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of Western Australia

Kemerton Industrial Park
Water Supply
Public Environmental Review

BHP Engineering
November 1993

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Water Authority
of Western Australia

WATER RESOURCES DIRECTORATE
Water Resources Planning Branch
Country Source Planning

Kemerton Industrial Park Water Supply

Public Environmental Review

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November 1993

KEMERTON INDUSTRIAL PARK
WATER SUPPLY

An Invitation to Comment on this Public Environmental Review

The Environmental Protection Authority invites submissions on this proposal.

The Public Environmental Review for the proposed Kemerton Industrial Park Water Supply has been prepared by BHP Engineering Environmental Consulting Services on behalf of the Water Authority of Western Australia, in accordance with Western Australian Government procedures. Comment on the report will be received for eight weeks:

- Beginning - 15 November 1993
- Finishing - 17 January 1994

Following receipt of comments from the public and government agencies, the Environmental Protection Authority will summarise the comments and forward them to the proponent and may ask for further information. The Environmental Protection Authority will then prepare an Assessment Report, taking into account issues raised in the submissions.

Why write a submission?

A submission is a way to provide information, express your opinion, and put forward your suggested course of action including any alternative approach. It is useful if you indicate suggestions that would improve the proposal.

Developing a submission

You may agree or disagree, or comment on, the general issues discussed in the Public Environmental Review or with specific proposals. It helps to give reasons for your conclusions supported by relevant data. You may make an important contribution by suggesting ways to make the proposal environmentally or socially more acceptable.

When making comments on specific proposals in the Public Environmental Review:

- clearly state your point of view;
- indicate the sources of your information or argument if this is applicable;
- frame your queries in the form of questions; and
- suggest recommendations, safeguards or alternatives.

Points to keep in mind

By keeping the following points in mind, you will make it easier for your submission to be analysed:

- attempt to list points so that the issues raised are clear. A summary of your submission is often helpful;
- refer each point to the appropriate section of the Public Environmental Review;
- keep them distinct and separate so that there is no confusion as to which section you are considering; and
- attach any factual information you wish to provide and give details of the source. Make sure your information is accurate.

When preparing a submission, it is useful to refer back to the Scope and Timing of the Proposal, Section 2.3. This will help to ensure that issues raised are relevant to this proposal.

Please indicate whether your submission can be quoted, in part or in full, by the Environmental Protection Authority in its Assessment Report.

Remember to include:

- ***your name;***
- ***address; and***
- ***the date.***

The closing date for submissions is- **17 January 1994**

Submissions should be addressed to:

The Chairman
Environmental Protection Authority
8th Floor, Westralia Square
141 Saint Georges Terrace
PERTH WA 6000

Attention: Mr Simon Smalley

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1.0 SUMMARY

Background

The Water Authority of Western Australia (Water Authority) is the proponent for the development of a water supply to the Kemerton Industrial Park (Kemerton).

Kemerton is established as a prime site for industrial growth and is developing as a regional centre for major industry in the South West. Industries currently operating at Kemerton draw on local groundwater and the demand is close to the supply capacity. No additional groundwater can be made available in the immediate vicinity of Kemerton. Before any new industries can be accommodated a new source of water is required.

Description of Proposal

An assessment by the Water Authority of potential water sources to satisfy the predicted increased demand identified the Collie River as a preferred source. Factors considered in the assessment included:

- water availability and security of supply;
- water allocation policy objectives;
- environmental and social impacts, including System 6 values;
- economic and engineering considerations; and
- public input.

Following consultation with interested groups, government agencies and a formal community consultation programme; a river offtake about 700 metres downstream of the South West Highway, at Rose Road and a pipeline route to Kemerton along the Australind Bypass is proposed. The Collie River offtake site is within cleared farming land and the pipeline route is contained within road reserves and privately owned land.

The primary environmental and social issues resulting from this water source option are associated with:

- the release of additional water from Wellington Dam to meet the demand at Kemerton;
- changes in the Collie River flow regime;
- construction and operation of the pipehead weir; and
- construction of the pipeline.

Environmental and Social Impacts and Management

Potential environmental and social impacts associated with the construction and operation of the proposed water supply scheme are expected to be minimal and manageable. A summary of these impacts is provided below.

- **Management of Water Resources**
  - More than sufficient water is available to satisfy the estimated Kemerton demand.
  - The water allocation to industry from Wellington Dam is currently not used, and is going to waste when the dam overflows.
  - Use of water from Wellington Dam will not impact on the supply to irrigators in the Collie Irrigation District.

- **Flora, Fauna and Ecosystem - Wetland Management**
  - The potential environmental impacts to flora, fauna and wetland systems are of a magnitude which is less than that of the other potentially most viable source; the Brunswick River Dam.
  - The salinity level of water in the Collie River will be marginally better than that in Wellington Dam because of the impact of freshwater from the catchment area downstream of Wellington Dam.
  - Water that is withdrawn for Kemerton will be released from Wellington Dam. This will slightly increase summer flows between Wellington Dam and the offtake point on the Collie River. Downstream of the offtake point, river flows will be substantially unchanged except that overflows from Wellington Dam would be reduced slightly.

- **Construction and Operational Management Issues**
  - The conservational and visual amenity values of the offtake site and pipeline route would be preserved by the adoption of construction practice that:
    - minimise physical disturbance to the banks of the Brunswick and Collie Rivers, controls dust generation and manages sediment-runoff; and

- limits impacts upon vegetation and where vegetation clearance is necessary the impacts would be managed and the land rehabilitated at the completion of construction activity.

- **Social Impacts and Management**
  - The social impacts associated with this option would be minimal and would be principally concerned with the pipehead weir and pipeline route from the pipehead weir to Kemerton.
  - Input received during the public consultation program, indicates regional community support for the Collie River source.

Management Commitments

The Water Authority undertakes responsibility for the implementation of commitments relating to the management of the construction and operational impacts of the proposal on the environment. A detailed listing of these commitments is presented in Section 8.0, however a summary is provided below.

- **Remnant Native Vegetation**
  - Impacts on remnant native vegetation will be limited.
  - Revegetation of the Collie River banks will be undertaken using suitable indigenous species.
  - The stand of mature trees within the Rose Road reserve will be preserved.
  - The Department of Conservation and Land Management will be consulted in regard to the management of the population of Acacia semitrullatea.

- **Collie River**
  - Sediments entering the Collie River will be minimised by containing runoff from site works.
  - During operation the flow of water in the Collie River, downstream of the off-take site, will be similar to that prior to implementing the proposal.
  - The pipehead weir will be designed so as not to form a significant barrier to aquatic fauna.

- **Brunswick River**
  - Sediments entering the Brunswick River will be minimised by containing runoff from site works.
  - The conservation properties of the Brunswick River will be preserved and any impacts upon the riparian ecosystem will be minimised.

- **Land Use**
  - Prior to construction, agreements will be concluded with owners of land on which facilities are to be constructed.

- **Dust and Erosion**
  - Land disturbed by the project will be contoured to restore the pre-construction drainage regime and access.
  - During construction:
    - fugitive dust will be prevented by watering;
    - off road traffic and disruption to traffic would be kept to a minimum; and
    - where practicable, the removal of natural vegetation would be avoided.

- **Noise**
  - Noise will be abated to accord with statutory requirements.
  - Noise impact during construction will be controlled.

- **Rehabilitation**
  - Where trees or other vegetation need to be cleared, the disturbed areas will be rehabilitated at the conclusion of site works.

2.0 INTRODUCTION

2.1 THE PROPONENT

The proponent for the development of the Kemerton Industrial Park (Kemerton) Water Supply Scheme is the Water Authority of Western Australia (Water Authority). The proposal was initiated by the Department of State Development and the Western Australian Land Authority (formerly the Industrial Lands Development Authority).

2.2 BACKGROUND AND OBJECTIVES

In 1988 the South-West Strategy, released by the South West Development Authority, acknowledged the future industrial development of the Bunbury and South West region as being of prime importance. Kemerton was one of the three locations stipulated as prime growth areas for industry in the Bunbury-Wellington Region Plan[1]. The Kemerton Industrial Parklands Study identified several industries which may establish at Kemerton over the next several years[2]. The industries are predicted to require a total of ten million kilolitres of water per year in addition to current use.[3] Before any new major industries can be accommodated, a new source of water is required.

In late 1990, at the request of the Department of State Development, the Water Authority commenced investigations to assess potential water sources to meet the estimated increase in water demand at Kemerton. The major objectives of the investigation were to identify a secure water supply that was cost efficient and takes proper account of environmental and social considerations.

In mid 1992 the Water Authority, after having located a water supply source, sought advice from the Environmental Protection Authority concerning the level of assessment applicable to the development of the source. The Environmental Protection Authority established the level of assessment as a Public Environmental Review. This document has been prepared to satisfy that requirement, in accordance with the guidelines.

---

1 Department of Planning and Urban Development, 1993, Bunbury Wellington Region Plan, Chapter 5, Western Australia.

2 Feilman Planning Consultants et al, 1988, Kemerton Park - Final Report, Western Australia.

3 Estimate determined from discussions between Kemerton Advisory Board and Water Authority.

2.3 SCOPE AND TIMING OF THE PROPOSAL

The scope of this proposal is limited to the installation of facilities for the supply of water to Kemerton. It considers headworks and a pipeline from the headworks to a storage tank in the Kemerton Industrial Park.

Construction of a water supply scheme would not commence until either a new industry is committed to Kemerton or an existing industry requires additional water which cannot be supplied from local groundwater. Although it is not possible to reliably forecast when a water supply scheme would be required, it is anticipated to occur within the next two to five years. Recognising that there can be a considerable lead time in providing a water supply scheme, this proposal has been initiated at this time to minimise time constraints to industrial development at Kemerton.

2.4 RELEVANT STATUTORY PROCEDURES AND APPROVALS

The environmental impact assessment procedure is designed to provide information to the public and the Environmental Protection Authority about proposed developments and their associated environmental and social implications. In Western Australia, the process is formalised by the Environmental Protection Act 1986. This Act also provides for enforcement of environmental and management commitments made by the proponent.

The full assessment procedure is illustrated in Figure 1. The process is initiated when a proposal is referred to the Environmental Protection Authority for assessment. The Environmental Protection Authority is required to review each proposal and determine an appropriate level of assessment. In respect to the Kemerton Industrial Park Water Supply, the Environmental Protection Authority set the level of assessment at Public Environmental Review, requiring eight weeks of public review.

After a Public Environmental Review has been prepared and released for public comment, and comment received from interested parties, the Environmental Protection Authority prepares an assessment. Results of the assessment are published in the form of an Assessment Report which includes recommendations, in regard to the proposal, made to the Minister for the Environment. Interested parties can appeal, in writing, to the Minister for the Environment against the content or recommendations in the Environmental Protection Authority's Assessment Report.

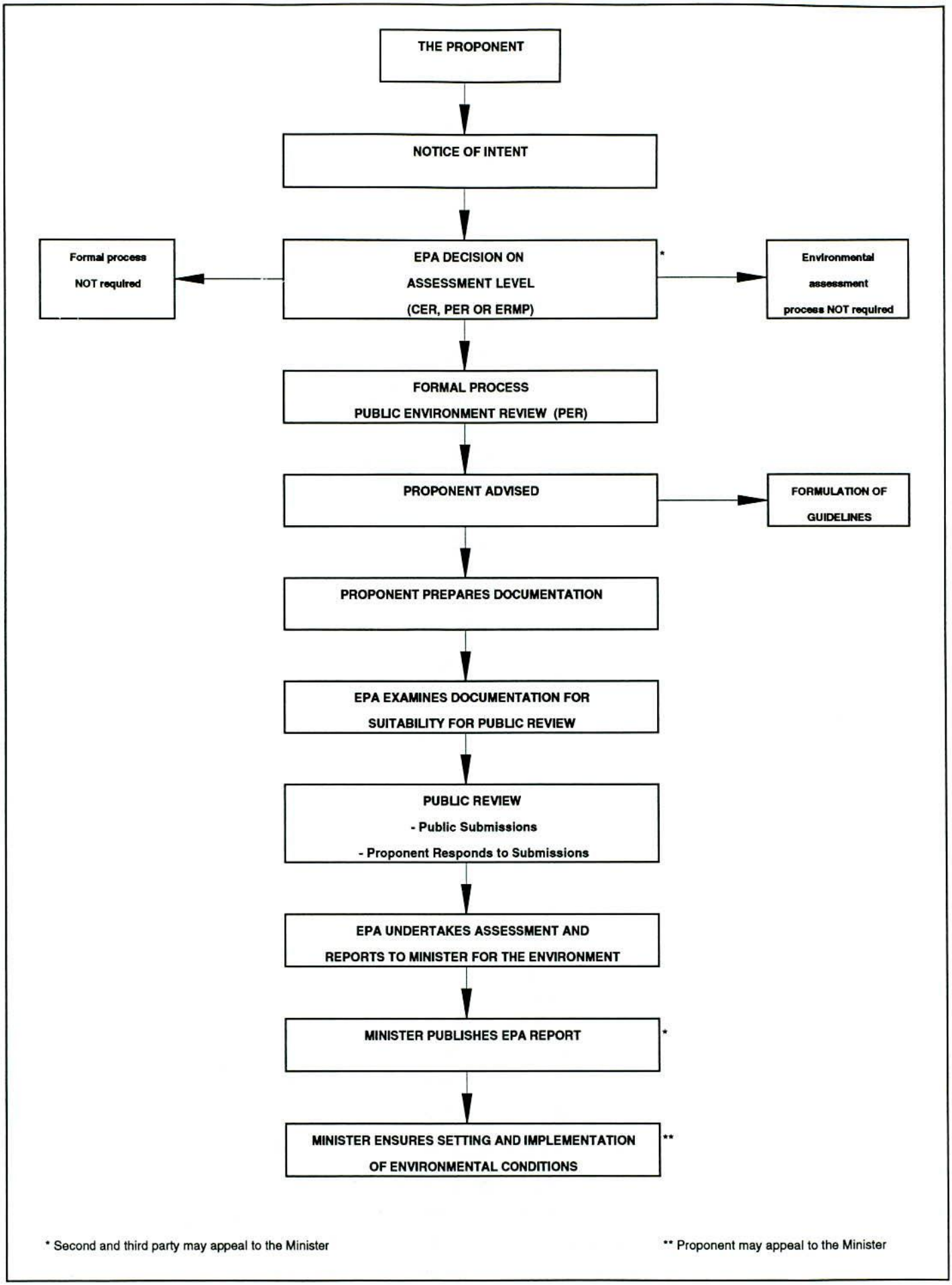

Figure 1 ENVIRONMENTAL ASSESSMENT PROCESS

3.0 NEED FOR THE PROPOSAL

3.1 WATER SUPPLY - PRESENT AND PREDICTED

The Kemerton Industrial Park is the major heavy industrial estate servicing the South West Region. The park has been progressively developed with two major industries, SCM Chemicals and SIMCOA, established and operating. The industrial core has approximately 1 000 hectares yet to be developed. Various scenarios investigated indicate that upward of 20 additional industries could be located within the park[4]. It is estimated that an additional ten million kilolitres of water per year will be required. Present usage is approximately two and a half million kilolitres per year.

