Department of Water

and

South West Development Commission

Business Case for
Phase B – Salinity Treatment
and Disposal Project
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1 Executive summary

The Department of Water, and its predecessors, have been working to develop sustainable salinity recovery solutions for the Collie-Wellington river basin. Considerable progress has been made, but further work is required to bring the water quality of the Wellington Reservoir back to levels that will allow the Government to meet its environmental and industry development objectives.

The current work plan involves two key phases:

- Phase A: Collie-Wellington Salinity Diversion - Pilot Expansion.
- Phase B: Salinity Treatment and Disposal Project (this business case requests partial funding for Phase B (the Project) and its successful completion would meet the Government’s objectives and facilitate new development).

This business case is for Phase B, which involves design, build and operation of a desalination plant to take saline water from the Collie River, salt removal via treatment and then disposal of brine down the Verve Saline Water Disposal Pipeline.

The benefits of the Project are improved salinity in Wellington Reservoir, making available 3.7 GL of high quality water to the Collie Basin, and making available additional capacity in the Saline Water Disposal Pipeline. These benefits will lead to a more sustainable irrigation industry on the Swan Coastal Plain, more sustainable water resource management, and provide fit-for-purpose water supply for new industrial development in the Collie-Bunbury Region.

The total capital cost of the Project is $18.5 million, with $5.2 million required from Royalties for Regions and $1.8 million from the South West Development Commission Royalties for Regions. This funding is primary leverage to match funding from the Commonwealth, Water Corporation and the Department of Water.

Royalties for Regions - policy objectives:

The implementation of Phase B of the Collie salinity recovery directly meets the policy objectives of Royalties for Regions.

a) Building capacity in regional communities

The Royalties for Regions funding will provide a significant injection of secure fresh water for the Collie-Wellington communities. This fresh water from the desalination plant and from the freshening of Wellington Reservoir will provide opportunities for regional communities to diversify in both agriculture and industrial aspects.

Irrigation communities on the coastal plain, mining industry in the Collie coal basin and prospective new industries in the Collie-Wellington region will benefit with improving water quality in Wellington Reservoir and additional fresh water in the Collie basin. This benefit has a multiplier into state growth and development from the primary users, such as power stations and irrigators. One case study is that Bluewaters 1 Power Station will be providing all of the electricity for the development of the Boddington gold mine project.

The Bluewaters power stations will employ in the order of 300 permanent staff with significant number of jobs during the construction and support phases.
The urea plant proposals have the potential to inject $2 billion into the state during construction including over 1000 jobs and result in over 200 permanent jobs when commissioned as well as significant services jobs. A reliable and secure water supply is critical to the success of these projects.

b) Retaining benefits in regional communities
The Collie community will retain significant benefits from reduced salinity in Wellington Dam and the Collie River primarily through jobs based on sustainable water supplies, better quality water for public parks and gardens and a restructured horticultural industry. The total jobs created (as reported in s3.4) based on sustainable water supply (and other approvals) will be in excess of 500 permanent and approximately 1500 construction and services jobs.

c) Improving services to regional communities
A growth of over 500 permanent jobs in the Collie area (s3.4) will be a welcome boost to the regional community as it will drive further investment in the town’s social infrastructure through both private and Government initiatives. Without this project which is the cornerstone of a sustainable water supply, these jobs are significantly jeopardised. A number of associated water projects include significant opportunities for the indigenous community with progress well advanced on an indigenous aquaculture project supported by Wesfarmers Premier Coal.

d) Attaining sustainability
Sustainable water supplies for power stations and industrial growth is the foundation for this initiative and this request is to mitigate a fundamental constraint.

When commissioned to Phase B this project also has provision to relieve pressure on the Gnangarra Mound by identifying 6GL/an (or more) supplementary water for Perth and the Integrated Water Supply Scheme.

e) Expanding opportunity
The Royalties for Regions funding will ensure that there is potential for industrial expansion in the Collie-Wellington region with the production of fresh water from the desalination plant in the Collie Basin and increasingly fresh water in Wellington Reservoir for irrigation intensification and industrial opportunities at locations such as Kemerton.

Without this project water constraints will cap any further industrial development in the Collie area should the Government allocate the remaining water to planned developments already in the assessment system.

f) Growing prosperity
Growing prosperity directly for the Collie community and indirectly for the South West and other parts of the state will arise from major capital projects, permanent jobs for new industry and greater farm-gate returns for farmers in the Collie Irrigation District.
By 2013 the Project will reach commercial maturity and formally involve private-sector funding and expertise as part of a sustainable approach to the region’s water resources, that is both equitable for current and future users whilst promoting regional and broader economic, environmental and social objectives. Proposals have already been put forward to the Department by key stakeholders and/or potential investors to participate, or take a key role, in the Project. These offers are highly conditional on certain steps by Government (highlighting the need for its involvement), but also demonstrates the importance of addressing salinity in the Collie Basin and providing greater access to fit-for-purpose water supplies.

The Project is unlikely to proceed without Government involvement. This is because:

- achieving the objective is beyond the control of any private party as it will be influenced by the actions of several parties, including Government
- the benefits will be spread amongst various parties, including the environment and community more broadly.

The benefits of the Project are likely to be significant and include the value of increased irrigation industry production, changing irrigation system operations to release potable water, producing potable water, increased sustainable yield of Wellington Reservoir and increased use of fit-for-purpose water in the industrial sector to mention a few.

As summarised in Table 10, the quantifiable benefits have been conservatively estimated to be in the range of $67 to 79 million (present value at June 2009) which results in a benefit cost ratio of 1.3 to 1.6. This compares with a total economic cost over the 20-year design life of $50.8 million (net present value at June 2009).

For the other types of benefits, it is not possible to estimate their value, however, those values could be significant and include improved environmental outcomes from a reduction in salinity levels, improved social outcomes (e.g. improved amenity), the options for further investment the Project may facilitate, encouraging further water trading, avoiding costs that may otherwise be incurred by industry in the Collie Basin, and regional development and employment benefits.

Extensive stakeholder consultation has been undertaken and stakeholder commitment and expectations for the Project are very high. The Project has the backing of local industry and the community. In addition the South West Development Commission’s offer of $1.8 million in funding is seen as a priority for the region.

Progressing the Project assists the South West region of Western Australia to achieve longer-term sustainable development and growth, whilst enhancing a strong and vibrant Bunbury-Wellington community. This is in line with State Government initiatives for regional Western Australia.

Should the Project be delayed or cancelled, it would have the following serious consequences:

- Regional industrial growth will be compromised
- The Collie Irrigation District becomes unviable
- Community, cultural and environmental values will be compromised
- Commonwealth funding for this Project may be lost
• Commonwealth funding for Harvey Water’s Collie Irrigation Piping Scheme will be lost, which in turn has a number of other impacts on regional development, including:
  — the development of the Kemerton Industrial Park will be constrained
  — water will continue to be wasted
  — water trading potential will be severely curtailed
• Environmental conditions and water efficiency would not evolve.

Recommendation
That Government provide the funding requested to enable the Project to proceed.
2 Background

2.1 Introduction

Since the 1960’s the Collie River has become increasingly saline as a consequence of land clearing in the catchment. As a result, Wellington Reservoir has become virtually unusable for the purpose for which it was built, being for irrigation and public water supply.

In line with direction from successive Governments, the Department of Water (the Department), and its predecessors, have been working on developing sustainable salinity recovery solutions for the Collie-Wellington river basin for some time. These solutions commenced with controls imposed on land clearing, followed by a Government land purchase and reforestation programme. This initial salinity recovery work has ensured that salinity hasn’t reached predicted levels of over 1,700 mg/L total dissolved solids (tds). Rather, these initiatives have been successful at moving salinity levels within the Wellington Reservoir towards an average of about 900 mg/L. Further work is required to bring the water quality of the Wellington Reservoir back to levels suitable for broad irrigation and public water supply purposes.

Figure 1: Forecast average salinity levels at Wellington Reservoir inflow

To achieve these lower salinity levels, the Salinity Recovery Scheme was developed with the intention of reducing salinity levels to an average of 615 mg/L. At 615 mg/L, the water in the Wellington Reservoir will be of significantly greater value for environmental protection and higher-value irrigation. It will also be more suited to future fit-for-purpose industrial use and be closer to the maximum desirable limit for potable water of 500 mg/L.

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1 The above graph represents forecast and measured salinity levels on a weighted average across the inflows to Wellington Reservoir. In a static state, there will be a lag of approximately 5 years before the average salinity levels at the reservoir’s outflow approaches the average levels at the inflows.
Table 1: Indicative effects of salinity levels on agricultural use

<table>
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<th>Salinity mg/L</th>
<th>Effects</th>
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| 0 - 440       | • Suitable for irrigation of all pastures, fruits and vegetables, especially clovers, strawberry, avocado, stone fruit, citrus fruit, apples, pears, green beans, peas, onion, carrots, celery.  
   • Suitable for animals and domestic use. |
| 440 – 700    | (i.e. following Phase B)  
   • Pastures, fruits and vegetables mentioned above are so affected that they are not recommended for irrigating with water of this salinity.  
   • The productivity of pastures, fruits and vegetables is increasingly reduced as salinity levels increase – by up to 30% (local experience) at 700 mg/L.  
   • Suitable for animal and domestic use. |
| 700 – 1265   | (i.e. following Phase A)  
   • Productivity of pastures, fruits and vegetables increasingly reduced as salinity increases.  
   • At the upper end of these salinities, irrigation water is not recommended for growing most fruit, vegetables and clover pastures.  
   • Still suitable for stock and domestic use although the limit for hot water systems is about 880 mg/L. |
| > 1265 mg/L  | • Only plants that have at least some tolerance to salt.  
   • Limit to human consumption about 1375 mg/L. |

Following a detailed process, the best option for achieving the objectives of the Salinity Recovery Scheme was identified as involving the diversion of early autumn/winter saline river flows from the eastern part of the Collie River catchment, followed by storage, treatment and safe disposal of the by-products (fresh water and brine).

The Salinity Recovery Scheme is to be delivered in two phases, with the second phase being the subject of this business case. These phases are described in detail below.

### 2.2 The Salinity Recovery Scheme

The Salinity Recovery Scheme has been designed to reduce salinity levels in Wellington Reservoir to 615mg/L by 2015. The purpose of the Salinity Recovery Scheme is to achieve salinity reduction, not necessarily greater water consumption or a commercial return. The scheme is, however, an enabler to a number of other potential developments and projects within the region, which are likely to have the effect of increasing regional development. These projects will include using the Wellington Reservoir for industrial and possibly potable purposes.

As above, the Salinity Recovery Scheme is to be implemented in two phases. This business case is for the second and final phase, being the Salinity Treatment and Disposal Project. The two phases of the Salinity Recovery Scheme are as follows:

- **Phase A** – Collie-Wellington Salinity Diversion – Pilot Expansion – in progress.
- **Phase B** – Salinity Treatment and Disposal Project – subject to approval of this business case.

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2 Sources: Department of Agriculture and Food WA advice notes and Departmental communication with irrigation farmers. Further detail on the impact of salinity on crop productivity is included in Section 8.
2.2.1 Phase A – Collie-Wellington Salinity Diversion – Pilot Expansion (not the subject of this business case)

The Pilot Expansion involves several key activities, in particular:

- The construction of a pipeline from W5H mine void to Verve’s existing Saline Water Disposal Pipeline and installation of a pre-treatment facility along this line to remove contaminants before the water is discharged into the ocean.

- The construction of a pipeline from Chicken Creek 4 (CC4) mine void to W5H and the subsequent pumping of the existing water in CC4 (which was diverted there as part of the Department’s original trial and calibration of the Salinity Recovery Scheme) to Verve’s existing Saline Water Disposal Pipeline via the W5H mine void.

- The construction and operation of a river diversion from the Collie River East Branch to W5H.

- The diversion of up to 2.4 GL/a of early autumn/winter saline river flows into W5H so that this initial, more saline water, can be prevented from reaching the Wellington Reservoir. The amount to be diverted will be small until the water in CC4 has been disposed of (forecast to be complete by 2011) through Verve’s Saline Water Disposal Pipeline.

- The progressive disposal of the diverted river flows through Verve’s existing Saline Water Disposal Pipeline and/or to Verve’s own small treatment plant at Muja Power Station.

- The planting of a further 800 ha of perennials and targeted plantations in the Wellington Dam catchment area.
Figure 2: Plan of Phase A – Pilot Expansion

The implementation of Phase A is forecast to reduce the salinity of the Wellington Reservoir from the current average levels of 900 mg/L to 750 mg/L. This will provide some relief for irrigators, especially in dry years.

2.2.2 Phase B – Salinity Treatment and Disposal Project (the subject of this business case)

The Salinity Treatment and Disposal Project (the ‘Project’) builds on the Pilot Expansion through the following:

- The addition of a desalination plant (immediately after the pre-treatment plant) to concentrate the saline water diverted to the W5H mine void. The desalination plant will produce up to 0.8 GL/a of concentrated brine and up to 3.7 GL/a of product water, that may be used in local industry or released to the environment, depending upon how much water is taken by Verve’s treatment plant at Muja Power Station.

- The diversion of a further 2.1 GL/a of early autumn/winter saline river flows into the mine void – thus diverting a total of up to 4.5 GL/a of saline river flow from the Collie River East Branch.

- The disposal of the concentrated brine (using Verve’s existing Saline Water Disposal Pipeline to discharge the brine into the ocean gradually over the year) and the release and/or sale of the product water.
The estimated capital cost for Phase B is $18.5 million (real at June 2009 prices). The implementation of Phase B is forecast to reduce the average salinity of the Wellington Reservoir from the 750 mg/L (resulting from Phase A) to 615 mg/L. It will also allow the concentration of the saline water thus limiting the amount of flow required to be disposed down the constrained Verve pipeline.

The desalination plant proposed under Phase B will concentrate the saline water to produce brine at approximately 30,000 mg/L tds (less than the 35,000 mg/L of sea water). Not only will this allow more of the early saline river flows to be diverted (and hence allow the salinity levels in Wellington Reservoir to be reduced to a lower level) it will also:

- Allow salinity levels to be reduced earlier – as concentrating the water to go down the Verve Saline Water Disposal Pipeline (being the limit on process flows) will allow the Collie River East Branch river diversion to commence earlier.

- Minimise the impact on the limited capacity within Verve’s Saline Water Disposal Pipeline – thus delaying or avoiding the need to spend in the order of $120 million on a new disposal line to the ocean and hence avoiding immediate curtailment of industrial growth in the region.

### 2.3 Purpose of this business case

This business case seeks $5.2 million for Phase B, the Salinity Treatment and Disposal Project (or the ‘Project’) from the State through the Royalties for Regions. The implementation of
Phase B of the Collie salinity recovery directly meets the policy objectives of Royalties for Regions. Phase A (the Pilot Expansion) is fully funded and has been endorsed by Cabinet.

Capital and recurrent cost forecasts are provided in Section 8.

### 2.4 Water supply and demand in the Collie-Wellington river basin

The Collie-Wellington river basin currently provides water for energy producers (supplying over 50% of the South West of Western Australia’s power), the Great Southern Towns Water Supply Scheme (GSTWS), irrigators on the coastal plain, recreational pursuits and the environment, including Leschenault Inlet.

There are three key sources of water in the basin:

- **Groundwater** – The basin contains a 7,000 GL largely potable aquifer with recharge estimated at 20 GL/a. This water is accessed via groundwater bores and mine de-watering. The Upper Collie Water Management Plan seeks to limit the maximum total allocation for groundwater licences to 6.5 GL/a and ensure no further commercial licences are issued.\(^3\) A significant quantity of groundwater is, however, also extracted by mine de-watering and is used largely for cooling purposes at electricity generation plants. With the cessation of mine de-watering, the previously allocated mine de-water will then provide recharge to the aquifer.

- **Wellington Reservoir** – The reservoir has a capacity of 185 GL with an allocation limit of 85 GL/a. The East and South branches of the Collie River, from which there are also diversions, feed the reservoir. The allocation limit is currently:
  
  - Harvey Water (68 GL/a)
  
  - a reserve (17 GL/a), which includes a priority allocation for power generators (5 GL/a).\(^4\)

  The water has a relatively high salt content (average of 900 mg/L tds) making it of limited use to industry and of marginal use for irrigation purposes. A significant proportion of these allocations are, therefore, not currently used or used very inefficiently. For example, to use the current reservoir water, irrigators adopt inefficient flood irrigation in order to increase soil moisture without salt deposition. This ‘wastes’ significant quantities of water. The reservoir also has an unprotected catchment making it unsuitable for potable use without significant biological treatment and catchment protection.

- **Harris Reservoir** – The reservoir has a capacity of 72 GL. The Water Corporation currently has an allocation of 15 GL/a. The reservoir contains potable water and is connected into the Integrated Water Supply Scheme (IWSS), servicing Perth and environs, the towns of Collie and Allanson, and the GSTWS.

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\(^4\) 12 GL/a is currently in the process of being allocated to Perdaman Chemicals & Fertilisers
2.5 History of related Government policy and statements

The Department of Water and its predecessors have been working on the Salinity Recovery Scheme for a number of years and various key policies and commitments have driven the development of the Project as summarised below.

- **Before Harris Reservoir** was completed in 1990, Water Corporation was directed to reduce the salinity levels of Wellington Reservoir (as the construction of Harris Reservoir would reduce the volume of low salinity water flowing into Wellington Reservoir). No firm target was put on salinity levels for Wellington Reservoir but supply of water to the IWSS was to only occur if it did not impact upon Wellington Reservoir salinity levels. Due to demands for potable water within the IWSS, this requirement was relaxed by agreement. The Water Corporation was obliged to implement measures to improve Wellington Reservoir water quality levels by 32 mg/L, at an estimated cost at the time of $3.6 million.

- The **Western Australian Salinity Action Plan (1996)** was approved by the then Liberal government, which directed the Water and Rivers Commission (now the Department of Water) to proceed with reducing salinity levels to 500 mg/L. This was the initiation of the Collie River Salinity Recovery Scheme. The Salinity Situation Statement: Collie River (2001) identified the trends and status of water in the Wellington Reservoir. Generic options, including the scale of those options, were developed to enable the achievement of the 500 mg/L tds target in the Wellington Reservoir by 2015.

- A **first concept proposal** was defined and included an application for bilateral funding under the National Action Plan for Salinity and Water Quality. The bilateral agreement saw approximately $158 million of State matched contribution approved by Cabinet, of which $15 million of Water Corporation funds were allocated to fund the State’s contribution for the Collie River Salinity Recovery Scheme (matching the Commonwealth’s funding of $15 million for capital costs for the Collie River Salinity Recovery Scheme).

- A **Collie River Pipeline: Installation and Management Agreement** was signed between the Water and Rivers Commission (now the Department of Water), Griffin Coal and Harvey Water to enable a trial diversion to be undertaken in 2005.

- The then Premier, the Hon. Dr Geoffrey Gallop, reinforced the 500 mg/L target set in the Salinity Action Plan, launching the Project as part of a **Collie River Salinity Recovery Plan**, which included trials for diversion, tree plantings and marron recovery. At this point, the Salinity Recovery Scheme was launched by the then Premier.

- An **independent report to the Western Australian government recommended that the Salinity Recovery Scheme be implemented** (Water Source Options in the Collie-Wellington Basin: Final Report to the Minister for Water Resources by the Water Source Options Steering Committee 2007, often referred to as the “Kelly Report”).

- As part of the **Harvey Pipe Project** (an agreement by Water Corporation to trade 17.1 GL/a of water entitlements from Harvey Water’s allocation at Harvey Reservoir in 2005), the Water Corporation re-committed to its obligation to provide the State’s contribution of $15 million of matched funding for capital costs for the Collie River Salinity Recovery Scheme.
• The Water Corporation agreed to install Phases A and B to a maximum of $15 million (being additional to the $15 million of capex mentioned above) on the condition that they would have rights to the by-product water generated by the desalination plant.

• The then Minister for Water Resources requested the Department to provide an implementation strategy in response to the Water Source Options in the Collie-Wellington Basin: Final Report to the Minister for Water Resources (2007). The implementation strategy was approved by the then Minister for Water Resources in 2007 (this approval provided for the Salinity Recovery Scheme and endorsed subsequent water recovery stages).

• Since Ministerial approval in 2007, the Department has proceeded with planning and preliminary design activities for the Salinity Recovery Scheme in accordance with the National Action Plan for Salinity and Water Quality bilateral funding agreement. An extensive process of stakeholder engagement and consultation has been undertaken during the above policy history.

• The State Liberal Plan for Collie-Preston made a commitment to ‘continue important infrastructure projects in water and sewage treatment that are needed in the growing region’ one of which was the Collie-Wellington Salinity Diversion Project ($15.5 million) (2008). The plan also committed to maximising the potential of the Wellington Reservoir, including assessment of the options for using the reservoir for potable purposes. The State Government has subsequently endorsed a study to examine such options for water recovery in detail (April 2009).
3 Statement of need

3.1 Why is the Project needed?

The objective of the Project is to efficiently reduce average salinity levels in the Wellington Reservoir from 750 mg/L to 615 mg/L. Such a reduction will permit a step change in the use of the water resource, addressing a number of political, public, private, environmental and water-use needs. The key needs for the Project are as set out below.

