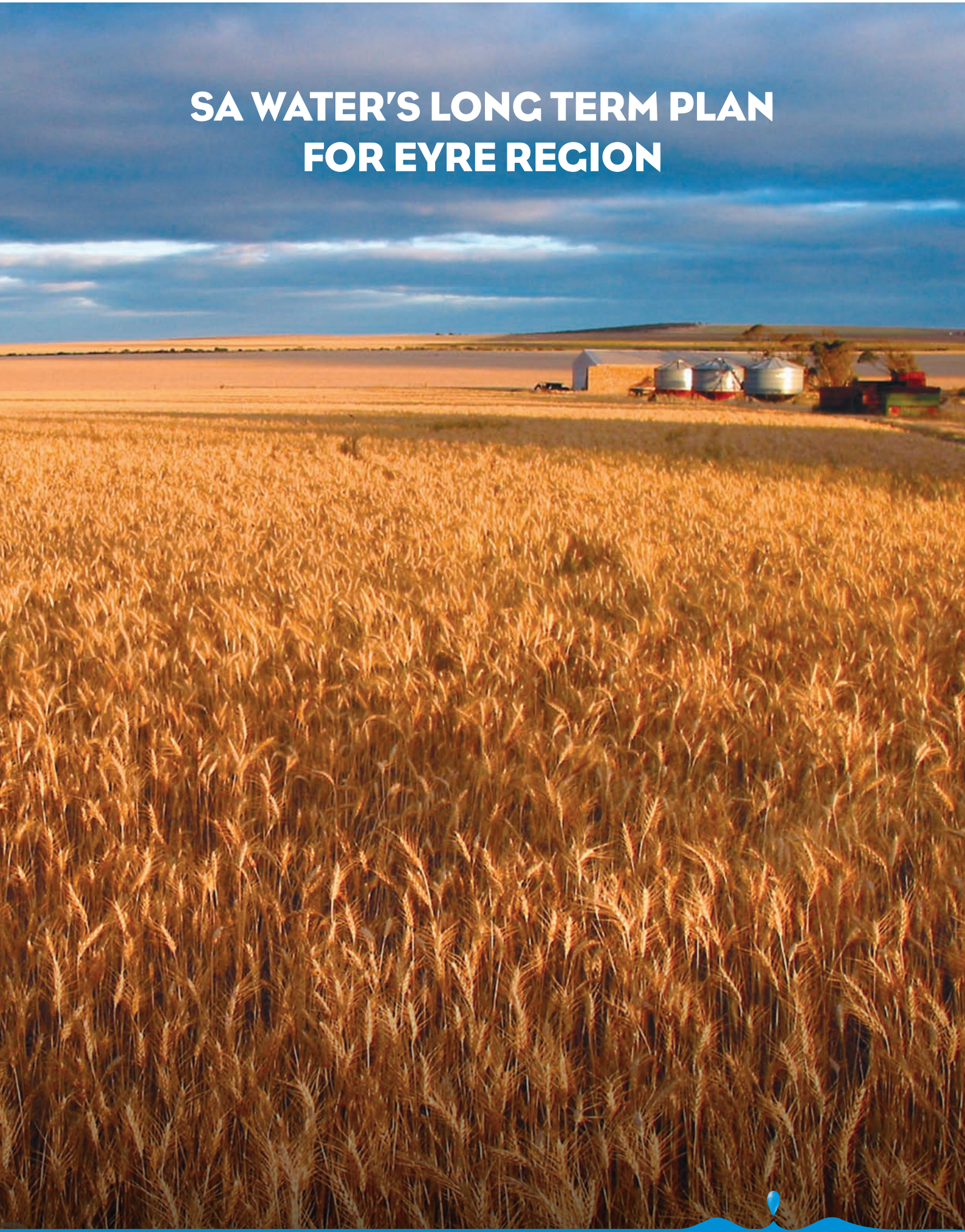
# SA WATER'S LONG TERM PLAN FOR EYRE REGION



Government of South Australia

SA Water

Securing tomorrow's water today

November 2008

Front cover image: Port Neill, Eyre Peninsula

## Forward

*Meeting Future Demand – SA Water's Long Term Plan for Eyre Region* is an initiative of the South Australian Government, through SA Water, to establish a framework to ensure Eyre Peninsula has a secure water supply to meet increases in demand for the next 25 years.

The Long Term Plan presents a number of recommendations to better manage water systems and develop new sources of water for this important region of our State. Investigations into demand projections undertaken in developing this plan indicate a new source of water will be required for the region in 2014/15. However, these projections will be reviewed annually and the timing for a new resource assessed accordingly.

Through careful planning we will know if we have to act sooner and what the best options will be. Desalination and an expansion of the Iron Knob – Kimba pipeline are two of the recommendations we will more fully investigate.

Reviewing this information every year is a critical part of the planning process.

It means our delivery of water security for Eyre Peninsula is based on the most up-to-date, sound data we have available. We will need to continue our monitoring and planning ahead, taking into account changes brought about by climate change, population growth and other development needs of Eyre Peninsula.

Community engagement has been integral to the development of the Long Term Plan with a number of information sessions, forums and opportunities for comment included in the process. This has resulted in the Eyre Peninsula community having significant input into, and providing their endorsement of, the Long Term Plan.

The Eyre Peninsula, along with the rest of the State, is experiencing the worst drought conditions in recorded history. While this severe drought has reminded us our climate can have devastating impacts, we also have to ensure we are prepared for the longer term impacts of climate change, including likely reduced rainfall and reduced inflows into farm dams and waterways.

This Long Term Plan is an adaptive management tool that can respond to changing environments to ensure security of water supply to the Eyre Region for the next 25 years and beyond.

**Hon Karlene Maywald**
Minister for Water Security
November 2008

## The Plan in Action

SA Water's Long Term Plan for Eyre Region (Long Term Plan) is a new initiative intended to establish a framework for water security that is responsive to changing circumstances currently being experienced through drought conditions and climate change.

The Long Term Plan provides for an annual review process in order to ensure such future changes are addressed and appropriate adjustments made to the Long Term Plan if required. In this context, the Long Term Plan has been structured as an adaptive management tool able to respond to changes in climate conditions, resource allocations and increases in demand.

Since the writing of the Long Term Plan, changes to the condition of the groundwater resource at Polda Basin have been identified. The long term decline in recharge has had an impact on the Polda Basin that was unknown at the time of writing the Long Term Plan.

Subsequent to the completion of the draft Long Term Plan the Department for Water, Land and Biodiversity Conservation (DWLBC) advised SA Water on 7 July 2008 that the annual water allocation from Polda Basin had been reduced from 326.4 ML/a to 283 ML/a, in response to reduced recharge.

Given this, and in accordance with the fundamental principle of the Long Term Plan that assumptions will be reviewed as necessary, investigations have commenced into the status of the other groundwater basins in the southern Eyre Peninsula region, including the Lincoln and Uley South Basins.

Salinity profiles taken from the production bores in the Lincoln Basin revealed a significantly reduced extent of fresh water in the lens. Results for Uley South showed no significant change in the available resource.

As a consequence of the completion of these investigations, a number of initiatives are already in place and will contribute to a review of the Long Term Plan in 2009 in line with the recommended annual review process. These initiatives include the following:

- SA Water has temporarily ceased pumping from Polda Basin (other than for emergency situations) until a full assessment of the condition of the Basin can be undertaken.
- SA Water is planning to reduce the amount of water it pumps from the Lincoln Basin.

DWLBC, the Eyre Peninsula Natural Resources Management Board (EPNRMB) and SA Water have commenced a comprehensive monitoring program over the Uley South Basin to cover knowledge gaps in relation to the salt water/ freshwater interface at the coast in order to inform the 2009 review process.

SA Water has commenced work on the recommendations contained in the Long Term Plan to investigate desalination and system enhancement as they relate to security of the potable supply.

This Long Term Plan estimates that a new water source will be required in approximately 2014/15 based on a medium demand projection and 2011/12 based on a high demand projection. This timing was based on a range of assumptions, including SA Water's existing allocations from the groundwater basins and assumptions regarding future demands.

The work currently underway in response to the ongoing drought conditions will inform the 2009 review process and necessary adjustments will be made to the Long Term Plan if required. This may include changes to the timing for a new resource dependent upon the outcomes of the monitoring and research work under the combined management of DWLBC, EPNRMB and SA Water.

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## Executive Summary

The Long Term Plan for Eyre Region (Long Term Plan) is an initiative by the South Australian Government, through SA Water, to establish a framework to ensure Eyre Peninsula has a secure water supply to meet increases in demand for the next 25 years.

**MEETING DEMAND**

In meeting future demand, SA Water acknowledges the need to manage existing resources sustainably while identifying new and alternative solutions to allow for the growth of the region. SA Water will work with relevant local, State and Federal Governments and the community to achieve this objective.

Effective water planning is now recognised as fundamental to managing the nation's water resources and competing uses. Communities across Australia are feeling the need to improve water planning processes to address growing demand for water and the uncertainty of climate change and stressed water systems. To this end the Federal Government has made water a key priority and is developing a "Water for the Future" Plan that will address issues of water security across both urban and regional areas of Australia.

Within this broader framework, the South Australian Government has a specific role to play in managing water resources across the State and has commissioned a range of infrastructure programs to secure water supplies to both metropolitan and regional communities. A great amount has been done in the past five years to build on our water infrastructure needs and secure our water supplies for the future – not least of which has been South Australia's leading role in helping to secure a national approach to managing the River Murray. Capital expenditure across the State over the past five years has increased by 52% and is set to increase a further 60% in the next five years.

Management of existing resources, encouraging responsible water use and sound infrastructure planning are critical to delivering water security for South Australia's future. Eyre Peninsula is experiencing many similar issues as broader Australia and the community is seeking a more proactive approach to long term water security through sustainable management practices and identification of new water sources.

In March 2008, the South Australian Government established the Office for Water Security to provide a single point focus for water security planning across government. A key task of the Office is to develop a State Water Security Plan (Water Security Plan) which, given the geographic and climatic variability across South Australia, will initially concentrate on the overarching strategies, policies and reforms needed to underpin water security. The focus will then shift to developing individual regional plans, tailored to the unique conditions and needs of each of the State's regions.

In the case of Eyre Peninsula, the engagement process undertaken during 2007/08 to inform the development of SA Water's Long Term Plan means the region is well placed to contribute to the state-wide planning process, and to quickly finalise a broad Water Security Plan for the Eyre Region. SA Water's Long Term Plan will in time form a key part of the

overarching Water Security Plan. The Water Security Plan will build on the initiatives identified in SA Water's final Long Term Plan by introducing new strategies to address those issues not within the scope of SA Water's infrastructure planning process.

In March 2007, community leaders came together for a Water Summit hosted by the Minister for Water Security, Karlene Maywald MP where water security planning was discussed. At this Water Summit, concern was raised as to the long term sustainability of the southern groundwater basins and the extent to which they could supply an increase in demand for water on Eyre Peninsula. With possible future growth anticipated in agriculture, mining and aquaculture along with the uncertainty of climate change, a robust long term plan was needed.

In order for the Long Term Plan to effectively address these issues, a number of key elements required careful consideration. These elements and their relationship to the Long Term Plan are documented in figure one.

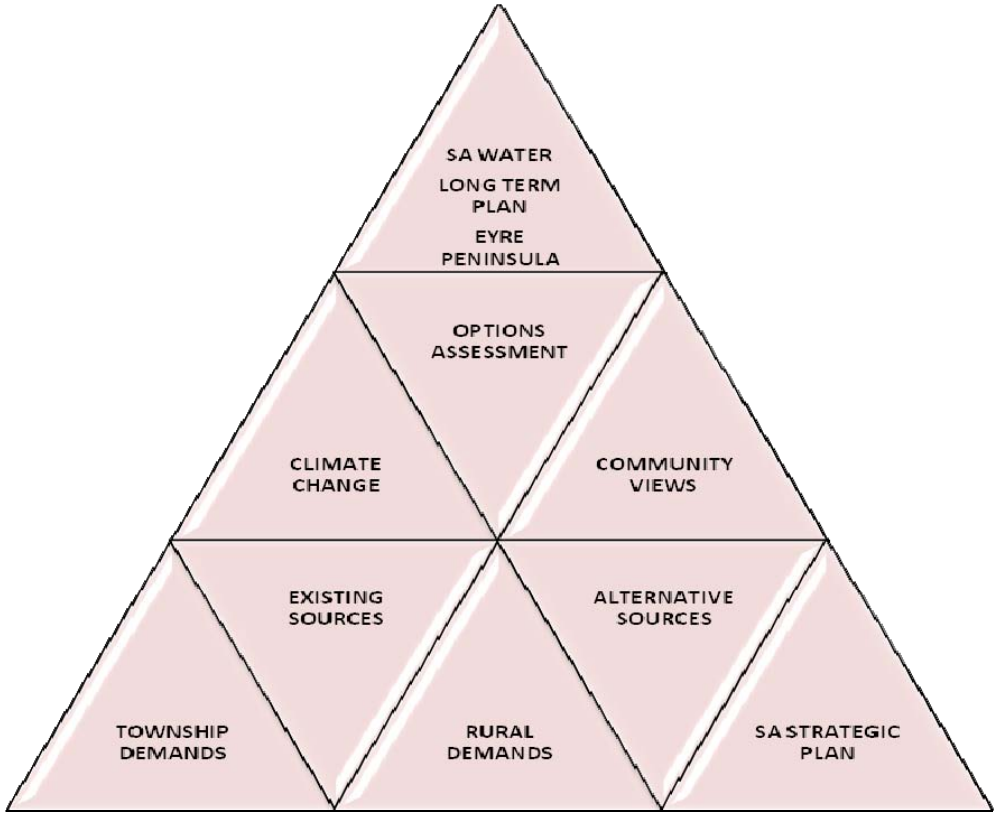



*Figure 1: Key Elements of the Long Term Plan for Eyre Region*

The recommendations detailed throughout the Long Term Plan have been developed in response to these elements. Relevant sections from South Australia's Strategic Plan, Water Proofing Adelaide, the State Natural Resources Management Plan, the Initial Eyre Peninsula Natural Resources Management Plan (inclusive of associated Water Allocation Plans) and Planning SA strategies have been referenced in the preparation of the Long Term Plan.

Included in the process has been a comprehensive review of SA Water's previous 2003 five year plan which has provided a basis for further technical and scientific research.

The recommendations made in the Long Term Plan directly respond to the various scenarios assumed from the research and may be summarised as follows:

- System enhancement
- New water sources

While the Long Term Plan promotes an integrated water cycle planning approach, many of these initiatives are being driven by the community and Local Government. A significant component of the Long Term Plan therefore focuses on the management of the potable water system. The Long Term Plan looks at opportunities for system enhancement and new water sources, as and when required, to complement demand management initiatives and community/local government water cycle initiatives already in place.

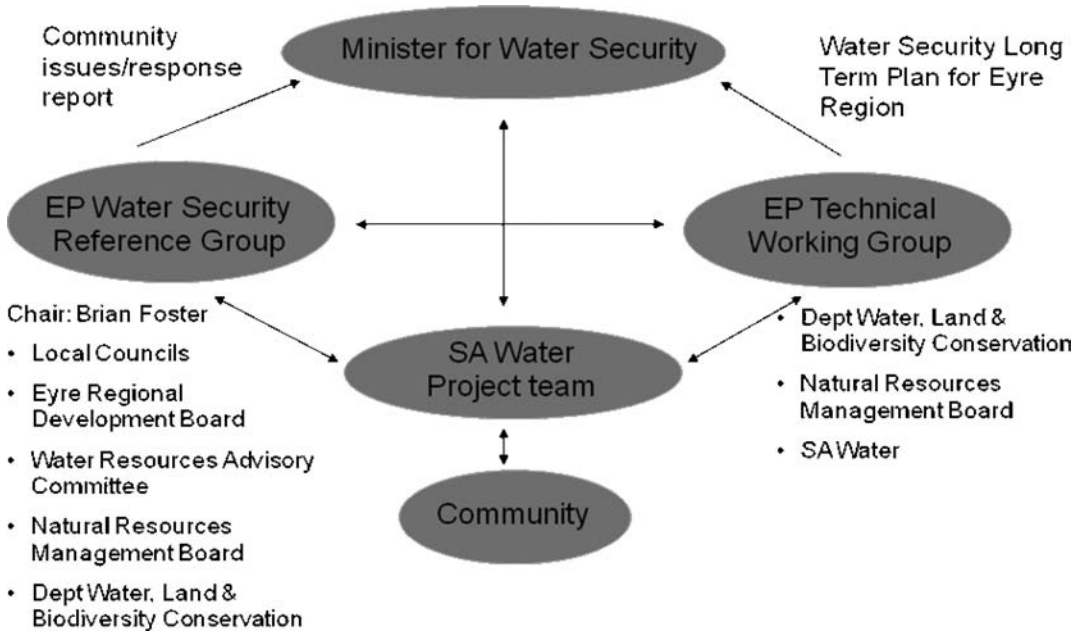
**COMMUNITY ENGAGEMENT**

Integral to the development of this Long Term Plan has been the level of involvement from the community in identifying key issues and reviewing water security options. Every property owner on Eyre Peninsula was given the opportunity to contribute to the community engagement process. Nineteen community information sessions were held in 13 towns at the commencement of the planning phase to canvass issues and concerns relative to water security. The 13 towns (inclusive of surrounding districts) participating in the workshops included Arno Bay, Ceduna, Cleve, Coffin Bay, Cowell, Cummins, Kimba, Lock, Port Lincoln, Port Neill, Streaky Bay, Tumby Bay and Wudinna.

Subsequently, five community forums were convened comprising volunteers from the information sessions. These forums have been established to provide input to the development of the Long Term Plan. The forums cover the following areas:

- Lower Eyre (Coffin Bay, Cummins and Tumby Bay)
- Eastern Eyre (Cowell, Cleve, Arno Bay and Port Neill)
- Far West (Ceduna, Streaky bay, Smoky Bay and Wirrulla)
- Mid West (Lock, Wudinna, Elliston, Kimba)
- Port Lincoln

To support the community engagement process and ensure contribution from local government and key organisations, a committee structure was established as illustrated below.




The Eyre Peninsula Water Security Reference Group (EPWSRG) comprises two representatives from each Eyre Peninsula Council (one elected member and one staff member), the Chair and Chief Executive of the ERDB, the General Manager and Program Manager from the EPNRMB, a representative of the EPNRMB Water Resources Advisory Committee (WRAC) and representatives of the Department of Water, Land and Biodiversity Conservation (DWLBC) and SA Water. The group is chaired by the Chair of the EPNRMB.

During the community engagement process a number of issues were raised with respect to water management and planning. The need to account for increases in demand by planning effectively for changes in population, industry growth and agriculture was expressed by many communities across the Eyre Peninsula. Other topics raised included the future of the Tod Reservoir, climate change, the need to consider alternative options to secure water supply and water quality as it relates to new sources.

While the above issues specifically relate and have been considered as part of the Long Term Plan there were a number of additional issues that sit outside, and in some instances, do not sit clearly within SA Water's areas of responsibility.

These issues have not been included in the Long Term Plan but have been documented in the Community Response Report which has been prepared to capture all issues raised during the engagement process and provide a means for the community to express their views on the Long Term Plan.

**DEMAND**

A fundamental component of the Long Term Plan was to ascertain likely demand projections for the Eyre Peninsula in order to determine the timing for the implementation of any future water security measure.

A review of SA Water's historical information on demands in Eyre Region indicated a steady decrease in the 5 year average demand since 2000-01, as shown in Figure 2.

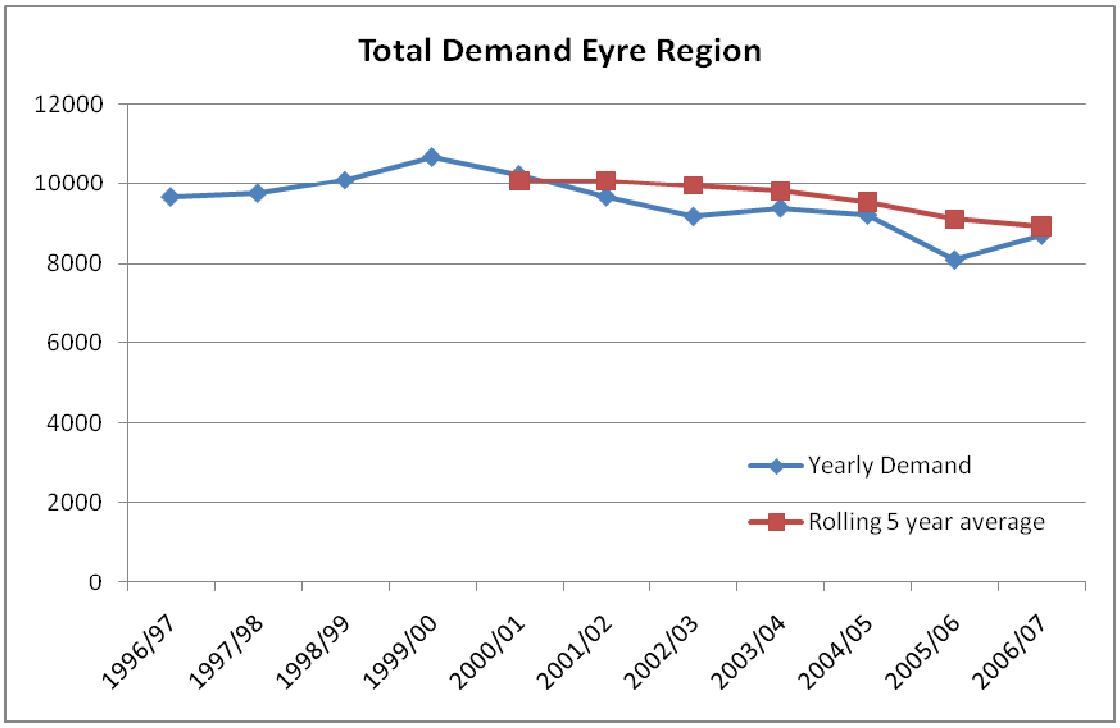



*Figure 2: Total historical demand, Eyre Region 1996 - 2007*

The decline in demand in Eyre Region is due to a number of factors that may include recent water restrictions (based on water conservation measures but specific to Eyre Region), increased use of rainwater tanks, community projects involving reuse of stormwater, wastewater reuse schemes established by Councils and changing farming practices. These factors can assist in reducing the overall reliance on SA Water sources.

While the 5 year average demand has been reducing in recent years, longer term water use data indicates that overall demand can fluctuate. Planning for the future has to include scenarios where demand increases.

In order to develop the projected demand, historical demand was split into township and rural demands using a 48:52 ratio based on historical information. These categories were then analysed separately.

**Township Demands**

Growth in the townships in Eyre Region were based on a demand increase of 1.5% per annum for residential properties and 0.3% per annum for non-residential properties. A review of historical figures suggested that these predictions are consistent with past trends.

An allowance was also made for any change to restrictions to be in line with Permanent Water Conservation Measures and the possible impact that this may have on overall demand.

Water demand from the tourism industry has been estimated to increase by 4% per annum as per advice received from the ERDB.

**Rural demands**

Based on industry information, an increase of 1.5% per annum in the demand for water in rural areas has been allowed.

**SA Water Projected Demands - Summary**

SA Water's demand projection, discussed above, suggests augmentation of the existing regional water supplies of Eyre Peninsula will be required in approximately 2014-15 as shown in the figure below.

It is understood that while a trend of increasing demand is possible, there will be some fluctuation and variability in this trend. To allow for this possibility and to allow for delivery time for options, it is proposed that further investigations be commenced immediately, with a new source to be available for supply in 2014-15 based on the projections shown in Figure 3. Should this demand projection change, then the date for a new source to be available will likewise change. The need for any such changes to be made will be the subject of the annual review process.

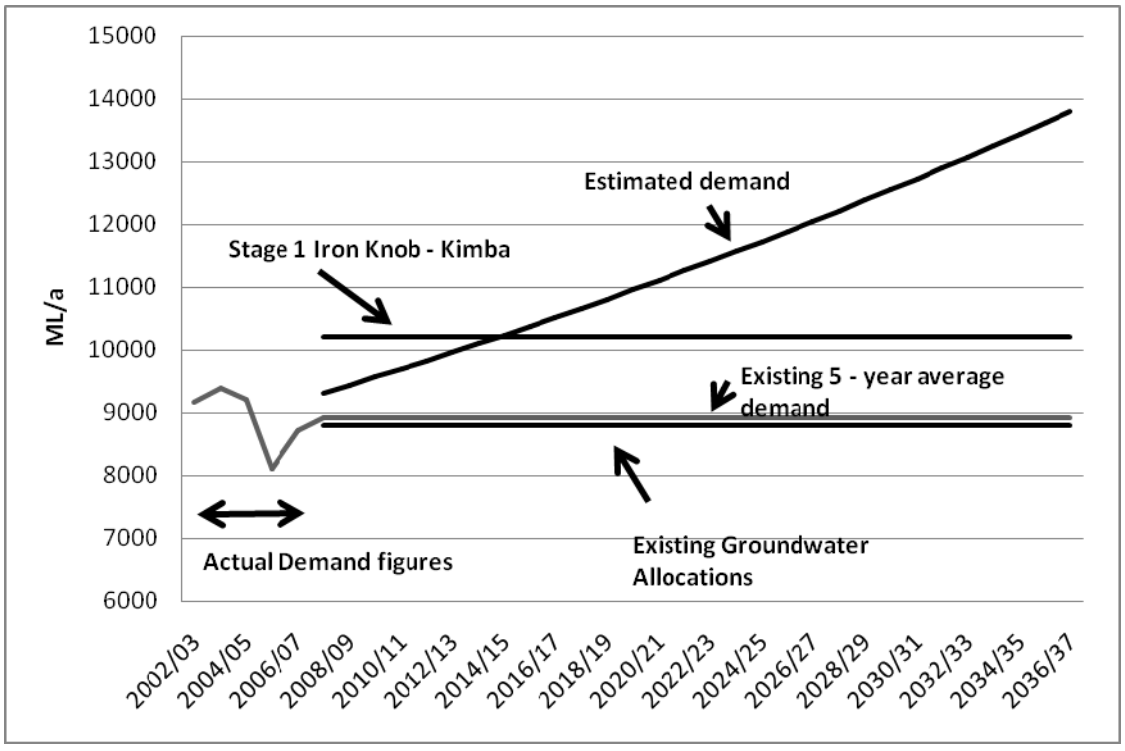



*Figure 3: Total future projected demand 2007 - 2037*

**Alternative Demand Projections**

In June 2007, Planning SA released a document titled "Population Projections for South Australia (2001–31) and the State's Statistical Divisions (2001–21)". The projections were

based on the 2001 Census of population and housing. When reviewed for Eyre Peninsula, the projected demand is lower than SA Water's calculations (Figure 4). If this low projection were to eventuate, then a new option would not be required until 2015-16.

In developing projection scenarios, Eyre Peninsula Councils were asked to provide information on the type, size, nature and timing of developments within their Council area. Some were able to provide significant information regarding prospective future developments, including dwelling numbers and timing. Others were able to provide some of these details. When assessed, the demand based on the statistical information provided by Councils is higher than the SA Water projection (figure 4). Under the high projection scenario, an alternative option could be required as early as 2011-12.

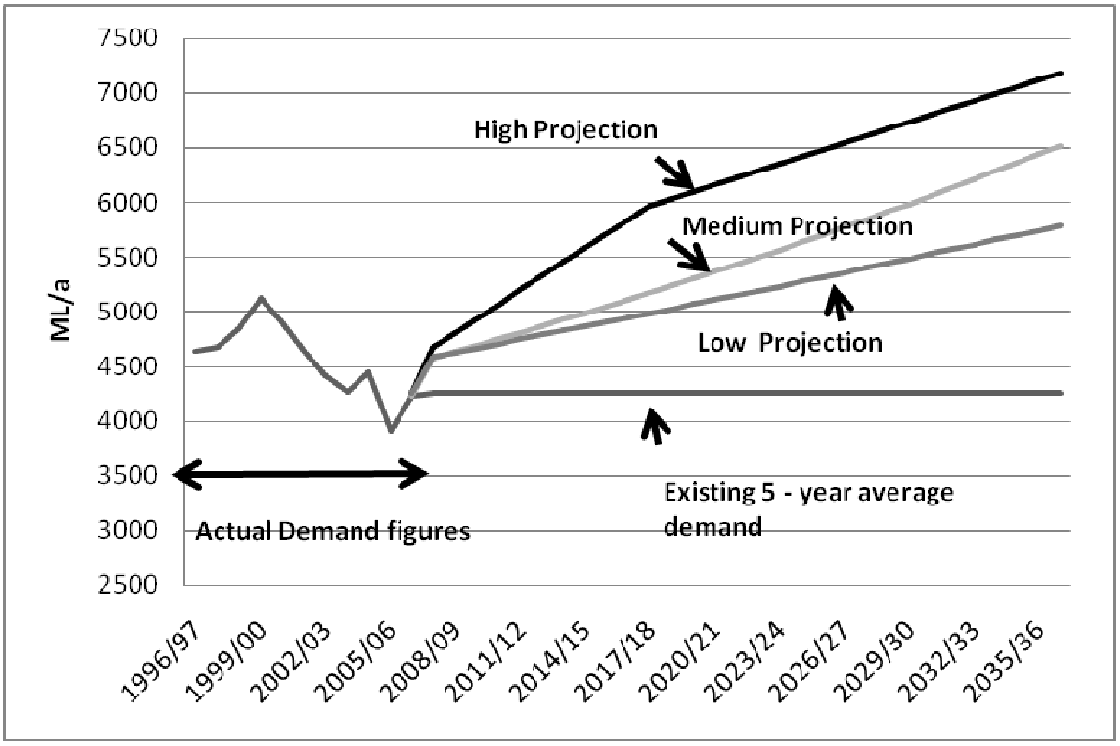



*Figure 4: Demand projection scenarios (Township component of demand only)*

While SA Water has worked to the medium projection scenario, this will be monitored and reviewed annually and changes made to the timing of the implementation of key options if required.

**Demand from Mining ventures**

SA Water's demand projection has allowed for growth in residential demand due to mining developments. There has however been no allowance for water demands from mining operations themselves. Mining companies will be expected to source their own water for extraction and mining operations.

In some situations, SA Water may be in a position to provide water requirements associated with trial or pilot mining schemes. Any supply provided by SA Water will be dependent on:

- SA Water's ability to maintain suitable supply to existing customers (including allowing for reasonable growth in this customer base, as outlined in this document)
- The availability of the resource and infrastructure capacity in SA Water's supply system at the time of application
- The conditions and legislative requirements of licenses issued to SA Water to allow us to provide a public water supply
- Specific arrangements with SA Water for full cost recovery of any augmentation to the supply or resource required to meet demand requirements from a mining venture

SA Water will assess applications from mining companies for water requirements associated with trial or pilot mining schemes on a case by case basis. SA Water will also assess opportunities to partner with mining companies on new resources (such as desalination plants) to provide water for mining operations as well as supplement the public water supply on a case by case basis and in the context of the strategy presented as part of this long term plan.

**EXISTING SOURCES**

While demand on Eyre Peninsula has been declining over the past eight years, the community, local Councils and other stakeholders anticipate that significant growth will occur on the Eyre Peninsula over the next 20 – 25 years. The installation of a pipeline from Iron Knob to Kimba has increased the available resource on Eyre Region by 15% providing some scope for an increase in demand over the short term. In addition, existing information provided by the DWLBC suggests that groundwater basins are currently managed sustainably and there is no indication at present that SA Water allocations from these sources will need to reduce significantly.

There is a strong link between groundwater levels and rainfall - that is, when there are high levels of rainfall, there are high levels of recharge. However, groundwater systems continue to discharge no matter what the seasonal conditions, so in times of low rainfall the overall groundwater levels fall. It's important for appropriate risk management practices to be in place to ensure groundwater extractions meet demands in a sustainable way.

Currently in the Uley Basin, about 60 wells are monitored for groundwater levels and 30 are monitored for groundwater quality (including salinity). Water levels are recorded monthly throughout the year and water quality measurements are monitored daily by SA Water at the major pumping stations.

Water allocation plans aim to balance social, economic and environmental demands against the long-term sustainability of the available resource, under a regime of below average rainfall and reduced recharge.

The basic objectives for managing the available groundwater resources include:

- Sustainable use of the underground water
- Encourage efficiency within new water using industries
- Efficient use of the water
- Equitable allocation of water
- Adequate portion of water to meet environmental demands

Annual allocations from each resource are calculated based on the past ten-year average of recharge, taking into account rainfall and aquifer storage. Consideration is also given to natural discharge required for environmental needs and the balance is then made available for extraction.

Current Water Allocation Plans ensure that even where there is a continued below average rainfall for extended periods of time there is still a capacity to reduce allocations and ensure the long-term sustainability of the resource. Water Allocation Plans do not stop the decline in groundwater levels, this can occur even if there is no pumping demand.

In addition to the current level of monitoring, over the next two years, the EPNRMB together with partners SA Water and DWLBC will undertake a significant research project titled the Groundwater Allocation, Planning and Management Project. With approximately $700,000 in funding from the Australian Government National Water Commission the research will increase understanding of the ground water resources and assist in developing future management plans. The project involves a number of different elements including:

- Reviewing the monitoring process for the groundwater resources
- Preparing new conceptual groundwater models
- Assessing impacts of climate change on recharge
- Investigating the relationship between soils, vegetation and recharge
- Undertaking predictive modelling to inform future groundwater allocation and management plans.

This research project commenced in February 2008 under the leadership of the EPNRMB. Outcomes from the study will contribute to the updating of the final Long Term Plan particularly as it relates to current groundwater allocations. The research will assist the EPNRMB to develop new Water Allocation Plans that will include a much more detailed assessment of the capacity of the resource to meet the demands for water on a continuing basis. Any change to allocations arising from this research will impact upon the timing for a new resource and will be addressed through the annual review process.

**River Murray**

The Morgan-Whyalla water supply system provides filtered River Murray water to the mid - North region of South Australia.

Water delivered via the Morgan – Whyalla pipeline is from SA Water's existing Country Allocation from the River Murray. Unrestricted, this allocation is 50 GL/a. However, recent drought conditions have seen the allocations drop to 31 GL/a in 2007-08.

In July 2007, Stage 1 of a pipeline and pumping system was commissioned which connects the Morgan-Whyalla system at Iron Knob with the Eyre Peninsula system at Kimba. This enables water to be transferred from the Morgan-Whyalla system to the Eyre Peninsula system. Stage 1 can supply up to 1,400 ML/a (over 15% of the Peninsula's total demand over last five years and 3% of SA Water's country allocation from the River Murray) to supplement Eyre Peninsula supplies. The pipeline's design allows further stages if necessary to augment this capacity.

BHP Billiton has announced that they have commenced an EIS (environmental impact statement) into a proposed desalination plant at Port Bonython to supply their expansion of Olympic Dam. In the long term there is the opportunity that the townships of Whyalla, Port Augusta, Port Pirie and the current connection from Iron Knob - Kimba could receive desalinated water.

**CLIMATE CHANGE**

Water sources that supply Eyre Peninsula, like most in Australia, are climate dependent. To further improve the understanding of the impact of climate change on water resources DWLBC has commissioned the Commonwealth Scientific and Industrial Research Organisation (CSIRO) to undertake a downscaling project that would, among other areas, cover the Eyre Peninsula. This project is due for completion by early 2009.

The Groundwater Allocation, Planning and Management Project recently commissioned by the EPNRMB is expanding the work undertaken by DWLBC to explore further the impacts by using the synthetic data on the hydrological models that represent the groundwater basins on Eyre Peninsula.

**Potential Impact on Demand**

As rainfall decreases and temperature and evaporation generally increase it is expected that the demand for further resources will rise.

Using this scenario SA Water have undertaken an analysis of population, stock numbers and climatic variables against demands between 1996-97 to 2006-07 financial years assuming that:

- average rainfall decreases by up to 10%
- average temperature increase by up to 1.2$^{o}$C
- annual evaporation increases by up to 5%.

This analysis indicated that climate change could potentially increase the overall Eyre Peninsula demand by 8-9% by 2030. The biggest impact is anticipated beyond 7 years. SA Water's demand projections forecast a new resource will be required by 2014-15 regardless of climate change. No adjustment has therefore been made in this timing for the

impact of climate change. Changes in demand (due to climate change) and in predictions of the impact of climate change will be assessed as part of the annual review as further information becomes available.

**SOUTH AUSTRALIA'S STRATEGIC PLAN**

The updated version of South Australia's Strategic Plan was released in January 2007 and contains seven main targets that are considered relevant to this Long Term Plan, namely:

- Reduction of greenhouse gas emissions
- Reduction of ecological footprint
- Managing water supplies within sustainable limits
- Supporting the development of renewable energy
- Maintaining regional share of SA's population (18%)
- Maintain minerals exploration
- Increase minerals production.

Consideration of the South Australia's Strategic Plan targets has been fundamental in the development of the Long Term Plan. To achieve the Strategic Plan's targets, Eyre Peninsula will need to share in and contribute towards them. A balance will need to be achieved that is practical and reasonable, for example any increases in population impact upon the ecological footprint, but impacts can be balanced through option selection and technology choices.

**OPTIONS**

A number of different options were considered to secure existing potable water supplies on Eyre Peninsula including:

- A desalination plant on the lower west coast of Eyre Peninsula
- A desalination plant on the north west coast of Eyre Peninsula
- Rehabilitation of the Tod Reservoir
- Augmentation of stage 2 of the Iron Knob to Kimba pipeline
- Construction of a new trunk main from Whyalla to Cowell
- Additional ground water resources.

The six options provide a number of alternatives to secure potable water supplies each with different benefits and risks. While the specific details for each option such as site selection for a desalination plant, pipeline routes and pumping stations will require further detailed assessment, the Long Term Plan identifies which combination of options may best meet predicted demands towards 2036–37.

The EPWSRG, when reviewing the list of possible options, suggested the addition of artificial catchments. The use of artificial catchments (or modified catchments) for rainwater harvesting was discussed in the original Eyre Peninsula Master Plan (PB, 2003) and their use

forms part of the objective and principles of the Eyre Peninsula Catchment Management Plan (part of the initial Natural Resources Management Plan).

If used as source water for a drinking water system, artificial catchments introduce a much higher risk than other existing sources. As it is a rainfall dependent option it is affected by climate variability and long term change and in times of drought such an option is unlikely to provide a sufficient supply. Natural catchments act as a barrier to filter out and biodegrade many pollutants that occur in catchments such as bird and animal faeces, pesticides and other pathogens. In a modified catchment this natural barrier is removed and many of these pollutants typically end up in the storage if appropriate treatment is not carried out.

While artificial catchments may have benefits for non-potable water supplies in certain environments, they are not considered appropriate to securing SA Water's existing potable supply for Eyre Peninsula.

**OPTION ASSESSMENT**

In order to determine the benefits and risks of each option a Multi Criteria Analysis (MCA) approach was used. This required options to be measured against specific criteria in order to determine the merit of each.

While an MCA is particularly helpful to prioritise options it should only be considered as a supporting tool as there may be other externalities which may influence certain decisions.

In general, MCA processes use a "triple-bottom line" approach which considers environmental, social and economic factors. As part of this analysis, a fourth category was added namely 'Technical and Functionality' to ensure that the most sustainable solution is also a practical solution.

An MCA provides significant benefits compared with other tools, such as:

- Providing a framework for incorporating complex and large amounts of information
- Combining quantitative and qualitative aspects of decision making
- Is able to highlight the strengths and weaknesses of any particular option
- Provides an open and transparent methodology which can involve stakeholders
- Can incorporate a diverse range of opinions and expertise.

Criteria were grouped under the four main categories of sustainability, namely:

- Environment
- Economic/Commercial
- Social/Community
- Technology/Functionality.

This process enabled the planning team to identify those options that will deliver the most benefit for the security of Eyre Peninsula's potable supply.

Within the economic criteria, a broad cost analysis was undertaken on high level concepts for comparative purposes only. For the purposes of the analysis, notional sites were considered and will require further investigation during the next stage of project development. Allowances were made for provision of necessary power supplies and land acquisition but did not include the costs for vegetation offsets that may be required with the clearance of native vegetation or to make the option carbon neutral.

Given this, a broad capital cost estimate has been selected for each option in order to allow some flexibility subject to further detailed analysis on the preferred option(s). These estimates are presented in Figure 5.

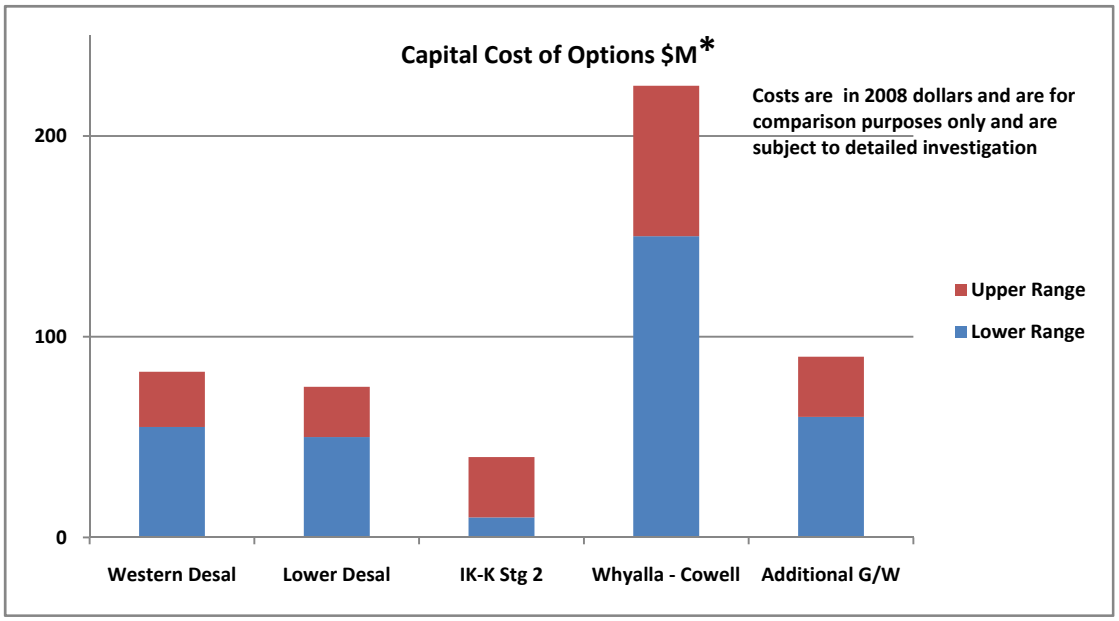



*Figure 5: Estimated capital cost.*

* Notes:

- No costs have been prepared for the option of rehabilitating the Tod Reservoir as there is not sufficient information to make a suitable cost estimate.
- The Whyalla to Cowell pipeline option would involve the construction of a new pipeline connecting Whyalla to the existing water distribution system at Cowell, a distance of approximately 120 km. It would also include several booster pump stations and significant augmentation to the existing East Coast Main. Native vegetation would also need to be offset against significant environmental benefits. These issues contribute to the high cost of this option.
- A large storage may be required in the Iron Knob to Kimba Stage 2 pipeline to address water quality issues. The lower range cost does not allow for this storage while the upper range includes a storage plus contingencies as per the other options.

On the basis of cost alone, Stage 2 of the Iron Knob to Kimba Pipeline is the most economically viable of the five options costed. However, when considered in relation to the volume of water able to be produced, the lower desalination plant appears more favourable.

Initial estimates show a slightly higher cost for a desalination plant on the north-west coast near Ceduna. However, this is due largely to system integration estimates and will require further analysis.

**STRATEGIES**

The primary purpose for SA Water's Long Term Plan is to identify those options required to secure a water supply to Eyre Peninsula to meet projected demand for the next 20 – 25 years. These options are intended to complement other initiatives including water conservation measures and community water schemes either already in place or to be considered by the Office of Water Security through the water security planning process.

The MCA identified two options for further investigation. These options will form the basis for securing Eyre Peninsula's future potable water supply with implementation to be staged in accordance with the outcomes of the recommended investigations discussed below.

**System Enhancement**

In 2007 SA Water completed the construction of a pipeline extension from Iron Knob to Kimba with an approximate capital cost of $48.5 million. Stage 2 would involve further system enhancements to allow an additional 900 ML/a to be transferred to Lock township.

The implementation of Stage 2 of this system and the introduction of a new source water to the western region of the Eyre Peninsula via this pipeline would assist in the reduction of scaling thereby improving water quality.

While the lead time for Stage 2 of the Iron Knob to Kimba pipeline is favourable (approximately 6 – 12 months) the additional volumes of water produced are relatively low in comparison with other options and this will need to be considered in light of future demand projections.

**New water sources**

The Long Term Plan also recommends further investigation into a seawater desalination plant located in the lower region of Eyre Peninsula that could provide approximately 2,200 ML/a or 16% of the projected 2036-37 demand.

By constructing a plant in the lower region of Eyre Peninsula, the close proximity of the Uley South Borefield, the Uley South main (transporting groundwater from the Uley South to the North Side Hill Tanks) could be used to transport desalinated water into the reticulated water supply network of Eyre Peninsula. From North Side Hill Tanks, desalinated water can then be pumped throughout the reticulated water supply system of Eyre Peninsula, including Port Lincoln and the East Coast system.

Further work on the desalination proposal will address its complexity and environmental sensitivities including site selection, baseline environmental investigations, power supply, Aboriginal and Cultural Heritage assessments and system augmentation.

A private consortium in partnership with Ceduna Council prepared a submission for funding to the Federal Government in 2006 to construct a desalination plant near Penong on the north west coast of Eyre Peninsula to supply potable water to Ceduna and surrounds. The submission for funding included reference to the use of alternative technologies and the opportunities for the re-use of the brine in a commercial salt works.

The MCA undertaken by SA Water suggested the lower desalination plant to be a more favourable location based on standard Reverse Osmosis technology. This analysis provides a benchmark for further research and review on the benefits and risks of desalination on the west coast of Eyre Peninsula.

It is acknowledged however that should other technologies be adopted (such as those reference in the 2006 submission for funding by Ceduna Council and the private consortium) the MCA scores for the north west desalination plant may be improved. Such delivery mechanisms would be considered in any procurement process and the benefits measured against the further investigations outlined in this plan.

For the purposes of further investigations existing standard technologies will continue to be applied so as not to compromise any future private sector submission should a decision be made to build a desalination plant on the north west coast.

**Process**

The demand projections adopted in this Long Term Plan indicate that a new resource will not be required until 2014-15. Clearly if demand projections are higher, as suggested using Council projections, then a new resource may be required earlier (approximately 2011-12).

While the annual review process will monitor demand, further work will be required in the short term to determine which option should be implemented first to meet any demand increase. The Long Term Plan therefore recommends the immediate implementation of a three phase process as follows:

*Phase 1 - Investigation (2008/09)*

- Undertake further investigations into Stage 2 of the Iron Knob to Kimba Pipeline
- Commence further investigation into a desalination plant on the lower west coast of the Peninsula
- Continue investigations into the merit of a desalination plant on the upper west coast near Ceduna or Penong in order to effectively compare with the lower west coast option
- Investigations to commence in 2008-09 financial year (investigation scope to be finalised)
- Investigation progress to be reported to the Water Security Reference Group at the 12 month review (November 2009)
- Preferred option for implementation selected
- Determine timing for implementation based on projected demand 12 month review.

*Phase 2 – Preferred Option*

- Complete any outstanding work required for the preferred option for implementation
- Prepare project scope
- Determine timing for implementation based on projected demand 12 month review.

*Phase 3* **-** *Implementation*

- Ensure preferred option is implemented in sufficient time to meet projected demands (currently predicted in 2014-15)
- The remaining option to be implemented subsequently as required dependent upon demand.

**IMPORTANT ISSUES**

The many efforts of the community to conserve and harness water are fundamental to planning effectively for the future. The importance of these water management initiatives by the Eyre Peninsula community cannot be underestimated both in terms of the reduced demand on SA Water supplies, and in heightening the awareness of the need for water conservation in the community. The Eyre Peninsula community is a leader in South Australia in water conservation and management and this should continue to be recognised in water security planning.

As previously stated, the primary purpose of this Long Term Plan is to address supply and demand for potable water for the Eyre Peninsula for the next 20 – 25 years. During the community engagement process however, a broad range of issues were raised, a number of which are unrelated to this purpose. These issues have been documented in the Community Response Report for further consideration by Government. SA Water has however identified opportunities to contribute in the management of some of these issues and these are documented under the following five key areas.

**Water Conservation**

Water conservation initiatives are fundamental to water security and the Eyre Peninsula community has embraced a range of measures including the installation of rainwater tanks and various household appliances that assist in reducing consumption. These measures will continue to be supported through the South Australian Government's $H_2OME$ rebate scheme.

In some communities there is a strong desire to gain greater independence from the potable system through water conservation plans and projects. SA Water acknowledges its role as a contributor to encouraging responsible water use through such projects and programs. Where appropriate, SA Water will work together with relevant authorities to assist communities looking to actively conserve water.

SA Water will also continue to work closely with industry and business to reduce water use through the preparation and implementation of water efficiency plans.

South Australia has moved from a two tiered to a three tiered water pricing system to ensure high water use is appropriately charged. This initiative will help promote water conservation across the State as well as on Eyre Peninsula.

**Community Water Schemes**

Ongoing investment in community water schemes and domestic water harvesting is an important part of the overall water supply picture on Eyre Peninsula. Such initiatives have been instrumental in reducing the demand on SA Water supplies. Stormwater harvesting, wastewater reuse and installation of rainwater tanks while not directly administered by SA Water should continue to be promoted by local government and relevant State Government Agencies across Eyre Peninsula.

Specific initiatives to assist communities seeking to initiate community projects that replace potable water with alternatively sourced water such as reuse of wastewater and stormwater harvesting, where sustainable benefits can be demonstrated should be encouraged.

In Port Lincoln for example, the Council initiated wastewater reuse scheme has provided an additional water source for the irrigation of open space. This initiative is an important contributor to the overall management and conservation of existing supplies and SA Water will continue to work with the City of Port Lincoln to improve overall quality of the reuse water and usage.

SA Water is currently working towards improving the salinity of the wastewater at Port Lincoln which will lead to improvements in the quality of wastewater provided to the reuse scheme. Two projects relevant to this objective include:

- Reducing infiltration of saline groundwater in the sewer network
- Splitting the wastewater treatment plant into a high saline and lower saline stream to better manage waste disposal from the fish processing industry.

The average annual reuse from the plant by the City of Port Lincoln Reuse Scheme has been 62 ML during the past four years.

It is estimated that the existing users of the Port Lincoln effluent reuse plant could increase their annual usage to approximately 120 ML/a. In order to increase annual reuse above 120 ML/a, it would be necessary for additional users of treated effluent to be identified, potentially within the township of Port Lincoln, with additional pipelines installed in order to supply the treated effluent.

Other opportunities exist to capture stormwater through reinstating abandoned water harvesting infrastructure. The Eyre Peninsula Catchment Report (Eyre Peninsula Catchment Management Board, 2004) notes that there are more than 200 abandoned water harvesting schemes across Eyre Peninsula, including dams, reservoirs and tanks. The ownership and management over these sites varies and includes private owners, Local Councils, Department for Environment and Heritage and SA Water.

An example of recommissioning older projects is the Polda Rock scheme, originally commissioned in the 1920s, which was reinstated in 1998 to provide irrigation water for local amenities in the Wudinna township, some 7 km away. On average 40 ML/a can be harvested from this scheme, which exceeds the average volume of 25 ML/a used on public spaces in the township of Wudinna.

It is recommended that an investigation be undertaken into the abandoned water harvesting schemes currently owned by SA Water to determine future ownership and management options.

**Venus Bay, Port Kenny and Coffin Bay**

Three options to supply water to the towns of Venus Bay and Port Kenny were also considered in the Long Term Plan. These towns are currently not connected to the Eyre Peninsula water supply network.

The feasibility of providing a water supply to Venus Bay and Port Kenny will need to be the subject of commercial discussions between the South Australian Government, SA Water and the District Council of Elliston.

The options available for augmenting supply to Coffin Bay were also reviewed including additional allocation from the existing groundwater supply (Coffin "A" lens), seawater desalination and a pipeline from the Eyre Peninsula system connected at Uley Wanilla.

Investigations into the extent of the lens at Coffin Bay are continuing however, the initial results indicate that the aquifer may be able to support additional extraction. In light of this information, SA Water will look to review the augmentation charge (including the use of funds already collected) for development at Coffin Bay.

**Water Quality**

Given the community concern in relation to water quality, some consideration has been given to possible options that could be further investigated independently from the water security initiatives and recommendations.

The issue stems from the calcium carbonate content of the water on the Eyre Peninsula, which tends to be precipitated when water temperature increases. This can occur in above ground steel mains, but more particularly in hot water services and in small diameter agricultural pipes that may run above ground for many kilometres within customers' properties.

It has been suggested that hardness could be reduced across the entire network by installing a large scale water softening plant. While such a plant would not directly increase the available resource on the Eyre Peninsula, it would reduce the salinity of treated water through less saline discharges to the wastewater system from individual water softeners. This may increase the range of end uses for recycled water schemes.

There are issues associated with such practice on a large scale. A regional water softening plant would require significant quantities of chemicals, including over 3 tonnes/day of lime. This process would generate significant quantities of waste "sludge" that would have to be removed to landfill, or treated further. In addition, while it is understood that household water softeners are widely used in Eyre Region, it is considered impractical in large scale applications.

The Western Australian Water Corporation has adopted the CALGON (sodium hexametaphosphate, or "SHMP") treatment option to reduce the build up of scale in some of their water supply systems. It is possible that the use of SHMP represents a cost effective means of dealing with the scaling issue on Eyre Peninsula and could assist the farming community.

The Long Term Plan recommends further investigation of SHMP and engagement with the community as to its practicality and application for the Eyre Region. Other ways of reducing hardness will be considered in parallel with this investigation.

**Future of Tod Reservoir**

Tod Reservoir does not currently form part of the water supply system on Eyre Region, however it is still an integral part of the overall contingency plan for the system. If recreational access is to be permitted to this site in the future, then funding would be required to address land management, public safety issues, water quality issues and emergency contingency planning issues associated with opening the reservoir land for limited public use. The nature of the uses permitted would be subject to satisfactorily addressing these issues. The financial and resource implications of permitting access to SA Water's reservoirs would be substantial.

In the event that recreational use of the reservoir was permitted, SA Water would look to other state or local authorities to manage the upgrade of facilities and subsequent annual costs. This would need to be done under a memorandum of understanding regarding the use of the Tod Reservoir as water supply during emergency situations.

**Contingency Planning**

It should be noted that SA Water has various contingency plans in place should a sudden change occur due to unforeseen circumstances. For example, sudden and unexpected changes to stock numbers, or a substantial reduction in allocation from the Southern Groundwater basins may result in the need for an additional resource earlier than anticipated. In such an event, SA Water would implement its contingency planning that would ensure supplies are maintained to the Eyre Region.

**ANNUAL REVIEW**

The Long Term Plan recommends an annual review of demand projections and key recommendations in line with SA Water's Long Term planning procedures.

For Eyre Peninsula, a number of key triggers have been identified that will impact water security. These triggers include sudden increases in population, increases in rural and township demand, decreases in water allocation from the Southern Groundwater basins and uncertainty of climate change. In consultation with other relevant agencies, including the DWLBC and the EPNRMB, SA Water will annually monitor and review the initiatives documented in the Long Term Plan.

In this context, it is recognised that there is potential for a major mining expansion on Eyre Peninsula although this expansion cannot yet be quantified. There is likely to be an increase

in demand from service industries and residential development in townships as a consequence. Other industries such as aquaculture and tourism could also expand significantly adding to future demands on the potable water supply. Again, these increases at this point are difficult to quantify and will therefore be subject to the annual review process undertaken by SA Water.

The EPWSRG will meet annually (November) and SA Water will report against the Long Term Plan's demand assumptions at these meetings. The November timing will also allow the EPNRMB to report the water allocation plan for the forthcoming year.

It is also expected that as part of the Annual Review process, that members of the Water Security Reference Group will provide the SA Water project team with updated information on projected development in their respective council areas one month prior to the annual meeting of the EPWSRG.

A mechanism will also be established to ensure the community remain informed of the status of the Long Term Plan and any relevant changes.