3.2 WESTERN AUSTRALIAN WATER RESOURCES COUNCIL PERTH - BUNBURY REGIONAL WATER ALLOCATION STRATEGY

The Western Australian Water Resources Council Perth - Bunbury Regional Water Allocation Strategy provisionally allocates the water resources of the Perth - Bunbury region to environmental and consumptive beneficial uses in order to guide current and future management for their effective protection and sustainable use[5]. This proposal to provide for an additional ten million kilolitres per year to Kemerton is in compliance with the scheme supply allocation for urban and industrial use, as designated by the Allocation Plan[6] for the southern half of the Perth - Bunbury region.

3.3 BENEFITS AT A LOCAL AND REGIONAL LEVEL

The primary benefit arising from this proposal would be to enable Kemerton to attract additional industry. This would improve the region's industrial base with resulting job prospects and economic flow-on benefits at both a local and regional level.

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4 Identified by the Department of Resources Development, in discussions with the Water Authority.

5 Western Australian Water Resources Council, 1991, Safeguarding our Water Resources- Perth/Bunbury - Regional Allocation Plan, Western Australian Water Resources Council, Western Australia.

6 Western Australian Water Resources Council, Chapter 6 - Scheme Supply Beneficial Uses, Safeguarding our Water Resources - Perth/Bunbury - Regional Allocation Plan.

3.4 CONSEQUENCES OF NOT IMPLEMENTING THE PROPOSAL

Groundwater within Kemerton has been committed or allocated to specific users and therefore does not offer a long term viable supply for any additional industry with large water requirements. For Kemerton to reach its full development potential, an adequate and secure source of water is essential. **No further industry can establish in the Kemerton Industrial Park until the water supply issue is resolved.**[7]

There is a possibility industry seeking to establish in Kemerton may prefer an alternative water source to that in this proposal. In this event, the industry could either establish in another region or it could seek Environmental Protection Authority approval to develop an alternative water source. However, this scenario is unlikely to occur if development of this proposal precedes such an event.

---

7 Identified by the Department for State Development, in discussions with the Water Authority.

4.0 EVALUATION OF ALTERNATIVE WATER SOURCES

4.1 INTRODUCTION

In 1991 the Water Authority assessed a range of water supply options to meet the needs for industrial development at Kemerton. Fourteen water supply options were evaluated giving consideration to security of supply, water quality, cost, social and environmental impacts and water allocation policy objectives. It was concluded that three regional surface water sources and groundwater in the region warranted a more detailed investigation.

These potential water sources were:

- Groundwater (Local and Regional);
- Harvey River;
- Brunswick River; and
- Collie River.

The location of these water sources are shown in Figure 2 and a comparison of the available water and its estimated cost is shown in Figure 3.

4.2 GROUNDWATER (Local and Regional)

- **General**

  The four main aquifers at a local and regional level are the:

  - Superficial Formation;
  - Leederville Formation;
  - Yarragadee Formation; and
  - Cockleshell Gully Formation.

- **Security of Supply**

  On a local and regional level the groundwater resources of the Superficial Formation are predominantly committed to current users and hence are not considered to be available for new industry at Kemerton.

  The groundwater resources of the Leederville Formation, at a local and regional level, have been completely reserved for future use by town water schemes and even if reallocated, they are of insufficient magnitude to satisfy the projected industrial demand at Kemerton.

The resources of the Yarragadee Formation in the immediate vicinity of the Kemerton/Australind area are at a premium, however on a regional basis, the groundwater resources are available and present a secure supply option for Kemerton. To use the groundwater resources from the Yarragadee Formation would require the construction of an extensive wellfield, likely in the Dardanup - Eaton area, and a pipeline to Kemerton.

The local and regional groundwater resources of the Cockleshell Gully Formation are little used and a significant portion of this resource is not currently allocated and is available for Kemerton. However, actual quantities available are unknown.

- **Water Quality**

  The Cockleshell Gully Formation aquifer averages in excess of 2,000 milligrams per litre salinity thereby classifying it brackish[8]. Drinking water is considered fresh if the salinity level is less than 500 milligrams per litre. Most industries developing at Kemerton would likely find this water quality unsuitable, although it could be developed by individual industries capable of using brackish water.

  The Yarragadee Formation groundwater is good quality, being the best of the groundwater resources considered.

- **Cost**

  To use the groundwater resources of the Yarragadee Formation would require the construction of an extensive wellfield with a long pipeline to Kemerton. The cost of drilling into the Cockleshell Gully Formation is higher than for the Leederville or Yarragadee Formation. Therefore water from the Cockleshell Gully Formation will more expensive than the Yarragadee Formation. Consequently, this is one of the most expensive water supply alternatives considered.

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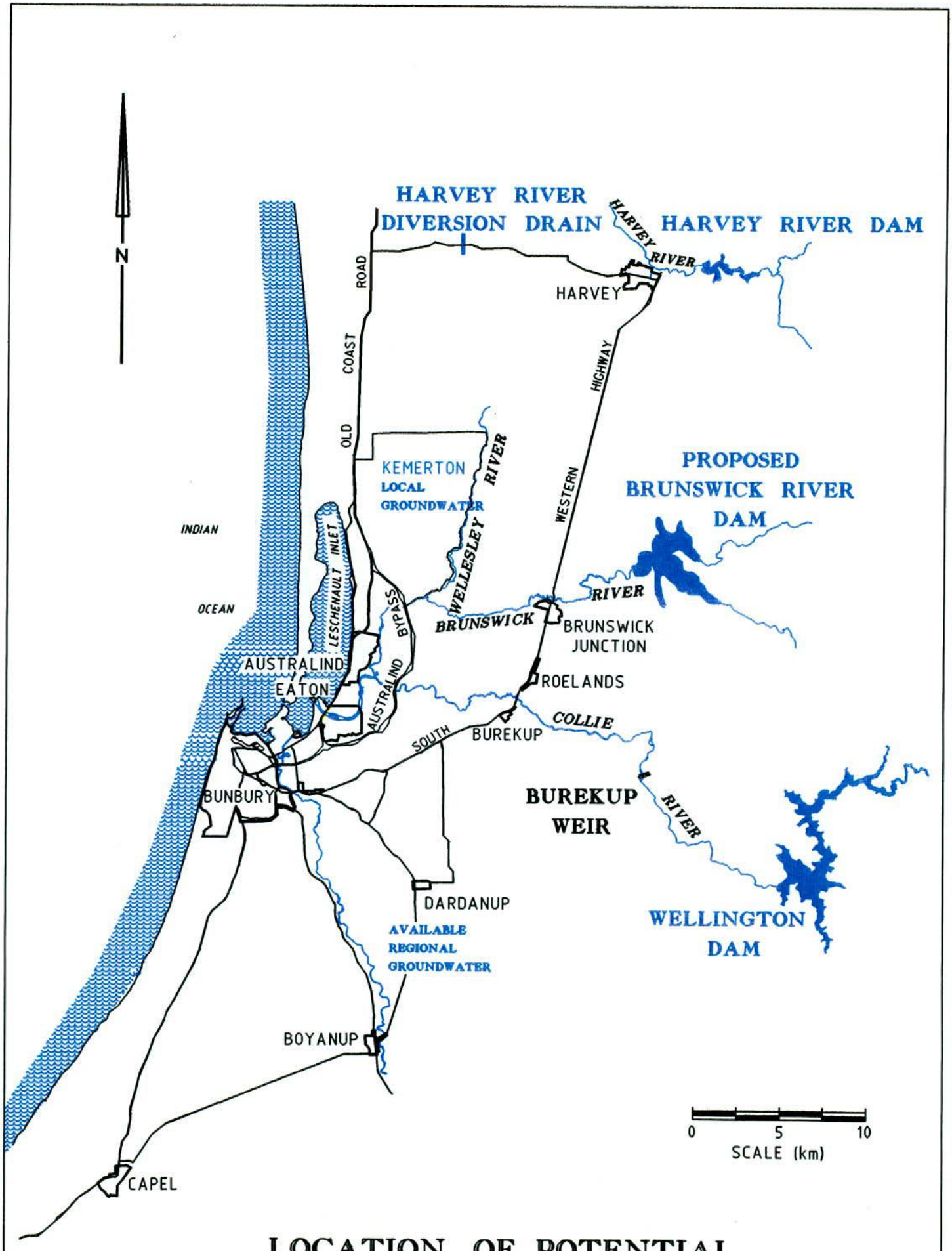
8 Water Authority, Kemerton Industrial Park - Water Source and Effluent Disposal Assessment - Internal Report.



LOCATION OF POTENTIAL WATER SOURCES

FIGURE 2

CAD No. QSA2:[211305]KEMFIG1.DGN

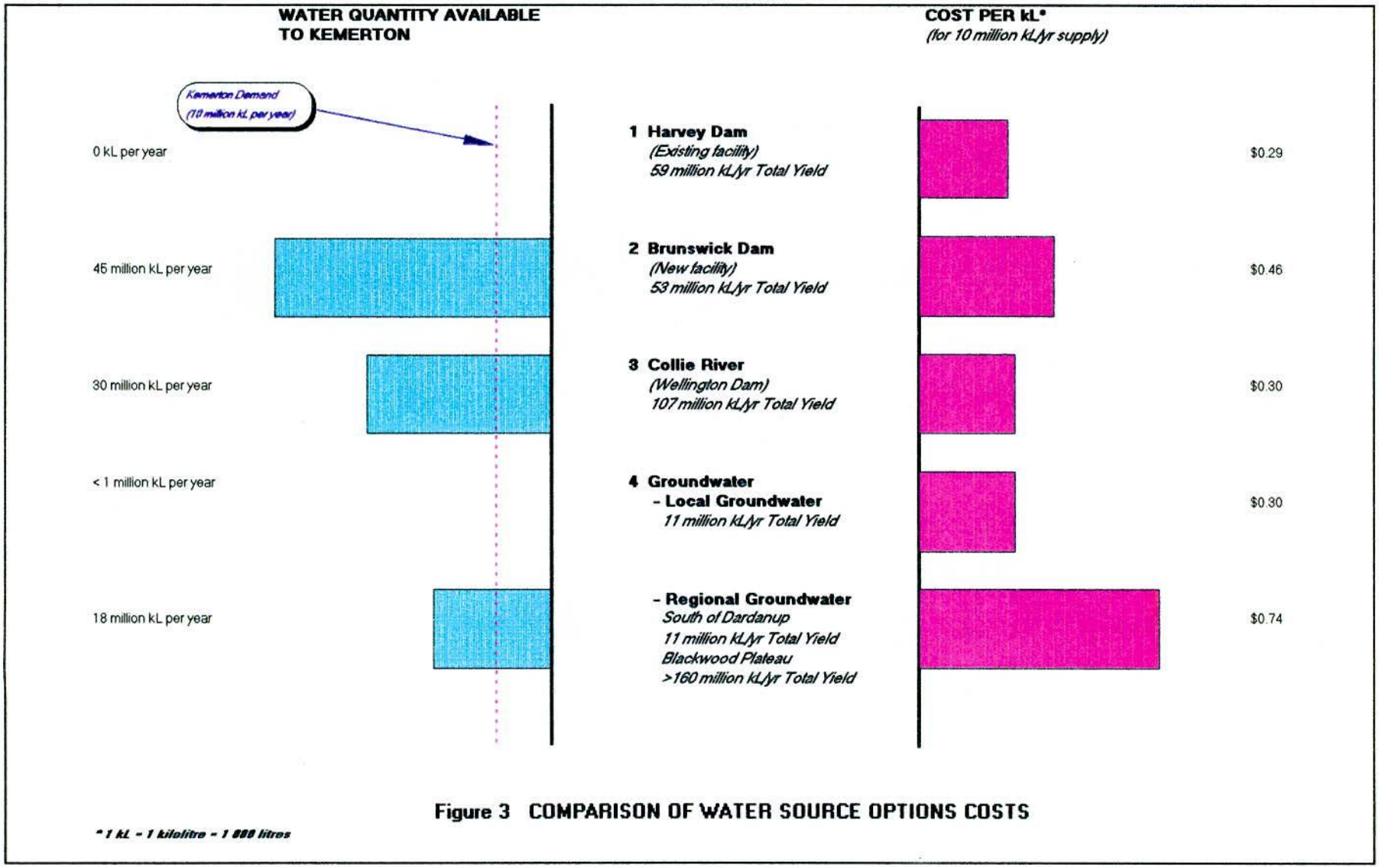


Figure 3 COMPARISON OF WATER SOURCE OPTIONS COSTS

** 1 kL = 1 kilolitre = 1 000 litres*

4.3 HARVEY RIVER

Two potential water sources, based on the Harvey River, were assessed.

4.3.1 Harvey River Dam

- **General**

  The Harvey River is dammed above the town of Harvey and supplies the Harvey township and Harvey Irrigation District via a network of canals and pipes. The water quality is very good, averaging 200 milligrams per litre salinity, which would meet the requirements of any industry proposing to develop at Kemerton[9]. This water supply option involves piping water from the Harvey River Dam, using existing pipelines where available, and constructing a new pipeline to Kemerton. This is one of the least expensive supply options investigated.

- **Security of Supply**

  Currently the water resource of the Harvey River Dam is completely allocated to the irrigators in the Harvey Irrigation District and is not available for Kemerton. To supply Kemerton from the Harvey River Dam would require legislative changes as existing water entitlements are not transferable.

- **Water Quality**

  This option was not considered further, refer to Security of Supply.

- **Cost**

  This option was not considered further, refer to Security of Supply.