Section 8 discusses in further detail the economic benefits that the Project is likely to produce.

3.1.1 Ensure that Government commitments are met

The Salinity Recovery Scheme has a history of policy approvals by successive governments (refer to section 2.5 for more detail). Implementation of the Project will help address aspects of these, in particular the current Liberal Party election commitments, which include:

- A commitment to provide $15.5 million funding for the Collie-Wellington Salinity Diversion Project (being the $15 million to be provided via Water Corporation). This funding relates to Phase A of the Project with the value of this investment being enhanced with the addition of Phase B.

- A commitment to maximise the potential of Wellington Reservoir, including assessing the options for using the reservoir for potable purposes.

- Delivering upon an environmental sustainability and water management plan with the following relevant actions:
  - “to take a coordinated approach to all the State’s water needs to give industry and agricultural providers confidence…”
  - “[to undertake a] feasibility assessment of treating large saline reserves east of the Darling Escarpment to … enhance water resources for the coastal plain”
  - “work with catchment authorities, industry, farmers and landholders to ensure catchments are being managed in a responsible manner”
  - “work with Federal government programs to identify means of reducing river salinity…”
  - “rising water tables and problems created by the natural drainage of saline water from the SW Wheatbelt into catchments will be a priority”
  - “continue important infrastructure projects in water … including the Collie-Wellington Salinity Diversion Project …”.

3.1.2 **Address needs of public users in the area**

The reduction in the salinity of the Collie River and Wellington Reservoir, through the Project, will address the following local public needs:

- The alternative strategies of acquiring and replanting existing farmland in the catchment will not be required. This will help retain regional populations and hence benefit communities and businesses in the towns of these farming areas.

- Public facilities (parks, school grounds, etc) in the Collie town will improve as water currently used from the Collie River is causing the grass areas of the public facilities to die.

- Irrigators in the Collie and Harvey irrigation Districts have access to higher quality water, potentially enhancing farming systems and providing positive flow-on effects for regional communities such as employment and maintenance of populations. Poor water quality is impacting on the productivity of traditional irrigated pasture enterprises and is limiting options for alternative irrigated agriculture. The salinity of irrigation water is deterring any significant development of higher-value horticultural investments in the Collie Irrigation District\(^5\) and leading to inefficient use of the water. Critically, the Project will reduce salinity levels below important thresholds (described in Table 1) and promote investment and greater opportunity for water trading.

Economic stimulus to the local economy as a result of the Project may have flow-on effects for small businesses in the region. It is anticipated that there will be increases in regional employment via the construction and operation of the Project.

3.1.3 **Address needs of the private sector in the area**

Lowering the salinity in the Wellington Reservoir creates immediate and potential future benefits for irrigators. In addition, a by-product of the desalinisation process is fresh water which provides future options for the following.

- fit-for-purpose industrial water for use by regional industry (including power stations)

- makes possible export of additional water to the GSTWS or the IWSS and/or

- increasing environmental flows and lowering of salinity levels within the reservoir and the Collie River above and below the reservoir.

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Table 2: The following private entities will directly or indirectly benefit from the implementation of the Project.

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<th>Private sector entity</th>
<th>Description</th>
<th>Relevance to the Project</th>
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</table>
| Harvey Water          | Harvey Water is a private irrigators’ cooperative (formerly known as South West Irrigation) which delivers water to irrigators via a gravity pipe and channel system which it operates, maintains and improves.                                                                                                                                                                                                                                         | • The value of Harvey Water’s existing water allocation from Wellington Reservoir will increase and the currently unused element of the allocation is more likely to be used, whether by its irrigators or through a sale to other users (e.g. industry at Kemerton).  
  • Harvey Water has also proposed to pipe the irrigation District and create a direct connection to the Kemerton Industrial Park. Changing from open channel to pipe transfer will also result in much more efficient use of the water, more productive farming techniques and less impact on soil conditions.6 |
| Farmers (Agriculture) | Harvey Water provides irrigation across approximately 10,000 ha for dairy farming, beef grazing and horticulture. The irrigation currently benefits some 700 irrigators, of which a number are supplied with water from Wellington Reservoir. (Water is also supplied from six other reservoirs including Harvey, Logue Brook, Drakesbrook and Waroona reservoirs).                                                                                                                                  | Benefits to irrigated agriculture from improved water quality include:                                                                                                                  |
|                        |                                                                                                                                                                                                                                                                                                                                                                                                                                       | • Direct productivity gains from higher quality water.                                                                                                                                   |
|                        |                                                                                                                                                                                                                                                                                                                                                                                                                                       | • Option to invest in higher value horticultural enterprises (potential water savings).                                                                                                   |
|                        |                                                                                                                                                                                                                                                                                                                                                                                                                                       | • Associated productivity gains from reduced salt levels in soil (with flushing, and especially with investment in drainage).                                                                                                               |
|                        |                                                                                                                                                                                                                                                                                                                                                                                                                                       | • Reduced water consumption with less flushing.                                                                                                                                      |
|                        |                                                                                                                                                                                                                                                                                                                                                                                                                                       | • Incentive to invest in water saving technologies.                                                                                                                                  |
|                        |                                                                                                                                                                                                                                                                                                                                                                                                                                       | • Greater incentive for new investment in a restructured dairy industry.                                                                                                                                                                           |
| Perdaman Chemicals Fertilisers (PCF) | PCF propose to build and operate a urea plant in the Collie region.                                                                                                                                                                                                                                                                                                                                                                    | • PCF has already expressed an interest in purchasing the fit-for-purpose water generated by the proposed desalination plant. PCF has also expressed an interest in gaining access to Verve’s Saline Water Disposal Pipeline (through the Department’s allocation) so that they discharge their own effluent. See letter in Appendix A.  
  • Lower salinity levels in the Wellington Reservoir make the reservoir a more attractive source of water for industrial purposes.                                                                                                                |                                                                                                                                                                                                                                                   |
| Griffin Energy         | Griffin Energy is the owner and operator of two coal-fired power stations near Collie (Bluewaters 1 and 2). Griffin Energy receive their coal and cooling water from the adjoining mines of Griffin Coal. Griffin Energy currently plan to build two more similar sized power stations (Bluewaters 3 and 4) which will require more cooling water and, equally important, greater access to dispose of the resulting saline water through the existing sea-water disposal pipeline to the ocean.                                                                                           | • Griffin Energy has expressed an interest in gaining access to Verve’s Saline Water Disposal Pipeline (through the Department’s allocation) so that they discharge their own effluent. A written proposal from Griffin is in Appendix B.  
  • Lower salinity levels in the Wellington Reservoir make the reservoir a more attractive source of water for industrial purposes. Whilst we understand that Griffin Energy currently believes it has adequate water through Griffin Coal’s mine de-water, potential access to the fit-for-purpose water generated by the proposed desalination plant and/or improved Wellington Reservoir water could provide benefits Griffin Energy. |

6 The benefits of this additional investment are not considered here as they would involve additional costs and are to be captured in Harvey Water’s business case for government funding for the above scheme.
<table>
<thead>
<tr>
<th>Private sector entity</th>
<th>Description</th>
<th>Relevance to the Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verve Energy</td>
<td>Verve Energy is a State owned power generator active in the Collie region and owner of the only saline disposal pipeline in the region. Access to this pipeline is of great interest to existing and emergent industries in the region as it can avoid the need to build their own pipeline to the ocean at a cost in the order of $120 million.</td>
<td>• Verve stand to benefit from access to up to 1 GL/a of diverted Collie River East Branch flow from W5H mine void. To date, no agreement has been reached on the terms for this arrangement and the Department’s access to Verve’s Saline Water Disposal Pipeline. Further, Verve Energy has expressed an interest in operating aspects of the Project. • Lower salinity levels in the Wellington Reservoir make it a more attractive source of water for industrial purposes. Whilst Verve Energy currently have adequate water through Wesfarmers Premier Coal mine de-water, potential access to the fit-for-purpose water generated by the proposed desalination plant and/or improved Wellington Reservoir water represents a potential benefit to Verve Energy.</td>
</tr>
</tbody>
</table>

### 3.1.4 Address environmental needs

The Project is expected to improve the environmental ecology and function downstream of the Buckingham diversion through decreased salinity levels in the Collie River. For example, there will be protection and enhancement of the environmental values of culturally and socially significant sites, including Buckingham Pool and Minninup Pool. The trial diversion saw re-colonisation of some native fish back into the Collie East below the diversion and any reduced environmental flows are considered to be more than compensated by the resulting improved water quality.

It is anticipated that there will be no negative demographic impacts to the region.

### 3.1.5 Cater for needs for any future water supply development

The implementation of the Salinity Recovery Scheme is considered to be a critical precursor to any larger water supply development of Wellington Reservoir. During and after the completion of the Project there will be the opportunity for further evaluation of options that may positively impact on the economic development and industry growth of the Collie-Bunbury region and more broadly. For more detail, refer to the table in Section 3.3.

### 3.1.6 Promote use of unallocated water

There is currently 17 GL/a of unallocated water within the Wellington Reservoir. Subject to assessment of requirements for scouring, environmental flows and potential reduction to yield with planting of upland trees, it is possible this unallocated volume may increase by some 5 to 10 GL/a. Should the Project proceed, there is a greater chance that this unallocated water would be used, reflecting its benefit to the user.

---

7 The Project is unlikely to be stranded by investment to convert Wellington Reservoir to a potable resource in the future because the irrigation area would still require fit-for-purpose water and is unlikely to be able to pay for desalinated water from a plant designed to produce potable water. It will also reduce the extent of desalination required downstream of ex-Wellington, were this strategy to be pursued. The range of salinity levels that a downstream desalination plant would need to deal with would also be smaller, leading to lower treatment costs.
It should be noted that currently the price at which allocations (and water) are sold is irrespective of the water quality. If this were to change, further value may be captured by the Government.

There may also be future opportunity for water trading between agricultural and urban/industrial consumers as efficiencies in irrigation techniques and infrastructure are realised.

3.2 Key stakeholders consulted and their level of support

There has been extensive consultation with stakeholders over a number of years as part of successive policy proposals and commitments of the last three State governments. Appendix C summarises key aspects of the stakeholder consultation.

The consultation and engagement processes have included the following:

- The establishment of the Collie Water Advisory Group I and II.
- The establishment of the Collie Salinity Recovery Team.
- The establishment of the Project Steering Committee, including representatives from all parts of the catchment, to oversee the Project.8
- Several consultations with high priority (close working relationship), medium priority (periodic relationship) and low priority (informative relationship) stakeholders.9

3.3 Evidence of current and projected demand

Section 3.1 summarises the need for the Project, listing the range of political, public, private, environmental and water-use needs for the Project. This section considers the water-use benefits further, describing the industrial schemes that are dependent upon the successful implementation of the Project.

There is a significant demand for fit-for-purpose water in the Collie-Wellington River Basin for industrial and irrigation purposes. The key demands are from:

- irrigators in the Collie River and Harvey River Irrigation Districts
- industry in the Collie Basin
- existing and future industry in the Kemerton area.

In addition, there is a high demand for potable water in the IWSS, as evidenced by the cost of the Water Corporation’s planned investment in a new desalination plant at Binningup.

8 The Project Steering Committee overseeing the implementation of the Project includes representatives from landowners, the community, the Shire of Collie, Harvey Water, the Department of Environment and Conservation, Water Corporation, Verve Energy, Wesfarmers Premier Coal, Griffin Coal, the Department of Agriculture and Food, South West Catchments Council and the Department of Water.

9 Stakeholders were assigned strategic priority according to the degree to which the group is dependent or linked to the resource, and/or on the basis to which they may influence or contribute to this process.
Table 3: Lists the key current stakeholder groups consulted to date and level of support for the Project.

<table>
<thead>
<tr>
<th>Stakeholder group</th>
<th>Stakeholders consulted</th>
<th>Level of support (High / Med / Low / Indifferent)</th>
</tr>
</thead>
</table>
| Government agencies | Department of Environment and Conservation  
Department of Water  
Department of Agriculture and Food  
South West Development Commission  
Water Corporation  
Environmental Protection Agency  
Department of Planning and Infrastructure | High  
High  
High  
High  
High  
Indifferent  
High |
| Local government | Shire of Collie  
Shire of West Arthur  
Shire of Boyup Brook | High  
High  
Indifferent |
| Industry | Harvey Water  
Forest Products Commission – Strategic Tree Farms  
Pastoral and Graziers Association  
WA Farmers Federation  
Griffin Energy and Griffin Coal  
Verve Energy  
Wesfarmers Premier Coal  
Collie Chamber of Commerce  
Bunbury-Wellington Economic Alliance Group  
Real Estate Agents | High  
High  
High  
High  
High  
High  
High  
High  
High  
High  
Indifferent |
| Media | GWN  
Collie Mail  
SW Times  
West Australian  
ABC Radio  
Darkan Bleat | Indifferent  
Indifferent  
Indifferent  
Indifferent  
Indifferent  
Indifferent |
| Community | South West Catchment Council  
South West Council of Elders  
Ngalang Boodja Council Aboriginal Corporation  
Collie Land Conservation District Committee  
West Arthur Land Conservation District Committee  
Boyup Brook Land Conservation District Committee  
Conservation Council  
WA Forest Alliance  
Collie Conservation Group  
Collie and Darkan residents (urban and rural)  
Perth residents  
Leschenault Catchment Council | High  
High  
High  
Moderate  
High  
Indifferent  
Moderate  
Moderate  
Moderate  
High  
Indifferent  
High |
Table 4: Sets out the key proposals that are dependent on the Project.

<table>
<thead>
<tr>
<th>Proposal</th>
<th>Description</th>
<th>Dependency or relationship with the Project</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Harvey Water piping proposal</strong></td>
<td>Harvey Water is currently planning to replace all of its open channel network with pressure pipework to reduce water loss, improve irrigation effectiveness and reduce maintenance costs. The Project will also directly connect Wellington Reservoir to the Kemerton Industrial Park, which will allow Harvey Water to sell more water to current and future industry at Kemerton. Harvey Water are currently requesting $165 million of Commonwealth funds to assist with their capital proposal.</td>
<td>Harvey Water has indicated that its piping proposal is contingent upon the Project proceeding. Benefits from the Project should be considered within the evaluation for government funding of Harvey Water’s proposal (and hence are not captured in this business case).</td>
</tr>
<tr>
<td><strong>Kemerton Industrial Park</strong></td>
<td>Kemerton Industrial Park is located some 17 km north of Bunbury, offering 5,400 ha of land (including fire breaks) for existing and future industrial and support tenants.</td>
<td>The continued development of the Kemerton Industrial Park for water-intensive industry is contingent on the cost effective supply of fit-for-purpose water. The Project, combined with the Harvey Water proposal (above) and/or other piping arrangements, will assist this.</td>
</tr>
</tbody>
</table>
| **Water recovery proposal**            | In addition to the Salinity Recovery Scheme, the Department has developed an approach for optimising the use of the Region’s water resources for industrial, irrigation and potable purposes.  
  As set out in Section 2.5, the State Government has recently endorsed the Minister for Water’s proposal to independently assess the options for maximising the potential of Wellington Reservoir, including considering using the reservoir for potable purposes. | Should any water recovery scheme proceed, it will benefit from the lowered salinity levels attained by the Project. |
| **Perdaman Chemicals and Fertilisers - urea plant proposal** | Perdaman require 12 GL/a of varying quality water for their operations which is predominantly to be supplied from Wellington Reservoir. At the design stage Perdaman need to consider onsite desalination as part of their capital development to compensate for salinity levels in Wellington Reservoir. | The instigation of the Project will facilitate fit-for-purpose water supply - whether through the by-product water and/or improved Wellington Reservoir. |
| **Griffin’s Bluewaters 1, 2, 3 and 4** | As described earlier, Griffin currently has sufficient mine de-water for their current Bluewaters 1 and 2 power stations. Current mine dewater is inadequate for the proposed Bluewaters 3 and 4 expansion. | The instigation of the Project will offer added security to Griffin’s water source for their existing and proposed power stations – whether through the by-product water and/or improved Wellington Reservoir. |
| **Verve**                              | Verve is currently considering options to reinstitute Muja A/B and/or the development of new coal fired generation capacity.                                                                                   | The instigation of the Project will offer added security to Verve’s proposed power stations – whether through the by-product water and/or improved Wellington Reservoir. |
| **Other**                              | This business case only considers known proposals.                                                                                                                                                           | The Department and South West Development Commission believe that future proposals will benefit from the Project and secure economic development. |
3.4 Consequences of the Project being delayed or cancelled

Progressing the Project will help the South West region of Western Australia to achieve longer-term sustainable development and growth, whilst enhancing a strong and vibrant Bunbury-Wellington community. This is in line with State Government initiatives for regional Western Australia.

Should the Project be delayed or cancelled, it would have the following serious consequences.

- **Regional industrial growth will be compromised** – forecast jobs and income for the area will not materialise unless local industry has access to fit-for-purpose water. For example:

  Griffin’s Bluewaters 3 & 4 needs to secure water to progress – reported 600 construction jobs and 30 permanent jobs

  Perdaman’s urea plant needs to secure water to progress – reported 1500 construction jobs and 200 permanent jobs

  the proposed BRL regional alumina refinery water supply would be problematic – reported 500 jobs

  Kemerton Industrial Park cannot grow without additional water supply (see below).

- **Collie Irrigation District becomes unviable** – The irrigation industry must move from low value pasture to high value food production to remain viable. For example, low-value agricultural production is becoming increasingly unprofitable in the Collie Irrigation District as the high salinity levels prevent good quality pasture. With better quality water, improved pastures and/or higher value crops can be grown thus increasing local income and realising future growth potential in the region.

- **Community, cultural and environmental values will be compromised** – Stakeholder interest and expectations are high following the extensive levels of consultation at a regional, State and Commonwealth level over the past 8 years. Project delay or cancellation will result in loss of reputation and adverse media.

- **Commonwealth funding for this Project may be lost** – Cancellation or even moderate delay of the Project would lead to the loss of the $10 million of Commonwealth funds promised via the Water for the Future scheme (overseen by Minister Wong).

- **Commonwealth funding for Harvey Water’s Collie Irrigation Piping scheme will be lost** – Without the Project proceeding, the $165 million Collie Irrigation Piping scheme will not proceed. This, in turn, has a number of other impacts on regional development. For example:

  - **Kemerton Industrial Park expansion will be limited** – If the piping scheme (which is dependent upon the Project) were constructed, it would allow Wellington Reservoir water to be piped to the Kemerton Industrial Park. As the Kemerton Industrial Park currently uses its full water allocation, without additional supply (as proposed by the Collie Irrigation District Piping project) growth of the industrial area cannot occur.
- **Water will continue to be wasted** – The piping scheme, which will replace open channels, will reduce water losses by an estimated 16-20 GL/a of valuable water.

- **Water trading potential will be severely curtailed** – Without the piping scheme, the ability to release additional water to the IWSS, from Harvey and Stirling reservoirs, will be prevented. In addition, water trading within the irrigation District will remain limited and hence restrict economic growth.

- Loss of operational funds and operator for Phase A – The Department has sufficient funds to operate Phase A for only two years. In addition, Water Corporation has confirmed they will not fund, and therefore not operate, Phase A without Phase B being implemented.

- Environmental conditions and water efficiency would not evolve – Without the Project, salinity levels in the rivers and reservoir downstream of the diversion would remain high with consequential negative environmental effects and economic impacts. In addition, without reduced salinity levels, both higher Wellington Reservoir scouring levels and wasteful flood irrigation techniques would lead to inefficient water use, limiting the benefits of this otherwise valuable resource.
4 Consideration and selection of preferred options

4.1 Options considered to address the need of salinity reduction

4.1.1 Introduction

A number of options and combinations of options have been considered to achieve salinity reduction in the Collie-Wellington River Catchment Basin. These options have been developed and refined following an exhaustive and robust process of modelling, analysis and consultation with stakeholders.

4.1.2 Approach taken by the Department of Water

The approach taken by the Department was in accordance with the Department’s “Resource Recovery Approach”. The recovery approach provides a comprehensive analysis and evaluation of the various options to reduce salinity levels. The following diagram summarises the recovery approach which commences with the examination of management options and concludes with the finalisation of a recovery plan.

4.1.3 Management options and salinity situation statement

To commence the development of options, the Department examined generic salinity management options that could reduce salinity inflows to the Wellington Reservoir. For each salinity management option the Department used modelling software to estimate their respective hydrologic effectiveness. These initial salinity management options are set in the table below.