A key outcome from the Annual Review process will be to confirm trends and whether the timing proposed in this report for the implementation of the recommendations is appropriate or needs to be amended. The first annual review process will therefore be critical in assessing these timeframes in relation to any changes in demand.

**CONCLUSION**

Water security is the responsibility of a range of parties including the community, water authorities and the three levels of Government. While this Long Term Plan focuses on the role of SA Water, water security can only be delivered through a range of parallel initiatives driven by other authorities and embraced by the community. The National Water Commission now has an integral role in water planning across Australia through policies and funding initiatives. The South Australian Government has given high priority to proactive water security planning by establishing the Office for Water Security to develop a State Water Security Plan. This work will include Eyre Peninsula by expanding on the work already undertaken by SA Water through this planning process. In addition, Local Governments are contributing through local water harvesting and recycling projects and the EPNRMB continue to research and manage the existing ground water resources. Combined, these projects and initiatives will complement the strategies proposed in this Long Term Plan.

With the ongoing support of the community and local, State and Federal Governments, this Long Term Plan when finalised will enable SA Water to deliver a sufficient water supply to meet increases in demand over the next 25 years.

This Long Term Plan aims to identify sustainable initiatives that can compliment a continued emphasis on water conservation and demand management while enabling the region to grow and develop with water security.

**SUMMARY OF SA WATER INITIATIVES**

| STRATEGY | DELIVERABLE | TIMING | LINKAGES |
|---|---|---|---|
| **Annual Review of Long Term Plan** | | | |
| Review demand projections and progress against key recommendations | Confirm existing trends and whether timing for implementation of recommendations proposed in this report is appropriate or needs to be amended | Yearly (Commencing Nov 2009) | Eyre Peninsula Water Security Reference Group<br>EPNRMB<br>DWLBC |
| **Water Security (System enhancement and new water sources)** | | | |
| Undertake investigation and feasibility study into desalination and compare with system enhancement | The staging for the implementation of the preferred water security options are identified | Nov 2009 | Private Consortium and Ceduna Council Proposal |
| **Water Quality** | | | |
| Investigate possible initiatives (e.g. SHMP) and engage with the community as to their practicality and application for the Eyre Region | The feasibility of improving water quality through this method is identified | Nov 2009 | West Australian Water Corporation |
| **Small Town Supply** | | | |
| Undertake commercial discussions with the District Council of Elliston regarding the provision of a water supply to Venus Bay and Port Kenny | An appropriate water supply is identified for Venus Bay and Port Kenny including options for delivery | Nov 2009 | Government<br>District Council of Elliston |
| Continue investigations into the extent of the lens at Coffin Bay and review the augmentation charge (including the use of funds already collected) for development at Coffin Bay | Augmentation charges for Coffin Bay are reviewed in association with an increase in knowledge concerning the Coffin A lens | Nov 2009 | EPNRMB<br>DWLBC |
| **Groundwater Basins** | | | |
| Contribute to the Groundwater Allocation, Planning and Management Project | Project enables an increase in understanding of the ground water resources assisting to develop robust water allocation plans | February 2010 | EPNRMB<br>DWLBC<br>National Water Commission |

| | | | |
|---|---|---|---|
| **Water Conservation** | | | |
| Embrace opportunities to partner with Local, State and Federal Government authorities to assist communities looking to actively conserve water | Water Conservation projects are identified in partnership with other relevant agencies | Ongoing | Federal, State and Local Government authorities |
| Work closely with industry and business to reduce water use through the preparation and implementation of water efficiency plans | Industry and business assisted to conserve water | Ongoing | Industry |
| **Community Water Schemes** | | | |
| Investigate abandoned water harvesting scheme sites currently owned by SA Water to determine future ownership and management options | Future of sites resolved | Nov 2009 | Local Government |
| **Tod Reservoir** | | | |
| Hold discussions with the District Council of Lower Eyre and the District Council of Tumby Bay to determine an appropriate strategy for managing the issues associated with the possible recreational access to the facility | Possibility to allow recreational access determined and if allowed nature of activity permitted. | Nov 2009 | District Council of Lower Eyre<br>District Council of Tumby Bay |
| **Recycled Water – Port Lincoln** | | | |
| Reduce infiltration of saline groundwater in the sewer network | Quality of wastewater available for reuse is improved | Ongoing | |
| Split the wastewater treatment plant into a high saline and lower saline stream to better manage waste disposal from Fish Processing industry (subject to industry support) | Quality of wastewater available for reuse is improved, Port Lincoln Fish industry are able to dispose of waste and environmental benefits. | 2010 | Fish Processing Industry<br>Environment Protection Authority<br>ERDB |
| | | | |

This table represents SA Water's contribution to a number of areas. It is not intended to be a comprehensive list of all initiatives that may be undertaken by other agencies.

# 1 Background

## 1.1 References

Sections of the following chapter have been reproduced with permission from the following sources:

- Water Security Fact Sheets:
  1. Water Roles and Responsibilities
  2. Groundwater Resources
  3. SA Water Long Term Plan
  4. Frequently Asked Questions
- www.epnrm.sa.gov.au/WaterResources/EyrePeninsulaWaterSecurityLongTermPlan.aspx (under the sections Project Overview and SA Water's Long Term Plan)
- www.epnrm.sa.gov.au/WaterResources/EyrePeninsulaWaterSecurityLongTermPlan/EyrePeninsulaWaterSecurityReferenceGroup.aspx

Appendix A includes a general location map for reference.

## 1.2 Eyre Peninsula Water Summit March 2007

On Wednesday 7 March 2007, a Water Summit was hosted by the Minister for Water Security, Karlene Maywald MP, to progress a way forward to deliver water security for Eyre Peninsula in the future. A variety of issues were discussed including:

- Water resources information (data collection and reporting)
- Water resources planning (commitment to Master Planning process)
- Water resources assessment (investigations and reporting of findings)
- Community awareness (confidence and transparency)
- Tod Catchment
- Native vegetation and recharge (current and future investigations)
- Land management issues (invasive species and process to solve)
- Bushfire prevention (management of native vegetation and prescribed burning)
- Water restrictions and State parity
- Desalination
- Storm water and effluent harvesting and re-use systems

The following outcomes were developed as a consequence of the summit:

- Prepare a Long Term Water Infrastructure Plan for Eyre Peninsula with a report to be tabled by May 2008
- Engage the Eyre Peninsula community in the development of a Long Term Plan
- Identify information needs of Eyre Peninsula communities and develop tools and strategies to meet needs (including fact sheets, FAQs, newspaper features)

- Establish a committee structure(s) involving representatives of the local councils and key government agencies to oversee the review of the Long Term Plan
- Give consideration to council issues raised at the summit

Following the summit, SA Water prepared the scope for the Long Term Plan , including the establishment of the following key objectives:

- Determine a long term strategy for water management on Eyre Peninsula for the next 25-year period and review existing 2003 Master Plan
- Enable SA Water to identify future projected growth and demand of communities
- Identify potential growth impacts on infrastructure systems
- Identify local government and community issues to be addressed through Long Term Plan and those to be managed through independent processes
- Ensure local communities across Eyre Peninsula are engaged in development of plan

## 1.3 Long Term Plan Overview

Long Term Plans aim to ensure that SA Water bulk systems (including water sources, treatment plants and transfer pipelines) have capacity to meet customer needs over a 25-year period by:

- Analysis of current status of water resource and bulk systems
- Estimation of population growth
- Analysis of development, by sector growth
- Allowance for environmental and sustainability issues, including climate variability and change
- Consulting external local and state stakeholders and communities
- Establishment of an internal technical reference group.

The SA Water Long Term Plan for Eyre Region builds on the previous *2003 Eyre Peninsula Master Plan* report with reference to the following:

- Water Proofing South Australia (by incorporating an increased emphasis on integrated water cycle planning and reuse principles indicated by the Water Proofing Adelaide Study)
- State Natural Resources Management Plan, Initial Eyre Peninsula Natural Resources Management Plan(including associated Water Allocation Plans)
- Planning SA planning strategies
- South Australia's Strategic Plan

As part of this process SA Water has:

- Considered when and where the increased volumes of water will be required as a defined upgrade path to continue the security of supply for Eyre Peninsula
- Undertaken the development of technical options with the assistance of specialist consultants

- Undertaken extensive consultation with Eyre Peninsula communities, local and State government agencies and authorities

The plan will guide the scheduling of capital works for securing water supply on Eyre Peninsula.

The Eyre Peninsula Natural Resources Management Board has assisted in the development of the Long Term Plan by providing information relevant to the current status of the water resources. In addition, the Board has supported the community engagement process through active contribution as a stakeholder and by looking to ensure issues and opportunities raised through the community forums are adequately explored.

The elements considered as part of SA Water's Long Term Plan are depicted in the figure below.

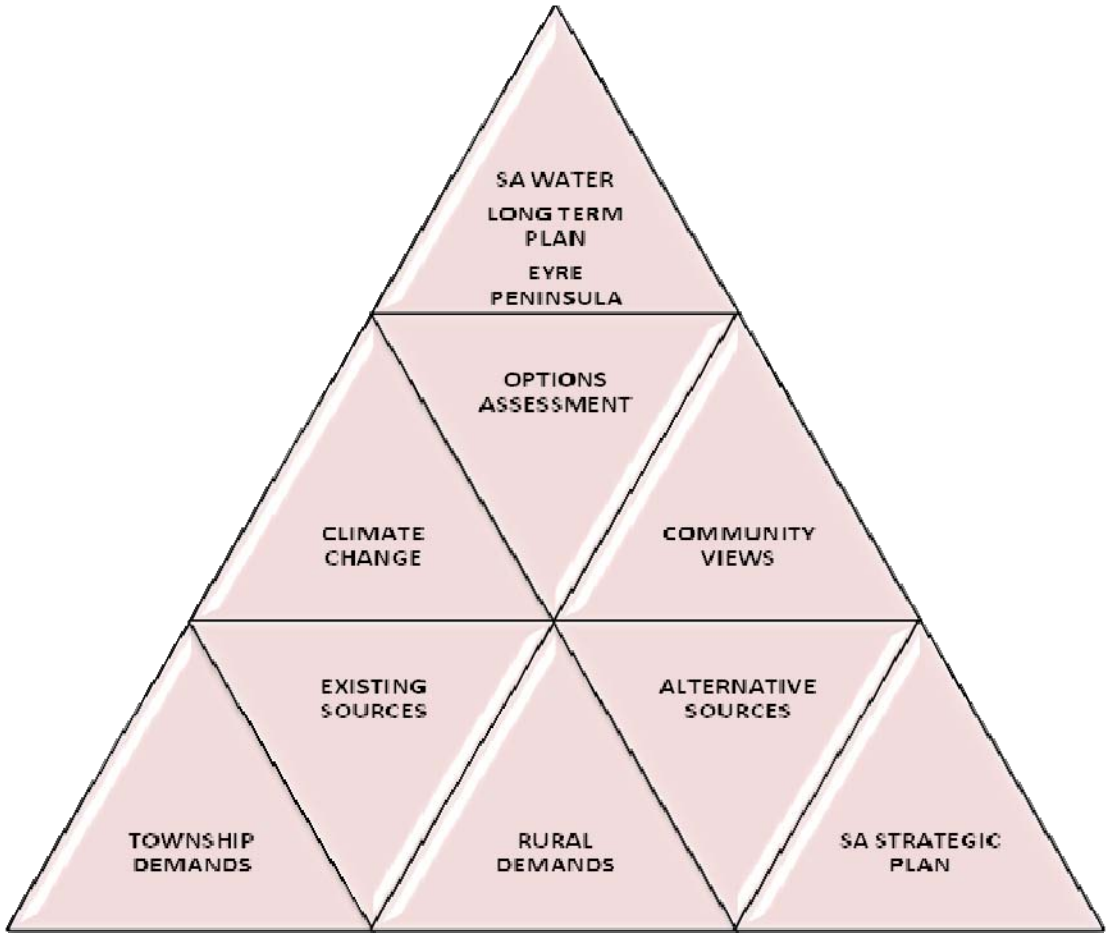



**Figure 1-1: Issues to be considered as part of SA Water's Long Term Plan**

## 1.4 Water Security Plan

In March 2008, the Government established the Office for Water Security to provide a single point focus for water security planning across government. A key task of the Office is to develop a State Water Security Plan for South Australia (Water Security Plan) which, given the geographic and climatic variability across South Australia, will initially concentrate on the overarching strategies, policies and reforms needed to underpin water security. The focus will then shift to developing individual regional plans, tailored to the unique conditions and needs of each of the State's regions.

In the case of Eyre Peninsula, the engagement process undertaken during 2007/08 (discussed in Section 2) to inform the development of SA Water's Long Term Plan means the region is well placed to contribute to the state-wide planning process, and to quickly finalise a broad Water Security Plan for the Eyre Region. SA Water's Long Term Plan will in time form a key part of the overarching Water Security Plan. The Water Security Plan will build on the initiatives identified in SA Water's final Long Term Plan by introducing new strategies to address those issues not within the scope of SA Water's infrastructure planning process.

## 1.5 Project Reporting Structure

From the Eyre Peninsula Water Summit in March 2007 a project reporting structure was established. The structure aimed to ensure:

- The Minister for Water Security was well briefed on issues emerging from the consultation process
- Coordination of inputs from other key government agencies
- Opportunity for Eyre Peninsula local government and other stakeholders to have input to the long term planning process

To achieve these objectives, three groups were established

- Water Security Reference Group (WSRG)
- Water Security Technical Group (WSTG)
- SA Water internal project team

The reporting arrangements of the various parties in the project are illustrated in Figure 1-2, below.

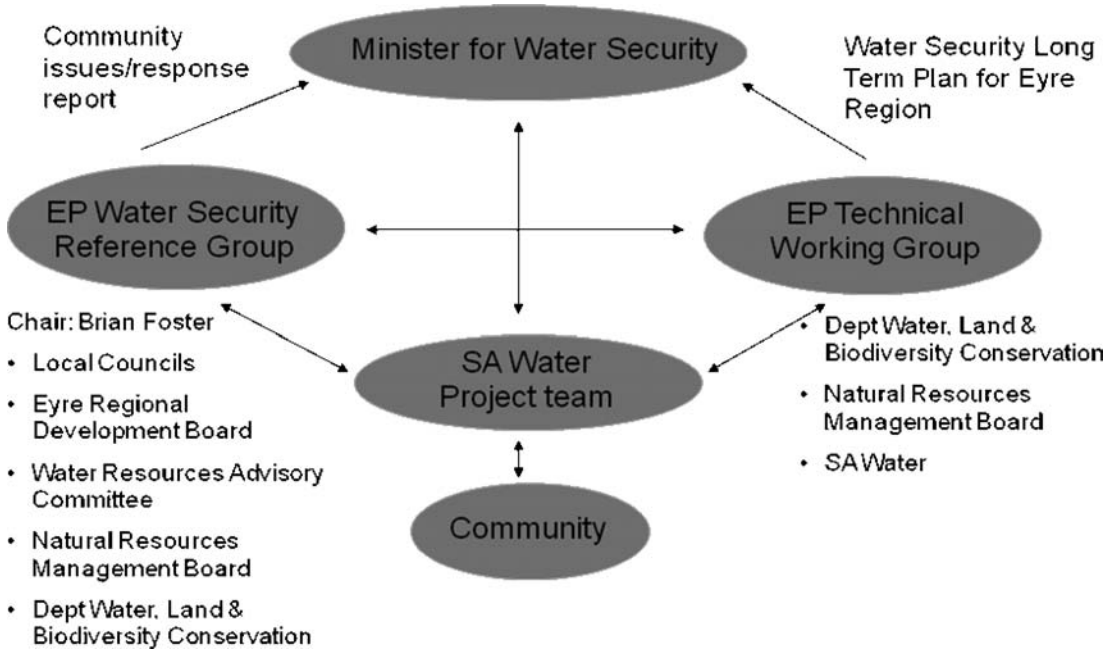



**Figure 1-2: Project reporting structure**

### 1.5.1 Water Security Reference Group (WSRG)

The terms of reference for the Water Security Reference Group (WSRG) were confirmed at the group's meeting on 22 November 2007:

1. To oversee the review of Meeting Future Demands SA Water's Long Term Plan for Eyre Region (25 years) prepared by SA Water
2. To provide local knowledge and intelligence to inform the review process
3. To raise issues of concern and ideas relating to the review
4. To provide advice and assistance in the communication and consultation with local communities
5. To provide key feedback to the work of the Eyre Peninsula Technical Working Group
6. To receive, comment and discuss printed materials

A set of communication protocols was also agreed by the group and these are referenced in the Community Response Report.

The Reference Group members are:

- District Council of Ceduna
- District Council of Cleve
- District Council of Elliston
- District Council of Franklin Harbour
- District Council of Kimba
- District Council of Le Hunte
- District Council of Lower Eyre Peninsula
- City of Port Lincoln
- District Council of Streaky Bay
- District Council of Tumby Bay
- Whyalla City Council
- Eyre Peninsula Local Government Association (EP LGA)
- Eyre Regional Development Board (EPDB)
- EPNRMB Water Resources Advisory Committee (WRAC)
- Department of Water, Land and Biodiversity Conservation (DWLBC)
- Eyre Peninsula Natural Resources Management Board (EPNRMB)
- SA Water

### 1.5.2 Water Security Technical Group

The terms of reference for the Water Security Technical Group (WSTG) were confirmed at the WSRG meeting on 30 August 2007 as follows:

- To coordinate technical input to the development of the Long Term Plan
- To coordinate the provision of information required for the implementation of the communication and community involvement strategy
- To ensure the EP Long Term Plan is consistent with other relevant plans developed by the three Government Agencies
- To prepare, coordinate and agree on information to be presented to the Eyre Peninsula Water Security Reference Group.
- To enable the consistent and regular exchange of information between the parties in relation to water resource management and infrastructure planning for Eyre Peninsula.
- To oversee the communication and consultation strategy and recommend changes or adjustments pending on public responses throughout the process.
- To enable the coordination of actions between the parties that may arise from the communication and consultation process or the Eyre Peninsula Water Security Reference Group unrelated to SA Water's Long Term Plan.

The members of the Water Security Technical Group are:

- Department of Water Land and Biodiversity Conservation (DWLBC)
- Eyre Peninsula Natural Resource Management Board (EPNRMB)
- SA Water

#### 1.5.3 SA Water Project Team

The SA Water project team consists of representatives from the following teams

- Asset Management
- Environmental Management
- Operations
- Stakeholder Relations
- Systems Planning
- Wastewater treatment design
- Water treatment design

In addition to these team members, SA Water enlisted the assistance of Tonkin Consulting in developing the options for alternative sources.

## 1.6 Previous Investigations (2003 Eyre Peninsula Water Supply Master Plan)

SA Water commissioned the Eyre Peninsula Water Supply Master Plan Study in 2001 because newly introduced water allocations were insufficient to meet existing and long term demands. The Study was project managed by United Utilities Australia (UUA) and overseen by a working group comprising UUA, SA Water, Department of Water, Land and Biodiversity Conservation and the previous Eyre Peninsula Catchment Water Management Board.

The Master Plan investigated several options for augmenting the water supply in Eyre Region, namely;

- Seawater Desalination at Louth Bay or Ceduna
- Brackish Desalination at Tod Reservoir
- Connection to the Morgan – Whyalla pipeline at Kimba (Iron Knob – Kimba pipeline)
- New borefield at Kappawanta – Bramfield

The Master Plan recommended a three part plan involving the introduction of a new water source on the Peninsula as well as the re-use of treated wastewater for appropriate uses and a water efficiency program to achieve a minimum 5% reduction in water usage. At the time of the public release of the Master Plan, the preferred option for an additional source of water on the Peninsula was a desalination plant at Tod Reservoir.

SA Water undertook extensive investigations during 2003 and 2004, including an eight month pilot plant study of the Tod Reservoir desalination option and extensive consultation with relevant authorities. These detailed studies uncovered additional data that concluded there was insufficient water available for consumptive use at Tod Reservoir compared with

what was originally understood at the time of the Master Plan. There were also environmental constraints on the discharge of the brine from the desalination process, requiring additional equipment and infrastructure for the marine discharge of the brine stream.

SA Water's report to the Public Works Committee (SA Water, 2005) listed the changes required to the Tod desalination proposal in order to address these issues, as:

- Size of the Tod desalination plant reduced from 2300 ML/a (7.5 ML/day) to 1400 ML/a (4.5 ML/day) due to reduced yield available from the Tod Reservoir. This would consequently require alternative augmentation to meet the projected demand of 2.3 GL/year
- Constraints on the marine discharge of the brine stream (containing low levels of pesticides, colour and nutrients from the Tod Catchment) which required additional equipment and infrastructure to meet environmental requirements.

These changes "significantly increased the capital cost of the Tod desalination option and therefore required further review to attempt to reduce costs through alternative designs and also to consider other viable options for additional potable water" (SA Water, 2005).

A multi criteria analysis was undertaken on the remaining desalination options and the connection to the Morgan – Whyalla pipeline. This analysis concluded that the pipeline option had "the least environmental impact in terms of greenhouse gas and marine discharge, provides for future growth and protection of the Eyre Peninsula groundwater resources and has the lowest Net Present Value (NPV) cost" (SA Water, 2005).

The preferred option was subsequently amended to a pipeline from Iron – Knob to Kimba. Stage 1 of this pipeline, which can deliver 1,400 ML/a was completed in June 2007.

## 1.7 Whyalla Water Supply

Whyalla is supplied via the Morgan – Whyalla pipeline from the River Murray. This supply is generally considered adequate for future growth in Whyalla. SA Water is currently working with Planning SA in development of the Regional Strategy for Whyalla, Port Augusta and Port Pirie. Constraints in SA Water's infrastructure will be highlighted as part of this process. In addition to this, SA Water is proposing to undertake consultation in the latter half of 2008 to identify issues relevant to the community of Whyalla. This will not involve the preparation of a long term plan as outlined in this document, but will seek to identify any actions required to issues raised.

## 1.8 Delivery Options

There are numerous issues which need to be addressed prior to an option being implemented. This includes pricing options and project delivery mechanism of the preferred options including the potential for public private partnership arrangements. This has not been discussed further in this report and will be covered in an implementation plan that will form part of the next stage of investigation. The different delivery mechanisms have

advantages and disadvantages which can vary based on the estimated cost and the nature of the option.

## 1.9 Areas Not Currently Supplied by SA Water

There are areas of Eyre Peninsula which are not currently connected to SA Water's supply systems. These include townships such as Venus Bay and Port Kenny and farming areas such as Mangalo. The recent drought conditions have highlighted these areas, as their traditional sources such as rainfall and bore water become scarcer.

This report investigates options for supplying Venus Bay and Port Kenny (refer to Section 7.12) but does not investigate options for other small townships or broad acre farming areas. These areas will be addressed via a separate process between local councils and SA Water. This is discussed in more detail in the Community Response Report.

# 2 Community Engagement

## 2.1 Overview of Engagement Process

### 2.1.1 Overview

The Water Summit held in March 2007 recommended that SA Water seek community ownership over the Long Term Planning process and strive to obtain endorsement of the planning outcomes.

In response, SA Water prepared a communication and community engagement plan to deliver on the following specific objectives:

- To engage Eyre Peninsula communities in the development and review of SA Water's Long Term Plan for the Peninsula
- To provide a means whereby each community is able to inform SA Water of its projected growth and development over the next 25 years and the impact that this will have on demand for water and wastewater services
- To facilitate a process for Eyre Peninsula councils to have structured input to both the development of ongoing communication materials and the engagement process for SA Water's Long Term Plan
- To establish an engagement structure within each community to enable ongoing input to the development of the Long Term Plan
- To obtain community support for a Long Term Plan for the Eyre Peninsula
- To ensure the communication needs of communities on the Eyre Peninsula are met through the delivery and distribution of information that is easy to read and understand
- To enable SA Water, the EPNRMB and DWLBC to communicate key messages about their respective roles and activities in managing and securing water resources and supply for the Eyre Peninsula.

The communication and community engagement process comprised a number of specific phases in order to meet the intended objectives. All property owners on Eyre Peninsula and community organisations and volunteer groups were invited to participate in the community engagement process. The process included:

- Communication about the state and management of the Region's Groundwater Resources and SA Water's infrastructure planning and projects for Eyre Peninsula
- Issues identification
- Long Term Plan scope and structure
- Technical options to be considered
- Multi-criteria analysis including input to the ranking of social and environmental criteria by the WSRG
- Presentation of the Long Term Plan and community response

## 2.2 Community Response Report

A community response report will be prepared for the Minister for Water Security and submitted together with this Long term Plan.

The Community Response Report will:

- Detail the communication and community engagement process implemented
- Document all the issues raised by the community and identify agencies responsible for driving potential outcomes
- Discuss the responses received on SA Water's Long Term Plan
- Identify any changes made to SA Water's Long Term Plan in response to community feedback
- Identify any areas of difference between community views and SA Water's Long Term Plan recommendations
- Present the Eyre Peninsula Water Security Reference Groups response to SA Water's Long Term Plan

# 3 Community Issues Addressed in the Long Term Planning Process

During phase one of the engagement process, participants were invited to brainstorm issues relating to water and water security for Eyre Peninsula. These issues were grouped into topics and an approach to addressing them identified. The issues raised were not limited to SA Water's area of responsibility but involved broad government policies and other agency policies and projects.

A detailed list of all the issues raised is included in the Community Response Report, together with possible actions and the agency responsible for managing relevant outcomes.

In summary, these include:

- The potential impact of mining, tourism, industry expansion and resultant population growth on demand
- The need to identify new water resources
- Water quality (as it relates to new resources)
- Role of the new pipeline from Iron Knob to Kimba (and future stages)
- Ongoing use of Tod Reservoir as a water supply source
- Supply of water to Port Kenny/Venus Bay
- Supply of water to remote and regional areas not currently connected to a supply
- Process for ongoing review of assumptions in this report

# 4 Demands

## 4.1 Overall Demands

Using SA Water's master meter data, the annual average demand associated with the major components of the Eyre Peninsula Water Supply network and the Independent Eyre Peninsula Water Supply Schemes have been determined for the period 2002-03 to 2006-07 and are presented in Table 4-1 and Figure 4-1.

**Table 4-1: Eyre Peninsula annual demands**

| Independent Scheme | Annual Water Demand (ML/a) | | | | |
|---|---|---|---|---|---|
| | 2002-03 | 2003-04 | 2004-05 | 2005-06 | 2006-07 |
| Overall Major System | 8994 | 9198 | 9028 | 7917 | 8541 |
| Coffin Bay | 112 | 113 | 109 | 99 | 96 |
| Elliston | 67 | 74 | 75 | 78 | 72 |
| Overall EP Demand | 9173 | 9385 | 9212 | 8094 | 8709 |
| Rolling 5 year demand | 9965 | 9825 | 9533 | 9106 | 8915 |

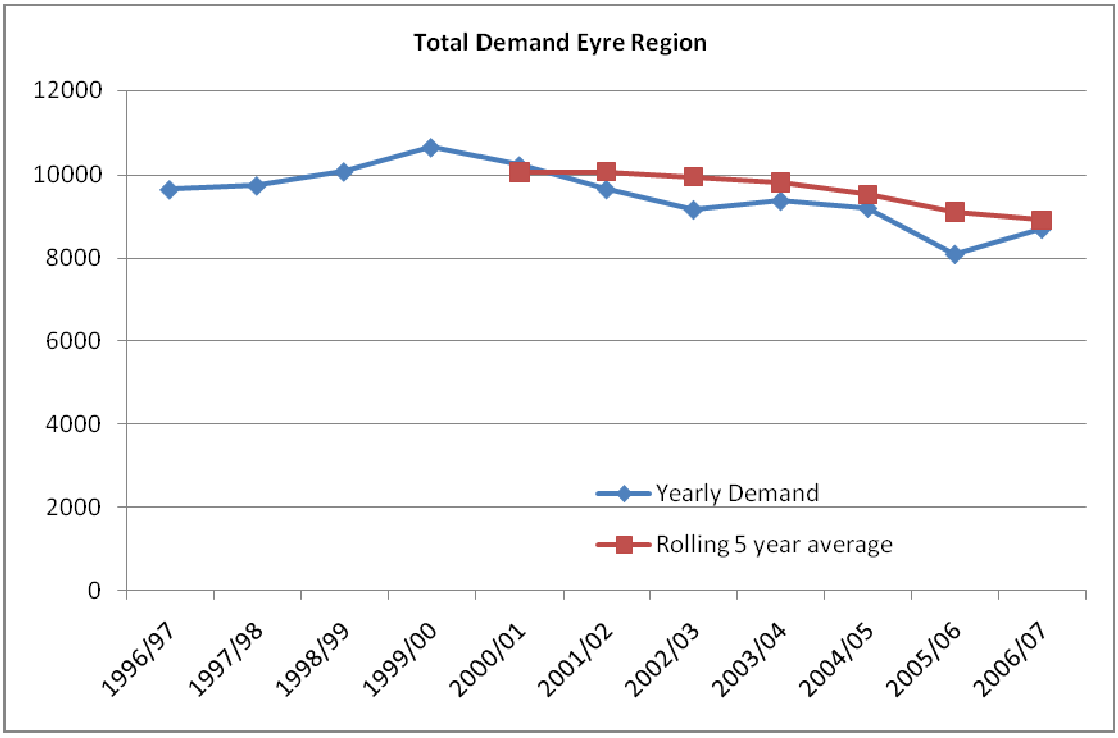



**Figure 4-1: Total demand Eyre Region**

Figure 4-1 above shows that demand in Eyre Region has been decreasing. There are likely to be numerous reasons of the decline in demand on Eyre Region, these may include

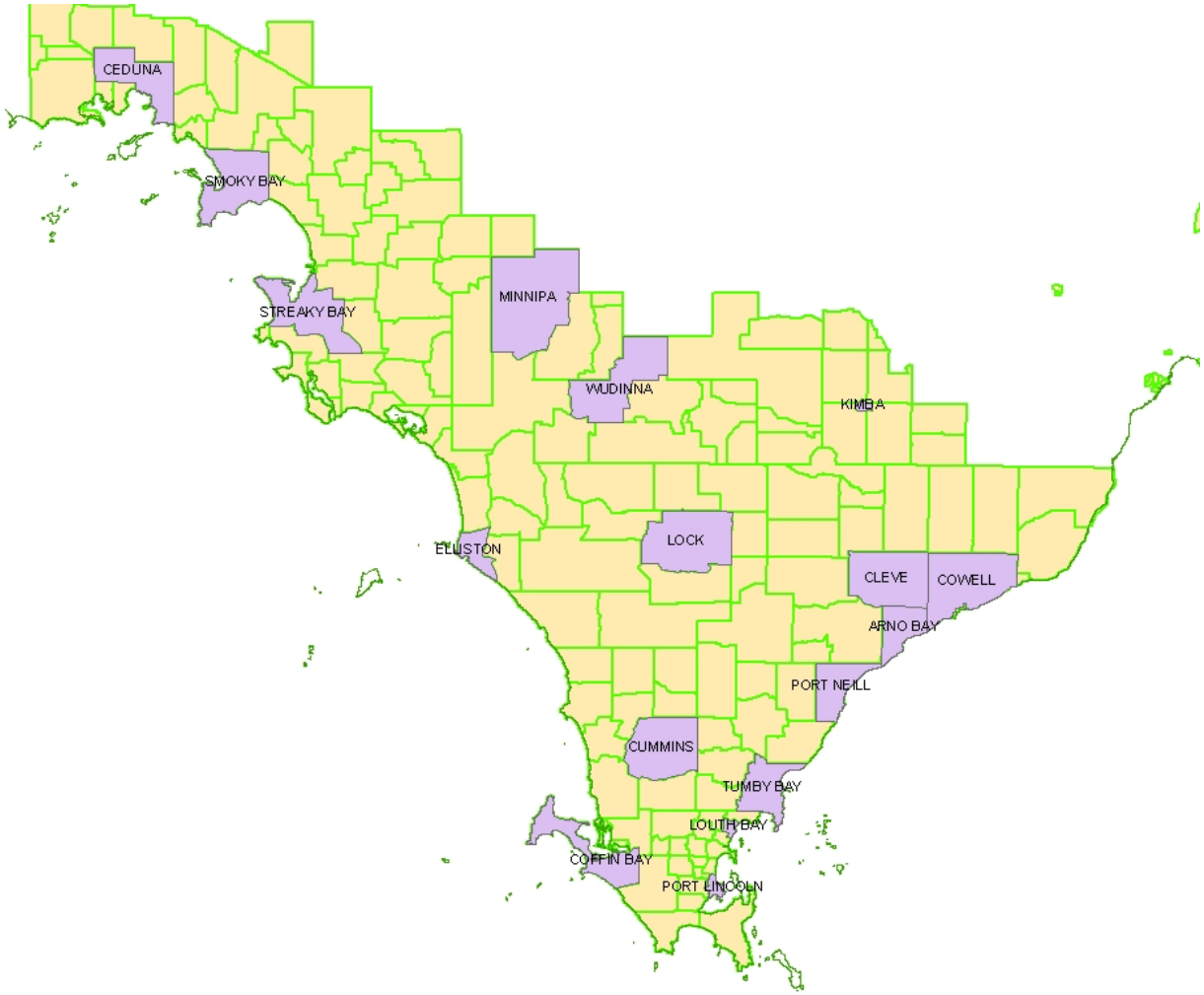
- Eyre Peninsula Water Restrictions
- Increased use of rainwater tanks reducing reliance on SA Water sources
- Community projects involving reuse of stormwater
- Wastewater reuse schemes established by councils

The impact of these factors on demand has not been quantified, but can be assumed to have contributed to decreasing demand over time. Further work could be undertaken as a separate project to determine the extent to which these factors have impacted on demand.

For the purposes of this report township demands are defined as the demands in the townships listed below and shown in Figure 4-2:

- Port Lincoln
- Coffin Bay
- Cummins
- Louth Bay
- Tumby Bay
- Port Neill
- Elliston
- Lock
- Cleve
- Arno Bay
- Cowell
- Kimba
- Wudinna
- Streaky Bay
- Ceduna
- Minnipa
- Smoky Bay

Demands outside these areas are considered to be rural demands.




*NB Suburbs highlighted in purple*

**Figure 4-2: Suburbs (defined as "townships" for the purposes of this report)**

Analysis of SA Water's consumer meter information over the past five years shows that township demand is approximately 48% of overall demand in the region as shown in the graph below.

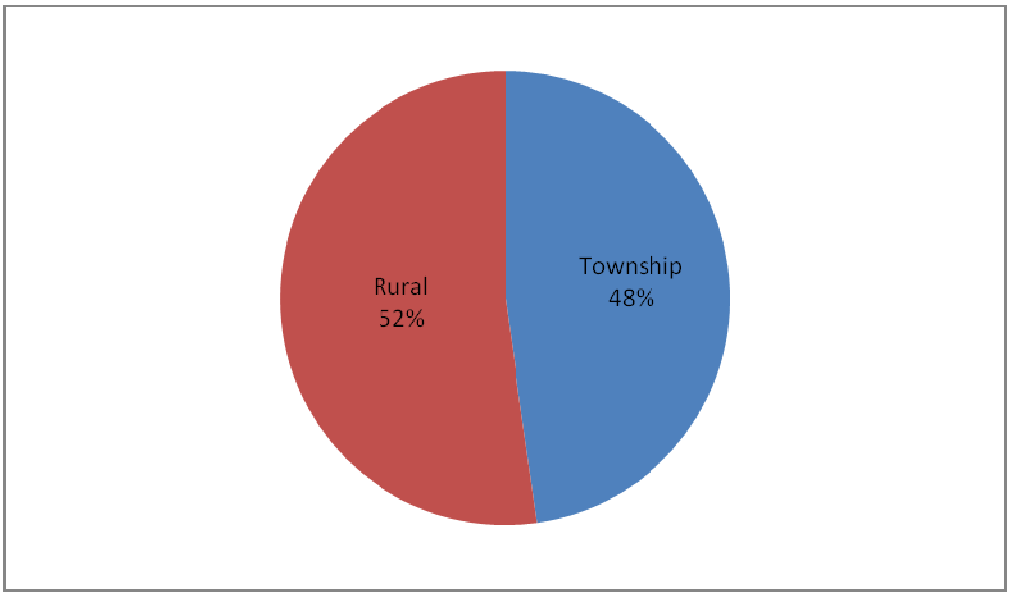



**Figure 4-3: Breakdown of Eyre Region SA Water demands 5 year average demands**

## 4.2 Township Demands

### 4.2.1 Existing Demands

#### *4.2.1.1 SA Water Information*

Analysis of SA Water's consumer meter data for the past five years (2002-03 – 2006-07) indicates the breakdown of demand in townships as per the pie chart and table below.

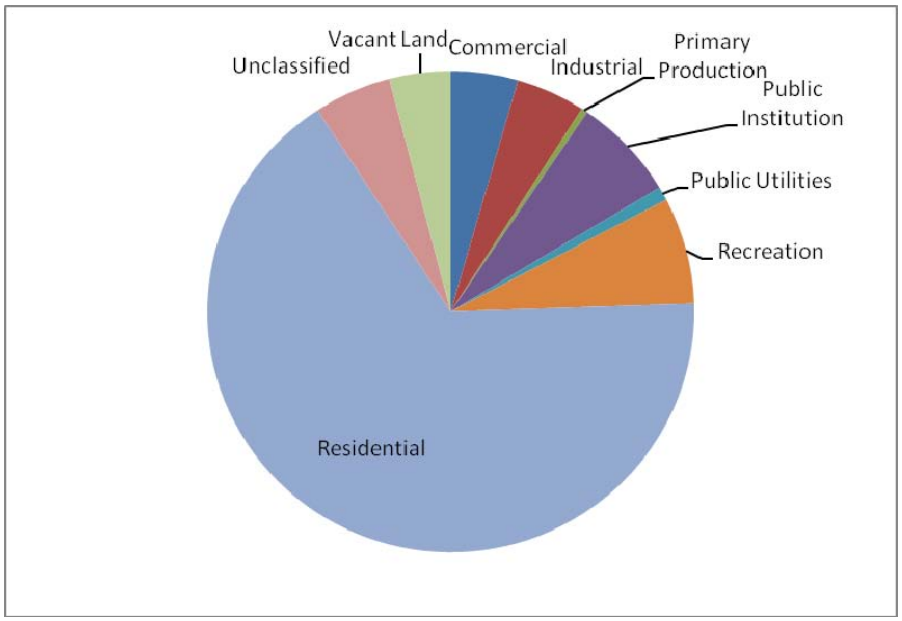



**Figure 4-4: Pie chart of township demands**

**Table 4-2: Breakdown of township demands**

| Demand Type | % of Overall Use |
|---|---|
| Commercial | 4.3% |
| Industrial | 4.3% |
| Primary Production | 0.4% |
| Public Institution | 7.0% |
| Public Utilities | 1.0% |
| Recreation | 7.4% |
| Residential | 66.5% |
| Unclassified | 4.9% |
| Vacant Land | 4.1% |

Appendix B provides a breakdown of the individual township demands as defined above.

Analysis of SA Water meter numbers for the past seven years shows that over that period, the number of residential meters has increased by 1.5% pa and the number of meters in total has increased by 1.3%. This is summarised in the table below.

**Table 4-3: Historical growth in residential meters**

| Year | Meters | Residential Meters | 5 year average | |
|---|---|---|---|---|
| | | | All Meters % increase | Residential % increase |
| 2000-01 | 11490 | 9055 | | |
| 2001-02 | 11595 | 9125 | | |
| 2002-03 | 11947 | 9376 | | |
| 2003-04 | 12148 | 9580 | | |
| 2004-05 | 12328 | 9685 | 1.45% | 1.4% |
| 2005-06 | 12374 | 9729 | 1.34% | 1.32% |
| 2006-07 | 12574 | 9909 | 1.05% | 1.13% |

These meter numbers and the breakdown between townships and rural and residential and non-residential, demands within townships give the consumption per meter for residential meters as shown below in Table 4-4.

**Table 4-4: Consumption per residential meter**

| Year | Residential* | Meters | ML/Meter |
|---|---|---|---|
| 2002-03 | 2743 | 9376 | 0.293 |
| 2003-04 | 2644 | 9580 | 0.276 |
| 2004-05 | 2755 | 9685 | 0.284 |
| 2005-06 | 2421 | 9729 | 0.249 |
| 2006-07 | 2621 | 9909 | 0.264 |
| 5 year average consumption per service (excl. Tourism) | | | 0.273 |
| Increase for PWCM (refer to discussion below) | | | 0.287 |

**Residential demand based on 67% of township demand and township demand 48% of total master meter for all Eyre Region (excludes tourism demands)*

The Eyre Region is currently subject to Eyre Peninsula Water Restrictions, with the exception of Elliston which is on Permanent Water Conservation Measures (PWCM).

A comparison between Eyre Peninsula water restrictions and PWCM is illustrated in the following table.

**Table 4-5: Comparison between Current Restrictions and PWCM**

| | **Current Restrictions Eyre Region** | **PWCM** |
|---|---|---|
| Watering (sprinklers) | Between 8pm and 8am during daylight saving hours and 6pm and 8am outside of daylight saving hours | Between 6pm and 10am during daylight saving hours and 5pm and 10am outside of daylight saving hours |
| Watering (hose and drippers) | Drippers - as above<br>Hose - anytime | Anytime |
| Watering (cans and buckets) | Anytime | Anytime |
| Paved areas | Only permitted for health, safety or emergency reasons | Only permitted for health, safety or emergency reasons |
| Window Cleaning | Use bucket or watering can only | Not restricted |
| Ponds/pools spas | To fill new or empty requires permit | Not restricted |
| Fountains | Only recirculating models | Not restricted |
| Washing cars | Trigger nozzles, bucket, watering can or commercial car wash | High pressure low volume cleaner, trigger nozzles, bucket, watering can or commercial car wash |

For the purposes of this investigation it has been assumed that the impact of replacing the current Eyre Peninsula restrictions with PWCM accounts for an additional 5% on residential demand only. The demand per residential connection used in this report therefore increases to 280 kL/a per service.

Using the meter numbers presented above and the breakdown between townships and rural and residential and non-residential demand inside townships, the consumption per meter for non residential meters can be estimated as shown below in Table 4-6.

**Table 4-6: Consumption per non-residential meter (townships)**

| Year | Non - Residential* | Meters | ML/Meter |
|---|---|---|---|
| 2002-03 | 1793 | 2571 | 0.698 |
| 2003-04 | 1596 | 2568 | 0.614 |
| 2004-05 | 1726 | 2643 | 0.653 |
| 2005-06 | 1174 | 2645 | 0.444 |
| 2006-07 | 1446 | 2665 | 0.543 |
| 5 year average consumption per service | | | 0.590 |

**Non - Residential demand based on 33% of township demand and township demand 48% of total master meter for all Eyre Region*

#### *4.2.1.2 Tourism Demand*

An analysis over the past five years indicates that demand from tourism facilities has been approximately 5% of overall township demand. The Tourism SA website (www.tourism.sa.gov.au) indicates the number of visitor nights in the State as a whole has remained generally static, as show in the graph below. While Tourism SA does not provide specific information for Eyre Region, anecdotal information provided by the Eyre Regional Development Board indicates that the tourism industry believes the region has been increasing at 3–4 % pa.


*(Source: South Australia Tourism Trends, Tourism SA Sept 2007)*

**Figure 4-5: South Australia Visitor and Nights**

**Table 4-7: Regional tourism profile information**

| Year | Overnight Visitors* | Nights in region* | Average nights/stay |
|---|---|---|---|
| 2003 | 430 000 | 2 100 000 | 5 |
| 2004 | 416 000 | 2 100 000 | 5.1 |
| 2005 | 327 000 | 1 560 000 | 4.8 |
| 2006 | 409 000 | 1 900 000 | 4.5 |

**Tourism SA's definition of Eyre Region includes Whyalla.*

*(Source: South Australia Tourism Commission, 2004 – 2007)*

#### *4.2.1.3 Population Information (Census)*

The census information obtained from the Australian Bureau of Statistics is shown below by Local Government Area. Similar information is available on the ABS website QuickStats http://www.abs.gov.au/AUSSTATS/abs@.nsf/PrimaryMainFeatures/2061.0?OpenDocument. These figures are generally lower than the information provided direct from ABS, so the higher values have been used.

**Table 4-8: Census information**

| Local Government Area | Population 1996 | 2001 | 2006p |
|---|---|---|---|
| Ceduna | 3544 | 3640 | 3672 |
| Cleve | 1939 | 1897 | 1988 |
| Elliston | 1257 | 1155 | 1175 |
| Franklin Harbour | 1228 | 1305 | 1322 |
| Kimba | 1296 | 1234 | 1159 |
| Le Hunte | 1573 | 1455 | 1370 |
| Lower Eyre Peninsula | 4036 | 4217 | 4577 |
| Port Lincoln | 12 851 | 13 899 | 14 245 |
| Streaky Bay | 1952 | 1989 | 2128 |
| Tumby Bay | 2659 | 2591 | 2640 |
| Unincorporated Areas | N/A | 638 | N/A |
| Total | 32 335* | 33 382 | 34 276* |
| Total (w/o Unincorporated areas) | 32 335 | 33 382 | 34 276 |

**Excludes unincorporated area*

*(Source: Australian Bureau of Statistics, 2007)*

These figures can be interpreted as the following increases.

**Table 4-9: Annual population increase**

| Year | % Increase (pa) |
|---|---|
| 1996 - 2001 | 0.65% |
| 2001 - 2007 | 0.54% |
| 1996 - 2007 | 0.60% |

#### *4.2.1.4 Dwelling Information*

The ABS website provides some information regarding the dwelling numbers for Local Government areas. This information is provided below. However, it should be considered provisional until the final Census information is available in late 2008. These figures indicate that the total number of dwellings in the Eyre Region have increased by 1.4% between 2001 and 2006. Occupied dwellings have increased by 1.2% over the same period.

**Table 4-10: Dwelling changes**

| Local Government Area | % Changes (2006-2001) | |
|---|---|---|
| | Dwellings | Occupied dwellings |
| Tumby Bay | 2.5% | 1.1% |
| Streaky Bay | 1.9% | 2.2% |
| Port Lincoln | 1.6% | 0.8% |
| Lower Eyre Peninsula | 0.9% | 1.3% |
| Le Hunte | 0.3% | -0.1% |
| Kimba | -0.6% | 0.4% |
| Franklin Harbour | 2.8% | 2.1% |
| Elliston | 1.0% | 1.0% |
| Cleve | 2.0% | 3.7% |
| Ceduna | 0.1% | 0.9% |
| Total EP | 1.4% | 1.2% |

*(source www.censusdata.abs.gov.au)*

The increase in dwellings is similar to the increase in residential meters as shown in Table 4-10 above.

### 4.2.2 Future Demands

For the purposes of this report, we have investigated three scenarios for growth in the townships in Eyre Region, namely:

- Low projection, based on information in Planning SA's document titled "Population Projections for South Australia (2001 – 31) and the State's Statistical Divisions (2001 – 21)"
- Medium projection, based on:
  - Historical growth in meters
  - An allowance for altering restrictions to be in line with Permanent Water Conservation Measures
  - Increase in tourism demand as per tourism industry advice.
- High projection using Council information on proposed developments, based on size and timing information provided during the Council consultation in June/July 2007.

These scenarios are discussed separately below.

#### *4.2.2.1 Low Projection*

In June 2007, Planning SA released a document titled "Population Projections for South Australia (2001 – 31) and the State's Statistical Divisions (2001 – 21)". The projections were based on the 2001 Census of population and housing. The report also indicates that "a set of population projections by age and sex for South Australia and its statistical divisions based on the most recent 2006 Population Census can commence at the end of 2008, when final detailed demographic data will be available".

The report presents three population scenarios, namely low, medium and high which contain varying assumptions on factors such as:

- Birth rate
- Mortality
- Migration

The population scenarios for Eyre Statistical Division are shown in the table below.

**Table 4-11: Population scenarios for Eyre Statistical Division**

| | Projection series | | |
|---|---|---|---|
| | **Low** | **Medium** | **High** |
| **Year** | **Total Population** | | |
| 2001 (base yr)* | 34,020 | 34,020 | 34,020 |
| 2006 | 35,040 | 35,078 | 35,098 |
| 2011 | 35,557 | 36,103 | 36,404 |
| 2016 | 35,398 | 36,520 | 37,307 |
| 2021 | 35,197 | 36,799 | 38,143 |
| **Absolute Population change over 5 year intervals** | | | |
| 2001-06 | 1,020 | 1,058 | 1,078 |
| 2006-11 | 517 | 1,025 | 1,306 |
| 2011-16 | -159 | 417 | 903 |
| 2016-21 | -201 | 279 | 836 |
| **2001-21** | **1177** | **2779** | **4123** |

*(Source: Planning SA, 2007)*

**Includes 638 in unincorporated areas (34,020 – 638 = 33,382)*

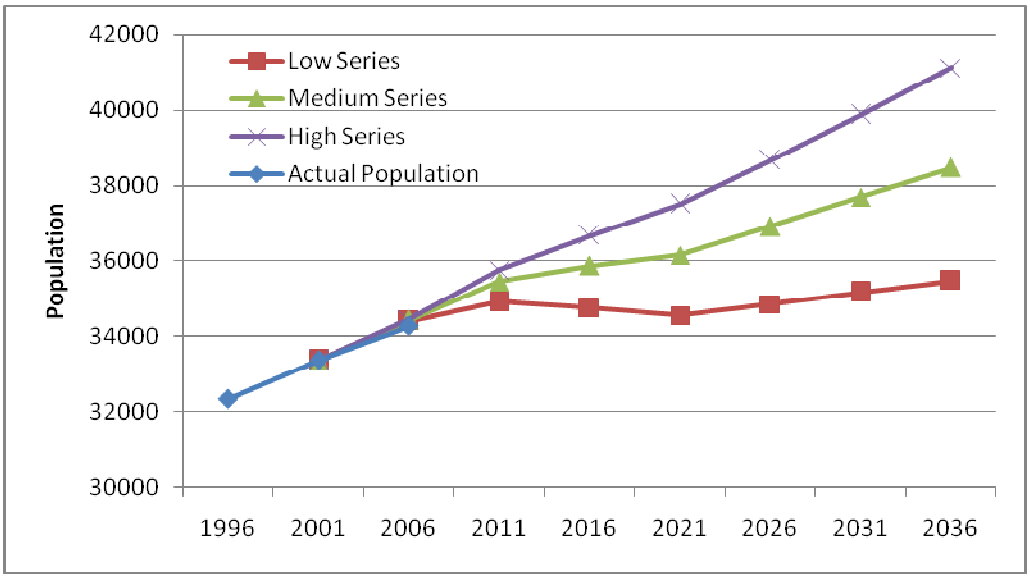
When adjusted for unincorporated areas (assuming these populations remain the same from 2001 – 2021) the table is amended as per table 4-12 below.

**Table 4-12: Population scenarios for Eyre Statistical Division amended for unincorporated areas**

| | Projection series | | |
|---|---|---|---|
| | **Low** | **Medium** | **High** |
| **Year** | **Total Population** | | |
| 2001 (base yr) | 33,382 | 33,382 | 33,382 |
| 2006* | 34,402 | 34,440 | 34,460 |
| 2011 | 34,919 | 35,465 | 35,766 |
| 2016 | 34,760 | 35,882 | 36,669 |
| 2021 | 34,559 | 36,161 | 37,505 |
| **Absolute Population change over 5 year intervals** | | | |
| 2021 – 2001 % | 0.18% | 0.42% | 0.62% |
| **2001-21** | **1177** | **2779** | **4123** |

**Actual population in 2006 was 34,276 which is lower than was predicted by Planning SA using 2001 base information.*

The following graph depicts graphically the different population scenarios.

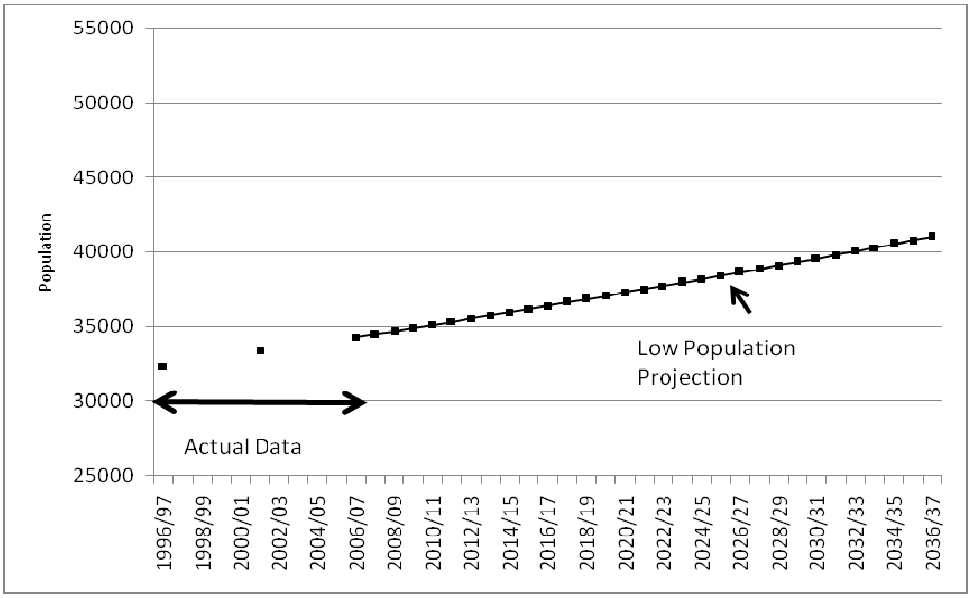



*(Planning SA Population Projections - Eyre Region, does not include unincorporated areas)*

**Figure 4-6: Planning SA Population Projections – Eyre Region**

For the purposes of this investigation, the Planning SA projections have been calculated by extrapolating Planning SA's high series projection scenario to the end of the study period (i.e. 30 years). For the purposes of this study this projection, is considered to be the low projection.

This is illustrated on the figure below.




*(Source : Population Projections for South Australia (2001-31) and the State's Statistical Divisions (2001 – 21) Planning SA June 2007*

**Figure 4-7: Low projection (population)**

This population can be converted into consumption as shown in the following figure.

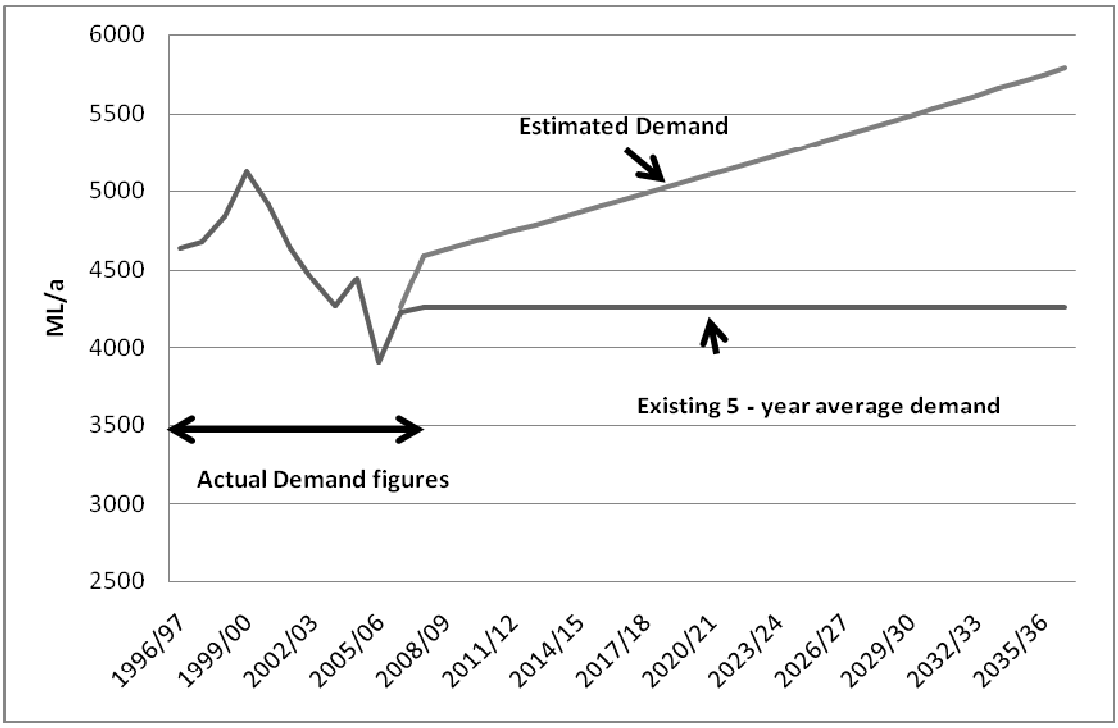



**Figure 4-8: Low Projection (estimated demand)**

#### *4.2.2.2 Medium Projection*

The following assumptions have been made based on the information provided above in determining the SA Water projected demand for the Eyre Region.