4.3.2 Harvey River Diversion Drain

- **General**

  This water supply option involves using *run-of-river* flows in the Harvey Diversion Drain by constructing a pipehead weir and a pumping station at an offtake from the drain with a pipeline to Kemerton. Water quality is variable, being subject to runoff from irrigated farm land.

---

9 Water Authority, Kemerton Industrial Park- Water Source and Effluent Disposal Assessment - Internal Report.

- **Security of Supply**

  The Harvey River does not flow year round and therefore a *run-of-river* scheme would not meet the projected Kemerton demand during the dry summer months. This alternative is therefore not a secure supply and cannot be considered as a stand alone water supply option.

- **Water Quality**

  This option was not considered further, refer to Security of Supply.

- **Cost**

  This option was not considered further, refer to Security of Supply.

4.4 BRUNSWICK RIVER

Two potential water source options, based on the Brunswick River, were assessed.

4.4.1 Brunswick River Dam

- **General**

  Several potential dam sites have been identified in previous investigations for a water supply dam on the Brunswick River.[10] This option would require the construction of a dam, pump station, power supply and a pipeline to Kemerton.

- **Security of Supply**

  All potential dam sites command catchments which would provide water in excess of that required to satisfy the projected industrial demand at Kemerton.

- **Water Quality**

  The Brunswick River is one of the few remaining large freshwater rivers in the region, untapped for water production. The water quality is excellent, with no treatment being required.

---

10 Investigations conducted by the Water Authority between 1985 - 1991.

- **Cost**

  The cost of this water supply option is one of the most expensive investigated and is some 50% more than the majority of the other options investigated[11].

4.4.2 Brunswick River Pipehead

- **General**

  This option involves the construction of a pipehead weir on the Brunswick River with a pump station, power supply and a pipeline to Kemerton. Two alternative locations for the pipehead weir were considered.

- **Security of Supply**

  The Brunswick River flow is not perennial, therefore a *run-of-river* scheme such as a pipehead weir would not provide a secure supply, as a stand alone source, to Kemerton.

- **Water Quality**

  This option was not considered further, refer to Security of Supply.

- **Cost**

  This option was not considered further, refer to Security of Supply.

4.5 COLLIE RIVER

- **General**

  This water supply option involves the construction of a pipehead weir, pumping station and power supply on the Collie River to intercept part of the water released from Wellington Dam and then delivering it, via a buried pipeline, to Kemerton (Figure 4).

- **Security of Supply**

  The Collie River, via the Wellington Dam, is the major source of water to irrigators in the Collie Irrigation District. It also supplied water to the Great Southern Towns Water Supply Scheme[12] until recently when it was replaced by the Harris River Dam.

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11 Water Authority, Kemerton Industrial Park - Water Source and Effluent Disposal Assessment - Internal Report.

12 Water Authority of Western Australia, 1988, The History of Catchment and Reservoir Management on Wellington Reservoir Catchment, Western Australia.

The current water allocations policy for Wellington Dam allocates 30 million kilolitres per year to industry with 9 million kilolitres available for salinity control.[13]

The present water allocation for industry is not used and is lost when Wellington Dam overflows, as it has for the past four years. Hence, the available industry allocated water, is more than sufficient to meet the estimated demand at Kemerton.

- **Water Quality**

  The relatively high and variable salinity[14] *(an average of 1,100 milligrams per litre but with short term fluctuations, as a result of scouring, to between 2,000 and 2,600 milligrams per litre)* of the Collie River may be a problem for some industries which may wish to establish at Kemerton.

- **Cost**

  The capital cost of this option is comparatively low. However, it is acknowledged that some industries seeking to establish at Kemerton may require a higher water quality, resulting in end user treatment costs. Overall this water supply option is expected to remain the least cost option for industry.

4.6 CONJUNCTIVE USE

- **General**

  The water source options which on a stand alone basis, cannot provide a secure supply to Kemerton could have their security improved by conjunctive use with local groundwater.

- **Security of Supply**

  As described in Section 4.2, local fresh groundwater resources in the Kemerton/Australind area are fully allocated or reserved for future town water schemes. While this situation remains, local groundwater cannot be considered for conjunctive use. However, if current allocations are redistributed then the security of this option could be adequate.

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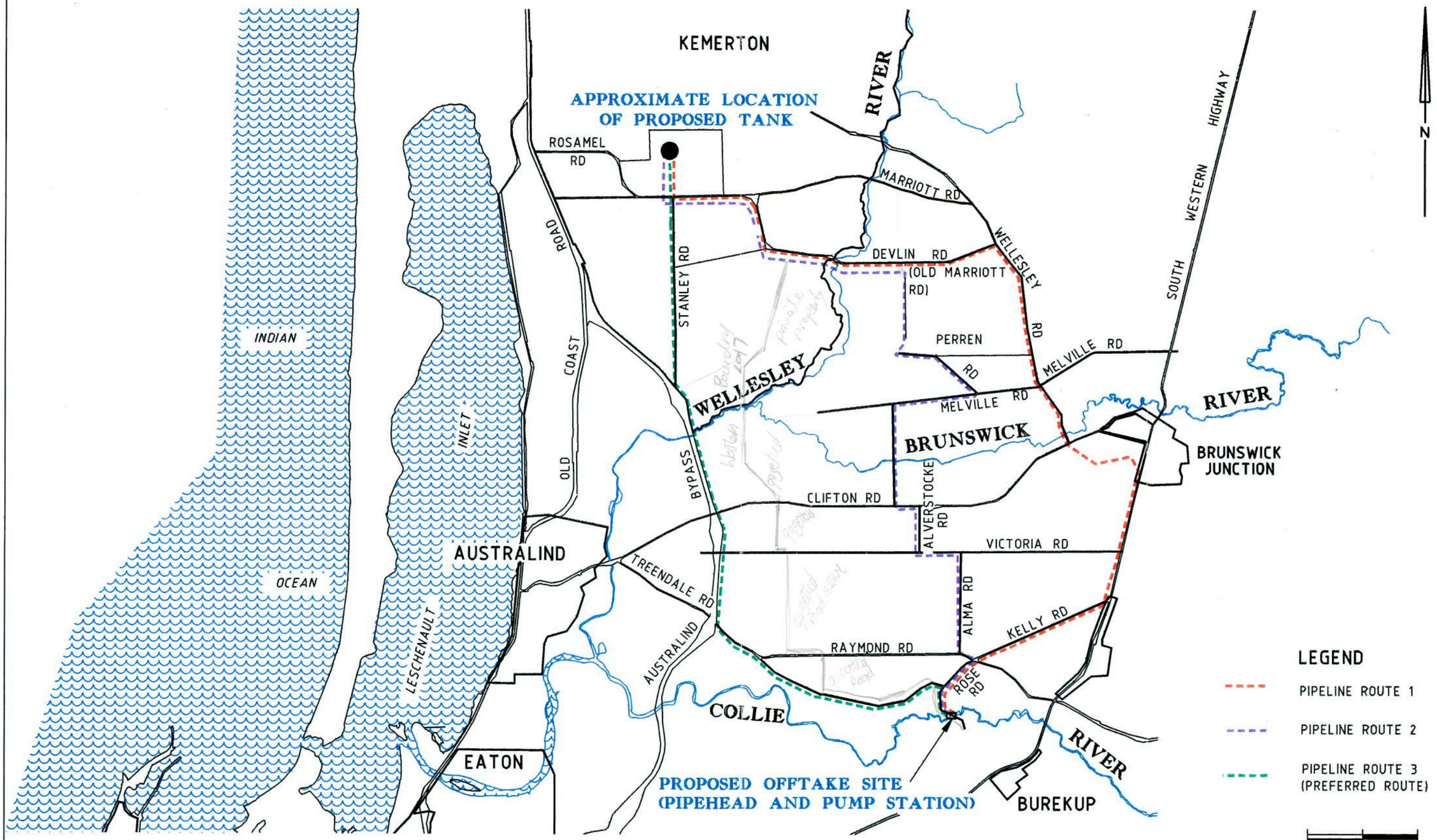
13 Identified by the Water Authority.

14 Water Authority of Western Australia, 1988, Wellington Dam Catchment Regeneration, Western Australia.



COLLIE RIVER PROPOSED OFFTAKE SITE AND PIPELINE ROUTE OPTIONS

FIGURE 4

CAD DRG No. QSA2:[211305]KEMFIG4.DGN

- **Water Quality**

  Conjunctive use entails the supply of water from two (or more) sources. Final water quality is dependent on the quality of sources and the blending ratio. The quality of sources is subject to seasonal variations and industries which wish to establish at Kemerton would have to deal with this variable quality.

- **Cost**

  The cost of a conjunctive use option is the combined cost of using local groundwater and the partnered source. Consequently the improvement in security of supply through conjunctive use results in a subsequent increase in the cost of the water supply. This results in the conjunctive use option being one of the most expensive of the water supply options considered and it is not evaluated further.

5.0 ENVIRONMENTAL AND SOCIAL IMPACT OF ALTERNATIVE WATER SOURCES

5.1 INTRODUCTION

From the evaluation of the four potential water sources (Section 4.0), the supply options which met the criteria for security of supply, water quality, cost and water allocation policy objectives were:

- Regional Groundwater - Yarragadee Formation
- Brunswick River Dam; and
- Collie River Pipehead Weir

The environmental and social impact of these available sources is discussed below.

5.2 REGIONAL GROUNDWATER

- **Management of Water Resources**

  In general the environmental consequences associated with the use of groundwater resources depends on the aquifer used.

  The major concern with the use of water resources from a confined aquifer is that the abstraction rate may exceed the recharge rate, resulting in unsustainable abstraction, increased pumping costs as water levels decline and possible intrusion of saline water[15].

  Use of the Superficial aquifer can result in a lowering of the water level in surface water bodies and saltwater intrusion together with environmental impacts resulting from lower water levels in the wetlands.

- **Flora, Fauna and Ecosystems - Wetland Management**

  A decrease in the water level of the Superficial Formation, an unconfined aquifer, that exceeds normal seasonal fluctuations may result in unacceptable stress on vegetation communities and wetland habitats. In particular, the Kemerton and south-eastern wetland systems which are supported by local groundwater throughflow[16].

---

15 Environmental Protection Authority, 1987, Proposed Chloride Process Titanium Dioxide Plant at Kemerton - Report and Recommendation, Environmental Protection Authority Bulletin 283, Perth.

16 Environmental Protection Authority, Bulletin 283.

Abstraction from a confined aquifer, like the Yarragadee Formation, will not affect the wetland systems or associated vegetation communities.

- **Operational Management**

  For the confined aquifers situated near the coast, excessive abstraction rates may lead to a landward migration of the saltwater/freshwater interface. This would have the potential of permanently increasing salinity levels and adversely affecting the overall groundwater quality[17]. As a result, abstraction rates would need to be monitored and controlled to avoid any long term impacts to the aquifer.

- **Social Impacts**

  The social impacts associated with a water supply from a confined aquifer would be minimal and would be mainly concerned with the extensive wellfield and pipeline to Kemerton. The use of water from the Superficial Formation would impact on local private users and their limited allocations.

5.3 BRUNSWICK RIVER DAM

- **Management of Water Resources**

  The construction of a dam at any of the potential dam sites would result in inundation of parts of the Brunswick River valley. By way of example, the inundation area upstream of one of these potential dam sites, Olive Hill, comprises:

  - 70-80% cleared land used mainly for grazing and mixed farming.
  - 10-15% modified vegetation significantly impacted upon.
  - 10-15% remnant vegetation resembling original communities[18].

  The remnant vegetation occurs on the steeper and rockier areas, while some areas along the southern side of the valley have been planted with eucalypt plantations. Aesthetically, the Brunswick

17 Environmental Protection Authority, Bulletin 283.

18 General percentage values obtained from aerial photographs (1992) and vegetation maps (Department of Conservation and Land Management, 1990) of the inundation area.

River valley presents a rural outlook that is markedly different to that of the coastal plain, but is not unique to the region.

Other potential dams sites would most likely comprise a similar vegetation distribution within the inundation area.

- **Flora, Fauna and Ecosystem - Wetland Management**

  Brunswick River flows are, at present, effectively uncontrolled resulting in significant variation in seasonal flows. A dam would alter this flow regime affecting the downstream flora and fauna to various degrees depending on their reliance on river flows. A dam may also impact on the Leschenault Estuary and lower Collie River by reducing the input of freshwater. The extent of any impact would depend on the respective contributions of the Collie, Wellesley and Brunswick Rivers. No flora or fauna reserves were identified at the Olive Hill dam site, however the lower reaches of the Brunswick River, below Brunswick Junction, form part of a nominated System 6 reserve; identified in recommendation C67. Some wetland areas near the junction with the Collie River are identified in the Environmental Protection (Swan Coastal Plain Lakes) Policy 1992. Alteration to existing river flow, as would result from a dam, would impact on these areas.

- **Operational Management**

  While construction activities may result in local disruption including increased traffic, noise and dust, impacts could be minimised and managed. Operational activity associated with the dam is likely to produce negligible impacts.

- **Social Impact**

  The primary social impacts would involve the need to relocate farmers currently residing in the inundation area. For the Olive Hill site the construction of the dam would require the relocation of Beela Road and the railway line. This would require the acquisition of additional land, possibly necessitating the division of paddocks into subeconomic areas. Additionally, recreational use of the area may increase as private land becomes publicly owned. Social issues associated with the construction workforce, like local

employment, accommodation and provision of services would have to be investigated and managed.

5.4 COLLIE RIVER PIPEHEAD WEIR

The primary environmental and social issue resulting from this water source option are associated with:

- the release of additional water from the Wellington Dam to meet the demand at Kemerton;
- any changes in the Collie River flow regime; and
- construction and operation of the offtake facilities.

A detailed assessment of potential environmental and social issues, and their management, is presented in Section 7.0, with a summary provided below.

- **Management of Water Resources**
  - More than sufficient water is available to satisfy the estimated Kemerton demand.
  - The water allocation to industry from Wellington Dam is currently not used and is lost when the dam overflows.
  - Use of water from Wellington Dam will not impact on the supply to irrigators in the Collie Irrigation District.
  - Additional water will be released from Wellington Dam to meet the required take off for Kemerton at the pipehead weir.

- **Flora, Fauna and Ecosystem -Wetland Management**
  - The potential environmental impacts are of a magnitude which is less than that of the other potentially most viable source; the Brunswick River Dam.
  - The salinity level of water in the Collie River will be marginally better than that in Wellington Dam because of the additional inflow of freshwater from the catchment area downstream of Wellington Dam.
  - Water that is withdrawn for Kemerton will be released from Wellington Dam. This will slightly increase summer flows between Wellington Dam and the offtake point on the Collie River. Downstream of the offtake point, river flows will be substantially unchanged except that overflows from Wellington Dam would be reduced slightly.