---

10 Platt, J, Tingey, W, Sparks, T, Collie River Salinity Recovery – Improving water resource outcomes in a competing environment
12 Platt, J, Tingey, W, Sparks, T, Collie River Salinity Recovery – Improving water resource outcomes in a competing environment
Table 5: Initial salinity management options

<table>
<thead>
<tr>
<th>Option No.</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Upland commercial trees: Involving the planting of various species of chip-wood or saw-log quality trees on all land with deep well-drained soils suitable for growing ‘commercial’ trees. The trees tap into the ground water lowering the watertable and stabilising the mobilisation of salts.</td>
</tr>
<tr>
<td>2</td>
<td>Lowland trees: Involving planting of varieties of vegetation on land not suitable for commercial chip-wood or saw-log trees.</td>
</tr>
<tr>
<td>3</td>
<td>Lucerne: Involving deep-rooted perennial pastures, such as lucerne, on all suitable land to significantly reduce groundwater recharge.</td>
</tr>
<tr>
<td>4</td>
<td>Shallow drainage: Use of shallow drains in discharge areas to reduce soil erosion, inundation and waterlogging.</td>
</tr>
<tr>
<td>5</td>
<td>Groundwater pumping: Use of a series of groundwater extraction bores to lower groundwater levels where deep groundwater discharge otherwise occurs. Pipelines and associated pumping stations are required to move the saline water outside the catchment.</td>
</tr>
<tr>
<td>6</td>
<td>Diversion: Interception of stream flow from the most saline tributaries by a Reservoir and transported outside the catchment or, if possible, to a site for treatment.</td>
</tr>
</tbody>
</table>

The comprehensive study on salinity management options led to the release of a Salinity Situation Statement: Collie River.13

4.1.4 Further development and evaluation of initial options

The salinity situation statement, and consideration of stakeholder views, identified 26 options based on the initial salinity management options. Of the 26 options, those delivering salinity outcomes of greater than 700 mg/L when modelled were disregarded, resulting in 13 salinity management options which became the long-list of options to be further discussed and evaluated.14

4.1.5 Long-list options developed for consideration

The long-list of 13 options is described below.

14 Department of Water, Collie River Salinity Recovery Plan – A Plan to Reverse Salinity in the Wellington Reservoir, Report No 39, April 2009
Table 6: Long-list of options considered

<table>
<thead>
<tr>
<th>Option No.</th>
<th>Target Salinity Amount</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>550 mg/L</td>
<td><strong>Ground water pumping</strong>: Install 670 bores across the Collie River South, James Well, Collie River East and Collie Central management units.</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td><strong>Upland trees</strong>: Plant 16,000 ha of commercial upland trees and 700 ha of lowland trees in strategic locations.</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td><strong>Lowland trees</strong>: Plant 8,000 ha of commercial lowland trees in strategic locations.</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td><strong>Ground water pumping and trees</strong> – install 225 bores across the Collie River Central East management units as well as planting 3,000 ha of lowland trees.</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td><strong>Desalination</strong>: Desalinate water from Collie River East at Buckingham Bridge.</td>
</tr>
<tr>
<td>6</td>
<td>600 mg/L</td>
<td><strong>Groundwater pumping</strong>: Install 404 bores across the Collie River South, East and Central East management units.</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td><strong>Upland trees</strong>: Plant 14,400 ha in strategic locations.</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td><strong>Lowland trees</strong>: Plant 6,200 ha in strategic locations.</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td><strong>Full diversion at Collie East</strong>: Divert 100% of the flow 9 km downstream from James Crossing.</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td><strong>Diversion and bores</strong>: Partial diversion at James Crossing and the installation of 227 bores in the Collie River South management unit and full ground water pumping in the Collie River Central East management unit.</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td><strong>Part groundwater pumping and upland trees</strong> – install 186 bores in the Collie River East management unit along with plantations of 6,600 ha of upland tree plantations.</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td><strong>Partial diversion of Collie River East</strong> – divert 50% of water in Collie River East at Buckingham Bridge into a Muja mine void.</td>
</tr>
<tr>
<td>13</td>
<td></td>
<td><strong>Desalination</strong>: Reduced levels of desalination of water in Collie River East at Buckingham Bridge.</td>
</tr>
</tbody>
</table>

4.1.6 Stakeholder evaluation of these options through multi-criteria analysis

The above list of 13 options received further consideration and analysis in a stakeholder workshop run by URS in November 2002. The aim of the workshop was to consider the long-list of options against specific criteria and then rank the options to create a shortlist for further evaluation. Forty-six people representing the twenty-seven major stakeholder organisations attended the workshop and provided input. The evaluation criteria specifically considered in the multi-criteria analysis are outlined in Table 7 below.
Table 7: Evaluation criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Specific areas considered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation</td>
<td>• Technical certainty</td>
</tr>
<tr>
<td></td>
<td>• Ease of implementation</td>
</tr>
<tr>
<td></td>
<td>• Management complexity</td>
</tr>
<tr>
<td></td>
<td>• Timescale of benefits</td>
</tr>
<tr>
<td>Social</td>
<td>• Population</td>
</tr>
<tr>
<td></td>
<td>• Business</td>
</tr>
<tr>
<td></td>
<td>• Employment</td>
</tr>
<tr>
<td></td>
<td>• Services</td>
</tr>
<tr>
<td></td>
<td>• Security</td>
</tr>
<tr>
<td>Economic</td>
<td>• Total cost to government</td>
</tr>
<tr>
<td></td>
<td>• Water yield (GL/a)</td>
</tr>
<tr>
<td></td>
<td>• Cost/GL</td>
</tr>
<tr>
<td>Environmental</td>
<td>• Flora and fauna</td>
</tr>
<tr>
<td></td>
<td>• Wetlands and water bodies</td>
</tr>
<tr>
<td></td>
<td>• Water quality</td>
</tr>
<tr>
<td></td>
<td>• Water quantity</td>
</tr>
<tr>
<td></td>
<td>• Weeds and feral animals</td>
</tr>
<tr>
<td></td>
<td>• Physical impacts</td>
</tr>
<tr>
<td></td>
<td>• Greenhouse implications</td>
</tr>
<tr>
<td></td>
<td>• Fire risk</td>
</tr>
<tr>
<td></td>
<td>• Heritage</td>
</tr>
</tbody>
</table>

Results of the options analysed against the multi-criteria analysis are in Appendix D.

4.1.7 Short-list of preferred options from multi-criteria analysis

The stakeholder workshop identified the following preferred options.
Table 8: Short-list of options considered

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Upland trees: Plant 16,000 ha of commercial upland trees and 700 ha of lowland trees in strategic locations.</td>
</tr>
<tr>
<td>4</td>
<td>Ground water pumping and trees: Install 225 bores across the Collie River Central East management units as well as planting 3,000 ha of lowland trees</td>
</tr>
<tr>
<td>9</td>
<td>Full diversion at Collie East: Divert 100% of the flow 9 km down stream from James Cross.</td>
</tr>
<tr>
<td>10</td>
<td>Diversions and bores: Partial diversion at James Crossing and the install 227 bores in the Collie River South management unit with full ground water pumping in the Collie River Central East management unit.</td>
</tr>
<tr>
<td>12</td>
<td>Partial diversion of Collie River East: Divert 50% of Collie River East water at Buckingham Bridge into a Muja mine void.</td>
</tr>
<tr>
<td>12 (a)</td>
<td>‘Buckingham diversion’ option combined with 4,200 ha of upland plantations and 3,000 ha of lowland revegetation.</td>
</tr>
<tr>
<td>12 (b)</td>
<td>‘Buckingham diversion’ option combined with groundwater pumping.</td>
</tr>
</tbody>
</table>

4.1.8 Evaluation of short-listed options – benefit-cost analysis

The above seven preferred options were considered for more detailed assessment and benefit-cost analysis. The aim of the more quantitative analysis was to help in the selection of a preferred option.16

The quantitative analysis involved the calculation of the Project’s net present value, payback period and a benefit-cost rating. The table below presents this information.17

Table 9: Assessment of short-listed options

<table>
<thead>
<tr>
<th>Option</th>
<th>Resultant salinity at Wellington Reservoir (mg/L)</th>
<th>Maximum cost ($ millions)</th>
<th>Net present value (NPV) ($ millions)</th>
<th>Benefit-cost ratio (BCR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 2</td>
<td>550</td>
<td>85</td>
<td>7</td>
<td>1.2</td>
</tr>
<tr>
<td>Option 4</td>
<td>550</td>
<td>75</td>
<td>-13</td>
<td>0.8</td>
</tr>
<tr>
<td>Option 9</td>
<td>600</td>
<td>138</td>
<td>-115</td>
<td>0.3</td>
</tr>
<tr>
<td>Option 10</td>
<td>600</td>
<td>83</td>
<td>-62</td>
<td>0.4</td>
</tr>
<tr>
<td>Option 12</td>
<td>600</td>
<td>10</td>
<td>28</td>
<td>2.4</td>
</tr>
<tr>
<td>Option 12a</td>
<td>550</td>
<td>44</td>
<td>28</td>
<td>1.7</td>
</tr>
<tr>
<td>Option 12b</td>
<td>550</td>
<td>58</td>
<td>3</td>
<td>1.0</td>
</tr>
</tbody>
</table>

The analysis identified that, of the preferred options, only options 2, 12, 12a and 12b returned positive net present values and benefit-cost ratios greater than one. In addition, the preferred options by the stakeholder group were option 12, 12a and 12b. These options all involved a diversion of Collie River East at Buckingham Bridge as the core approach.

4.1.9 Preferred option selected

The preferred option selected involved the approach in option 12(a) of diversion and mine void storage. The initial approach involved a trial run with storage occurring in the CC4 mine void.

16 URS, Economic Benefits of Reducing Salinity in Wellington Reservoir and the Collie River, May 2003
The preferred option was then refined into what are now Phase A and Phase B of the Salinity Recovery Scheme. This further refinement was required to account for the following:

- **Use of CC4 mine void and Verve’s Saline Water Disposal Pipeline:** Initially the approach involved the storage of the water in the CC4 mine void and a subsequent purpose-built pipe to transport the water to the ocean utilised for saline water disposal. More recently the CC4 mine void has become unavailable as it is now required again for use by its owners. In addition, the construction of a saline disposal pipe to the ocean, when costed, was prohibitively expensive and hence it was decided to use the Verve Saline Water Disposal Pipeline.

- **Incorporation of a desalination unit:** Subsequent cost improvement of desalination technology had become more feasible and hence has been incorporated into the Project to allow required saline flows to be taken by Verve’s constrained Saline Water Disposal Pipeline. A significant proportion of the cost to operate the desalination plant is offset by the savings in access charges for the Verve pipeline.

**4.2 Why is the selected option the best to meet the need**

The preferred approach was only adopted by the Department after extensive examination and stakeholder consultation. This option, when compared and contrasted against other options, was economically viable based on the results of the benefit-cost analysis and was the preferred approach from the stakeholder group. The evolution of this option and the change in technologies has allowed the development of Phase A and Phase B of the Salinity Recovery Scheme.

This Salinity Recovery Scheme addresses the need identified through the reduction in salinity levels in the Wellington Reservoir. This will be achieved by reducing salinity levels to an average of 615mg/L by 2015. As an added benefit, the preferred option will also create up to 3.7 GL/a of water. The satisfaction of the criteria in the multi-criteria analysis and returns on investment identified in the benefit-cost analysis, combined with the views of the stakeholder group, differentiates the preferred approach from the other options considered.

The diversion and storage approach is still the most appropriate as it reduces salinity levels, makes use of existing infrastructure to the greatest extent possible and is cost effective. The preliminary analysis and design prepared allows this option to be effectively implemented and will provide the most time effective results, being a reduction in salinity levels in the inflows to Wellington Reservoir sooner than any other option considered.
5 Socio-economic evaluation

This section provides an evaluation of the socio-economic costs and benefits of the Project. It draws together the analysis of costs in Section 8, with the analysis of benefits below. It focuses on the economic costs and benefits of the Project. It also identifies some of the broader benefits that more effective management of water resources in the Collie Basin would provide, and which the Project would facilitate. In particular, it:

- explains the rationale for government involvement in the Project
- explains the approach taken to the socio-economic evaluation and identifies the types of socio-economic costs and benefits that the Project delivers
- examines and monetises, quantifies or qualifies those benefits where possible
- compares the socio-economic costs and benefits.

5.1 The economic rationale for government involvement

The case for government involvement is typically based on a view that:

- There is a ‘market failure’ which means that it is difficult for private parties to manage the risks and capture the benefits of an investment (i.e. there is limited incentive for them to undertake it).
- The economic benefits of the investment are likely to outweigh the economic costs, including the cost of any intervention.

The existence of ‘market failure’ is therefore a necessary, but not sufficient, condition for government involvement. It is also necessary to demonstrate that the benefits of the investment are likely to outweigh the costs.

There is a strong argument that such a ‘market failure’ exists in relation to the Project. It arises because of the inability to adequately allocate risks and benefits of the Project to a party. In particular, the:

- Ability to achieve the objective (i.e. the reduction in salinity in Wellington Reservoir) is likely to be beyond the control of any private party because it will be influenced by the actions of a number of parties, including those undertaken by Government (e.g. activity in the Collie Basin). A private party is therefore unlikely to be able to assume the risk of achieving this objective. By contrast, the State is likely to be in a stronger position to manage the risk or put in place mechanisms such that a private operator can be confident that any risks outside their control are being managed by these mechanisms.

- Benefits are likely to be split between several parties, including the community and environment generally. They will also depend on government decisions and/or by existing regulation. For example, if the existing ‘rights’ to water were clearer and more readily tradeable, the problem of ensuring the benefits accrue to the party making the investment would be lessened, but external benefits would remain (e.g. the environmental and broader economic benefits to the community).
A significant proportion of the benefits of the Project are, however, likely to accrue to Harvey Water or its members (given its allocation in Wellington Reservoir). It is, however, not obvious that Harvey Water:

- would be in a position to assume the salinity risk in Wellington Reservoir
- would capture enough of the benefits itself to justify the investment
- has the financial capacity to fund the Project. Harvey Water has a turnover of about $5 million per annum and although it has been involved in larger projects, it has not fully funded them.

It is apparent that Harvey Water has not been prepared to put forward a proposal to undertake the Project itself at this stage. Harvey Water does, however, sees itself as a provider of fit-for-purpose water to end users, and so may well be prepared to take a larger role in the Project at some stage. In contrast, other parties have indicated an interest in being involved in the Project, but at this stage those offers are highly conditional. This reflects the need for government involvement to enable them to proceed.

There is therefore a strong case for government involvement in the Project as it is unlikely to proceed in the absence of that involvement.

### 5.2 Summary of the socio-economic evaluation

Table 10 summarises the economic costs and benefits of the Project.

In respect of the costs, these are drawn from Section 8.

In respect of the benefits, Table 1 summarises the analysis undertaken in this section. It shows that the benefits of the Project are likely to be significant, but that it is difficult to assign a value to a number of the benefits, even though that value may be significant in some cases.

Eleven types of benefits have been identified for the Project. Where possible, estimates of their magnitude and economic value have been made (using net present values over 25 years and a discount rate of 7% real, pre-tax). These include the value of:

- increased irrigation industry production
- changing irrigation system operations to release potable water
- producing potable water.

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18 It could be argued that Harvey Water may be in a position to ‘free ride’ at the moment because it is not paying all the costs of reducing the salinity, but is likely to be a key beneficiary. It argues, however, that its members have in fact borne the cost of the increased salinity over recent decades, because it is primarily a function of the Conditional Purchase Scheme that applied to land in the Collie Basin (i.e. which required clearing). The Conditional Purchase Scheme was re-introduced in 1961 and continued until 1982. Under the Scheme large areas of land were released at relatively low prices (around 25 cents per ha) and purchases were conditional on clearing a proportion of the land (Australian Greenhouse Office, *Land Clearing: A Social History*, Technical Report no.4).

19 Discount rates of 4% and 10% are also used in the analysis to provide additional sensitivities. The lower discount rate improves the economics of the Project.
These benefits have been conservatively estimated to be in the range of $38-48 million.

A more indicative estimate of potential economic value has been made for two types of benefits. These include the potential value of:

- increased sustainable yield of Wellington Reservoir
- increased use of fit-for-purpose water in the industrial sector, which also potentially releases more potable water.

These benefits could be approximately $29-31 million.

For the other types the benefits, it is not possible to estimate their value. In some cases, however, those values could be significant and these benefits include:

- improved environmental outcomes via less salinity damage
- improved social outcomes (e.g. improved amenity)
- the options for further investment the Project may facilitate
- more water trading
- avoiding costs that may otherwise be incurred by industry in the Collie Basin
- regional development and employment benefits.
Table 10: Total economic benefits and costs of the Project in net present value terms

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Quantified impact</th>
<th>Value of benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased economic value of irrigation production</td>
<td>• Improved yield - 10%</td>
<td>$17.2-24.5m</td>
</tr>
<tr>
<td></td>
<td>• Increased hectares – 10%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Change in land use – 10% increase in horticulture share</td>
<td></td>
</tr>
<tr>
<td>Increased sustainable yield of Wellington Reservoir</td>
<td>Potential increase of 7.5 GL per annum in the sustainable yield of Wellington Reservoir with benefits of around $14.3m - $16.4m</td>
<td></td>
</tr>
<tr>
<td>Changing irrigation system operation and release of potable water</td>
<td>1-1.5 GL per annum created</td>
<td>$4-6m</td>
</tr>
<tr>
<td>Using more fit-for-purpose water in the industrial sector</td>
<td>Potential to generate significant benefits by deferring the need for supply augmentations of the potable water system. With benefits of up to $15m, based on known developments only</td>
<td></td>
</tr>
<tr>
<td>Production of potable water</td>
<td>Up to 3.7 GL per annum for 20 years</td>
<td>$17.2m</td>
</tr>
<tr>
<td>Improved environmental outcomes and less salinity damage</td>
<td>Benefits from lower salinity in the District and use of more fit-for-purpose water in industry and agriculture. Lost forward production associated with the increase in salinity over the last decade is significant – in the order of $33.6m.</td>
<td></td>
</tr>
<tr>
<td>Improved social outcomes</td>
<td>Benefits are likely to be material, but are difficult to quantify</td>
<td></td>
</tr>
<tr>
<td>Option value the investment creates</td>
<td>Potential to generate significant benefits by encouraging further investment and potentially deferring the need for supply augmentations of the potable water system. For example, the Economic Regulation Authority (ERA) estimates that every year construction of the new desalination plant was postponed, customers would have saved approximately $50 to $100 million</td>
<td></td>
</tr>
<tr>
<td>More water trading</td>
<td>A significant increase in water trading can be expected, although the magnitude of the benefits are difficult to determine</td>
<td></td>
</tr>
<tr>
<td>Avoided cost for industry in Collie Basin</td>
<td>Potentially significant costs incurred if salinity levels in the Collie Basin are not reduced</td>
<td></td>
</tr>
<tr>
<td>Regional development and employment</td>
<td>Benefits are likely to be material, but are difficult to quantify.</td>
<td></td>
</tr>
<tr>
<td>Total primary economic benefits</td>
<td></td>
<td>$38-48m</td>
</tr>
<tr>
<td>Other potential economic benefits</td>
<td></td>
<td>$29-31m</td>
</tr>
<tr>
<td>Total primary and potential benefits</td>
<td></td>
<td>$67-79m</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Costs</th>
<th>Value of costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital costs</td>
<td>$18.5m</td>
</tr>
<tr>
<td>Operating costs</td>
<td>$34.0m</td>
</tr>
<tr>
<td>Total costs</td>
<td>$52.5m</td>
</tr>
</tbody>
</table>

The analysis suggests that the economic benefits of the Project are likely to outweigh the costs, particularly after taking into account all of the benefits.

5.3 Our approach to the socio-economic evaluation

This evaluation uses an approach consistent with those used in standard benefit-cost analysis by most governments and agencies in Australia and Western Australia for capital business cases.20

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This approach is broadly consistent with investment evaluation criteria commonly used in commercial practice, notwithstanding the different focus it involves. In particular, the focus in financial evaluations is typically on the costs and benefits to the proponent, or particular parties, rather than the economic costs and benefits to society.

Some of the characteristics of this approach that are particularly relevant to the Project are that:

- It compares the cost and benefits of the Project to what would otherwise be expected happen in the absence of it proceeding. On this basis, only incremental economic costs and benefits are considered. In other words, all sunk costs or costs that are likely to be incurred anyway are ignored. The costs and benefits considered are total incremental economic costs or benefits that the investment will incur or produce.

  This is relevant to the Project because it potentially contains several phases or approaches, which may be undertaken for different purposes and involve different costs and benefits. The Project also has a long history and key stakeholders have expectations influenced by it.

- All types of economic costs and benefits are considered. This includes ‘external’ costs and benefits, including determining whether they can be:

  - quantified
  - monetised
  - described only in a qualitative way; regardless of who bears those costs or enjoys the benefits. It therefore assesses the cost and benefits from a “societal” or community perspective. It also focuses on ‘first round’ or direct impacts, but also discusses ‘second round’ impacts where they may be material.21

  This perspective is relevant to the Project because some of the benefits relate to the external benefits of reducing salinity and are particularly difficult to quantify.

- It separates consideration of the investment decision from the funding decision. In other words, the approach focuses on whether the Project is justified based on the economic costs and benefits associated with it. This section does not consider who bears the costs (i.e. how those costs might be funded or how the use of any assets created might be priced).22

  This is relevant to the Project because of the different funding options that have been proposed for it, or parts of it, using government and private sources.

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21 The first round impacts are the primary impacts caused by the investment decision. Second round impacts typically look at how the first impacts affect prices (and stakeholders’ incentives) and thus their behaviour.

22 In principle, if the investment produces net economic benefits (i.e. generates wealth), funding decisions are about the sharing of the costs and benefits to ensure the investment proceeds and the parties’ incentives are aligned with achieving the benefits. Consistent with this, this approach also ignores transfers of wealth. Transfers typically relate to how the costs and benefits are borne by the various parties and shifted between them as a result of any new decisions, in part by virtue of funding and pricing decisions.
5.4 The socio-economic costs of the Project

From an economic perspective, the Project involves investing to reduce the salinity of the water in Wellington Reservoir to provide greater opportunities for its use (and thus value).