- Assume increase in residential meters = 1.5% pa

This is based on the past seven years of growth in the number of SA Water residential water meters. In addition to this, Table 4-10 shows that dwelling numbers have increased by 1.4% (2001-06). This supports the use of the 1.5% pa growth rate. This is converted into a water demand using 290 kL/a per service.

- Assume increase in non-residential meters in townships = 0.3% pa

This is based on the past seven years of growth in the number of SA Water non-residential water meters. This is converted into a water demand using 590 kL/a/per service.

- Assume tourism water use increases by 4% pa

With the information available from SA Water's consumer meter data it has been difficult to determine accurately the growth in demand from tourism facilities alone. It has therefore been assumed that tourism will grow in line with the anecdotal information of 4% and this translates into an equivalent growth in water consumption.

This results in a growth in total consumption in townships from 4,200 ML/a to 6,500 ML/a by 2036, as shown in the graph below.

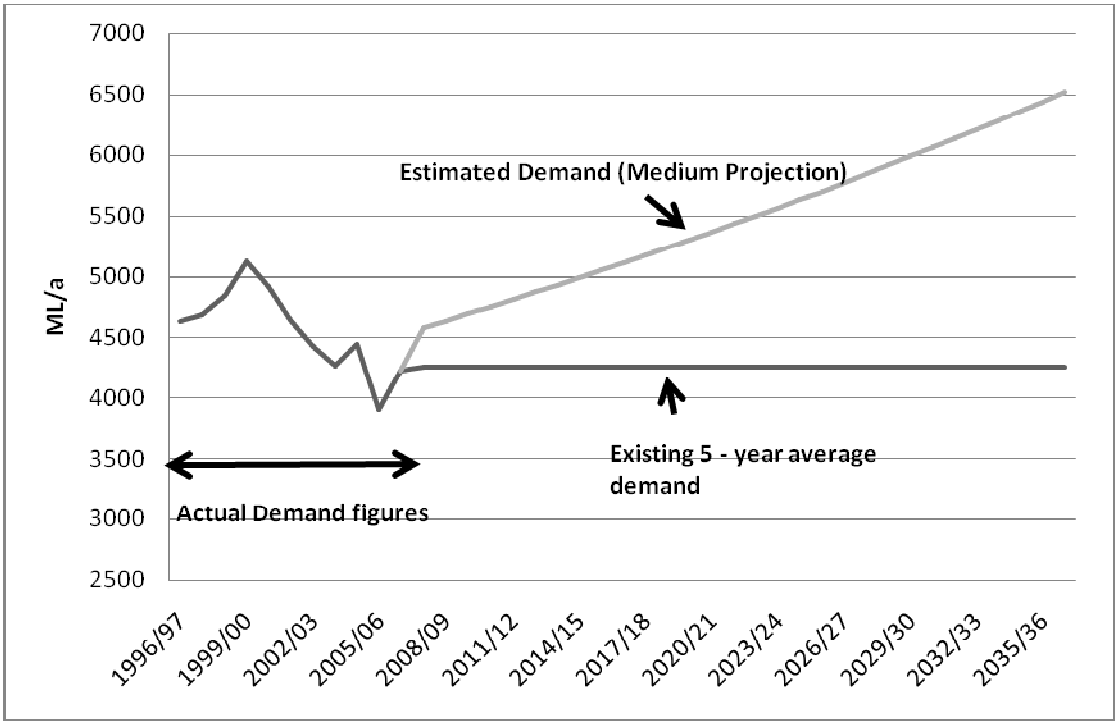



**Figure 4-9: Medium Projection (estimated demand)**

This consumption can be converted into an equivalent population for the purposes of display as shown in the following figure.

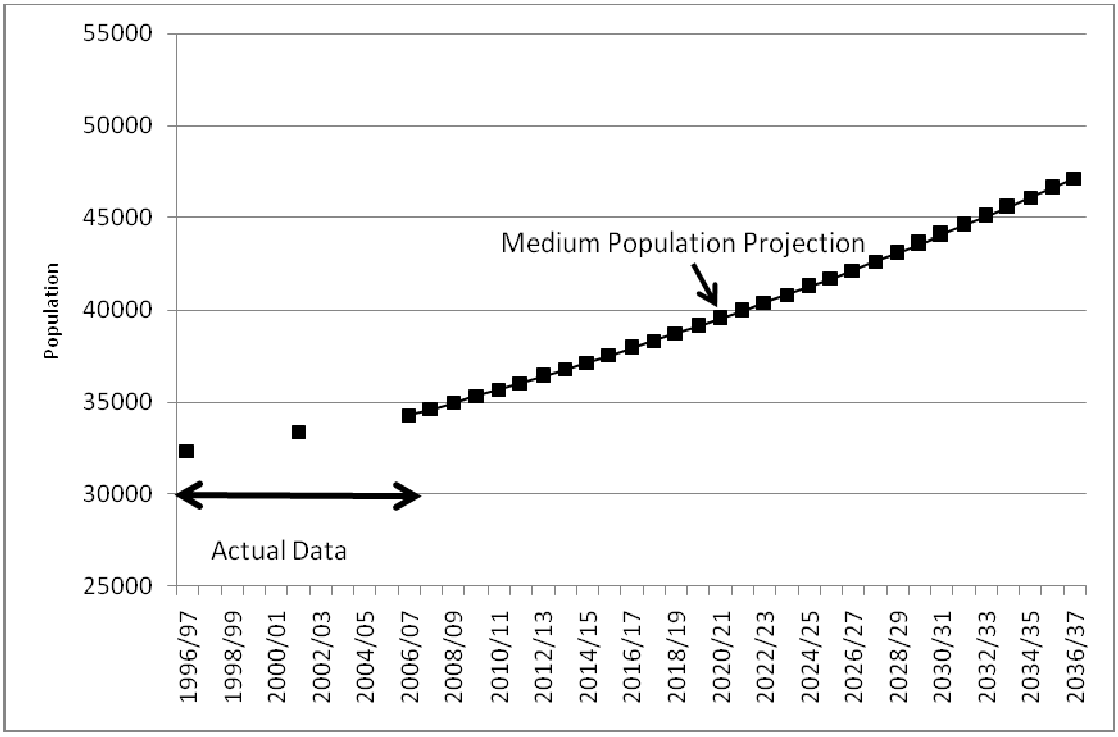



**Figure 4-10: Medium projection (equivalent population)**

#### *4.2.2.3 High Projection*

As part of the council consultation discussed in Section 2, SA Water asked all the local governments that form part of the study area to provide information on the type, size, nature and timing of developments within their council area. Some councils were able to provide significant information regarding prospective future developments, including dwelling numbers and timing. Others were able to provide some of these details. All statistical information provided by the councils relevant to their projections is included in Appendix C. The full list of issues raised by the councils is presented in the Community Response Report. A summary of the top five residential developments in terms of number of lots is presented below.

**Table 4-13: Information from council consultation re future developments**

| LGA | Information from council consultation notes | # lots | Years |
|---|---|---|---|
| Franklin Harbour | A Council PAR will be initiated through a Statement of Intent in the latter half of 2007 to provide for the development of 1600 allotments over the next 10 years (including a possible 40 rural living allotments) | 1600 | 10 |
| Lower Eyre | Port Lincoln Fringe: possibly up to 1000 lots (3 stages over 10 yrs). 200 lots are in Stage 1 600 – 800 $m^{2.}$ Likely to have a safe mooring/boat ramp in future | 1000 | 10 |
| Tumby Bay | Further ~900 allotment development South of the current "Island". Pressure to reconsider minimum block size, proposal that 700 $m^2$ not required with current lifestyles and that 300 $m^2$ more appropriate. Given this the development could be up to 1500 allotments | 900 | Unknown |
| Port Lincoln | Point Boston will have impact on city – potential 700-800 allotments | 800 | Unknown |
| Port Lincoln | Lincoln Lakes (Stage 3 of the marina) – 2/3 weeks from plans; 10-year project; 600 | 600 | 10 |
| Port Lincoln | Other potential subdivisions – 140 allotments at northern end of city; 160 at south; Robertsons 160; Garret Rd 80 allotments | 540 | Unknown |

Using only information where the number of lots was provided, the following totals were calculated:

- 4430 in 5 – 10 years (calculated based on information where lots and possible timing was provided)
- remaining 3353 in 10 – 30 years (calculated based on information where lots were provided but timing was unknown)

Using an average number of people per lot of 2.3 (which is consistent with the ABS dwelling and population information) the resultant projected population has been calculated and is shown below.

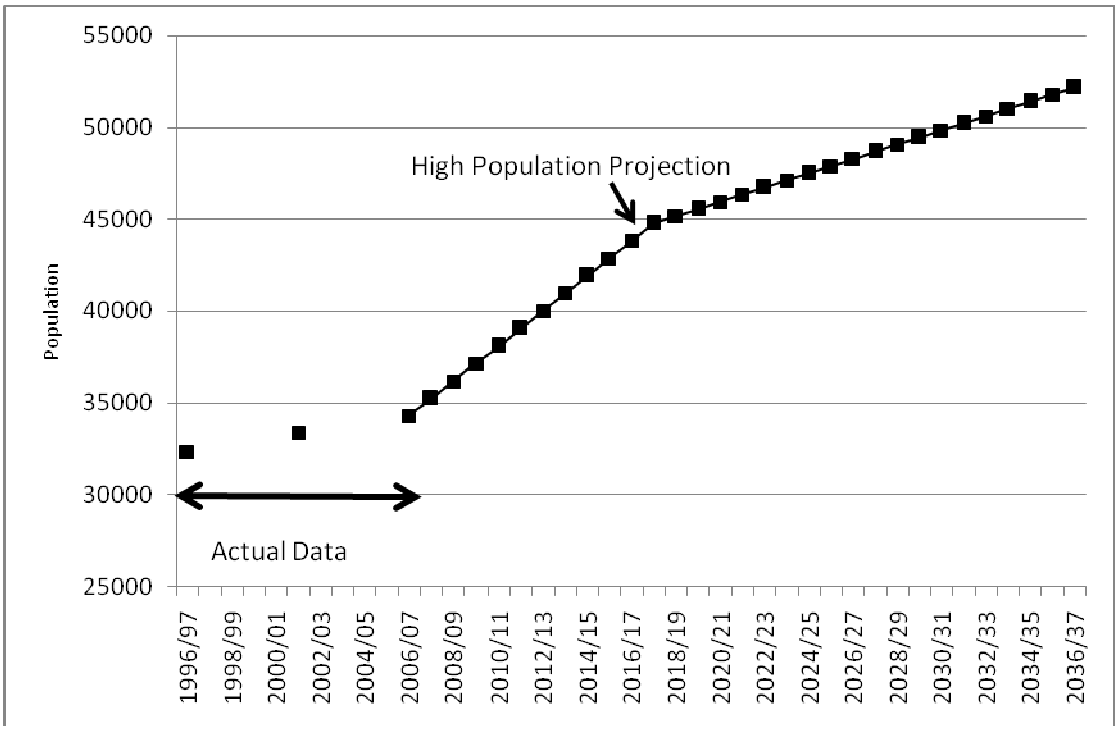



**Figure 4-11: High projection (council population projections)**

This can be converted into a residential water demand, using the same assumptions as listed above in Section 4.

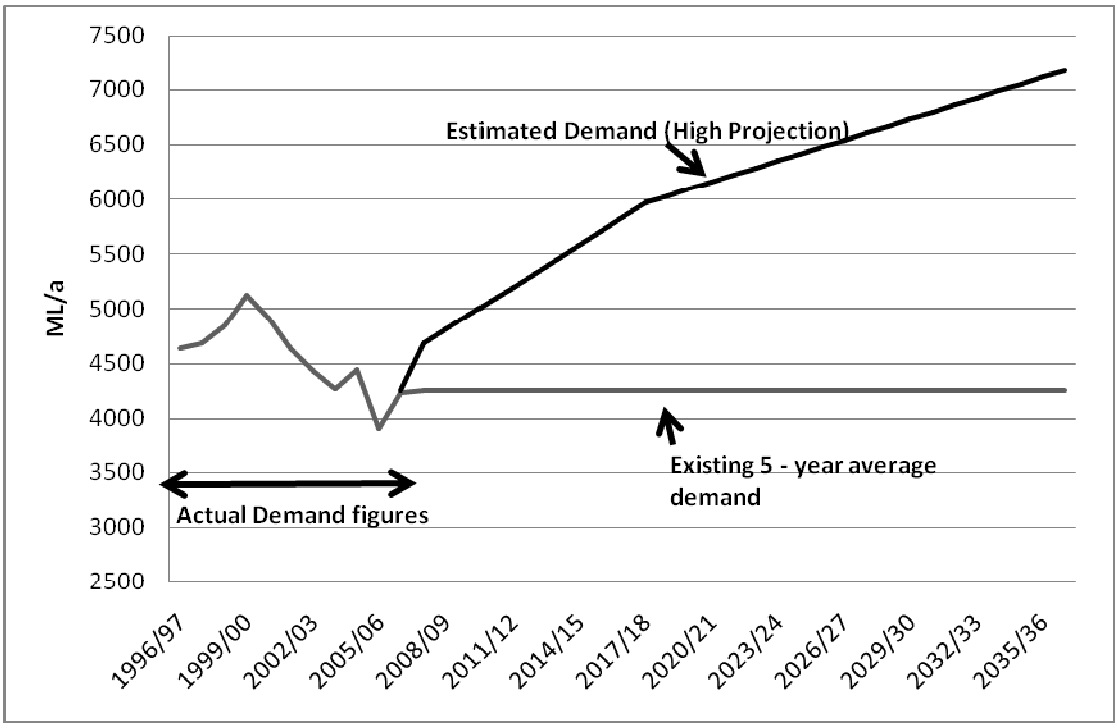



**Figure 4-12: High projection (estimated demand)**

### 4.2.2.4 *Township Demand Scenarios*

Using the information discussed above a number of scenarios have been developed and are described below.

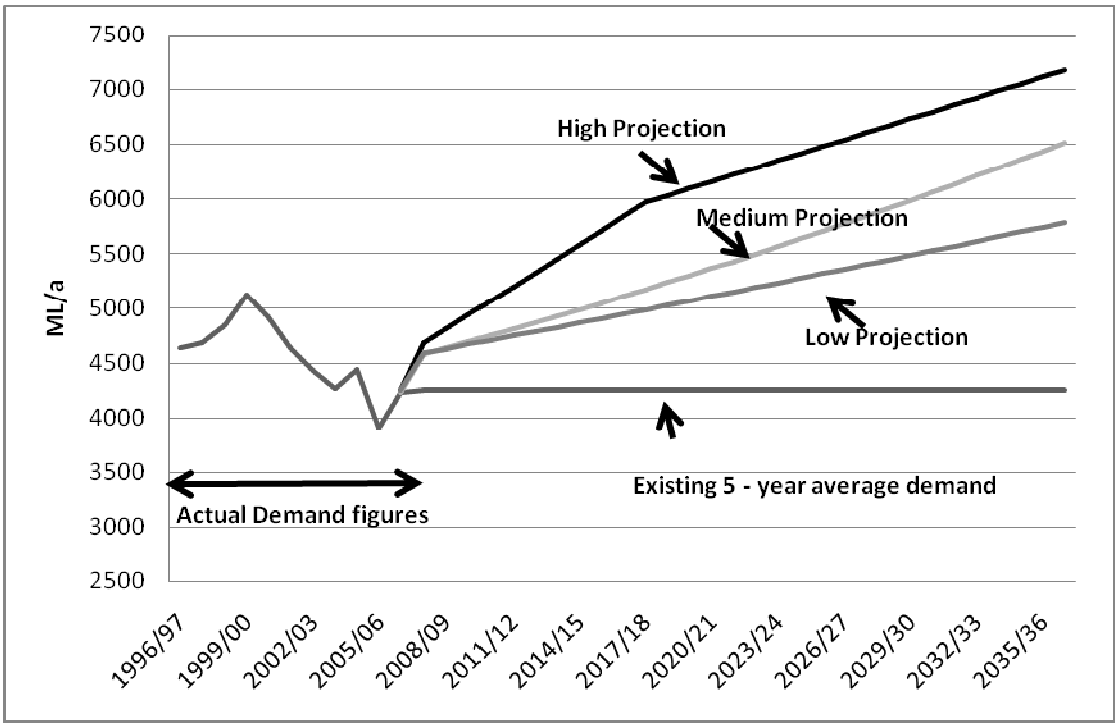



**Figure 4-13: Demand projections scenarios – townships**

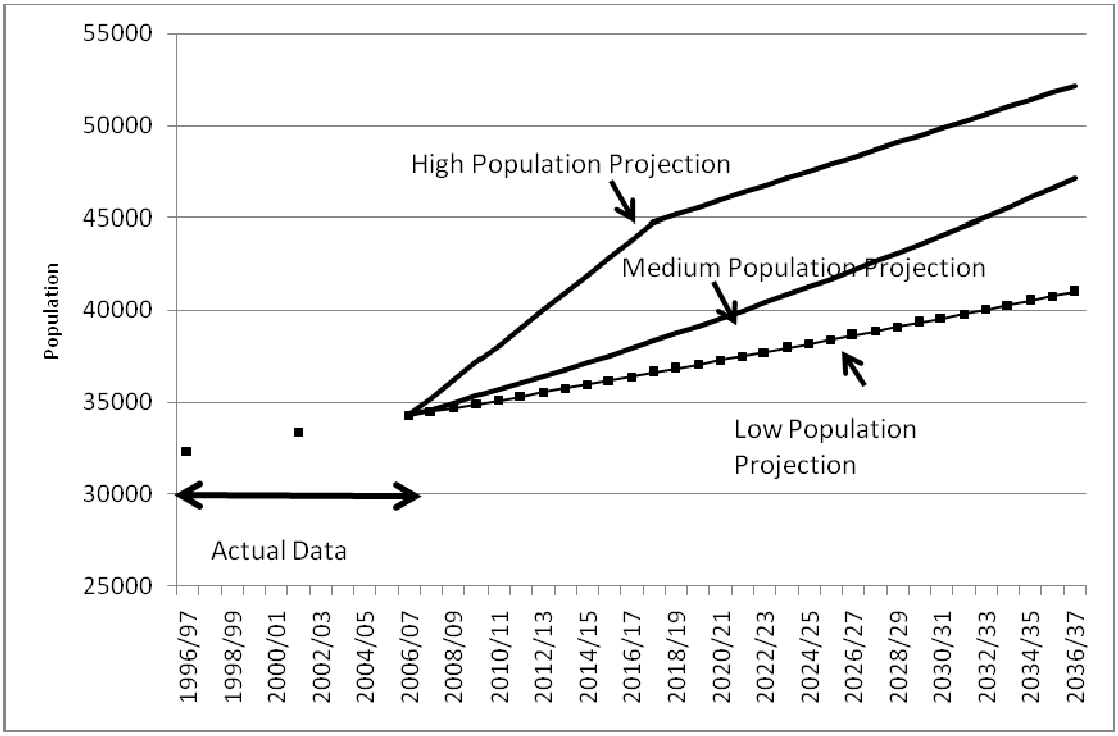



**Figure 4-14: Population projection scenarios**

For the purposes of this investigation, the medium scenario has been adopted. This assumption will be monitored as part of the annual review discussed in Section 11.1 and projections amended accordingly, if required.

## 4.3 Rural Demands

### 4.3.1 Existing Demands

#### *4.3.1.1 SA Water Information*

An analysis of SA Water meter numbers for 2000-01 - 2006-07 shows that over that period, the number of rural meters has increased by 0.32 - 0.46% pa. This is summarised in the table below.

SA Water's consumer meter data system does not differentiate between different types of rural customers. All meters in the areas determined to be rural for the purposes of this project have a land use category of "unclassified". Section 4.1 above indicates the split between rural and township is approximately 52:48 and these percentages have been used throughout this report.

Rural demands could include:

- Domestic (i.e. houses in rural areas)
- Stock demands
    - Sheep
    - Cattle
- Other demands in rural areas

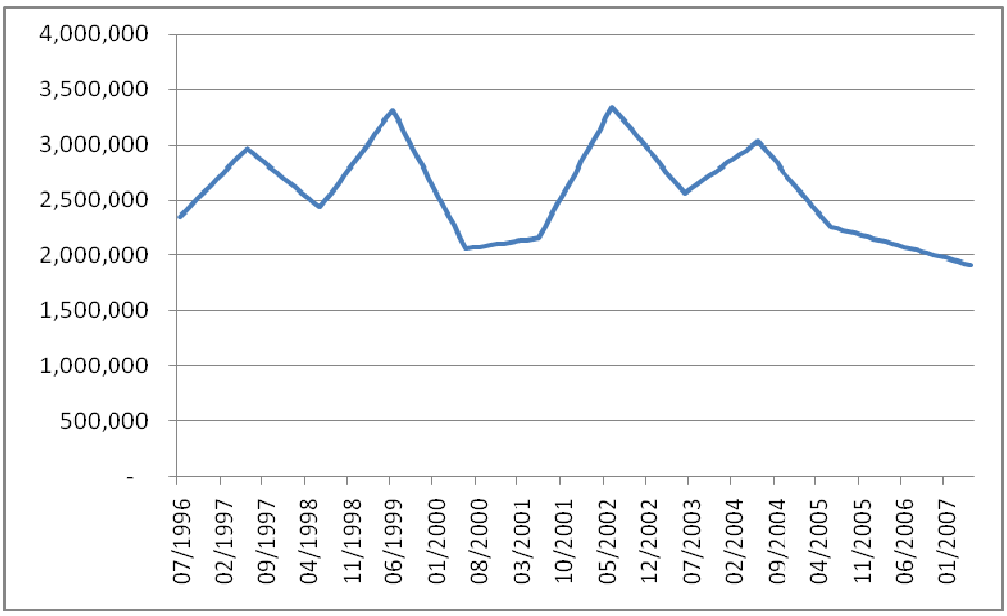
**Table 4-14: Rural meters**

| Year | Unclassified Meters | 5 year average Unclassified Meters % Increase |
|---|---|---|
| 2000-01 | 5104 | |
| 2001-02 | 5138 | |
| 2002-03 | 5143 | |
| 2003-04 | 5177 | |
| 2004-05 | 5225 | 0.46% |
| 2005-06 | 5222 | 0.32% |
| 2006-07 | 5261 | 0.46% |

#### *4.3.1.2 Stock Numbers*

The stock numbers on Eyre Region since 1996 have been represented in the following figure. These are presented in dry sheep equivalents (DSE), which means that beef cattle have been converted into equivalent sheep numbers. The figure shows there is a trend of increasing numbers between 1996-1998, with a declining trend from 2002-2007. Anecdotal

information from the community and council engagement undertaken as part of this study indicates the trend may be about to swing to increasing sheep numbers.




*(Source www.abareconomics.com/ame/mla/mla.asp)*

**Figure 4-15: Stock numbers (dry sheep equivalents)**

### 4.3.2 Future Demands

SA Water and the Department of Primary Industries and Resources South Australia (PIRSA) representatives met in early January 2008 to discuss potential future demands from:

- Mining developments (supporting population and process water)
- Increasing stock numbers (sheep and cattle)
- Aquaculture

PIRSA advised that future water requirements for these uses are generally extremely difficult to predict.

Determining the amount to allow for growth in this consumption group is therefore also very difficult. Stock constitutes a large proportion of the demand in rural areas and that demand is likely to fluctuate with varying stock numbers. There was discussion about potential changes in stock numbers in the region during the council engagement in June/July 2007. However, opinions on whether stock numbers were likely to increase or decrease were varied.

Based on the discussions held with PIRSA, and, it has been assumed that demand will increase by 1.5% per year for the next 10 years. It should be noted, however, that this increase in demand is not just being applied to stock use, but to all uses in rural areas and therefore accounts for growth in the various different sectors that make up rural demand. The 1.5% growth should be considered an allowance for additional water consumption in the rural sector, which could be used as market forces dictate (i.e. not necessarily for sheep).

It is understood that while the overall trend may be upwards, there will be some fluctuations within this trend. The possibility for fluctuations within this trend has been accounted for in the supply analysis.

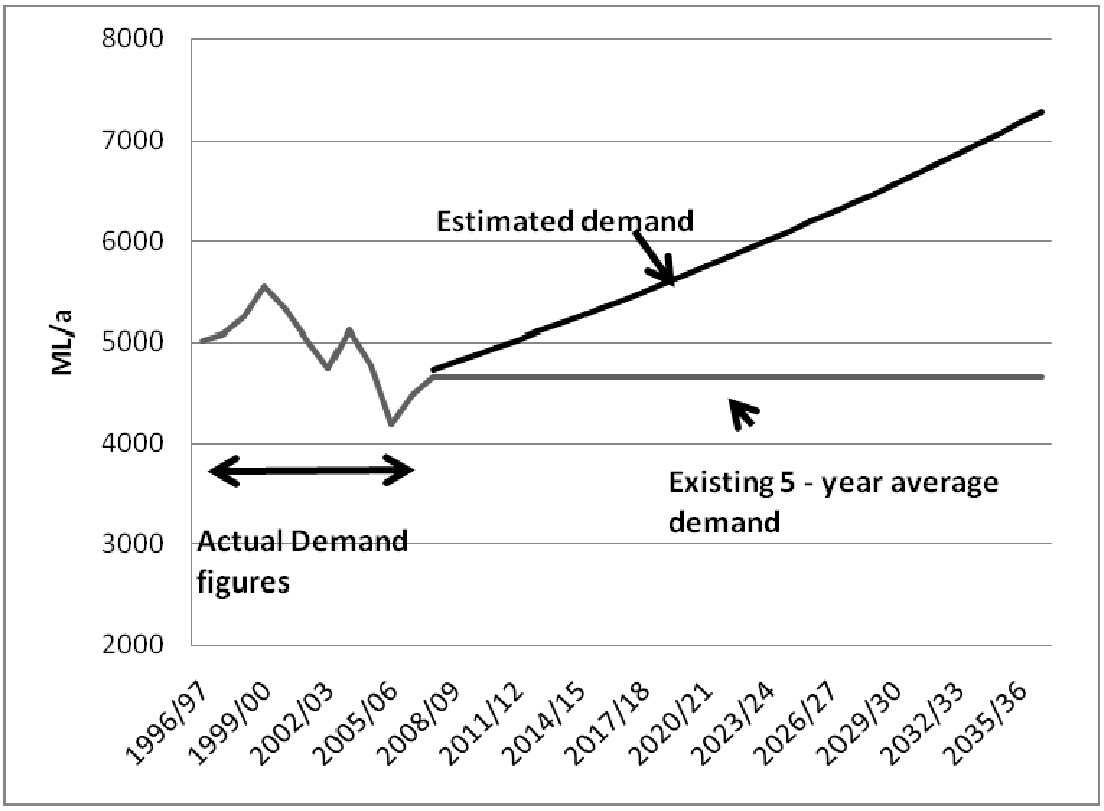



**Figure 4-16: Estimated rural demands**

## 4.4 Overall Demands

The combination of rural and township demand projections is summarised in Figure 4-17.

This is based on the medium project for township demands, which has been adopted for the purposes of this report.

There will be some fluctuation and variability in projected trend of increasing demand. Actual growth will be monitored and compared with these projections which will be adjusted annually (refer to Section 11.1 regarding ongoing review of the Long Term Plan).

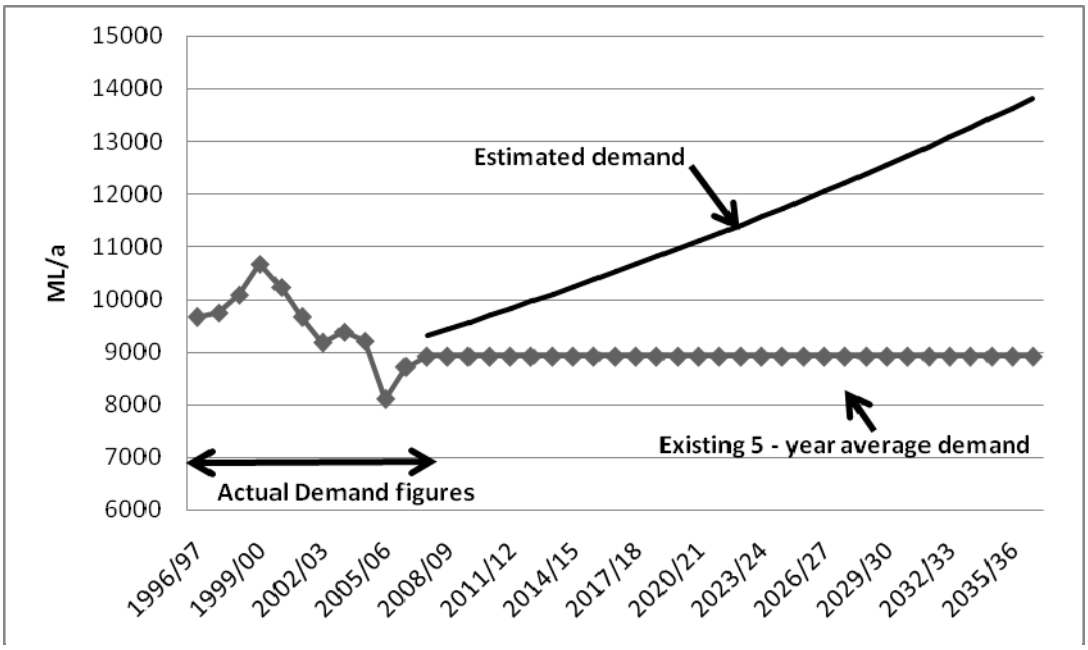



**Figure 4-17: Overall demands (based on medium township projection)**

**Demand from Mining ventures**

SA Water's demand projection has allowed for growth in residential demand due to mining developments. There has however been no allowance for water demands from mining operations themselves. Mining companies will be expected to source their own water for extraction and mining operations.

In some situations, SA Water may be in a position to provide water requirements associated with trial or pilot mining schemes. Any supply provided by SA Water will be dependent on:

- SA Water's ability to maintain suitable supply to existing customers (including allowing for reasonable growth in this customer base, as outlined in this document)
- The availability of the resource and infrastructure capacity in SA Water's supply system at the time of application
- The conditions and legislative requirements of licenses issued to SA Water to allow us to provide a public water supply
- Specific arrangements with SA Water for full cost recovery of any augmentation to the supply or resource required to meet demand requirements from a mining venture

SA Water will assess applications from mining companies for water requirements associated with trial or pilot mining schemes on a case by case basis. SA Water will also assess opportunities to partner with mining companies on new resources (such as desalination plants) to provide water for mining operations as well as supplement the public water supply on a case by case basis and in the context of the strategy presented as part of this long term plan.

# 5 South Australia's Strategic Plan

## 5.1 Relevant Objectives of South Australia's Strategic Plan

The updated version of South Australia's Strategic Plan was released in January 2007 and contains seven main targets that are considered relevant to this project, namely;

- **T3.5 Greenhouse gas emissions reduction:** achieve the Kyoto target by limiting the State's greenhouse gas emissions to 108% of 1990 levels during 2008-2012, as a first step towards reducing emissions by 60% (to 40% of 1990 levels) by 2050.
- **T3.7 Ecological footprint:** reduce South Australia's ecological footprint by 30% by 2050.
- **T3.9 Sustainable water supply:** South Australia's water resources are managed within sustainable limits by 2018.
- **T3.12 Renewable energy:** support the development of renewable energy so that it comprises 20% of the State's electricity production and consumption by 2014.
- **T5.9 Regional population levels:** maintain regional South Australia's share of the state's population (18%).
- **T1.17 Minerals exploration:** Exploration expenditure in South Australia to be maintained in excess of $100 million per annum until 2010.
- **T1.18 Minerals production:** Increase the value of minerals production to $3 billion by 2014.

Consideration of South Australia's Strategic Plan targets were fundamental in the assessment of options as outlined in Section 10. The targets and corresponding relevance to the SA Water Long Term Plan for Eyre Region is discussed below.

These targets apply to the State as a whole and Eyre Peninsula will share in and contribute towards them. A balance will need to be achieved that is practical and reasonable, for example increases in population impact upon the ecological footprint, but impacts can be balanced through option selection and technology choices.

**T3.5 Greenhouse gas emissions reduction *and* T3.12 Renewable energy**

The amount of greenhouse gas emitted during construction and during operation are two of the key criteria in the assessment of options (refer to Section 10). Calculations of greenhouse gases in construction and during operation have been used to assess the options (refer to Section 7 and 10). Further stages of option development will investigate options for making the preferred augmentation option carbon neutral.

**T3.7 Ecological footprint**

The Ecological Footprint (EF) is a comparative measure of the sustainability of resource use. It can be determined as a single index based on the area of land and water required on a continuous basis to provide all of the energy and material resources consumed and to absorb all the waste discharged by an individual or community.

For example, a “Water EF” to serve a given community has to include all sources of water, not just SA Water supplies. SA Water’s EF could be reduced if all customers installed rainwater tanks. However, the total EF would not reduce by the same amount.

Meeting Target T3.7 as a “Water EF”, without offsets in other areas, would require a 30% reduction in demand compared with current levels. This compares with the demand projected based on population target T5.9, as shown in Figure 5-2.

Calculation of the EF for each option is beyond the scope of this document.

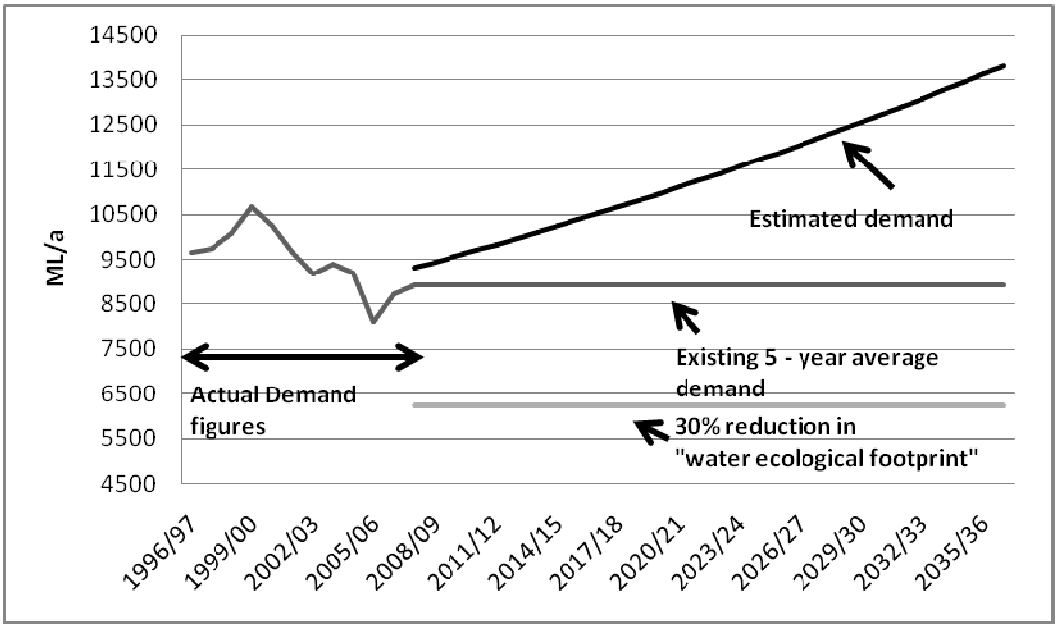


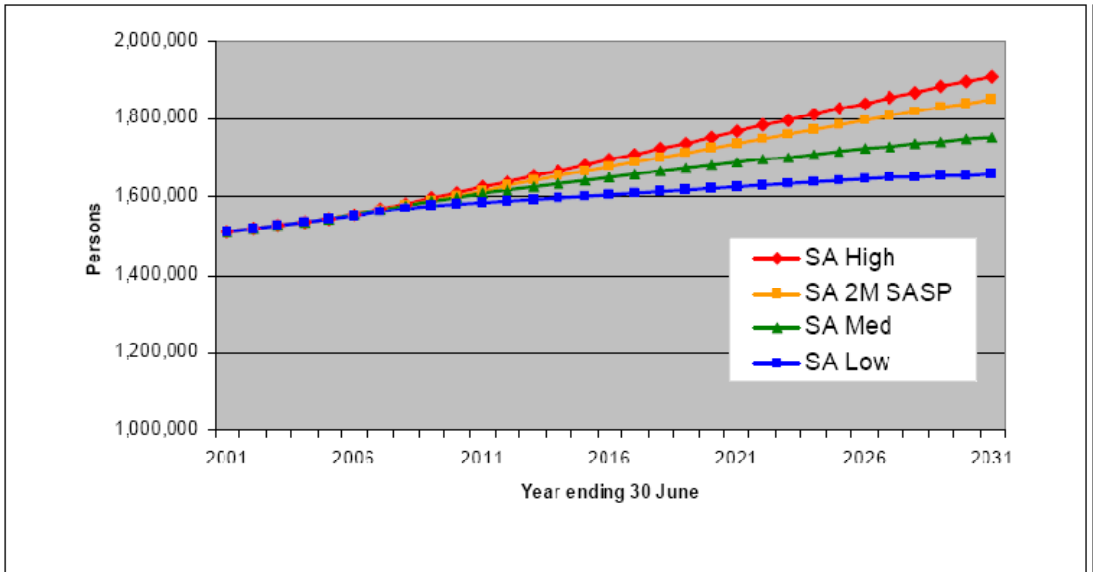

**Figure 5-1: Estimated demand with 30% reduction in water ecological footprint**

**T3.9 Sustainable water supply**

Refer to Section 6.2.6 below. Eyre Region’s water resources are managed within sustainable limits by the implementation of the Water Allocation Plan process. This report assumes this continues to be the case.

**T5.9 Regional population levels**

South Australia’s Strategic Plan contains a target for total population in South Australia to increase to two million by 2050 and the plan includes a target for regional areas to maintain the current share of the state’s population (i.e. 18%). The overall state target is illustrated to 2031 in the following chart from Planning SA’s “Population Projections for South Australia (2001 - 31)”.




*(Source Population Projections for South Australia (2001 - 31), Planning SA)*

**Figure 5-2: Population projections for South Australia**

On the way to reaching two million by 2050, the target population in 2036 is around 1,900,000. Assuming Eyre Peninsula maintains its current 2.25% share it will reach a population of around 43,000 in 2036 and 45,000 in 2050.

# 6 Existing Sources

SA Water's supply in Eyre Region comes from two primary sources, namely:

- Groundwater Basin extractions
- River Murray water supplied from the Morgan-Whyalla pipeline via the Iron Knob-Kimba pipeline

Until 2002, the Tod Reservoir formed part of the water supply. However, it was taken off line due to increasing salinity. It is currently maintained as part of the overall contingency planning for the Eyre Region, as a backup emergency source in the event of failure of Uley South pump station or Duck Ponds pump station.

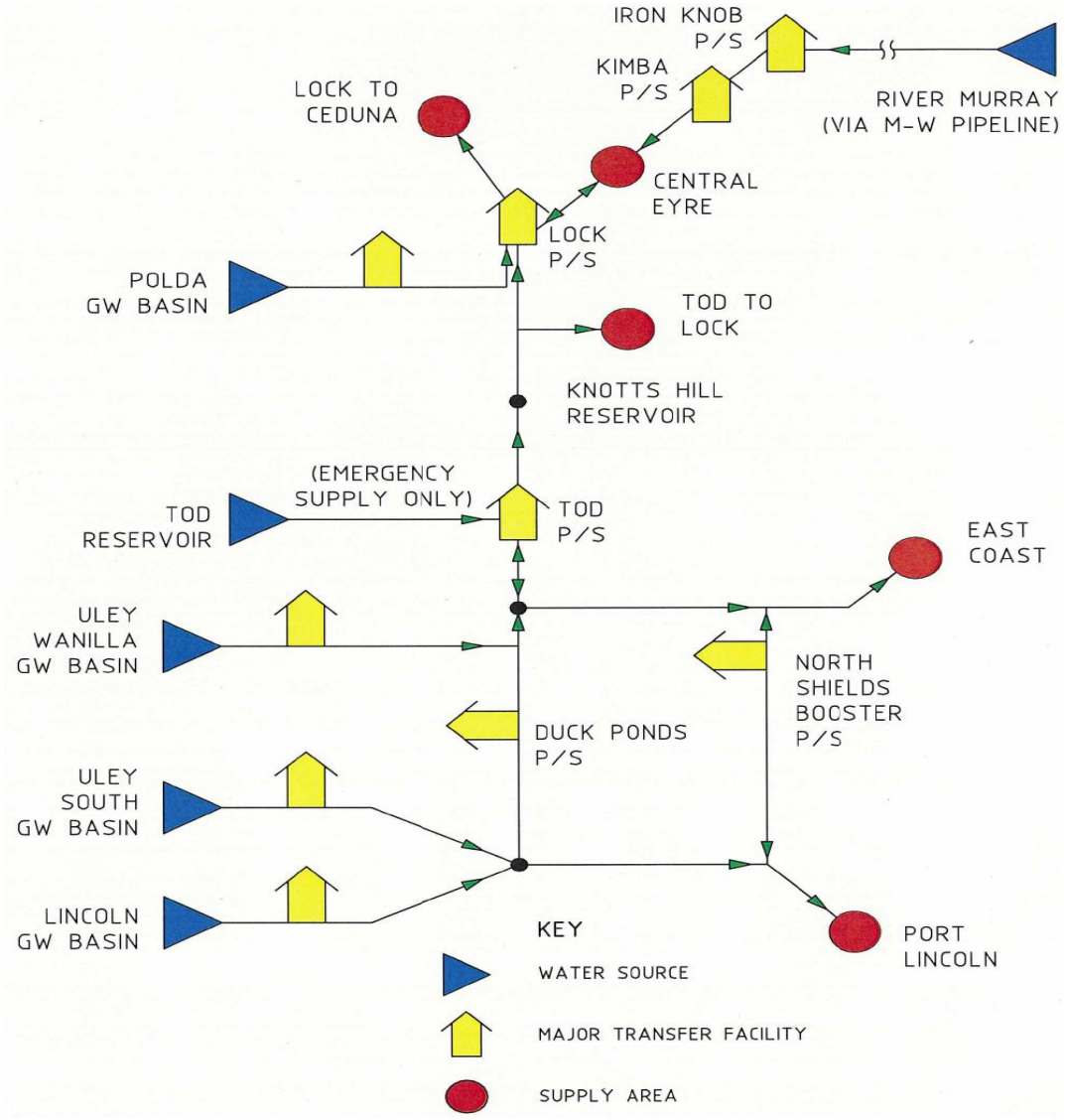



**Figure 6-1: Eyre Peninsula water supply system schematic**

The following chapter outlines the existing sources of water on Eyre Peninsula.

## 6.1 References

Sections of the following chapter have been reproduced with permission from the following sources:

- Water Security Fact Sheets
  1. Water Roles and Responsibilities
  2. Groundwater Resources
  3. Long Term Plan
  4. Frequently Asked Questions.
- www.epnrm.sa.gov.au/WaterResources/EyrePeninsulaWaterSecurityLongTermPlan.aspx
  (under the sections Project Overview and SA Water's Long Term Plan)
- www.epnrm.sa.gov.au/WaterResources/EyrePeninsulaWaterSecurityLongTermPlan/EyrePeninsulaWaterSecurityReferenceGroup.aspx

Sections of the following chapter have been reproduced from information provided by Tonkin Consulting with permission.

## 6.2 Groundwater

### 6.2.1 Background and Description

Groundwater extraction across Eyre Peninsula has increased over time to match demand from rural and urban development. The reticulated water supply for much of Eyre Peninsula comes from a number of well-fields developed by SA Water within the Southern Basins Prescribed Wells Area (PWA). These include the Lincoln A, B and C, Coffin Bay A, Uley-Wanilla and Uley South well-fields. Other groundwater resources are found throughout Eyre Peninsula and are used to supply coastal townships, particularly along the western side of the peninsula. A lack of recent rainfall and increasing demand on some of the region's smaller groundwater resources has lessened the amount of fresh water within these lenses and increased salinity. Such is the case for Robinson lens, which supplies Streaky Bay. A pipeline connecting Streaky Bay to the Tod-Ceduna trunk main now augments supply from the Robinson lens.

The groundwater systems of Eyre Peninsula are unique in comparison with other semi-arid regions in the State. Recharge rates and groundwater quality are, in some parts, higher than would normally be associated with similar semi-arid environments. The Eyre Peninsula Natural Resource Management Board (EPNRMB) is responsible for ensuring that the groundwater resource is well managed and will continue to provide a sustainable source of water for Eyre Peninsula while protecting the integrity of the resource and the ecosystems that depend on them. The Department of Water, Land and Biodiversity Conservation (DWLBC) on behalf of the Minister for Environment and Conservation is responsible for monitoring and reporting on the state and condition of the groundwater resources. DWLBC advise the EPNRMB on the status of the resources to enable them to effectively manage the resource and sign off on allocations. SA Water relies upon the advice given by DWLBC and

the EPNRMB as to the state of the natural groundwater resource and the extractions that can be sustained.

Based on work by DWLBC there is a strong link between groundwater levels and rainfall – that is, when there are high levels of rainfall, there are high levels of recharge. However, groundwater systems continue to discharge no matter what the seasonal conditions, so in times of low rainfall the overall groundwater levels fall. Work undertaken by DWLBC indicates that it is climate – not extraction – that predominantly dictates groundwater levels, so risk management practices are in place to manage human demands on these sources effectively.

The key groundwater sources on Eyre Peninsula are:

- Southern Basins PWA
    - Uley Wanilla,
    - Uley East,
    - Coffin Bay A, B and C,
    - Uley South
    - Lincoln Basin (A, B, C, D and D West lenses)
- Musgrave Area PWA
    - Bramfield,
    - Polda,
    - Kappawanta,
    - Talia,
    - Tinline and
    - Sheringa lenses

### 6.2.2 Southern Basins

The majority of good quality and adequate yielding groundwater in the southern part of Eyre Peninsula is within the Southern Basin Prescribed Wells Area. The Southern Basins PWA is located south-west of Port Lincoln. It covers an area of some 870 $km^2$ and comprises all or parts of the Hundreds of Lincoln, Wanilla, Lake Wangary, Uley, Sleaford and Flinders. The area incorporates the Kellidie Bay and Sleaford Mere Conservation Parks and parts of the Lincoln and Coffin Bay National Parks.

**Table 6-1: Southern Basins PWA Water Allocations for Public Water Supply**

| Quaternary Aquifer | 2007-08 Annual Water Allocation (ML/a) |
|---|---|
| Coffin Bay A | 118.5 |
| Uley Wanilla | 230.9 |
| Uley East | 180.9 |
| Uley South | 7224.0 |
| Lincoln A, B and C | 928.6 |

### 6.2.3 Musgrave Area

The Musgrave PWA is located around the township of Elliston. It covers an area of some 3,595 $km^2$ and comprises all or parts of the Hundreds of Colton, Talia, Tinline, Squire, Ward, Hudd, Kappawanta, Blesing, Way, Pearce and Haig, incorporating the townships of Elliston and Bramfield. The area incorporates the Lake Newland and part of the Bascombe Well Conservation Parks.

**Table 6-2: Musgrave PWA Water Allocations for Public Water Supply**

| Quaternary Aquifer | 2007-08 Annual Water Allocation (ML/a) |
|---|---|
| Polda | 326.4 |
| Kappawanta | 468.9 |
| Bramfield | 1155 |
| Polda North | 266.4 |

On the 7 July 2008, DWLBC advised SA Water that the annual water allocation from Polda had been reduced from 326.4 ML/a to 283 ML/a. In response to this and concerns by other stakeholders, SA Water has temporarily ceased pumping from Polda (other than for emergency situations) until an assessment of the condition of the basin can be undertaken. This information was received after the completion of the draft long term plan. This change (and any subsequent changes) to SA Water's allocations from the prescribed basins on Eyre Peninsula will be addressed through the annual review process discussed in Section 11.

### 6.2.4 Robinson Lens

The Robinson Lens is close to Streaky Bay and historically was the sole water supply source for the township. In 2003, a pipeline and pumping system was commissioned which connected the Tod-Ceduna pipeline at Poochera with the Streaky Bay water supply system.

The Robinson Lens does not fall within Prescribed Water Allocation areas, so there is no volume allocated for SA Water consumptive use during 2007-08. Due to the declining available resource in Robinson Lens, the amount of water extracted from the lens for SA Water's supply has reduced significantly over the past 10 years and in 2006-07 it dropped to 15 ML/a with no extraction in 2007-08.

It is assumed in this report that the full demand for the Streaky Bay supply systems is supplied from the Tod-Ceduna pipeline.

### 6.2.5 Groundwater Trends

The last major recharge event occurred in late 1992 and early 1993 when rainfall exceeded 100 mm during October, December and January and water levels in the aquifers rose by approximately one metre. DWLBC's analysis of available monitoring data from the past 60 years indicates that during periods of below average rainfall (such as the period around 1945 through to the mid 1960s) groundwater levels declined, irrespective of pumping. The Uley East lens does not undergo large extractions for town water supply requirements yet groundwater levels continue to decline. According to DWLBC, this decline is in response to the natural discharge from the system. The rate of decline in groundwater levels in the Uley

East lens, where only natural discharge occurs, averages 0.24 m/year since the last major recharge event of 1992–93. Similarly, the Uley Wanilla lens has experienced an average rate of decline over the past seven years of about 0.22 m/year. Previous groundwater level monitoring has shown long periods of sustained pumping at volumes greater than 1200 ML/a significantly impact on this resource.

It is acknowledged that some in the community consider that rainfall across the whole southern region impacts on the basins and activities in the catchment have resulted in less water entering the system even when rainfall events occur. For the purposes of this report, SA Water is acting on the advice of the resource managers, namely DWLBC and the Eyre Peninsula NRM Board (refer to Section 6.2.6). As discussed in Section 6.2.6, ongoing monitoring and modelling is continuing on the basins and additional information will be incorporated into the annual review of the plan as discussed in Section 11.1.

### 6.2.6 Resource Management

The amount of water that SA Water can extract from the groundwater sources on Eyre Peninsula for supplying customers on Eyre Peninsula is controlled by the Water Allocation Plans (WAPs) that have been developed for each of the prescribed water resources in the area. The Eyre Peninsula Natural Resource Management (EPNRM) Board's webpage (www.epnrm.sa.gov.au) defines these WAPs as the *"rule book"* for each of the prescribed wells (groundwater) areas.

- Southern Prescribed Wells Area (WAP)
- Musgrave Prescribed Wells Area (WAP)

The Department of Water, Land and Biodiversity Conservation (DWLBC), on behalf of the Minister for Environment and Conservation (the Minister), is responsible for determining annual allocations and issuing licences for extractions in accordance with the relevant WAP.

DWLBC, who are also responsible for monitoring and reporting on the state and condition of the resources, use rainfall and groundwater level data collected from monitoring bores in the various aquifers, to determine recharge rates on which annual allocations are based. Recharge rates are applied to the assessed 'catchment' area of each lens to generate an annual recharge volume for each lens. 60% of this annual recharge is set aside to maintain the integrity of the resource, leaving ~40% available for allocation (a percentage of which is set aside for stock and domestic users). Recharge rates are gazetted in November each year, which set the allocation for the following financial year.

The gazetted recharge rate is derived from an assessment of recent rainfall patterns, aquifer storage and effective recharge (including risk management factors based on rate of change in aquifer storage and precipitation projections).

The largest groundwater resource on Eyre Peninsula (i.e. Uley South) is monitored extensively to provide information for use in the calculation of groundwater resource allocations. Some of the monitoring undertaken at Uley South is listed below.

- Monthly groundwater level monitoring of observation well network
- Five yearly sampling and analysis of groundwater salinity from observation well network
- Annual reporting of total monthly extraction
- Six monthly monitoring of production well drawdown, recovery, flow rate and groundwater salinity
- Annual downhole geophysics of SLE 69 to monitor fresh/salt interface
- BOM rainfall data - Big Swamp station (daily when collected)
- Nine datalogger sites (observation wells) monitoring groundwater levels
- Three datalogger rainfall (pluviometer) monitoring sites

SA Water is issued with a license by DWLBC to extract water from the various lenses on Eyre Peninsula for public water supply purposes. The licence specifies certain conditions and provides annual allocations as determined using the allocation criteria in the WAPs. The licence allows the licensee (in this case SA Water) to extract water from the specified lenses for the purpose stated on the licence (in this case public water supply).

The responsibility for preparing, reviewing and amending the WAPs are the responsibility of the EP NRM Board under the *Natural Resources Management Act 2004*. The plans are reviewed within five years of adoption and if required a new WAP is developed, giving consideration to resource state and condition, environmental requirements, capacity to support demand and any relevant legislation. Community engagement occurs during WAP development, final adoption is by the Minister for Environment and Conservation under advice.

The WAPs for the Southern Basins and Musgrave Prescribed Wells Areas (PWAs) were adopted by the (then) Minister for Water Resources in 2000-01. In accordance with the *Natural Resources Management Act 2004*, the EPNRMB reviewed the WAPs in 2005-06. The review included a comprehensive consultation process involving key stakeholders including Local and State Government, SA Water, the EPNRMB, Licencees and the local community. A number of key issues were raised as a result of the review and consultation including

- Identifying and benchmarking of water dependent ecosystems,
- Investigating allowance for climatic variation,
- Understanding and quantifying the sustainable yield of the groundwater system,
- Investigating and potentially redefining the prescribed wells area boundary,
- Assessing the impacts on vegetation and pest species on recharge,
- Developing policies and procedures for allocating minor lenses,
- Developing policy and implication of rollover credits on water allocation,
- Developing policies and procedures for property level monitoring and reporting,

- Identifying appropriate policies and procedures for stock and domestic water use ,
- Ensure that water trading rules are economically effective whilst being socially and environmentally responsible,
- Due consideration to other components of water allocation planning principles outlined in the State NRM Plan and consistent with the National Water Initiative 2004 (NWI).

### 6.2.7 Recent Investigations into Uley South

In 2007, DWLBC conducted an investigation titled Uley Basin Groundwater Modelling Project. The objectives of the project were:

"… to develop a numerical groundwater model flow that will help to:

- Determine sustainable yields from the Uley Basin aquifers
- Predict the response of the aquifer system to potential groundwater use scenarios to provide a more robust declared annual water allocation based on percentage shares of the resource capacity
- Predict the response of the aquifer system climatic variability, risk of over extraction and impact on the available yield"

*(Source : Zulfic, D. et al, 2007)*

Three different extraction scenarios for Uley South were considered, alongside three recharge conditions for each scenario. The three extraction scenarios considered were:

- The constant extraction of 7500 ML/a (approximately equal to the current allocation)
- An annual extraction increase of 1000 ML/a to a total of 8500 ML/a until 2020
- The periodic increase of 2500 ML/a once every five years, bringing total Uley South extractions to 10,000 ML/a in those years and remaining at 7500 ML/a in other years

The extraction from Uley Wanilla was maintained at 300 ML/a under each scenario.

For each condition of future groundwater extractions, three scenarios of future rates of recharge were considered, namely:

- The calibrated recharge rates over the past 15 years were assumed to be replicated during 2005-2020,
- The recharge rates for each year during the period were assumed to be equal to the long-term average recharge rates and
- The recharge rates for each year in the period 2005-2020 were assumed to be 50% of the values for the period 1990-2004.

The investigation concluded that:

- When the recharge conditions from the past 15 years are assumed to be repeated during 2005-2020, it was clear that the aquifer at Uley South remained fully sustainable under each of the three future extraction conditions. However, the southern parts of both the Uley Wanilla and Uley East lenses may have significant drawdown under this recharge scenario, which would need to be managed.
- Considering long term recharge, the maximum residual drawdown in 2020 would be between 0.4 to 0.6 m at Uley South and more than one metre at both Uley Wanilla and Uley East. This indicates that although the Water Allocation Plan for the Southern Basins Prescribed Wells Area specifies 34% of water in the Uley East lens for potential public water supply use, it is likely that any extraction from this lens will place it under further stress.
- Considering recharge over the period 2005-2020 being equal to a 50% reduction in the recharge from the past 15 years, larger drawdowns at winter 2020 are observed under each future extraction scenario than observed with a repeat of the past 15 years recharge. This indicates that the three groundwater lenses would be under stress by 2020 and the three extraction scenarios considered are therefore unsustainable.

