SAMSON BROOK REDEVELOPMENT SCHEME

ENVIRONMENTAL PROTECTION STATEMENT

Prepared for
Water Corporation
by Welker Environmental Consultancy

July 2002

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Client: Water Corporation

Report	Version	Prepared by	Reviewed by	Submitted to Client	
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EXECUTIVE SUMMARY

INTRODUCTION

Samson Brook is the next Harvey Basin source scheduled for development for supply to the Integrated Water Supply System (IWSS). The redevelopment of Samson Brook has been brought forward due to the drought conditions and is a key element of the Water Corporation's drought recovery strategy.

The Harvey Basin Surface Water Allocation Plan requires the establishment of environmental water provisions before any further diversion of water can occur from regulated streams such as Samson Brook (the Brook).

NEED FOR THE SCHEME

The inflow to the metropolitan dams in the 2001 winter was the worst since 1914 and, with environmental constraints limiting use of groundwater resources, the IWSS faces a serious water shortage. The Water Corporation has formulated a strategy that has three distinct elements, namely:

- managing water supplies in the short term;
- contingency planning in the event of continuing low inflow years; and
- a medium-term drought recovery plan to enable a gradual improvement of the water supply situation over several years.

Underpinning this drought response strategy is a range of demand management initiatives.

The Samson Brook Redevelopment Scheme is a key element of the Corporation's drought recovery plan. Redevelopment of this source will allow unallocated water resources in this catchment to be accessed for public water supply. It will also provide opportunities for water trading with South West Irrigation Co-operative.

THE PROPOSAL

The Samson Brook Redevelopment Scheme involves the construction of a new pipehead dam approximately 6 km downstream of the existing Samson Brook Dam.

In summary the proposal will also include:

- construction of infrastructure for the diversion of 8 GL/yr on average (diverted in accordance with the Operating Strategy as approved by the Water and Rivers Commission) from Samson Brook to the IWSS in addition to current regulation, with future diversion of additional water subject to the development of Environmental Water Provisions acceptable to the Water and Rivers Commission;
- initially chlorination, buffering and fluoridation and then full treatment facilities in the long term;
- a temporary access road from Scarp Road to the pipehead dam site;
- a permanent access road from Weir Road to the proposed pipehead dam and treatment plant; and
- new 12.9 km, 0.9-1.0 m diameter pipeline from the proposed pipehead dam to the main Stirling Trunk Main.

The construction of the pipehead dam at the preferred location will allow the Water Corporation to access unallocated water from overflows from the existing Samson Brook Dam and the catchment

downstream of this dam. This facility also provides for diversion of any additional water that may be traded from South West Irrigation (SWI).

The key characteristics of the proposal are shown in Table 1 at the end of this summary.

COMMUNITY CONSULTATION

An extensive stakeholder consultation program was implemented during the process of preparation of this environmental review. The key components of which were:

- On-site government agency briefings
- Formation of a Stakeholder Liaison Group
- Consultation with potentially affected landowners
- Open community evenings
- Mail out of information to stakeholders and all the residents in the local community
- Advertising and news articles in the local newspaper
- One-to-one consultations with key stakeholders.

Key issues raised

During the community consultation process, a number of issues were raised about the proposed Samson Brook Redevelopment Scheme. The key issues raised were generally related to:

- the water needs of the local community and the security of irrigation and industrial water supplies;
- the effect of redevelopment on recreation and tourism;
- the environmental mitigation for loss of values; and
- the locations of infrastructure related to the redevelopment.

The responses to the issues raised by the stakeholder consultation process are detailed in Appendix 2. Many of the issues raised the during the stakeholder consultation process related to the regulations and policies that control the allocation of water in the catchment.

Outcomes of the consultation process

The results of the stakeholder consultation process were important in developing refinements and mitigation measures for the redevelopment, especially in the location of infrastructure and the environmental mitigation program.