In relation to costs, as Section 5 discusses, the Project involves:

- the capital costs of developing the desalination plant and associated infrastructure
- the operating and maintenance costs of using that infrastructure
- the incremental costs of using associated infrastructure (e.g. the saline disposal pipeline).

These costs have been put at $54 million in net present value terms.

5.4.1 Incremental economic costs

It is not obvious, however, that all of these costs are relevant to the socio-economic evaluation. The reason is that not all the costs may be incremental (i.e. some may be incurred anyway). In addition, there are some proposals (albeit highly conditional) around that may involve expenditure directed toward achieving similar outcomes.

The cost of using the Saline disposal pipeline

The financial evaluation includes the price that the Project proponents may have to pay to use Verve Energy’s Saline Water Disposal Pipeline. This cost represents $11 million or 20% of the net present total cost. However, this price does not necessarily reflect the incremental costs that will be imposed by allowing the Project to use the Saline disposal pipeline. Indeed, given there is spare capacity in the pipeline and it is gravity driven, the incremental costs of the Project utilising it, are likely to be very low. This cost is therefore ignored for the purposes of the economic evaluation.

The Project could conceivably create some other broader incremental costs that are not captured in this analysis. One such possible cost is either additional investment in effluent saline concentration and/or bringing forward the time at which the saline disposal pipeline may need to have its capacity increased. It is more likely to be the former if the Project does not seek to optimise this outcome, but these costs may be incurred anyway, as discussed below.

The Perdaman Chemicals & Fertilisers Proposal

Appendix A summarises the Perdaman proposal to construct the desalination plant.

The Department understands from Perdaman Chemicals & Fertilisers that, in the event that its urea plant proceeds (a final decision is expected in January 2010), it will need to gain access to water of various qualities to meet the needs of its plant and access to the Saline Water Disposal Pipeline. Its proposal is therefore driven by the need to get access to water and dispose of its effluent.
Its current options are to acquire mine de-water, groundwater allocations from those parties that already have them, or desalinate (and treat) water from Wellington Reservoir. Its proposal focuses on the latter and achieving higher concentrations of saline disposal, so that Verve Energy’s Saline Water Disposal Pipeline can be used, but not need to have its capacity increased.

In other words, if the Project did not proceed via the Department, Perdaman may need to invest in desalination anyway. The key differences may be that it might either choose to invest in:

- a larger desalination plant similar to the Project, but which also enables it to treat water ex-Wellington Reservoir
- infrastructure that only seeks to desalinate water ex-Wellington.

The worst case scenario for the Department would be that Perdaman decides to treat all the water ex-Wellington and so the Department’s objective is not met. The implication is that some investment in desalination may occur anyway, such that:

- many of the costs of the Project may be incurred anyway
- there would be merit in working with Perdaman to ensure that the investment that is made achieves both parties’ objectives, whilst minimising the overall cost.

The Griffin Energy Proposal

The Department understands that Griffin Energy has put a conceptually similar but more ambitious proposal to the Department, which would focus on salinity recovery for the entire Collie Basin. It would also meet its needs regarding saline disposal in particular. At this stage Griffin Energy have not presented their proposal in detail but a holding letter from Griffin Energy is in Appendix B.

The implication would appear to be similar to the Perdaman proposal (i.e. if the Project does not proceed, Griffin is likely to need to invest to manage its saline disposal needs regardless, so there should be an opportunity to optimise the overall investment).

Summary

For the purposes of this analysis, the potential of these proposals to reduce the incremental costs of the Project have been ignored, due to the uncertainties and long lead times (2013+) associated with them. There is, however, a significant chance that at least some of the costs of the Project would be incurred anyway. In addition, it shows that there may be more cost effective options available to the Department, and therefore Government, if it is prepared to work with these parties to develop a solution that addresses the needs of all parties.

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23 This may be a less cost effective option for Perdaman anyway (i.e. because at least partial upstream desalination may be a more cost effective way of delivering the water it needs).
5.5 The socio-economic benefits of the Project

In relation to benefits, the Project has the following potential benefits:

- increased economic activity in the irrigation sector
- increased sustainable yield of Wellington Reservoir
- facilitate changes in irrigation system operation and release potable water into the IWSS
- facilitate the sale of more fit-for-purpose water to industry and potentially release potable water
- production of potable water at the desalination plant
- improved environmental outcomes via less salinity damage
- improved social outcomes (e.g. improved amenity).

There may be a number of broader benefits, including:

- the option value the Project potentially creates, including additional investment to enable more ‘fit-for-purpose’ water use by:
  - producing further improvements in how water is used and thus valued (e.g. in on-farm land use and irrigation efficiency improvements)
  - releasing more water for industrial use (e.g. with pipeline investment direct to the Kemerton Industrial Park)
  - to further defer or avoid the need for more investment in potable water sources
- encouraging more water trading
- avoiding costs that may otherwise be incurred by industry in the Collie Basin
- regional development and employment.

5.5.1 Examining the benefits

The analysis below:

- examines the nature of the benefits outlined above
- estimates their magnitude where they can be quantified and/or monetised, or discusses their qualitative features where they cannot
- identifies and examines the material risks associated with them.
As with estimating the benefits in any benefit-cost analysis, this process inevitably involves making judgements, particularly where limited data is available. Where such judgements are made, the basis for them is made transparent and is tested by using sensitivity analysis. It also relies on confidential information and discussions held with a number of key stakeholders.

5.6 **Increased economic value of irrigation production**

The Project will allow for greater value to be generated by the irrigators in the Collie Irrigation District (and potentially beyond). More specifically, reduced salinity has the potential to:

- improve productivity by changing land and water use practices in existing activities:
  - Currently irrigators are provided with an allocation for approximately a third of their landholdings and use channels and flood irrigation techniques. They typically only have that proportion of their land in a position to use irrigation water. This land is typically the land most suitable for the use of these methods (i.e. it is usually the lowest lying land and requires laser levelling, costing around $14,000 per ha). Sometimes this land is not that particularly productive because it is already heavily salt affected by the long period of higher salinity water flows.
  - The flood irrigation techniques used take into account the salinity of the water. This means that more water is used, but it is more rapidly applied and drained from the irrigation area to ensure the ground gets the moisture it needs, but the amount of salt disposition is minimised. With relatively less saline water the risk of excessive salt disposition would be reduced and less water would be used.

Reduced salinity is likely to encourage irrigators to expand the area of land under irrigation and adopt different irrigation techniques to improve water use efficiency and production (e.g. extend growing season, which obviates the need to buy feed for livestock).

- improve productivity by changing the land use activity undertaken. As salinity levels in water decline, a wider range of crops, which generally are more valuable, can be produced.

- improve productivity by increasing total land area for irrigation. Reduced salinity would encourage the use of land outside the irrigation District for irrigation purposes. The Department understands that there are opportunities to make productive use of better quality water on land to the south of the existing Collie Irrigation District (see Figure 5 in Appendix G). This would require some investment in channels or piping also.

The opportunity to create greater value in irrigation production is a function of a large number of variables, including:

- the extent of the salinity reduction and the consistency of salinity levels
- the timeframe over which the reduction in salinity occurs
- the volumes of water available and its levels of security

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24 Communication with Harvey Water.
• the efficiency with which water is used

• the improvements to production processes for existing irrigation activities that reduced salinity would enable

• the expansion of existing, or the introduction of new, value adding irrigation activities that reduced salinity would enable

• the expansion of irrigation activities in the region

• the cost of getting potentially greater volumes of water to existing and new users

• the prevailing conditions in the irrigation District (e.g. soil conditions).

Estimating the potential improvement in irrigation production value is therefore difficult. Nevertheless, there are two main ways of estimating the economic value created by the investment in the Project from changes in irrigation practices:

• the change in the gross value added by irrigators

• the change in the value the market assigns to the water.

Both approaches are used below to test the reliability of the estimates.

5.6.1 Changes in gross value added through irrigation production

The change in gross value added is a function of a number of factors, including:25

• any changes in irrigation farming techniques amongst existing users and the area under irrigation

• any changes in the type of crops produced

• any changes in the volume of crops produced (i.e. improvements in yield)

• the value associated with the production of these crops

• the timeframes over which this occurs

• any additional costs required to secure these benefits.

These benefits have been estimated previously in a report by URS for the Water and Rivers Commission (now the Department of Water).26

25 The gross value add in this context is that applied by the ABS whereby value added is output less the value of goods and services consumed as intermediate inputs to the process of production. Gross value added is before capital costs but after operating costs.

26 URS Sustainable Development, May 2003, Final Report to Water and Rivers Commission, Economic Benefits of Reducing Salinity in Wellington Reservoir and the Collie River. In contrast to the ABS, the URS measured benefits
**URS Study findings**

In 2003, URS prepared a report for the Water and Rivers Commission on the economic benefits of reducing salinity in the Wellington Reservoir and the Collie River. Five investment options were assessed each having a different impact on the level of salinity over a 25 year period.

The study included several economic benefits including the value to:

- irrigated agriculture
- urban and industrial water sales
- urban and industrial consumers.

For the purposes of this analysis the focus is on the URS results for benefits to irrigated agriculture. This is because:

- The URS paper concludes the benefits to water sales would be zero assuming no increase in the (then) current 15 GL allocation to the Water Corporation.
- The benefits to urban and industrial consumers are somewhat hypothetical in the sense that they presume use of the existing water and therefore the improvement from using less saline water. In practice, the water is not being used currently by these users. These users are currently using water from other sources including potable systems, which would come at a higher cost, but lower salinity. For them the trade-off would be between the costs savings associated with shifting from these sources to Wellington Reservoir water, and any additional costs incurred (e.g. due to the higher salinity).

The irrigated agriculture benefits were calculated by estimating the impact on agricultural production both via increased hectares of irrigated land and productivity improvements. The assumed rates of change in land use were based on the level of investment in horticulture (grapes, citrus and vegetables) in the Harvey Irrigation District, where water salinity is not a significant issue.

Five land use categories were considered including; dairy, beef, fodder, grapes, citrus and vegetables. The study assumed no change in the area for dairy, beef and fodder and a maximum increase of 300 hectares across grapes, citrus and vegetables.

A function converting the salinity level to yield was used to estimate the impact on yield for each land use type. Table 11 is taken from the URS report and shows the tolerance of the different crops to saline water. Table 11 indicates that for each crop there is a different salinity threshold for which there is no further yield loss when salinity declines further.

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by taking the difference between profit at full equity with no yield loss to profit at full equity with a loss in yield (due to higher salinity levels).
Table 11: Yield Thresholds – Tolerance of Crops to Irrigation with Saline Water

<table>
<thead>
<tr>
<th>Irrigated Enterprise</th>
<th>Yield Loss at x mg/L TDS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0%</td>
</tr>
<tr>
<td>Dairy</td>
<td>650</td>
</tr>
<tr>
<td>Beef</td>
<td>650</td>
</tr>
<tr>
<td>Fodder – Maize</td>
<td>605</td>
</tr>
<tr>
<td>Grapes</td>
<td>550</td>
</tr>
<tr>
<td>Citrus</td>
<td>605</td>
</tr>
<tr>
<td>Vegetables</td>
<td>500</td>
</tr>
</tbody>
</table>

Source: URS 2003

Table 11 shows that on average, reducing salinity from 800 mg/L to around 600 mg/L will improve yield for all crops by around 10 per cent. This function was used to calculate the change in profit for each land use type. The conversion to profits took into account factors such as the reduced water usage due to less flushing.

The net present value of the benefits to irrigated agriculture, which ranged from $2.2M to $20.7 million, were presented for all five investment options plus one option which combined two of the five options. The report focused primarily on the combined option which involved diverting 50% of flows into mine voids and planting upland trees. This resulted in an immediate decline in the level of salinity from 800 mg/L to 600 mg/L and a further gradual decline starting in year 10 from 600 mg/L to 550 mg/L then levelling off from year 16. The results indicated this option would deliver benefits of around $20.7 million over the 25 year period using a 7% discount rate. In comparison the option to divert 50% of flows into mine voids (but not plant upland trees) reduced salinity to 600 mg/L from the first year onwards, with no further reduction, and delivered benefits of $16.9 million.

A key finding of the study was that the vast majority of benefits were due to productivity improvements (i.e. the effect of lower salinity on yield) rather than increased hectares of horticulture crops. For example under the combined option (described above), $19.4 million of the benefits were attributable to improved productivity and increasing horticulture land use by 300 hectares provided additional benefits of only $1.1 million.27

Applicability of URS findings

The results of the URS study provide a useful benchmark for assessing the economic benefits to irrigated agriculture of the Project for the following reasons:

- The study assessed the incremental economic benefits of reducing salinity in the same irrigation District and uses a conventional approach.

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27 The URS study assumed 160 hectares additional irrigated horticulture crops and an additional 40 hectares in additional vegetable crops (from discussion with URS).
The investment options assessed in the URS report resulted in salinity levels broadly comparable to the Project.\(^{28}\)

Changes in farming techniques and water use efficiency were included in the calculation of benefits.

However, there are several factors to consider before applying the benefits to this business case:

- The URS study does not account for existing irrigated land changing to an alternative use, or existing irrigators expanding their area under irrigation. There are likely to be additional benefits if existing farmers were to switch their land use following the reduction in salinity. For example, farmers on irrigated land used for dairy and beef cattle maybe used part of their land for higher value land use, such as horticulture. Alternatively, they are likely to devote additional land to irrigation. Both of these changes have occurred in the Harvey Irrigation District.

This would appear to understate the likely benefits of lower salinity.

- The URS assumption that the rate of change to additional horticulture land use will be the same as investment in the Harvey irrigation District does not appear to consider the different cost of water across the Districts. Over the past 7 years the price of permanent transfers of irrigated water in the Harvey Irrigation District has been over 15 times more expensive than permanent transfers in the Collie Irrigation District (see Appendix G). The price of water in the District is likely to increase if its quality improves. However, if the price continues to remain substantially below the price in the Harvey District, but with a salinity level that does not significantly affect crop yields, then the land use profile in the Collie District may differ to the Harvey District and change more quickly.

- Since the URS study several developments have affected land use techniques and use of water across the Districts. Investment in pipelines between the Collie and Harvey Districts has enabled water from Collie to be transported to the Harvey District and blended for use on irrigation farms.

The potential benefits to irrigated agriculture from investing in the Project, as it relates to changes in land use, are investigated below.

### 5.6.2 Estimating the impact of changes in the use of irrigated land

The impact of the Project on changes in the use of existing irrigated land has been estimated by:

- examining the difference in land use across the Harvey and Collie Irrigation Districts over the past 7 years
- making assumptions based on this data regarding potential changes in land use in the Collie District following a reduction in the salinity levels from 750 mg/L to 615 mg/L

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\(^{28}\) The Project proposes to reduce salinity from 750mg/L to 615mg/L, which is somewhat smaller in proportional terms to the reduction assumed by URS (i.e. 25% and 18% respectively). URS uses a higher starting point.
• using Department of Agriculture and Food (WA) estimates on the gross margin per hectare of land for various farming enterprise types (e.g. dairy versus horticulture) to estimate the economic benefits of a change in land use as a result of reductions in salinity levels.29

The agriculture production that has been lost in recent times because of the increase in salinity levels is also estimated.

Land use change across Districts

Harvey Water provided data on the number of irrigated hectares for each land use type in the three Districts – Harvey, Waroona, and Collie. Key developments in the Harvey and Collie Districts are outlined in Table 12.30

<table>
<thead>
<tr>
<th>Harvey irrigation District</th>
<th>Collie irrigation District</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total irrigated hectares have <em>increased</em> by around 20% from 1998 to 2007.</td>
<td>Total irrigated land <em>decreased</em> by around 33% from 1998 to 2008.</td>
</tr>
<tr>
<td>Dairy’s share of irrigated hectares has declined from around 65% in 1998 to 48% in 2007.</td>
<td>Dairy’s share of irrigated land declined from 53% in 1998 to 33% in 2008.</td>
</tr>
<tr>
<td>Beef’s share of irrigated hectares have remained relatively constant around 25% from 1998 to 2007</td>
<td>Beef’s share of irrigated land increased from 36% in 1998 to 46% in 2008.</td>
</tr>
<tr>
<td>The combined share of vegetables, grapes and citrus increased from around 3% in 1998 to 11% in 2007</td>
<td>The combined sum of vegetables, grapes and citrus is around zero and has shown no growth over the period.</td>
</tr>
</tbody>
</table>

Thus there are clearly several key differences in the land use trends across the two Districts. Moreover, the soil salinity in some parts of the Collie District has already been substantially affected over time by water salinity. This means some of it is less likely to be suitable to high value uses, even with the improvement in water salinity.

Estimating the benefits

The benefits have been estimated by:

• Assuming a reduction in salinity to 615 mg/L will result in a change in the land use of existing irrigated land. The strong growth in horticulture crops in the Harvey District suggests that much of this growth is likely to be in the horticulture industry.31 However, several factors will have a bearing on the degree to which this takes place, such as the:

  - price of water in the Collie District as compared to the Harvey District
  - capacity of existing land to switch to an alternative crop due to issues like soil type

29 The URS gross profit figures were not published for each land use type therefore it is not possible to reconcile their figures with the more recent data.
30 Data was not available for the Harvey District for 2008. The Waroona District is not used for the reasons identified.
31 Further, according to the Collie-Wellington Basin Water Source Options Steering Committee, there is scope for a significant increase in the amount of irrigated agriculture land and given the increased pressure on horticultural land close to Perth over time intensive horticulture activity could develop in the region. Collie-Wellington Basin Water Source Options Steering Committee, 2007, Final Report to the Minister for Water Resources, *Water source options in the Collie-Wellington Basin*
salinity levels of the water in each District (i.e. 200 mg/L in the Harvey District versus 615 mg/L in the Collie District).

- Using the URS estimate of $16.9 million over a 25 year period using a 7% discount rate to capture the benefits from increased irrigated land and productivity improvements.\(^{32}\)

- Adding an estimate of the net benefits from a change in land use to the URS estimate above. This was calculated by assuming a 5% reduction in beef and a 5% reduction in dairy’s share of total irrigated land and a corresponding 10% increase in horticulture crops.

The additional benefits from the change in existing land use are estimated by applying the net increase in the gross margin from a change to horticulture from beef or dairy and multiplying this by the number of hectares changing land use.\(^{33}\) Table 13 outlines the gross margins applied. These are sourced from the Department of Agriculture and Food in Western Australia and apply to the Scott Coastal Plain in Southern Western Australia.\(^{34}\)

<table>
<thead>
<tr>
<th>Land use type</th>
<th>Gross margin ($/ha)(^{(a)})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy</td>
<td>$929/ha</td>
</tr>
<tr>
<td>Beef</td>
<td>$176/ha</td>
</tr>
<tr>
<td>Horticulture</td>
<td>$4,152/ha</td>
</tr>
</tbody>
</table>

\(^{(a)}\) The gross margin of enterprise equals output less variable costs of production (i.e. it excludes fixed costs).

The results indicate that after accounting for zero benefits in the first 5 years of the Project, the NPV over the full 25 year period using a 7% discount rate yields total economic benefits to irrigated agriculture of $17.2 million, of which:

- $12.1 million in benefits from increased productivity and a 10% increase in total irrigated land.\(^{35}\)

- $5.1 million in benefits from the change in existing land use.

### 5.6.3 Summary using the gross value added approach

The benefits discussed above provide an indication of the incremental economic value to irrigated agriculture from the Project. The analysis suggests around $17.2m in benefits,

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\(^{32}\) This figure was adjusted by inflating to 2009 dollars and the benefits delayed until 2016.

\(^{33}\) The change in hectares was calculated as 10% of the average irrigated hectares over the past 3 years.

\(^{34}\) This assumes the salinity level in this District is below the level that would reduce the yield for each of the horticulture crops. Therefore to account for the slightly higher salinity in Wellington Reservoir the gross margin per hectare was adjusted using the yield salinity function from the URS paper (i.e. the gross margin for horticulture crops was adjusted down by the average yield loss from increasing salinity from the 0% yield loss for each horticulture crop to 615 mg/L). This approach assumes an increase in the relative productivity of the land resulting from lower salinity levels will translate into higher gross margin per hectare this implies that all other variable factors remain constant (for example volatility in market price of commodity and various input prices such as labour and fertiliser). However, an alternative proxy measure of productivity improvements was unavailable. Further, the gross margin does not subtract fixed operating costs and therefore is likely to overstate the gross value add. To account for this, the benefits from additional horticulture land were revised down by 20% (based on the assumption fixed operating costs accounted for this portion of costs).

\(^{35}\) This is the URS result adjusted for the time it will take to realise the benefits (i.e. 2016) and for inflation.
however, this is based on several key assumptions that are likely to have both upside and downside risks, in particular:

- The URS figures used to estimate the impact of increased productivity of existing land use and an increase in total irrigated land may be outdated given changes in irrigated agriculture over the past 6 years.

- The URS assumption that horticulture growth in the Collie District will reflect the growth in the Harvey District does not account for differing water prices and the higher salinity level in the Collie District (even after the investment is made). The net impact of these offsetting factors is difficult to estimate.