The report suggests that the most recent 15 year period may be a better estimate of future recharge conditions than the other two methodologies presented and that under these conditions the current level of extraction from Uley South is sustainable. Advice from DWLBC indicates that SA Water's allocations from the groundwater basins are unlikely to change significantly based on this scenario.

#### 6.2.8 Future Investigations

The NRM board currently has two projects in development to improve the level of understanding of the groundwater on Eyre Peninsula. These projects are:

- Southern Eyre Peninsula Hydrogeology Research Fellowship. This is a joint program between Flinders Uni, SA Water, DWLBC and the EP NRMB and will look at the major unknowns in the modelling work undertaken on Uley South (refer to Section 6.2.7).
- Groundwater Allocation, Planning and Management, Eyre Peninsula, South Australia. This is a Raising National Water Standards Project with funding from the Federal Government, EP NRMB, SA Water and DWLBC and will look at knowledge gaps, modelling and some policy development to feed into the Water Allocation Planning process.

### 6.3 River Murray

The Morgan-Whyalla water supply system provides filtered River Murray water to the mid - North region of South Australia.

Water delivered via the Morgan – Whyalla pipeline is from SA Water's existing Country Allocation from the River Murray. Unrestricted, this allocation is 50 GL/a. However, recent drought conditions have seen the allocations drop to 31 GL/a in 2007-08.

In July 2007, Stage 1 of a pipeline and pumping system was commissioned which connects the Morgan-Whyalla system at Iron Knob with the Eyre Peninsula system at Kimba. This enables water to be transferred from the Morgan-Whyalla system to the Eyre Peninsula system.

Stage 1 can supply up to 1,400 ML/a (over 15% of the Peninsula's total demand over last five years and 3% of SA Water's country allocation from the River Murray) to supplement Eyre Peninsula supplies. The pipeline's design allows further stages if necessary to augment this capacity.

The timing of further stages would be subject to the rate of demand growth for water on Eyre Peninsula and the potential implementation of alternative options. Potential future stages associated with this transfer facility are outlined in Section 7.5.

BHP Billiton has announced that they have commenced an EIS (environmental impact statement) into a proposed desalination plant at Port Bonython to supply their expansion of Olympic Dam. In the long term there is the opportunity that the townships of Whyalla, Port Augusta, Port Pirie and the current connection from Iron Knob - Kimba could receive desalinated water.

## 6.4 Surface Water

### 6.4.1 Introduction

SA Water does not currently source any supply from surface water on Eyre Peninsula. In the recent past, the Tod River Reservoir was used. However, it was discontinued due to salinity and reliability issues.

As part of the Eyre Peninsula Water Supply Master Plan (PB, 2003) a desalination plant at Tod Reservoir was recommended as the preferred option. Subsequent investigations by SA Water highlighted significant issues regarding the potential yield from the Reservoir and also some significant water quality concerns. As a result of this further work, Stage 1 of the Iron Knob to Kimba pipeline was implemented.

### 6.4.2 The Tod River

The major surface water development on Eyre Peninsula is the Tod Reservoir which sources its water from the Tod River catchment. The Tod River is the Peninsula's only significant perennial stream. Tod Reservoir is located approximately 30 km to the north of Port Lincoln.

The Tod River catchment consists of three main waterways: Tod River, Toolillie Creek and Pillaworta Creek. The dam which forms Tod Reservoir is located on the Toolillie Creek just upstream of its confluence with the Tod River. Water from the main stream of the Tod River and the Pillaworta Creek can be diverted into the reservoir via concrete lined channels, when stream flow is of sufficiently low salinity.

High salinity of the natural catchment runoff is the major issue with the Tod catchment. These high salinity levels are understood to be due to the geology/soils within the catchment

mobilising the salinity following native vegetation clearance. Salinity tends to vary with season and rainfall event, being higher in low flow periods and fresher at the start of high flows. Under current operating rules saline runoff (greater than 1500 mg/L TDS) is not diverted into the reservoir and it is understood that a significant proportion of the available water (potentially 90%) is diverted past the reservoir due to high salinity.

The Tod Reservoir has a capacity of approximately 11,300 ML and was most recently full in 1993. Although in previous years up to 3000 ML/a was extracted from Tod Reservoir for potable use, negligible water has been extracted since 2001-02 due to increasing salinity.

The Tod Reservoir still forms part of SA Water's contingency planning for the Eyre Region, in event of a failure of the Uley South or Duck Ponds Pump stations.

Future uses for the Tod Reservoir are discussed in Section 7.9.2.

## 6.5 Non-potable schemes

In the context of this report, non potable schemes include:

- Stormwater harvesting
- Wastewater reuse
- Rainwater tanks

They are generally schemes which are not considered to meet the Australian Drinking Water Guidelines for human consumption, but provide a useful resource for non-potable uses such as stock watering or watering of parks and gardens. These schemes are generally run by local councils or community groups and a summary of existing schemes is presented below.

The community engagement process highlighted that these schemes were very important to the local community on Eyre Peninsula and several communities.

Reliability of a scheme needs to be considered, especially those dependent on the rainfall, as climate variability and long term climate change can potentially provide inadequate supply in periods of drought. Many users of schemes such as rainwater tanks have had to seek a backup source until the rainwater tank is replenished during the recent drought.

The regulation and funding for these schemes is not administered by SA Water, but SA Water recognises the importance of these schemes, both in terms of the reduced demand on SA Water supplies and in heightening the awareness of the need for water conservation in the community.

While this report primarily focuses on drinking water system, an integrated water cycle planning approach is recommended. Many of these initiatives are being driven by the community and local government.

### 6.5.1 Stormwater Harvesting

The Eyre Peninsula Catchment Report (Eyre Peninsula Catchment Water Management Board, 2004) notes that there are more than 200 abandoned water harvesting schemes

across Eyre Peninsula, including dams, reservoirs and tanks. An investigation of 27 of these indicated that nine have the potential for rehabilitation and these could make available more than 44 ML/a for reuse schemes. An example of recommissioning older projects is the Polda Rock scheme, originally commissioned in the 1920s, which was reinstated in 1998 to provide irrigation water for local amenities in the Wudinna township, some seven kilometres away. The catchment report notes that on average 40 ML/year can be harvested from this scheme, which exceeds the average volume of 25 ML/year used on public spaces in the township of Wudinna.

### 6.5.2 Wastewater Reuse

#### *6.5.2.1 Port Lincoln*

Port Lincoln is the only town on Eyre Peninsula within the study area with a sewer system, which is operated by SA Water. The Port Lincoln Wastewater Treatment Plant (WWTP) has a capacity of 4.0 ML/day. The Port Lincoln City Council Reuse Scheme and Effluent Filtration Plant were commissioned in November 2002. This scheme is owned by the Port Lincoln City Council and operated by SA Water. Currently the Port Lincoln Racecourse and the Ravendale sporting complex are users of treated wastewater from the nearby Port Lincoln WWTP. The average annual inflow to the WWTP is 1,056 ML/a, equivalent to a daily inflow of 2.9 ML/day. The peak monthly flow during 2006-07 was approximately 3.15 ML/month. Average annual reuse from this plant has been 62 ML during the past four years, equivalent to 169 kL/day, although this peaked at approximately 200 kL/day during 2006-07.

The salinity of the wastewater in Port Lincoln, may limit the amount of treated wastewater that can be reused for irrigation. There are numerous reasons for this salinity, such as:

- The prevalence of household water softeners, designed to remove hardness from the reticulated water supply for in-house use which is discussed in Section 7.9.1.
- Fish processing waste
- Infiltration of saline groundwater in sewer network

SA Water is currently working towards improving the salinity of the wastewater at Port Lincoln through projects which are looking at

- Reducing infiltration of saline groundwater in the sewer network
- Splitting the wastewater treatment plant into a high saline and lower saline stream to better manage waste disposal from Fish Processing industry.

These projects may in turn allow for greater reuse opportunities.

#### *6.5.2.2 Community Wastewater Management Schemes*

There are 12 townships within the study area which currently have a Community Wastewater Management Scheme (CWMS), formerly referred to as Septic Tank Effluent

Disposal Schemes (STEDS). All other localities within the study area use on-site septic systems, typically with an associated septic soakage trench on each domestic property. Audits conducted by the Local Government Association in 2005 identified that six townships across Eyre Peninsula have recently commenced reusing CWMS effluent to irrigate either public spaces (such as golf courses or ovals) or woodlots. If these effluent reuse schemes represent the substitution of potable water for treated effluent, then overall demand on the reticulated water supply of Eyre Peninsula will have been reduced as a result of the implementation of these reuse schemes. However, if these reuse schemes have been initiated only as a mechanism to dispose of treated effluent, then they will have little impact on the overall water supply/demand balance for Eyre Peninsula.

**Table 6-3: Summary of townships with CWMS currently reusing treated wastewater for irrigation (source: Local Government Authority)**

| District Council | Township | Number of live connections (at 2005) | Annual Volume* (ML/a) |
|---|---|---|---|
| Ceduna | Ceduna/ Thevenard | 1180 | 256 |
| | Smoky Bay | 170 | 37 |
| Cleve | Cleve | 458 | 99 |
| Lower Eyre | Coffin Bay | 765 | 166 |
| | Tulka | 20 | 4 |
| Streaky Bay | Streaky Bay | 491 | 107 |
| Total average annual volume = | | | 669 ML/a |
| ** Annual volumes calculated by assuming average usage of 595 L/connection/day* | | | |

### 6.5.3 Rainwater Tanks

A recent survey undertaken by the University of South Australia for the Eyre Peninsula NRM Board of 524 residents on Eyre Peninsula indicated that 97% of all respondents had a least one rainwater tank and 80% of all respondents had between one and three tanks. However, it is difficult to obtain accurate data on the size of tanks that are in use across Eyre Peninsula and whether existing tanks are used throughout houses or only for outdoor use. It is difficult to estimate the amount of water that could be harvested from additional uptake of domestic rainwater tanks across the project area. This will depend upon the mixture of incentives to encourage uptake and education and public awareness.

The community engagement process raised issues associated with these rebates being generally geared toward urban environments rather than rural areas. This issue is discussed in more detail in the Community Response Report.

## 6.6 Overview of Current Supply Situation

In order to provide an overview of the current water supply situation for the Eyre Peninsula Water Supply system (exclusive of the Independent Schemes), Table 6-4 outlines the 2007-08 annual water allocation and assumed water availability from the five potential supply sources. The volume available for extraction from Robinson Lens is shown as 0 ML for 2007-08, as discussed previously.

**Table 6-4: 2007-08 Eyre Peninsula Water Supply System Supply availability – SA Water developed systems only**

| Potential Supply Sources | Annual Water Allocation/Water Availability (ML/a) |
|---|---|
| Southern Basin PWA | 8484 |
| Musgrave PWA | 401* |
| Robinson Lens | 0 |
| Tod Reservoir | 0 |
| Morgan-Whyalla Pipeline | 1400 |
| **Total Supply Source Availability** | **10285** |

**Only Polda is a developed basin, this figure also includes the portion of Kappawanta assigned to Elliston – not the full allocation (as this is not currently accessible by SA Water).*

# 7 Alternative Sources

## 7.1 References

As noted in Section 1.5.3, the SA Water project team enlisted help from Tonkin Consulting to develop options for alternative sources. Sections of the following chapter have therefore been reproduced from information provided by Tonkin Consulting with permission.

The information on possible vegetation at possible site locations has been obtained from http://www.naturemaps.sa.gov.au/ (accessed February 2008).

## 7.2 Introduction

The demands discussed in Section 4.3 suggest that augmentation of the existing regional water supplies of Eyre Peninsula will be required in approximately 2014-15 as shown in the figure below.

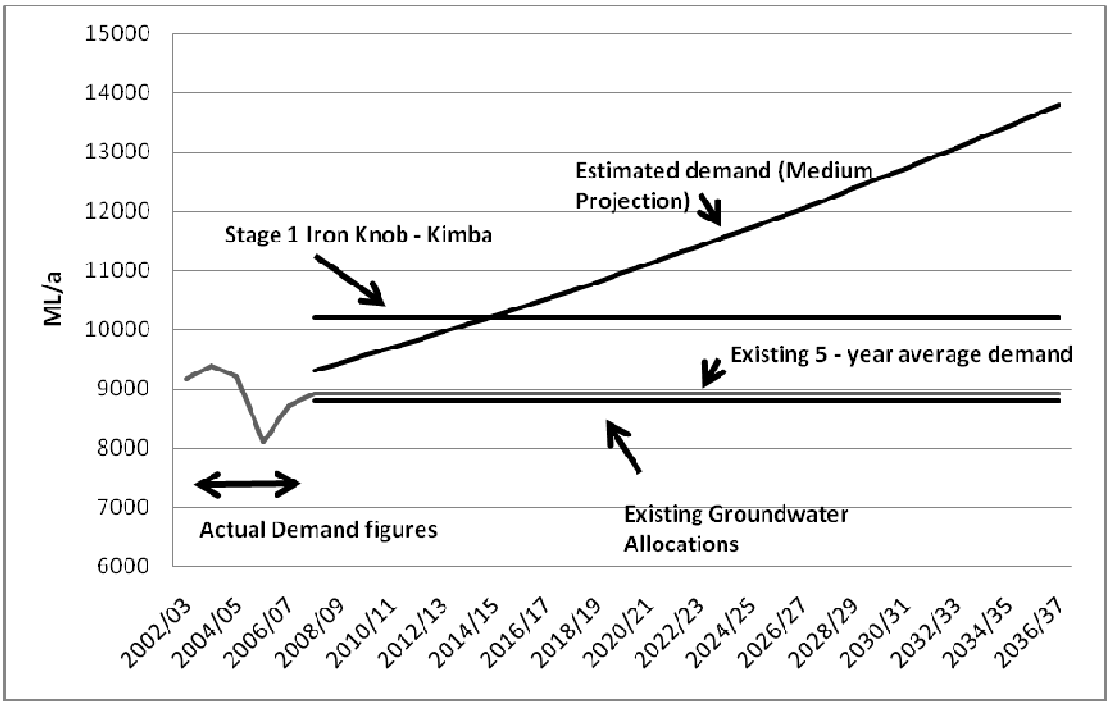



**Figure 7-1: Timing for augmentation based on overall medium demand projection**

Under the high projection, an alternative option could be required as early as 2011-12. The low projection would push augmentation out to 2015-16.

It is understood that while a trend of increasing demand is possible, there will be some fluctuation and variability in this trend. This will be assessed as part of the annual review discussed in Section 11.1.

In this report, seven options to augment existing regional water supplies on Eyre Peninsula have been investigated. These options are:

- A seawater desalination plant on the north-western coast of Eyre Peninsula
- A seawater desalination plant on the southern coast of Eyre Peninsula (lower desalination plant)
- Expansion of the Iron Knob-Kimba pipeline to transfer additional water to Eyre Peninsula (currently sourced from the Morgan-Whyalla pipeline)
- A pipeline from Whyalla to supply portions of the East Coast of Eyre Peninsula from Whyalla
- Improvements to the condition of the Tod Reservoir catchment in order to improve the quality of future runoff
- Additional groundwater extraction through the development of new borefields
- Demand management approaches to reduce the demand on reticulated supply across Eyre Peninsula

Three options to supply water to the towns of Venus Bay and Port Kenny are also discussed. These towns are not connected to the Eyre Peninsula water supply network.

The seven options in this section have been investigated using a desktop analysis only. The sites selected for storages, pipe routes and treatment plants should be considered notional and there will be alternative sites which can be explored once it is decided to pursue an option. All of the options discussed in this section have the potential to be staged based on actual demands.

The supply demand graphs presented below indicate that a combination of options will be required to meet predicted demands in 2036-37.

In Section 10 options are assessed using a multi criteria analysis (MCA). As part of this assessment, options have been assessed against criteria under four categories, namely

- Environment:
    - Impact on terrestrial ecosystems
    - Estimate of greenhouse gas emissions from construction
    - Estimate of greenhouse gas emissions from operation
    - Impact on aquatic ecosystems (e.g. waste disposal)
- Economic/commercial
    - Total cost to customer/utility/government
    - Total cost per ML
- Social/community
    - Potential for public health issues to arise
    - Amenity value of infrastructure (e.g. impact on landscape)
    - Potential to improve hardness
    - Equitably provide water for all aspects of community

- Aesthetic value (e.g. taste)
- Community acceptability of option

- Technology/functionality
  - System complexity
  - Reliability of supply/technology
  - Operability
  - Provides for diversity in fit for purpose water supply products
  - Increased exposure to risks
  - Regulatory impacts

## 7.3 Desalination

Two localities have been nominated for investigation for seawater desalination. As discussed above, these localities should be considered notional and more detailed investigations into their suitability will be part of future stages of option development.

The localities assumed in this investigation are:

- North West desalination plant (possibly located at Ceduna or on the coast near Penong)
- Lower desalination plant (possibly located at Cathedral Rocks)

In order to develop the options to a suitable level of detail to allow options to be compared, the following assumptions and limitations have been made in this report:

Assumptions:

- Reverse Osmosis technology has been assumed for each desalination plant option, as this is a proven technology, is widely used in seawater desalination plants worldwide and is the most efficient method of desalination (Desalination Working Group, 2007).
- The brine stream is disposed to the ocean
- Key components of a desalination plant are:
  - Pre treatment
  - Post treatment
  - Reverse Osmosis plant
  - Seawater inlet pipe (including offshore structures)
  - Brine outlet pipe (including offshore structures)
  - Connection from desalination plant to existing system
  - Pump Stations
    - Inlet Seawater (with screening)
    - Treated Water
    - Brine Discharge

Limitations:

- Pre and post treatment has been allowed in this analysis. However, the exact nature of these processes requires appropriate investigation during further development of these options. The type and extent of pre-treatment required will depend on seawater quality. This can vary widely depending on location.
- Additional work will be required to determine the availability, practicality, type and cost of providing power supply to the possible sites as well as transfer pump stations. Relevant authorities will need to be consulted to determine power supply capacity and network transmission capacity and the cost of any upgrades required.
- A more rigorous analysis of water depths, seasonal seawater quality, oceanographic conditions including tides, currents and mixing conditions and the marine ecosystems is required to allow assessment of potential environmental impacts of intake and outfall structures and discharge. This analysis will include a more comprehensive investigation into the exact location of intake and outfall locations (including for the effect of desalination plant discharges) to optimise cost and minimise environmental impacts and the suitability of surrounding coastline for brine discharge (including depth, circulation and mixing, proximity to aquatic ecosystems, and important fisheries or aquaculture areas).
- More rigorous analysis of the impact on system water quality is required, particularly where blending between desalinated water and traditional supplies is necessary.
- Geotechnical analysis of the pipe route, storage and treatment plant sites. Specifically with regard to the volume of rock likely to be encountered during excavation and the presence of ground water in storage excavations.
- Investigations of terrestrial site conditions (plant and pipeline locations) including flora, fauna and cultural heritage (Aboriginal and European) assessment.
- Investigations into the potential for Native Title claims, including over the seabed.

The primary environmental issues associated with seawater desalination are generally considered to be the management of the plant discharges (brine stream) produced as a by-product of the desalination process and energy usage associated with plant operation. Strategies for managing the brine stream fall within two broad headings: land based disposal (e.g. evaporation basins, deep-well injection) or marine based disposal (e.g. a marine outfall). Both options involve different environmental risk mitigation strategies that would need to be carefully addressed in the design of the plant. Marine based disposal has been assumed for the purposes of this report.

### 7.3.1 North West Desalination (possibly located at Ceduna or near Penong)

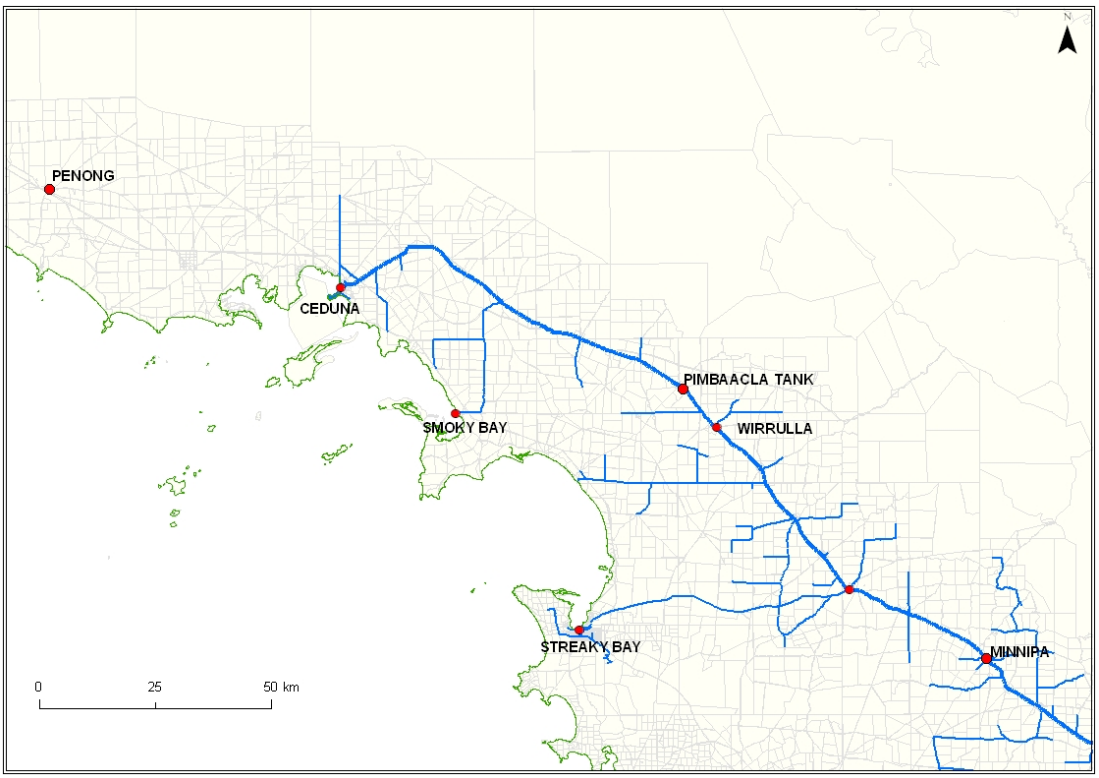



**Figure 7-2: North West Desalination plant supply area – possibly located at Ceduna or on the coast near Penong**

This option allows for approximately 1,800 ML/a, which is considered sufficient to meet future demands in Ceduna and between Ceduna and Pimbaacla.

The option would best be staged with an initial desalination plant supplying demands in the township of Ceduna. Additional units would then be added as dictated by demand in Ceduna and from Ceduna to Pimbaacla.

If required, additional units could be installed to supply demand between Pimbaacla and Minnipa. However, for the purposes of this report it has been assumed that the supply zone of this option stops at Pimbaacla. This option involves a reversal of flow between Ceduna and Pimbaacla. There are potential issues associated with this, including the condition of the pipe between Ceduna and Pimbaacla. A detailed surge analysis and condition assessment of the pipeline would need to be undertaken to determine if any sections need to be relaid.

It is understood from discussions with members of the community from Ceduna that a private sector proposal for a site near Penong which involves the use of alternative technology for desalination. This proposal was the subject of a submission for funding to the Federal Government in 2006.

If the plant was to be located on the coast line near Penong, and based on supplying demands at least as far as Ceduna, approximately 95 km of 375 mm pipeline would be

required to connect the plant to the existing system at Ceduna. The District Council of Ceduna has a 70 km pipeline which extends from the township of Ceduna towards Penong. It is understood that this pipeline varies from 200 mm to 150 mm diameter. Detailed analysis is required, however it is considered that this pipeline is unlikely to have adequate capacity to transfer 1800 ML/a to Ceduna from the coastline near Penong.

Anecdotal information received from community representatives during the community engagement sessions indicates that if a plant was installed near Penong, that the brine could be discharged to the nearby Cheetham salt pans. It is unknown if the brine would be of suitable quality for use in a salt works. The technology and recovery rate assumed in this report requires the use of anti-scalants. There will be a residual of these chemicals in the brine. Additional investigations would be required to determine if the quality of the brine was suitable, but also if the quantity produced was appropriate for continual discharge to a salt works.

Information provided by community representatives at the community sessions also suggested that the power supply for the plant could be via solar energy stored using carbon block technology. It is unknown whether a connection to the electricity grid would be required to make this option feasible. Energy supply options, including procurement of renewable energy should be developed based on the best economic value. A range of 'green' energy options should be investigated.

#### *7.3.1.1 Supply/Demand Balance*

A seawater desalination plant located in the north-west of Eyre Peninsula could provide approximately 1,800 ML/a or 13% of the projected 2036-37 demand.

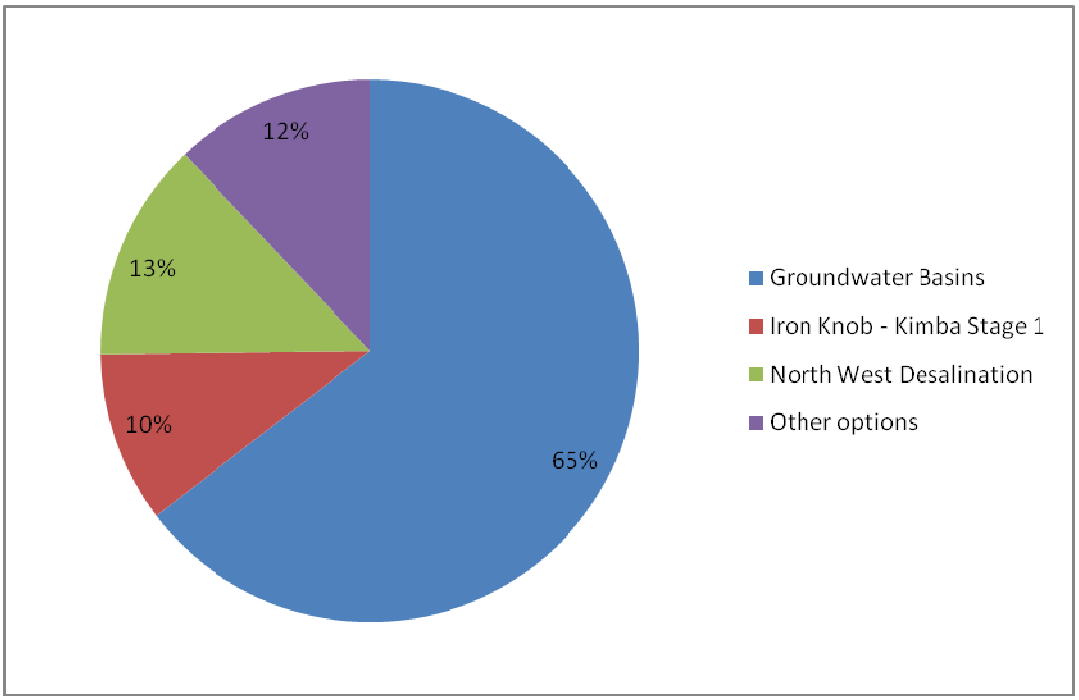



**Figure 7-3: Percentage of projected 2036-37 Eyre Peninsula consumption – North West desalination plant option**

#### *7.3.1.2 Benefits and Risks*

The following outlines some of the benefits and risks associated with installing a desalination plant in the North West of Eyre Peninsula. This will input to the multi criteria analysis discussed in Section 10.

- Roadside vegetation may be impacted by pipeline installation. Previously cleared land would preferably be used for desalination plant and storage sites. There is limited information on the quality of the vegetation in this area and impacts to native vegetation require approval in accordance with the Native Vegetation Act and are required to be offset through the achievement of a significant environmental benefit (*Multi Criteria Analysis criterion: Impact on terrestrial ecosystems*).
- The construction of an intake and outfall structure for ocean disposal of the waste concentrate is typically achieved by trenching of the seabed, or drilling to install the outfall pipeline below the seabed. Construction may impact directly upon the marine environment, in particular existing benthic communities such as seagrass beds (*Multi Criteria Analysis criterion: Impact on aquatic ecosystems*).
- Provides desalinated water only for customers within Ceduna - Pimbaacla supply zone (*Multi Criteria Analysis criterion: Equitably provide water for all aspects of community*).
- Will improve aesthetic value for customers Ceduna - Pimbaacla water supply zone only (*Multi Criteria Analysis criterion: Aesthetic value e.g. taste*).
- Will reduce hardness for consumers in Ceduna to <100 mg/L but will have no impact on consumers in other parts of region. (*Multi Criteria Analysis criterion: Potential to remove hardness*).
- Option requires flow between Ceduna and Pimbaacla in opposite direction to design (*Multi Criteria Analysis criterion:* Systems complexity).

### 7.3.2 Lower Site (Possibly located at Cathedral Rocks)

A number of locations were previously investigated for a seawater desalination plant at the southern end of Eyre Peninsula.

- Louth Bay, Point Lowly – (PB, 2003)
- Cathedral Rocks – brief investigation by SA Water in 2004

For the purposes of this investigation it has been assumed that a lower desalination plant could be located at Cathedral Rocks, however further investigations would be required into the most appropriate location if this option is to be pursued.

The Cathedral Rocks coastal site is approximately 30 km southwest of Port Lincoln and as shown in Figure 7-4 is close to the Uley South borefield.

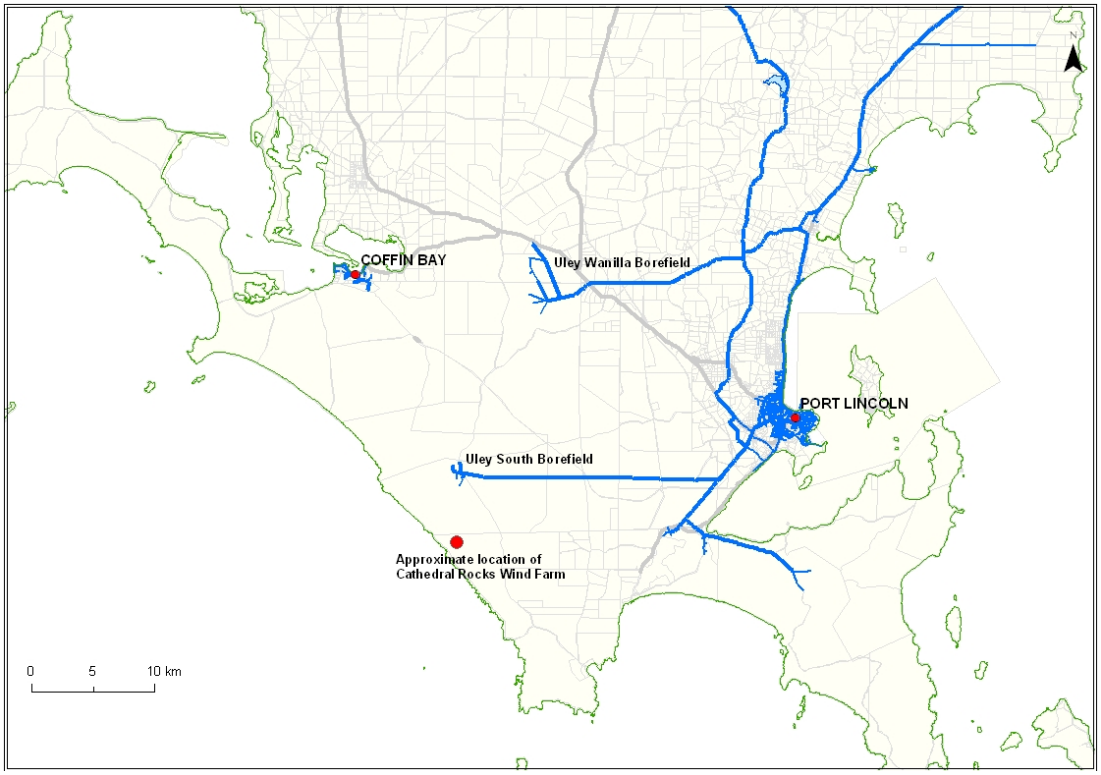



**Figure 7-4: Location of lower desalination plant on southwest coast of Eyre Peninsula**

This option allows for approximately 2,200 ML/a.

The Cathedral Rocks site is very remote and its exposed coastline would assist with dispersion of a waste concentrate discharge stream from a seawater desalination plant. The remoteness of the site also implies that the aquatic and terrestrial ecosystems and any cultural heritage items are likely to be currently undisturbed and construction activities as proposed in this option may have a significant impact.

With the proximity of the Uley South borefield, the Uley South main (transporting groundwater from the Uley South to the North Side Hill Tanks) could be used to transport desalinated water into the reticulated water supply network of Eyre Peninsula. The amount of spare capacity in this main and pump station would need to be investigated. From North Side Hill Tanks, desalinated water can then be pumped throughout the reticulated water supply system of Eyre Peninsula, including Port Lincoln and the East Coast system.

#### *7.3.2.1 Benefits and Risks*

Many of the issues raised previously for a seawater desalination plant in the North West of Eyre Peninsula also apply to a lower site.

It is emphasised that Cathedral Rocks is an area of remote coastline, with no development apart from the adjacent wind farm. The construction of an access road, electrical transmission line and connecting pipework would impact upon the terrestrial environment. Additionally, the seawater inlet pump station would likely be located on sandy beach, below the desalination plant, which may impact upon the marine environment as well as providing

significant construction challenges. Brine discharges would be into relatively pristine environment that is likely to have healthy marine communities present.

Furthermore, the possibility of constructing a large below-ground storage in the Uley South borefield, to facilitate the desalination plant operation suggested in this option, could have comprehensive environmental challenges, which would have to be investigated more thoroughly. Site works (especially any tunnelling through the cliffs for pipelines etc) would need to be carefully planned to avoid impacting the basins by setting up preferential flow paths that either lead to a higher rate of water loss out of the basin or a conduit for the ingress of salt water to the basin.

The possible site for a desalination plant will impact on native vegetation. While the quality of this vegetation is not specifically known, it is likely to be very high quality given the remoteness of the site and absence of past impacts.

As with the other options presented in this report, the availability of power would need to be determined in more detail if this option was to be investigated further. In this case the suitability of the adjacent wind farm and associated connection to the national grid for supplying a constant load to a desalination plant would need to be further explored.

It has been assumed in the development of this option that the technical challenges associated with mixing desalinated water with water from a groundwater source can be managed using a large storage located near the Uley South basin, however further work will be required to determine the specifics of integrating a desalination plant at this location into the existing water supply system.

The benefits and risks for a desalination plant in Lower Eyre Peninsula in terms of selected criteria the multi criteria analysis (discussed in Section 10) are outlined below.

- Some roadside vegetation may be impacted by pipeline installation. Impacts to native vegetation require approval in accordance with the *Native Vegetation Act* and are required to be offset through the achievement of a significant environmental benefit (*Multi Criteria Analysis criterion: Impact on terrestrial ecosystems*).
- Tidal and current mixing on the western lower portion of Eyre Peninsula may be good, however the area is currently undisturbed and construction and operation of an intake and outfall structure for ocean disposal of the waste concentrate may impact directly upon the marine environment (*Multi Criterion Analysis criterion: Impact on aquatic ecosystems*).
- Provides new source of water for whole region (*Multi Criterion Analysis criteria: Equitably provide water for all aspects of community).*
- Will have some improvement on aesthetic value for entire region as shandied with other sources (*Multi Criteria Analysis criterion: Aesthetic value e.g. taste).*
- Will slightly improve hardness for all customers in Eyre Region (possible reduction approximately 50 mg/L) (*Multi Criteria Analysis criterion: Amenity value of infrastructure).*

### 7.3.2.2 Supply/Demand Balance

A seawater desalination plant located in the lower region of Eyre Peninsula could provide approximately 2,200 ML/a or 16% of the projected 2036-37 demand.

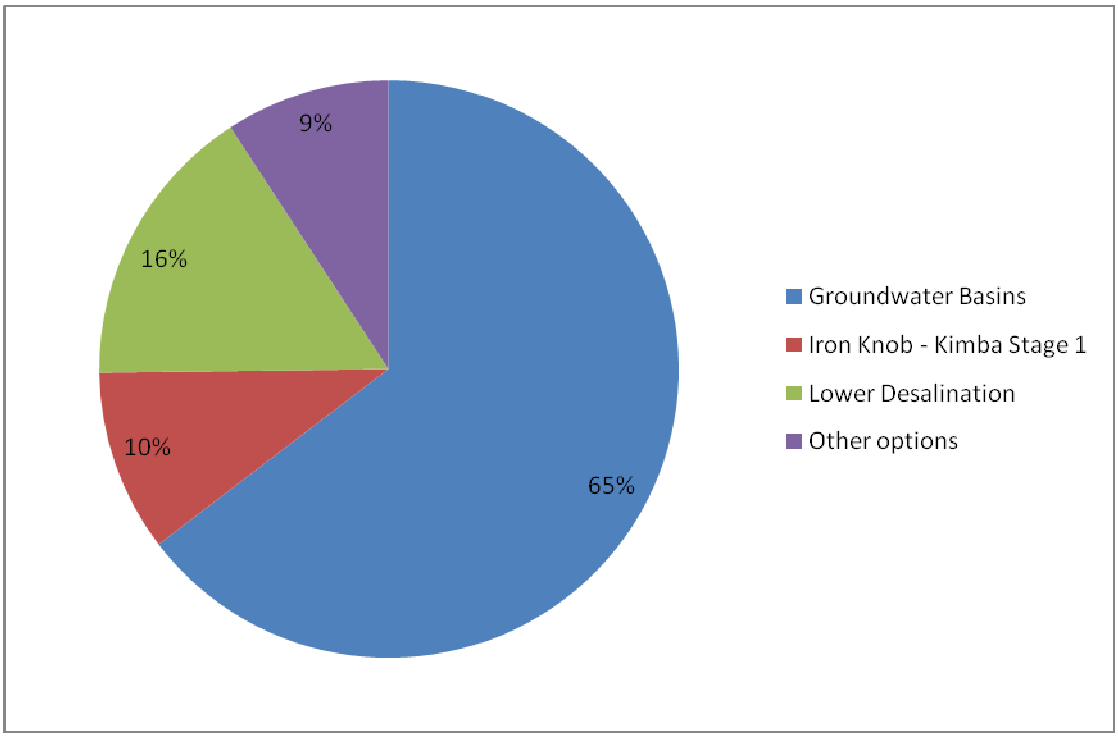



**Figure 7-5: Percentage of projected 2036-37 Eyre Peninsula consumption – lower desalination plant option**

## 7.4 Water Quality Improvement of Tod Reservoir

### 7.4.1 Option Overview

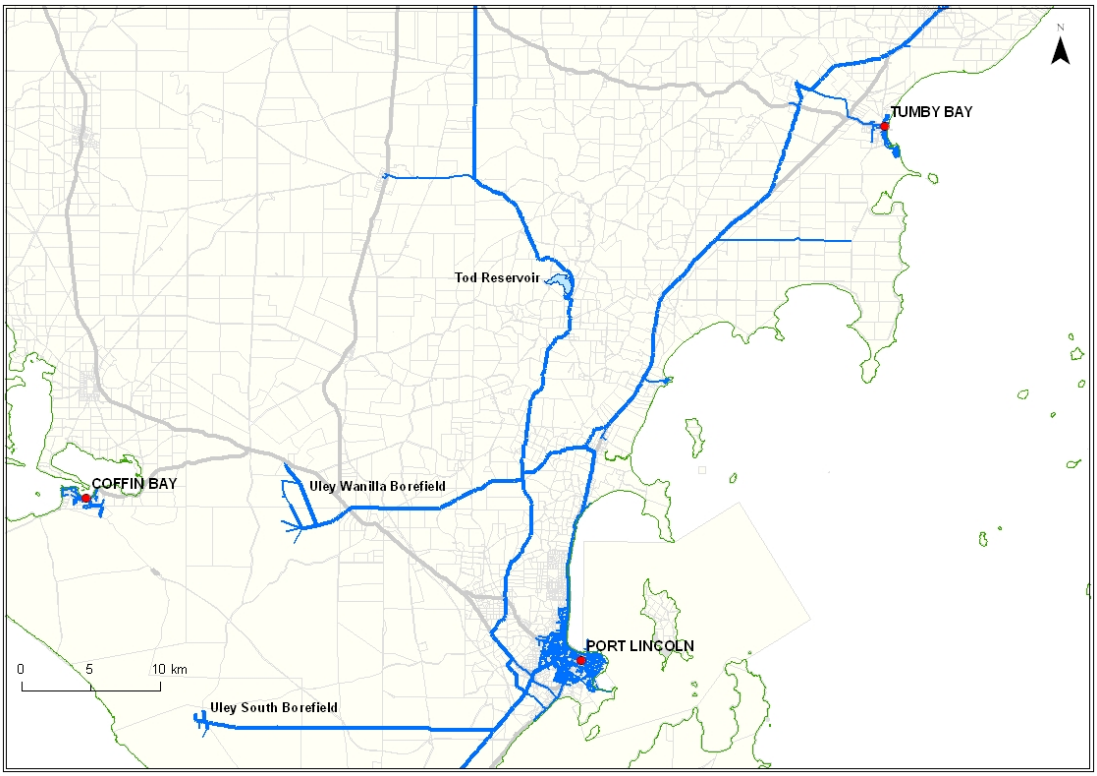



**Figure 7-6: Location map – Tod Reservoir**

Tod Reservoir, located in the Toolillie Gully catchment of the Tod River, is the only major surface water storage on Eyre Peninsula. Water quality in Tod Reservoir has been deteriorating, with salinity exceeding 4,000 mg/L and water has not been extracted for potable use since early 2002.

An option to augment the water supply on Eyre Peninsula is a program of catchment rehabilitation to improve the health of the Tod Reservoir and as a consequence improve the quality of its inflows. The future management of the Tod Reservoir as a storage for potable water depends upon the improved health of the catchment. Salinity, high nutrient levels, pathogens, unrestricted stock access and acid sulphate seeps all pose threats to the quality of reservoir inflows.

The chances of addressing dryland salinity are maximised by targeting known high recharge areas of the catchment for improved catchment management practices.

Water currently stored within Tod Reservoir is becoming increasingly saline, reflecting the elevated levels of salinity across its catchment and a range of undesirable water quality parameters have increased over recent years. SA Water is currently investigating a range of proposals to improve the quality of this water in the short term. Following construction of the Iron Knob-Kimba pipeline, the Tod Reservoir will be retained as an emergency storage for Eyre Peninsula but at present is unsuitable for ongoing potable use.

### 7.4.2 Potential Additional Supply Volumes

It is difficult to confidently predict the impacts of a catchment rehabilitation program with regard to the salinity and yield for the Tod Reservoir.

A volume of 1,000 ML/a has been assumed for this option. 1,000 ML/a recognises the need to provide suitable environmental flows downstream of the reservoir and to protect against varying salinities and reliabilities of the yield. This has been used as the basis for the supply demand balance shown in Figure 7-7 and for the MCA. 1,000 ML/a has been adopted based on the assumption that suitable catchment rehabilitation measures can be undertaken to ensure that this volume is available at a suitable quality for use in the Eyre Region's water supply on an ongoing basis.

### 7.4.3 Benefits and Risks

Improvements to catchment management practices will provide a long-term improvement to the health of the Tod Reservoir catchment, its native flora and fauna and would be widely accepted by the community. However there is a risk that potential improvements to water quality in the Tod Reservoir catchment may be difficult to quantify and in fact may only slow the upward trend in salinisation of the catchment.

Any increases in the catchment takes would need to be within sustainable limits and give consideration to downstream ecosystems within the lower Tod Catchment which include areas of identified ecological value.

It is likely that in order to improve water quality (specifically salinity) in the Tod catchment significant land use change may be required in the catchment with possible significant economical and social implications for the catchment community and associated industry.

The benefits and risks for rehabilitating Tod Reservoir catchment in terms of selected criteria the multi criteria analysis (discussed in Section 10) are outlined below.

- Option aim is to improve overall health of catchment; additional draw would need to be within sustainable yields of Tod Reservoir to avoid impact on downstream ecosystems (*Multi Criteria Analysis criterion: Impact on terrestrial ecosystems and Impact on aquatic ecosystems*).
- Provides new source of water for customers North of the Tod Reservoir (*Multi Criteria Analysis criterion: Equitably provide water for all aspects of community).*
- May provide limited improvement on aesthetic value for most of region (*Multi Criteria Analysis criterion: Aesthetic value e.g. taste).*
- May still require additional treatment to ensure public health is protected depending on water quality outcomes achieved. Higher potential risk of public health issues than other options due to uncontrolled catchment. (*Multi Criteria Analysis criterion: Potential for public health issues to arise).*
- Option is designed to improve overall health of catchment and therefore may improve the amenity value of the infrastructure. (*Multi Criteria Analysis criterion: Amenity value of infrastructure).*

– May be a minimal improvement in hardness depending on water quality outcomes. (*Multi Criteria Analysis criterion: Potential to improve hardness).*

### 7.4.4 Supply/Demand Balance

Assuming that 1,000 ML/a can be made available from the Tod Reservoir at a suitable reliably and quality, this option would supply 7% of the projected 2036-37 demand.

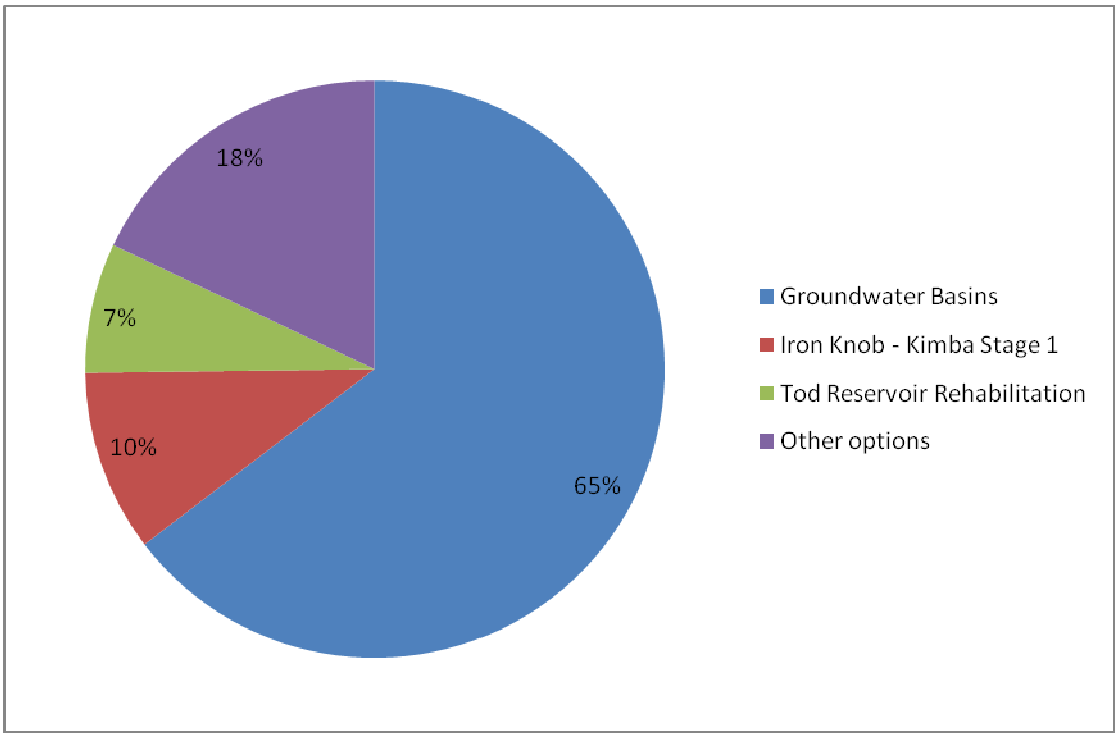



**Figure 7-7: Percentage of projected 2036-37 Eyre Peninsula consumption – Tod Reservoir rehabilitation**

## 7.5 Further Expansion of the Iron Knob-Kimba Transfer Pipeline

### 7.5.1 Option Overview

Stage 1 of the Iron Knob – Kimba pipeline was commissioned in June 2007. This scheme supplements water supplies on Eyre Peninsula from the River Murray using spare capacity in the Morgan-Whyalla pipeline. Stage 1 of the scheme provides Eyre Peninsula with an additional 1,400 ML/a, at an approximate capital cost of $48.5 million (SA Water, 2005). Stage 1 was implemented as a result of work undertaken by SA Water after the completion of the Eyre Peninsula Water Supply Master Plan (PB, 2003). Stage 2 of the scheme was designed to provide an additional 900 ML/a and was anticipated to be undertaken within 5 years. The total augmentation after Stage 2 would be 2,300 ML/a.

Staging of the project was catered for by sizing the pipeline between Iron Knob and Kimba to accommodate the Stage 2 design flow of 2,300 ML/a (7.5 ML/day).

Stage 1 compromised a new 375 mm diameter DICL pipeline between Iron Knob and Kimba, including five new pump stations shown in Figure 7-8.

Initially supplied with water from SA Water's country licence from the River Murray, in the long term this option provides the opportunity to link Eyre Region with the proposed BHP Billiton desalination plant at Port Bonython.

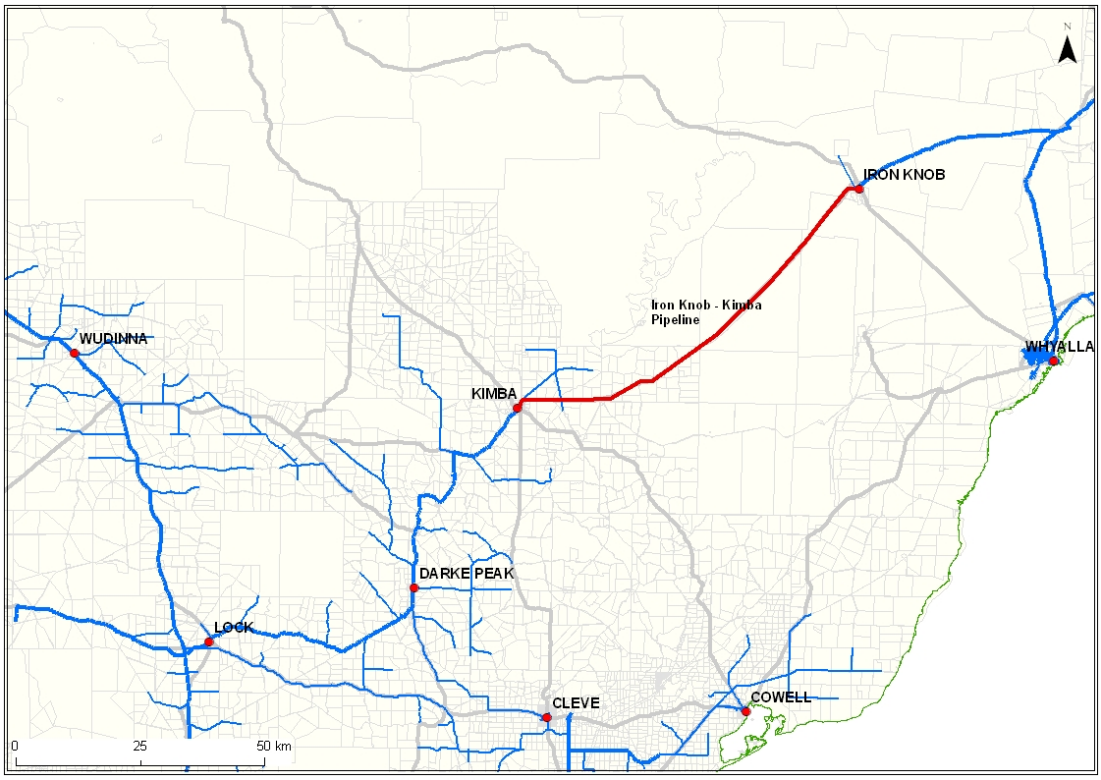



**Figure 7-8: Iron Knob-Kimba pipeline, location map.**

### *7.5.1.1 Stage 2 Works*

It was proposed that Stage 2 would involve the duplication of a section of the Kimba – Lock main to allow the additional 900 ML/a to be transferred to Lock township. However, as can be seen in Section 4, demands on Eyre Peninsula have been decreasing since the pipeline was originally proposed and the 1,400 ML/a supplied by Stage 1 is now sufficient to supply the area between Lock tank and Kimba. There is 900 ML/a additional capacity in the Iron Knob to Kimba section of the pipeline and alternative means for using this water on Eyre Peninsula are being investigated. These include:

- Shandying the additional water at the Lock tank and using it to supplement supply between Lock and Minnipa
- Installing a connection between the Kimba – Lock main and the East Coast main by augmenting existing mains

There are potential water quality concerns with shandying River Murray water in significant quantities with groundwater. However, as previously mentioned, in the long term there is

the opportunity that the water at Whyalla could be supplied via the proposed BHP Billiton desalination plant at Port Bonython. The opportunity therefore exists to shandy this water with groundwater in a similar manner to the lower desalination plant option as discussed previously. This would require a storage to allow the pipeline to deliver an average of 900 ML/a throughout the year, but maintain a constant ratio of basin water to desalinated water.

### 7.5.2 Benefits and Risks

The general area around Lock is cleared farming land and it can be assumed that infrastructure can be located to avoid small pockets of remnant Eucalyptus mallee forest and mallee woodland in the vicinity. As previously discussed, there is the opportunity for this option to involve using desalinated water via the proposed BHP Billiton desalination plant at Port Bonython, however it has been assumed in the summary below that the benefits and risks associated with this desalination plant are not relevant to this discussion.

The benefits and risks for the option of implementing Stage 2 of the Iron Knob – Kimba pipeline in terms of the multi criteria analysis (MCA) (discussed in Section 10) are discussed below. The MCA presented in this report does not consider the benefits and risks associated with the proposed desalination plant at Port Bonython.

- Area is generally cleared farming land, siting of infrastructure to avoid remanent vegetation *(Multi Criteria Analysis criterion: Impact on terrestrial ecosystems).*
- Provides augmented source of water for areas North of Lock along West Coast main (*Multi Criteria Analysis criterion: Equitably provide water for all aspects of community).*
- Will provide limited improvement on aesthetic value for customers North of Lock (*Multi Criteria Analysis criterion: Aesthetic value e.g. taste).*

### 7.5.3 Supply/Demand Balance

Stage 2 of the Iron Knob – Kimba scheme would provide approximately 0.9 GL/a or 6% of the projected 2036-37 demand.

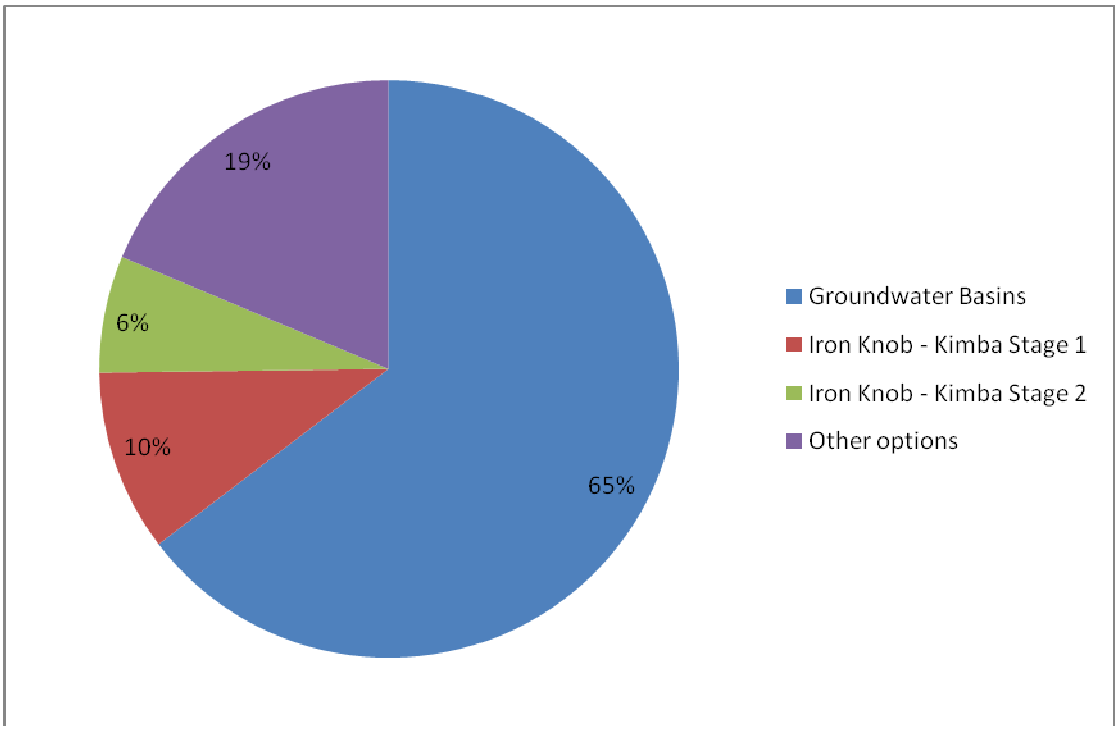



**Figure 7-9: Percentage of projected 2036-37 Eyre Peninsula consumption – Iron Knob – Kimba Stage 2**

## 7.6 Transfer Pipeline from Whyalla to supply East Coast of Eyre Peninsula

### 7.6.1 Option Overview

This option uses excess capacity in the Morgan-Whyalla scheme at Whyalla to augment the supply on Eyre Peninsula via the east coast.