Key outcomes resulting from the consultation process included:

- allowing the north eastern tributary of Samson Brook to remain unregulated, to provide a linkage between the plain and the forested upland catchments;
- committing to the development of a Recreation and Tourism Master Plan for the Waroona area, covering the Drakes Brook and Samson Brook Catchments to address the impact of the proposal on recreation;
- discussion with local landowners and Landcare groups and their agreement on the location of access tracks, the chemical dosing plant and the pipeline to minimise disruption to landuse and ecological values;

- committing to a mitigation program to alleviate the impact of the construction of the pipehead dam, inundation after construction of the pipehead and the construction of the pipeline on flora and fauna; and
- proposing a pipehead dam location and pipeline route that will prevent impacts on areas and features with potential Aboriginal heritage significance.

Some issues raised in the consultation process were beyond the scope of the Environmental Protection Statement. These were dealt with in other forums.

ENVIRONMENT IMPACT ASSESSMENT AND MANAGEMENT

The following environmental factors may be affected by the Samson Brook Redevelopment Scheme:

- Flora and terrestrial vertebrate fauna – impact from inundation and clearing
- Aquatic fauna - impact from inundation and changes to streamflow
- Watercourses - impact from inundation and changes to streamflow
- Noise and vibration – impact from construction
- Dust – impact from construction
- Water quality – impact from construction and operation
- Aboriginal Heritage and use
- Recreation
- Traffic – impact from construction
- Public safety

Vegetation, priority flora and fauna

In total a maximum of about 8.5 ha of the Helena Vegetation Complex will be disturbed by the proposal. Construction of the pipehead dam and inundation by the pipehead reservoir will result in the loss of about 7 ha of the Helena Vegetation Complex (with a significant proportion of the area being bare rock). Approximately 600 m of riparian vegetation, mostly Site-Vegetation Type C would be affected by inundation. The construction of the temporary access road to the pipehead construction site will result in the disturbance of about 0.9 ha, that will be rehabilitated after the completion of construction. The construction of the chemical dosing plant will be on cleared agriculture land to the west of the proposed pipehead.

Construction of the pipeline will result in the clearing of 0.6 ha of Helena complex vegetation and another 0.65 ha adjacent and to the west of South West Highway.

Disturbance of these areas is the minimum that can be practicably achieved to implement the proposal.

The Helena Vegetation Complex is well represented in existing and proposed reserves (44% of original extent) and locally significant site-vegetation types R and G are well represented in the conservation estate. Locally significant site-vegetation type C occurs on in the stream zone and has important ecological functions including fauna habitat and control of erosion.

No Declared Rare or Priority Flora have been located to date in the inundation area and areas disturbed by the construction of the pipehead dam, access road or chemical dosing plant. However, the proponent has committed to conducting a detailed flora spring survey to confirm the presence or

otherwise of such flora in areas that may be disturbed by the proposal. If the survey locates any Declared Rare or Priority Flora, a protection plan will be prepared in accordance with the requirements of the Department of Conservation and Land Management (CALM).

The implementation of the Flora Weeds and Dieback Management Plan will ensure flora is protected. The maintenance of environmental water provisions (EWPs) for riparian vegetation in the Brook and the commitments to rehabilitate riparian vegetation and introduce a conservation covenant for the catchment of Samson Brook within Lot 6 will enhance flora values in the vicinity of the proposal.

The implementation of the Samson Brook Redevelopment Scheme is unlikely to result in a significant adverse impact on terrestrial and aquatic fauna. There will be a small loss of fauna habitat but commitments to feral animal control and erection of cockatoo nesting boxes will improve the faunal values of Lot 6. The implementation of EWPs for aquatic fauna through the WRC allocation licensing process will facilitate the protection and potentially enhancement of aquatic fauna downstream of the proposal.

Rare species potentially present such as Carnaby's Black-Cockatoo, Baudin's Black-Cockatoo, and to a lesser extent the Chuditch, are not reliant on the area affected by construction and inundation. The Noisy Scrub Bird has been re-introduced regionally, but the proposal will not impact on any sites where releases have taken place or those being considered for future releases. The habitat that will be affected is common on a local and regional scale and has only moderate value due to activities that have previously taken place in the area. The implementation of the Faunal Management Plan should protect fauna that are present in the area.