- **Social Impacts**
  - The social impacts associated with this option would be minimal and would be principally concerned with the pipehead weir and pipeline route from the pipehead weir to Kemerton.
  - Input received during the public consultation program, indicates regional community support for the Collie River source.

5.5 PREFERRED OPTION

Table 1 summarises the comparison of the water source options against water supply and environmental criteria. It indicates that the Collie River pipehead weir option has the least environmental and social impacts while best satisfying the water source criteria. Accordingly, this was adopted as the preferred water supply option for Kemerton.

6.0 DESCRIPTION OF PROPOSAL

6.1 PREFERRED OFFTAKE SITE

Following the selection of the Collie River as the preferred water source, several offtake sites and pipeline route alternatives have been investigated for supplying water to Kemerton. A summary of the evaluation of the various offtake sites with regard to their environmental and social impacts, security of supply and cost is contained in Appendix F. Based on this evaluation an offtake site downstream of the South West Highway is preferred and is discussed below.

6.2 PIPEHEAD WEIR AND PUMPING STATION

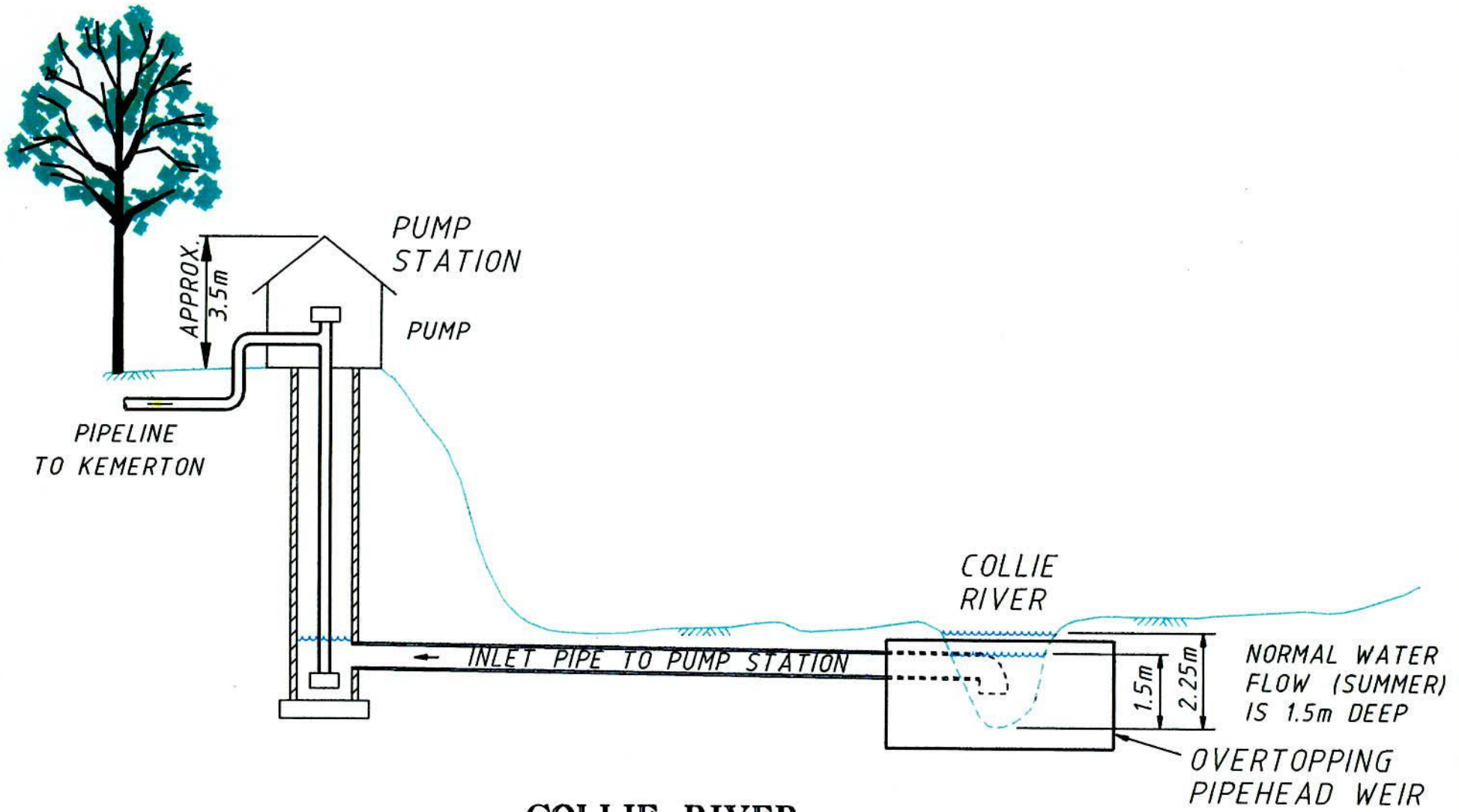
The preferred offtake site is adjacent to the Rose Road Reserve where it crosses the Collie River, approximately 700 metres downstream of the South West highway. The major facilities comprising the Collie River offtake are a pipehead weir, a pumping station and a buried connecting pipeline between these facilities.

A pipehead weir would be constructed across the river bed to provide a minimum depth of water over the inlet from which water would be pumped to a tank sited within Kemerton. A pipehead weir is a low structure which is designed to facilitate a continuous discharge of water over the top (Figure 5). Preliminary design indicates the pipehead weir would raise the *normal* summer flow level in the Collie River about 1.0 metre (Figure 5). The inundated area would therefore be generally within the deeper river channel, forming a narrow permanent pool upstream of the pipehead weir to about the South West Highway. The likely inundation area would therefore be contained within the banks of the Collie River.

The pumping station, consisting of a building containing pumps, motors and associated equipment would be constructed on a prepared concrete pad on the bank of the Collie River, above the design flood level. A schematic of the proposed pipehead weir and pumping station is shown in Figure 5. The approximate site of the pipehead weir, pipeline route and water tank is shown in Figure 6.

KEY ISSUES / SOURCE	Water Source Criteria				Environmental and Social Criteria			
	Water Supply Option	**Security of Supply**	**Water Quality**	**Cost per Kilolitre**	**Management of Water Resources**	**Flora,Fauna & Ecosystems Wetland Management**	**Operational Management**	**Social Impacts**
GROUNDWATER	*Local* - Superficial Formation - Leederville Formation - Yarragadee Formation	- Predominantly committed to current and future town water schemes and industry.	- Very good.	$0.30	NOT INVESTIGATED FURTHER BECAUSE THIS WATER SUPPLY OPTION WAS NOT CONSIDERED AVAILABLE.			
	- Cockleshell Gully Formation	- Little used. - Significant portion are NOT allocated.	- Over 2 000 milligrams per litre in Cockleshell Gully.	$0.40	NOT INVESTIGATED FURTHER BECAUSE THIS SUPPLY OPTION DID NOT MEET WATER QUALITY AND COST CRITERIA.			
	Regional - Superficial Formation - Leederville Formation	- Predominantly committed to current and future town water schemes and industry.	- Very good.	$0.64	NOT INVESTIGATED FURTHER BECAUSE THIS WATER SUPPLY OPTION WAS NOT CONSIDERED AVAILABLE.			
	- Yarragadee Formation - Cockleshell Gully Formation	- Little used. - Significant portion are NOT allocated.	- Very good. - Over 2 000 milligrams per litre in Cockleshell Gully.	$0.74	- Abstraction rate may exceed the recharge rate. - Cause decrease in the volume of water contained in the aquifer.	- Abstraction from a confined aquifer will NOT affect wetland systems. - Abstraction from a confined aquifer will NOT affect associated vegetation communities.	- Excessive abstraction rates may lead to a landward migration of the saltwater/freshwater interface. - Abstraction rate must be monitored and controlled.	
HARVEY RIVER	*Harvey River Dam*	- Fully allocated to irrigators in the Harvey Irrigation District. - Require legislative changes to ensure secure supply.	- Very good.	$0.29	NOT INVESTIGATED FURTHER BECAUSE THIS WATER SUPPLY OPTION WAS NOT CONSIDERED AVAILABLE.			
	Harvey River Diversion Drain	- Does NOT flow all year round. - Run-of-River Scheme would NOT be able to produce water during the dry summer months.	- Variable due to irrigation practices. - Likely to contain levels of agricultural chemicals. - Might require treatment.	$0.32	NOT INVESTIGATED FURTHER BECAUSE THIS WATER SUPPLY OPTION WAS NOT CONSIDERED AVAILABLE.			
BRUNSWICK RIVER	*Brunswick River Dam*	- All potential dam sites command a catchment which would provide water in excess of that required.	- Excellent. - Averages 250 milligrams per litre.	$0.46	- All the potential sites would impact upon the Brunswick River Valley.	- Alter flow regime affecting downstream flora and fauna. - Impact the lower reaches of the Collie River and the Leschenault Inlet. - Impact System 6 Locality C67 and some wetlands protected by EPP.	- Operational activity associated with the dam is likely to be negligible.	- Relocation of farmers residing in the inundation area. - Relocation of Beela Road. - Relocation of railway line.
	Brunswick River Pipehead	- Does NOT flow all year round. - Run-of-River Scheme would NOT be able to produce water during the dry summer months.	- Treatment for colour and turbidity.	$0.27	NOT INVESTIGATED FURTHER BECAUSE IT WAS NOT CONSIDERED A SECURE SUPPLY OPTION.			
COLLIE RIVER	*Collie River Pipehead Weir*	- Present water allocation from Wellington Dam for industry is NOT used. - Sufficient to meet the estimated demand for the Kemerton.	- Variable and a relatively high salinity. (Average of 1 100 milligrams per litre) - May be a problem for some industries.	$0.30	- Collie Irrigation District would NOT be adversely affected. - Recreational opportunities on the Collie River and Wellington Dam will NOT be affected.	- Environmental impacts are of a magnitude less than that of the other potentially most viable source. - Riverflows downstream of the pipehead will NOT be affected.	- Operational impacts of noise from the pump station would be managed. - There would NOT be any other operational impacts.	- Input from the public, through the community consultation programme indicated strong regional support.
CONJUNCTIVE USE	*with Local Groundwater*	- Local groundwater resources are currently allocated. - Require redistribution of allocation to ensure a secure supply.	- Would be a combination of good quality local groundwater and the quality of the selected option.	Combined Cost of Local G/Water and the water supply option.	NOT INVESTIGATED FURTHER BECAUSE IT WOULD REQUIRE REDISTRIBUTION OF WATER ALLOCATION AND IT DID NOT MEET COST CRITERIA.			

Table 1 Comparison of Water Source Options



COLLIE RIVER
PIPEHEAD WEIR AND
PUMPING STATION SCHEMATIC

FIGURE 5

CAD DRG No.QSA2:[211305]KEMFIGS.DGN

N

APPROXIMATE LOCATION
OF PROPOSED TANK

ROSAMEL RD

STANLEY ROAD

COAST ROAD

OLD COAST ROAD

INLET

LESCHENAULT

AUSTRALIND

EATON

BYPASS

DAMPIER - BUNBURY GAS PIPELINE

RIVER

WELLESLEY

MARRIOTT RD

DEVLIN RD

RD

WESTERN HIGHWAY

BRUNSWICK RIVER

CLIFTON ROAD

VICTORIA RD

AUSTRALIND

TREENDALE RD

ROSE RD

COLLIE RIVER

LEGEND

WETLAND

DAMPIER-BUNBURY NATURAL GAS PIPELINE

HIGH PRESSURE GAS PIPELINE

PROPOSED WATER PIPELINE ROUTE

SYSTEM 6 GENERAL RECOMMENDATION POTENTIAL REGIONAL PARK

SYSTEM 6 SPECIFIC LOCALITY

0 1000 2000 Metres

(SCALE 1 : 60 000)

PREFERRED PIPELINE ROUTE

FIGURE 6

CAD DRG No.QSA2:[211305]KEMFIG8.DGN

The pumping station would be fenced and secured, with access likely by the Rose Road Reserve. The pipe intake to the pump station at the pipehead, would be protected, from public access for safety reasons.

6.3 PIPELINE

The pipeline would be constructed of steel or concrete pipe, buried along the pipeline route from the pumping station to the tank site.

Three pipeline route alternatives were investigated in detail and are shown in Figure 4. Resulting from a presentation to the Kemerton Community Committee and the public consultation programme (Appendix E), an alignment referred to as the Australind Bypass Route is proposed.

The proposed route begins at the pumping station on the bank of the Collie River and follows a route initially through private land till Treendale Road. The route follows Treendale and Raymond Roads; on the left hand side travelling west, to the Australind Bypass. Then it would travel north paralleling the Australind Bypass, through private property until it meets Stanley Road. The pipeline would cross the Brunswick River supported from the road bridges, along the Australind Bypass. From Stanley Road it would then cross Marriott Road to the tank site.

The Main Roads Department of Western Australia (Main Roads) have been consulted regarding the possibility of locating the pipeline in the Australind Bypass road reserve. The Main Roads have approved the use of the Brunswick River road bridges for the river crossing. However, they have not permitted the use of the Australind Bypass road reserve from Raymond Road to Stanley Road. The resulting requirement that the pipe be placed in a separate easement across private property will result in adverse impacts to those affected landowners. The associated correspondence between the Water Authority and the Main Roads is contained in Appendix D.

6.4 WATER TANK

A water tank sited in the Kemerton Industrial Park, will receive the water from the pipeline. The tank will be constructed on a topographical high

point to provide a gravity feed to Kemerton. The final site is subject to detailed design.

7.0 ENVIRONMENTAL AND SOCIAL IMPACTS AND MANAGEMENT

7.1 MANAGEMENT OF WATER RESOURCES

The potentially most significant impacts resulting from the operation of the proposed water supply scheme are associated with the impoundment of water behind the pipehead weir, the release of water from Wellington Dam storage and the withdrawal of water from the Collie River for Kemerton.

7.1.1 Pipehead Weir

As discussed in Section 6.2, the pipehead weir is expected to raise the summer river level by about 1.0 metre, maintaining the level generally within the banks of the deeper Collie River channel. A permanent pool would result, possibly extending upstream to where the South West Highway crosses the Collie River.