This option would involve the construction of a new pipeline connecting Whyalla to the existing water distribution system at Cowell, a distance of approximately 120 km. It would also include several booster pump stations and augmentation to the existing East Coast Main.

This option provides a volume of approximately 1,700 ML/a which is considered sufficient to meet future demands between Cowell and the Hutchinson Tank.

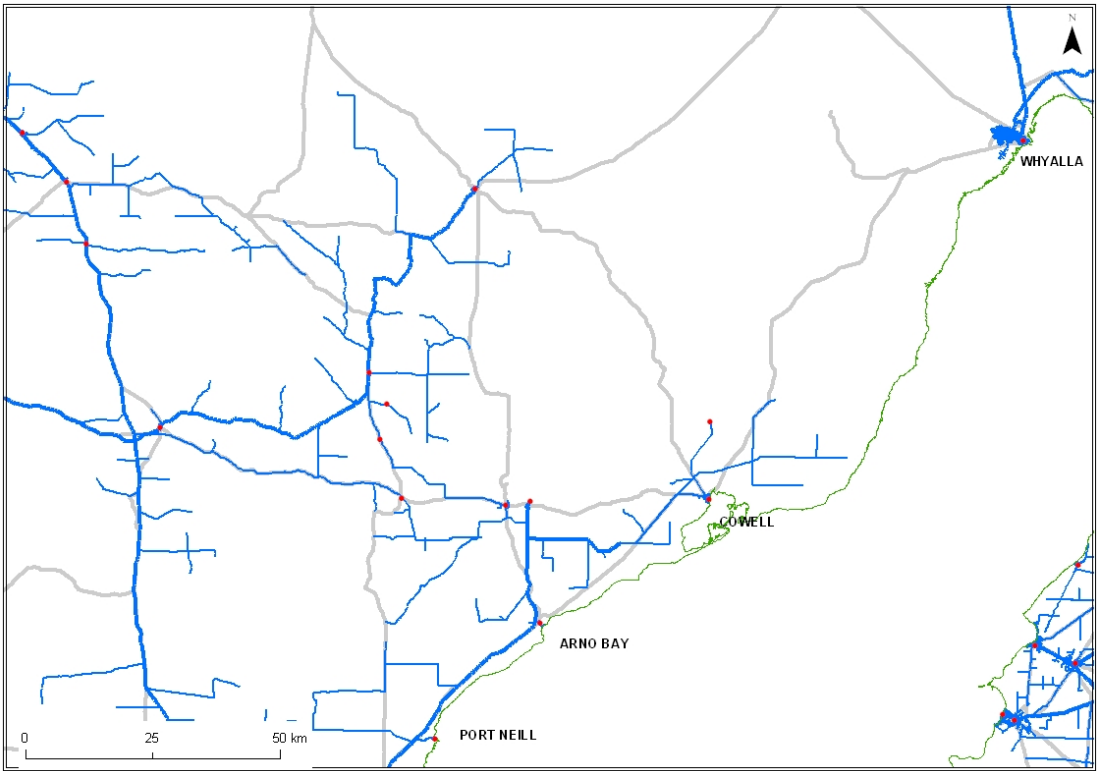



**Figure 7-10: Location map: Whyalla -Cowell pipeline**

### 7.6.2 Benefits and Risks

As with Stage 2 of the Iron Knob – Kimba pipeline discussed in Section 7.5, the opportunity may exist to source water for this option from desalinated water from the proposed BHP Billiton Desalination Plant at Port Bonython rather than water from the River Murray.

Excavations and earthworks associated with pipeline construction can have a range of potential environmental and social impacts, including possible disturbance of Aboriginal heritage. The inappropriate location of stockpiles and construction materials could lead to native vegetation damage and alter drainage lines. The erosion of exposed surfaces could lead to a loss of topsoil with windblown dust problems and potential pollution of watercourses. The use of machinery and plant would have to be managed carefully, in order to reduce the risk of weed seeds and plant pathogens being introduced from imported material. The possible spread of weeds can be managed by controlling the source of fill material, covering loads of fill at all times during transportation, closely inspecting machinery and using dedicated wash-down areas.

It is likely that there would be roadside vegetation along the route of this pipeline. The quality of this vegetation is unknown. Impacts to native vegetation require approval in accordance with the *Native Vegetation Act* and are required to be offset through the achievement of a significant environmental benefit. This may impact significantly on the cost of this option.

The benefits and risks for a connection between Whyalla – Cowell in terms of the multi criteria analysis (discussed in Section 10) is presented below. The MCA presented in this

report does not consider the benefits and risks associated with the proposed BHP desalination plant at Port Bonython. The benefits and risks are:

- Pipeline installation will impact on roadside vegetation as will the footprint of several pump stations *(Multi Criteria Analysis criterion: Impact on terrestrial ecosystems).*
- Provides new source of water for customers on East Coast main only *(Multi Criteria Analysis criterion: Equitably provide water for all aspects of community).*
- Will improve aesthetic value for customers on East Coast Main *(Multi Criteria Analysis criterion: Aesthetic value e.g. taste).*
- Will improve hardness for the majority of customers along the East Coast main *(Multi Criteria Analysis criterion: Potential to improve hardness).*

### 7.6.3 Supply/Demand Balance

A connection from Whyalla to Cowell could provide approximately 1.7 GL/a or 12% of the projected 2036-37 demand.

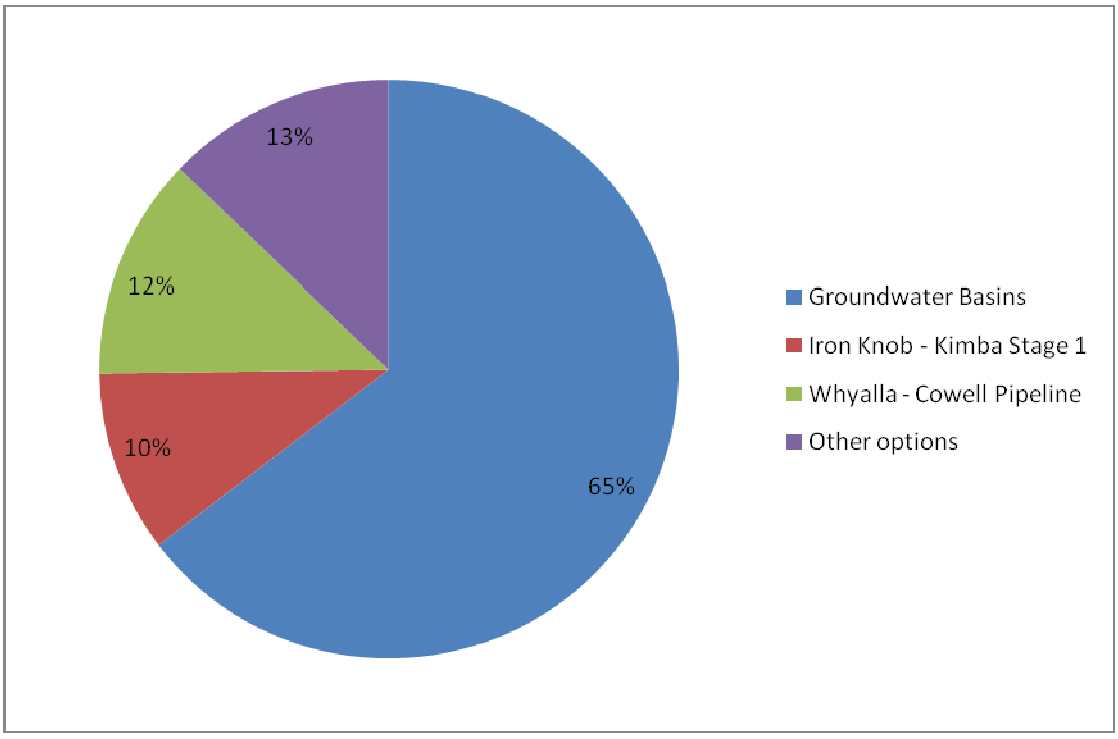



**Figure 7-11: Percentage of projected 2036-37 consumption: Whyalla – Cowell pipeline**

## 7.7 Increased Use of the Peninsula's Groundwater

### 7.7.1 Option Overview

The Eyre Peninsula Water Supply Master Plan (PB, 2003) undertook a significant literature review on the available groundwater resources on Eyre Peninsula. The report concluded that the most viable source (in terms of quality and quantity) of possible future groundwater for public water supply was in the Musgrave area.

This option investigates developing these additional resources and connecting them to the existing trunk system.

### 7.7.2 Potential Additional Supply Volumes

As discussed in Section 6.2, SA Water currently has allocations from the Kappawanta, Bramfield, Polda North and Uley East aquifers which are not used. These are summarised below in Table 7-1.

**Table 7-1: Uley East and Musgrave PWA Water Allocations for Public Water Supply**

| Quaternary Aquifer | 2007-08 Annual Water Allocation (ML/a) |
|---|---|
| Uley East | 180.9 |
| Kappawanta | 468.9 |
| Bramfield | 1155.0 |
| Polda North | 266.4 |
| Total | 2072.0 |

The future sustainability of additional groundwater extractions from the Uley Basin was investigated by the South Australian Department of Water, Land and Biodiversity Conservation, (Zulfic *et al.* (2007). This investigation suggested that under a continuation of long-term average recharge conditions, extractions from Uley South at current rates may cause a significant drawdown in the level of the Uley East lens over the next fifteen years, even without making extractions from Uley East. This indicates that although there is an allocation for public water supply in Uley East, this may be unsuitable to extract. This is discussed in more detail in Section 6.2.

### 7.7.3 Option

The Eyre Peninsula Water Supply Master Plan (PB, 2003) outlined an option to extract an additional 1,700 ML/a of groundwater from the Kappawanta and Bramfield lenses, equivalent to 4.8 ML/day. This has been reduced in this option to 1,600 ML/a in line with the 2006-07 allocations from Kappawanta Bramfield basin as shown in Table 7-1.

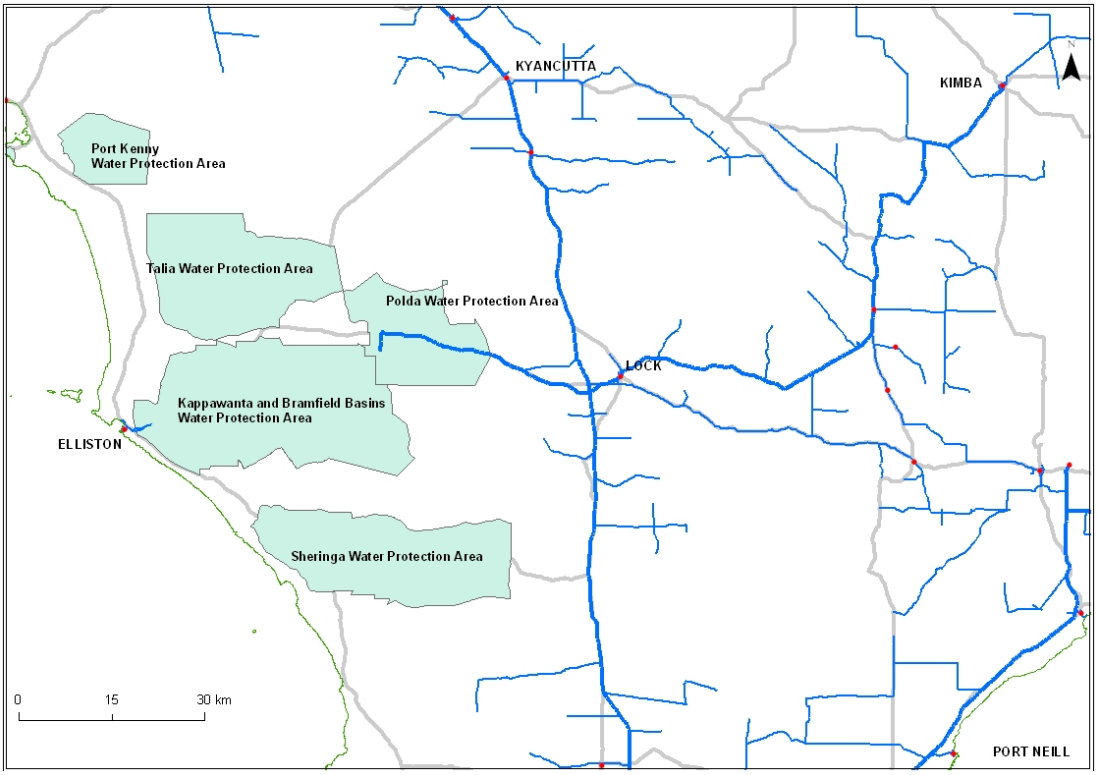



**Figure 7-12: Location map: Extraction of additional groundwater**

The costs for this option are influenced by the establishment of the borefields, the proximity of the borefields to the existing water and power supply infrastructure and the need to augment existing infrastructure to accommodate the new resource.

The Bramfield borefield, having the largest potential volume available for extraction, is situated approximately 40km from existing water supply infrastructure. Further analysis of potential locations for new groundwater bores and locations and capacities of existing electricity infrastructure would be necessary in order to determine more accurate cost estimates. Additional environmental investigations such as potential impacts to native vegetation associated with the bores and pipeline would also need to be investigated as would any potential for Aboriginal heritage issues.

In discussions with DWLBC, environmental risks such as potential impacts on groundwater dependent ecosystems, associated with the extraction of groundwater from new sources would be managed within groundwater extraction licence arrangements under the Musgrave Prescribed Well area WAP. There is currently no indication of a reduction in allocation for water supply purposes.

### 7.7.4 Benefits and Risks

The benefits and risks for increasing the amount of groundwater used in Eyre region in terms of the multi criteria analysis (discussed in Section 10) are shown below.

- Potential impact on vegetation along pipeline route and bores (Multi Criteria Analysis criterion: Impact on terrestrial ecosystems).

- Extractions from this area would be limited to SA Water's current licence and is therefore within sustainable limits (Multi Criteria Analysis criterion: Impact on aquatic ecosystems).
- Provides new source of water for customers North of Lock along West Coast main (Multi Criteria Analysis criterion: Equitably provide water for all aspects of community).
- Is unlikely to provide any improvement to aesthetics of supply (Multi Criteria Analysis criterion: Aesthetic value e.g. taste).
- Unlikely to improve hardness as source is groundwater (Multi Criteria Analysis criterion: Potential to improve hardness).

### 7.7.5 Supply/Demand Balance

Developing additional groundwater resources on Eyre Peninsula would provide approximately 1.6 GL/a or 13% of the projected 2036-37 demand.

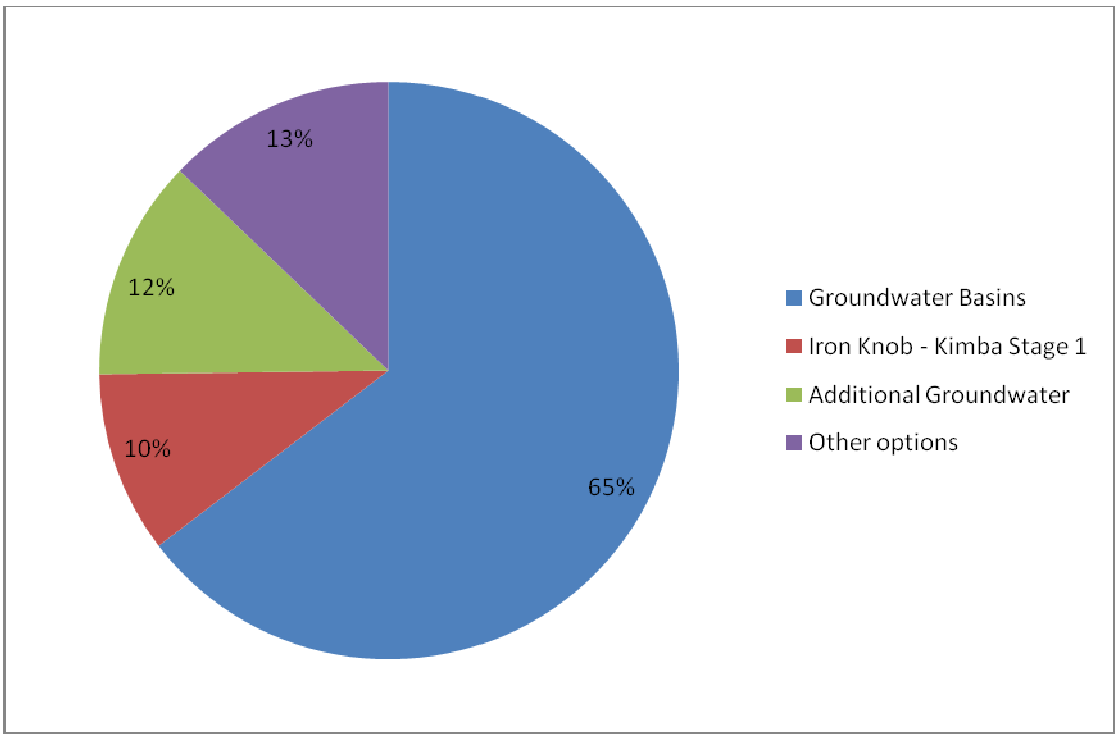



**Figure 7-13: Percentage of projected 2036-37 Eyre Peninsula consumption – additional groundwater source**

## 7.8 Estimated cost range of options

The relative cost of the options presented in this section are shown below.

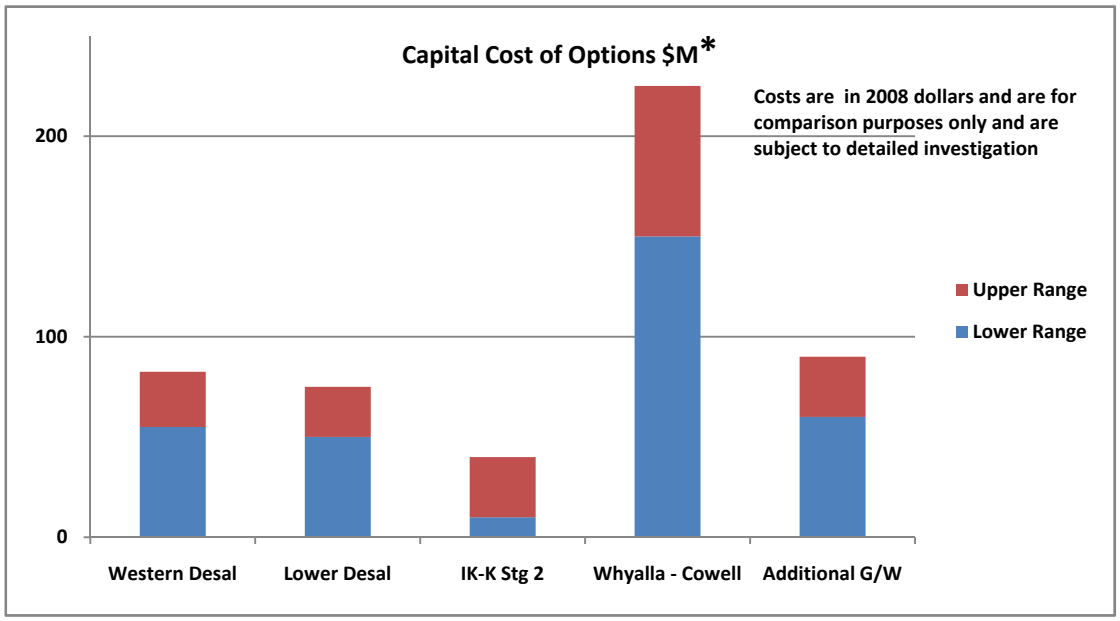



**Figure 7-14: Estimated cost range for options**

Limitations on cost estimates:

- The costs presented have been prepared on a similar basis for all options for the purposes of comparison, and should be considered as indicative only. Actual costs can only be determined on the basis of competitive tender prices.
- No costs have been prepared for the option of rehabilitating the Tod Reservoir as there is not sufficient information to make a suitable cost estimate.
- For the purposes of this report, notional sites for treatment facilities and pipeline routes have been selected. These will be further investigated for the preferred option during the next stage of project development.
- Costs do not include the costs of vegetation offsets associated with clearance of native vegetation or making the options carbon neutral.
- Further investigations will be required to determine if additional costs, over and above the allowance made, are required to reduce the environmental impact of brine discharge or seawater intakes for the desalination options (e.g. longer outfall pipeline).
- The Whyalla to Cowell pipeline option would involve the construction of a new pipeline connecting Whyalla to the existing water distribution system at Cowell, a distance of approximately 120 km. It would also include several booster pump stations and significant augmentation to the existing East Coast Main. These issues contribute to the high cost of this option.
- A large storage may be required in the Iron Knob to Kimba Stage 2 pipeline to address water quality issues. The lower range cost does not allow for this storage

while the upper range includes a storage plus contingencies as per the other options.

## 7.9 Other Considerations

### 7.9.1 Water Quality (large-scale water softening plant)

One of the major issues raised during the community engagement process was the hardness of the water available in Eyre Region. Addressing specific water quality issues is not within the scope of the SA Water Long Term Plan for Eyre Region. However, given the community concern, some consideration has been given to possible options that could be further investigated independently from the water security initiatives and recommendations.

The issue stems from the calcium carbonate content of the water on the Peninsula, which tends to be precipitated when water temperature increases. This can occur in above ground steel mains, but more particularly in hot water services and in small diameter agricultural pipes that may run above ground for many kilometres within customers' properties.

Hardness is generally caused by the presence of dissolved ions in water, particularly calcium ($Ca^{++}$) and magnesium ($Mg^{++}$) ions. Hard water requires more soap in order to lather and can cause a solid scale build up within water pipes and fittings.

The Australian Drinking Water Guidelines (NHMRC, 2004) defines the following degrees of total hardness:

| | |
|---|---|
| <60 mg/L $CaCO_3$ | soft but possibly corrosive |
| 60-200 mg/L $CaCO_3$ | good quality |
| 200-500 mg/L $CaCO_3$ | increasing scaling problems |
| >500 mg/L $CaCO_3$ | severe scaling |

The historic hardness of water in Eyre Region is illustrated below.

**Table 7-2: Historical hardness (Eyre Region: 2004 - 2007)**

| Groundwater Source | Hardness as CaCO3 (mg/L) | | |
|---|---|---|---|
| | Min | Max | Average |
| Coffin Bay | 230 | 240 | 230 |
| Elliston | 280 | 350 | 320 |
| Lincoln Basin | 290 | 570 | 360 |
| Uley South | 250 | 320 | 270 |
| Uley Wanilla | 250 | 380 | 280 |

To date, customers have been encouraged to treat or manage the issue at their supply point by using a water softening system and/or ensuring their domestic/agricultural pipe is buried well below ground.

The following section outlines, in general terms, what could be done on a whole of network scale to improve the hardness of the water. It should be noted that there is no clear solution to the issue and that further work would be required on either of the possible strategies documented in this report.

#### *7.9.1.1 Water Softening*

Hardness could be reduced across the entire network by installing a large scale water softening plant. While such a plant would not directly increase the available resource on the Peninsula, it would reduce the salinity of treated water through less saline discharges to the wastewater system from individual water softeners. This may increase the range of end uses for recycled water schemes.

Water softening describes processes that are designed to reduce hardness in water and is generally undertaken using two processes, namely:

- Ion-exchange resins, used in household water softening units and
- Lime-soda ash softening used in industrial scale applications

While it is understood that household water softeners are widely used in the Eyre Region, it is considered uneconomical in large scale applications. It is likely that the use of water softening units at the household level is contributing to the salinity of the wastewater in Port Lincoln, which can in turn limit the opportunities for the reuse of this water.

A regional water softening plant would require significant quantities of chemicals, including over three tonnes/day of lime. This process would generate significant quantities of waste "sludge" that would have to be removed to landfill, or treated further.

#### *7.9.1.2 Calgon*

The Western Australian Water Corporation has adopted a Calgon (sodium hexametaphosphate, or "SHMP") treatment option to reduce the build up of scale in their water supply systems.

Dosing of Calgon could reduce pipework scaling although hardness would be unchanged and the lathering and taste issues remain. Calgon acts as a sequesterent meaning that it collects up the hardness salts and prevents them from precipitating onto the pipe.

It is possible that the use of SHMP represents a cost effective means of dealing with the scaling issue on Eyre Peninsula.

In order for SHMP to be considered applicable for the Peninsula, further investigations would be necessary. Such investigations will need to include:

- The applicability of the technology to the Eyre Peninsula water
- The cost of implementation
- A complete understanding of the benefits and disadvantages
- Community engagement

As a separate initiative, SA Water through its water quality division will investigation SHMP and its applicability for the Eyre Region. This will occur in parallel to the recommendations outlined in this report.

### 7.9.2 Contingency Planning and Future Use of Tod Reservoir

Tod Reservoir is an integral part of the overall contingency plan for the region and presents options to ensure that the water quality in Tod Reservoir is suitable for use as an emergency supply. There are, however, options to eliminate the need to maintain Tod Reservoir as a contingency supply. These would include providing a backup power supply at Uley South and Duck Ponds Pump Stations or increasing the size of an additional source (i.e. desalination or a connection to Whyalla).

SA Water is currently investigating backup power for Uley South.

Increasing the size of the options discussed above to allow for suitable contingencies is likely to be at significant cost.

It should be noted that SA Water has various contingency plans in place should a sudden change occur due to unforeseen circumstances. For example, sudden and unexpected changes to stock numbers, or a substantial reduction in allocation from the Southern Groundwater basins may result in the need for an additional resource earlier than anticipated. In such an event, SA Water would implement its contingency planning that would ensure supplies are maintained to the Eyre Region.

### 7.9.3 Upgrade of Dam Wall

The dam wall at Tod Reservoir is scheduled for upgrade in 2009-10 to comply with the requirements of the ANCOLD Guidelines with respect to flood capacity, resistance to piping and resistance to earthquakes.

The upgrade is required regardless of the level at which the dam is operated to avoid a flood overtopping the dam wall.

### 7.9.4 Recreational Use of Tod Reservoir

It has not been SA Water's policy to permit recreational activities on water supply reservoirs. However, given that the Tod Reservoir remains only as a contingency supply there may be some recreational uses that could be permitted. This would be subject to satisfactorily addressing land management, environmental and public safety issues.

If SA Water were to permit recreational access to Tod Reservoir it would consider divesting its management to an external provider experienced in managing public access while retaining the infrastructure and assets for any future use as well as the right to close all access for any period for water supply requirements.

SA Water Public Access Policy is based on the Australian Drinking Water Guidelines, the Outer Metro Planning Strategy and a Cooperative Research Centre for Water Quality report

on the impacts of recreational access to drinking water storages, all of which advocate a multiple barrier approach to protecting water quality.

The other policy principles for limiting access include risk of fire, protecting the ecological health of reservoir catchments, , implications of legal liability for injury on SA Water land and the risk and impact of vandalism on infrastructure and assets.

These issues can be mitigated through appropriate planning and management. However, further investigation will be required to determine if water quality issues can be satisfactorily resolved if Tod Reservoir may be used as a back up in the future.

### 7.9.5 Summary of Issues

The issues surrounding Tod Reservoir can be summarised as:

- The reservoir no longer forms part of the water supply system on Eyre Region, as discussed in Section 6.4.
- The dam wall requires upgrade if it is to be retained. These upgrades are on SA Water's capital plan for 2009-10.
- The option of decommissioning and removing the dam wall would also have cost implications for SA Water and would potentially have social and environmental issues as well. Decommissioning removal of dams not connected to the system as an alternative to upgrade has been investigated in other regions. Decommissioning was not found to be the preferred option even on the basis of cost.
- The reservoir forms part of the overall contingency planning for Eyre Region. Short term works are required to ensure the quality of water is suitable for use in an emergency situation (including the management of the higher salinity water currently in the dam).
- If the reservoir was to be removed from SA Water's contingency plans, then other suitable plans would need to be made. The cost of other measures may be significant.
- Funding would be required to address land management, public safety issues, water quality issues and emergency contingency planning issues associated with opening the reservoir land for limited public use. The nature of the uses permitted would be subject to satisfactorily addressing these issues. The financial and resource implications of permitting access to SA Water's reservoirs would be substantial.
- In the event that recreational use of the reservoir was permitted, SA Water would look to other state or local authorities to handle the upgrade of the facilities and subsequent annual costs. This would need to be done under a memorandum of understanding regarding the use of the reservoir as water supply during emergency situations.

It is recommended that further discussions are held with local authorities to determine an appropriate strategy of managing the issues discussed above.

### 7.9.6 SA Water's Asset Management Plan for Eyre Region

SA Water prepares Asset Management Plans for all of its water and wastewater assets. SA Water reviews its asset management plants for each region on an annual basis. SA Water is forecasting expenditure in excess of $12M over the next five years to continue the asset replacement and renewal program.

## 7.10 Potable Substitution and Reduction

This section presents a range of approaches to reuse treated wastewater effluent, capture and reuse stormwater, increase rainwater harvesting and/or to reduce in-house consumption through demand management. The implementation of these schemes is consistent with the philosophy of an integrated water cycle management approach and responsible water use (adopted during the Water Proofing Adelaide project and will be adopted as part of the Water Proofing South Australia project being undertaken by the Office for Water Security). Consideration of these options ensures balanced decisions in long term water resource management by considering all significant water sources and planning.

The reduction in consumption on Eyre Peninsula coinciding with the implementation of Eyre Peninsula Water Restrictions in December 2002 indicates, in general, the communities on Eyre Peninsula are mindful of water use and have embraced the philosophy of responsible water use.

Reliability of a scheme needs to be considered, especially those dependent on rainfall, as climate variability and long term climate change can potentially provide inadequate supply in periods of drought. During the recent drought, many users of schemes such as rainwater tanks have had to seek a backup source until the rainwater tank is replenished.

The regulation and funding for these schemes is not administered by SA Water, but SA Water recognises the importance of these schemes both in terms of the reduced demand on SA Water supplies and in heightening the awareness of the need for water conservation in the community.

The information provided below on National Water Initiative projects was provided by the EP NRM Board (Nov 2007) and can be found at the following web address:

www.communitywatergrants.gov.au/grants/index.html

### 7.10.1 Artificial Catchments

The use of artificial catchments (or modified catchments for rainwater harvesting) was discussed in the original Eyre Peninsula Master Plan (PB, 2003) and their use forms part of the objective and principles of the Eyre Peninsula Catchment Management Plan (part of the Initial NRM plan).

The Eyre Peninsula Water Supply Master Plan (PB, 2003) defined artificial catchments as using:

*"… the principle of the domestic rainwater tank on a much larger scale. Domestic rainwater tanks collect water from the roof of a house, whereas an artificial catchment provides a much larger area over which to collect rainfall runoff. An artificial catchment can be created by using existing sealed roads/footpaths, or the area may be created by an impervious membrane." (PB, 2003)*

The report concluded that:

*"… this is not an economically feasible option when large volumes are required. It may however be more feasible in small towns such as Venus Bay, or in other parts of the state where rainfall is higher. The environmental impacts of artificial catchments should also be noted, such as loss of arable land, loss of native vegetation and visual impact." (PB, 2003)*

When used as source water for a drinking water system artificial catchments introduce a much higher risk than other existing sources. As it is a rainfall dependent option it is affected by climate variability and long term change, in times of drought such an option is unlikely to provide a sufficient supply. Natural catchments act as a barrier to filter and biodegrade many pollutants that occur in catchments such as bird and animal faeces, pesticides and other pathogens. In a modified catchment this natural barrier is removed and many of these pollutants typically end up in the storage if appropriate treatment is not carried out.

### 7.10.2 Wastewater Reuse

Treated wastewater provides a potential alternative source that could be used to offset potable water demand. The reuse of wastewater has an advantage over other sources of water supply augmentation (such as stormwater reuse) in that wastewater flows remain fairly constant throughout the year. However, wastewater flows are usually influenced by rainfall events and winter storage of peak flows is often required.

#### *7.10.2.1 Regional Eyre Peninsula*

As discussed in Section 6.5, there are 12 townships across Eyre Peninsula that currently have Community Wastewater Management Schemes (CWMS). All other localities within Eyre Peninsula use on-site septic systems, typically with an associated septic soakage trench on each domestic property. Audits conducted by the Local Government Authority in 2005 identified that six townships across Eyre Peninsula had recently commenced reusing CWMS effluent to irrigate either public spaces (such as golf courses or ovals) or woodlots. The annual volume used by these CWMS is estimated at 670 ML/a (refer to Section 6.5).

Table 7-3 details the townships on Eyre Peninsula where treated CWMS effluent is currently disposed of within evaporation basins. If these schemes were modified to substitute existing reticulated water use (for irrigation of parks and gardens), they would represent potential savings of 470 ML/a from existing potable water usage across Eyre Peninsula. The reuse of treated effluent from existing CWMS is contingent upon the development of infrastructure between treatment lagoons and possible reuse sites. As a result, the estimation of overall

costs associated with these reuse schemes requires additional investigation. This is also required to establish more accurately the volume of potable water currently being used for outdoor irrigation that could be replaced with treated effluent.

**Table 7-3: Summary of townships with CWMS currently disposing of effluent through evaporation basins without reuse**

| District Council | Township | Number of live connections (at 2005) | Annual Volume* (ML/a) |
|---|---|---|---|
| Elliston | Lock | 98 | 21 |
| Kimba | Kimba | 421 | 91 |
| Le Hunte | Wudinna | 319 | 69 |
| Lower Eyre | Cummins | 462 | 100 |
| Lower Eyre | North Shields | 86 | 19 |
| Tumby Bay | Tumby Bay | 770 | 167 |
| Total average annual volume = | | | 468 ML/a |
| * Annual volumes calculated by assuming average usage of 595 L/connection/day | | | |

*(source: LGA)*

New CWMS are currently proposed for a number of townships within the study area (including Arno Bay, Cowell, Tulka and Cleve amongst others). The Local Government Authority has recently been awarded significant funding from the Commonwealth Government through the National Water Initiative to implement wastewater reuse schemes across South Australia. These new schemes and the upgrade of existing schemes to reuse treated effluent, could deliver additional savings from the reticulated water supply if treated effluent could act as a substitute for non-potable uses such as the irrigation of public spaces. By way of example, the wastewater reuse scheme associated with Arno Bay is anticipated to deliver 66 ML/a when completed in 2008, with this potentially rising to 140 ML/a with further development of the township.

Additional investigations are required to determine the overall impacts of future wastewater reuse schemes on the Eyre Peninsula water supply system. The costs associated with each scheme will be dependent upon existing infrastructure and the locations of potential reuse sites in relation to treatment sites.

#### *7.10.2.2 Port Lincoln*

As discussed in Section 6.5 the average annual inflow to the WWTP is 1,056 ML/a and the average annual reuse from this plant by the Port Lincoln City Council Reuse Scheme has been 62 ML during the past four years.

It is estimated that the existing users of treated effluent from the Port Lincoln effluent reuse plant could increase their annual usage to approximately 120 ML/a. In order to increase annual reuse above 120 ML/a, it would be necessary for additional users of treated effluent to be identified, potentially within the township of Port Lincoln, with additional pipelines installed in order to supply the treated effluent.

The salinity of the wastewater in Port Lincoln, may limit the amount of treated wastewater that can be reused for irrigation. There are numerous reasons for this salinity, such as:

- The prevalence of household water softeners, designed to remove hardness from the reticulated water supply for in-house use which is discussed in Section 7.9.1.
- Fish processing waste
- Infiltration of saline groundwater in sewer network

SA Water is currently working towards improving the salinity of the wastewater at Port Lincoln through projects which are looking at

- Reducing infiltration of saline groundwater in the sewer network
- Splitting the wastewater treatment plant into a high saline and lower saline stream to better manage waste disposal from Fish Processing industry.

These projects may in turn allow for greater reuse opportunities.

#### *7.10.2.3 Supply/Demand Balance*

Additional wastewater reuse schemes could provide approximately 430 ML/a or 3.8% of the projected 2036-37 demand.

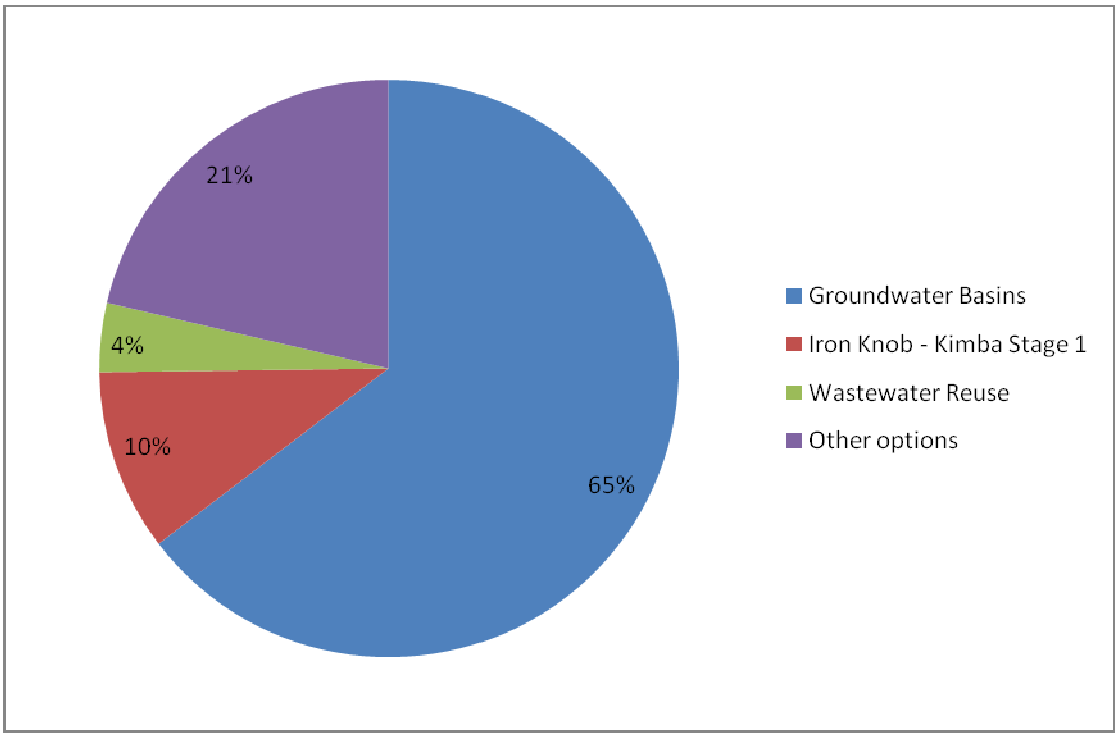



**Figure 7-15: Graphic of % of projected 2036-37 Eyre Peninsula consumption – wastewater reuse**

### 7.10.3 Stormwater Reuse

Stormwater is runoff from buildings and impervious areas e.g. roads and streets. It is a potential source of additional water and is often disposed to sea or surface waterways. Many communities across the study area can (and do) capture and reuse stormwater to replace existing uses of reticulated supply. Stormwater reuse is well suited for applications such as the irrigation of public spaces or various industrial uses that do not require further

water treatment. Reusing stormwater as a source of potable water substitution may require significant treatment and retention basins or below-ground storage (i.e. ASR) as the timing of peak demand for the water (i.e. summer) is likely to be different from the timing of its availability, following rainfall events.

The Stormwater Management Authority (SMA) was established on 1 July 2007 under the Local Government (Stormwater Management) Amendment Act 2007. The SMA will operate as the planning, prioritising and funding body in accordance with the Stormwater Management Agreement and will play an integral role in the stormwater projects listed below.

It is difficult to assess the potential volume of stormwater that could be captured for reuse across Eyre Peninsula as this is dependent upon the volume already captured, particularly by domestic rainwater tanks. There are a number of existing stormwater capture and reuse schemes, including the townships of Cleve, Cummins, Lock and Wudinna. It is possible that some of these schemes could be upgraded to capture additional volumes.

The Eyre Peninsula Catchment Report (Eyre Peninsula Catchment Management Board, 2004) notes that there are more than 200 abandoned water harvesting schemes across Eyre Peninsula, including dams, reservoirs and tanks. The ownership and management over these sites varies and includes Local Councils, Department of Environment and Heritage and SA Water.

It is recommended that an investigation be undertaken into the sites currently owned by SA Water to determine future ownership and management options.

Information provided by councils and the EP NRM board on submissions to the National Water Initiative offer a useful source of information on proposed schemes, costs and capacities. The information presented below is a summary of the National Water Initiative submissions for rounds 1, 2 and 3. It is possible some of these schemes have already been implemented. However, for the purposes of this report they are a useful guide as to the nature of the schemes proposed. Table 7-4 summaries the schemes by council area.

**Table 7-4: Stormwater use schemes**

| Council Area | Capacity (ML/a) |
|---|---|
| Cleve | 11.5 |
| Le Hunte | 7.2 |
| Lower Eyre | 4.6 |
| Streaky Bay | 3 |
| Tumby Bay | 6.5 |
| Total | 32.84 |

The five largest volume projects included in the summary above are listed below. (The descriptions, costs and water savings below have been sourced from EP NRM Board):

- Stormwater harvesting Tumby Bay - dam construction
  (District Council of Tumby Bay)

This project will harvest stormwater with the construction of a dam. The water will be harvested from sheds, silos and bunkers and will be used to enhance degraded wetlands, suppress dust and eventually irrigate public facilities in Tumby Bay. This project will save 6,500,000 litres of water each year.

- Cleve urban stormwater harvesting project - Cleve Sporting Bodies Club
  (District Council of Cleve)
  This project will re-use stormwater to irrigate the sports ground and other community areas at the Cleve Sporting Bodies Club. Stormwater will be stored in existing infrastructure and pumped through the system. This will make irrigation self-sufficient and reduce the reliance on potable water. This project will save 10,000,000 litres of water each year.
- District Council of Le Hunte - Wudinna Western Water Catchment
  (District Council of Le Hunte)
  The District Council of Le Hunte will save mains water by capturing stormwater. The water will be stored in a dam and used for irrigation. This project will save 3,000,000 litres of water per year.
- Stormwater Storage Pond for Reuse - Streaky Bay Area School
  (DC Streaky Bay)
  This project will reuse stormwater to irrigate the school oval and wetland at Streaky Bay Area School. Stormwater will be diverted into a new pond where it will be stored for irrigation. This project will save 3,000,000 litres of water each year.
- Cummins Bowling Club Inc
  (District Council of Lower Eyre)
  It is understood that with management of flow control devices all three dams were just able to be filled in 2007. Each of these projects involves the collection and storage of stormwater runoff which is used for irrigation of recreation areas. None of these schemes are owned or operated by Council. Cummins Bowling Club will recycle stormwater and rainwater captured from club house roof and grounds. This water will be stored in tanks by upgrading existing piping this water will be used within the club house. This project will save 4,080,000 litres of water per year.

#### *7.10.3.1 Supply Demand Balance*

The stormwater projects identified as part of the NWI project could provide approximately 33 ML/a or 0.2% of the projected 2036-37 demand.

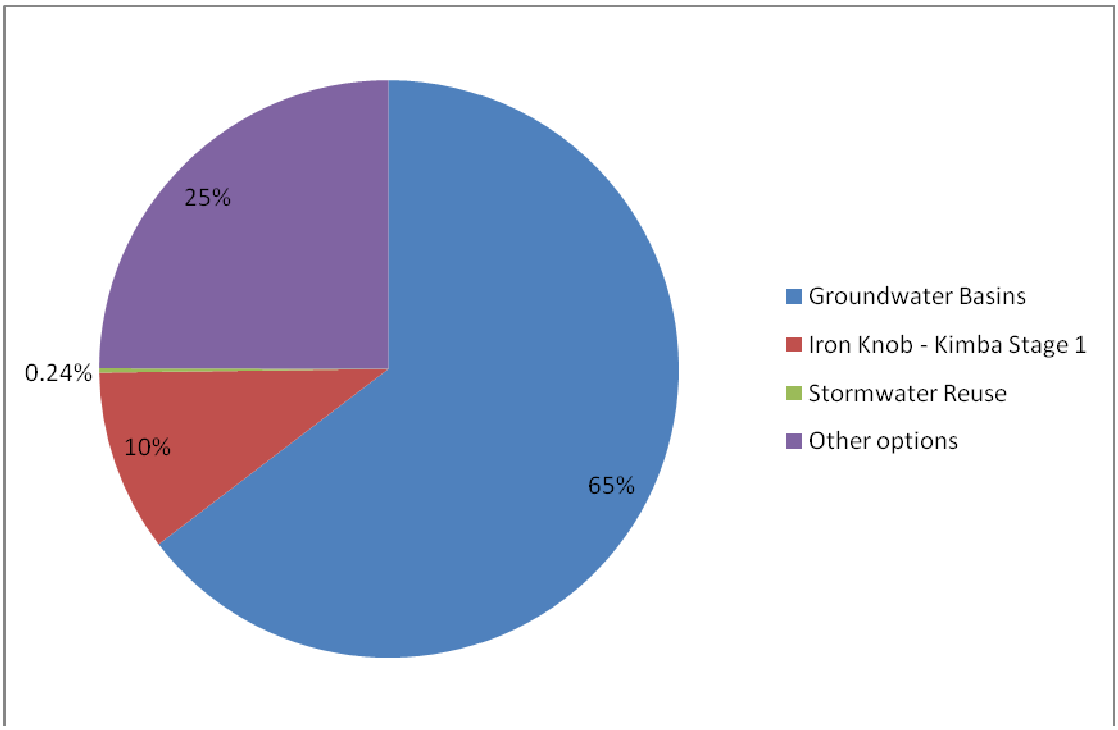



**Figure 7-16: Percentage of projected 2036-37 Eyre Peninsula consumption – stormwater reuse**

### 7.10.4 Demand Management

In line with the philosophy of responsible water use, significant water savings could be made in water demand through a combination of education and public awareness. The mixture of incentives and education approaches could include behaviour modification to the use of water outside the home, rebates for the implementation of water-saving devices throughout existing households and/or the requirement for all new developments to use such devices.

The overall impact of these methods to reduce potable water demand across Eyre Peninsula will be determined only through more careful investigation. However, information provided by councils and the EPNRMB on submissions to the National Water Initiative (NWI) offer a useful source of information on proposed schemes, costs and capacities. The information present below is a summary of the NWI submissions for rounds 1, 2 and 3. It is possible some of these schemes have already been implemented. However, for the purposes of this report they are a useful guide as to the nature of the schemes proposed. Table 7-5 summaries the schemes by council area.

**Table 7-5: Water use efficiency schemes**

| Council Area | Capacity (ML/a) |
|---|---|
| Ceduna | 0.79 |
| Cleve | 2 |
| Elliston | 0.57 |
| Franklin Harbor | 0.75 |
| Le Hunte | 0.74 |
| Lower Eyre | 8.1 |
| Pt Lincoln | 3.4 |

| Council Area | Capacity (ML/a) |
|---|---|
| Streaky Bay | 4.00 |
| Tumby Bay | 2.5 |
| Total | 22.8 |

The five largest volume projects included in the summary above are listed below. (The descriptions, costs and water savings below have been sourced from EP NRM Board):

- Installation of Water Efficient Sprinkler System for Sports Oval, Arno Bay (District Council of Cleve)
  This project will save water by replacing the irrigation system at Arno Bay Sports Oval. The current system will be replaced with a more efficient automatic pop-up system that will save water by allowing night watering, thereby reducing the rate of water lost through evaporation. This project will save 2,000,000 litres of water each year.
- Tumby Bay Area School Water Saving Scheme, Tumby Bay
  This project will save water by replacing the antiquated manual irrigation system at Tumby Bay Area School. The current system will be replaced with a more efficient automated system. In addition to this, a tank will be installed to collect rainwater to irrigate grassed areas and gardens surrounding the school. This project will save 2,198,000 litres of water each year.
- Schools Water Efficiency Project, Port Lincoln High School
  This project will improve water efficiency at Port Lincoln High School by implementing a range of water saving initiatives in the school's washrooms. These include installation of constant flow valves on taps, replacement of inefficient toilets, sealing leaks and adjusting flush volumes. In addition, the school will trial a waterless urinal. These changes will save 3,100,000 litres each year.
- Wirrulla Sports and Recreation Centre Inc, Streaky Bay
  Wirrulla Sports and Recreation Centre will save water by installing water tanks. Harvested rainwater will be used to irrigate sports grounds and for clubhouse usage. This project will save 3,987,130 litres of water per year.
- Marble Range Community and Sports Centre Incorporated, Lower Eyre
  This project will save water at the Marble Range Community and Sports Centre by upgrading the oval irrigation system to a sub-surface system. This project will save 5,100,000 litres of water per year.

#### *7.10.4.1 Supply/Demand Balance*

The water conservation projects identified as part of the NWI project could provide approximately 23 ML/a or 0.17% of the projected 2036-37 demand.

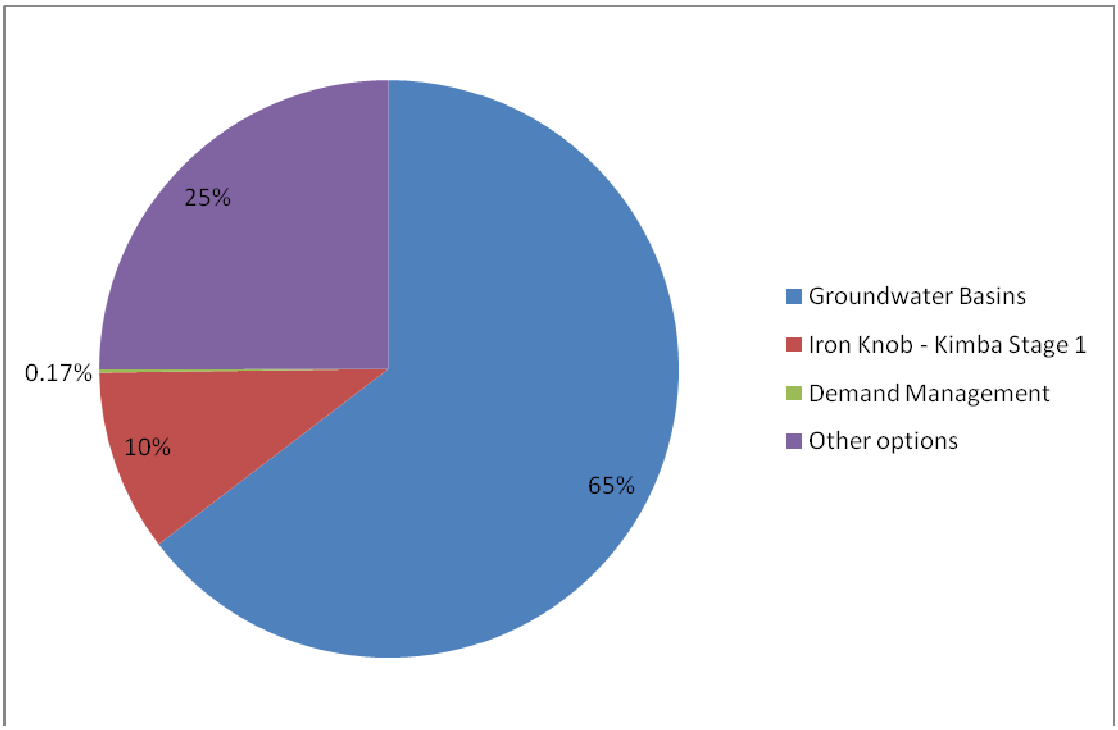



**Figure 7-17: Percentage of projected 2036-37 Eyre Peninsula consumption – demand management**

7.10.5 Increased Rainwater Use

### *7.10.5.1 Description*

As discussed in Section 6.5 accurate data is not readily available on the size of tanks that are in use across Eyre Region and whether existing tanks are used throughout houses or only for outdoor use. The State Government rebate on rainwater tanks plumbed into the house has increased the uptake of rainwater tanks across South Australia. However, the impact of this in Eyre Region is difficult to quantify. The community engagement process raised issues associated with these rebates being generally geared toward urban environments rather than rural areas. This issue is discussed in more detail in the Community Response Report.

Information provided by councils and the EPNRMB on submissions to the National Water Initiative offer a useful source of information on proposed schemes, costs and capacities. The information presented below is a summary of the NWI submissions for rounds 1, 2 and 3. It is possible some of these schemes have already been implemented. However, for the purposes of this report they are a useful guide as to the nature of the schemes proposed. Table 7-6 summaries the schemes by council area.

**Table 7-6: Rainwater tanks – summary of schemes**

| Council Area | Capacity (ML/a) |
|---|---|
| Ceduna | 1.02 |
| Cleve | 6.6 |
| Elliston | 0.067 |

| Council Area | Capacity (ML/a) |
|---|---|
| Franklin Harbor | 0.79 |
| Kimba | 1.6 |
| Le Hunte | 2.3 |
| Port Lincoln | 7.1 |
| Streaky Bay | 1.81 |
| Tumby Bay | 4.2 |
| Total | 25.42 |

The five largest volume projects included in the summary above are listed below. (The descriptions, costs and water savings below have been sourced from EP NRM Board):

- Cleve Area School
  (District Council of Cleve)
  This project will save water at the Cleve Area School through the installation of water tanks. The collected rainwater will be used instead of potable water in the toilets, showers and the swimming pool. This project will save 1,320,000 litres of water per year.
- Port Lincoln High School
  (City of Port Lincoln)
  This project will save water at Port Lincoln High School by establishing a rainwater harvesting system. Two dams will store captured water and become aquaculture ponds. The water will be used for irrigating horticulture beds. This project will save 2,645,370 litres of water per year.
- Rainwater harvesting at Port Lincoln Golf Club
  (City of Port Lincoln)
  This project will involve the installation of rainwater tanks to store rainwater that is collected from the roof of the Port Lincoln Golf Clubhouse. The collected water will be used to irrigate the grounds. The project will also enable a lined dam to be excavated to catch stormwater and also to hold pumped bore water when levels are low. These changes will save 2,980,000 litres of water each year.
- Yalanda Water Harvesting Project
  (District Council of Tumby Bay)
  This project will harvest rainwater by covering 10,000 $m^2$ of soil with High Density Polyethylene sheeting, which will be placed on sloping land at Yalanda. Rainwater will be collected, then stored in an existing tank and distributed in the area when water supplies are low. This project will save 3,000,000 litres of water each year.
- Efficient use of water in the Arno Bay district - Arno Bay Progress Association
  (District Council of Cleve)
  Operational in the first half of 2008, this project will re-use run-off from silo storage, in addition to rainwater, to irrigate community ovals and greens in the Arno Bay district. A dam will be constructed to hold the harvested water. Dam liners, covers, security fencing, piping and storage tanks will also be installed. This project will save 2,590,000 litres of water each year and two hectares will be revegetated.

### *7.10.5.2 Supply/Demand Balance*

The projects aimed at increasing rainwater use identified as part of the NWI project could provide approximately 26 ML/a or 0.2% of the projected 2036-37 demand.