The construction of the pipehead dam is not expected to have any significant impact on the long-term viability of the aquatic fauna present in the Brook. Some changes will occur upstream of the pipehead dam as a result of the inundation of the riparian vegetation and the change from stream fauna to lake fauna.

Watercourses

The diversion of streamflow to the IWSS and inundation of a small length of riparian zone will have a negligible impact on the ecological values supported by Samson Brook. The maintenance of EWPs, restoration of riparian vegetation on Samson Brook and the introduction of a conservation covenant for the Samson Brook catchment within Lot 6 is likely to enhance key ecological values supported by the Brook.

Monitoring of key biological, hydrological and physical parameters is proposed to facilitate refinement of EWPs and verification of anticipated impacts.

Dust, noise and vibration

The construction site for the pipehead dam is well away from sensitive areas and the application of control measures described in the Dust Management Plan, should keep dust emissions to acceptable levels.

Noise and vibration that may result from the construction phase of the redevelopment is expected to be acceptable because of:

- large separation distances to the nearest residences from the pipehead damn construction site;
- application of control measures contained in the Noise and Vibration Management Plan;
- use of the Scarp Road access route by construction vehicles;

- development and implementation of a Traffic Management Plan in consultation with the Shire of Waroona;
- monitoring of blast noise levels in accordance with the requirements of the DEP; and
- monitoring vibration levels (at reference points or at the nearest residence) for blasts that take place within 1 km of residences.

The proponent will also implement a complaints response system and maintain liaison with nearby residents to address noise and dust issues that may arise during construction.

Water Quality

Due to the undisturbed nature of the upper part of the Samson Brook catchment (Lot 6 and above), water quality in the Brook is of high quality with a neutral pH, low salinity and high dissolved oxygen content.

Water quality in the coastal plain area of the catchment is degraded as a result of adjacent agricultural land uses, with increased nutrient status and elevated turbidity.

The implementation of the redevelopment proposal is not expected to significantly affect water quality in Samson Brook. Upstream of the site, the land surrounding the Brook will not be disturbed. Control measures will be put in place in accordance with the Water Quality Management Plan. The installation of two coffer dams, one to divert flow around the pipehead dam construction site and the other to intercept any runoff or sediment from the site, will protect downstream water quality.

Aboriginal Heritage and Use

The Samson Brook Redevelopment Scheme avoids any known Aboriginal heritage sites. A detailed Aboriginal heritage survey is proposed and in the event that sites are located an Aboriginal heritage site management plan will be prepared and implemented to protect sites.

The proponent will consult with the local Aboriginal community before and during the implementation of the redevelopment.

Recreation

Future recreation opportunities will be affected by the implementation of the Water Source Protection Plan (WSSP) for the catchment. The WSSP will be implemented in the Samson Brook Catchment independently of the proposed Samson Brook Redevelopment Scheme. The effects of the WSSP and the Samson Brook Redevelopment Scheme on recreation in the catchment will be managed under the Waroona Recreation and Tourism Management Master Plan that will include consideration of mitigation measures.

Examples of mitigation measures being discussed with key stakeholders include:

- A de-stocking program for marron in drinking water supply dams.
- Construction of habitat enhancement within the Waroona Dam when the dam is drained for remedial works to the wall.
- A stocking program for trout in existing resources – the Drakes Brook and Waroona dams.
- Consideration of access issues and facilities for recreational fishers to be included in recreation planning for the area.

Traffic

The construction of the pipehead dam will lead to a short-term increase in the amount of traffic that transits South Western Highway. However, the increase in heavy traffic movements is temporary and relatively small compared to the current level of traffic. Increases in the heavy traffic movements on local roads will be managed under the Traffic Management Plan.

A Traffic Management Plan will be prepared and implemented in consultation with the Shire of Waroona and the local community.

Public safety

The location of the chemical dosing facility is likely to comply with EPA criteria and in-house Water Corporation standards for such facilities. A quantitative risk assessment will be conducted as part of the process for obtaining a works approval under the Environmental Protection Act.