- The 10% increase in horticulture’s share of the existing irrigated land may take time to evolve rather than occurring at the same time that salinity is reduced to 615 mg/L (in 2015), however offsetting this may be a greater share of horticulture given the anticipated demand in the region.

5.6.4 Changes in the market price of water

An alternative method to capture the benefits of improving salinity is to identify how the value of the water might change. In practice, however, it is complicated by limitations on the available data and volumes traded. As a result, it is used as a cross check on the analysis of gross margins undertaken above.

Appendix A outlines the available historical evidence on the value of water across the three irrigation Districts in the South West. The value of water across the three irrigation Districts vary for a number of reasons, including the:

- demand and supply for water

- quality of the growing conditions in the various Districts (e.g. soil types)

- quality of the water and its security level.

Purchases of irrigation land by Alcoa in the Waroona District to ensure the ongoing viability of its operations in the area makes this data difficult to interpret. Therefore the focus is on the differences between the Collie and Harvey Irrigation Districts.

It would not be reasonable to expect the value of water to be similar across the Collie and Harvey Irrigation Districts. It is, however, probable that changes in the quality of water will affect the demand for water and thus its price in any particular District (and perhaps in both Districts, to the extent that substitution can occur).

The data shows that:

- Both volumes and prices for temporary and permanent transfers have been volatile in the Harvey and Collie Districts over the past 7 years.

36 The values here do not capture directly the cost of providing the water, for which there are separate charges.
The average volume over the past 7 years of temporary transfers in the Harvey District is around double the average volume traded in the Collie District.

The average price for temporary transfers over the past 7 years in the Collie District (average $11/Ml from 2002 to 2008) is less than half the average price in the Harvey District (average $25/Ml from 2002 to 2008).

In contrast to the temporary transfers, the average volume of permanent trades in the Harvey District is almost half the average volume traded in the Collie District.

On average over the past 7 years, the price for permanent transfers in the Harvey District is over 15 times the price in the Collie District (in 2008 the price in the Harvey District was $493/Ml compared to $35/Ml in the Collie District).

Unfortunately, identifying the extent to which the reduction in salinity would influence the market price of water is difficult based on the market evidence alone. Given this, it is only possible to undertake some sensitivity analysis to assess the potential changes in value given the change in salinity.

Table 14 shows the salinity level and 3-year average temporary and permanent price in the Harvey and Collie Districts. The salinity level assumed for Collie is based on the current outflows from Wellington Reservoir.37

<table>
<thead>
<tr>
<th>District</th>
<th>Salinity</th>
<th>Temporary transfer</th>
<th>Permanent transfer price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harvey</td>
<td>200mg/L</td>
<td>$36/ML</td>
<td>$480/ML</td>
</tr>
<tr>
<td>Collie</td>
<td>1,100mg/L</td>
<td>$9/ML</td>
<td>$25/ML</td>
</tr>
</tbody>
</table>

Assuming a linear relationship between the price and level of salinity, Table 15 outlines the potential prices in Collie District following a reduction in salinity to 615 mg/L.

<table>
<thead>
<tr>
<th>District</th>
<th>Salinity</th>
<th>Temporary transfer</th>
<th>Permanent transfer price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collie</td>
<td>615 mg/L</td>
<td>$20/ML</td>
<td>$270/ML</td>
</tr>
</tbody>
</table>

The price for temporary and permanent water traded in the Collie District has averaged $9/Ml and $25/Ml respectively over the last three years.38 This implies a value for the entire allocation of Wellington Reservoir of about $1.9 million on a permanent basis. This is for non-potable water with a salt content of around 1,100 mg/L tds (but also quite variable salt content).

In the Harvey District, the average price for temporary and permanent water traded has averaged $36/Ml and $480/Ml respectively over the last three years. This is for non-potable water with a salt content of around 200 mg/L tds, which is lower than that proposed for Wellington Reservoir.

37 This is what Harvey Water claims it receives, although this will fall over time assuming inflows are now 900 mg/L.
38 This is up to the year ended 2007/08. The volumes traded are, however, small, which is consistent with the absence of scarcity. In these circumstances, some trading (i.e. particularly for temporary water) occurs at reasonably ‘nominal’ values to recover some of the charges the irrigator would otherwise occur.
On the basis of the above, the value of permanent water in Wellington Reservoir would be:

- $23 million if the value of the water increased in direct proportion to the reduction in salinity.
- Up to about $41 million if a salinity level the same level as the Harvey District was achieved.\(^{39}\)

The market value may be understated due to the assumption that the relationship between the level of salinity and the market price for water is linear. In practice, this relationship is likely to be non-linear with larger price increases once the level of salinity reaches certain levels but smaller improvement in value for salinity levels below this point. This would be consistent with the evidence on yield loss associated with salinity (see Table 11). If, for example, reducing salinity captured 65% of the benefits, the market price of water in the Collie District might be somewhat higher (e.g. around $310/ML) and the increase in the value of the water in Wellington Reservoir would be around $24.5 million.

5.6.5 Summary of changes in the value of economic production

The analysis indicates both methods of calculating the benefits to economic production produce similar results:

- $17.2 million in the gross value added by irrigators.
- $21.1-24.5 million in the change in the value the market assigns to the water.

Both are well within the feasible range (as defined by the value of water in the Harvey District) and therefore are likely to be conservative.

An alternative approach to testing the benefits of reducing salinity is to measure the foregone irrigated agriculture production that has arisen in recent times because of the rise in salinity. This is estimated at approximately $33.6 million. Again, this provides some indicative support for the magnitude of the benefits identified in the analysis above.\(^{40}\)

5.7 Increased sustainable yield of Wellington Reservoir

The Project will increase the sustainable yield of Wellington Reservoir and potentially allow for higher allocation limits, or perhaps allow for higher environmental flows.

Wellington Reservoir has a capacity of 185 GL and an allocation limit of 85 GL/a.

\(^{39}\) Although in these circumstances, prices in the Harvey District might fall in the first instance, but new demand might also arise.

\(^{40}\) This was estimated by assuming the total hectares of irrigated land in the Collie District increased by the same amount as the Harvey District over the period 1998 to 2007 (i.e. an additional 2500 hectares in 2008). The benefit was estimated by calculating the difference in the value of production under the two scenarios (i.e. the actual level of production in 2008 and the hypothetical level of production assuming the Harvey growth rate). This approach applied the actual share of dairy and beef in the Collie District but increased the horticulture share to 10% to reflect the Harvey District and estimated the benefits by multiplying actual hectares by the gross margin.
The allocation limit is currently affected by the degree of scouring that occurs to manage salinity. With larger reservoirs the density of water with different salinity and oxygen levels cause them to separate. This process, called stratification, sees the denser salty water lay beneath the fresher water. Scouring involves releasing higher salinity water at the bottom of the reservoir at particular times of the year when the difference in salinity of water in the Reservoir is greater than 400 mg/L. The degree of scouring in any year is driven by a number of variables. For example, over the last eight years the volume has ranged between zero and 41 GL, with an average of about 18 GL.

A reduction in the salt content will reduce the need for scouring. It is expected that only a proportion of the feasible reduction from scouring would be achieved because significant quantities would still be required for environmental flows.41

A reduction in the salt content from 750 to 615 mg/L may increase the sustainable yield potentially by 5 to 10GL.

For the purposes of estimating the potential benefits if we assume the increase in sustainable yield was 7.5GL and the price in the Collie region increases as discussed in Section 5.6.4, then the possible benefits are:

- $2 million per year assuming a price of $270/Ml.
- $2.3 million per year assuming a price of $310/Ml.

5.8 Changing irrigation system operations and releasing potable water

The reduction in salinity will facilitate changes in irrigation system operation and allow for the release of potable water into the IWSS. In summary, this is because:

- The reduced salinity of Wellington water will facilitate its greater use by Harvey Water.
- The Collie Irrigation District is now inter-connected to the Harvey Irrigation District, which facilitates the use of Wellington water in the latter and displaces the need to rely on water from the Harvey catchment.
- Harvey Water has allocations in two potable sources that it uses as necessary to provide for its existing uses.
- The above strategy would free up this allocation for possible sale of the allocation to the Water Corporation or other parties.
- This process requires no capital expenditure but would involve some pumping costs (i.e. to get water from Wellington to Harvey Reservoir).

More specifically, Harvey Water recently invested $7 million primarily in pipework to integrate the operation of the Collie Irrigation District with the Harvey Irrigation District. This has benefits for Harvey Water because it enables it to provide fit-for-purpose water by shandying

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41 Studies are currently underway to establish what those environmental flows should be under these prospective conditions.
the higher salinity Wellington Reservoir water with the much lower salinity Harvey Reservoir water (200 mg/L). This allows it to provide either higher levels of security to irrigators (which improves the value of water rights) or provide more water but of a somewhat higher salinity, whilst remaining fit-for-purpose. The primary objective at the moment is to improve security, because the key issue in the Harvey District is water quantity rather than quality.

Harvey Water currently has allocations in Stirling Reservoir and Samson Brook Reservoir, which are both potable sources and part of the IWSS (see Appendix G Figure 5). Harvey Water has confirmed that the greater use of Wellington would displace some of the existing use of water from these reservoirs. In this regard, the Department understands it is currently in negotiations with the Water Corporation regarding swapping some of its existing allocations in these two reservoirs for allocations the Water Corporation has in Logue Brook and Harvey Reservoirs (not potable). The Water Corporation has an allocation of approximately 5 Gl in Logue Brook Reservoir, but this reservoir has been allocated to recreational use and can therefore no longer be used as a potable source.42

A reduction in the salinity of Wellington Reservoir means that this swap could be extended to cover the sale of the additional allocation made available by greater use of this source. There is precedent for this (see below). The Water Corporation has confirmed that this could be achieved with no new investment.

The Department understands Harvey Water is currently using 4 to 6 GL/a from Wellington Reservoir for this purpose. It is likely that with lower salinity, Harvey Water would expand the use of Wellington Reservoir water for this purpose. They have indicated that with a reduction to around 615 mg/L, it would approximately double its use of Wellington water for this purpose to 8-12 GL/a.

The reduction in salinity of Wellington Reservoir under this Project creates the opportunity to create about 25% of the benefits outlined above or roughly 1 to 1.5 GL/a.

The Harvey Water and Water Corporation trade

In 2006, Harvey Water and the Water Corporation entered into an arrangement which involves the Water Corporation providing the funding to allow Harvey Water to pipe its irrigation District (now complete), in return for Harvey Water granting certain potable water allocations to the Water Corporation on a permanent basis.

The agreement is being phased in from 2005-06 to 2009-10. The associated water entitlement trades are being assessed and approved each year as each stage of the piping projects proceeds. By 2009-10, entitlements totalling 17.1 GL/a are expected to be permanently traded from Harvey Water to Water Corporation.

An overall price per Ml can be inferred from Water Corporation’s payments to Harvey Water for the costs of the piping Project. By 2009-10, the Water Corporation will have paid Harvey Water $72 million towards the piping project. This is equivalent to a permanent trade price of $4,210 per ML (or $4.21/KL).43 In practice, this is likely to be significantly lower than the

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42 At least, without changes in existing rules around the use of water.  
43 Resource Economics Unit, Inquiry into Competition in the Water and Wastewater Services Sector: Water Trading Issues, Prepared for the Economic Regulation Authority, 30th October 2007, page 24. This is before transfer and
avoided costs of a new desalination plant. However, due to the uncertainty in regard to what the avoidable costs might be, this figure has been used.\footnote{44}

5.8.1 **Summary**

On the basis of the above, the reduction in the salinity of Wellington Reservoir under Phase B will create value of around $4-6 million on the basis of the price the Water Corporation has previously shown a willingness to pay, through the release of potable water.\footnote{45}

More potable water is likely to be released for the IWSS to the extent that industry is attracted to Kemerton (e.g. as opposed to establishing operations in Perth) in part because it provides fit-for-purpose and cheaper water. The benefits this is likely to provide are, however, much more difficult to measure.

Indeed, these options are likely to be amongst the most cost effective way of releasing potable water from improving water resource management in the Collie District, because it involves low investment costs. It is also consistent with the options approach to potable resource augmentation recommended by the Economic Regulation Authority (ERA) (see below).

5.9 **Using more fit-for-purpose water to the industrial sector**

The Project would facilitate greater use of more fit-for-purpose water in the industrial sector and in the Kemerton Industrial Park in particular. The Department understands Harvey Water has a channel to the Kemerton Industrial Park and currently supplies at least one customer, albeit at a reasonably modest quantity. Lowering the salinity of Wellington Reservoir would encourage greater sales of fit-for-purpose water to industry. Indeed, Harvey Water has indicated that it could provide it with an incentive to invest in a pipeline direct from the Collie irrigation area to the industrial park, but this is unlikely to occur in isolation (i.e. without piping the irrigation area).

To the extent this encouraged industry to locate in this area it is likely to defer investment in the potable water system (e.g. either in the IWSS or perhaps Bunbury). This option is likely to be most attractive to large water uses who need water of industrial quality, and who would otherwise incur significant costs using potable water.\footnote{46} This will usually involve businesses that have significant process cooling requirements (e.g. such as electricity generation).

Information on the prices that industry would be prepared to pay for water is scarce. Where they use potable water large non-residential users (over 1.1 GL/a) in metropolitan Perth currently pay $1.028/kl (or just over $1,000/ML). It should be noted that this is significantly lower than the unit cost of a second desalination plant, which the Department understands has been costed by the Water Corporation at $1.90/kl or $1,900/ML.

\footnote{44}It is possible that the Water Corporation would argue that new potable supplies are now worth less to it because it has decided to construct the second seawater desalination plant, but there is also some debate about precisely the appropriate cost to attribute to such a plant.

\footnote{45}The value might be higher in terms of avoided costs.

\footnote{46}Notwithstanding that the lower salinity allows for cycling the water through a plant more times and requires less infrastructure such as storage to manage the lower quantity of water.
Information on the price electricity generators are prepared to pay for water for cooling purposes, and other industrial users are prepared to pay for a variety of different uses is, however, more scarce. Indeed, most electricity generators do not pay market prices for water. There are instances of electricity generators paying prices of around $500/Ml on a temporary basis, and $3,000/Ml on a permanent basis for a medium priority right. Moreover, it is likely to be necessary (and the evidence supports) the view that industry typically is able to pay (and must be able to pay) more for water than irrigators to get access to supply.

5.9.1 Summary

The greater use of fit-for-purpose water in the industrial sector is likely to deliver economic benefits by deferring the need for augmentation of the potable water system. Any significant increase in industrial use would therefore provide significant benefits (along the lines suggested for changes in irrigation system operation). It is, however, very difficult to estimate the extent to which this would occur and thus the economic benefits it might provide.

The Department understands that there are arrangements in place that means demand in the Kemerton Industrial Park will be at least 5 GL/a by 2013-15. If this replaces potable use, then it would create value per GL similar to that associated with changing irrigation system operation (i.e. $4,210/Ml for a permanent trade), or up to $21 million in nominal terms.

5.10 The production of potable water

The Project will involve, essentially as a by-product, the production of up to 3.7 GL/a of potable quality water (at least in so far as its salinity is concerned) for 20 years. It would also be high security water. In principle, this water could either be:

- treated and used as potable water (e.g. by putting it into the IWSS), although this would involve additional costs particularly to get into the potable system
- used as high quality industrial water by neighbouring industry, which may also involve some transfer costs.

The main disadvantages with this water are that, the quantity is not substantial, and the investment required to access it is difficult to ascertain and may be prohibitive.

Placing a precise value on this water is therefore difficult. The simplest way to do so would be to auction the rights to this water. KPMG’s consultation with various stakeholders have suggested that the value of this water would be difficult to determine. For example:

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47 *This is from confidential sources.* There are also expectations in a number of cases of those temporary prices increasing considerably over the medium term. The quality of water in some of those cases differs from that which is likely to be provided in the Collie District.


49 The water value assumed here might be toward the high end of a reasonable range (e.g. as some industry might otherwise find and use other non-potable ground water resources), but the volumes essentially assume no other growth in the Kemerton Industrial Park, which would appear to be a conservative assumption.
• If it is competing with mine de-water (for the costs of ‘production’ i.e. pumping must largely be incurred anyway), its value is likely to be very low. In this case, however, it is likely to have more value being placed into Wellington Reservoir and contributing to a greater reduction in salinity.

• If it is competing with ground de-water, its value will reflect at least the pumping costs and the scarcity value of ground de-water of a similar quality and reliability. In these circumstances, its value is likely to be significantly higher.

• If it is competing with alternative sources of similar water in the District (i.e. the use of Wellington water desalinated to a similar level and transported to the Collie Basin). Based on discussions with stakeholders in the region, the latter scenario seems the most plausible. Based on this scenario and discussions with stakeholders, a benchmark price of $500/Ml would seem to be reasonable. This would produce a gross value of around $1.85 million per annum.

5.11 Improved environmental outcomes and less salinity damage

Figure 4 illustrates the salinity damage to soil in the Collie Irrigation District. This issue occurs when salt (from the water) is continually deposited on the soil without being flushed by fresher water or rainfall. Fresher irrigation water will see less salt deposits and damage to soil.

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50 It could also be competing at the margin with potable water and the costs of treating for such a purpose. However, this is unlikely to occur.
Figure 4 - Salinity Damage in Collie District
6 Procurement planning

6.1 Evidence that costing and relevant plans have been developed by an appropriately qualified person/agency

The costs provided in this business case are based on the Preliminary Design Report (PDR) for the Collie River Recovery Project. This report was prepared by GHD, one of Australia’s leading engineering consultancies. GHD are consultants on the Water Corporation’s design engineering panel and experienced with the Corporation’s requirements for development of PDRs. The scope for this exercise was prepared jointly by the Water Corporation and the Department, given the Water Corporation’s role as project manager for the Salinity Recovery Scheme.

The PDR defined the scope of works, determined the design criteria for the project infrastructure, established the water treatment process based on water characteristics and devised the pumping and electrical requirements for the Project. The PDR also determined the capital cost estimates and operations and maintenance costs for the Project. During development of the PDR, GHD consulted with suppliers, treatment plant manufacturers and stakeholders such as Verve, Griffin, Wesfarmers and Harvey Water.

The PDR comprises a report and set of engineering drawings. This output has been technically reviewed by appropriate personnel from the Water Corporation, together with project personnel from the Department. In addition, the estimates have also been reviewed by the Water Corporation’s expert in-house Project Management Branch estimating team. The PDR output becomes the basis for the next phase of the project delivery, the Engineering Design Report (EDR). This document was also reviewed by Verve, Griffin, Wesfarmers (Premier Coal) and Harvey Water.

6.2 Demonstrate that the Project can be delivered within the relevant timeframe and budget provided

The Project will be delivered through an Engineering, Procurement and Construction Management (EPCM) process. The next phase of the procurement strategy is to appoint the EPCM contractor. The Water Corporation has signed off on the procurement plan for the EPCM contractor whose first task will be to undertake the EDR. Upon acceptance of the EDR by the stakeholders, the EPCM contractor will be responsible for the delivery of the Project within the EDR estimated costs and to the schedule.

Management of the EPCM contractor will be the responsibility of the Water Corporation in its role as project manager.

6.3 Proposed implementation strategy

6.3.1 Description of how the Project will be implemented

The Department is currently negotiating a Memorandum of Understanding (MoU) with the Water Corporation. The MoU will describe the roles and responsibilities of each organisation for the delivery of the Project and the ongoing operation of the constructed facilities. The key

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principles of the MoU are that the Department will be the Principal for the works with the Water Corporation acting as the Principal’s Representative/Project Manager. The MoU is scheduled to be agreed by the end of June 2009.

The Project will be implemented through an EPCM delivery mode as described above. The EPCM contractor will be charged with the delivery of the Project to time, cost and quality objectives that will be described in the EPCM tender documents. The Water Corporation will manage the EPCM contract, endorse payments recommended by the EPCM contractor and oversee the time and quality performance of the works.

The Water Corporation will use its existing Capital Project Delivery Project Management tools to manage the EPCM contractor. This will include the use of the Corporation’s corporate risk identification and risk mitigation process. This element of project delivery will be conducted at the appropriate milestone dates during the development of the EDR.

6.3.2 What planning approvals have been obtained/are required and approximate time frames? Evidence if possible of planning approvals and relevant agency support for plans.

Associated timeframes are found within the GHD PDR, however preliminary consultation has been undertaken with the Department of Conservation and Environment (DEC), which is responsible for managing the affected Crown Land surrounding lease arrangements at W5H.

As agreements are negotiated with Verve, further planning approvals may be required for access to utility easements.

A Rights in Water and Irrigation Act licence is required for extraction of water from the Collie River East. As this license is issued by the Department, this will not present a constraint (the Department has recognised and managed the conflict of interest).

6.3.3 Milestones and key dates

The key milestones and dates for the Project are as follows:

- Memorandum of Understanding between the Department and Water Corporation – to be finalised by end of June 2009.

- Memorandum of Understanding between the Department and Verve – discussions with Verve to develop a letter of agreement, particularly regarding strategic intent, pipeline access including 3rd party operators and discharge quality, to commence immediately and delivered by the end of July 2009.