There are no identified rare or endangered flora within the expected impoundment area, the area already having been cleared for grazing land[19]. The visual amenity is not expected to be unacceptably impacted and, considering the degraded nature of parts of the river bank at this location, it will likely be improved by the pool.

The localised impacts of the pipehead weir will be minimised through design of the pipehead structure, ensuring it would be submerged during normal flows. It is unlikely that local flood levels will vary from the existing situation.

7.1.2 Release of Water from Wellington Dam

- **Collie River Flow**

  The proposal requires the release of additional water from Wellington Dam to supply the water withdrawn for Kemerton at the Collie River offtake. This water is currently allocated to industry but is not used. The additional water released for Kemerton will result in a marginal increase in river flow between Wellington Dam and the offtake with an increase in flow depth of

19 Visual examination of the offtake site.

less than 5 millimetres. The flow downstream from the offtake will remain substantially the same as at present except that there will be some reduction in winter overflows and consequently occasionally reduced winter flows downstream of the offtake. *(In the 18 years between 1974 and 1992 Wellington Dam has overflowed in nine of those years. If the proposed water supply scheme had been extracting 10 million cubic metres per year, during that period Wellington Dam would have overflowed in eight rather than nine of those years).*

As the river flow regime will vary only marginally from the existing, there will not be any meaningful impacts on the riparian ecosystems of the lower Collie River.

- **Collie Irrigation District**

  Following the construction of the Harris Dam, the current water allocation in Wellington Dam is:

  - **Total Annual Yield : 107 million kilolitres per year**
  - **Irrigation (Basic Allocation) : 68 million kilolitres per year**
  - **Historic Industry Allocation : 20 million kilolitres per year**
  - **Additional Allocation to Industry : 10 million kilolitres per year**
    (Reallocation of Town Water Supply Water)
  - **Balance (Winter Scouring Policy) : 9 million kilolitres per year**

  In the above context, total annual yield means the amount of water which can be drawn from the reservoir in all but the most severe of dry years.

  As agreed with the Irrigation Advisory Committee in the past, the reservoir would be operated so that the allocation 68 million kilolitres per annum would be provided in at least 95% of years and additional water would be available in above average years.

  Prior to construction of Harris Dam, 20 million kilolitres of the Wellington Dam annual yield was identified for potential industrial users. With the construction of Harris Dam, a further 10 million kilolitres per annum could be reallocated for industry. The 20 million kilolitres of the Wellington Dam annual yield could be supplied to industries in 98% of years. It is highly likely that the additional 10 million kilolitres per annum could be supplied with a

similar guarantee without affecting the irrigators. This would leave nine million kilolitres per annum available for winter scouring *(the release of high salinity water to reduce total salt load in the reservoir)*. The amount used for winter scouring varies each year depending on reservoir inflows and storage levels. Currently, as irrigation farmers are not using all their allocation and industry is not using its allocation, much larger amounts of water can be scoured each winter.

The Water Authority, as a condition of its Environmental Management Plan for the Harris Dam, has committed to manage the two reservoir systems in such a way to ensure that the salinity of supply to irrigators will not be made worse as a result of the construction of Harris Dam[20]. Any changes in the operation of the two reservoir systems that deviates from the irrigation allocation of 68 million kilolitres per annum and an industry allocation of 20 million kilolitres per annum will require a re-evaluation of the impact on the salinity of supply to the irrigators.

- **Recreational Activity on Wellington Dam**

  The estimated amount of water that would be released from Wellington Dam to supply Kemerton, which is not considered a town supply, will not significantly lower water levels within the Dam. Therefore it is unlikely that a reduction in the recreational opportunities which are currently enjoyed would be experienced. The prime purpose of Wellington Dam is as a water supply source and recreation is accepted on an opportunity basis. Current Water Authority policy regarding recreation on Wellington Reservoir is based on the assumption that in the long term some water from Wellington Dam will be reallocated to public water supplies.

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20 Water Authority of Western Australia, 1985, Harris Dam Project - Environmental Review and Management Programme, Dames and Moore, Western Australia.

7.2 FLORA, FAUNA AND ECOSYSTEMS

7.2.1 System 6 Values C67 - Brunswick, Collie and Wellesley Rivers

The Darling System - System 6 report identified three specific localities within the proposal area which should not have their conservation and recreational values lessened by any development. These specific localities were identified as:

- C63 - Myalup Swamp and Mialla Lagoon;
- C66 - Leschenault Inlet; and
- C67 - Brunswick, Collie and Wellesley Rivers (parts of)[21].

The Brunswick River downstream of Brunswick Junction, the Wellesley River downstream from about one kilometre north of the Wellesley Road bridge, and the Collie River from its mouth in the Leschenault Estuary to approximately four kilometres upstream are the subject of a System 6 recommendation, as a specific locality designated C67, because of the areas conservation values, proximity to populated areas and subsequent potential for recreational use.

The recommended area C67 is also considered for conservation purposes in the Leschenault Inlet Management Authority's, Leschenault Inlet Management Program. The Bunbury - Wellington Region Plan has identified the Collie, Brunswick and Wellesley River systems as *Rural Landscape Amenity* areas and the Shire of Harvey's Town Planning Scheme No. 10 identifies the area as *an area within which development will be scrutinised.*

The recommended area C67 contributes to a larger area of open space of regional significance which includes the Leschenault Estuary and the middle reaches of the Collie River. Part of the river areas are lined with flooded gum and provide ideal surroundings for passive recreation. However as the rivers flow mainly through privately owned freehold land, not all of the land within this area has conservation and recreation as primary management objectives[22].

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21 Environmental Protection Authority, 1983, The Darling System - System 6 Part II: Recommendations for Specific Localities, Department of Conservation and Land Management - Report 13, Western Australia.

22 Environmental Protection Authority, The Darling System - System 6 Part II and Department of Conservation and Land Management, 1987, Regional Management Plan 1987 - 1997 - Central Forest Region, Western Australia.

Pipeline

The proposed pipeline route (Figure 6) along the Australind Bypass where it crosses the Brunswick River will reside within a System 6 locality. It is intended that the pipeline will cross the Brunswick River, supported from the existing Brunswick River road bridges. Consequently, construction activity to install the pipeline would be confined to site preparation of the road reserve and not involve any meaningful disturbance of the Brunswick River, its banks or flow regime. The river crossing is not considered to present any significant impacts upon the recreational or conservational values, nominated under System 6. Once installed, the operational impacts of the pipeline will be negligible.

Although low in risk because of the gentle terrain, the porous nature of the soil and the type and locations of construction activities, the potential for sediment contamination of the Brunswick River will be greatest during pipeline installation near to and across the bridges. To further reduce the risk of sedimentation, any required runoff interception works will be installed and the area contoured and stabilised following construction.

The proponent will incorporate appropriate dust control measures, including water spraying of disturbed land, to control fugitive dust and ensure that Environmental Protection Authority guidelines for the control of airborne dust are observed.

The conservational and recreational values and visual amenity properties of the Brunswick River and its banks will be preserved by ensuring all construction activity is managed to cause the least disturbance and that any impacts upon the riparian ecosystem are minimal.

Offtake

The site of the proposed pipehead weir and pumping station, on the Collie River is remote from the specific locality C67. The potential for construction work at the offtake site adversely impacting upon downstream areas within the C67 locality is considered to be minimal. However, the pipehead weir site is located within an area recommended as a *Potential Regional Park* by the Darling System - System 6 Report Part I and the potential impacts of construction works and their management are discussed in Section 7.2.2[23].

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23 Environmental Protection Authority, 1983, the Darling System - System 6 Part I: General Principles and Recommendations Department of Conservation and Environment - Report 13, Western Australia.

7.2.2 System 6 Values - Potential Regional Park

The Darling System - System 6 report makes general recommendations for the conservation of other areas as *Potential Regional Parks*. One of these recommendations includes an area of the Collie River system from the Leschenault Estuary to an area approximately 12 kilometres upstream of Wellington Dam. The proposed offtake site on the Collie river, while located upstream of the System 6 locality C67, lies within the boundaries of this greater area recommended for conservation by the Conservation through Reserve Committee.

The offtake site is located on a private farming property, and is not available for general public access. Due to the effect of grazing stock, the immediate area has been largely degraded, supporting little natural vegetation. Vegetation disturbance and construction activity will be confined, wherever possible, to the immediate working area and will not involve any meaningful disturbance of the banks of the Collie River. It is intended to preserve the stand of mature trees within the Rose Road Reserve. The river banks will be contoured at the completion of construction activity to ensure that drainage is returned as near as practical, to the pre-construction conditions. Where appropriate, disturbed areas would be revegetated with suitable indigenous species. All rehabilitation would be undertaken in consultation with the landowner.

Although it is expected to be minimal, the potential for sediment contamination of the Collie River will be greatest during construction of the pipehead weir. The proponent would ensure that construction activities are managed to limit sediment potential and, if necessary, sediment interception facilities would be installed.

Water spraying of land disturbed by site preparation and earthmoving activities would be implemented as necessary, to control fugitive dust and ensure that Environmental Protection Authority guidelines for the control of airborne dust are achieved. It is recognised that construction traffic and vehicles moving over disturbed surfaces can initiate or accelerate soil erosion and as a consequence it is intended to adopt the following mitigation measures:

- off road movement of vehicles during construction and operation would be kept to a practical minimum;

- where practicable, the removal of natural vegetation would be avoided; and
- construction traffic movements would be kept to a practical minimum in wet weather.

7.2.3 Flora

Regional

The region over which the proposed pipeline route will be installed is on the western fringe of the Swan Coastal Plain. The pipeline route is predominantly underlain by the Bassendean Dune System. Small outcrops of limestone are evident in the higher parts of the dune system. The permeable sands have a low natural fertility. The native vegetation is closely related to soil types and its composition and distribution have been described extensively in numerous reports and studies since 1985[24].

Due to past clearing activities and stock grazing the region is a composite of significant areas of natural vegetation and cleared areas supporting only remnant natural vegetation. The vegetation in some of these latter areas has been degraded to some extent, but each community retains recognisable remnants of its original structure and species composition. The principal natural vegetation represented in the region are:

- tuart (Eucalyptus gomphocephala) with an understorey of peppermint (Agonis flexuosa) and bull banksia (Banksia grandis) in the western area of the region;
- jarrah (E. marginata) and marri (E. calophylla) with an understorey primarily of narrow-leaved banksia (B. attenuata) and holly-leaved banksia (B. micifolia) in the central and eastern areas of the region; and
- wetlands supporting a fringing woodland of paperbarks (Melaleuca rhapiophylla and M. preiisiana), flooded gums (E. rudis) and some river banksia (B. littoralis).

A diverse flora has been indicated by surveys of the region, with nine species being considered to have restricted distributions including a population of Pultenaea skinner, a gazetted rare species, on the southern

24 Dimmock, G M, 1985, Programme of Studies on Environmental Impacts of an Aluminium Smelter, Preliminary Field Assessment of Soils and Vegetation at the Kemerton Site - Interim Report, Western Australia.

side of the corner of Marriott Road, remote from any proposed construction activities.[25]

Pipeline Route

Vegetation disturbance associated with construction activities would be limited, involving minor clearing for the installation of the pipeline. The vegetation encountered along the pipeline route is well represented in the region, and no endangered flora has been identified in the construction areas.

The construction of the Raymond, Treendale and Stanley Road sections of the pipeline route are not expected to result in the removal of any species of flora considered to have restricted distributions. The road reserves in this section of the pipeline route vary in width with parts of them having been completely cleared of vegetation during the initial road construction.

A population of Acacia semitrullata, a gazetted rare species of flora, has been identified in a section of the Australind Bypass Road Reserve. The road reserve passes through this population. Although there is a potential for the disturbance of this species, detailed construction planning and the limited area required for pipeline installation will minimise any adverse impacts. Prior to the commencement of detailed design and construction, the Department of Conservation and Land Management will be consulted in regard to the management of this population of flora. Areas which are disturbed will be rehabilitated at the completion of construction activity.

Where the pipeline passes through privately owned land along the Australind Bypass impacts associated with construction activities would be contained wherever possible, minimising the amount of vegetation cleared and land disturbed. The vegetation encountered on these properties are well represented in the region and do not contain any gazetted rare or endangered species of flora. The land that is disturbed will be contoured at the completion of construction activity to ensure that drainage is returned as near to its status as that prior to construction. In addition, construction practice will minimise fugitive dust generation.

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25 Plant species identified from Marchant, N.G., et al, 1987, Flora of the Perth Region, Department if Agriculture, Western Australia, Rye, B.L., 1982 Geographically Restricted Plants of South Western Australia, Department of Fisheries and Wildlife - Report No. 49, Western Australia and Hopper, S.D., et al., 1990, Western Australia Endangered Flora, Department of Conservation and Land Management, Western Australia.

Tank Site

The tank site retains small remnants of native vegetation but has largely been cleared either to a parkland appearance or for agricultural purposes. While a specific site for the water tank has not been finalised, the nature of the area and minimal amount of land required for the water tank indicates that the clearance of native vegetation would be limited and the physical disturbance to the onsite vegetation would not result in an unacceptable environmental impact.

Construction activity involving clearing and disturbance along the pipeline route and at the tank site will be kept to a minimum. Where trees or other vegetation need to be cleared, the following measures will be adopted to rehabilitate disturbed areas.

- Areas disturbed during construction would be contoured, and revegetated with an appropriate species.
- Top soil and material would be respread following construction. Any excess spoil would be disposed of at an approved site.
- Trenches and backfill would be compacted and profiles shaped to minimise water erosion.
- All practicable measures would be undertaken to preserve the conservational and visual character of the area.
- All construction wastes would be collected and disposed of at an approved site.

7.2.4 Fauna

General

The fauna of the region, and in particular the Kemerton area, has been surveyed to a limited extent by Nichols[26] and Bunn[27] . These surveys predominantly concentrated on mammals, birds, amphibians and invertebrates. Nichols indicated that the number of mammal species was low, with no uncommon species identified. The identified species have been found elsewhere on the Swan Coastal Plan and it is unlikely, given the localised nature of construction activity, that it will impact upon any of these species or their habitat.

The Brunswick, Collie and Wellesley River systems are used by many species of water-birds and passerines as the rivers contain pockets of permanent water and in some years contain running water throughout the summer months. Many species of birds using the Leschenault Estuary move on a regular basis into the river systems to feed. However, given the nature of construction activity on the Collie and Brunswick Rivers, any impact upon the habitat of these water-birds is considered negligible.