CONCLUSION AND JUSTIFICATION

The Samson Brook Redevelopment Scheme is expected to result in a number of minor environmental impacts, the most significant of which are:

- loss of a small area of vegetation which is well represented in reserves;
- a small reduction in the volume of winter flow in Samson Brook;
- dust, noise and traffic issues which may potentially occur during the construction period; and
- restrictions on recreational activities in the Samson Brook catchment.

Through the application of environmental mitigation measures to alleviate permanent impacts and implementation of management plans, the proponent believes that these impacts are either not significant or can be managed to an acceptable level. A number of potential environmental benefits will come about as a result of the implementation of the proposal.

A summary of the proposed commitments is shown on page x of this summary.

The impacts identified by the environmental assessment are detailed below.

Vegetation and Flora

The major environmental cost associated with the redevelopment of Samson Brook is the permanent loss of 7 ha of Helena Complex Vegetation as a result of the construction of the pipehead and inundation. A maximum of about 600 m of stream zone vegetation will be inundated as a result of the redevelopment. Construction of the pipeline to the Stirling Trunk Main will result in the disturbance of a maximum of 0.6 ha of Helena vegetation on Lot 6 and 0.65 ha of other vegetation to the west.

The loss of this vegetation will lead to a loss of terrestrial and aquatic fauna habitat. The Samson Brook Redevelopment Scheme will result in only a small loss of Helena Vegetation Complex that has been degraded by previous grazing activities. The Helena Vegetation Complex is well represented in the conservation estate (44% in CAR reserves) and the implementation of the proposal will have only a negligible impact on the extent of this complex outside existing and proposed reserves. The mitigation program includes rehabilitation measures in order to compensate the loss of vegetation.

The pipeline to the Stirling Trunk Main has been routed to avoid impacts on vegetation as far as is practicable. Measures to mitigate the impact of the pipeline on vegetation are described in the Benefits section below.

Based on surveys so far, no Declared Rare or Priority Flora is likely to be disturbed by the proposal but further botanical survey work will be undertaken in spring to confirm the presence or otherwise of these species.

Water Quality and Quantity

The diversion of an average of 8 GL/yr (diverted in accordance with the Operating Strategy as approved by the WRC) of streamflow from Samson Brook to the IWSS will reduce the winter flows in the Brook downstream of the pipehead dam. However, the application of EWPs will ensure that the ecological values of the system downstream of the pipehead are maintained. Water quality downstream of the proposed pipehead dam is unlikely to be effected by the redevelopment. The short residence time and small volume of water in the pipehead dam means that the risk of thermal pollution is believed to be low.

It is not believed that the diversion of 8 GL/yr on average (diverted in accordance with the Operating Strategy as approved by the WRC) from Samson Brook will have a significant effect on the Peel Harvey Estuary system.

During the construction phase of the redevelopment water quality impacts are expected to be negligible. This will be a result of the controls proposed in the Construction Environmental Management System and the construction of coffer dams to divert catchment runoff and releases from Samson Brook Dam around the construction site and intercept runoff and sediment downstream of the site.

Construction operations

Construction operations will give rise to increased heavy traffic, some noise and dust emissions and vibration for a short period that has the potential to affect the amenity of nearby residences.

Increases in noise levels as a result of heavy vehicles have been estimated for residences on South West Highway and local roads for the peak number of heavy vehicle movements. There are expected to be negligible increases in the noise levels on South West Highway due to the heavy vehicle movements. Increases in traffic noise will occur on the local road, but this will be temporary and readily managed. Construction traffic will be managed under the Traffic Management Plan, which will be prepared in consultation with the Shire of Waroona.

Construction noise from the Samson Brook Redevelopment Scheme is not anticipated to affect the amenity of the local community. The local topography and the distance between the pipehead dam site and the nearest residences mean that estimated noise levels from construction will comply with DEP criteria. Blasting will be in accordance with the Australian Standard AS2187.2:1993 and the requirements of the *Explosives and Dangerous Goods Act 1961* and the *Mining Act 1978*. Management measures will ensure that noise from the construction of the pipeline is unlikely to have any impact.