- EPCM contract for Project – to be awarded by Water Corporation within 3 months of receipt of funding.

- Procurement of desalination units – to be finalised by June 2010.
• Start commissioning desalination – January 2011.
• Desalination fully operational – December 2011.

6.3.4 Who will be accountable?

The Water Corporation will appoint a senior project manager, familiar with the delivery of capital projects, to manage the EPCM contractor. The Department of Water will appoint an appropriate person to manage their requirements during the Project implementation and to be the prime point of contact for the Water Corporation’s Project Manager.

6.3.5 What changes are required to working practices?

Given that the Project is not delivering potable water, and that the infrastructure is to be deployed on active mining leases, the engineering standards will be appropriate but not necessarily to Water Corporation standards. However, Occupational, Health and Safety standards will not be compromised.

6.3.6 Governance arrangements to be addressed

The Department, as principal, will determine the appropriate governance arrangements for the project.

6.3.7 Provision for a marketing strategy for the Project

The Department, as principal, will determine an appropriate marketing strategy in consultation with key stakeholders and Government.
7 Financial and other risks

7.1 Known and potential risks

7.1.1 Introduction

Risk management and mitigation are important factors given the combination of public funding, stakeholder expectations and public perception for the Project. Consideration of risks from different perspectives is also very important. For example, whilst the Project will be managed by the Department (and hence the Department will manage overall Project risks), the Department is working closely with the Water Corporation in their role to deliver the engineering, procurement, construction and operation of the Project.52

Management and mitigation of these risks through a proactive risk management process reduces both the probability and likelihood of these risks and ensure the ongoing achievement of the Project objectives.

7.1.2 Risk management process – Project risks

A risk management process has been incorporated within planning for the Project. In November 2008 the Department undertook an initial risk identification process to ensure that it had identified and understood the key high level risks that needed to be addressed in project planning. A project risk management workshop for this purpose was held by the Department on 3rd November 2008. The workshop was attended by key stakeholders from the Department and independently facilitated. The output of the workshop was a register of project risks (without analysis, evaluation, treatment or allocation of responsibility).

The Department intends to incorporate risk management processes into ongoing project planning and delivery. Development of a high level risk register commenced in May 2009 which will be subject to ongoing review and development and incorporated within governance and project management arrangements for the Project.

52 The commissioning of Water Corporation to manage the engineering, procurement, construction and operation of the Project demonstrates, in itself, the Department’s recognition that it is not the best party to deliver these elements of the project and hence why getting a skilled delivery agent such as the Water Corporation helps manage the Project’s risks.
7.1.3 Risk management process – engineering, procurement, construction and operation risks

The Water Corporation will assess and manage risks pertaining to the engineering, procurement, construction and initial years of operation and maintenance in conformance with the Corporation’s risk assessment manual. The Water Corporation, in conjunction with the EPCM contractor, will undertake its first risk assessment as part of the engineering design development phase.

7.1.4 Summary of key risks for the Project

The key risks for the Project have been identified and are currently being evaluated along with development of controls by the Department.

Table 16: The following is a summary of the areas representing key risks for the Project.

<table>
<thead>
<tr>
<th>Key Project risks</th>
<th>Description</th>
<th>Controls in place</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attaining funding for the Project</td>
<td>The Project needs to be initiated to ensure the required level of pre-approved Commonwealth funding will be received.</td>
<td>Pre-approved Commonwealth funding is in place and awaiting matched State funding as set out in this business case.</td>
</tr>
<tr>
<td>Agreement with Verve</td>
<td>Access to Verve’s Saline Water Disposal Pipeline is critical to the success of the Project. Agreement on arrangements for Verve’s off-take of diverted water to Muja is also important for designing an efficient Project.</td>
<td>A number of discussions have been held with Verve and indicative pricing and access has been agreed. Department to obtain legal agreement with Verve covering access to Saline Water Disposal Pipeline and arrangements for use of diverted water by Muja by end of June 2009.</td>
</tr>
<tr>
<td>Agreement with Water Corporation</td>
<td>An agreement is required to lock in the important project management role of Water Corporation for the Salinity Recovery Scheme, including the Water Corporation’s commitment to providing initial recurrent expenditure up to $15 million.</td>
<td>A Memorandum of Understanding is currently being negotiated between Water Corporation and Department and is to be signed by the end of June 2009.</td>
</tr>
<tr>
<td>Agreement to access W5H mine void</td>
<td>An agreement is required with Wesfarmers Premier Coal as owners of W5H mine void for long-term access.</td>
<td>Wesfarmers Premier Coal has indicated a willingness to allow free access to W5H but retained the right to re-use the void with adequate notice. Department to sign agreement with Wesfarmers Premier Coal (for a period that is longer than the expected period for which the Department will own the Project) by the end of July 2009.</td>
</tr>
<tr>
<td>Agreement to access land for diversion, interconnecting pipework and desalination unit</td>
<td>The mentioned infrastructure will be primarily located on crown land but some will sit on land owned by Griffin.</td>
<td>Department to negotiate with Griffin and the Department of Environment and Conservation. for approval for lease arrangements at W5H, and with Verve for further planning approvals for access to utility easements.</td>
</tr>
<tr>
<td>Project attaining forecast salinity levels</td>
<td>This business case is based on the Project achieving a set drop in average salinity levels within the Wellington Reservoir over a defined period.</td>
<td>Forecasts are modelled on the initial feasibility diversion trial run over the past 3 years, which has seen a salinity benefit at Wellington Reservoir of 150 mg/L tds. The Project will deliver additional salinity benefits and the delivery of fresh water to existing and future industry in the Collie Basin.</td>
</tr>
<tr>
<td>Key Project risks</td>
<td>Description</td>
<td>Controls in place</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Department exiting once the Project</td>
<td>The Department needs a sustainable management model in order to ‘exit’ from</td>
<td>The Department is finalising negotiations with the Water Corporation to give a more-than-sufficient time buffer in which to agree a sustainable approach to the region’s water resources that is both equitable for current and future users whilst promoting regional and broader economic, environmental and social objectives. Four separate entities have registered or expressed their interest in taking over the Project. (in confidence at this stage)</td>
</tr>
<tr>
<td>reaches commercial maturity</td>
<td>the Project. Recurrent funding has been arranged for the initial 4 years of operation.</td>
<td></td>
</tr>
<tr>
<td>Final cost certainty</td>
<td>The current costs have been conservatively estimated based on the Preliminary Design Report prepared by GHD.</td>
<td>Final design, and hence updated cost estimates, will be developed once funding certainty has been obtained.</td>
</tr>
</tbody>
</table>
8 Project budget and budgetary implications

8.1 Project budget, including a forecast of operating income and expenditure

8.1.1 Introduction

The Project requires $18.5 million (real at June 2009) in capital funding with an ongoing requirement of $4.4 million per annum to operate the Project once CC4 mine void is emptied and the desalination plant in full operation.

8.1.2 Forecast costs and revenue

The following table identifies the annual capital and recurrent cost estimates. In addition, the table identifies an allowance for contingencies and an estimate of revenue that may be gained from the sale of by-product water produced from the desalination plant.

Table 17: Forecast expenditure

<table>
<thead>
<tr>
<th></th>
<th>Note</th>
<th>Totals</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015 onwards</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capital Costs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Desalination plant</td>
<td>(1)</td>
<td>9.0</td>
<td>0.0</td>
<td>9.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pipes, pumps and other</td>
<td>(2)</td>
<td>3.0</td>
<td>1.5</td>
<td>1.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Process development</td>
<td>(3)</td>
<td>3.0</td>
<td>1.5</td>
<td>1.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Contingency</td>
<td>(4)</td>
<td>3.5</td>
<td>0.5</td>
<td>3.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sub Total</td>
<td></td>
<td>18.5</td>
<td>3.5</td>
<td>15.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Operating Costs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O &amp; M</td>
<td>(7)</td>
<td>-</td>
<td>-</td>
<td>3.4</td>
<td>3.4</td>
<td>3.4</td>
<td>3.4</td>
<td>3.4</td>
</tr>
<tr>
<td>Contingency</td>
<td>(8)</td>
<td>-</td>
<td>-</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Access to Verve pipeline</td>
<td>(9)</td>
<td>-</td>
<td>-</td>
<td>0.8</td>
<td>0.8</td>
<td>0.8</td>
<td>0.8</td>
<td>0.8</td>
</tr>
<tr>
<td>Sub Total</td>
<td></td>
<td>-</td>
<td>-</td>
<td>4.4</td>
<td>4.4</td>
<td>4.4</td>
<td>4.4</td>
<td>4.4</td>
</tr>
</tbody>
</table>

Notes for Table 17

(1) Desalination capital cost based on Water Corporation estimate confirmed on 12 May 2009. The forecast capital cost is based on the desalination plant being able to treat the maximum amount of water to be diverted.
(2) Pipes, pumps, other capital cost based on Water Corporation estimate confirmed on 12 May 2009.
(3) Contingency based on Water Corporation estimate confirmed on 12 May 2009.
(4) Process development cost based on Water Corporation and Department meeting of 8 May 2009.
(5) Evacuation cost for CC4 mine void based on Department estimates from Expenditure and assumptions 21 Nov 08 at 4 PM (2).doc, indexed at 6.5% to get to 2009 figures and spread over 3 years, rather than 2 years, to be conservative.
(6) O&M costs based on Department estimates from Expenditure and assumptions 21 Nov 08 at 4 PM (2).doc, indexed at 6.5% to get to 2009 figures, with separation of Process Development values where appropriate.
(7) Contingency based on Department estimates from Expenditure and assumptions 21 Nov 08 at 4 PM (2).doc, indexed at 6.5% to get to 2009 figures.
(8) Access to Verve pipeline charges are based on indicative rates provided by Verve on 24 November 2008.
(9) Real discount rate of 7% used.

Additional notes
- Numbers are rounded and hence may not appear to add exactly.
- Design life of 20 years, from start of installation, used.
- Estimates are based on GHD Preliminary Design Report plus additional costs provided by the Water Corporation.
- It should be noted that the estimated capital and recurrent costs of the Project are based on preliminary design estimates and that final design estimates, and then tender costs, will be needed before a final decision to proceed with acquisition of the assets takes place. However, it is necessary to obtain approval to proceed to the final planning and engineering design stage at this time, if the scheme is to remain able to continue to meet Commonwealth funding requirements.
- There are no known lower cost alternatives to the proposed scheme which can achieve the same reduction in salinity in the Wellington Reservoir to 615 mg/L by 2015.
- Capital expenditure:
  - based on Perth rates plus regional factor of 10%
  - excludes Department of Water / Water Corporation indirect costs
  - final total capital expenditure is expected to be no more than +20% above and no more than 5% below the preliminary design estimate for the project
  - assumes equitable agreements are established with:
    - Verve Energy for
      a) power supply to desalination etc
      b) access to pipe routes (at no cost)
    - Griffin Coal for
      a) access to Buckingham site (at no cost)
    - Wesfarmers
      a) diversion of natural runoff away from W5H (at no cost)
      b) access to desalination site and pipe routes (at no cost).

8.2 Sources of Project funding

8.2.1 Capital expenditure
Subject to agreement to this business case, the Project’s capital expenditure will be funded by $5.2 million in State funding (the subject of this business case), $1.8 million in regional funding and $10 million in Commonwealth funding and $1.5 million from Water Corporation (Additionally, the Department, through consolidated funding, will incur $1 million via in-kind expenditure). The resulting $18.5 million (real at June 2009) of capital expenditure will be sufficient to bring the Project to operational capacity.

8.2.2 Recurrent expenditure
Recognising that the Department has insufficient engineering, procurement, construction and operation skills to successfully deliver the Project, the Department has approached the Water Corporation to manage the delivery of these aspects of the Project for the initial years.
Funding for operation of the scheme will be sourced through a commercial arrangement involving sale of the desalination units product water. A record of the current understanding between the Department and Water Corporation is in Appendix E.

Furthermore, it is not the Department’s objective to be the long-term owner and/or manager of the infrastructure required to achieve the Department’s salinity reduction objectives. The Department’s objective is to acquire the public benefits of the Project rather than be intimately involved in their delivery.

To this end, the Department has already undertaken significant work in considering and developing public and private sector management options for the Salinity Recovery Scheme, including the development of approaches to creating a ‘regional water utility’. This work has identified significant private-sector demand for the Project and expressions of interest in providing private-sector funding and expertise to deliver both the resulting public and private benefits. Much of this interest is led by the private-sector interest in the Project’s by-product water and expected access rights to Verve’s Saline Water Disposal Pipeline.

The examination of management options is intrinsically linked with proposals to assess water recovery options. Therefore, the outcome of this work will follow the proposed independent study on water recovery options recently endorsed by the Liberal/National Cabinet (see Section 2.5).

Currently, the proposal is to operate the unit for the 3 to 5 years that it will take for the scheme to become commercially mature. The budget for recurrent expenditure – via sale of the desalination unit’s product water – is forecast to be adequate to operate and maintain the Project up to 2015. This should provide more than adequate time for the development and finalisation of a sustainable approach to the region’s water resources that is both equitable for current and future users whilst promoting regional and broader economic, environmental and social objectives. It is the intention for Government to withdraw from the Project once the implementation of a sustainable management solution is complete.

It should be noted that it would not represent value for money for the Department to contract for its salinity reduction targets until the Project and benefits are more proven. Further, significant work is still required to agree the management framework with potential participants, a number of which will not be in a position to contract to provide the services for at least another 1 to 2 years. Delaying the Project until everything is finalised would result in the loss of $10 million in Commonwealth funding, a delay to significant benefits and the damage to Government credibility in the region. The final outcome is dependent upon implementing and proving the Project.
Table 18: Identifies the source of indicative capital and recurrent funding for the project, prior to any off-setting revenues, which are estimated as shown in Table 17.

<table>
<thead>
<tr>
<th>$ millions (Real at June 2009)</th>
<th>Year</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015 onwards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sources of capital funding</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State (Royalties for the Regions)</td>
<td>5.2</td>
<td>0.7</td>
<td>4.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Commonwealth</td>
<td>10</td>
<td>1.5</td>
<td>8.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>South West Development Commission</td>
<td>1.8</td>
<td>0.5</td>
<td>1.3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Water Corporation</td>
<td>1.5</td>
<td>0.8</td>
<td>0.7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Subtotal</td>
<td>18.5</td>
<td>3.5</td>
<td>15.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sources of recurrent funding</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State (Water Service Provider)</td>
<td>7.0</td>
<td></td>
<td>4.4</td>
<td>2.6</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Future (industry)</td>
<td>81.6</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.8</td>
<td>4.4</td>
<td>4.4 p.a.</td>
</tr>
<tr>
<td>Subtotal</td>
<td>46.6</td>
<td></td>
<td>4.4</td>
<td>4.4</td>
<td>4.4</td>
<td>4.4</td>
<td>4.4 p.a.</td>
</tr>
</tbody>
</table>

8.3 Managing changes in recurrent costs during and after implementation

During the period in which Water Corporation will operate and maintain the Project, changes in recurrent costs will be reflected in the length of the Water Corporation contract. Water Corporation will be incentivised to project manage to enable their Ministerial Conditions, that is to mitigate the salinity of Wellington Reservoir, to be permanently removed.

After Water Corporation’s operation and maintenance period, it is expected that changes in recurrent costs will become the risk of the new operator. Changes in recurrent costs may be partially offset through any increases in operating revenue through the sale of water produced from the desalination plant.

8.4 Budget implications if other sources of funds are not yet approved

As shown in the sources of funding table above, the Project is expected to involve the following funding sources outside the capital funds requested in this business case. All of these sources of funding have been approved except for the unfunded recurrent costs from 2013 onwards. The future estimated recurrent costs are discussed further below:

- **Commonwealth**: the current Australian Government has promised up to $10 million for the Project subject to State matched funding. As above, the Department has identified $10 million of the matching funds required for this Project. This funding will be lost if matching State funding is not approved within a reasonable period, that is $5.2 million plus $1.8 million as well as $3 million in kind.

- **Water Corporation**: has agreed to install and operate the scheme (initially) in addition to the $15 million capital contribution. Funding for the initial operation and maintenance of the Project and process development will be funded through a commercial arrangement involving the sale of product water from the desalination unit.

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53 This line represents the capital funding requested through this business case
• South West Development Commission: has indicated to fund $1.8 million of the capital requirement (subject to confirmation of Royalties for Regions funding) in recognition of its support of the Project.

• Future (industry) – as above, funding for recurrent costs has been arranged for the first 4 years of the operating period. Before 2015 the project will have reached commercial maturity and the Department will have established arrangements for a separate entity to take over the operation and maintenance of the Project. Four proposals have already been put forward to the Department by key stakeholders and/or potential investors to participate, or take a key role, in the Project. These offers are highly conditional on certain steps by government (which highlights the need for its involvement), but also demonstrate the importance of addressing salinity issues in the Collie Basin and providing greater access to fit-for-purpose water supplies. The Department intends to collaborate with these parties in finalising its strategy to deliver the Project. This is likely to involve ensuring the key requirements are in place to enable the private sector to take a major role in the execution of the Project.

8.5 Opportunities for private-sector funding

There are a number of opportunities for longer-term private-sector funding for the Project. Such sources include the private-sector beneficiaries of the Project and other unrelated entities interested in investing in infrastructure assets. As above, these options, in addition to public sector options, will continue to be examined over the coming years until the time is optimal for the transfer (or sale) of the Project’s assets.

Lowering the level of salinity in Wellington Reservoir will help improve the environmental outcomes in the Collie River Basin. The creation and use of more fit-for-purpose will improve efficiency and allow for greater (higher quality) environmental flows. This is likely to assist in addressing the community concern that a reduction in the release amounts, timing and duration may affect the social and environmental values in the region.54

The Project is consistent with the current Government’s objectives regarding delivering upon an environmental sustainability and water management plan. The Statement of Need identifies several of these commitments including, working with the Australian Government to identify means of reducing river salinity and continuing to support important infrastructure projects in water….including the Collie-Wellington Salinity Diversion Project.

8.6 Improved social outcomes

Reducing salinity in the Wellington Reservoir will generate wider benefits to the community. These benefits have previously been estimated and include factors such as:

• improved amenity

• avoided marginal damage costs.

Improved amenity

The Wellington Reservoir and Collie River are currently used for a variety of recreational purposes such as bushwalking, swimming and camping. Estimates of the number of visitors to the main Reservoir range from 100,000 to 150,000 per annum. In 1990 when the Wellington Reservoir ceased to be used as a source of drinking water the controls in place to protect the Reservoir were eased. Thus while lowering the salinity in the Reservoir will improve the amenity of the Reservoir and surrounding regions it may result in tighter controls on recreational use if it is to be used for other productive purposes.

Avoided marginal damage costs

The URS study included the economic benefits of avoided marginal recurrent damage costs to the community from high salinity levels. The study used previously estimated marginal recurrent damage cost functions for households, the manufacturing and processing industry and commercial and service activities. The results showed social and environmental benefits ranging from $10.3 million to $57.8 million across the options. These are addressed separately in this analysis, by examining the additional value created by greater use of Wellington Reservoir water.

8.7 The option value the investment creates

The investment would also create options for further investment that would not proceed without the investment in reducing salinity, but may proceed with the investment and other developments in the market for water.

Harvey Water believes that it could:

- Result in piping of the Collie Irrigation District which would free up a considerable amount of water (around 22 GL). Piping the irrigation District would facilitate a substantial change in farming and irrigation techniques, as it would utilise the pressure benefits.

- Warrant an investment by it in a direct connection between the Collie Irrigation District and the Kemerton Industrial Park.

Other possibilities are that industry in the Collie Basin will invest in infrastructure to get the higher quality water back into the Basin for use.

The value of an options approach to water supply augmentation

The Project would be a practical example of taking a more options based approach to water supply augmentation.

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56 The results of the URS study included both the benefits from avoided costs and the benefits to the environment. The environmental benefits were not estimated in this study. The environmental impacts behind the Reservoir wall were taken from an earlier URS study (2002) and no valuation on the environment below the Reservoir wall was undertaken for this evaluation.
The value of taking a more options-based approach to investments in water security, in light of profound uncertainty, has been recognised by the ERA and by the WA Department of Treasury and Finance. For example, the ERA’s proposed reforms to water augmentation decisions included creating an Independent Procurement Entity (IPE) who would adopt an “options” approach to achieve security of supply at least expected cost. It states that:

The IPE model allows for greater competition in the identification of alternative options relative to the Corporation’s proposed model. This additional competition will ensure that all possible alternatives are considered and subsequently the least cost combination of options developed. Customers will experience benefits through reduced water bills.

Furthermore, the IPE would create a single agency with responsibility for managing all water supply and demand management functions within the IWSS. These functions are currently dispersed between the Corporation, the Department of Water and Government Ministers. As such, the IPE offers sizable coordination benefits. 57

The IPE would have responsibility for all factors that influence supply and demand. These factors would include sources, water efficiency rebates and water restrictions. As a result, the IPE would be able to implement a full options approach. This would ensure security of supply was met at least expected cost.

Furthermore, the establishment of an IPE would create a competitive business environment. It would achieve this as it would address all of the concerns of a private sector proponent wishing to enter the market. The creation of a competitive business environment would guarantee that the widest possible range of innovative source and demand management options were identified. This would in turn ensure that the least cost combination of options is developed.58

Further, the Department of Treasury and Finance expressed its support for the ERA’s recommendation to implement an options approach and establish an IPE in two of its submissions to the ERA inquiry.