The South West region has few native fish species. There are only ten species which spend the whole of their life cycle in fresh water, eight of which are endemic to the South West region. Knowledge of the present distribution and abundance of these native fish is limited. There are seven other native species which spend part of their life cycle in fresh water and part in saline estuaries in the area[28]. Of these seven, only the lamprey (Geotria australia) has been studied in any great detail.

Offtake

The Collie River's water quality, flow regime and environs have been modified as the result of Wellington Dam, Burekup Weir, agricultural land clearing, irrigation and farming activities. Given the nature of construction activity proposed, its effect upon the Collie River's environs would be minimal.

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26 Fauna survey by Nichols, O.G., 1980, Kemerton, Pinjarra and Wagerup Fauna Survey, Alcoa of Australia Limited - Internal Report, Western Australia.

27 Unpublished Aquatic invertebrate survey of wetlands by Bunn, S.E., 1983, Aquatic Invertebrate Survey of the Western Chain of Wetlands, Preliminary Report, Department of Zoology - University of Western Australia, Western Australia.

28 Western Australian Water Resources Council, 1992, The State of the Rivers of the South West, Western Australia.

The most significant impacts of the proposal are associated with the offtake works, specifically the pipehead weir.

Depending upon their configuration, structures in rivers have the potential to prevent the migration of aquatic fauna. Very few studies have been conducted on this issue for rivers of the South West[29]

The pipehead weir is specifically designed to be submerged during all but the lowest flows and would not form a significant barrier to the migration of lamprays, marron (Cherax tenuiamnus), yabbies (Cherax destructor) or other native aquatic fauna. There is documented evidence which suggests that lamprays, which traverse low stream flow barriers, such as natural rock barriers, would not be inhibited in their migration by the pipehead weir[30,31].

The pipehead weir is not expected to significantly modify or adversely impact on the existing river environment.

7.3 WETLAND MANAGEMENT

7.3.1 Impacts Upon Wetlands

The surface water resources of the region include the Wellesley, Brunswick, and Collie River systems and several perennial and seasonal lakes and swamps (Figure 6). These rivers form the eastern and south eastern boundary to the regional wetland system and are the source of water which replenishes many of the ephemeral lakes and swamps in the north, north west and south east of the Kemerton area, known collectively as the Kemerton wetlands. These are mostly a surface expression of the local Superficial groundwater aquifer and water levels therefore fluctuate seasonally[32].

The south eastern wetland basin is a largely intact ephemeral wetland and is the closest to the pipeline route in Stanley Road. As a result of the relative lack of disturbance to the wetland itself, and to the jarrah-marri

29 Western Australian Water Resources Council, The State of the Rivers of the South West.

30 Canadian Journal of Fisheries and Aquatic Sciences, Volume 37, 1983, Pg 2118-22, Canada.

31 Environmental Protection Authority, 1987, The Effects of Gauging Station Control Structures on Native Fish Migration in Freshwater Streams of the South West of Western Australia, Environmental Protection Authority Bulletin 282, Perth.

32 Dames and Moore, 1989, Kemerton Aluminium Smelter - Public Environmental Review, Western Australia.

banks, a woodland immediately adjacent, the wetland has considerable inherent conservation value. The intended pipeline route is approximately 2 kilometres west of this wetland basin and would not impact upon this in any way (Figure 6).

There are two wetland areas along the pipeline route. These areas are a lake located under and adjacent to the Brunswick River road bridge reserve and the other is a dampland, within the Kemerton Industrial Park, at the end of Stanley Road (Figure 6). The former of these wetlands is protected by the Environmental Protection (Swan Coastal Plain Lakes) Policy 1992.

The lake has been modified by the Brunswick River bridge works and works associated with the pipeline will cause minimal disturbance to the natural functions or human use values of this lake. Since the pipeline will be supported from the bridge, the potential for disruption to the lake will be limited and minimal. Construction activity along the approaches to the bridges would involve trenching for the pipeline followed by backfilling. This would involve the clearance of some fringing vegetation. Disturbed areas would be rehabilitated once the pipeline is buried and any loss of fringing vegetation would be replaced by an appropriate species.

The dampland located in Kemerton, is bisected by Marriot Road and Stanley Road. Thus, the dampland is separated into three areas, the largest, occurring opposite the termination of Stanley Road, is significantly degraded by agricultural land clearing and the encroachment by grazing stock. The remaining areas on either side of the proposed Stanley Road, although small in area and separated by a cleared track, are considered to have conservation value. It is proposed to install the pipeline in the already cleared tract of land along Stanley Road, hence no direct disruption of the dampland vegetation is excepted. At the completion of construction activity the land would be contoured so the drainage is returned as near as possible to its pre-construction status. Any land that is disturbed outside the cleared track will be re-vegetated with an appropriate species at completion of construction activity.

7.4 CONSTRUCTION AND OPERATIONAL MANAGEMENT ISSUES

7.4.1 Noise Control

The construction activities would generate noise. Sources of noise during construction would include:

- earthmoving equipment;
- fabrication; and
- off-site and road truck movements.

The acoustic amenity of people living in the properties lining the roads along the pipeline route may be affected for short periods while construction is in progress in their immediate vicinity.

Noise impact during construction would be controlled by implementing the following measures:

- use of appropriate noise limiting equipment on earthmoving and other construction equipment;
- minimising equipment activity outside normal working hours;
- provision of noise screens around stationary construction equipment where applicable;
- offsite fabrication and use of pre-fabricated construction materials where applicable; and
- all construction activity would be in strict adherence to Statutory Noise Regulations.

Once the water supply scheme is operational, the pump station would be the only source of noise. Noise control measures will be incorporated in the pumping station design, limiting noise generation to a level at or below statutory requirements. As appropriate, measures to minimise the potential for any possible noise impact on nearby receptors would include:

- cladding the pump station building with sound absorbing material; and
- selection of pumps and motors with low noise levels.

7.4.2 Dust Control

The construction phase of the development would extend for approximately eight months. Construction activity may result in a few short term effects such as the physical disturbance and possibly localised dust generation

caused by earthworks and construction equipment. Since the construction activities would at most times be remote from both residences and from dust sensitive agricultural activities, the possibility of dust related impacts are considered to be negligible and manageable.

The project will not result in dust generation in the operational phase.

7.5 SOCIAL IMPACTS AND MANAGEMENT

7.5.1 Archaeological and Ethnographic Sites

The Collie region is rich in aboriginal ethnographic sites. It is also surrounded by archaeological sites. Several of these sites are located near the Collie River and other local rivers and streams. However, a preliminary archaeological survey undertaken by Pearce and Mulvaney in 1983 failed to find any aboriginal sites in a systematically searched area covering 500 hectares in the Kemerton region, which includes the tank site[33],[34]. No archaeological or ethnographic sites have been identified which would be affected by the proposal.

7.5.2 Recreational Impacts

The Leschenault Estuary, and lower reaches of the Collie River and the Brunswick River just prior to joining to the Collie River, provide the main water based recreational resources of the Bunbury region. These areas attract power-boating, sailing, fishing, prawning, crabbing and swimming. The major concentrations of water front activities are located on the Collie River around the Australind and Eaton town sites which are well removed from the proposed offtake site.

As discussed in Section 7.1.2, flows in the Collie River down stream of the offtake, following implementation of the proposal, will remain substantially unchanged. The proposal will therefore not adversely impact on present recreational activities located in and around the Australind and Eaton townsites.

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33 Pearce, T.H. and Mulaney, K, 1983, Report on an Archaeological Survey at Kemerton, Western Australia.

34 Department of Planing and Urban Development, 1990, Working Paper No. 6 - Aboriginal Heritage and Planning Survey, Western Australia.

As described in Section 7.1.2, no unacceptable impacts on recreational activity at Wellington Dam are anticipated as the result of the release of industry allocated water for Kemerton.

7.5.3 Construction Workforce

Give the nature and scale of construction activities, it is likely a construction work force of less than twenty would be required. There appears to have been few problems in the past associated with the presence in the region of considerably larger construction workforces. It is therefore highly unlikely that the construction workforce would place unacceptable demands on community or social infrastructure.

7.5.4 Construction Impacts

Any impact on the public during construction would be short term and minimal. Measures to limit construction impacts are as follows:

- any temporary closure of roads or property accesses would be kept to a minimum and advice would be given in advance to concerned individuals;
- noise and other disturbances would be kept to a minimum;
- appropriate arrangements would be negotiated for facilities constructed on private land;
- fencing or any other property disturbed or removed as a result of construction activities would be repaired or replaced in a timely manner; and
- entry to private property would be kept to a minimum and security would be maintained by shutting gates and ensuring fences are not breached.

7.5.5 Community Consultation

After the initial study had examined various source options, the Collie River was identified as the preferred water supply source for Kemerton. A pipehead located close to the western side of South West Highway with a pipeline route along the South West Highway and Wellesley Road to the Kemerton Industrial Park (Figure 4) was identified as Route 1. This route was investigated (Appendix E) and a community consultation programme

was established. The programme provided the local community with information on the project and facilitated public input.

As a result of the consultation programme, two other pipeline routes, Routes 2 and 3, were identified. Both were investigated (Appendix E) and Route 3, known as the Australind Bypass route, was adopted as the preferred alignment.

An open day was held at the Australind shopping centre on 2 September 1992 where a display and information was provided on the potential water sources and the alternative pipeline routes from the Collie River. Comments and submissions from the community were invited. Thirty three public submissions were received and 22 supported the water supply from the Collie River with 17 supporting the Australind Bypass route (Route 3). Many of the submissions raised issues related to management and utilisation of water resources generally with concerns regarding the uncertainty of Brunswick Dam and the salinity problems associated with Wellington Dam. While these matters are not directly related to this proposal, they have been individually answered by the Water Authority. A response to each person who made a submission was provided. From the submissions received, there is strong community support for both the proposed source of the water and the preferred pipeline route. A summary of the issues raised by the submissions is presented in Appendix B, and a detailed description of the community consultation programme is presented in Appendix E.

8.0 MANAGEMENT COMMITMENTS

The Water Authority undertakes responsibility for the implementation of the commitments listed below. This holds whether the work is done directly by Water Authority personnel of by others contracted for specific phases or elements of the project. All commitments will be expedited promptly at the appropriate stage during the design or construction of the project, and will be carried out to the satisfaction of the Project Manager through the Construction Co-ordinator.

1. Remnant Native Vegetation

1-1 Impacts on remnant native vegetation will be limited to those which are unavoidable for the construction and operation of the proposed pipeline and pipehead weir by controlled clearing and subsequent rehabilitation.

1-2 Revegetation of the Collie River banks will be undertaken using suitable indigenous species.

1-3 The stand of mature trees within the Rose Road reserve will be preserved.

1-4 Prior to commencement of detailed design and construction the Department of Conservation and Land Management will be consulted in regard to the management of the population of Acacia semitrullata. Areas which are disturbed will be rehabilitated at the completion of construction activity.

2. Collie River

2-1 Sediments from work associated with the project entering the Collie River will be minimised by containing runoff from the works.

2-2 During operation of the pipeline and pipehead dam, the flow of water in the Collie River will be managed so it is similar downstream of the offtake site to that prior to implementing the proposal.

2-3 The pipehead weir will be specifically designed to be submerged during all but the lowest of flows so as not to form a significant barrier to the migration of aquatic fauna.

3. Brunswick River

3-1 Sediments from work associated with the project will be minimised from entering the Brunswick River by containing runoff from the works.

3-2 The conservation and recreation values, and visual amenity properties of the Brunswick River and its banks will be preserved by ensuring all construction activity is managed to cause the least disturbance and that any impacts upon the riparian ecosystem are minimal.

4. Land Use

4-1 Throughout the project, land disturbed by work associated with the project will be contoured to restore the pre-construction drainage regime and access.

4-2 During construction of the pipeline and pipehead weir, any disruption to traffic will be managed in liaison with the local government authority or Main Roads Department of Western Australia as applicable.

4-3 Prior to construction of the pipeline and pipehead weir, agreements will be concluded with owners of land on which facilities are to be constructed.

5. Dust and Erosion

5-1 Throughout the project, land disturbed by work associated with the project will be contoured to restore the pre-construction drainage regime and access.

5-2 During construction of the pipeline and pipehead weir, fugitive dust will be prevented by watering.

5-3 During construction the following mitigation measures will be adopted:

- off road movement of vehicles during construction and operation would be kept to a practical minimum;
- where practicable, the removal of natural vegetation would be avoided; and
- construction traffic movements would be kept to a practical minimum in wet weather.

6. Noise

6-1 Throughout the project, noise will be abated to accord with statutory requirements.

6-2 Noise impact during construction will be controlled by implementing the following measures:

- use of appropriate noise limiting equipment on earthmoving and other construction equipment;
- minimising equipment activity outside normal working hours;
- provision of noise screens around stationary construction equipment where applicable; and
- offsite fabrication and use of pre-fabricated construction materials where applicable.

6-3 Measures to minimise the potential for any noise impact from the pump station would include:

- cladding the pump station building with sound absorbing material; and
- selection of pumps and motors with low noise levels.

7. Rehabilitation

7-1 Where trees or other vegetation need to be cleared, the following measures will be adopted to rehabilitate disturbed areas.

- Areas disturbed during construction would be contoured and revegetated with an appropriate species.

- Top soil and material would be respread following construction. Any excess spoil would be disposed of at an approved site.
- Trenches and backfill would be compacted and profiles shaped to minimise water erosion.
- Construction wastes would be collected and disposed of at an approved site.

APPENDIX A

LIST OF AUTHORITIES CONSULTED

APPENDIX A - LIST OF AUTHORITIES CONSULTED

Discussions were held with the following:

- Conservation Council of Western Australia.
- Department of Agricultural-Harvey.
- Department of Conservation and Land Management.
- Department of Planning and Urban Development Bunbury.
- Environmental Protection Authority.
- Farmers who have their property along the preferred pipeline route

  GG Fry
  NC Tothill
  CJ Campbell
  T & P Treasure
  M & J Davies
  K & E Bevan; and
  D & K Davies.

- Harvey Shire Clerk.
- Harvey Shire Engineer.
- Harvey Shire Planner.
- Kemerton Advisory Group - Shire President John Sabourne.
- Local Farmers Group.
- Local Landcare Group.
- Museum - Aboriginal Sites Department.
- Social Impact Officer - Committee Member of Kemerton Community Committee.
- Social Impact Unit.
- South West Development Authority - Executive Officer of Kemerton Community Committee.
- Waterways Commission.
- Western Australia Water Authority - Tony Ford.