A Noise and Vibration Management Plan has been prepared and will be implemented in consultation with the Shire of Waroona and the local community.

The emission of dust from construction during the Samson Brook Redevelopment Scheme is not expected to impact on land uses or amenity. The separation of the pipehead dam site and the concrete

batching plant from the nearest residences will mitigate against dust emissions becoming a nuisance as will the vegetation present between the proposed pipehead dam and sensitive areas. There is the potential for the emission of dust from the construction of the pipeline, but this will be minimised by implementing mitigation measures.

The Dust Management Plan details the steps that will be taken to ensure dust emissions resulting from the Samson Brook Redevelopment Scheme are minimised.

Recreation

The need to protect water quality for public water supply will reduce future recreational opportunities in the catchment above the proposed Samson Brook Pipehead dam. Such constraints would have been imposed in the absence of the development given the need to protect the existing public water supply to Waroona and Hamel.

Benefits

There are a number of potential environmental benefits that would not have otherwise occurred without the implementation of the proposal at this time. These benefits include:

- introducing a conservation covenant on the catchment of Samson Brook within Lot 6 to protect conservation values;
- rehabilitation of riparian vegetation on Lot 6 to improve ecological values previously degraded by grazing;
- rehabilitation of an existing access track after the completion of construction;
- control of feral animals thereby increasing the chances of recruitment of locally extinct native fauna and increasing the local abundance of native fauna species;
- repairing/replacing fencing around Lot 6 to protect ecological values and control access;
- additional nesting habitat for rare cockatoos through the provision of nesting boxes on Lot 6;
- establishment of EWPs for Samson Brook from the Samson Brook Dam to the South Western Highway to enhance and protect ecological and social values; and
- early determination of recreation mitigation.

Key characteristics of the proposal

Characteristic	Pipehead 150 m site
Diversion of water from Samson Brook	8 GL/yr on average (diverted in accordance with the Operating Strategy as approved by the WRC)
Pipehead dam	
Wall height (m)	20
Location (km from South Western Highway)	Approximately 4.3 km east
Description	Concrete gravity dam
Spillway	60 m wide
Top water level (m AHD)	147.5
Storage volume (ML)	300
Offtake	Piped offtake
Vegetation disturbance (ha)	Approximately 7 ha by inundation and construction of the pipehead Approximately 600 m of riparian vegetation will be inundated. Approximately 7.3 ha of dieback free vegetation potentially impacted by construction.
Access roads	
Length (km)	Temporary access road to pipehead: approx 2.6 km Permanent access road to pipehead: approx 4.5 km Permanent access road to water treatment facility: approx 1.6 km
Width of disturbance (m)	Temporary access track 7 m.
Vegetation disturbance	Temporary access road 0.9 ha, minimal disturbance by permanent access road
Pipeline	
Length (km)	12.9
Diameter (m)	0.9 – 1.0
Capacity	125 ML/day
Route	Northern Route. Along permanent access track on Lot 6, through cleared agricultural land, crossing Samson Brook and South West Highway. Along James Rd, Fawcett Rd and then Buller Rd, crossing South West Railway on James Rd. Refer Figures 1 and 6.
Width of disturbance (m)	10 –25 m approx. 10 m in areas of native vegetation.
Vegetation disturbance (ha)	Approximately 0.6 ha in forested areas on Lot 6 Approximately 0.65 ha to the west of South West Highway
Water treatment plant	
Description	Chemical dosing plant – chlorination, fluoridation and stabilisation.
Area disturbed (ha)	1.5 ha ;
Vegetation disturbance (ha)	Cleared agricultural land
Environmental Mitigation/Benefits	
Rehabilitation	A total of 16.5 ha of rehabilitation, comprising • 6 ha outside the riparian zone; • 1 ha of riparian and other vegetation; • 7.3 ha of dieback free vegetation potentially impacted by construction • 0.65 ha of vegetation impacted by pipeline construction; and • 1.5 ha contingency
Conservation Covenant	Introduction of a conservation covenant on part of the Samson Brook catchment on Lot 6 to protect ecological values.
Mature Trees	Replacement of mature individual trees removed on the pipeline route with 2 juvenile tress of the same species.
Grass Trees	Translocating grass trees impacted by construction of the pipeline
Fencing	Repairing, or where necessary replacing fencing around Lot 6.
Feral Animal Control	Co-operating with CALM in the implementation of a feral animal control program
Nesting Boxes	Installation of cockatoo nesting boxes on Lot 6
Recreation	Development of a Recreation and Tourism Master Plan for the Waroona area.