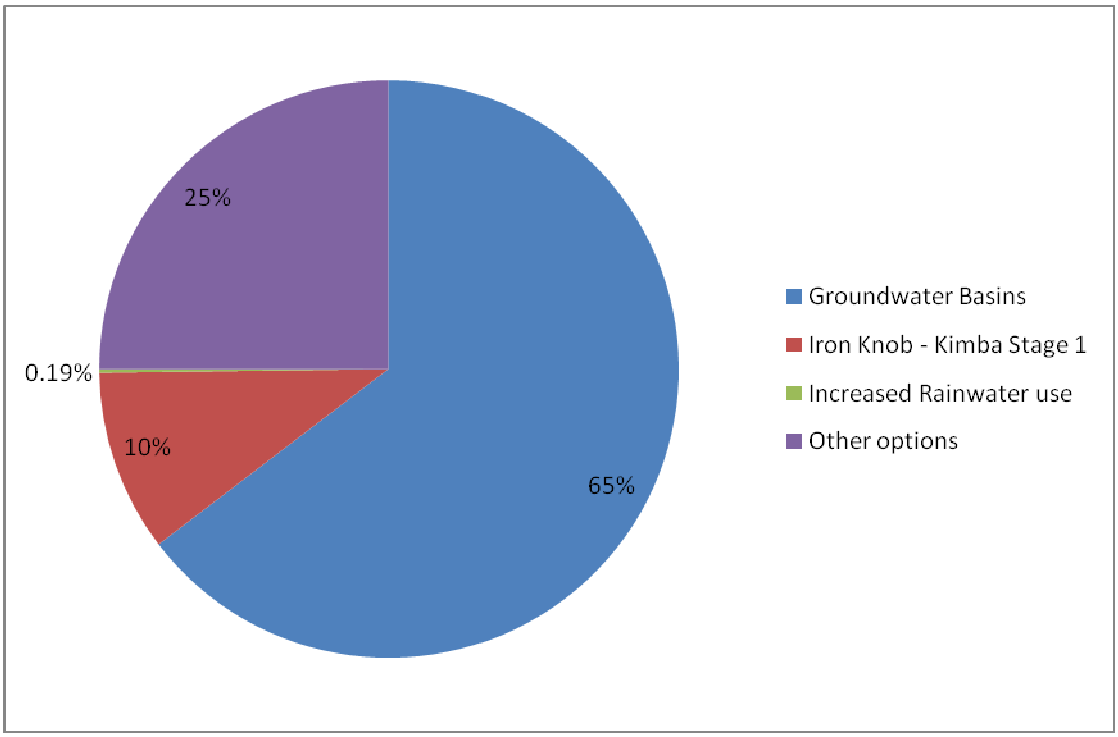



**Figure 7-18: Percentage of projected 2036-37 Eyre Peninsula consumption – Increased rainwater use**

7.10.6 Overall Supply Demand Balance

The implementation of all of projects discussed in this section, would provide approximately 612 ML/a or 4.4% of the projected 2036-37 demand.

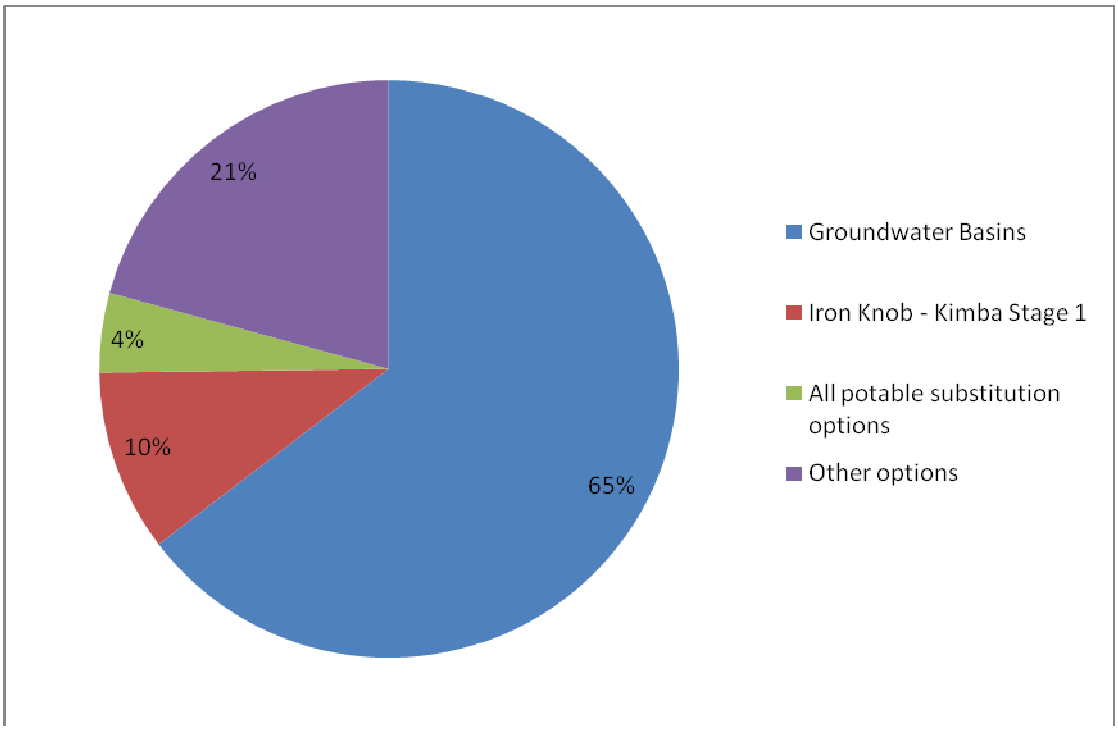



**Figure 7-19: Percentage of projected 2036-37 Eyre Peninsula consumption – all potable substitution options**

## 7.11 Coffin Bay Water Supply

### 7.11.1 Background

Coffin Bay is a small township located on the south west coast of Eyre Peninsula, about 49 km west of Port Lincoln.

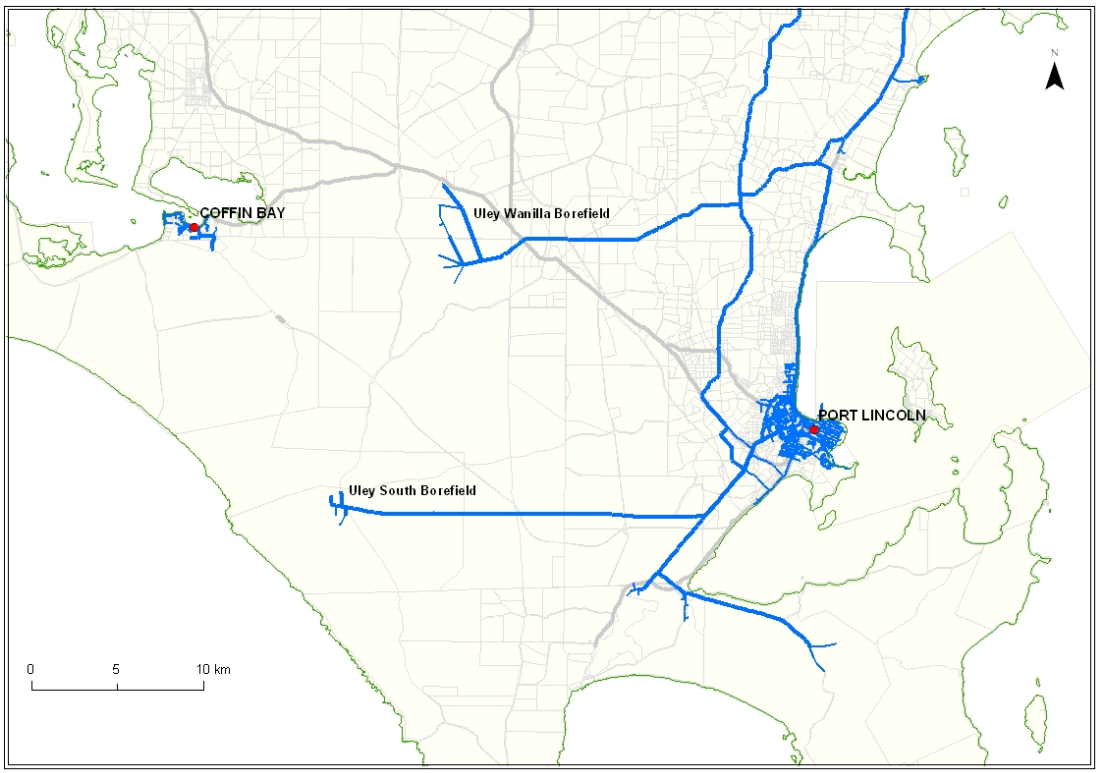



**Figure 7-20: Location of Coffin Bay in relation to existing water supply infrastructure**

The town has developed from a holiday retreat to a permanent population of 430 and over 2000 during holiday periods. In 2006-07 there were 591 services with a total consumption of 90 ML (includes 15% adjustment for errors and meter inaccuracies).

Coffin Bay is supplied with groundwater from the Coffin bay 'A' Lens.

The DWLBC issued SA Water with a licence in 2001 for an allocation of 98.89 ML/a from Lens 'A' based on the Water Allocation Plan for the Southern Basins Prescribed Wells Areas adopted in 2000. Following a review of the recharge calculations the allocation was revised to 118.509 ML/a.

The allocation set by DWLBC was sufficient for existing customers only and provides no opportunity for expansion of the township. Advice at the time from DWLBC indicated that the available scientific information on the Coffin Bay lens was insufficient to provide any certainty to SA Water that additional allocation could be made available to support growth in the township. An augmentation charge was therefore set in 2002 to allow development to continue without the risk of there being insufficient resource in the long term to supply the township.

The charge was based on either a desalination plant or a pipeline from Uley Wanilla.

Based on the area available to be developed and the past connection rates, it is estimated that the demand in Coffin Bay could increase to 200 ML/a by 2036-37.

### 7.11.2 Options for augmenting supply

Three major options were investigated, namely:

1. Additional allocation from the existing groundwater supply (Coffin 'A' lens)
2. Seawater desalination
3. Pipeline from the Eyre Peninsula system connected at Uley Wanilla

This section provides an overview of the investigation undertaken by SA Water. Options two and three assume that the existing allocation of 120 ML/a is available into the future.

#### *7.11.2.1 Additional Allocation from the Existing Groundwater Supply*

The Water Allocation Plan and subsequent allocations from the Coffin Bay 'A' Lens were based on the known extent of the 'A' Lens, which is to the boundary of the Coffin Bay National Park. While it is generally suspected that the aquifer extends into the park, investigations are underway to confirm this. The steep, heavily vegetated sand dunes of the park restricted access and therefore initial investigation method of ground based electromagnetics provided preliminary but inadequate data.

Two monitoring bores were subsequently completed in the Coffin Bay National Park in 2007. Water was struck at about 2 metres and continued the full depth of the holes, approximately 60 metres. Salinity of the water was good (TDS approximately 500 mg/L) with a gradual increase in depth to approximately 50 metres at which point it increased significantly (TDS to approximately 25,000 mg/L).

Aerial electromagnetic survey techniques have also been used with data being captured for Coffin Bay, Uley South and Uley Wanilla basins. At the time of report writing the data was being analysed to determine the accuracy with which it could interpret the extent of the freshwater in the aquifer.

One outcome of this work is expected to be a more accurate understanding of the Coffin Bay A lens. This information will be fed into a subsequent review of the Water Allocation Plan which will then determine a revised water allocation for the SA Water licence.

There is nothing from the results of the work to date that would suggest that the aquifer would not be able to support extraction of up to 200 ML/annum. Additional work is still required to provide a high level of confidence that the dynamics of the A lens is understood. This work will include the completion of the interpretation of the aerial electrical magnetic survey data and monitoring of the new wells in the Coffin Bay National Park. Any change to the water allocation parameters would require the review of the Southern Basins Prescribed Wells Water Allocation Plan and need to consider the integrity of the resource to allow for an increase in allocation, the potential impacts on dependent ecosystems (possible including the Coffin Bay Estuary) and the short and long term influences on the sustainable yield of the resource (e.g. impacts of climate change).

Additional allocation would require additional bores to spread the pumping load. Under the current bore configuration there was evidence of saline water being pumped from the lower

portion of the aquifer in years prior to the issue of a Water Licence when extractions reached 200 ML.

Any additional bores would extend along the boundary of the National Park possibly into land which is not currently owned by SA Water. Installation of bores would likely involve impacts to native vegetation, which would require further assessment. Access would need to be negotiated to land not currently under SA Water ownership.

#### *7.11.2.2 Seawater Desalination*

As discussed previously for the North West and lower desalination plants, desalination plants can have a variety of issues and potential impacts. Full assessment of these options requires further investigation work, including:

- A more rigorous analysis of water depths, seasonal seawater quality, oceanographic conditions (tides and currents) and likely environmental impacts of intake and outfall structures is required. This analysis will include a more comprehensive investigation into the exact location of intake and outfall (including the receiving capacity for discharges of concentrate) to optimise cost and minimise environmental impacts (including depth, proximity to aquatic ecosystems and important fisheries or aquaculture areas).
- Additional work will be required to determine the availability, practicality and cost of providing power supply to the possible sites as well as transfer pump stations. Relevant authorities will be consulted with to determine power supply capacity and network transmission capacity and the cost of any upgrades required.
- Proximity of site to sensitive areas, reserves, areas of known vegetation significant and heritage (Aboriginal and European).

As with the lower desalination plant option discussed in section 7.3.2, further work will be required to determine the specifics of integrating a desalination plant into the existing water supply system given technical challenges associated with mixing desalinated water with water from a groundwater source.

#### *7.11.2.3 Pipeline from Uley Wanilla*

This option would create an additional demand on the southern basins. As discussed in Section 6.2 SA Water currently extracts the available allocation from Uley Wanilla and therefore 80 ML/a of Uley Wanilla water would need to be redirected from the main trunk system and provided to Coffin Bay. Any future options for the Peninsula would need to consider the possibility of providing an additional 80 ML/a to Coffin Bay.

It is likely there would be roadside vegetation along the route of this pipeline. The quality of this vegetation is unknown; impacts to native vegetation require approval in accordance with the *Native Vegetation Act* and are required to be offset through the achievement of a significant environmental benefit. This may impact significantly on the cost of this option.

### *7.11.2.4 Estimated Costs*

The relative cost of the options presented in this section are shown below.

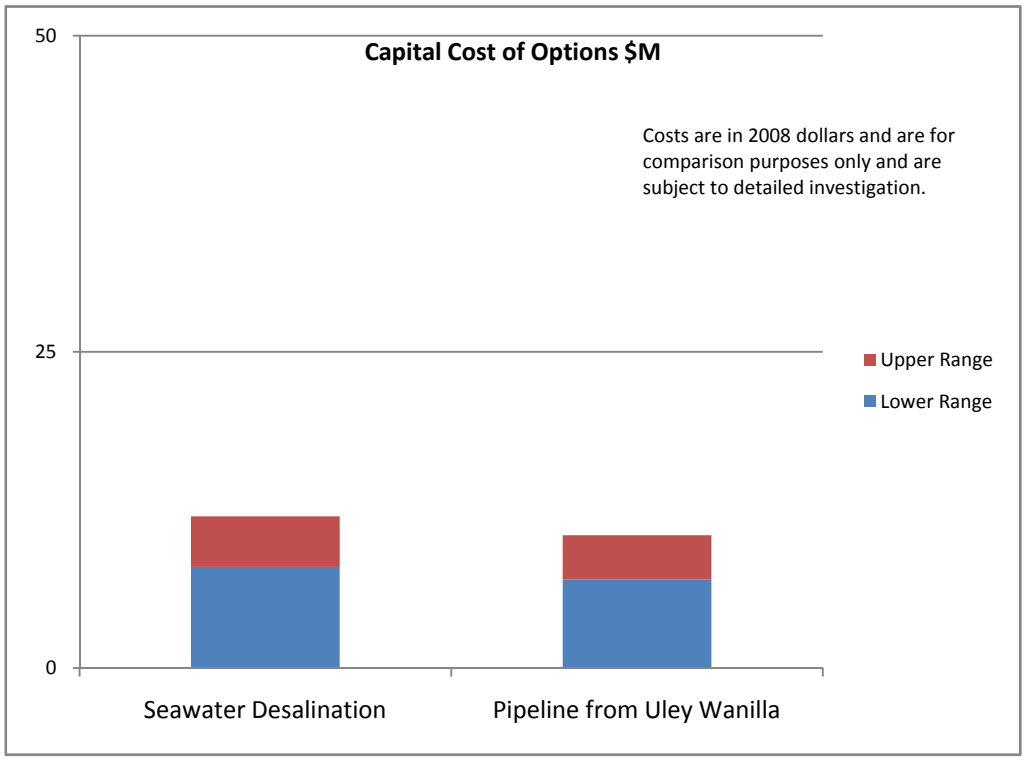



**Figure 7-21: Estimated cost range for Coffin Bay supply**

Limitations on cost estimates:

- The costs presented have been prepared on a similar basis for all options for the purposes of comparison, and should be considered as indicative only. Actual costs can only be determined on the basis of competitive tender prices.
- For the purposes of this report, notional sites for treatment facilities and pipeline routes have been selected. These will be further investigated for the preferred option during the next stage of project development.
- Costs do not include the costs of vegetation offsets associated with clearance of native vegetation or making the options carbon neutral.
- Further investigations will be required to determine if additional costs, over and above the allowance made, are required to reduce the environmental impact of brine discharge or seawater intakes for the desalination options (e.g. longer outfall pipeline).
- Costs have not been presented on the option of additional groundwater as this is contingent on additional allocations being available (subject to the review of the WAP).

## 7.12 Port Kenny/Venus Bay

### 7.12.1 Overview

Venus Bay and Port Kenny are two small towns that are not currently supplied by SA Water. As shown in Figure 7-22, the Venus Bay/Port Kenny region is situated a significant distance from the existing water distribution network. Rainwater provides the main source of water for the permanent residents in these towns, although private carting of water from the District Council of Elliston water storage facility is also used. It is also understood that there is limited groundwater use from the Port Kenny lens.

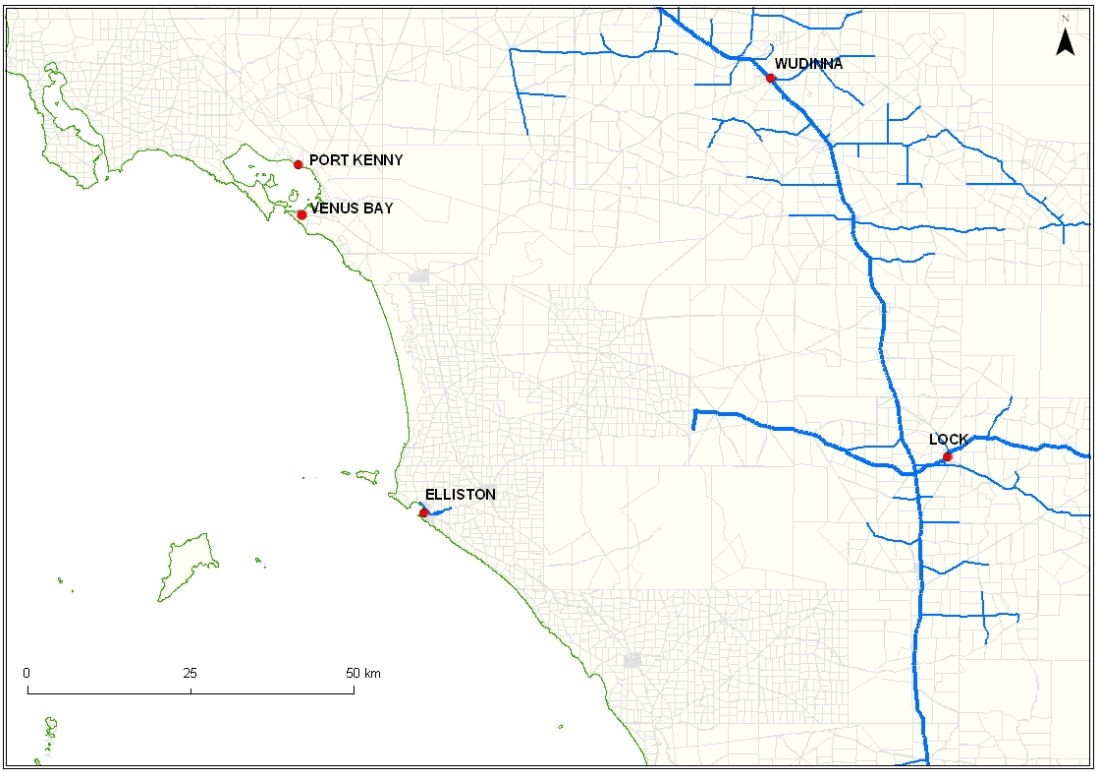



**Figure 7-22: Location of Venus Bay/Port Kenny in relation to existing water supply infrastructure**

This section considers three options for supplying water to the towns of Venus Bay and Port Kenny, namely:

- A pipeline to connect the towns to the existing reticulated supplies from the Tod-Ceduna trunk main northeast from the towns.
- A pipeline to connect into groundwater supplies from Elliston in the south.
- The construction of a small-scale seawater desalination plant at Venus Bay with a pipeline to supply Port Kenny.

These options involve an SA Water supply. However, there may be additional options available via use of the type of non-potable options discussed in Section 6.5 and 7.10 which may help reduce the size of the options presented below, or eliminate the need for them entirely.

Information from Planning SA's dwelling count database indicates that there are approximately 180 dwellings in Port Kenny and Venus Bay. For the purposes of this analysis, it has been assumed that the number of connected properties would be 200, which will allow for some growth and non-residential connections. SA Water will work with the District Council of Elliston to confirm the number of properties to be served and the appropriate allowance for future growth during the next phase of developing the options below. By assuming an annual demand of 300 kL/connection/a, the annual demand from 200 connections across the two towns would be 60 ML/a.

In developing these options, it has been assumed that sufficient power supply is available at Venus Bay, Port Kenny and Elliston for these options to be implemented.

### 7.12.2 Water Supply Options

#### *7.12.2.1 Water Supply Pipeline from Elliston*

The first option considered for a water supply system for Venus Bay/Port Kenny is to supply the towns from Elliston, approximately 60 km to the south. Elliston is supplied by groundwater that is extracted from the Kappawanta-Bramfield lens. The additional 60 ML/a required to supply Venus Bay/Port Kenny can be managed under SA Water's current allocation from the Kappawanta-Bramfield lens (refer to Section 6.2).

It is likely there will be roadside vegetation along the route of this pipeline. The quality of this vegetation is unknown; impacts to native vegetation require approval in accordance with the *Native Vegetation Act* and are required to be offset through the achievement of a significant environmental benefit. This may impact significantly on the cost of this option.

#### *7.12.2.2 Water Supply Pipeline Joining Existing Distribution System*

The second option investigated to supply Venus Bay/Port Kenny with water involves the construction of a pipeline to the northeast to join into existing reticulated water supply from the Tod-Ceduna trunk main.

Preliminary hydraulic modelling has indicated there is sufficient capacity in the existing 200 mm AC pipeline at Port Kenny-Pygery Road. However, field measurements may be required to confirm this if a pipeline connection from this point to Venus Bay/Port Kenny is examined further.

It is likely there will be roadside vegetation along the route of this pipeline. The quality of this vegetation is unknown; impacts to native vegetation require approval in accordance with the *Native Vegetation Act* and are required to be offset through the achievement of significant environmental benefit. This may impact significantly on the cost of this option.

#### *7.12.2.3 Small-scale Seawater Desalination Plant*

The third option investigated in this report is to supply the two towns with a small-scale seawater desalination plant located at Venus Bay, with a pipeline constructed to connect Port Kenny.

It is assumed that a seawater desalination plant at Venus Bay would be operated continuously and designed to supply the average annual demand of 60 ML/a. In the low demand months, the excess desalinated water not used could be stored in a treated water storage, which would then be drawn down during the high demand periods.

Similar assumptions have been applied to this desalination plant as those used in Section 7.3 above.

Venus Bay is supplied from the electricity grid at 11 kV. Estimates of the cost for supplying power from this connection to the desalination plant have assumed the installation of a two kilometre transmission line to the plant. However, there would be substantial cost associated with this option if there is insufficient capacity at Venus Bay or Port Kenny.

As with the previous options, no allowance has been made for installing reticulation systems in the towns of Venus Bay and Port Kenny.

Due to the depth of water at Venus Bay, it may be more appropriate to use beach wells in order to reduce the level of pre-treatment required on the source seawater. Shallow waters can lead to higher temperatures, higher nutrient levels and higher salinity which can increase the costs associated with pre-treating the water. The shallow water at Venus Bay may also raise issues for the discharge of brine to the marine environment and may require a significantly longer outfall than has been assumed in this report to reach deeper, better mixing water that will allow for sufficient dilution of the brine.

#### *7.12.2.4 Estimated costs*

The relative cost of the options presented in this section are shown below.

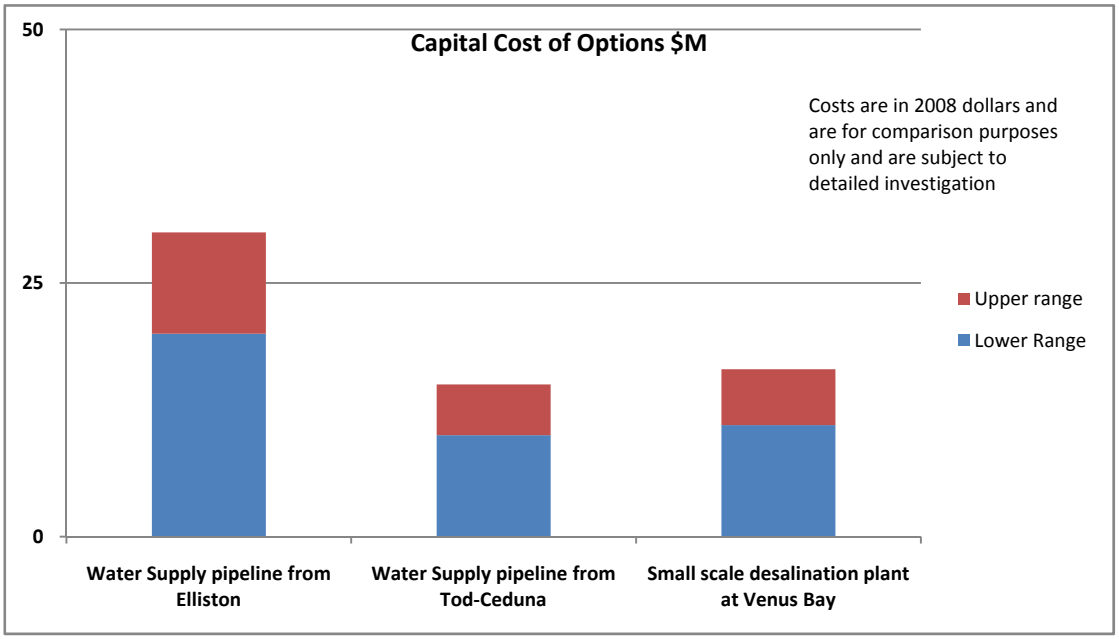



**Figure 7-23: Estimated cost range for Venus Bay/Port Kenny supply**

Limitations on cost estimates:

- The costs presented have been prepared on a similar basis for all options for the purposes of comparison, and should be considered as indicative only. Actual costs can only be determined on the basis of competitive tender prices.
- For the purposes of this report, notional sites for treatment facilities and pipeline routes have been selected. These will be further investigated for the preferred option during the next stage of project development.
- Costs do not include the costs of vegetation offsets associated with clearance of native vegetation or making the options carbon neutral.
- Further investigations will be required to determine if additional costs, over and above the allowance made, are required to reduce the environmental impact of brine discharge or seawater intakes for the desalination options (e.g. longer outfall pipeline).
- Costs presented do not include costs associated with the construction of reticulation systems around the towns of Venus Bay and Port Kenny. An alternative to installing a reticulation system around the two towns would be to supply water to a standpipe within each town, which would provide a lower capital cost option.

# 8 Impact of Climate on Demand and Supply

## 8.1 Summary of Historical Climate Characteristics

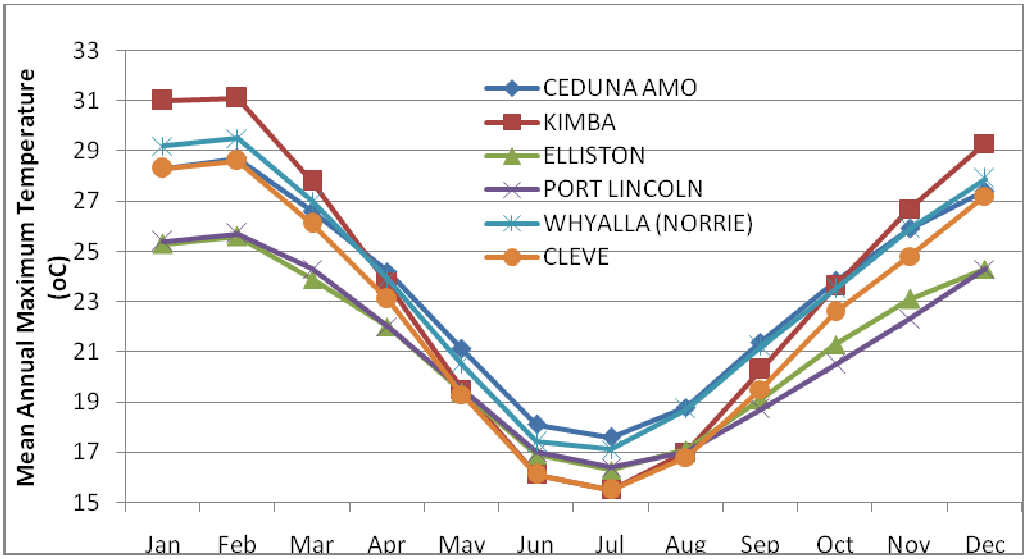
The climatic conditions vary considerably across Eyre Peninsula, as seen in Table 8-1, where the average rainfall can be as low as 283 mm at Ceduna and up to 513 mm at Port Lincoln. While many of the weather stations have existed far longer than the period summarised below the period has been chosen to allow for consistent comparison over the same period.

**Table 8-1: Summary of annual climatic conditions (1971 to 2000)**

| | Station Number | Mean Maximum Temperature (°C) | Mean Minimum Temperature (°C) | Mean Rainfall (mm) | Mean Number of Days of Rain ≥ 1 mm |
|---|---|---|---|---|---|
| CEDUNA AMO | 18012 | 23.5 | 10.5 | 283.1 | 55.1 |
| KIMBA | 18040 | 23.5 | 10.2 | 363.8 | 59 |
| WHYALLA (NORRIE) | 18103 | 23.5 | 13 | 297.8 | 49 |
| POLDA (GUM VIEW) | 18139 | 23.9 | 9.8 | 401.2 | 73.9 |
| ELLISTON | 18069 | 21.2 | 11.7 | 432.9 | 77 |
| CLEVE | 18014 | 22.3 | 11.4 | 415.9 | 73.8 |
| PORT LINCOLN | 18070 | 21.1 | 12.1 | 512.8 | 89.7 |

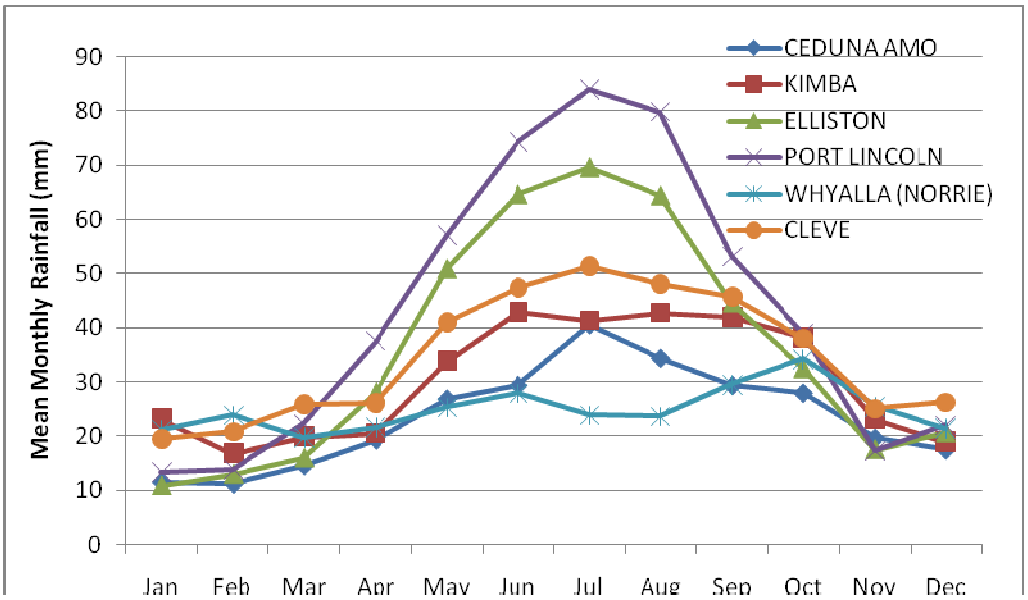
*Source: Bureau of Meteorology website (accessed March 2008)*

Figure 8-1 and Figure 8-2 show the seasonal variation of the average monthly maximum temperature and rainfall for key sites on Eyre Peninsula.




*( Source: Bureau of Meteorology website )*

**Figure 8-1: Average monthly maximum temperature (°C) 1971 – 2000**




*(Source: Bureau of Meteorology website)*

**Figure 8-2: Average Monthly Rainfall (mm) across the Eyre Peninsula (1971 – 2000)**

Port Lincoln represents the largest population centre in the region and therefore the rainfall for this site has been analysed in more detail. In Figure 8-3, the variability is shown through the annual rainfall and the cyclical nature is illustrated by the residual mass (cumulative deviation around average rainfall). Reviewing this information it can be seen that:

- 1895 – 1917 was typically a stable period
- 1917 – 1964 a drier than average period
- 1964 – 1992 a wetter than average period
- 1992 onwards (while below average) has been a stable period

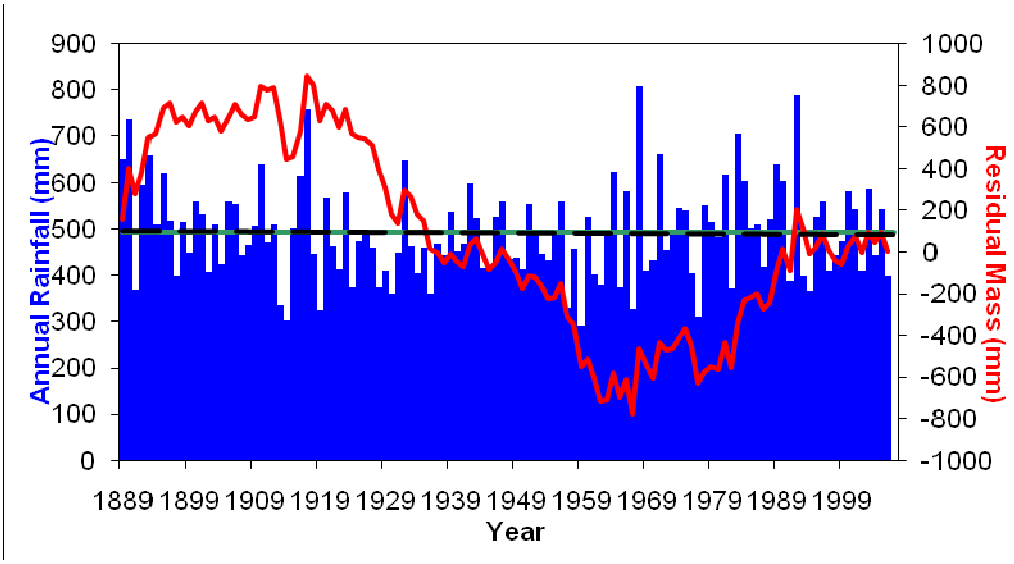



**Figure 8-3: Annual rainfall and residual mass at Port Lincoln Bureau of Meteorology site (Rainfall Station 18070)**

## 8.2 Demand and Supply

### 8.2.1 General

In 2006 the CSIRO Marine and Atmospheric Research Group completed an assessment of possible temperature and rainfall projections under different $CO_2$ emission scenarios. This process used global climate models and applied a downscaling technique that allowed the scientists to evaluate scenarios for particular regions of South Australia. Table 8-2, Table 8-3 and Table 8-4 summarise those scenarios for the Eyre Peninsula NRM Board area.

**Table 8-2: Annual and seasonal predictions of temperature and rainfall changes by 2030 and 2070 for the Eyre Peninsula NRM Board region under a range of $CO_2$ emission scenarios**

| Change by 2030 | Annual | Summer | Autumn | Winter | Spring |
|---|---|---|---|---|---|
| Table 6a: Range of warming (°C) for SRES scenarios | 0.4 to 1.2 | 0.4 to 1.3 | 0.4 to 1.1 | 0.4 to 1.2 | 0.4 to 1.3 |
| Table 8a: Range of warming (°C) on a path that stabilizes $CO_2$ at 450 ppm by the year 2100. | 0.4 to 0.8 | 0.3 to 0.9 | 0.4 to 0.8 | 0.4 to 0.8 | 0.4 to 0.9 |
| Table 10a: Range of warming (°C) on a path that stabilizes $CO_2$ at 550 ppm by 2150 | 0.4 to 0.9 | 0.4 to 1.0 | 0.4 to 0.9 | 0.4 to 0.9 | 0.5 to 1.0 |
| Table 7a: Range of rainfall changes (%) for SRES scenarios. | -10 to -1 | -9 to +4 | -10 to +3 | -12 to -2 | -20 to -2 |
| Table 9a: Range of rainfall changes (%) on a path that stabilizes $CO_2$ at 450 ppm by the year 2100 | -7 to -1 | -6 to +3 | -7 to +2 | -9 to -2 | -15 to -2 |
| Table 11a: Range of rainfall changes (%) on a path that stabilizes $CO_2$ at 550 ppm by 2150. | -8 to -1 | -7 to +3 | -7 to +2 | -9 to -2 | -16 to -2 |

**Table 8-3: Annual and seasonal predictions of temperature and rainfall changes by 2030 and 2070 for the Eyre Peninsula NRM Board region under a range of $CO_2$ emission scenarios**

| Change by 2070 | Annual | Summer | Autumn | Winter | Spring |
|---|---|---|---|---|---|
| Table 6b: Range of warming (°C) for SRES scenarios | 0.9 to 3.5 | 0.8 to 4.0 | 0.8 to 3.5 | 0.8 to 3.6 | 0.9 to 3.8 |
| Table 8b: Range of warming (°C) on a path that stabilizes $CO_2$ at 450 ppm by the year 2100. | 0.9 to 1.8 | 0.7 to 2.0 | 0.8 to 1.8 | 0.8 to 1.8 | 0.9 to 2.0 |
| Table 10b: Range of warming (°C) on a path that stabilizes $CO_2$ at 550 | 1.1 to 2.2 | 0.9 to 2.5 | 1.0 to 2.2 | 0.9 to 2.2 | 1.1 to 2.4 |

| Change by 2070 | Annual | Summer | Autumn | Winter | Spring |
|---|---|---|---|---|---|
| ppm by 2150 | | | | | |
| Table 7b: Range of rainfall changes (%) for SRES scenarios. | -30 to -2 | -25 to +13 | -30 to +8 | -35 to -4 | -60 to -4 |
| Table 9b: Range of rainfall changes (%) on apath that stabilizes $CO_2$ at 450 ppm by the year 2100 | -15 to -2 | -14 to +7 | -15 to +4 | -19 to -3 | -30 to -3 |
| Table 11b: Range of rainfall changes (%) on a path that stabilizes $CO_2$ at 550 ppm by 2150. | -19 to -3 | -17 to +8 | -18 to +5 | -23 to -4 | -40 to -4 |
| Values above 20 are rounded to the nearest 5. | | | | | |

*Source: CMAR. 2006*

**Table 8-4: Evaporation predictions under SRES scenario**

| | Annual | Summer | Autumn | Winter | Spring |
|---|---|---|---|---|---|
| Average range of potential evaporation change (%) by 2030 | 1-5 | 1-4 | 1-4 | 2-6 | 2-6 |
| Average range of potential evaporation change (%) by 2070 | 4-14 | 3-11 | 4-13 | 5-20 | 5-18 |

*Source: CAR. 2003*

To further improve the understanding of the impact of climate change on water resources DWLBC has commissioned CSIRO to undertake a downscaling project that would, among other areas, cover the Eyre Peninsula. This project is due for completion by early 2009 and will generate daily synthetic climatic data that represents the potential climate scenarios into the future. The Eyre Peninsula NRM Board is expanding the work undertaken by DWLBC to further explore the impacts by using the synthetic data on the hydrological models that represent the groundwater basins on Eyre Peninsula.

### 8.2.2 Demand

As rainfall decreases and temperature and evaporation generally increase it is expected that this will increase the demand for further resources.

Using this scenario SA Water have undertaken an analysis of population, stock numbers and climatic variables against demands between 1996-97 to 2006-07 financial years assuming that:

- average rainfall decreases by up to 10%
- average temperature increase by up to 1.2$^{o}$C
- annual evaporation increases by up to 5%

This analysis indicated that climate change could potentially increase the overall Eyre Peninsula demand by 8-9% by 2030.

The impact on future demands is illustrated in Figure 8-4.

The biggest impact due to climate change is experienced in the period seven-plus years. Previous projections presented (that did not include climate change) predicted a new resource would be required in seven years. No adjustment has therefore been made in this timing for the impact of climate change. Changes in demand (due to climate change) and in predictions of the impact of climate change will be reviewed annually as discussed in Section 11.1.

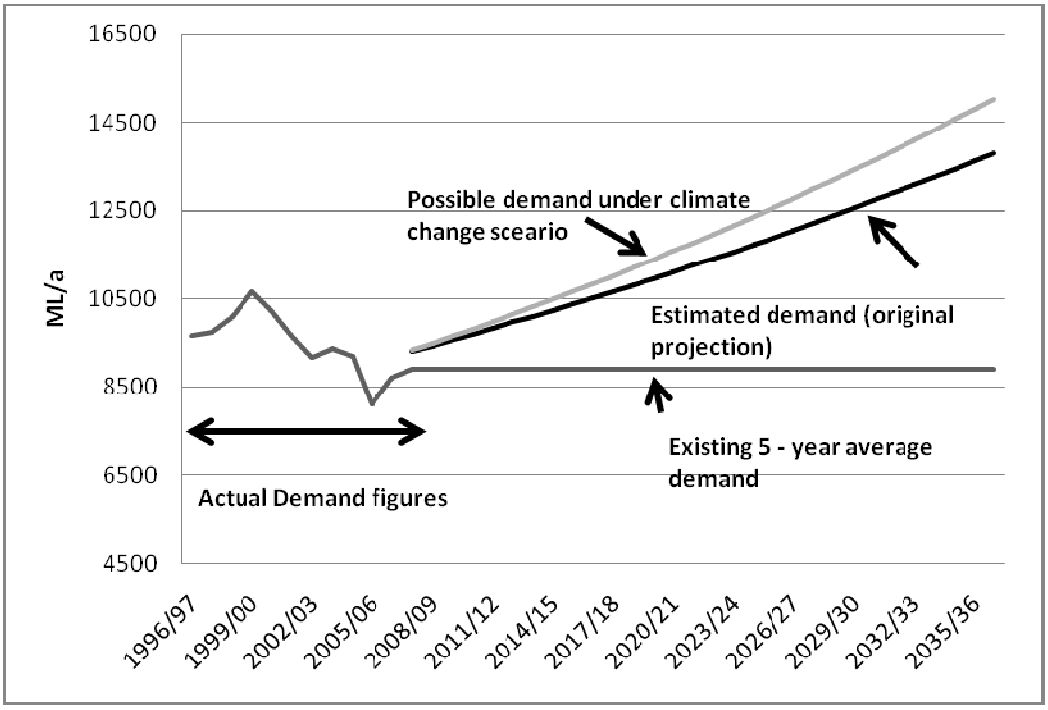



**Figure 8-4: Potential change to demand predictions due to climate change**

### 8.2.3 Supply

As discussed in Section 6.2.7, a recent study by DWLBC into the Uley Basins considered the impact of climatic variability on the sustainable yield of the basin with the climatic conditions of 1990–2005 repeated in 2005-2020. The first volume of the report estimated that average winter rainfall was 322 mm/y and, based on this, average winter recharge was estimated to be 105 mm.

The second volume by DWLBC found that while some of the fringe areas of the basin may experience some drawdown, the basin overall was still likely to operate within sustainable limits. Under this scenario the report highlighted that as recharge was likely to be underestimated, potentially a further 1000 ML per year could be extracted within the sustainable yield. Should only 50% of the recharge be experienced the drawdown is likely to become excessive with a permanent drawdown in the order of 1.2 to 1.4 m by 2020. Conservatively an ongoing monitoring program would ensure this drawdown was mitigated before it became a problem.

The amount of water that SA Water can extract from the groundwater sources on Eyre Peninsula for supplying customers on Eyre Peninsula is controlled by the WAPs that have been developed for each of the prescribed water resources in the area. The management of these resources is discussed in Section 6.2.6.

As discussed in Section 6.2.6, ongoing monitoring at the groundwater basins will ensure the allocations set by the water allocation planning process will be reactive to variations in climatic conditions as a result of climate change. This will then be picked up during the annual review of assumptions, which is discussed in more detail in Section 11.1.

# 9 Community Views

An extensive community engagement process has been implemented to assist in the development of the Long Term Plan. The process has enabled the project team to:

- Identify community issues relative to water and water security on Eyre Peninsula
- Identify issues to be addressed in the Long Term Plan
- Seek feedback and comment on the Long Term Plan framework and key elements
- Identify the level of community support for the Long Term Plan

The engagement process is defined in the Community Response Report, together with the detailed issues and responses presented by the community throughout the project. In summary, 19 information sessions were held in 13 towns at the commencement of the planning phase to canvass issues and concerns relative to water security. The 13 towns (inclusive of surrounding districts) participating in the workshops included Port Lincoln, Tumby Bay, Port Neill, Arno Bay, Cowell, Kimba, Cleve, Cummins, Coffin Bay, Lock, Wudinna, Streaky Bay and Ceduna.

Following the identification of key issues relating to the Long Term Plan, SA Water presented the framework and key elements of the plan to the Eyre Peninsula Water Security Reference Group (EPWSRG) and to five community forums established following the information sessions. These forums were established to provide input to the development of the Long Term Plan. The forums covered the following areas:

- Lower Eyre (Coffin Bay, Cummins and Tumby Bay)
- Eastern Eyre (Cowell, Cleve, Arno Bay and Port Neill)
- Far West (Ceduna, Streaky bay, Smoky Bay and Wirrulla)
- Mid West (Loch, Wudinna, Elliston, Kimba)
- Port Lincoln

Key elements presented included:

- Demand scenarios including population projections, stock numbers, tourism and mining
- Climate change calculations
- South Australia's Strategic Plan targets relative to water security for Eyre Peninsula
- Demand management options
- New infrastructure options for water security

Responses were varied across Eyre Peninsula communities and are summarised as follows:

- Demand projections provided by Local Government exceed those recommended by SA Water. The Long Term Plan should account for a range of demand scenarios including higher projections suggested by Local Government. The twelve monthly reviews will enable these predictions to be monitored.
- New water resources need to be explored in order to reduce allocations from the ground water basins.

- Desalination is an obvious long term solution to water security for Eyre Peninsula providing the right location is selected and environmental management issues are fully considered.
- Desalination is considered an effective way to reduce water hardness.
- The Iron Knob to Kimba pipeline is not considered by many in the community to be a long term sustainable option given the existing source water from the River Murray. Even if this were to be replaced by desalination through the BHP proposal at Port Bonython, it is unlikely to obtain community support. A desalination plant in the Upper Spencer Gulf is generally not supported as being environmentally sustainable. Desalination in the Upper Spencer Gulf should be considered a last resort.
- Demand management through stormwater harvesting schemes, recycling and rainwater tanks is a desirable approach to reducing long term demand on potable supplies and should be promoted and made more accessible to the community through funding grants and rebates appropriate to rural areas.
- Consideration should be given to connecting regional areas to a potable supply in order to sustain farming in such areas as climate change begins to take effect.
- A direction should be set for the future of the Tod Reservoir in order that the community may benefit from the asset.

These responses were considered in preparing the Long Term Plan. In addition, the EPWSRG had input to the ranking of the sub criteria relating to the environment and social aspects of the MCA. Long term infrastructure options were then subjected to the MCA process in order to determine the key recommendations.

The draft Long Term Plan was released to the EPWSRG on 16 June 2008 and then made available to the five community forums and the broader community for comment from 26 June 2008 to 1 August 2008.

A number of issues and comments were received from the five community forums and members of the EPWSRG and these are documented in the Community Response Report in detail. However, in summary these comments and issues included the following:

- The final plan contain a policy statement about mining
- A notation made following the MCA section regarding the possibility of lowering the MCA scores for desalination through various delivery mechanisms that may include alternative technologies
- A statement included about SA Water's contingency plans that would be implemented to maintain supplies in the event that there is a sudden change in the water resource
- Coffin Bay augmentation charges review to include a review over the use of funds already collected
- The final plan include more information relating to SA Water's contingency planning
- The final plan highlight community concern regarding ongoing draw from the River Murray and seek to identify new sources of water
- The final plan provide information relating to SA Water's asset management and maintenance programs

- Consideration be given to clearing vegetation from the surface area of the southern groundwater basins to maximise the recharge potential of the basins
- Consideration be given to connecting other small towns to a potable supply (other than those addressed in the draft Long Term Plan).

A number of changes were made to the draft Long Term Plan to address some of the issues listed above. These changes are provided as appendices in the Community Response Report.

In total, nine submissions were received from the general community. The key themes of these submissions can be summarised as follows:

*Desalination - North West Coast*

Two submissions focused on desalination at Penong. These comments specifically suggested that the assessment scores provided to this option through the MCA process should reflect the submission for Federal funding developed by a private consortium and the District Council of Ceduna for a desalination plant at Penong.

One submission mentioned the need to manage environmental issues with regard to desalination.

*Ecological footprint*

One submission favoured water management techniques rather than new water sources. It was expressed that any future option implemented to supply additional water to Eyre Region needed to be sustainable and create a minimal ecological footprint.

*Sustainability of basins*

Two submissions raised questions about the sustainability of the basins. These submissions favoured a new water source being implemented to reduce Eyre Peninsula's reliance on the groundwater basins.

*River Murray*

Aligning with comments made throughout the community engagement process, a number of submissions presented the opinion that any option implemented should not use River Murray water as a source of supply.

All of the submissions were considered in the finalising changes to the draft Long Term Plan, however not all comments resulted in a change. All submissions have been included in the appendices of the Community Response Report and referred to in the body of the report.

All five community forums, key stakeholders and members of the EPWSRG were each provided the opportunity to endorse the draft Long Term plan at various meetings held at the conclusion of the community engagement process. Endorsement of the draft Long Term Plan was received as follows:

- The five community forums endorsed the draft Long Plan but expressed the view that any long term solution should avoid any ongoing draw from the River Murray
- The EPNRM wrote to SA Water on 12 September 2008 formally endorsing the draft Long Term Plan with proposed amendments and noting the community concern about ongoing draw from the River Murray
- DWLBC endorsed the draft plan with proposed amendments
- The Eyre Regional Development Board (ERDB) endorsed the draft Plan with the proposed amendments highlighting community concern of the River Murray. This was advised via a letter to SA Water dated 26 September 2008.

At its final meeting held on the 1 October 2008, the EPWSRG endorsed the following statement by majority vote:

"The Eyre Peninsula Water Security Reference Group supports SA Water's draft long term plan and endorses the proposed changes as circulated by SA Water on the 1 September 2008. In so doing, the Reference Group supports community opinion as expressed through the five regional community forums that SA Water should be endeavouring in the longer term to find other sources of water (other than the River Murray). The Reference Group also acknowledges the annual review process proposed in the draft Long Term Plan which will aim to accommodate any future changes to demand scenarios and water allocations from the prescribed resources".

SA Water highlighted that even though the EPWSRG supports the view of the community in relation to the River Murray, this did not restrict, limit or preclude the extension of the Iron Knob to Kimba pipeline being considered as a genuine option to be compared to desalination.

The District Council of Ceduna voted against the statement but advised the EPWSRG it would support the majority view.

The ERDB also requested that SA Water collaborate with key mining companies in the establishment of an economical model and distribution system that will underpin the future water security of the region's potable water supplies in addition to supporting mining needs through a partnership of investment. This has been noted but is not an issue that can be directly addressed in the Long Term Plan.

The Technical Working Group established to facilitate the transfer of technical information between DWLBC, the EPNRMB and SA Water met on five occasions throughout the development of the Long Term Plan. Each agency was represented by key staff including the Chair of the EPNRMB. A project sponsor was also appointed by the Minister for Water Security from each of the three agencies contributing to the Technical Working Group. Anne Howe, Chief Executive SA Water, Kate Clarke, General Manager EPNRMB and Ben Bruce, Director Knowledge and Information DWLBC (initially Dr Michael Deering in an acting capacity), had overall responsibility for ensuring SA Water developed a Plan that adequately addressed water security as it related to the potable supply for Eyre Region while engaging the community in the development of the Plan.

The Technical Working Group and project sponsors have also endorsed this final draft inclusive of the proposed changes made as a consequence of the community engagement process.

# 10 Options Assessment

In order to provide a suitable method of assessing the options discussed in Section 7, SA Water developed a multi criteria analysis specifically for this project based on sustainability assessments undertaken by SA Water, other organisations and Australian water utilities such as:

- SA Water Water Quality Risk Assessment
- SA Water Business Risk Assessment
- SA Water Directional Sustainability Assessment
- Water Proofing Adelaide
- First screen sustainability analysis
- Sustainability MCA
- Transport SA Assessment
- ACTEW
- Sydney Water
- Far North Queensland
- Gold Coast Water

A multi criteria analysis provides significant benefits, such as:

- Providing a framework for incorporating complex and large amounts of information
- Combining quantitative and qualitative aspects of decision making
- Is able to highlight the strengths and weaknesses of any particular option
- Provides an open and transparent methodology which can involve stakeholders
- Can incorporate a diverse range of opinions and expertise

While a multi criteria analysis is particularly helpful to **prioritise options** it should only be **considered as a supporting tool** as there may be other externalities which may influence certain projects such as budgetary or political constraints.

In general, multi criteria analysis processes use a triple-bottom line approach which considers environment, social and economic factors. As part of this analysis, SA Water has chosen to add a fourth category of Technology and Functionality to ensure that the most sustainable solution is also a practical solution.

The multi criteria analysis process used in this project therefore involved the use of four sustainability categories, namely:

- Environment
- Social
- Economic
- Technology/Functionality

Under each of these categories, criteria were developed which have been used to assess each option. Consideration of the South Australia's Strategic Plan targets (as presented in Section 5) was fundamental in the development of the criteria presented in this section.

The four categories and each criterion in the categories were assigned weightings that have been used to calculate the sustainability score for each option. This is often referred to a two tiered weighting system and reduces the impact of one category having more criteria than another.

The general steps of the multi criteria analysis process used in this project were:

- Determine initial criteria (SA Water project team)
- Determine weightings of sustainability categories with Water Security Technical Group
- Confirm criteria with Water Security Technical Group
- Rank criteria in order of importance (social and environmental categories) undertaken by the Water Security Reference Group
- Assign weightings (using ranking from reference group for social and environmental categories (SA Water Project Team)
- Confirm weightings with Water Security Technical Group and
- Assess options against criteria and calculate score using weightings.