APPENDIX B

ISSUES RAISED BY THE COMMUNITY FROM SUBMISSIONS

APPENDIX B **ISSUES RAISED BY THE COMMUNITY FROM SUBMISSIONS**

Issue of Concern / Comments	*Details Raised*	*Times Raised*
Build a new dam on the Brunswick River		3
	- would create employment.	1
	- would provide good quality water to Kemerton.	1
	- would provide good quality water to Australind, Brunswick Town and Binniup.	2
	- portion of my property will become unsellable.	1
	- water could be used for irrigation cutting out the Wellington supply and solving salinity problems.	1
	- would bring people to the district.	1
Search for other sources of water supply		1
Uncertain future concerning dam on the Brunswick River		5
	- affecting horticultural/farming ventures.	1
	- property values low.	1
Need more water for the farmers		3
Promise that there would be NO more industry at Kemerton has been broken		1
Leave Brunswick River for future drinking water		3
Concerned about farms being destroyed by salinity		1
Go the Treendale/Australind route		5
Collies River fine as water source for industry		9
	- would need desalination units during summer.	1
	- would need restriction on industry to protect the dairy farmers and primary producers.	1
Opposed Alma Road route because it would do untold damage to farmers and irrigation	- it could service existing and promote new industries in these two towns.	1
Want follow up to out input		1
Mix water from Brunswick and Collie to be used on ovals, school or swimming pool to Australind		1
No dam on the Brunswick		7
	- it would destroy productive hill country.	1
	- split farms to service the railway.	1
	- social and environmental problems will result.	1
	- Beela Valley best for horticulture, agriculture and tourism.	1
	- will lose our livelihood.	1
	- will be very costly to government and industry.	1
Loss of flushing water into the Collie River would effect the estuary		1
Go Raymond Road and Australind Bypass		1
We do not have enough water resources in the south for industry and to maintain our existing lifestyle		1
Get water from Lake Argyle		1
Go Australind Bypass route		7
	- expedite project and create employment.	1
Industry should not use fresh water if not absolutely necessary		1
Concern that water rates to farmers would go up		1
Put dam on the eastern side of the south west highway near Brunswick township		1
In favour of south west highway route		1
Environmental studies on the Collie River should be undertaken		2
Future industry should be located at Kemerton on the chosen site		1
Water Authority officers should make professional decision in this regard after all that is what they are being paid for		1
Will the amount of water in the Collie River be reduced		1
Include river management in your planning		1
Needs more consultation with the present users of Wellington Dam water before a final decision is made because of the potential affects on water available to the farmers		1
Impact of weir on nearby farms		2
Concern if project is privately operated and not held accountable		1
Preservation of Collie Irrigation Scheme is vital		1

APPENDIX C

ENVIRONMENTAL PROTECTION AUTHORITY PUBLIC ENVIRONMENTAL REVIEW GUIDELINES KEMERTON INDUSTRIAL PARK WATER SUPPLY

APPENDIX C - ENVIRONMENTAL PROTECTION AUTHORITY PUBLIC ENVIRONMENTAL REVIEW GUIDELINES KEMERTON INDUSTRIAL PARK WATER SUPPLY

Overview

In Western Australia all environmental reviews are about protecting the environment. The fundamental requirement is for the proponent to describe what they propose to do, to discuss the potential environmental impacts of the proposal, and then to describe how those environmental impacts are going to be managed so that the environment is protected.

If the proponent can demonstrate that the environment will be protected then the proposal will be found environmental acceptable; if the proponent cannot show that the environment would be protected then the Environmental Protection Authority would recommend against the proposal.

Throughout the process it is the aim of the Environmental Protection Authority to advise and assist the proponent to improve or modify the proposal in such a way that the environment is protected. Nonetheless, the environmental review in Western Australia is proponent driven, and it is up to the proponent to identify the potential environmental impacts and design and implement proposals which protect the environment.

For this proposal, protecting the environment means that the natural and social vas associated with recommendations of the Environmental Protection Authority as detailed in the Darling System - System 6 Report, and wetland values as identified by the Environmental Protection (Swan Coastal Plain Lakes) Policy 1992. Where these values cannot be protected, proposals to mitigate the impacts are required.

Purpose of a Public Environmental Review

The primary function of a Public Environmental Review is to provide the basis for the Environmental Protection Authority to provide advice to Government on protecting the environment. An additional function is to communicate clearly with the public so that the Environmental Protection Authority can obtain informed public comment. As such, environmental impact assessment is quite deliberately a public process. The Public

Environmental Review should set out the series of decisions taken to develop this proposal at this place and time and why.

Objectives of the Review

The Public Environmental Review should have the following objectives:

- to place this project in the context of the regional environment and the progressive development of resources in the region, including the cumulative impact of this development;

- to explain the issues and decisions which led to the choice of this project at this place at this time;

- to set out the environmental impacts that the project may have; and

- for each impact, to describe any environmental management steps the proponent believes would avoid, mitigate or ameliorate that impact.

The Public Environmental Review should focus on the major issues for the area and anticipate the questions that members of the public will raise. Data describing the environment should be directly related to the discussion of the potential impacts of the proposal. Both should then relate directly to the sections proposed to manage those impacts.

Key Issues

The critical issues for the proposal are likely to be the assessment of alternative sources of water and alignments for pipelines which conduct the water from source to Kemerton Industrial Park. It is critical therefore that the Public Environmental Review shows a detailed understanding of conservation, landscape and social values in the area. The conservation values of areas to be disturbed should be examined in detail. Any proposals the proponent has with respect to the potential locations of development zones and zones for conservation should be indicated clearly in relation to landscape contours and specific landscape features.

The key issue for this project should be clearly identified and the content of succeeding sections determined by their relevance to those issues.

In this case the key issues should include:

- an assessment of the alternative water sources and pipeline routes considered;

- construction or extension of dams, and management of subterranean and river water quantity;
  - area of inundation for dam proposals;
  - effect of water extraction on groundwater resources and vegetation
  - effect of release of storage dam water on rivers;
  - effect of harvesting river water on downstream water quality and quantity;

- flora, fauna and ecosystems;
  - values of the Collie, Brunswick and Wellesley Rivers which were identified and recommended for conservation in the System 6 report by the Environmental Protection Authority;
  - Regional Park values of the Collie River identified in the System 6 report
  - rare and poorly known flora, fauna and communities, shown on distribution maps;
  - inter-relationships of the biota and environment;

- wetland management;
  - direct and indirect impact upon wetlands, and associated vegetation, including alteration of drainage, clearance of vegetation, excavation or filling;
  - management of remnant vegetation;
  - management of public access;

- operational management issues:
  - dust and noise control;
  - feral fauna, weed, access and fire control for lands reserved for conservation purposes;

plus any other key issues raised during the preparation of this report.

Public participation and consultation

A description should be provided of the public participation and consultation activities undertaken by the proponent in preparing the Public Environmental Report. It should describe the activities undertaken, the dates, the groups and individuals involved and the objectives of the activities. Cross reference should be made with the description of environmental management for the proposal which should clearly indicate how community concerns have been addressed. Where these concerns are dealt with via other departments or procedures, outside the Environmental Protection Authority process, these can be noted and referenced here.

Detailed list of environmental commitments.

The commitments being made by the proponent to protect the environment should be clearly defined and separately listed. Where an environmental problem has the potential to occur, there should be a commitment to rectify it. They should be numbered and take the form of:

- who will do the work;
- what the work is;
- when the work will be carried out; and
- to whose satisfaction the work will be carried out

All actionable and audible commitments made in the body of the document should be numbered and summarised in this list.

APPENDIX D

CORRESPONDENCE WITH MAIN ROADS DEPARTMENT OF WESTERN AUSTRALIA REGARDING BRUNSWICK RIVERS BRIDGE CROSSING AND THE AUSTRALIND BYPASS ROAD RESERVE

Water Authority
of Western Australia

629 NEWCASTLE STREET
LEEDERVILLE W.A.
Postal Address. P.O. Box 100 Leederville
Western Australia 6007
Telephone (09) 420 2420 Telex: AA 95140
Facsimile: (09) 420 3200

Your Ref
Our Ref FILE NO. A239025
Enquiries PETER GOODALL
Tele Direct 420-3284

MAIN ROADS DEPARTMENT
ROBERTSON DRIVE
BUNBURY W AUST 6230

ATTENTION: MR. FORBES WATSON

SUBJECT: KEMERTON WATER SUPPLY PIPELINE

The Water Authority proposes to construct a pipeline from the Collie River along the Australind Bypass to supply water to the Kemerton Industrial Park. We anticipate that this pipeline would be built during the next five (5) years and are currently seeking Environmental Protection Authority approval for the project.

As part of this process, we seek your approval in principle for constructing the pipeline within the Main Roads Department Australind Bypass right of way and hanging the pipe off the bridges which cross the Brunswick River.

It is proposed that the pipe will be 750mm diameter , buried with 600mm cover and will be laid along the 2.1 metre alignment along the east boundary of the right of way.

It is proposed that the ultimate river crossing will be a 750mm diameter steel pipe hung off the future south-bound bridge but that in the event that the pipe construction precedes bridge construction, a temporary pipe of (say) 300mm diameter would be hung off the existing bridge to be replaced when the new bridge is in place.

Please send a letter indicating your approval in principle and any conditions you may wish to impose.

Peter Goodall
Senior Engineer
Water Resources Planning
January 28 1993 :mh

KEMERTON.DOC

MAIN ROADS DEPARTMENT

BUNBURY DIVISION, Robertson Drive, Bunbury 6230, Western Australia
Telephone (097) 25 4077 Facsimile (097) 25 4013 DIVISIONAL OFFICE
Telephone (097) 25 4842 Facsimile (097) 91 1569 PROJECT OFFICE

Enquiries F Watson

Our Ref. 640-12

Your Ref. A239025

Mr Peter Goodall
Water Authority of Western Australia
P O Box 100
LEEDERVILLE WA 6007

Dear Peter

RE: KEMERTON WATER SUPPLY PIPELINE (AUSTRALIND BYPASS)

Thank you for your letter of January 28 1993. Main Roads Western Australia has no objection in principal to the construction of the pipe line within the road reserve on the Australind Bypass provided that it is at the standard offset and depth.

Where the proposed pipe crosses side roads close liaison with this office will be required to ensure that it is constructed at such a depth so as not to conflict with the road pavement or drainage.

With regard to hanging the pipe from the Brunswick River Bridge I advise that Main Roads Western Australia has no objection in principal to this. A 300 mm pipe can be attached to the existing structure by utilizing the holes in the external beams which were provided to support the deck cantilever formwork. The future duplicate bridge can be designed to accommodate a 750 mm pipeline.

I attach for your information MRWA's stand and conditions for the attachment of services to bridges.

FW1.FE1

At this stage the duplication of the bypass and bridge is unlikely to occur within the next 5 years. However it is likely that design will commence within this period. Can you therefore keep me informed on your intentions with regard to the proposed pipeline so that account can be taken of it during the design process.

Yours faithfully

F W Watson
PROJECT MANAGER

February 5, 1993

MAIN ROADS DEPARTMENT

BUNBURY DIVISION, Robertson Drive, Bunbury 6230, Western Australia
Telephone (097) 25 4077 Facsimile (097) 25 4013 DIVISIONAL OFFICE
Telephone (097) 25 4842 Facsimile (097) 91 1569 PROJECT OFFICE

Enquiries F Watson

Our Ref. 640-12

Your Ref. A234025

097-911-569

FAXED TO: WAWA (P. Goodall)
COPY TO: —
FAX NO: 09: 420 3200
ORIG. IN POST: /
DATE: 12-2-93 /PAGES

Mr Peter Goodall
Western Australia Water Authority
P O Box 100
LEEDERVILLE WA 6007

Dear Peter

RE: KEMERTON WATER SUPPLY PIPELINE (AUSTRALIND BYPSSS)

Further to our telephone discussion of February 10 1994 I advise that my letter of February 5 1993 is in error.

The Australind Bypass is a proposed Freeway and as such it is not desirable to have services within the road reserve as these will create additional accesses from the road.

Therefore Main Roads Western Australia cannot agree in principal to your proposal to locate a water supply pipeline within the Australind Bypass Road Reserve. However, Main Roads has no objection to your proposal to having the pipeline from the bridge over the Brunswick River. The comments in my letter of February 5 1993 with regard to the requirements for the bridge still hold.

I apologise for any inconvenience this error may have caused.

Yours faithfully

F W Watson
PROJECT MANAGER

February 12, 1993

FW6.FE2

WATER AUTHORITY
of Western Australia

629 NEWCASTLE STREET
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Postal Address. P.O. Box 100 Leederville
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Telephone:(09) 420 2420 Telex: AA 95140
Facsimile: (09) 420 3200

Your Ref 640-12
Our Ref A23502
Enquiries Mr P. J. Goodall
Tele Direct 420 2944

Mr F. W. Watson, Project Manager
Main Roads Department
Bunbury Division
Robertson Drive
BUNBURY
Western Australia 6230

WATER SUPPLY TO KEMERTON ALONG AUSTRALIND BYPASS

We are in receipt of the attached letter in response to our request for approval in principle for construction of a pipeline in the road reserve for the Australind Bypass.

We believe that our proposal to place the pipeline along the edge of the road reserve of the Australind Bypass is the best for the community as a whole as it is approximately $1 million less expensive than the next option. We estimate that the cost of obtaining easements, access and rights of way for an alignment which passes through private property adjacent to the Australind Bypass would be as follows:

Extra construction costs	$320,000
Cost of access	$140,000
Cost of easement	$ 60,000
Total extra cost for placing pipeline in private property	$520,000

These extra costs could be avoided if the pipeline could be placed within the road reserve.

If we are forced to place the pipeline across private property adjacent to the highway, disruption to the farmers along the route will be significant, and the resulting social impact would be much higher that if the pipeline were to be placed in the road reserve. In addition, the new pipeline would be placed adjacent to the existing high pressure gas pipeline which would impose a safety hazard for construction and maintenance activities.