Summary of Environmental Commitments

No	Topic	Action	Objective	Timing	Advice
1	Construction Environmental Management System (CEMS)	Prepare a Construction Environmental Management System which addresses the following • Flora, weed and dieback management; • Declared Rare and Priority Flora species Survey; • Declared Rare and Priority Flora Protection (if required); • Faunal Management; • Dust Management; • Noise and Vibration Management including monitoring of blast noise from pipeline and dam construction; • Construction of coffer dams above and below the construction site; • Water Quality Management including monitoring of water quality in Samson Brook downstream of the pipehead dam; • Traffic Management; and • Protection of Aboriginal Heritage Sites (see commitment 5)	To minimise the potential for environmental impacts resulting from construction	Prior to construction	Shire of Waroona WRC CALM
2	CEMS	Implement the measures in the CEMS	Achieve the objectives of Commitment 1	During the construction of the pipehead dam and the pipeline	Shire of Waroona WRC CALM
3	Environmental Mitigation Program (EMP)	Prepare an Environmental Mitigation Program which addresses the following: • Lodgement of a conservation covenant on catchment of Samson Brook within Lot 6; • Rehabilitation of an equivalent area impacted by inundation, potential dieback infection and construction access track; • Rehabilitation of riparian vegetation on Lot 6; • Rehabilitation of an equivalent area as cleared during the construction of the pipeline; • Development of rehabilitation completion criteria; • Monitoring against agreed completion criteria; • Assist in the removal of weed tree species and transplant grass trees as necessary; • Compensate for the removal of mature trees during pipeline construction by planting two juvenile trees for each mature tree removed; • Repair, and if required replace, fencing around Lot 6; • Erection of cockatoo nesting boxes on Lot 6; and • Involvement in CALM feral animal control program;	Mitigate the permanent environmental impacts of the Redevelopment	Prior to construction	CALM Harvey Restoration Trust Harvey Land Conservation District Committee Landowners
4	EMP	Implement the measures in the EMP	Achieve the objectives of Commitment 3	During and after the construction period as required	CALM Harvey Restoration Trust Harvey Land Conservation District Committee Landowners
5	Aboriginal Heritage Site Management Plan (ASHMP)	Prepare an Aboriginal Heritage Site Management Plan which includes the following measures: • A detailed Aboriginal heritage survey over the Samson Brook redevelopment area; • Significant Site Management Plan if sites of importance are located in consultation with the local Aboriginal community; and • Consultation with the local Aboriginal community.	To protect Aboriginal Heritage Sites and address heritage issues	Prior to construction	Department of Indigenous Affairs Local Aboriginal Groups
6	ASHMP	Implement the measures in the ASHMP	Achieve the objectives of Commitment 5	Before and during the construction period	Department of Indigenous Affairs Local Aboriginal Groups