## 10.1 Criteria

The sustainability criteria developed for this project are shown below:

| Criteria | Definition |
|---|---|
| **Social** | |
| Potential for public health issues to arise | SA Water manages the risk to public health with respect to drinking water via the use of a multi-barrier approach from catchment to tap. Potential issues arising from the options being considered could include the historical variability in the source water and the existence of contaminating sources in the catchment. |
| Amenity value of infrastructure | Implementation of the options could mean a change to the aesthetic value of the landscape, either through infrastructure that may be visually obtrusive, less appealing or create an offensive odour or noise. A perceived reduction in the amenity value of the landscape reduces the social value in the community. |
| Improves hardness | Some of the options have the potential to improve the hardness of the water supply on Eyre Peninsula. This can vary between options based on the quality characteristics of the new source. |
| Aesthetic value | The aesthetic value of the drinking water (e.g. taste, colour or odour) can vary between options due to the differing sources of water and method of treatment. |

| Criteria | Definition |
|---|---|
| Community acceptability of option | Factors which could affect the community acceptability of an option include the original source of the water, the perceived reliability of the supply and the impact on the cultural and natural heritage of the community. The impact on cultural and natural heritage could include heritage or cultural value of a site for a new storage or site for a treatment plant. |
| Equitably provide water for all aspects of community | Depending on its location, an option may provide benefits to some parts of the community and not others, or may disadvantage some in terms of change in quality of water or level of service. |
| **Environment** | |
| Greenhouse gas emissions from construction | Some options may require more energy than others in order to be built. This impact diminishes the longer the lifespan of the infrastructure. |
| Greenhouse gas emissions from operation | Some options may require more energy to produce the same volume of water than others. |
| Impact on aquatic ecosystem | Some options involve waste disposal (e.g. brine) that can have an impact on aquatic ecosystems. Alternatively, an option may cause an improvement to the water quality in a catchment that will have a positive impact on the aquatic ecosystems in the area. |
| Impact on terrestrial ecosystem | Some options will impact on the terrestrial ecosystem either during construction and/or during operation. This could include the clearance of native vegetation for pipelines, treatment plant sites or storages. The level impact can vary between options based on size, location and the quality of the vegetation affected. |
| **Economic/Financial** | |
| Total cost to consumer/utility/government | Present Value Cost |
| Total cost per ML | Present Value $/ML |
| **Technology/Functionality** | |
| System complexity | Considers the base infrastructure complexity. Particularly keeping in mind if an option complements existing infrastructure and types of infrastructure where it could be managed with the human resources (i.e. right number of staff and right skills) already available in the region. |
| Reliability of supply/technology | Reflects the continued planned availability of either the water resource or the technology delivering and treating the resource. |
| Operability | Reflective of the system complexity however may consider how easy the system is to operate. In particular, if the option enhances the flexibility of the system by providing backup sources through additional sources of water or allows a degree of automation, etc. |

| Criteria | Definition |
|---|---|
| Regulatory impacts | Considers if a particular option is likely to require SA Water to administer additional licence, legislation or guidelines that may add to the complexity of the operation of the option. Complexity of operating an option may increase with associated increase in regulatory requirements. Future upgrades to infrastructure may be externally controlled to meet future regulatory issues. |

## 10.2 Weightings

The weightings for the sustainability categories were determined by the Water Security Technical Group. It was decided that all categories should receive the same weighting, as shown below in Table 10-1.

**Table 10-1: Sustainability category weighting**

| Sustainability Category | Weighting |
|---|---|
| Environment | 25% |
| Social | 25% |
| Economic | 25% |
| Technology | 25% |
| Total | 100% |

The rankings and weightings for the criteria under each category are shown below in Table 10-2. The Eyre Peninsula Water Security Reference Group were asked to establish the importance of the sub criteria for social and environmental using a scale of one to five (5 = most important, 1 = least important). The ranking was then established based on this assessment. Ranking for Technology/Functionality and Economic was undertaken by the SA Water project team.

**Table 10-2: Weightings and rankings for multi criteria analysis criteria**

| Criteria | Rank | Weight |
|---|---|---|
| **Social** | | |
| Potential for public health issues to arise | 1 | 31% |
| Amenity value of infrastructure | 5 | 10% |
| Improves hardness | 3 | 18% |
| Aesthetic value | 4 | 16% |
| Community acceptability of option | 6 | 5% |
| Equitably provide water for all aspects of community | 2 | 20% |
| **Environment** | | |
| Greenhouse gas emissions from construction | 4 | 10% |
| Greenhouse gas emissions from operation | 2 | 30% |
| Impact on aquatic ecosystem | 1 | 35% |
| Impact on terrestrial ecosystem | 3 | 25% |
| **Economic/Financial** | | |
| Total cost to consumer/utility/government | 1 | 50% |

| Criteria | Rank | Weight |
|---|---|---|
| Total cost per ML | 1 | 50% |
| **Technology/Functionality** | | |
| System complexity | 3 | 20% |
| Reliability of supply/technology | 1 | 40% |
| Operability | 2 | 30% |
| Regulatory impacts | 4 | 10% |

## 10.3 Assessment of Options

Using the categories, criteria and weightings discussed above, the seven options presented in Section 7 were assessed by the SA Water Project team.

The following outlines the major assumptions made in the assessment process:

- Each option was given a score out of five for each criteria. Scores are relative to the other options. However, the lower the score the more sustainable the option is considered.
- The benefits and risks of the source of water (i.e. River Murray or the proposed BHP Billiton Desalination Plant) for the Iron Knob – Kimba Stage 2 and Whyalla – Cowell options are not included in the assessment below, other than with regards to community acceptability of option.
- A brief assessment of the relative costs between a possible desalination plant located near Penong or near Ceduna, showed that possibly locating a plant near Ceduna was considerably lower in cost. This option has therefore been assumed in the multi criteria analysis below.
- It was assumed potential for public health issues to arise would generally be managed via SA Water's Water Quality framework. Tod Reservoir rehabilitation was scored higher on this criteria to reflect the potential for water quality incidents in the catchment.
- Amenity value of infrastructure was a qualitative assessment by the project team. Below ground pipelines were scored as likely to have a lower impact as desalination plants located on the coast.
- Improves hardness and aesthetic value were assessed based on the quantifiable improvement to water quality and the number of customers affected by an improvement.
- The community acceptability of each option was assessed using views that were documented during the community engagement process.
- Equitably provide water for all aspects of the community was assessed by the number of customers who would benefit from an option or improvement to water quality.
- Greenhouse gas emissions from construction and operation were a quantifiable assessment based on industry standard calculations. Options were then ranked and scored.

- Impacts to aquatic and terrestrial ecosystems were based on available information and project team past experience.
    - Tod Reservoir rehabilitation and Additional Groundwater were scored as likely to have slightly more impact on aquatic ecosystems than Iron Knob – Kimba and Whyalla – Cowell pipelines due to potential impacts on aquatic ecosystems of extracting additional water (even if within sustainable limits).
    - North West desalination was scored as likely to have a slightly higher impact on aquatic ecosystems than lower desalination due to the likely better mixing and higher wave energy at the possible lower site. However this has been based on the use of traditional reverse osmosis technology. It is recognised that the submission for Federal Government funding by a private consortium and Ceduna Council for a North West Coast desalination plant could improve this MCA score by using certain alternative technologies. Such private sector delivery mechanisms would be considered in any procurement process and the benefits measured against SA Water's benchmark studies.
    - The Whyalla – Cowell option was scored as likely to have the highest impact on terrestrial ecosystems due to its length and potential impact on roadside vegetation. A lower desalination plant and additional groundwater were scored above the remaining options due to the:
        - likely quality of vegetation at possible site (lower desalination) and
        - length of the pipe required (additional groundwater) and therefore the likely quantity of roadside vegetation impacted.
- Details of Economic and Financial information have been excluded from this report as they are commercial in confidence. The scores presented below are based on cost estimates prepared by SA Water and checked by external consultants using industry standard methodology (presented in Section 7.8).
- Initial estimates show a slightly higher cost for a desalination plant on the north-west coast near Ceduna. However, this is due largely to system integration estimates and will require further analysis. The overall score could be reduced using alternative technologies.
- Feasibility and technical scores were evaluated by the project team using SA Water's past experience.

**Table 10-3: Raw MCA scores for Eyre Peninsula options**

| Criteria | Weight | NW desal | Lower desal | Tod rehab | IK-K stage 2 | Whyalla - Cowell | Add G/W |
|---|---|---|---|---|---|---|---|
| **Social** | | | | | | | |
| Potential for public health issues to arise | 31% | 1 | 1 | 3 | 1 | 1 | 1 |
| Amenity value of infrastructure | 10% | 3 | 3 | 1 | 2 | 2 | 2 |
| Improves hardness | 18% | 2 | 2 | 4 | 3 | 3 | 4 |
| Aesthetic value | 16% | 1 | 1 | 4 | 3 | 3 | 4 |

| Criteria | Weight | NW desal | Lower desal | Tod rehab | IK-K stage 2 | Whyalla - Cowell | Add G/W |
|---|---|---|---|---|---|---|---|
| Community acceptability of option | 5% | 1 | 1 | 3 | 4 | 4 | 5 |
| Equitably provide water for all aspects of community | 20% | 3 | 1 | 2 | 4 | 3 | 4 |
| **Environment** | | | | | | | |
| Greenhouse gas emissions from construction | 10% | 2 | 2 | 2 | 2 | 5 | 3 |
| Greenhouse gas emissions from operation | 30% | 5 | 5 | 1 | 1 | 3 | 3 |
| Impact on aquatic ecosystem | 35% | 5 | 4 | 2 | 1 | 1 | 2 |
| Impact on terrestrial ecosystem | 25% | 2 | 3 | 2 | 2 | 4 | 3 |
| **Economic/Financial** | | | | | | | |
| Total cost ($) | 50% | 3 | 3 | 5 | 1 | 5 | 3 |
| Total cost per ML | 50% | 3 | 2 | 5 | 1 | 5 | 3 |
| **Technology/Functionality** | | | | | | | |
| System complexity | 20% | 5 | 3 | 3 | 4 | 3 | 2 |
| Reliability of supply/technology | 40% | 2 | 2 | 5 | 1 | 2 | 1 |
| Operability | 30% | 4 | 2 | 5 | 3 | 2 | 2 |
| Regulatory impacts | 10% | 3 | 3 | 3 | 2 | 2 | 1 |

*NB A lower score represents an option expected to have a lower impact*
*Scores reflect relative assessment between options, not necessarily severity of impact*

The multi criteria analysis scores indicate:

- A desalination plant in the lower portion of Eyre Peninsula is the more favourable option based on social criteria.
- Stage 2 of the Iron Knob – Kimba scheme ranks as most favourable on economic and environmental criteria. However, it should also be kept in mind that it provides the smallest additional resource volume.
- On a technical level the additional groundwater (new borefield) comes out the best due to it being standard technology that SA Water has extensive experience in constructing and operating.
- Overall, the Stage 2 of the Iron Knob – Kimba scheme is shown to be a favourable system. However, when considered in association with the volumes supplied, the desalination plant on Lower Eyre Peninsula becomes more favourable as the required volume becomes greater.

**Table 10-4: Final MCA score of options**

| Criteria | NW desal | Lower desal | Tod rehab | IK-K stage 2 | Whyalla - Cowell | Add G/W |
|---|---|---|---|---|---|---|
| Social | 17.8 | 13.8 | 29.4 | 25.3 | 23.3 | 29.2 |
| Environment | 39.5 | 38.5 | 17 | 13.5 | 27.5 | 26.5 |
| Economic/Financial | 30 | 25 | 50 | 10 | 50 | 30 |
| Technology/Functionality | 33 | 23 | 44 | 23 | 22 | 15 |
| Total Score | 120.3 | 100.3 | 140.4 | 71.8 | 122.8 | 100.7 |
| Volume option supplied (ML) | 1800 | 2200 | 1000 | 900 | 1700 | 1600 |
| Volume weighted score (score/GL) | 66.8 | 45.6 | 140.4 | 79.8 | 72.2 | 62.9 |

*NB The scores have evenly been factored up to assist with ease of comparison.*
*A lower score represents an option expected to have a lower impact*
*Scores reflect relative assessment between options, not necessarily severity of impact*

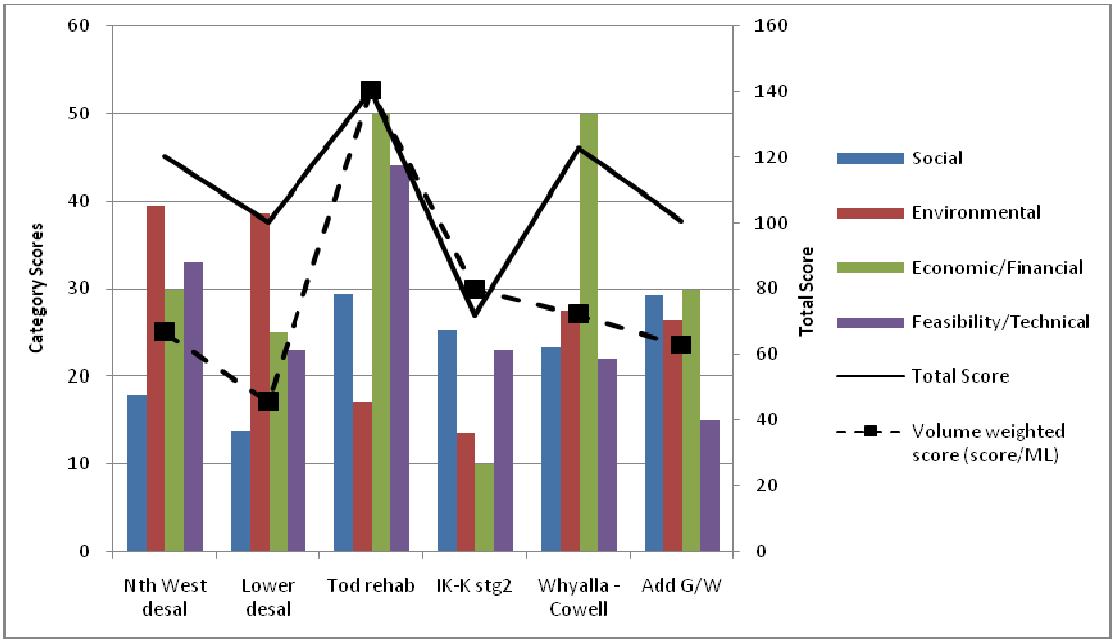



**Figure 10-1: MCA scores of the alternative source options**

# 11 Summary and Recommendations

The following points summarise the investigation detailed above

- Demand on Eyre Peninsula has been declining for the past eight years.
- The Community, local councils and other stakeholders anticipate that significant growth will occur on the Peninsula.
- The installation of a pipeline from Iron Knob - Kimba has increased the available resource on Eyre Region by 15%.
- The groundwater basins are currently managed sustainably and there is no indication that SA Water current allocations from these sources will reduce significantly. In addition to the current level of monitoring, over the next two years, the EPNRMB together with partners SA Water and DWLBC will undertake a significant research project entitled the Groundwater Allocation, Planning and Management Project.
- Medium demand projections indicate that a new resource will be required in seven years.
- SA Water recognises the importance of community water schemes and water conservation, in terms of the reduced demand on SA Water supplies, and in heightening the awareness of the need for water conservation in the community.
- A range of options were identified including desalination plants at the north-western and southern (lower) ends of the Peninsula, further pipeline connections with Whyalla and Tod Reservoir improvements.
- A sustainability analysis (using a multi criteria analysis technique) was undertaken which highlighted that the options of Stage 2 of the Iron Knob – Kimba pipeline and a lower desalination plant are the two options most worth further investigation.
- For the purpose of the study a site for the lower desalination plant adjacent to Cathedral Rocks and the Uley South Basin was assumed.
- Stage 2 of the Iron Knob – Kimba pipeline is estimated to have a lead time of six to 12 months. It is anticipated that a desalination option would require longer than this.
- Additional work would be required to determine the specifics of each option. This work could include:
    - Further investigations into Stage 2 of Iron Knob – Kimba pipeline.
    - Assessment of other sites in the lower area of Eyre Peninsula to determine the most suitable site.
    - Baseline environmental investigations for the marine and terrestrial environment.
    - Assessment of the cultural heritage of the site (particularly with reference to Aboriginal and European Heritage).
    - Detailed investigations into the suitability of the power supply.
    - Assessment of the Uley South pipeline and pump station to determine if upgrades are required.

- SA Water will undertake to commence further investigations in 2008-09.
- It is recognised that a submission for Federal Government funding was prepared by a private consortium and Ceduna Council in 2006 for a desalination plant near Penong. This broad proposal outlined in the submission for funding could improve the MCA score by using alternative technologies. Such private sector delivery mechanisms would be considered in any procurement process and the benefits measured against SA Water's benchmark studies should a decision be made to proceed with desalination following the necessary investigations.
- The use of artificial catchments (or modified catchments for rainwater harvesting) was discussed in the original Eyre Peninsula Master Plan (PB, 2003) and their use forms part of the objective and principles of the Eyre Peninsula Catchment Management Plan (part of the initial Natural Resource Management Plan). While artificial catchments may have benefits for non-potable water supplies in certain environments, they are not considered appropriate to securing SA Water's existing potable supply for Eyre Peninsula.
- Options were also investigated for supply to Venus Bay and Port Kenny, namely: desalination; pipeline from Elliston; and pipeline from Tod – Ceduna main. There are significant costs associated with these options and alternatives such as stormwater and wastewater reuse may be more appropriate.
- Tod Reservoir does not currently form part of the water supply system on Eyre Region, however it is still an integral part of the overall contingency planning for the system. If recreational access is to be permitted to this site then funding would be required to address land management, public safety issues, water quality issues and emergency contingency planning issues associated with opening the reservoir land for limited public use. The nature of the uses permitted would be subject to satisfactorily addressing these issues. The financial and resource implications of permitting access to SA Water's reservoirs would be substantial.
- In the event that recreational use of the reservoir was permitted, SA Water would look to other state or local authorities to handle the upgrade of the facilities and subsequent annual costs. This would need to be done under a memorandum of understanding regarding the use of the reservoir as water supply during emergency situations.
- The engagement process undertaken during 2007-08 (discussed in Section 2) to inform the development of SA Water's Long Term Plan means the region is well placed to contribute to the state-wide planning process, and to quickly finalise a broad Water Security Plan for the Eyre Region. SA Water's Long Term Plan will in time form a key part of the overarching Water Security Plan. The Water Security Plan will build on the initiatives identified in SA Water's final Long Term Plan by introducing new strategies to address those issues not within the scope of SA Water's infrastructure planning process.

## 11.1 Ongoing Review of the Long Term Plan

SA Water's procedures for developing and amending long term plans specify:

- Major assumptions contained in long term plans will be reviewed on an annual basis.
- A major departure from an assumption (i.e. significantly higher or lower population or demands than was originally predicted) can trigger a total review of the plan and the strategies it recommended.
- At a minimum Long Term Plans will be completely reviewed every five years.

The assumptions (departure from which can cause a major review of the Long Term Plan) can be known as trigger points or key parameters. The key parameters or trigger points in this plan are listed below:

- Population of Eyre Region
- Actual demand – townships (residential developments)
- Actual demand - rural (including stock numbers)
- Allocations from Water Allocation Plan for Southern Groundwater Basins and independent supplies at Elliston and Coffin Bay.
- Government policy with regards to carbon neutrality
- Impact of climate change on available resources and demand

These assumptions will be monitored and checked annually by the SA Water project team and the strategy presented in this document reviewed in light of these assumptions. It is proposed that the Water Security Reference Group will meet annually and SA Water will report on the above assumptions at these meetings.

It is also expected that as part of the Annual Review process, that members of the Water Security Reference Group will provide the SA Water project team with updated information on projected development in their respective council areas.

A process will be determined to ensure key stakeholders in the community are informed of the outcomes from the 12 month review process. Specific recommendations are made in the Community Response Report.

## 11.2 Out of Scope Issues

As discussed in Section 3 there were numerous issues which were raised during the community engagement which do not form part of the scope of this report. The proposed method of dealing with these issues is covered in the Community Response Report.

## 11.3 Recommendations

The recommendations made in this plan can be summarised as follows:

- System enhancement
- New water sources and
- Important issues

This plan looks at opportunities for system enhancement and new water sources as and when required to complement demand management initiatives and community/local government water cycle initiatives already in place.

**System Enhancement**

In 2007 SA Water completed the construction of a pipeline extension from Iron Knob to Kimba with an approximate capital cost of $48.5 million. Stage 2 would involve further system enhancements to allow an additional 900 ML/a to be transferred to the Lock township.

The implementation of Stage 2 of this system and the introduction of a new source water to the western region of the Eyre Peninsula via this pipeline would assist in the reduction of scaling thereby improving water quality.

While the lead time for Stage 2 of the Iron Knob to Kimba pipeline is favourable (approximately 6 – 12 months) the additional volumes of water produced are relatively low in comparison with other options and this will need to be considered in light of future demand projections.

**New Water Sources**

The Long Term Plan also recommends further investigation into a seawater desalination plant located in the lower region of Eyre Peninsula that could provide approximately 2,200 ML/a or 16% of the projected 2036-37 demand.

By constructing a plant in the lower region of Eyre Peninsula, the close proximity of the Uley South Borefield, the Uley South main (transporting groundwater from the Uley South to the North Side Hill Tanks) could be used to transport desalinated water into the reticulated water supply network of Eyre Peninsula. From North Side Hill Tanks, desalinated water can then be pumped throughout the reticulated water supply system of Eyre Peninsula, including Port Lincoln and the East Coast system.

Further work on the desalination proposal will address its complexity and environmental sensitivities including site selection, baseline environmental investigations, power supply, Aboriginal and Cultural Heritage assessments and system augmentation.

It is recognised that a submission for Federal Government funding was prepared by a private consortium and Ceduna Council in 2006 for a desalination plant near Penong. This broad proposal outlined in the submission for funding could improve the MCA score by using alternative technologies. Such private sector delivery mechanisms would be considered in any procurement process and the benefits measured against SA Water's benchmark studies should a decision be made to proceed with desalination following the necessary investigations.

**Process**

The demand projections adopted in this Long Term Plan indicate that a new resource will not be required until 2014-15. Clearly if demand projections are higher, as suggested using Council projections, then a new resource may be required earlier (approximately 2011-12). The same applies if allocations from the groundwater resources are reduced.

While the annual review process will monitor demand, further work will be required in the short term to determine which option should be implemented first to meet any demand increase. The Long Term Plan therefore recommends the immediate implementation of a three phase process as follows:

*Phase 1 - Investigation (2008-09)*

- Undertake further investigations into stage 2 of the Iron Knob to Kimba Pipeline
- Commence further investigation into a desalination plant on the lower west coast of the Peninsula
- Continue investigations into the merit of a desalination plant on the upper west coast near Ceduna or Penong in order to effectively compare with the lower west coast option
- Investigations to commence in 2008-09 financial year (investigation scope to be finalised)
- Investigation progress to be reported to the Water Security Reference Group at the 12 month review (November 2009)
- Preferred option for implementation selected
- Determine timing for implementation based on projected demand 12 month review.

*Phase 2 – Preferred Option*

- Complete any outstanding work required for the preferred option for implementation
- Prepare project scope
- Determine timing for implementation based on projected demand 12 month review.

*Phase 3* **-** *Implementation*

- Ensure preferred option is implemented in sufficient time to meet projected demand (currently predicted in 2014-15)
- The remaining option to be implemented subsequently as required dependent upon demand.

**Important Issues**

The many efforts of the community to conserve and harness water are fundamental to planning effectively for the future. The importance of these water management initiatives by the Eyre Peninsula community cannot be underestimated both in terms of the reduced demand on SA Water supplies, and in heightening the awareness of the need for water conservation in the community. The Eyre Peninsula community is a leader in South Australia

in water conservation and management and this should continue to be recognised in water security planning.

As previously stated, the primary purpose of this Long Term Plan is to address supply and demand for potable water for the Eyre Peninsula for the next 20 – 25 years. During the community engagement process however, a broad range of issues were raised, a number of which are unrelated to this purpose. These issues have been documented in the Community Response Report for further consideration by Government. SA Water has however identified opportunities to contribute in the management of some of these issues.

### Summary of Initiatives

Table 11-1 summaries the initiatives recommended as part of this long term plan.

**Table 11-1: Summary of Initiatives**

| STRATEGY | DELIVERABLE | TIMING | LINKAGES |
|---|---|---|---|
| **Annual Review of Long Term Plan** | | | |
| Review demand projections and progress against key recommendations | Confirm existing trends and whether timing for implementation of recommendations proposed in this report is appropriate or needs to be amended | Yearly (Commencing Nov 2009) | Eyre Peninsula Water Security Reference Group<br>EPNRMB<br>DWLBC |
| **Water Security (System enhancement and new water sources)** | | | |
| Undertake investigation and feasibility study into desalination and compare with system enhancement | The staging for the implementation of the preferred water security options are identified | Nov 2009 | Private Consortium and Ceduna Council Proposal |
| **Water Quality** | | | |
| Investigate possible initiatives (e.g. SHMP) and engage with the community as to their practicality and application for the Eyre Region | The feasibility of improving water quality through this method is identified | Nov 2009 | West Australian Water Corporation |
| **Small Town Supply** | | | |
| Undertake commercial discussions with the District Council of Elliston regarding the provision of a water supply to Venus Bay and Port Kenny | An appropriate water supply is identified for Venus Bay and Port Kenny including options for delivery | Nov 2009 | Government<br>District Council of Elliston |
| Continue investigations into the extent of the lens at Coffin Bay and review the augmentation charge (including the use of funds already collected) for development at Coffin Bay | Augmentation charges for Coffin Bay are reviewed in association with an increase in knowledge concerning the Coffin A lens | Nov 2009 | EPNRMB<br>DWLBC |

| STRATEGY | DELIVERABLE | TIMING | LINKAGES |
|---|---|---|---|
| **Groundwater Basins** | | | |
| Contribute to the Groundwater Allocation, Planning and Management Project | Project enables an increase in understanding of the ground water resources assisting to develop robust water allocation plans | February 2010 | EPNRMB<br>DWLBC<br>National Water Commission |
| **Water Conservation** | | | |
| Embrace opportunities to partner with Local, State and Federal Government authorities to assist communities looking to actively conserve water | Water Conservation projects are identified in partnership with other relevant agencies | Ongoing | Federal, State and Local Government authorities |
| Work closely with industry and business to reduce water use through the preparation and implementation of water efficiency plans | Industry and business assisted to conserve water | Ongoing | Industry |
| **Community Water Schemes** | | | |
| Investigate abandoned water harvesting scheme sites currently owned by SA Water to determine future ownership and management options | Future of sites resolved | Nov 2009 | Local Government |
| **Tod Reservoir** | | | |
| Hold discussions with the District Council of Lower Eyre and the District Council of Tumby Bay to determine an appropriate strategy for managing the issues associated with the possible recreational access to the facility | Possibility to allow recreational access determined and if allowed nature of activity permitted. | Nov 2009 | District Council of Lower Eyre<br>District Council of Tumby Bay |
| **Recycled Water – Port Lincoln** | | | |
| Reduce infiltration of saline groundwater in the sewer network | Quality of wastewater available for reuse is improved | Ongoing | |
| Split the wastewater treatment plant into a high saline and lower saline stream to better manage waste disposal from Fish Processing industry (subject to industry support) | Quality of wastewater available for reuse is improved, Port Lincoln Fish industry are able to dispose of waste and environmental benefits. | 2010 | Fish Processing Industry<br>Environment Protection Authority<br>ERDB |
| | | | |

This table represents SA Water's contribution to a number of areas. It is not intended to be a comprehensive list of all initiatives that may be undertaken by other agencies.

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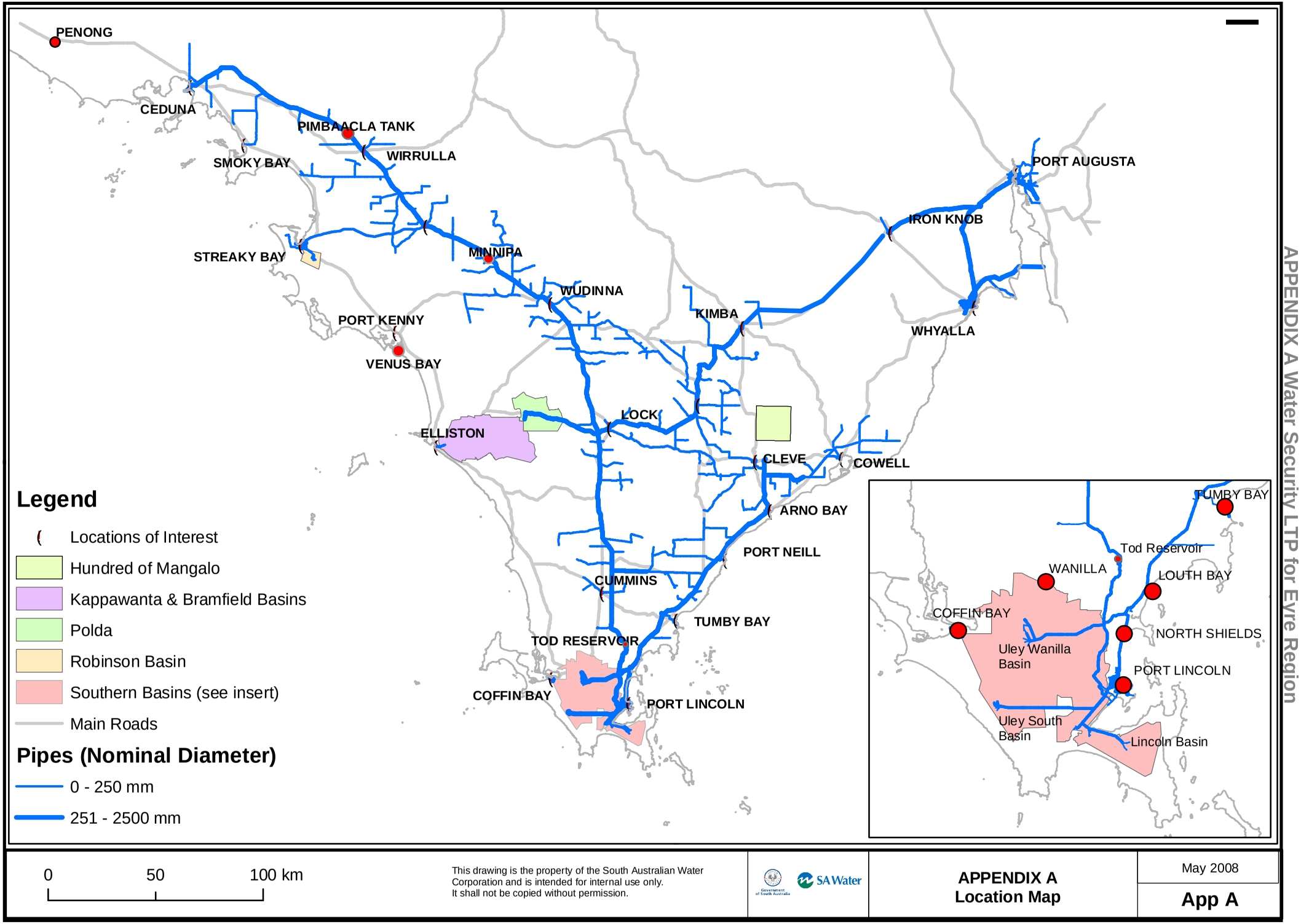
## Appendix A Location Map






SA Water

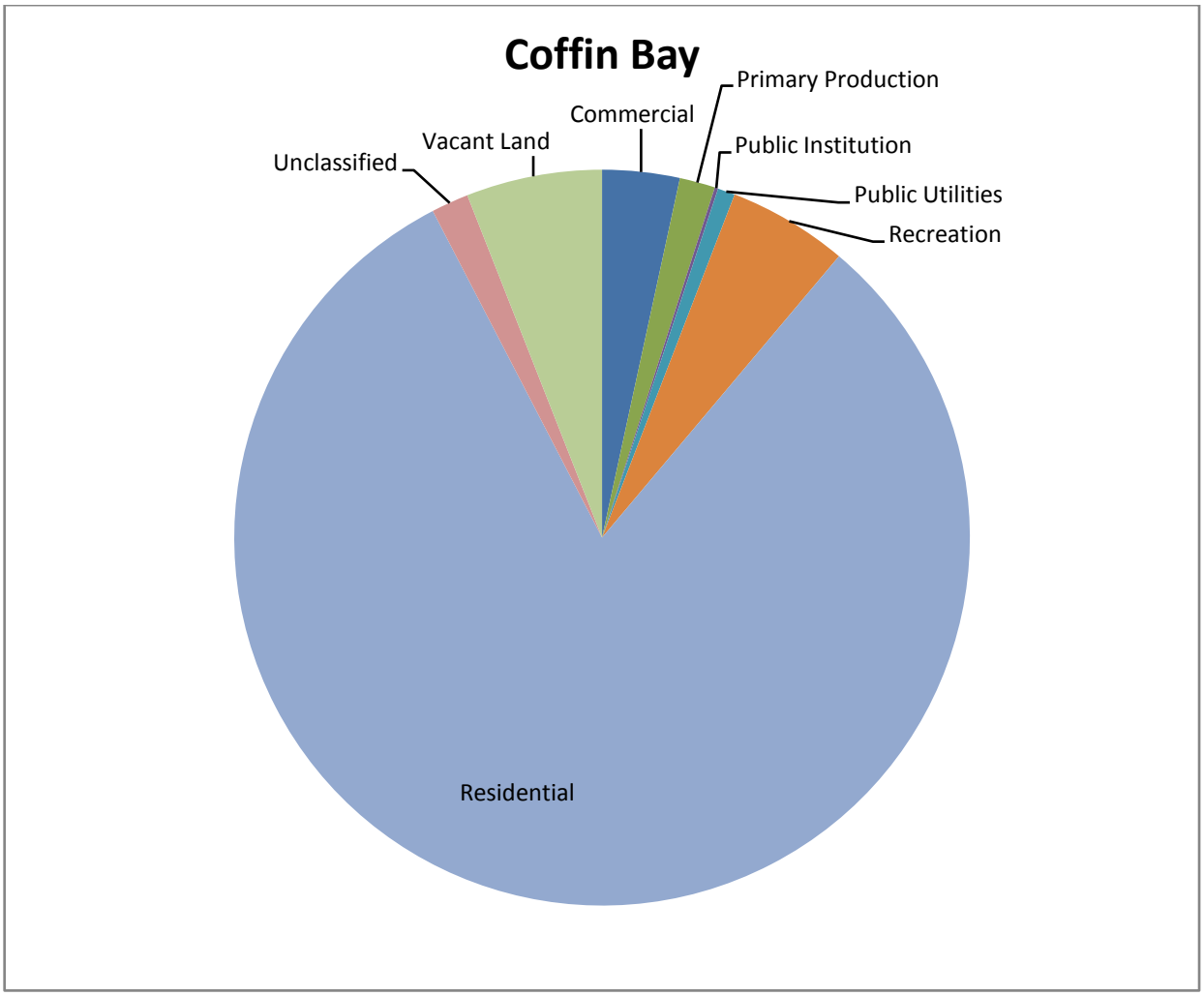
**APPENDIX A**
**Location Map**

May 2008

**App A**

APPENDIX A Water Security LTP for Eyre Region

## Appendix B Individual Township Demand Breakdowns

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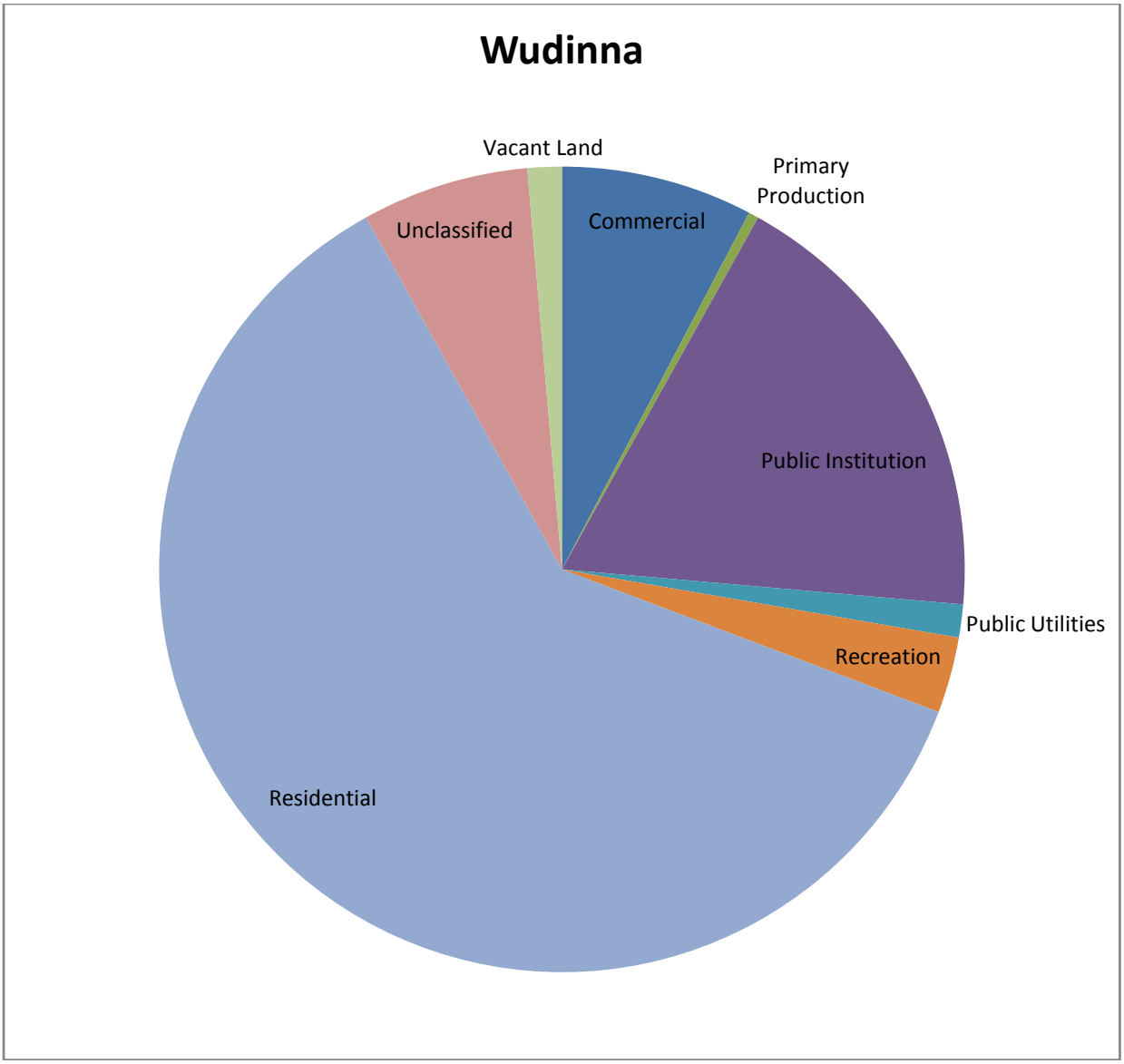


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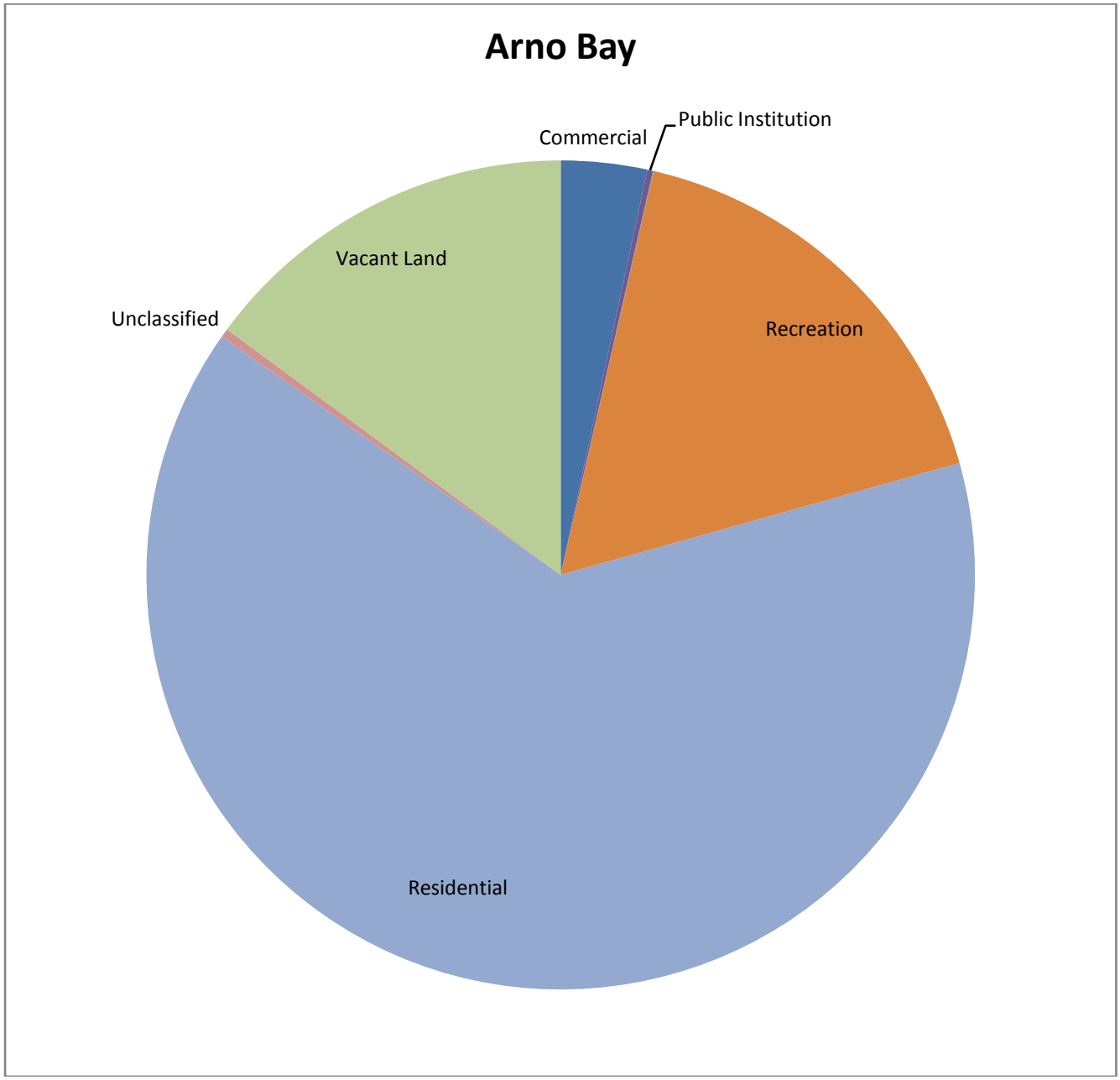


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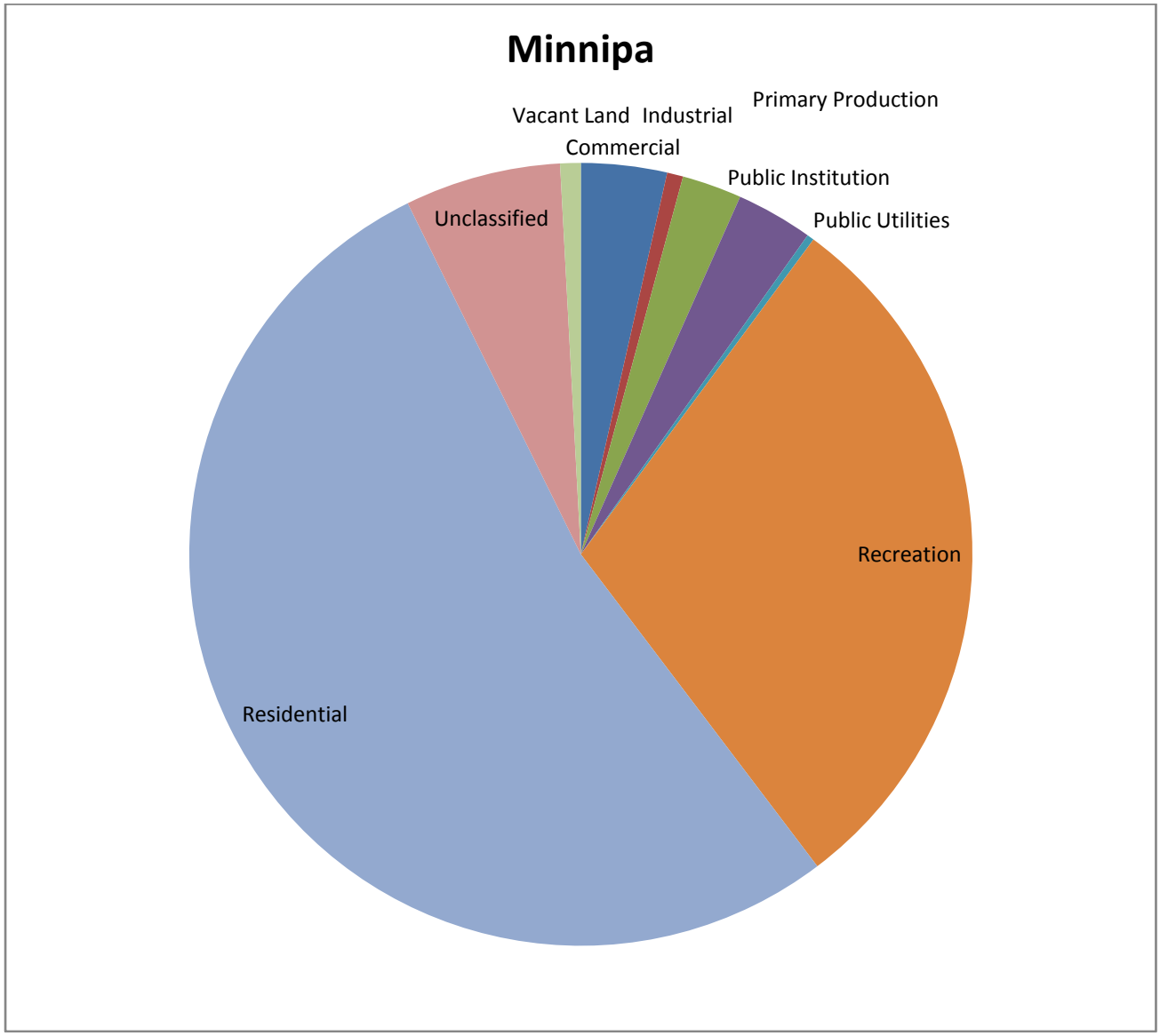


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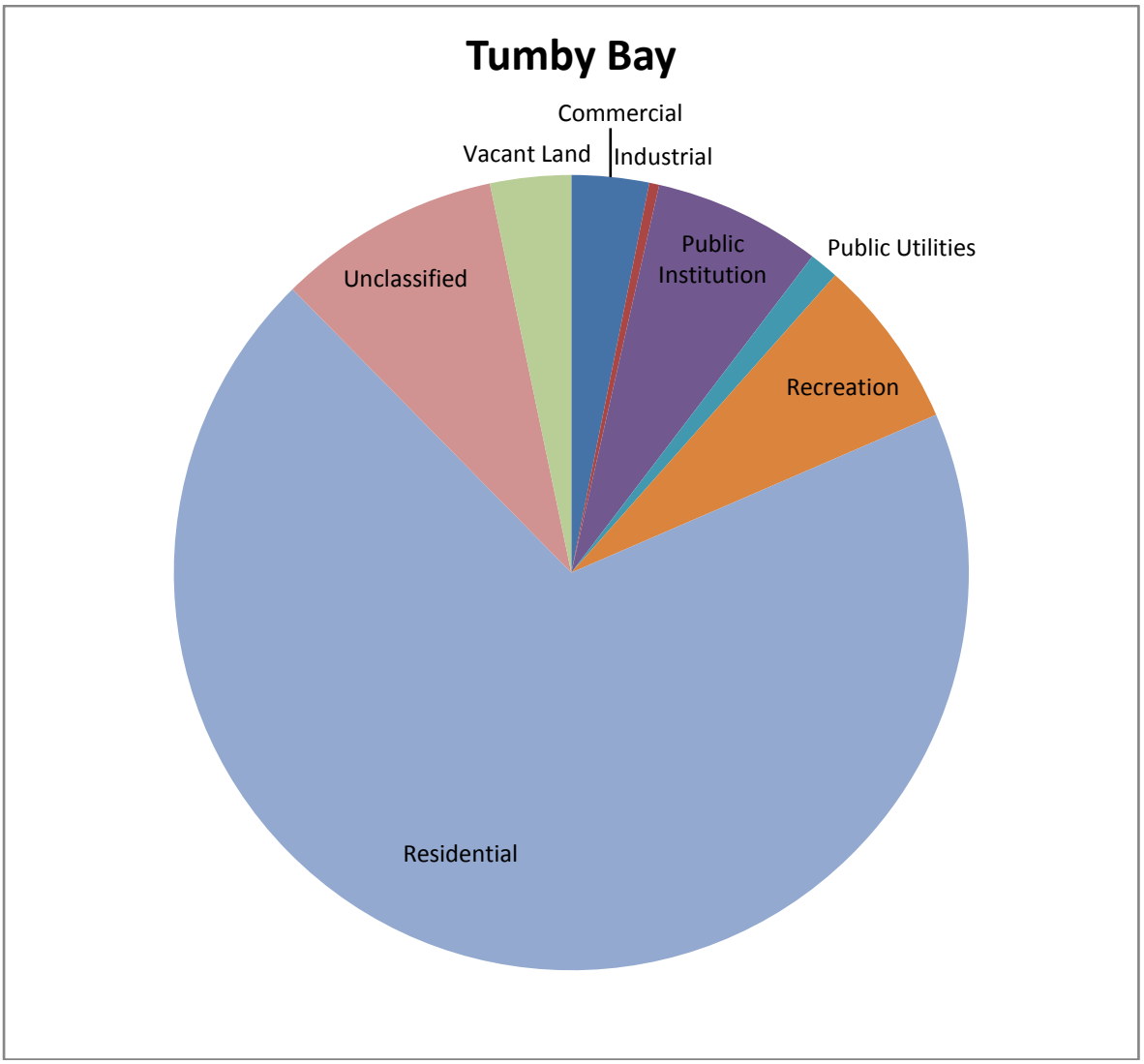


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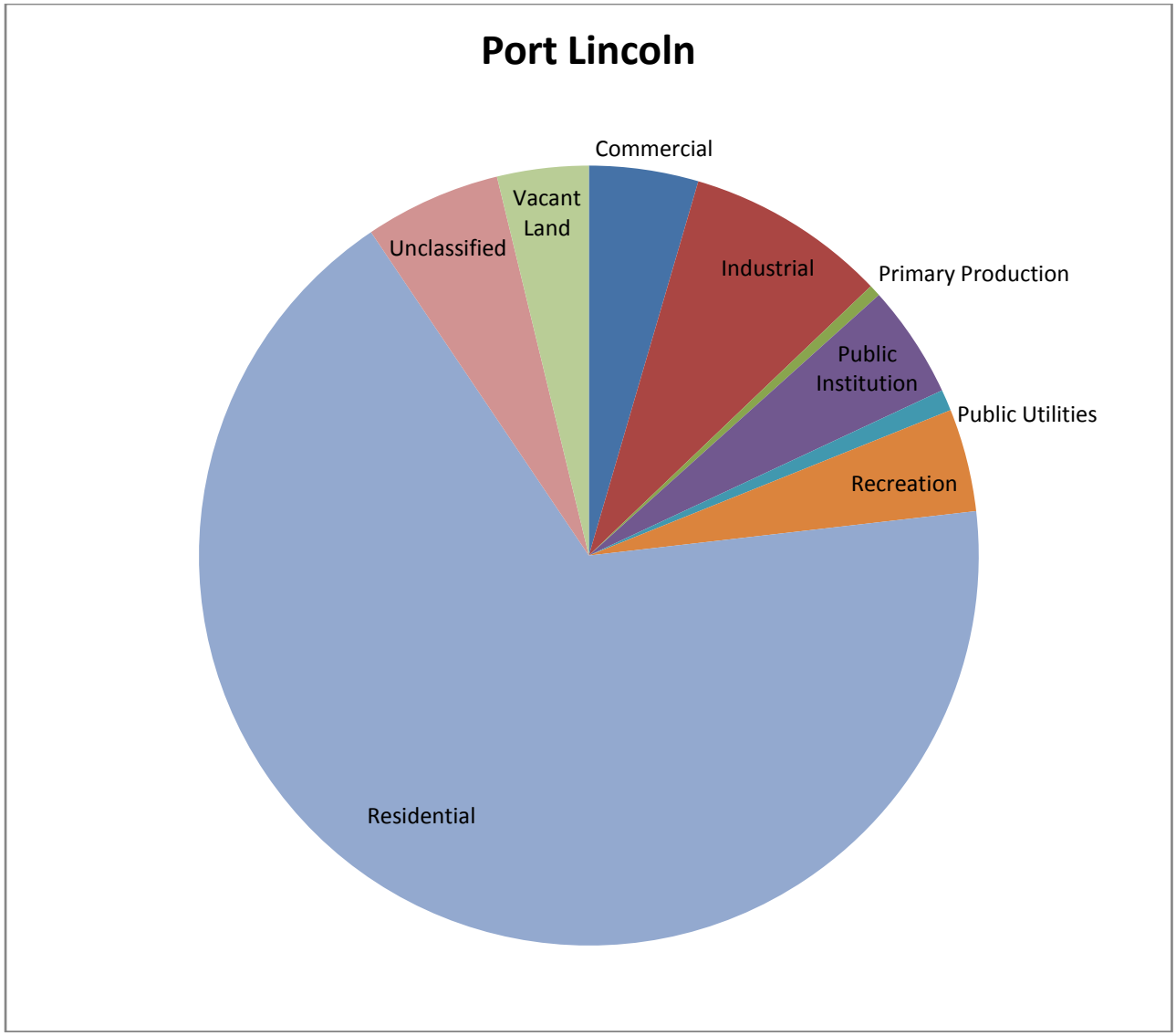


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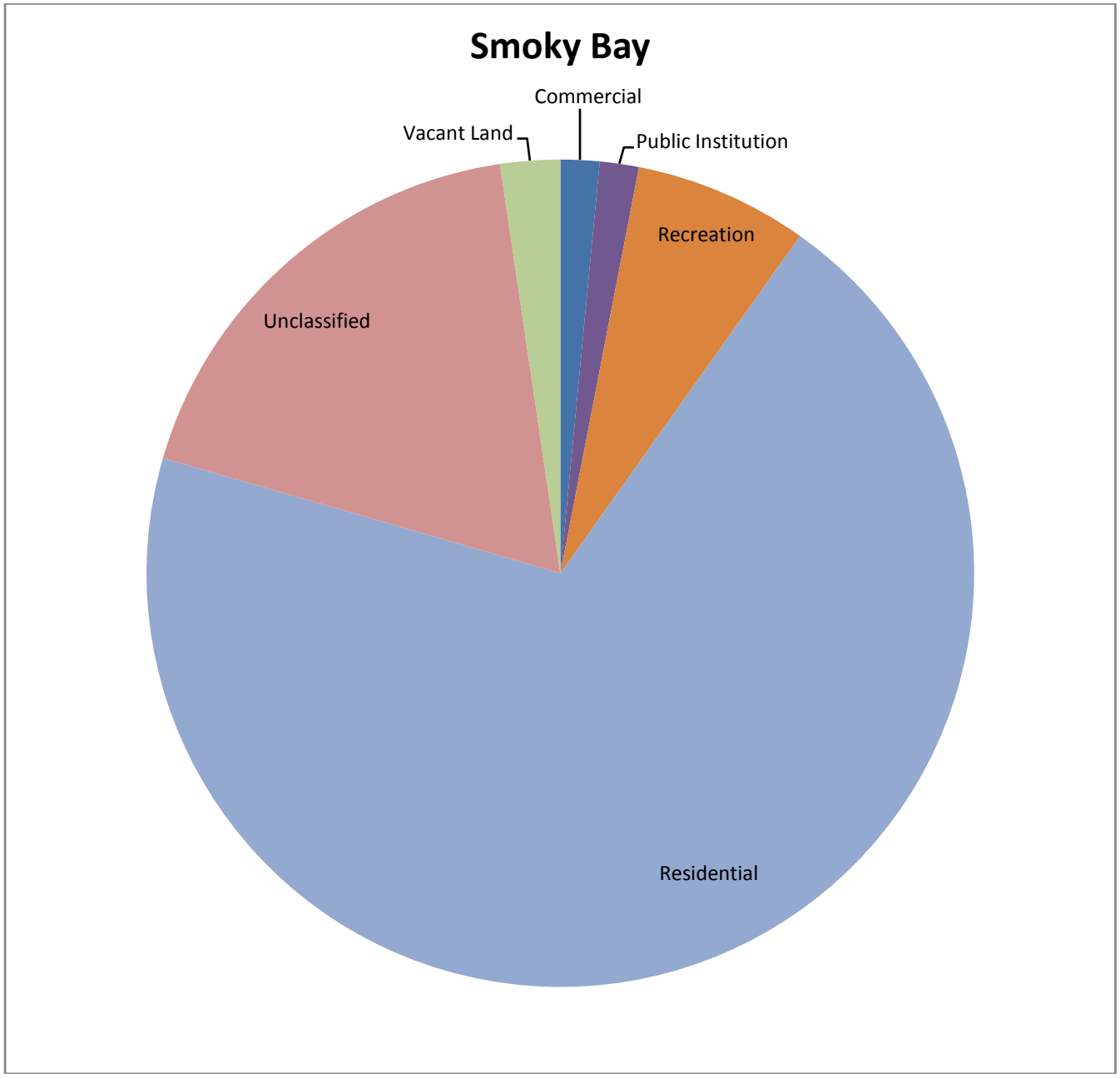