An IPE is consistent with the DTF’s view to introduce more competition into the provision of bulk water supplies, as the establishment of an IPE is a move towards a contestable bulk water market59

.....

The DTF concurs with the ERA’s assertion that the proposed approach would likely result in the development of sources which are substantially different from those which have been historically utilised in Western Australia. This change would be independent from the effect of external factors, such as climate change, community expectations and technological innovation. The analysis carried out by ACIL Tasman on behalf of the ERA illustrates how the options-based procurement process explicitly recognises the benefits of avoiding over investment in bulk water supply infrastructure. This approach may contribute to the development of smaller sources (with a higher per-kilo litre costs) as they are less costly from a system-wide perspective than larger source types (with a lower per-kilo litre costs).60

57 ERA, Inquiry on Competition in the Water and Wastewater Services Sector: Final Report, 30 June 2008, page VI.
58 ibid., page 43.
60 Department of Treasury and Finance, February 2008, Response to the Economic Regulation Authority Inquiry on Competition in the Water and Wastewater Services Sector.
In accordance with the options based approach, reducing industry demand for potable water from the IWSS may alleviate the need for investment in alternative supply options such as seawater desalination. This is likely to generate significant savings, for example in relation to a desalination plant, the ERA states that:

“...every year construction of the plant was postponed, customers would save approximately $50 to $100 million”\(^{61}\)

Thus reducing the salinity level of Wellington Reservoir is consistent with the ERA’s options based approach and has the potential to increase the available potable water supply in the IWSS.

8.8 **Encouraging greater water trading**

By improving the value of water it is likely that it will become more heavily utilised and more heavily traded. The evidence for this is reflected in the trading quantities and volumes of the three irrigation Districts and between the Collie and Harvey Districts in particular. It is also likely that the industrial sector would at some stage play a greater role in the market.

Water trading provides its own economic benefits because it generates greater efficiencies by:

- allowing water to move to its highest value uses, with the minimum of transaction costs (e.g. lower bid offer spreads induced by deeper markets)
- providing greater certainty and transparency to market participants regarding their potential access to water
- providing greater flexibility to water market participants in responding to market developments
- greater certainty for investment.

It would be reasonable to assume a material increase in water trading as a consequence of the Project.

8.9 **Avoided damage costs for industry in the Collie Basin**

The proposals that are coming from industry in the Collie Basin to assist in the Project are directed towards a broader objective than salinity recovery in Wellington Reservoir. Instead they are direct towards addressing the salinity problem in the Collie Basin more generally and getting access to more fit-for-purpose water.

\(^{61}\) ERA, Inquiry on Competition in the Water and Wastewater Services Sector: Final Report, 30 June 2008, page VI. The amount saved would depend on the cost of any alternative options developed. However, assuming a capital cost of $1 billion, a return on and off capital of 7 per cent and operating costs of approximately $30 million per year, the saving from deferral would be $100 million.
The interests of industry in managing the Project and addressing the broader issue would appear to have a number of benefits for them. These include:

- securing water supplies
- securing access to saline disposal pipe and thus avoiding the need to invest in similar infrastructure
- providing greater long term certainty for their operations in the region.

This implies that industry believes that there is some risk that, in the absence of action, these objectives may not be met (i.e. salinity increases to point that more serious impacts arise). Ultimately, this could lead to higher costs for them perhaps in the form of additional investment or stranded investment.

While the risk of this outcome is difficult to predict (and may be low), the costs associated with this outcome could be very high. The Project is one step in the direction of avoiding these costs and ensuring the sustainability of economic activity in the Collie Basin.

### 8.10 Regional development and employment

The South West Development Commission reported during the past 5 years the South West economy has been growing at an average of 11.6% per year. The Commission noted that while much of this is from the mining sector, the region supports a range of industries and continues to offer an abundance of land suitable for both heavy and light industries. Furthermore, the Shire of Collie 2008 Strategic Plan recognised one of its key objectives was to promote a strong and diversified economic base, providing a range of business and employment opportunities, including promoting employment opportunities within the community and encouraging people employed in the region to also reside in the region.\(^{62}\)

The Project will support these objectives by enhancing the security of water supply in the region. In particular, the Project will have a significant impact by:

- retaining and attracting investment in the agriculture and other industries located in the District
- increasing employment opportunities and improving the skill base in the District across the range of industries currently located in the region.

Enhancing the security of water supply will prevent any potential adverse impacts of declining water availability in regional areas. Research completed for the Rural Industries Research and Development Corporation, National Water Commission and Murray-Darling Basin Commission suggested communities were affected by reduced water availability in a number of ways, including:\(^{63}\)

---


• community cohesion – economic and social change associated with reduced water availability affects social cohesion of communities, which in turn affects levels of social capital, being the networks of mutual support, reciprocity, trust and obligations that enable a community to work together

• depopulation – the economic decline in rural Australia has resulted in towns losing jobs, population contracting and basic services (such as banks, health facilities and schools) being withdrawn. The reduction of water availability for production purposes is considered by the community as one factor that drives these problems

• social pressure – of most concern to communities is the loss of young people from rural areas to urban areas, recognising that young women tend to migrate in greater numbers than young men, thereby creating gender related social problems for communities, like reduced opportunities for marriage, families and children, which are necessary for community continuity and development

• health and welfare – loss of economic strength and community population from a region often threatens the provision of health services in smaller communities.
Appendices
A Letter of interest from Perdaman Chemicals and Fertilisers

In Confidence

24 April 2009

Mr W. Tingey
Department of Water
35-39 McCombe Road
Bunbury WA 6231

Dear Wayne

PROPOSAL TO TAKE WATER – UPPER COLLIE DIVERSION PROJECT

I write to formally express interest in the access by Perdaman Chemicals and Fertilisers (PCF) to water from the proposed DoW Upper Collie Diversion facility for the PCF project and propose that PCF enter into an Agreement or License with the Department of Water to acquire water from the facility.

Background

It is PCF’s understanding that existing Wellington Dam water salinity levels are adversely affecting agricultural use and rendering the quality of water unsuitable for potable or other uses. A key strategic objective of DoW as water resource manager is to restore potable quality water in the Upper Collie River Catchment for future generations by reducing Wellington Dam salinity. Concurrent with this objective is the need to manage the allocation of water in the catchment, as detailed in the draft Upper Collie Water Management Plan.

Initiatives are in place to restore water quality in the longer term through reforestation and these initiatives have halved the increase in salinity. However, as described in the 2001 Salinity Situation Statement, further initiatives could be undertaken to reduce salinity, one option being to divert the Collie East Branch seasonal flows to divert salt load away from Wellington Dam. A diversion project plan has been developed and funding secured by DoW from Federal and State Government sources, but PCF understands that to date the project has lacked a committed water user.

Proposal

PCF proposes to align itself with the DoW project plan and act as “catalyst” for the project by becoming the water consumer.

In Confidence
It is PCF’s understanding that a submission in relation to this project may currently be before Cabinet. PCF wishes to commence formal discussions with the DoW regarding its proposal, with a view to agreeing on a binding Heads of Agreement that would form the framework for the detailed binding contract, with financial close of the PCF project as the only condition precedent. To achieve a timely outcome prior to PCF’s project final investment decision, it will be necessary to progress discussions in the short term.

Could you please give this proposal due consideration and respond at your earliest convenience, preferably by 8 May 2009.

Sincerely yours

Gary Watson
Project Manager
Perdaman Chemicals and Fertilisers

In Confidence
PCE Deliverables

PCE proposes that it take all of the available pre-treated water from the DoW Upper Collie diversion facility and desalinate this water for use in its urea manufacturing plant. Once the PCE plant construction phase is complete and the plant is operational. All costs of building and operating the desalination facility would be met by PCE.

PCE would pay for this water per an agreed pricing arrangement with DoW, to defray the operating costs to the DoW associated with bringing the pre-treated water from WSH void to the PCE site.

DoW Deliverables

Conditional upon agreement to take the water by PCE would be:

1. PCE use of the Verve Energy outfall disposal pipeline capacity allocation that has been agreed between DoW and Verve. PCE intends to concentrate the desalination plant brine reject and urea plant waste streams and dispose of these to the pipeline in accordance with established outfall license discharge conditions.
2. DoW to secure all necessary arrangements with stakeholders in relation to diversion of saline river water and supply pre-treated water to PCE at the PCE site, broadly in accordance with the attached preliminary layout.
3. DoW to enter into a Supply Agreement and/or formally allocate the water by way of license to PCE on license conditions to be agreed.
4. DoW to work collaboratively with PCE to seek additional government funding if needed for the diversion and desalination project.

PCF believes that this arrangement will help the DoW achieve the outcome the DoW desires for the Collie River Diversion program by desalinating over each year the amount of water the DoW plans to divert each winter. The cost of constructing and operating the desalination plant would be to PCF’s account, relieving any budget issues for the DoW while providing a second source of water for the PCF project, which is needed for bankability reasons. The more saline East Collie River flow would be diverted from Wellington Dam to the PCF facility, achieving salinity reduction and improved riverine ecology in the Upper Collie Basin whilst enabling PCF to mitigate the amount of water it would draw from its proposed Wellington Dam 12 GLA allocation.

PCF would, with the DoW’s assistance, utilise the capacity in the existing Verve Energy outfall pipeline to the ocean, planned to be used by the DoW, for the desalination plant brine outflow.

PCF believes that this proposal is:

1. Simple
2. Of the scale originally intended by the DoW
3. Does not disrupt the current DoW schedule for the diversion project
4. Timely, given PCF understanding of the need to spend the Federal Government funding commitment
5. Delivers a win-win solution for the users of Wellington Dam, the DoW and PCF.

In Confidence
## Stakeholder consultation – 1996 to 2007

<table>
<thead>
<tr>
<th>Time</th>
<th>Description</th>
<th>Objective</th>
<th>Lead By</th>
<th>Type</th>
<th>Audience</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996 – 2001</td>
<td>Collie Salinity Recovery Team</td>
<td>To assist WRC/DoW by way of advice and support in the development and implementation of a salinity recovery strategy for Wellington Reservoir.</td>
<td>George Kikiros / Wayne Tingey</td>
<td>Stakeholder representation at Team meetings</td>
<td>Most key stakeholders</td>
</tr>
</tbody>
</table>
| 2001 / 2002| Collie River Salinity Situation Statement – prior to publication | - *Raise awareness* of the Collie SSS and the proposed process to follow  
- *Educate* re salinity issues, allocation issues and specific management options  
- *Obtain comments* re options and process  | John Platt                        | Individual presentations to some 35 key stakeholder groups | All priority 1 and priority 2 stakeholders (as per Salinity Recovery Communications Plan)  
- including indigenous, politicians, local govt, state and federal agencies, local landholder groups, local environmental groups, key industries |
| 2001 July - Dec | Collie River salinity situation statement         | - To publicly release report which outlines technically feasible options to restore Collie water resources to PWS quality  | John Ruprecht                   | Ministerial launch plus media release | Politicians, local Govt., local stakeholders; state agencies; Salinity Council |
| 2002       | Draft Decision Matrix                            | - *Raise awareness* of new options and more specifics of process to follow (preparation for involvement in MCA workshop below)  
- *Educate* re specifics of new options and social, economic and environmental effects of all options (preparation for involvement in MCA workshop below)  
- *Obtain comments* re options and process  
- *Obtain commitment* to process  | John Platt                        | Presentation                    | Agencies, Politicians, Local Govt, industry, media, community i.e. all priority 1 and 2 stakeholders as per Communications Plan. |
| 2002 Feb   | Public workshop                                   | - Ensure Salinity recovery issues included in planning for Wellington National Park Management Plan  | Mick Murray MLA (Workshop)      | Presentation and questions | Key local people and groups; state agencies                             |
| 2002 / 2003| Multi-criteria analysis workshop - Salinity recovery – options selection | - *Acceptance* of the decision making matrix (range/detail)  
- *Agreement* on weighting matrix elements and results of scoring process  
- *Commitment* to workshop results and next steps (further work or implementation plan)  
- To review options for resource recovery and chose preferred options.  | John Platt and contractor         | Focus workshop                  | 45 attendees represented 26 key stakeholder groups including indigenous, politicians, local govt, state and federal agencies, local landholder groups, local environmental groups; key industries |
<table>
<thead>
<tr>
<th>Time</th>
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<th>Lead By</th>
<th>Type</th>
<th>Audience</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003 Sept/Oct</td>
<td>Manned Display at Collie Boulevard Shopping Centre</td>
<td>• Opportunity for locals to hear about and/or question and/or comment on SSS outcomes and proposed next steps.</td>
<td>John Platt</td>
<td>Manned Display</td>
<td>Local Collie people</td>
</tr>
<tr>
<td>2003 Sept / Oct</td>
<td>Manned display at Perth Royal Show (part of Collie District display)</td>
<td>• Opportunity for locals to hear about and/or question and/or comment on SSS outcomes and proposed next steps.</td>
<td>John Platt</td>
<td>Manned display</td>
<td>Perth and Collie public</td>
</tr>
<tr>
<td>2003 – 2004</td>
<td>Development of detailed recommendations</td>
<td>keep key stakeholders aware / involved as the recommendations are developed utilise and build on expertise and experience of key stakeholders minimise potential of mis-communication and outrage (all stakeholders) maximise potential for win-win outcomes, triple bottom line approach and integrated actions</td>
<td>John Platt / Tim Sparks</td>
<td>Field tours; Individual meetings; meeting groups of stakeholders / industries</td>
<td>Southwest Catchment Council (x2). House of Reps group. Leschenault Catchment Council. NAP reps. Key stakeholders (priority 1 stakeholders mostly)</td>
</tr>
<tr>
<td>2004 - 2006</td>
<td>Development of Salinity Recovery Plan and feasibility study</td>
<td>keep key stakeholders aware / involved as the recommendations are developed utilise and build on expertise and experience of key stakeholders minimise potential of miscommunication and outrage (all stakeholders) maximise potential for win-win outcomes, triple bottom line approach and integrated actions</td>
<td>John Platt / Tim Sparks / Wayne Tingey</td>
<td>Individual meetings as required - too numerous to count.</td>
<td>Priority 1 stakeholders mostly; Priority 2 stakeholders as required.</td>
</tr>
<tr>
<td>2004 July-Dec</td>
<td>East branch diversion project consultation (sub-component of Collie River Salinity Recovery Project)</td>
<td>• To respect Aboriginal values and the need to consult with Aboriginal people • To capture aspirations and goals for project</td>
<td>Brendan Kelly (SW Region)</td>
<td>• Meetings • Site visit</td>
<td>Aboriginal groups (inc. Ngalang Bjooja, SWLSC, individuals)</td>
</tr>
<tr>
<td>2005 Jan-June</td>
<td>Ewington Weir replacement project</td>
<td>•</td>
<td>Chris S (?)</td>
<td>Meeting</td>
<td>?</td>
</tr>
<tr>
<td>2005 July-Dec</td>
<td>State Water Plan – Collie community workshop</td>
<td>• Primarily for WRC to gain local Collie community input to State Water plan process • Presentation re salinity recovery gives an opportunity for local people to appreciate</td>
<td>Charlie Welker (contractor) / Don McFarlane (WRC) re the Workshop,</td>
<td>Presentation and workshop</td>
<td>Industry, agencies, local Govt, community, indigenous</td>
</tr>
<tr>
<td>Time</td>
<td>Description</td>
<td>Objective</td>
<td>Lead By</td>
<td>Type</td>
<td>Audience</td>
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</tr>
<tr>
<td>2005 July-Dec</td>
<td>Waterway rehabilitation project – Marron Recovery (sub-component of Collie River Salinity Recovery Project) Lake Kepwari consultation day</td>
<td>- To capture stakeholders aspirations and aims for the project</td>
<td>Brendan Kelly (SW Region)</td>
<td>Workshop</td>
<td>Aboriginal groups</td>
</tr>
<tr>
<td>2006 Jan-June</td>
<td>Lake Kepwari – risk assessment</td>
<td></td>
<td>SWDC</td>
<td>Workshop</td>
<td></td>
</tr>
<tr>
<td>2006 July-Dec</td>
<td>Pool supplementation – stakeholder review group</td>
<td>- To organise a technical review of the pool supplementation program</td>
<td>Brendan Kelly (SW Region)</td>
<td>Meeting</td>
<td>Industry, agencies</td>
</tr>
<tr>
<td></td>
<td>Upper Collie issue scoping exercise</td>
<td>- Involve stakeholders in Upper Collie WMP process</td>
<td>Jessica Scott (PM) – Beckwith Consultants</td>
<td>Interviews</td>
<td>Industry, agencies, local Govt, community, indigenous</td>
</tr>
<tr>
<td>2006 - 2007</td>
<td>Implementation of Collie River Salinity Recovery Plan</td>
<td>minimise potential of miscommunication and outrage (all stakeholders)</td>
<td>John Platt</td>
<td>Individual meetings</td>
<td>Priority 1 and some priority 2 stakeholders as required.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>keep key stakeholders aware/involved as the Feasibility Plan is developed and presented through to Water Task Force/Cabinet/JSC. maximise potential for win-win outcomes and integrated actions facilitate timely and efficient implementation of Plan</td>
<td></td>
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</tr>
</tbody>
</table>
## D Multi-criteria analysis of long-list of options

<table>
<thead>
<tr>
<th>Criteria</th>
<th>550 mg/L</th>
<th>Target</th>
<th>600 mg/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>#550/1 Groundwater pumping 670 bores</td>
<td>Modelling</td>
<td>Modelling</td>
<td>Modelling</td>
</tr>
<tr>
<td>#550/2 Upland trees 16,700 ha</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td>#550/3 Lowland trees 3,000 ha</td>
<td>Low</td>
<td>Moderate</td>
<td>Low</td>
</tr>
<tr>
<td>#550/4 Trees (3,000 ha) and pumps (228 bores)</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>#550/5 Desalination at Collie</td>
<td>Ambitious</td>
<td>Can’t be staged</td>
<td>Modest</td>
</tr>
<tr>
<td>#600/1 Groundwater pumping 604 bores</td>
<td>Staged</td>
<td>Staged</td>
<td>Staged</td>
</tr>
<tr>
<td>#600/2 Upland trees 15,400 ha</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>#600/3 Lowland trees 3,200 ha</td>
<td>Low</td>
<td>Moderate</td>
<td>Low</td>
</tr>
<tr>
<td>#600/4 Full diversion 8 km down from James Cross</td>
<td>High</td>
<td>Can’t be staged</td>
<td>Low</td>
</tr>
<tr>
<td>#600/5 36% diversion at James Cross and 227 bores</td>
<td>High</td>
<td>Modest</td>
<td>Low</td>
</tr>
<tr>
<td>#600/6 Trees (6,600 ha) and pumps (186 bores)</td>
<td>High</td>
<td>Modest</td>
<td>Low</td>
</tr>
<tr>
<td>#600/7 Imposed at 20 km from mine intake</td>
<td>High</td>
<td>Can’t be staged</td>
<td>Low</td>
</tr>
<tr>
<td>#600/8 Reduced desalination at Collie</td>
<td>Ambitious</td>
<td>Can’t be staged</td>
<td>Low</td>
</tr>
</tbody>
</table>

### Social
- **Population**
  - Low impact overall
  - Minor increase in employment
  - More people on ground

### Economic
- **Total cost to government**
  - $122 m
  - 15.9 GL/a
  - $6.7 m/CL

### Environmental
- **May need EIA**
  - May need EIA
  - May need EIA
  - May need EIA

### Technical certainty
- Modelled
- Modelled
- Modelled

### Ease of implementation
- Staged
- Staged
- Staged

### Management flexibility
- High
- Moderate
- High

### Timescale for benefits
- Medium (5-15 yrs)
- Slow (> 15 yrs)
- Medium (5-15 yrs)

### Groundwater
- Upland trees
- Lowland trees
- Upland trees
- Lowland trees
- Upland trees
- Lowland trees
- Upland trees
- Lowland trees
- Upland trees
- Lowland trees
- Upland trees
- Lowland trees
- Upland trees
- Lowland trees

### Desalination
- Collie
- Shark Bay
- Collie
- Shark Bay
- Collie
- Shark Bay
- Collie
- Shark Bay
- Collie
- Shark Bay
- Collie
- Shark Bay
- Collie
- Shark Bay
- Collie

### Ambitious
- Can’t be staged
- Can’t be staged
- Can’t be staged

### Modelled
- Staged
- Staged
- Staged

### High impacts on farming population and Darkan business and community activities
- Reduced security
- Employment in forestry
- Reduced security
- Employment in forestry
- Reduced security
- Employment in forestry
- Reduced security
- Employment in forestry
- Reduced security
- Employment in forestry

### High impacts on farming population and Darkan business and community activities
- Moderate impact on Darkan business and community activities
- More people on ground
- Moderate impact on Darkan business and community activities
- More people on ground
- Moderate impact on Darkan business and community activities
- More people on ground
- Moderate impact on Darkan business and community activities
- More people on ground
- Moderate impact on Darkan business and community activities
- More people on ground