Summary of the environmental issues, potential impacts and management

ISSUE	EPA OBJECTIVE	EXISTING ENVIRONMENT	POTENTIAL IMPACT	POTENTIAL MITIGATION	PREDICTED OUTCOME
BIOPHYSICAL					
1. Flora and vegetation	To protect Declared Rare and Priority Flora consistent with the provisions of the *Wildlife Conservation Act 1950.* To maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities	Vegetation on Lot 6 is in relatively good condition but has been disturbed by grazing activities and logging. The understorey is dominated by weeds in some areas and is infected with dieback. No Declared Rare or Priority Flora have been located in surveys. The water pipeline route is through cleared agricultural land for the majority of the length	Construction of the pipehead dam and inundation by the reservoir will result in a total loss of about 8.25 ha of Helena Vegetation and other vegetation Complex. Approximately 600 m of riparian vegetation will be lost due to inundation. No impact on Declared Rare or Priority Flora subject to detailed spring survey.	Rehabilitation of disturbed areas outside the inundation area and temporary access track from Scarp Rd. Rehabilitation of equivalent area to that potentially impacted by dieback during construction. Implementation of Flora, Weed and Dieback Management Plan. Maintenance of EWPs for riparian vegetation and channel maintenance. Introducing a conservation covenant on part of Lot 6 to protect ecological values. Rehabilitation of riparian vegetation on Lot 6. Rehabilitate an equivalent area as cleared during the construction of the pipeline, assist in the removal of weed tree species and translocate grass trees as required. Detailed spring flora survey.	Loss of a small area of Helena Vegetation Complex that is well represented in the conservation estate. Long term protection of ecological values. Implementation of EWPs for recruitment of riparian vegetation. Progressive restoration of previous botanical values and ecological functions in disturbed areas (outside inundation area) and previously degraded riparian areas on Lot 6.. No impact on Declared Rare or Priority Flora.

ISSUE	EPA OBJECTIVE	EXISTING ENVIRONMENT	POTENTIAL IMPACT	POTENTIAL MITIGATION	PREDICTED OUTCOME
2. Fauna	To protect Specially Protected (Threatened) Fauna consistent with the provisions of the *Wildlife Conservation Act 1950*. To maintain the abundance, species diversity and geographical distribution of aquatic fauna.	A range of rare species might be present in the locality. The most significant of these are Carnaby's Black-Cockatoo, Baudin's Black-Cockatoo, and to a lesser extent the Chuditch. The upper Samson Brook system supports a high proportion of endemic aquatic fauna. In the channelised lower reaches there is reduced bio diversity and an increase in introduced species.	The area of habitat disturbed (8 ha) by the proposal is very small compared with the ranges of potential fauna that may use habitat. Immediately upstream of the pipehead dam some loss of aquatic fauna habitat and a successional change from stream fauna to lake fauna. No substantial impact on aquatic fauna downstream.	Implementation of a Fauna Management Plan. Retention of large trees outside the inundation area. Installation of nesting boxes in the area to provide additional nesting habitat for Forest Red-tailed Black Cockatoo cockatoos. Participation in feral animal control programs. The maintenance of EWPs for macroinvertebrates, fish migration, riparian vegetation and channel maintenance.	Insignificant impact on terrestrial fauna and aquatic fauna present in the Brook. Enhancement of some faunal values.
3. Watercourses	To maintain the integrity, functions and environmental values supported by watercourses.	The Brook is regulated by the Samson Brook Dam. Upstream of the proposed pipehead, the catchment is thickly vegetated, but has previously been used for stock grazing and selective logging. Downstream of the proposed pipehead the Brook makes its way through cleared agricultural land before entering an extensive network of irrigation drains.	The Samson Brook pipehead reservoir will inundate approximately 600 m of stream length of the Brook. Potential for streamlines to be disturbed by construction activities. Diversion of an average of 8 GL/year from the Brook will affect the flow regime in winter downstream of the pipehead dam.	Maintenance of EWPs downstream. Refer to mitigation for flora above.	Negligible impact on the ecological values supported by Samson Brook. Enhancement of key ecological values supported by the Brook. Water quality in the Peel-Harvey Inlet will not be affected.
POLLUTION					
4. Noise and vibration	To protect the amenity of nearby residents from noise and vibration impacts by ensuring noise and vibration meet established criteria.	The nearest residence to the pipehead is approximately 2.1 km to the southwest with other residences between 3.5 to 3.8 km to the west. Construction will take place in summer. Wind blows towards the residences for a significant part of the year in summer.	Noise emissions from construction activities may affect nearby residents. Vibration from blasting may affect residences.	Implement the Noise and Vibration Management plan. Monitoring of noise levels. Consultation with nearby residents. Complaints response system.	Noise levels are likely to be acceptable at nearby sensitive premises. No damage to residences.
5. Dust	To ensure that dust levels generated by the proposal do not adversely impact upon welfare and amenity or cause health problems by meeting acceptable standards.	Refer noise and vibration above. Potential for horticulture crops in the vicinity of the proposal.	Dust emissions from construction activities could affect the amenity of nearby residents and nearby land uses.	Implement the Dust Management Plan Consultation with nearby residents. Complaints response system.	Dust emissions are likely to be kept to acceptable levels.