We propose to place the pipeline along the 2.1 metre alignment (2.1 metres west of the east boundary of the road reserve, but the actual location of the pipeline within the road reserve would be negotiable. The pipe would be buried and would be installed with 600mm earth cover which would require approximately a 1.5 metre deep trench for the

750 mm diameter pipe. Vegetation would be restored over the pipeline to a standard equal or better than that required by the Main Roads Department. except that plant types with root systems which may jeopardise the integrity of the pipeline would not be placed in its immediate vicinity. Access points to the pipeline would be established by negotiation.

Pipe materials and construction would be selected so that the need for access for maintenance would be minimised and with minimal (or zero) interference to traffic flow. Maintenance and repair activities would be infrequent and we would anticipate that access for maintenance or repairs to the buried pipeline would not be more frequent than once every five years. The expected life of such an installation is sixty years which means that no major activity would be expected until after that period. Construction of the pipeline is anticipated to take place before construction of the second carriageway. This would serve to further reduce the likelihood of any impact to traffic flow during pipeline construction.

We understand that some concern has been expressed about the integrity of the flora/fauna corridor along the edge of the road reserve. If the pipe is placed as close to the boundary fence as possible, this impact would be minimised. We would further commit to rehabilitate the disturbed area equal to or better than Main Roads Department specifications.

We are also prepared to commit to design and install the pipeline in such a way as to minimise maintenance requirements and to minimise disruption to traffic flow to the extent that access to the pipeline is required.

I thank you for your consideration and look forward to your response.

P.J. Goodall
Senior Engineer, Country Source Planning
28 May, 1993
KEMBYPAS.DOC

MAIN ROADS
Western Australia

Bunbury Division
Robertson Drive
Bunbury WA 6230

Enquiries: F Watson

Our Ref: 640-12

Your Ref: a234025

Mr Peter Goodall
Water Authority of Western Australia
PO Box 100
LEEDERVILLE WA 6007

Dear Peter

RE: KEMERTON WATER SUPPLY PIPELINE (AUSTRALIND BYPASS)

I apologise for the delay in replying to your letter of May 28 1993.

As stated in Mr F W Watson's letter of February 11 1993, the Australind Bypass is a proposed control of access freeway. The **"Policy for Installation by Public Utility Authorities within the Road Reserve"** Published by NAASRA is quite clear in its requirement that ***no*** new services should be permitted within the control of access lines on of a freeway.

Main Roads Western Australia strongly enforces this requirement and therefore opposes any proposal for services to be located within the control of access lines of any freeway.

Your request for approval to locate a water supply pipeline within this road reserve therefore cannot be granted.

D H Lee
DIVISIONAL ENGINEER

July 13, 1993

Postal Addresss: PO Box 1593, Bunbury WA 6230 **Divisional Office Tel: (097) 25 4077 Fax: (097) 25 4013**
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APPENDIX E

COMMUNITY CONSULTATION PROGRAMME AND EVALUATION OF ALTERNATIVE PIPELINE ROUTES

APPENDIX E - COMMUNITY CONSULTATION PROGRAMME AND EVALUATION OF ALTERNATIVE PIPELINE ROUTES

E1 COMMUNITY CONSULTATION PROGRAMME

After the initial study had examined various source options and pipeline routes the Collie River was identified as the preferred water supply source with the pipehead located close to the western side of South West Highway and a pipeline route along the South West Highway and Wellesley Road to the Kemerton Industrial Park (Figure 4). This pipeline route, identified as Route 1, was investigated (Appendix E2.1) and a community consultation programme was established. This provided the local community with information on the project and facilitated input in terms of its concerns or suggestions for reducing social or environmental impacts.

E1.1 Discussions with involved Government Departments

Prior to comments being invited from the local community, officers from Government agencies and the Harvey Shire Council were contacted (Appendix A) and a list of potential issues and community concerns were identified. Following discussions with the Harvey Shire Engineer, it was suggested that it may be better to locate the weir further downstream on the Collie River. This opened the potential for a second pipeline option, identified as Route 2. This route was investigated and found to have less social and environmental impact than Route 1 (Appendix E2.2) .

E1.2 Presentation of the Study and Proposals to the Kemerton Community Committee

A presentation of the findings to that time was made to the Kemerton Community Committee. As a result of these discussions a third option was identified Route 3; known as the Australind Bypass route. This option would follow Treendale Road westwards to the Australind Bypass, north along the Bypass to Stanley Road and then continue northwards to the proposed tank site. After it was investigated this route became the preferred option (Appendix E2.3). All pipeline route options are shown in Figure 4.

E1.3 Open Day at the Australind Shopping Centre

An open day was held at the Australind shopping centre on 2nd September 1992 where a display was presented and information was provided on the potential water sources and the alternative pipeline routes from the Collie River. An officer from the Water Authority and the Social Impact Consultant were present and provided answers to questions from the public and explained the proposal in more detail. Comments and submission from the community were invited.

E1.4 Presentation to the Harvey Shire Council

Following the open day, a presentation to the Harvey Shire Council was made. A number of press releases were also prepared for the local newspaper and The West Australian, giving information on the study and seeking public input. Several of these articles were published in the local newspapers and The West Australian.

E1.5 Submissions

Thirty three public submissions were received and the issues raised have been individually addressed. In addition, a response to each person who made a submission was provided. Of the 33 submissions received, 17 supported the water supply from the Collie River with the Australind Bypass route (Route 3) being the preferred pipeline route option. In particular, the substantially lower cost and minimal environmental and social impact of this option received public support. Five submissions also supported the Collie River as the desired water source but with various other pipeline route options and three submissions supported the concept of more industry and water being provided for the industry. Additional comments were made on the supply of water to Roelands and Brunswick Junction and suggested another take-off point east of the South West Highway using irrigation channels rather than the pipeline.

Many of the submissions raised issues related to management and utilisation of water resources generally with concerns regarding uncertainty of Brunswick Dam and the salinity problems associated with Wellington Dam. While these matters are not directly related to this proposal, they have been individually answered by

MEDIA RELEASE

WATER AUTHORITY
of Western Australia

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PUBLIC COMMENT INVITED ON KEMERTON WATER SUPPLY OPTIONS

The Water Authority of Western Australia is seeking public comment as part of a feasibility study of a pipeline to supply water to Kemerton.

A one-day exhibition of possible water supply sources and pipeline routes will be held at the Australind Village Shopping centre on Wednesday, 2 September.

Mr Peter Goodall from Water Resources Planning will be available to answer any questions and receive comments.

"Construction of the pipeline won't commence until a new industry has committed itself to construct a facility at Kemerton," said Mr Goodall. "This could be somewhere between two to five years from now.

"This exhibition is part of the Water Authority's continuing drive to involve interested sections of the community in the resolution of major water issues. We look forward to receiving advice and comments from people who live and work in the region."

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the Water Authority. From the submissions received, there is strong community support for both the proposed source of the water and the preferred pipeline route. A summary of the issues raised by the submissions are presented in Appendix B.

E2 PIPELINE ROUTE INVESTIGATIONS

E2.1 Route 1 - South West Highway Option

An investigation of the route established that there were 25 houses within 200 metres of the proposed pipeline. The majority of these were within 50 metres of the alignment and several would be as close as eight metres. The pipeline would be located on the road verge, however in places this verge was very narrow and a large number of trees, including many mature melaleuca, marri and jarrah trees would have to be removed. This would result in social, environmental and engineering costs.

The route also corresponded in several places with irrigation and drainage channels. Crossing or other disruption to these channels would result in some economic and engineering impacts. Construction activities may also have resulted in disruption to irrigation supplies.

In a section of the route close to O'Keefe Road further impacts were identified. These included two houses, one on the west side and one on the east side which would be extremely close to the pipeline, and a brick wall which would be affected by the construction. In addition, in the same area, there are several very large English Oak trees and further south several Plane trees which would most likely be removed during construction of the pipeline. The loss of these trees was considered to be of significant social and environmental impact. At the crossing of the Brunswick River, the removal of a large number of mature native riverine trees was also identified as a significant impact.

As a consequence of these potential social and environmental impacts, together with the economic and engineering implications, this route was found to be unacceptable.

E2.2 Route 2 - Alma Road Option

This route was inspected and found to have less social and environmental impact than Route 1. However this route would still result is a large number of trees having to be removed and there was still potential problems with disruption to drainage channels. In addition it was likely the pipeline would be located on private property and although mostly along boundary fences, it would still present a significant social impact. In one instance the pipeline would have had to have been located through the centre of a large property. This impact was seen as a major complication and prompted further examination of alternative pipeline routes.

E2.3 Route 3 - Australind Bypass Section

This route became the preferred option in terms of social, environmental, economic and engineering considerations. It would have the least impact on road side vegetation in comparison to the other two routes. It is possible a small number of medium and one large red gum along Treendale road would however need to be removed, together with some melaleucas near the Raymond Road and Australind Bypass intersection.

In terms of impacts on private property, a block close to the Collie River would be affected in that the pipeline from the pipehead weir to Treendale Road would have to cross a cleared paddock. This option was suggested by the property owner in order to avoid disturbing a stand of mature Flooded gums in Rose Road near the Collie River. In addition the pipeline would be located through several private properties in the Australind Bypass section.

APPENDIX F

EVALUATION OF ALTERNATIVE OFFTAKE SITES

APPENDIX F - EVALUATION OF ALTERNATIVE OFFTAKE SITE

F1 Offtake : Burekup Weir

This option involves installing an outlet at the Burekup Weir and constructing an above ground pipeline through the Collie River valley and a buried pipeline to the Kemerton Industrial Park.

The reach of the Collie River below the Burekup Weir is attractive, rugged and has an abundance of riverine trees and understorey. Clearing of vegetation through the river valley and along the above ground pipeline route would be required for construction and maintenance access. Although this offtake option provides a secure supply, the cost is almost twice the cost of taking water from downstream on the Collie River because of the pipeline length and difficulties involved in constructing a pipeline through the river valley.

F2 Offtake : Irrigation Pipeline

Irrigation supplies are delivered via open canals from the Burekup Weir to the irrigation areas north and south of the Collie River. The northern irrigation areas are supplied by a pipeline across the Collie River, upstream of the South West Highway. This offtake site option would involve tapping into the irrigation pipeline and constructing a pumping station and a pipeline to the Kemerton Industrial Park.

As this offtake would be downstream of the Collie River valley, environmental impacts are significantly reduced in comparison to the previous site. Furthermore the cost is also significantly less. However, annual maintenance of the irrigation canals requires a downtime of 20 days per year, necessitating backup storage. This additional storage component would require a significant reservoir in the Kemerton Industrial Park. Thus the environmental impacts associated with this additional storage facility and the security of supply issue severely reduces the viability of this offtake option.

KEY ISSUES / OFFTAKE SITE	Security of Supply	Construction	Cost	Environmental and Social Impacts		
				Flora and Fauna	Traverse Conservation Reserves or Impact on Wetlands	Social Impacts
BUREKUP WEIR	- High security of supply.	- Gravity operated pipeline. - Steep Terrain. - Lack of access for construction. - Pipeline crossing of Collie River. - Pipeline crossing railway. - Pipeline crossing of South West Highway. - Using existing infrastructure.	$ 0.34 per kilolitre.	- Abundant riverine trees and understorey in the are below the weir. - Clearing of vegetation required.	- Likely to impact upon wetlands. - Crossing of Collie River at System 6 recommended Potential Regional Park.	- Minimal disruption to social fabric. - Visual amenity impact from above ground pipeline.
IRRIGATION PIPELINE	- Annual maintenance of irrigation canals requires 20 days downtime.	- Lack of access for construction. - Pipeline crossing of South West Highway. - Using existing infrastructure. - Pipeline completely buried. - Require storage facility at the Kemerton Industrial Park.	$ 0.22 per kilolitre.	- Minimal impact upon flora and fauna. - Flora and fauna impacts associated with the additional storage facility.	-Likely to impact upon wetlands. - Crossing of Collie River at System 6 recommended Potential Regional Park.	- Reduces rate at which irrigation water can be distributed. - Impact upon Collie Irrigation District.
WELLINGTON DAM	- High security of supply.	- Pipeline crossing of South West Highway. - New infrastructure required. - Pipeline crossing railway. - Steep Terrain. - Lack of access for part of construction works. - Pipeline completely buried.	NOT determined but likely to be >> $ 0.34 per kilolitre.	- Significant impact upon flora and fauna habitat. - Clearing of vegetation required. - Disruption to valued ecosystem.	-Pipeline traverses Lane Pool Reserve. -Likely to impact upon wetlands.	- Disruption to highly valued conservation reserve.
DOWNSTREAM SOUTH WEST HIGHWAY	- High security of supply.	- New infrastructure required. - Pipeline completely buried. - Pipeline crossing of Brunswick River.	$ 0.30 per kilolitre.	- Minimal impact upon flora and fauna.	-Minimal impact upon wetlands. - Crossing of Brunswick River at System 6 locality C67. - Offtake at Collie River in System 6 recommended Potential Regional Park.	- Minimal disruption to social fabric.

Table 2 Comparison of Offtake Site Options

F3 Offtake : Wellington Dam

This offtake option involved constructing a pipeline directly from Wellington Dam to the Kemerton Industrial Park.

The pipeline would have to pass through the Lane Pool Reserve necessitating the clearing of vegetation and disruption to a valued ecosystem. In addition to these significant environmental impacts this offtake site was the most expensive of the options evaluated, because of the length of the pipeline from Wellington Dam to the Kemerton Industrial Park.

F4 Offtake : Downstream of the South West Highway

A fourth offtake alternative was to construct a pipehead weir and pumping station, downstream of the South West Highway, with a buried pipeline to the Kemerton Industrial Park. The site was located adjacent to the Rose Road Reserve, some 700 metres downstream of the South West Highway.

The identified advantages of this offtake site include:

- The pipehead and pump station site are in grazing land and would have minimal impact on flora and fauna.
- The requirement for removing vegetation on the route is minimal and the least of the four offtake options considered.
- There is only minimal and easily managed interference with irrigation drainage works.
- Social impacts are minimal.
- Along the Australind Bypass section, the pipeline will cross the Brunswick River attached to the existing Brunswick River Road bridges.
- Comments received during the public consultation programme supported this offtake site.
- System 6 values are not adversely impacted.

In recognition of the above advantages, this offtake site is preferred.

APPENDIX G

STUDY TEAM

APPENDIX G - STUDY TEAM

Kemerton Advisory Board

- Steve Winke

Water Authority Western Australia

- Peter Goodall

BHP Engineering Environmental Consulting Services

• Lindsay Christensen	Project Manager
• Stephen Edwards	Environmental (General)

Social Impact Consultant

- Esther Skitmore