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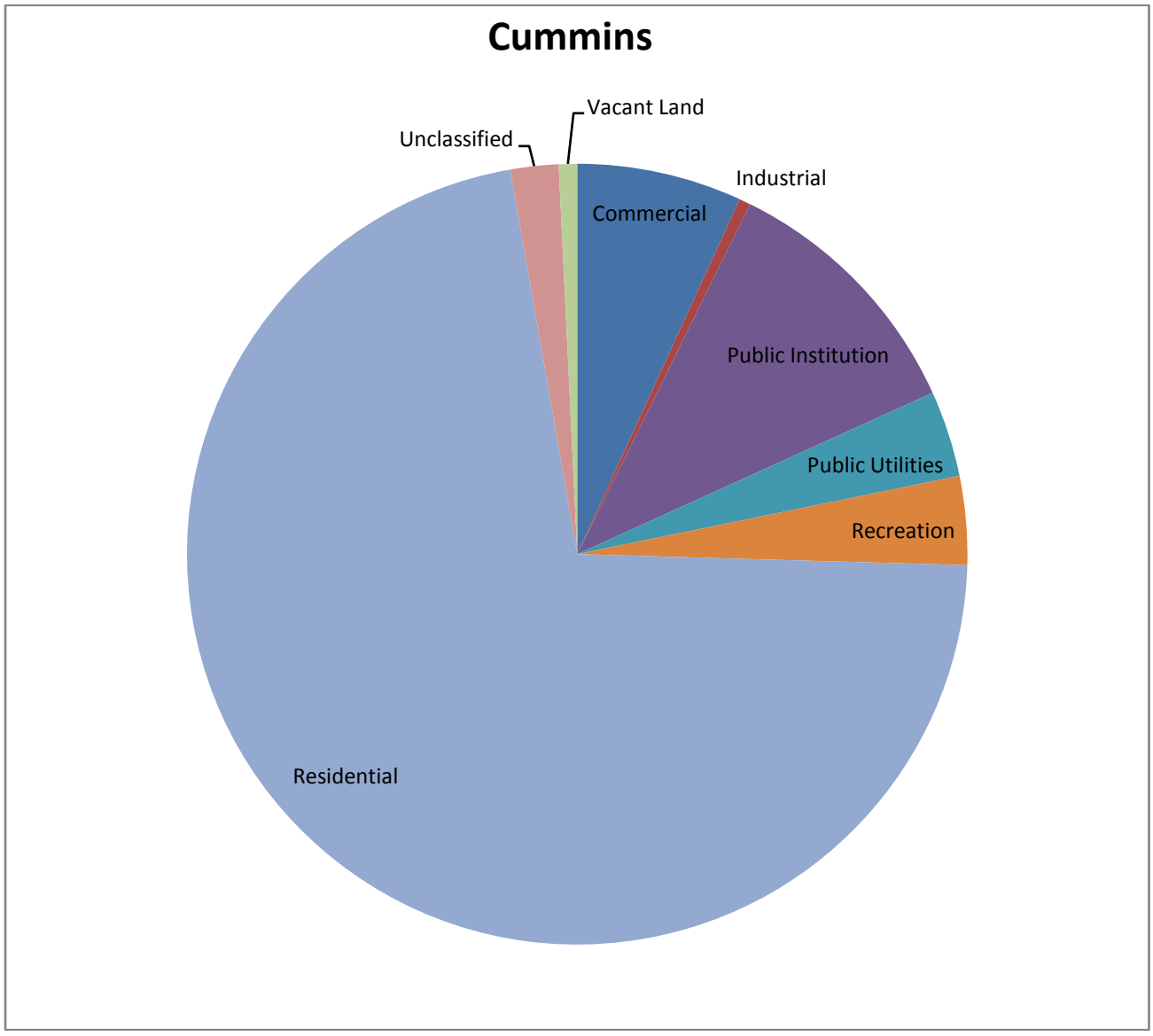


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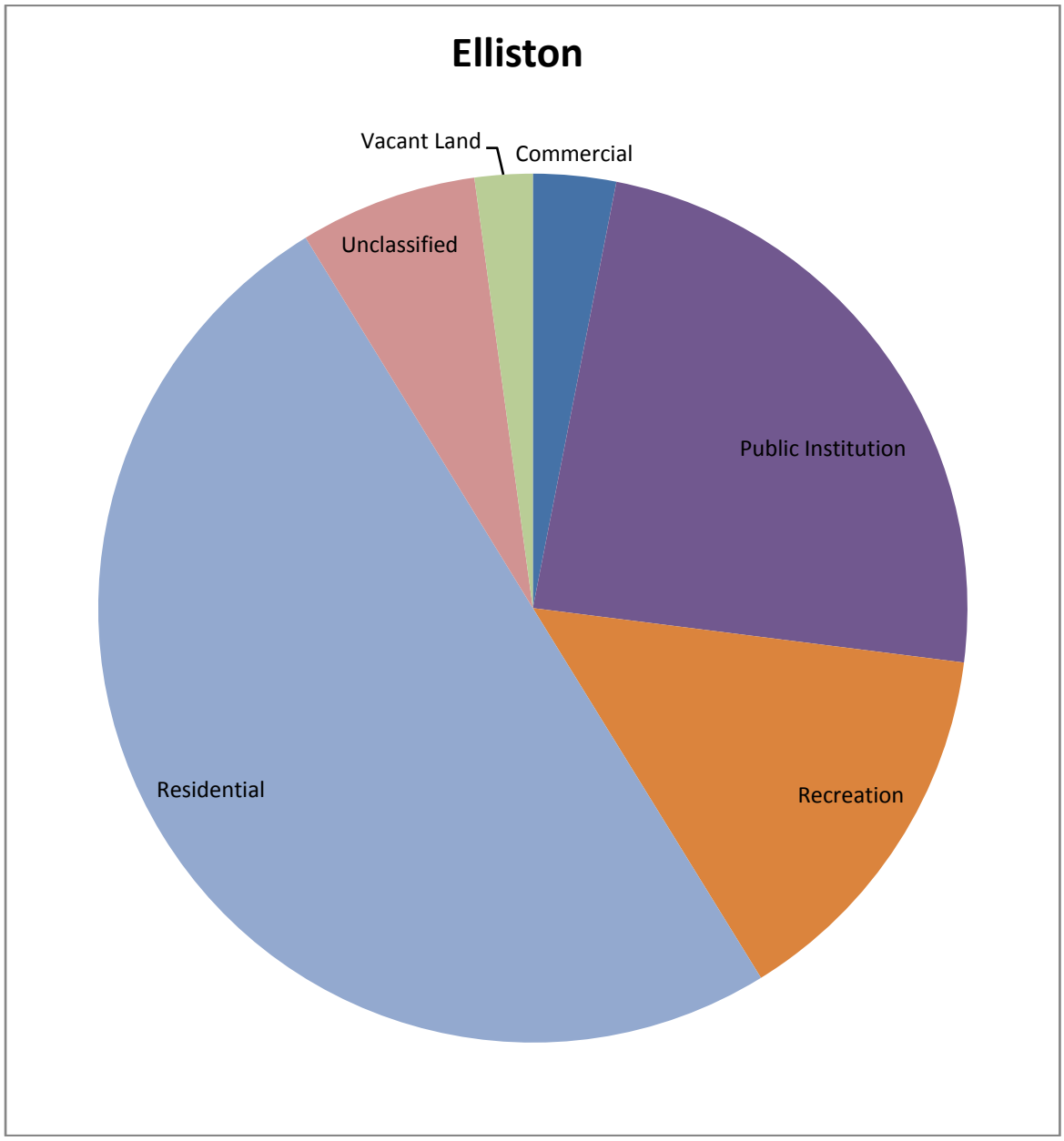


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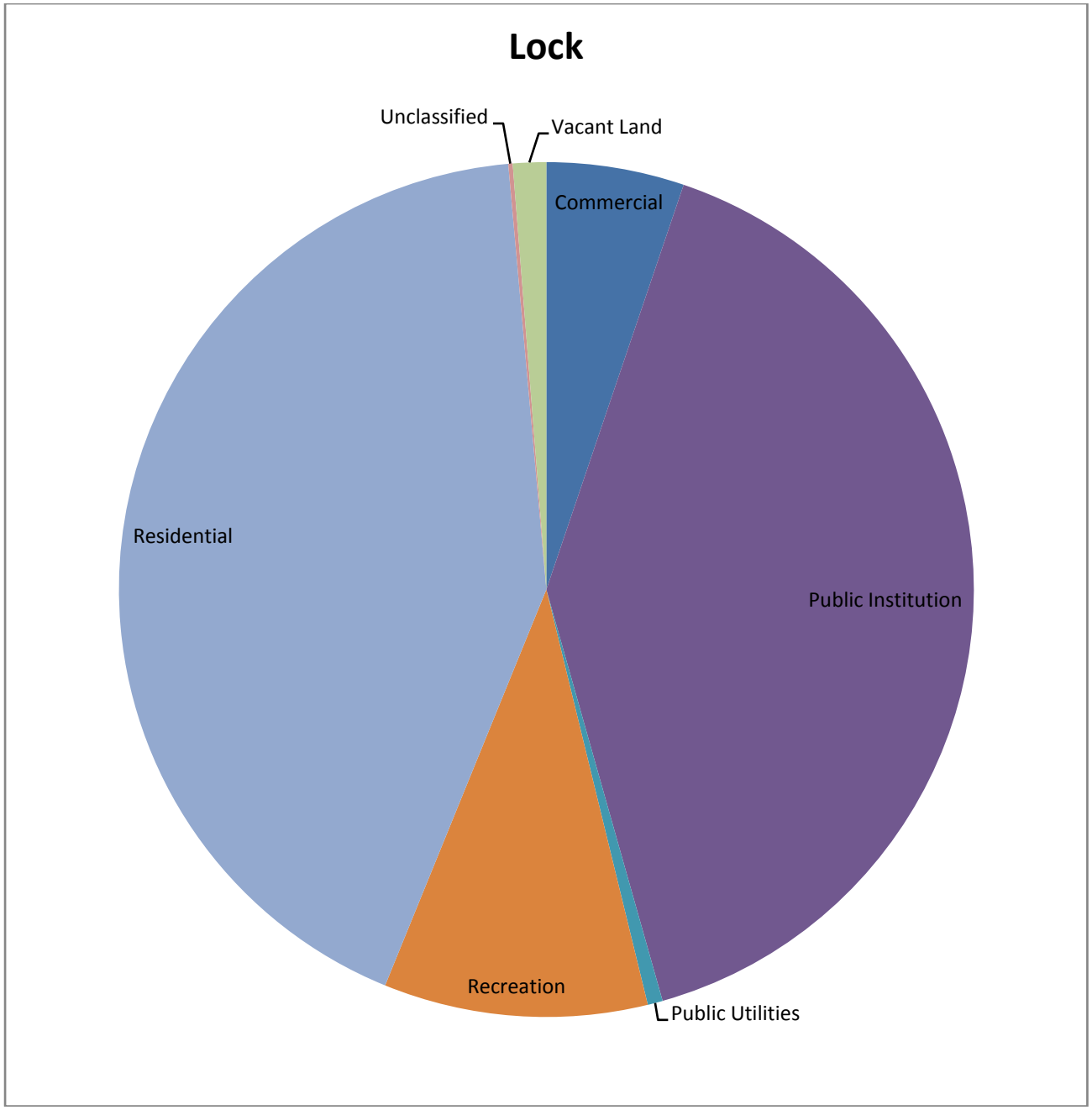


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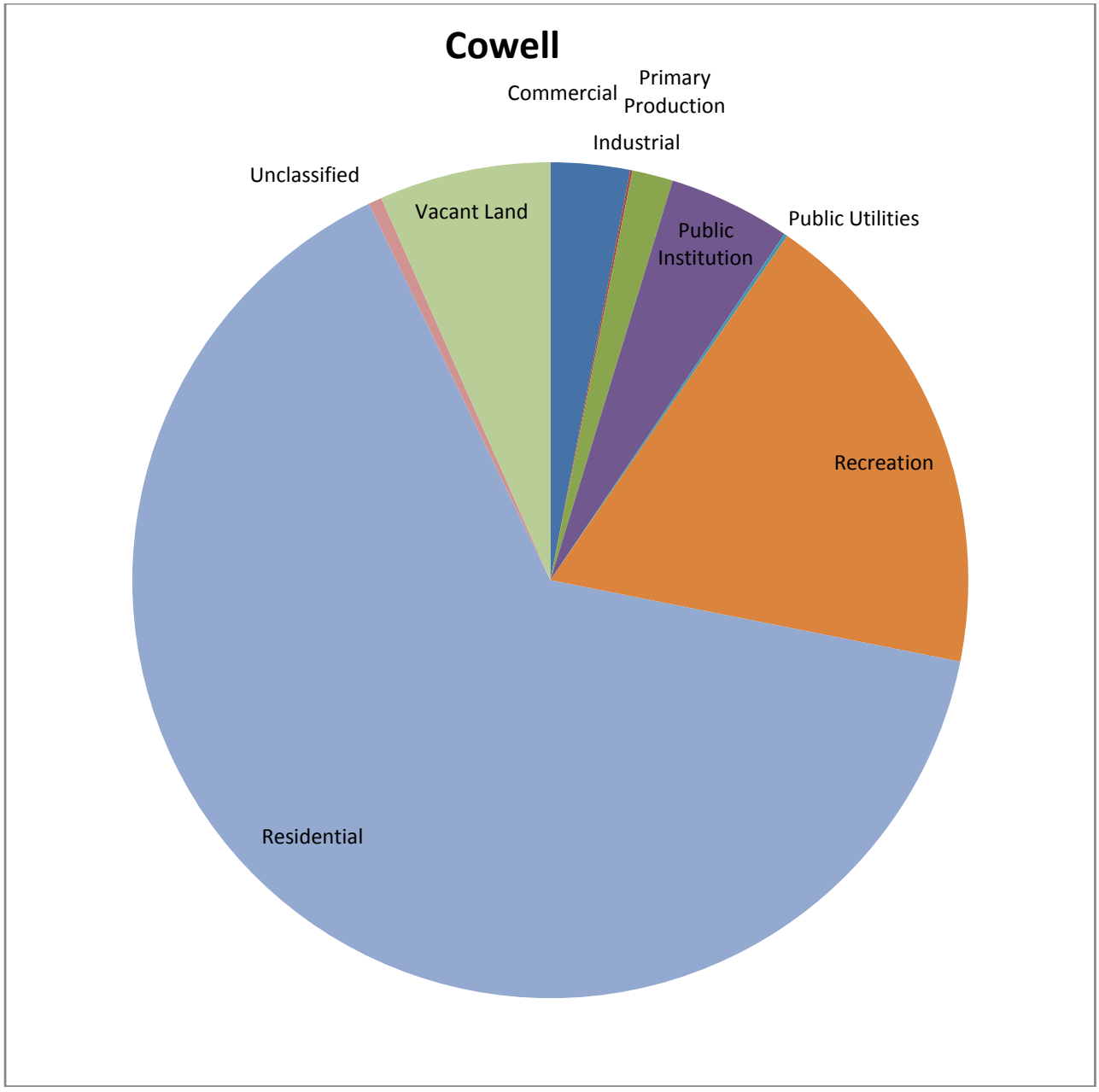


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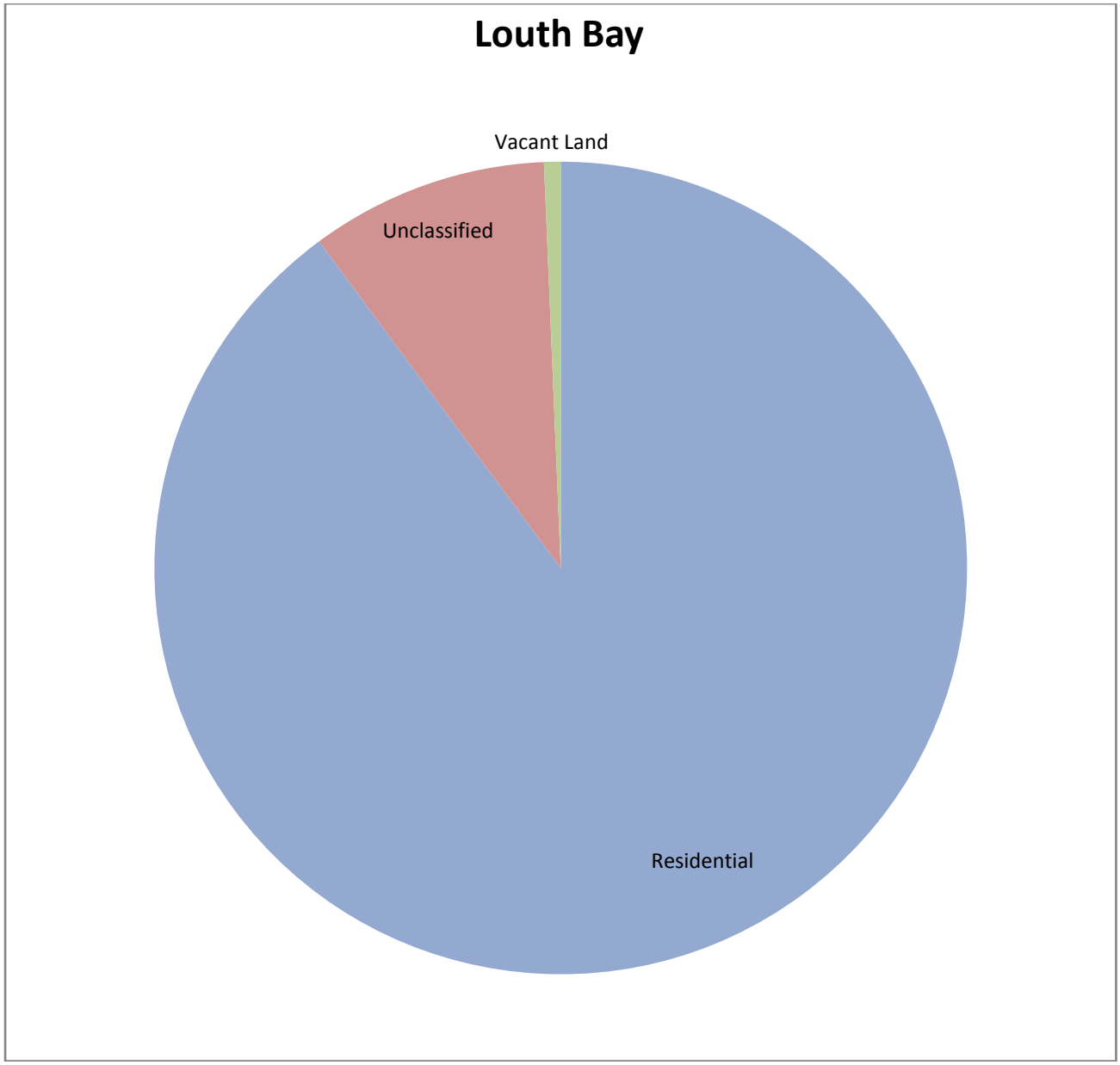


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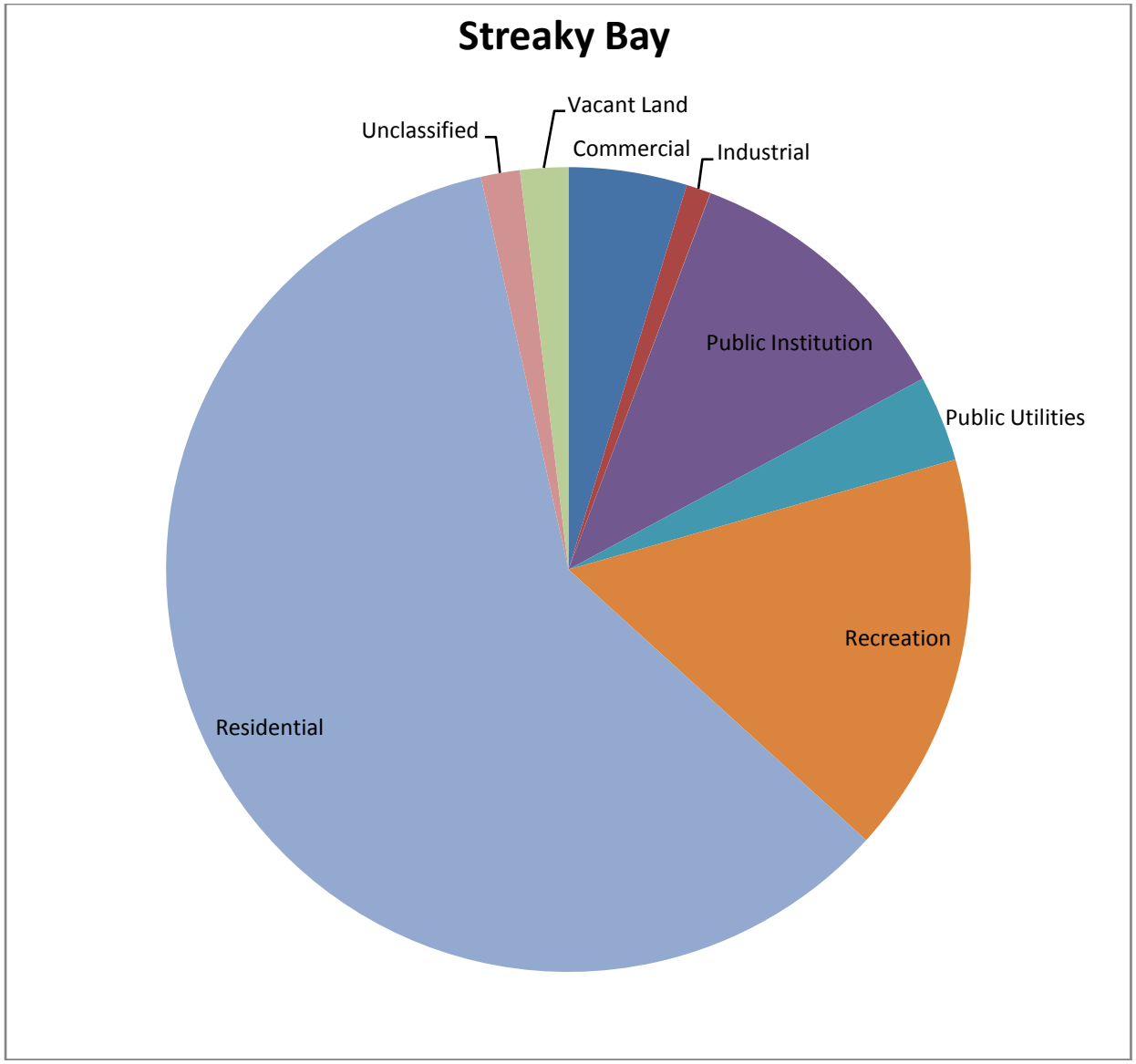


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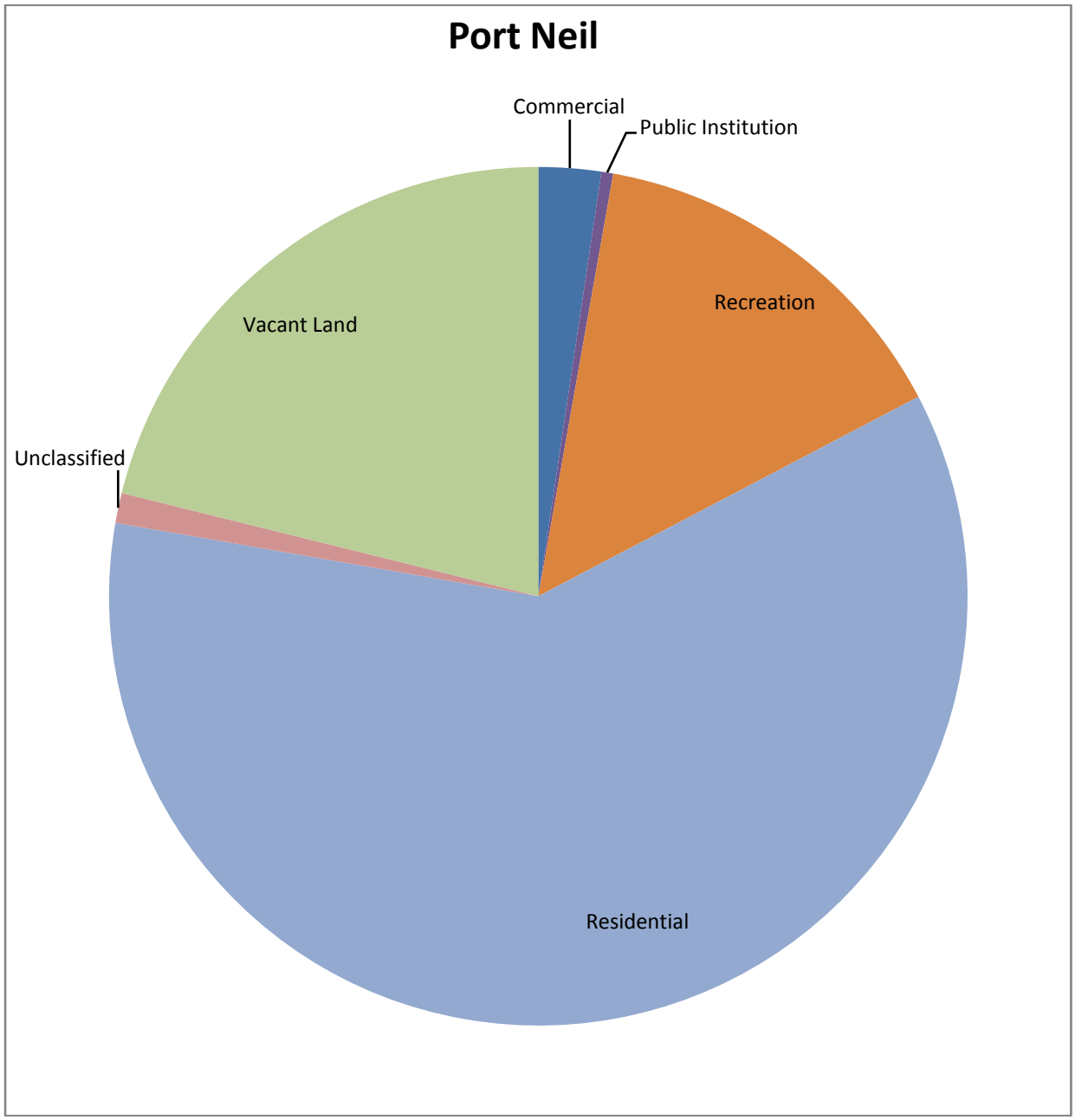


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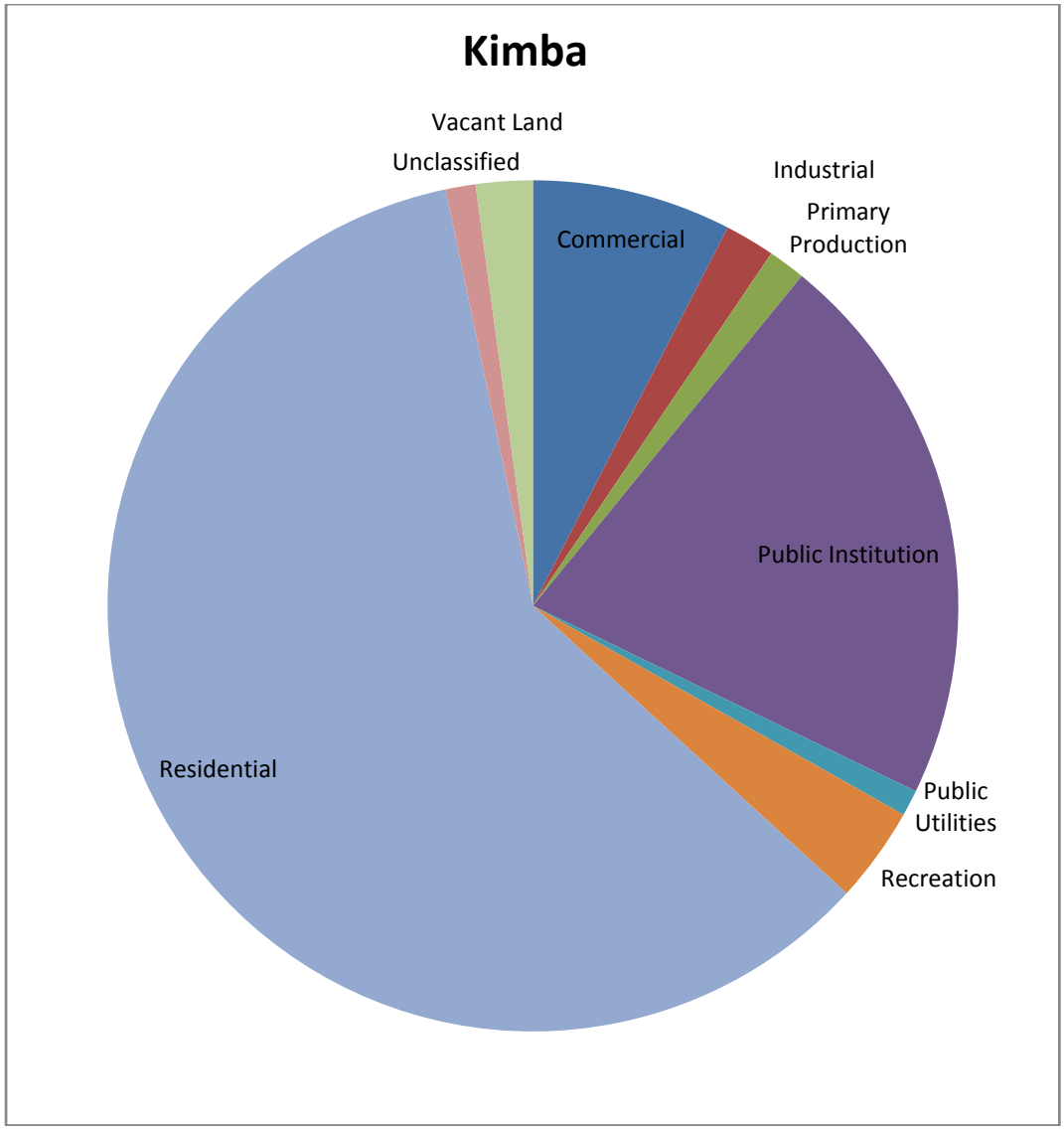


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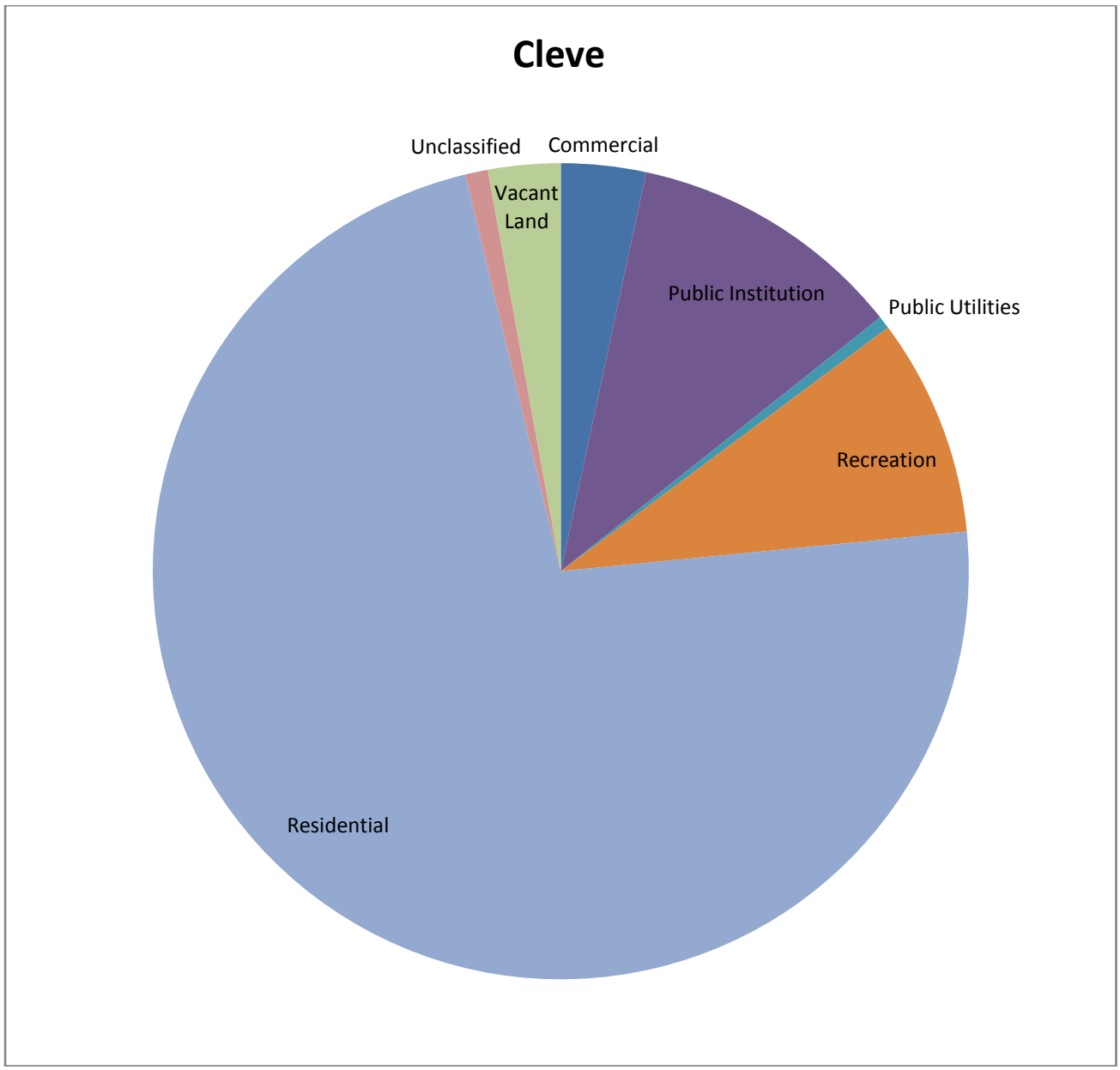
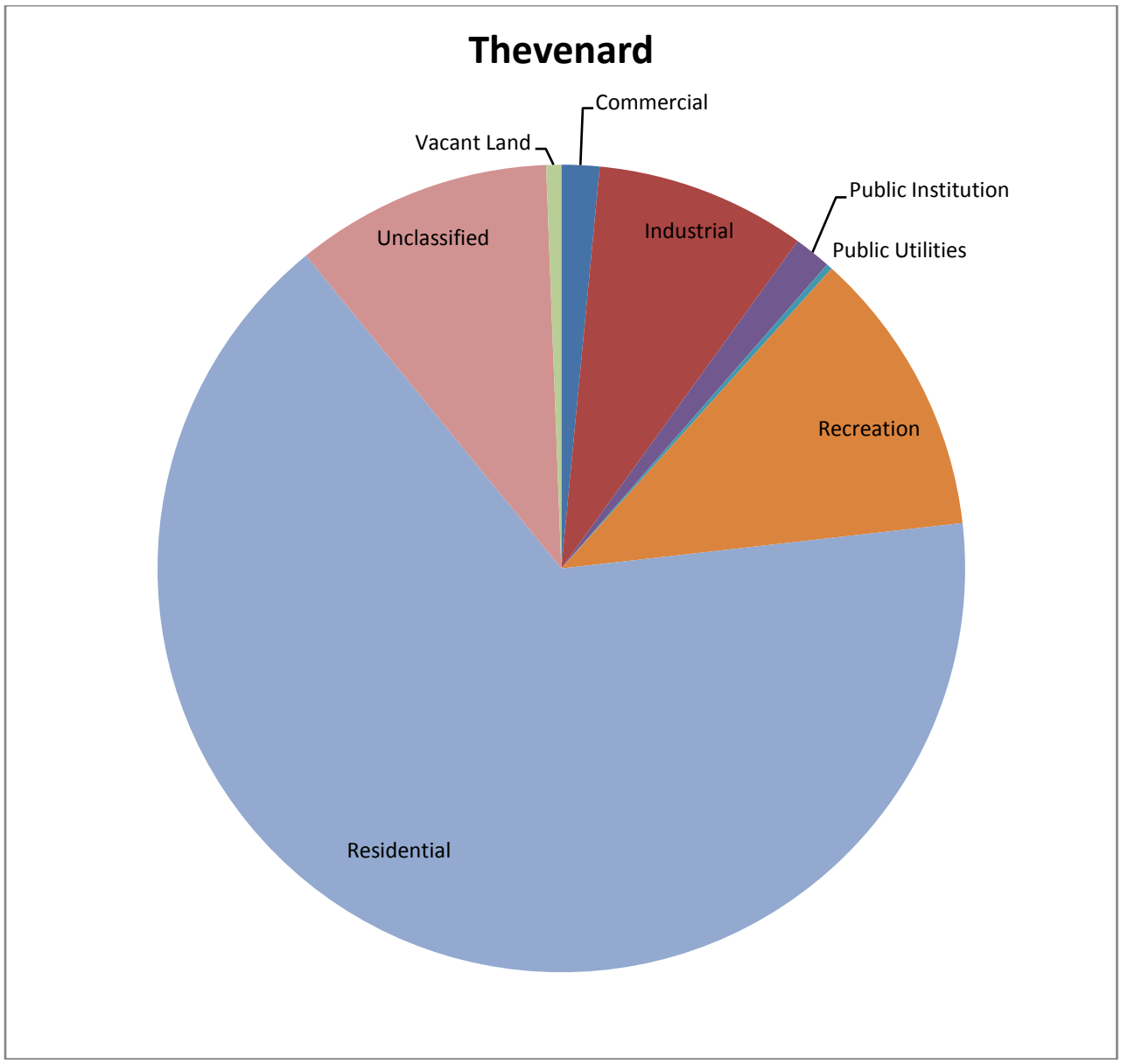
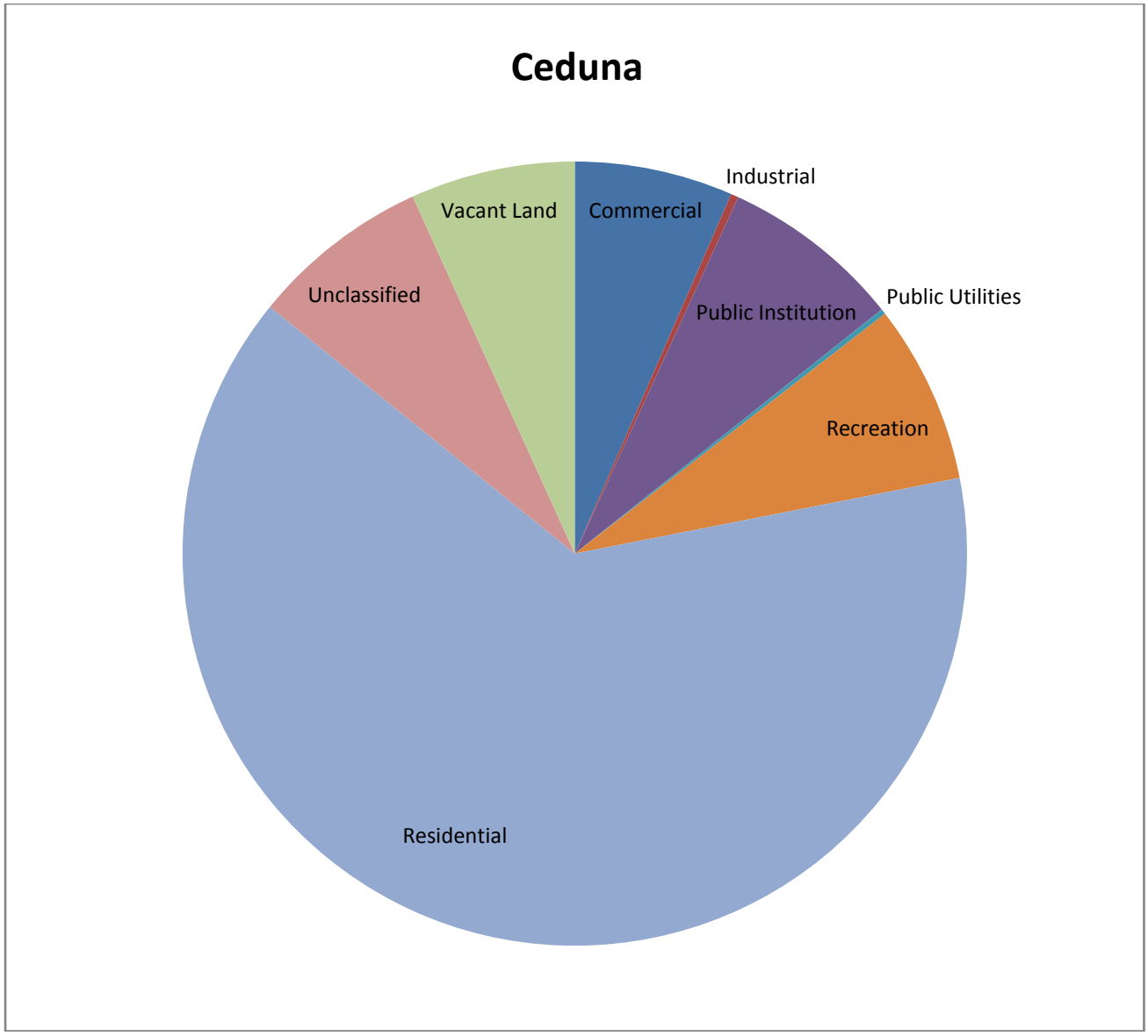
|---|---|
| **Commercial** | 7.6% |
| **Industrial** | 1.9% |
| **Primary Production** | 1.4% |
| **Public Institution** | 21.3% |
| **Public Utilities** | 1.0% |
| **Recreation** | 3.6% |
| **Residential** | 59.9% |
| **Unclassified** | 1.1% |
| **Vacant Land** | 2.2% |




| | |
|---|---|
| **Commercial** | 3.4% |
| **Industrial** | 0.0% |
| **Primary Production** | 0.0% |
| **Public Institution** | 11.0% |
| **Public Utilities** | 0.5% |
| **Recreation** | 8.6% |
| **Residential** | 72.8% |
| **Unclassified** | 0.9% |
| **Vacant Land** | 2.9% |




| | |
|---|---|
| **Commercial** | 1.5% |
| **Industrial** | 8.4% |
| **Primary Production** | 0.0% |
| **Public Institution** | 1.5% |
| **Public Utilities** | 0.2% |
| **Recreation** | 11.5% |
| **Residential** | 65.9% |
| **Unclassified** | 10.3% |
| **Vacant Land** | 0.6% |




| | |
|---|---|
| **Commercial** | 6.5% |
| **Industrial** | 0.3% |
| **Primary Production** | 0.0% |
| **Public Institution** | 7.5% |
| **Public Utilities** | 0.2% |
| **Recreation** | 7.4% |
| **Residential** | 63.9% |
| **Unclassified** | 7.4% |
| **Vacant Land** | 6.8% |

## Appendix C Summary of information provided by Council regarding future developments

| Township | Description | Number of lots | Years for development |
|---|---|---|---|
| Ceduna | Port expansion: $39m investment to ship mineral sands (600K tonnes). May be up to 3.5m tonnes of gypsum. Flinders Ports report at end of month | Unknown | Unknown |
| | Marina: to north of town. Settlement through, looking at Aug/Sept start date for development. Likely quick build (9 months) to cater for housing requirements. At this stage 380 allotment plus more with future expansion. Rainwater tank requirement 15K litres. SAW supply required | 380 | Unknown |
| | Peter Betts subdivision: rural living south of town. Scoped within Development Plan. General PAR for public comment in next couple of weeks. About 350 allotments of 1-4 hectares. Rainwater tank requirement 45 kL, plumbed in – to be self-sufficient | 350 | Unknown |
| | Smoky Bay: looking at northern extension. Augmentation issue. Population 300 but doubles over summer. STED scheme at maximum reuse | Unknown | Unknown |
| | Denial Bay: small pockets of development | Unknown | Unknown |
| | In Ceduna about 35-40 allotments spare – need more in industrial zone | 40 | Unknown |
| | Hastings Rd side of town 3-4 private schemes from Eyre Highway to Hastings Rd; potential for growth | Unknown | Unknown |
| | Mining key development impacts. Some still speculative but Iluka going ahead | Unknown | Unknown |
| | Iluka: expect mostly fly-in, fly-out residents but land buy-up at marina indicates Ceduna choice for many. Looking at 250-300 constructing from next year for about 2 years and then about 120 FTE. Mineral separation plant looking at 8 years construction (not yet public knowledge. In total looking at about 1000 extra people in town over next 5 years. Mining potential up to 15 years | Unknown | Unknown |
| | Prominent Hill uncertain | Unknown | Unknown |
| | Minotaur possible – bigger than Oxiana | Unknown | Unknown |
| | Tourism potential – 240-250K through town each year. South Australian Masters Games 2009. Oysterfest in October | Unknown | Unknown |
| Cleve | Cleve has experienced minimal growth over recent years with 8 lots approved for the last financial year | Unknown | Unknown |
| | Current potential for a further 100 lots over the next 5 years subject to the extent of the mining boom | 100 | 5 |
| | Arno Bay will experience significant growth as a popular destination holiday and retirement accommodation | Unknown | Unknown |
| | An existing development at Arno Bay consisting of 350 lots has 5 – 7 years remaining for completion at current rate of sale | 350 | 6 |
| | Development application at Arno Bay soon to be submitted (Bob Andrew and Jarrod Dunn) | Unknown | Unknown |
| | Mining is expected to develop in the region over the next 10 – 15 years with the Lock Mine (Centrex) due to commence by December 2008. The extent to which this activity will impact upon the Council region is unknown and difficult to quantify | Unknown | Unknown |
| | Stock numbers are likely to increase over the next few years | Unknown | Unknown |
| | The Stehr Group are currently processing in Port Lincoln but may consider developing their processing facility at Arno Bay | Unknown | Unknown |
| Elliston | Standing population is expected to double mainly due to holiday houses being used as permanent homes for retirees | Unknown | Unknown |
| | Half the development applications for Venus Bay have been for improvement to existing dwellings | Unknown | Unknown |
| | Two Caravan Parks with capacity for ~80 sites and fills every Summer | Unknown | Unknown |
| | Waterloo Heights has 76 dry allotments, Elliston Links has 26 serviced allotments | 102 | Unknown |
| | Have some companies interested in mines in the area some are reliant on the Centrex mine being successful eg Wildrup Any drilling could use a substantial amount of water | Unknown | Unknown |
| | Possibility of a coal mine in 10 -12 years | Unknown | Unknown |
| | Biggest issue will be the degradation of road infrastructure which will require a substantial amount of water to maintain | Unknown | Unknown |
| | Most of the mining companies don't want to set up a particular village hence employees likely to be spread amongst current towns. In the early stages it is likely that mostly local employees will be used, therefore only small population increase initially | Unknown | Unknown |
| | Aquaculture at Elliston is a possibility, having ~200Ha of suitable marine reserve. Assuming each site 15-20Ha and on average employing 12-15 people per site, therefore whole industry could be in order of 150 – 200 people PIRSA are likely to have forecasts | Unknown | Unknown |
| | Tourism has benefited from the ferry with an increase in thoroughfare through Lock since the service began | Unknown | Unknown |
| | Stock numbers are stable on the western side of the Peninsula, however holding may be getting bigger. Set number of stock a property can support not likely to change very much | Unknown | Unknown |
| Franklin Harbour | Currently 15-20 new dwellings each year | Unknown | Unknown |
| | A Council PAR will be initiated through a Statement of Intent in the latter half of 2007 to provide for the development of 1600 allotments over the next 10 years (including a possible 40 rural living allotments) | 1600 | 10 |
| | Additional infill and population growth may result as a consequence of the expansion of the Iron Duke Mine - approximately 50 to 60 town allotments remaining under current zoning | 60 | Unknown |
| | Mitchell area – potential for residential development | Unknown | Unknown |
| | Port Gibbon – may develop further (currently 20 homes) | Unknown | Unknown |
| | Lucky Bay – a canal type development is being proposed by the Ferry Company but will require a number of issues to be resolved including zoning, native vegetation etc. Currently have approximately 100 homes with large | Unknown | Unknown |
| | Mining is expected to develop over the next 10 – 20 years. Centrex are undertaking iron ore exploration in the region. Major potential to drive town growth | Unknown | Unknown |
| | Area is marginal farming country with stock farming often fluctuating depending upon prices – with increase in stock numbers there is potential for a rapid draw down the water system. Sheep making comeback | Unknown | Unknown |
| | Aquaculture within Franklin Harbour is unlikely to increase | Unknown | Unknown |
| | Ferry figures beyond expectations – big increase in tourism likely | Unknown | Unknown |
| Kimba | Mining has the potential to increase population growth with Iron Clad Mining currently exploring opportunities in the region | Unknown | Unknown |
| | Possible workforce could amount to a total of 200 by mid 2010, some of which may require housing in Kimba. | Unknown | Unknown |
| | Stock is unlikely to change with those farmers who have removed stock from their properties unlikely to return to stock farming | Unknown | Unknown |
| | There has been a decline in the number of piggeries in the area from seven to one. | Unknown | Unknown |

| | | | |
|---|---|---|---|
| Le Hunte | No significant sub developments planned (6-7 units for an aged care facility) | Unknown | Unknown |
| | Not likely to have much increase from mining industry except possibility of some on fly in – fly out to other areas (have resident commercial pilot) | Unknown | Unknown |
| Lower Eyre | Coffin Bay has experienced steady growth with approx 150 new allotments in the past five years (Rob Hughes commented that there have been in order of 20 new connections in that time) | Unknown | Unknown |
| | Cummins is well placed to service the new Centrex mine - in order of 30km from mine with good services however currently a lack of vacant land | Unknown | Unknown |
| | Port Lincoln Fringe : Large number of allotments have been/being approved as dry allotments eg Gladstanes Terrace | Unknown | Unknown |
| | Port Lincoln Fringe : Gum Hill, rural living has an indirect supply | Unknown | Unknown |
| | Port Lincoln Fringe : Boston Point, a new Community Title development with a low volume service at star tup and remainder of supply being met by the residents | Unknown | Unknown |
| | Port Lincoln Fringe : Possibly up to 1000 lots (3 stages over 10 yrs). 200 lots are in Stage 1 600 – 800m2 . Likely to have a safe mooring/boat ramp in future | 1000 | 10 |
| | Wangary : New developments going in dry. Council have set Rainwater Tank minimum sizes per bedroom plus firestrage (eg up to 22,500L per bedroom + 10,000L storage for fire fighting purposes) | Unknown | Unknown |
| | Centrex mine (see comments above) | Unknown | Unknown |
| | Industrial developments going ahead on Pine Freezer Road | Unknown | Unknown |
| | Stock at lowest number for a long time but is coming back slowly. It is thought that the lower part of the district has not fully restocked yet | Unknown | Unknown |
| Port Lincoln | Lincoln Lakes (Stage 3 of the marina) – 2/3 weeks from plans; 10-year project; 600 allotments | 600 | 10 |
| | City growth about 1.5% - 1000 people in past 5/6 years, currently 14,500 expect about 2000 more in next decade | Unknown | Unknown |
| | Last 2 years about 120 allotments per year on average, now slowing to about 70-80 a year but that pattern's continuing | Unknown | Unknown |
| | Point Boston will have impact on city – potential 700-800 allotments | 800 | Unknown |
| | Other potential subdivisions – 140 allotments at northern end of city; 160 at south; Robertsons 160; Garret Rd 80 | 540 | Unknown |
| | Industrial infill occurring Bellan/Seaton Aves + Pivot (50-60 allotments) | 60 | Unknown |
| | Aquaculture growth – limitations on quota; pilchards potential to grow; shellfish (eg mussels) may still grow | Unknown | Unknown |
| | Mining – Centrix adamant expanding within 12 months – rail through and export. Dust suppression or slurry – may have impact on water, especially if required for slurry | Unknown | Unknown |
| | Ports Master Plan – Parsons Brinkerhoff working on this for 18 months (also doing one for Thevenard) | Unknown | Unknown |
| | Also new port development possible – near ex-BHP wharf | Unknown | Unknown |
| Streaky Bay | Going to be substantial residential development - want Streaky Bay to get to about 2500 (currently 1200) | Unknown | Unknown |
| | Gibson Peninsula – was going to be PAR but told no water available, therefore not necessarily most desirable development for this land. Concept for 200 allotments near this | 200 | Unknown |
| | Number of other country land or Rural (8) zones on edge of town more attractive and beneficial. Perlubie Landing/Eba Anchorage – 100 allotments out on highway potentially | 100 | Unknown |
| | Steady growth in Streaky – listed as one of 5 fastest growing in SA. Looking at building on 117 allotments in 3 stages – virtually all sold out, approval for another 30 | 30 | Unknown |
| | Rural (8) allotments (3-8 hectares) – 37 on eastern side of Bay all sold, 10-12 towards Ceduna | 49 | Unknown |
| | 87 allotments within township already approved | 87 | Unknown |
| | Proposal for eco-tourism at Cape Bauer | Unknown | Unknown |
| | Caravan park planning approval – at moment no water | Unknown | Unknown |
| | Potential at Blancheport (concepts drawn up – residentially zoned) | Unknown | Unknown |
| | Expect that a fair proportion of vacant allotments that are now sold will be built on – people expected to build are from WA, NT, Qld and UK | Unknown | Unknown |
| | Suspect offshoots from mining – people will come to coast with $$ | Unknown | Unknown |
| | Challenger & Gawler Craton – mineral sands between Streaky and Ceduna; uranium, gold and iron ore exploration in region all may have impact | Unknown | Unknown |
| | Gypsum at Sceale Bay: 1m tonnes for 100 years if fully exploited | Unknown | Unknown |
| | Deep sea port for grain has been discussed – could be feasible to slurry gypsum to ships | Unknown | Unknown |
| | Hospitality industry and tourism increase | Unknown | Unknown |
| | Population increase linked to mining and aquaculture – up to 50 people living in Streaky Bay are employed in the oyster industry now | Unknown | Unknown |
| | Power supplies are an issue in the area also (should be noted in relation to any future desalination proposals) | Unknown | Unknown |
| | Aquaculture: onshore abalone farm; 18 oyster leases | Unknown | Unknown |
| | Agriculture still big employer – crops (barley and wheat) and already seeing increase in stock numbers | Unknown | Unknown |
| | Future increase in stock numbers is expected – grazing could expand (for meat rather than wool) | Unknown | Unknown |
| Tumby Bay | Augmentation charge was set after establishment of ~$300k supply main to the marina development. There is a future stage of the marina development with 200 – 400 allotments over 10 years. This will include an "over 50's" living section in the development | 400 | 10 |
| | Further ~900 allotment development South of the current "Island". Pressure to reconsider minimum block size, proposal that 700m2 not required with current lifestyles and that 300m2 more appropriate. Given this the development could be up to 1500 allotments | 900 | |
| | New industrial subdivision at northern end of Tumby Bay – total area ~1800m2 | Unknown | Unknown |
| | Population could be driven possibly by fly in-fly out services for the mining industry and/or access to the ferry service | Unknown | Unknown |
| | Caravan Park reported last Summer that ¾ of bookings from Yorke Peninsula residents | Unknown | Unknown |
| | Population currently around 2700 and mostly retirees and some holiday/tourism markets | Unknown | Unknown |
| | Port Neil - Council has 35 allotments that could develop in near future | 35 | Unknown |
| | Port Neil is a possible alternative site for a deep sea port for the Centrex iron ore venture | Unknown | Unknown |
| | Thought that there may be a move back to stock | Unknown | Unknown |