ISSUE	EPA OBJECTIVE	EXISTING ENVIRONMENT	POTENTIAL IMPACT	POTENTIAL MITIGATION	PREDICTED OUTCOME
6. Water Quality – Impact from construction	To maintain or improve the quality of surface and ground water to ensure that the existing and potential uses, including ecosystem maintenance, are protected consistent with the draft WA Water Quality Guidelines for Fresh and Marine Waters (EPA 1993) and the NHMRC/ARMCANZ Water Quality Guidelines.	Water quality in the upper part of the catchment of the Brook is high. This water enters the currently installed pipehead and is used as the water supply for the town of Waroona. Water quality on the coastal plain is degraded as a result with increased nutrient status.	Runoff from construction areas could affect the water quality in the Brook. Disposal of dewater may cause erosion.	Implementation of Water Quality Management Plan. Construction of coffer dams to divert water around the construction site and intercept runoff from the site. Water quality monitoring downstream of the pipehead dam.	Water quality of the Brook is not expected to be affected.
SOCIAL SURROUNDINGS					
7. Aboriginal Heritage and Use	To ensure the proposal complies with statutory requirements in relation to places and sites of heritage significance. To ensure the proposal does not result in changes to the physical and biological environment, which adversely affects cultural associations with the area.	No sites were identified in the preliminary Aboriginal heritage survey. A detailed survey will be carried out prior to construction. Archaeological materials are often found in the vicinity of watercourses and creek systems are often considered features of Aboriginal cultural or historical significance.	Construction of pipehead will result in the inundation of 600 m of Samson Brook. The pipeline route will cross under Samson Brook.	Carry out detailed Aboriginal Heritage Survey. Consult with the Aboriginal community. Seek approval for any disturbance.	Impact on known Aboriginal heritage sites will be avoided. Any sites found in future surveys will only be disturbed with approval.
8. Recreation	To ensure that water resource based recreation considered appropriate by the WRC and developed by planning agencies is not compromised	Limited recreational fishing is carried out in both Samson Dam and the Brook below this dam.	Recreation in the catchment of the pipehead dam will be restricted to reduce risk to water quality	A Recreational Management Plan will be developed as part of the source protection planning process.	Impact on recreation will be mitigated through the source protection planning process.
9. Traffic	To reduce, as far as is practicable, the impact of traffic resulting from the development.	South Western highway currently carries traffic from Perth through Waroona. Access to the pipehead dam construction site would be via Scarp Road. Access to the chemical dosing facility by Weir Road.	Increased traffic volumes along the access roads (Scarp Road, Nanga Brook Road, Willowdale Road and Weir Road) and South Western highway for a relatively short period. Condition of access roads may deteriorate.	Preparation of a Traffic Management Plan in consultation with the Shire of Waroona and the local community. Road conditions assessed.	Increased road traffic for a short period during construction will be managed in consultation with the community.

ISSUE	EPA OBJECTIVE	EXISTING ENVIRONMENT	POTENTIAL IMPACT	POTENTIAL MITIGATION	PREDICTED OUTCOME
10. Public safety	Ensure that the public risk associated with operation of the proposal is as low as is reasonably achievable and in compliance with criteria detailed in the statement on Risk Assessment and Management: Offsite Individual Risk from hazardous Industrial Plant (EPA 1998d).	No residence within 1.4 km of the chemical dosing facility.	Potential risk to public safety if EPA risk criteria are exceeded.	Quantitative risk assessment to confirm compliance with EPA criteria before construction. Compliance with DEP requirements.	No significant risk from chlorine usage and storage.