### High impacts on farming population and Darkan business and community activities
- Low impact overall
- Minor increase in employment
- More people on ground
- Low impact overall
- Minor increase in employment
- More people on ground
- Low impact overall
- Minor increase in employment
- More people on ground

### May need EIA
- Modelled
- Modelled
- Modelled

### Low impact overall
- Modelled
- Modelled
- Modelled

### Very low impact overall
- Modelled
- Modelled
- Modelled

### Low impact overall
- Modelled
- Modelled
- Modelled

### Very high impact on farming population and Darkan business and community activities
- Reduced security
- Employment in forestry
- Reduced security
- Employment in forestry
- Reduced security
- Employment in forestry
- Reduced security
- Employment in forestry
- Reduced security
- Employment in forestry

### May be small local drying
- Limited impact
- No change
- Limited impact
- No change
- Limited impact
- No change
- Limited impact
- No change
- Limited impact
- No change

### Low soil loss
- Moderate impact
- No change
- Moderate impact
- No change
- Moderate impact
- No change
- Moderate impact
- No change
- Moderate impact
- No change

### Low level of habitat at diversion point
- Loss of habitat
- Beneficial
- Beneficial
- Loss of habitat at Reservoir
- No change above Reservoir, loss of habitat at Reservoir
- Loss of habitat at Reservoir
- Loss of habitat at Reservoir
- Loss of habitat at Reservoir
- Loss of habitat at Reservoir
- Loss of habitat at Reservoir

### Small added risk
- Mixed impact, benefits and losses in habitat
- Very small loss of habitat at diversion point
- Loss of habitat
- Beneficial
- Beneficial
- Loss of habitat at Reservoir
- No change above Reservoir, loss of habitat at Reservoir
- Loss of habitat at Reservoir
- Loss of habitat at Reservoir
- Loss of habitat at Reservoir
- Loss of habitat at Reservoir

### No change above diversion
- Improved
- Improved
- Improved
- Improved
- Improved
- Improved
- Improved
- Improved
- Improved
- Improved

### No change
- Drying below Reservoir
- Drying below Reservoir
- Drying below Reservoir
- Drying below Reservoir
- Drying below Reservoir
- Drying below Reservoir
- Drying below Reservoir
- Drying below Reservoir
- Drying below Reservoir
- Drying below Reservoir

### Cost/CL
- $1.7 m
- $1.8 m
- $1.4 m
- $1.7 m
- $1.8 m
- $1.4 m
- $1.7 m
- $1.8 m
- $1.4 m
- $1.7 m

### Water yield (GL/a)
- $17.6 GL/a
- $18.2 GL/a
- $18.5 GL/a
- $18.3 GL/a
- $18.4 GL/a
- $18.5 GL/a
- $18.3 GL/a
- $18.4 GL/a
- $18.5 GL/a
- $18.3 GL/a

### Cost/CL
- $27 m
- $40 m
- $107 m
- $23 m
- $17 m
- Not calculated
E  Record of meeting between Water Corporation and the Department

Collie Coordination – Water Corporation
Actions – Meeting 11 May 2009

Present: Kim Taylor, John Ruprecht, Tim Sparkes, Wayne Tingey
Visitors: Peter Moor, Chris Botica, Mark Leathersich, Paul Ferguson

<table>
<thead>
<tr>
<th>Item</th>
<th>Action</th>
<th>Who</th>
<th>Due</th>
<th>Consideration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MoU – Water Corporation &amp; DoW</td>
<td>Chris</td>
<td>31/5</td>
<td>Roles WC and DoW&lt;br&gt;Appoint EPCM consultant&lt;br&gt;Develop scope of works and final engineering design</td>
</tr>
<tr>
<td></td>
<td>• Agreed that WC would provide project management support and advice&lt;br&gt;• Agreed that WC would put in place EPCM contract&lt;br&gt;• Agreed to finalise draft MoU by end of May</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>MoU – Verve &amp; DoW</td>
<td>Wayne</td>
<td>15/5</td>
<td>Meeting Ken Tushingham 15 May to scope timing and details of letter of agreement</td>
</tr>
<tr>
<td></td>
<td>• Start discussions now – letter of agreement&lt;br&gt;• Strategic intent&lt;br&gt;• Pipeline access including 3rd party operators&lt;br&gt;• Discharge quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Salinity Mitigation – Harris Dam</td>
<td>Wayne</td>
<td>14/5</td>
<td>Letter from DoW to WC agreeing to permanent release of salinity mitigation conditions</td>
</tr>
<tr>
<td></td>
<td>• Agreed that $15m is significant contribution to salinity mitigation WD&lt;br&gt;• Agreed that DoW would carry risk for permanent salinity reduction and ongoing operations&lt;br&gt;• Agreed that DoW would agree to permanent release from salinity mitigation conditions once Pilot Expansion completed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Revised Capital Costs – 11 May</td>
<td>Wayne</td>
<td>15/5</td>
<td>Strategy: for business case and discussion PR&lt;br&gt;RxR - $14m ($7m + $7m) towards Phase B&lt;br&gt;Existing budget - $21m for Pilot expansion + $2m capital towards Phase B + $4m operating 2 years</td>
</tr>
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<td>Pilot Expansion&lt;br&gt;Phase B – 12ML/day desal unit&lt;br&gt;Total</td>
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<td>$21m&lt;br&gt;$18m&lt;br&gt;$37m</td>
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<td>5</td>
<td>Private participation – feasibility study</td>
<td>Wayne</td>
<td>23/5</td>
<td>Write to stakeholders explaining cannot negotiate on single proposal and need to do feasibility study – request their contribution</td>
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<td></td>
<td>• Agreed that to respond to proposals DoW needs to understand issues&lt;br&gt;• Agreed that detailed feasibility study is needed to analyse issues and define scheme options&lt;br&gt;• Agreed to ask stakeholders to contribute towards feasibility study</td>
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In Confidence

Collie Phase B Business Case Final Final v9 13 07 09
**F  Department’s draft risk identification from 3 November 2008 – Phases A and B**

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<tr>
<td>1</td>
<td><strong>Service Delivery</strong></td>
<td></td>
<td><strong>Major</strong></td>
<td>Possible</td>
<td><strong>HIGH</strong></td>
<td>This risk is managed by the conceptual planning and design work undertaken by the DoW with experienced people over many years. All of the policy approvals over the years have converged on this scope or design and a trial has been undertaken during 2005 to 2007 confirming proof of concept and scale. Risks of climate change affecting salinity reduction is minimised by the design. The scoping and planning work over many years, including modelling, has verified the low sensitivity of the outcome to all relevant variables. The delivery of the scheme via the DoW’s specification is undertaken by the WC. Some of the risks under 3rd party access agreements are being shared. The responsibility of the outcome in terms of salinity reduction will be measured by the DoW and the system of measurement is clearly defined.</td>
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<td>Ineffective project outcome</td>
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<td>Legal or regulatory impacts on DoW</td>
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<td>Scheme does not adequately provide for broader benefits or is not positioned to enable them to be achieved effectively or efficiently</td>
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<td>2</td>
<td><strong>Policy and Funding Approvals</strong></td>
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<td><strong>Major</strong></td>
<td>Possible</td>
<td><strong>HIGH</strong></td>
<td>DoW planning and approval process and the project management arrangements to be put in place.</td>
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<td>Ineffective project outcome</td>
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There is a risk that the completed scheme will not produce the desired or predicted benefits and outputs as a result of inadequate planning, design, or through impacts beyond DoW control (e.g. risks in natural systems; climate; river or catchment conditions; catchment events; etc). There is a risk that benefits and outputs of the scheme are not defined in sufficient detail to enable monitoring of success.
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<tr>
<td>• Government approvals will not be secured</td>
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<td>funding arrangements; loss of funding</td>
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<td>DoW experience people who understand the policy and funding arrangements</td>
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<tr>
<td>• Government approvals will be delayed</td>
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<td>Higher costs (rectification, sunk assets)</td>
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<td>Contract via bilateral arrangements</td>
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<tr>
<td>• Incomplete Government approvals will be obtained, or incorrect approvals will be sought</td>
<td></td>
<td>Reputation of DoW or its agents</td>
<td></td>
<td>Long history of well documented policy and funding approvals</td>
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<td>There is a risk of inadequate management of cost estimates during the policy approval phase</td>
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<td>Legal or regulatory impacts on DoW</td>
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<td>Strategy for engagement under the project plan to deal with key stakeholders</td>
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<td>There is a risk that there will be inadequate funding or funding agreements</td>
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<td>Scheme does not adequately provide for broader benefits or is not positioned to enable them to be achieved effectively or efficiently</td>
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<td>Comprehensive process to take to Cabinet via a minute</td>
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<td>There is a risk that the Government does not approve DoW as asset owner and principal for delivery and operating contract for the scheme</td>
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<td>Business case prepared for the CRR Plan, this includes the BCA and the process included extensive community input supported by expert consultants. The Kelly Report (2007) also undertook an analysis of costs and benefits</td>
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<td>There is a risk that there will be incomplete or inadequate business cases to meet Government approval or policy requirements (affects project progress, reputation, costs, and stakeholder relations)</td>
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<td>There is a risk that other Government policy objectives or agendas defer the scheme, or delay</td>
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<td>Planning of Scheme</td>
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<td>DoW experienced people who understand the policy and funding arrangements</td>
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<td>Key process of getting WC to check and verify prior to implementation of the project</td>
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<td>Broader Collie Project Plan to ensure that the positioning of stage one is appropriate going forward to the other stages</td>
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<td>Existing policy approvals are well documented and allow for that positioning</td>
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<td>To get to the preferred option the scheme has undergone many stages of scrutiny</td>
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<td>The planning has been through a NAP review process and variations agreed through a re-approval process</td>
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<td>Regulatory and Statutory Approvals</td>
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<td>Have established DoW’s ability to be the asset owner and principal</td>
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<td>Project plan that makes it clear which regulatory and statutory approvals are to be obtained by DoW and WC in whatever combination. Structured checking process is to be instituted into the forward plan</td>
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<td>The extended stakeholder management plans are well documented and allow for that positioning</td>
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**Planning of Scheme**

There is a risk that there will be an inadequate plan for linking the first stage salinity recovery project to other elements of the broader Collie-Wellington strategy, which includes industrial water supply, irrigation, additions to IWSS.

There is a risk that industry in the Collie Basin is compromised or affected in some way because of inadequate water supply (where water supply market is planned, developed or expectation of services are created).

See also *Regulatory and Statutory Approvals, and Stakeholder Management*.

**Major**

- Scheme does not adequately provide for broader benefits or is not positioned to enable them to be achieved effectively or efficiently.
- Industry in the Collie Basin is compromised or affected in some way because of inadequate water supply.
- Ineffective project outcome; deferment or delays.
- Impact on approvals and funding arrangements; loss of funding.
- Higher costs (rectification, sunk assets).
- Reputation of DoW or its agents.
- Legal or regulatory impacts on DoW.

**Possible**

**HIGH**

- DoW experienced people who understand the policy and funding arrangements.
- Key process of getting WC to check and verify prior to implementation of the project.
- Broader Collie Project Plan to ensure that the positioning of stage one is appropriate going forward to the other stages.
- Existing policy approvals are well documented and allow for that positioning.
- To get to the preferred option the scheme has undergone many stages of scrutiny.
- The planning has been through a NAP review process and variations agreed through a re-approval process.

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<td>create or operate the scheme are not obtained</td>
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<td>Impact on approvals and funding arrangements; loss of funding</td>
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<td>consultative approach has provided opportunity for stakeholders to raise challenges regarding approval requirements</td>
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<td>Higher costs (rectification, sunk assets)</td>
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<tr>
<th>5</th>
<th>Stakeholder Management</th>
<th>Moderate</th>
<th>Possible</th>
<th>HIGH</th>
<th>Extensive stakeholder management to date via DoW with experienced staff</th>
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<tbody>
<tr>
<td></td>
<td>There is a risk that there will be inadequate consultation with stakeholders who could affect implementation or approval (e.g. Ministers, Departments etc)</td>
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<td>Project plan for approvals and further consultations by DoW</td>
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<td>Ineffective project outcome; deferment or delays</td>
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<td>Require a stakeholder management plan from WC as implementer</td>
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<tr>
<th>6</th>
<th>Legal Risks</th>
<th>Major</th>
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<th>HIGH</th>
<th>DoW experience people who understand the policy and funding arrangements</th>
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<tbody>
<tr>
<td></td>
<td>There is a risk that legal action will be taken by a stakeholder (e.g. planning for the scheme delivery or operations not meeting legal requirements; breaches of law in scheme implementation or operations)</td>
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<td>Key process of getting WC to check and verify prior to implementation of the project</td>
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<td>Impact on approvals and funding arrangements; loss of funding</td>
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<td>Have established DoW’s ability</td>
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<td>Higher costs (rectification,</td>
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<td>Delivery and Operations of the Scheme</td>
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<td>Delivery of the project will be impacted because its planning and delivery are outside DoW skills/capability</td>
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<td>Planning or engineering studies to date are not comprehensive enough to</td>
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**Risk Assessment**

**1. Risk description**

- Delivery and Operations of the Scheme
  - There is a risk that there will be inadequate project governance and project management (in both DoW and in the Water Corporation).
  - There is a risk that delivery of the project will be impacted because its planning and delivery are outside DoW skills/capability.
  - There is a risk that planning or engineering studies to date are not comprehensive enough to...

**2. Controls in place at present**

- None

**3. Consequences**

- Sunk assets:
  - Reputation of DoW or its agents
  - Legal or regulatory impacts on DoW or its agents

**4. Likelihood**

- Possible

**5. Current risk exposure and Priority**

- High

**6. Additional controls and responsibility**

- Project management arrangements including governance to be put in place by DoW.
- DoW to appoint a full time experienced project manager for a period of time.
- Require the WC to have appropriate project management in place including representation by the DoW.
- Experienced delivery agent to deliver and operate the project.
- Experienced delivery agent checking and verifying:
  - The planning pre-requisites.
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<td>allow the project and its procurement to commence</td>
<td>Legal or regulatory impacts on DoW</td>
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<td>There is a risk that there will be legal action by a stakeholder or contractor</td>
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<td>There is a risk that agreements for delivery for scheme planning or operation are inadequate or not in place including planning, compliance, approvals, design, construction, commissioning, operations, third party access; commercial arrangements</td>
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<td>There is a risk that there will be an inadequate stakeholder management plan</td>
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<td>There is a risk that there will be an inadequate risk management plan for the project</td>
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<td>There is a risk that there will be an inadequate communication plan for the project</td>
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<td>There is a risk that there will be an inadequate procurement strategy and/or plan for delivery (i.e. statutory compliance review, design and construction, commissioning and operations)</td>
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<td>There is a risk that there will be an inadequate communication plan for the project</td>
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<td>3rd party agreements</td>
<td>Statutory approvals</td>
<td>DoW require WC to have a range of plans as part of the formal agreement for delivery:</td>
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<td>Project management plan</td>
<td>Stakeholder management plan</td>
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<td>Risk management plan</td>
<td>Communications plan</td>
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<td>Procurement plan</td>
<td>Asset creation plan</td>
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<td>Operating plan</td>
<td>OHS plan</td>
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<td>Public health and safety plan</td>
<td>Media protocols</td>
<td>Comprehensive and systematic project management including risk management processes be put in place for the project</td>
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<td>will be lack of agreements for access to third party infrastructure including water disposal; this also includes access to land (e.g. inadequate agreements for access to land agreements, easements etc.) There is a risk that there will be inadequate DoW internal agreement and/or quality assurance over implementation – affects progress, timing, quality of delivery, costs There is a risk that there will be an inadequate asset creation plan/asset plan (includes whole process of planning, approvals, design, construction, commissioning) leading to risk of time delays, costs, quality of delivery) There is a risk that best practice operations and asset management of scheme will not be put in place leading to higher costs than predicted; poor asset performance; customer impacts; reputation impacts for DoW There is a risk that capital and/or operating costs will be higher than planned; there is a risk that there will be major changes to</td>
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<td>input costs; this may be caused by inappropriate increased engineering standards than required for this project or via increases in costs as part of implementation</td>
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<td>There is a risk that operation and management plans for the scheme are not adequate or that monitoring of the performance of the scheme will be inadequate (leading to higher costs; regulatory action or penalties for DoW or contractor; ineffective performance of scheme; reputation impacts; customer complaints or legal action; commercial penalties)</td>
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<td>There is a risk that there may be an inadequate model for efficient and effective procurement by the DoW for delivery or operations of the scheme</td>
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<td>There is a risk that the scheme will be delayed, deferred or ceased because funding is withdrawn due to lack of compliance with the bilateral contract</td>
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8 External scrutiny
There is a risk that there will be adverse political

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Development of a Cabinet Submission
Plan for engaging stakeholders
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<td>scrutiny or OAG opinions about the scheme or project</td>
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<td>Robust project management arrangements, governance, accountability, etc</td>
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<td>Efficient and effective service delivery and operating procurement model</td>
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<td>There is a risk that OHS responsibilities of principal (DoW) or its agents will not be met</td>
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G Harvey Water

Harvey Water is the trading name of the irrigation water provider cooperative serving 558 member irrigators in the Shires of Waroona, Harvey and Dardanup. It is a private organisation which was privatised from the Water Corporation in 1996 as a result of the Council of Australian Governments and National Competition Policy.

The Harvey Water Irrigation Area (HWIA) is located to the west of the Darling Scarp on the Swan Coastal Plain, about 100km south of Perth. It covers an area of 112,000 hectares (around 75km long and 15km wide) in three Irrigation Zones: Harvey, Waroona and Collie.

Figure 5 - Harvey Water Irrigation Districts

Irrigators own water in the form of shares in the co-operative plus a corresponding certificate of water entitlement. The entitlement to water can be leased for a season, or sold outright. Irrigators own water in the form of shares in the co-operative plus a corresponding certificate of water entitlement.
Records show that over 10 years of trading about 10 per cent of annual water sales relate directly to temporary trades and about 1 per cent of sales relate to permanent sales. Trades and prices generally increase in dry years. Three distinct markets have developed in each of the three irrigation Districts for different reasons. Harvey Water plays no direct role in water trading or price setting but has facilitated auctions each season to assist the trading process.

Table 19 shows annual water sales by District within the Harvey Water Cooperative. Annual sales have fluctuated over the last ten years with an average annual sale of approximately 81,000 Ml.

Table 19 Harvey Water annual water sales by District (Ml)

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<tbody>
<tr>
<td>Waroona</td>
<td>6,942</td>
<td>6,563</td>
<td>7,299</td>
<td>5,954</td>
<td>5,644</td>
<td>8,770</td>
<td>9,988</td>
<td>7,440</td>
<td>8,808</td>
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<td>Harvey</td>
<td>40,888</td>
<td>37,895</td>
<td>43,027</td>
<td>30,441</td>
<td>26,088</td>
<td>34,150</td>
<td>29,793</td>
<td>28,594</td>
<td>31,122</td>
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<tr>
<td>Collie</td>
<td>34,360</td>
<td>31,230</td>
<td>37,045</td>
<td>30,452</td>
<td>34,150</td>
<td>29,793</td>
<td>28,594</td>
<td>31,122</td>
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<td>82,190</td>
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<td>87,371</td>
<td>68,053</td>
<td>62,184</td>
<td>79,154</td>
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<td>69,889</td>
<td>68,260</td>
<td>62,104</td>
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</table>

Source: Harvey Water

Table 20 and Table 21 show the quantity (Ml) and price ($/Ml) of water trades between 2001-02 and 2006-07. The average price per Ml has fluctuated for both temporary and permanent trades.

Table 20 Water trade in temporary transfers

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<td>Waroona</td>
<td>295</td>
<td>1,469</td>
<td>2,656</td>
<td>2,417</td>
<td>350</td>
<td>806</td>
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<td>2,375</td>
<td>2,782</td>
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<td>758</td>
<td>806</td>
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Source: Harvey Water

Table 21 Water trade in permanent transfers

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Source: Harvey Water
H  Letter from DoW to Verve  
(Commercial in confidence)
Prior to the Water Corporation committing further funds for this Project on behalf of the DoW, the DoW requests that Verve Energy execute this Letter to Construct.

Execution by the DoW and Verve Energy of this Letter to Construct commits both parties or their agents on a reasonable endeavours basis to commence negotiations and reach an understanding on the following issues:

1. The terms and conditions which will grant access to the Department of Water or its agents to access the Collie "A" power generation site to effect construction of the pipeline. The proposed pipeline may be laid by Verve Energy or their agents on behalf of the Water Corporation acting for the DoW, and fully reimbursed as above in this Letter.
2. That ownership of the pipe assets, fittings and service crossing pipe casings will remain with the DoW.
3. That Verve Energy will allow use of the brine storage tank, brine disposal pump station and upgraded brine disposal pipeline to accept the agreed flow volumes from the project desalination plant, subject to the required Regulatory and stakeholder approvals.
4. That Verve Energy will discuss energy supply arrangements with the DoW for the pump station to dispose of the brine into the Verve Energy pipeline delivered from the operation of the desalination plant to be located at the agreed site near WSH void.
5. That the DoW will accept the agreed brine flow and quality from the Muja RO plant into WSH void for processing either through the desalination plant or directly into the brine disposal pipe to Collie "A".

Yours sincerely

Brendan O'Neil
Director, Corporate Services

28 March 2008