Ellenbrook sewer pressure main

Water Corporation

Report and recommendations of the Environmental Protection Authority

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Summary and recommendations

This report provides the Environmental Protection Authority's (EPA's) advice and recommendations to the Minister for the Environment on the proposal by the Water Corporation to construct a 500mm to 600mm diameter pressure sewer main, and associated pump station, to service the sewage requirements of residential developments within the vicinity of the Ellenbrook development located about 26km north of the Perth CBD.

Initially, the proposal was to construct the pressure main within the Gnangara Road reserve from Ellenbrook to Wangara where it would connect to a proposed sewer at Hartman Drive currently the subject of a separate assessment by the EPA. However, during this assessment the Water Corporation adopted the alternative route south from the Ellenbrook development on the east side of Lord Street for about 7km, west along Marshall Road for about 9km, and south along Alexander Drive for about 1km to an existing pressure main in Australis Avenue, Mirrabooka. The pump station is proposed to be constructed on land at the south-western corner of the intersection of Lord Street and Gnangara Road.

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

Relevant environmental factors

Although a number of environmental factors were considered by the EPA in the assessment, it is the EPA's opinion that the following are the environmental factors relevant to the proposal, which require detailed evaluation in the report:

(a) Vegetation Communities - impacts during construction;

(b) Declared Rare and Priority Flora - impacts during construction;

(c) Wetlands - impacts due to dewatering;

(d) Groundwater Quality - contamination due to leakage of sewage;

(e) Dieback - introduction into uninfected areas;

(f) Aboriginal Culture and Heritage - impact on areas of cultural significance;

(g) Noise - impact on adjacent residents; and

(h) Odour - impact on adjacent residents.

Conclusion

The EPA has considered the original and revised proposal by the Water Corporation to construct a 500mm to 600mm diameter pressure sewer main and associated pump station to service the requirements of residential development in the vicinity of the Ellenbrook development. The decision by the Water Corporation to adopt the alternative route to avoid impacts on the Priority 1 Underground Water Pollution Control Area is strongly supported. The EPA has concluded that the revised proposal can be constructed and operated to meet the EPA's objectives provided the conditions recommended in Section 4, and set out in Appendix 3, are imposed.

Recommendations

The EPA submits the following recommendations to the Minister for the Environment:

1. That the Minister considers the report on the relevant environmental factors of Vegetation Communities, Declared Rare and Priority Flora, Wetlands, Groundwater Quality, Dieback, Aboriginal Culture and Heritage, Noise, and Odour;

2. That the Minister notes that the EPA has concluded that the proposal can be managed to meet the EPA's objectives, and thus not impose an unacceptable impact on the environment, provided there is satisfactory implementation by the proponent of the commitments set out in Section 4;

3. That the Minister imposes the conditions and procedures consistent with Section 4 and set out in formal detail in Appendix 3 of this report.

Conditions

Having considered the proponent's commitments and the information provided in this report, the EPA has developed the following a set of conditions which the EPA recommends be imposed if the proposal the Water Corporation to construct a 500mm to 600mm diameter pressure sewer main and associated pump station to service the requirements of the Ellenbrook development is approved for implementation.

(a) the proponent shall fulfil the commitments in the Consolidated Commitments statement set out as an attachment to the recommended conditions in Appendix 3; and

(b) in order to manage the relevant factors and EPA objectives contained in this bulletin, and subsequent conditions and procedures authorised by the Minister for the Environment, the proponent shall demonstrate that there is an environmental management system in place which includes the following elements:

- environmental policy and commitment;
- planning of environmental requirements;
- implementation and operation of environmental requirements;
- measurement and evaluation of environmental performance; and
- review and improvement of environmental outcomes.

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1. Introduction and background

The Water Corporation proposes to construct a 500mm to 600mm diameter pressure sewer main and associated pump station to service the sewage requirements of residential development within the vicinity of the Ellenbrook development located about 26km north of the Perth CBD.

Sewage from the Ellenbrook development is currently loaded into tankers at Bronzewing Avenue and transported to a pump station in Wangara. The route travelled by the tankers is west from Ellenbrook along Gnangara Road through the Priority 1 and Priority 2 groundwater protection areas of the Gnangara Water Mound (see Figure 2).

To remove the need for tankering sewage from Ellenbrook and to cater for the predicted sewage volume in the future the Water Corporation originally proposed to:

1. Construct a pump station on land at the south-western corner of the intersection of Lord Street and Gnangara Road. This land is to be excised from Whiteman Park for the provision of services infrastructure.
2. Construct a 12km long 500mm diameter pressure sewer main within the Gnangara Road reserve to convey the sewage to the proposed Gnangara Branch Sewer (also currently the subject of a separate formal assessment).

The EPA determined that the level of assessment be set at Public Environmental Review (PER) on 9 May 1997 with the key factor being the potential for contamination of groundwater in the Priority 1 and Priority 2 areas of the Gnangara Mound. The guidelines that were issued indicated that a risk assessment would need to be conducted to determine the vulnerability of the groundwater to contamination.

During the course of the assessment the Water Corporation amended its proposal and adopted the alternative route for the pressure sewer main as presented in the PER. This assessment addresses the pump station in the original location and the pressure main on the alternative alignment.

Further details of the proposal are presented in Section 2 of this Report. Section 3 discusses environmental factors relevant to the proposal. Conditions and procedures to which the proposal should be subject if the Minister determines that it may be implemented are set out in Section 4. Section 5 presents the EPA's conclusion and Section 6 the EPA's recommendations.

A list of people and organisations that made submissions is included in Appendix 1. References are listed in Appendix 2, and recommended conditions and procedures and proponent's commitments are provided in Appendix 3. A summary of the relevant factors is included in Appendix 4.

The DEP's summary of submissions and the proponent's response to those submissions has been published separately and is available in conjunction with this report.

2. The proposal

The Water Corporation proposal is to construct a pump station and 12 kilometres of pressure sewer main to service the sewage requirements of residential developments within the vicinity of the Ellenbrook development located in the north eastern corridor of the Perth metropolitan area (see Figure 1). The pressure main was to be a 500mm diameter mild steel pipe with cement internal lining and polyethylene external lining, constructed by the joining of 12m sections by means of rubber ringed joints. The pressure main was to run underground at depths between 1 and 3m. At high points air values would be located to release collected gases through biological filters. At low points fully lined scour-pits would be installed containing scour valves for pipeline closure and drainage.

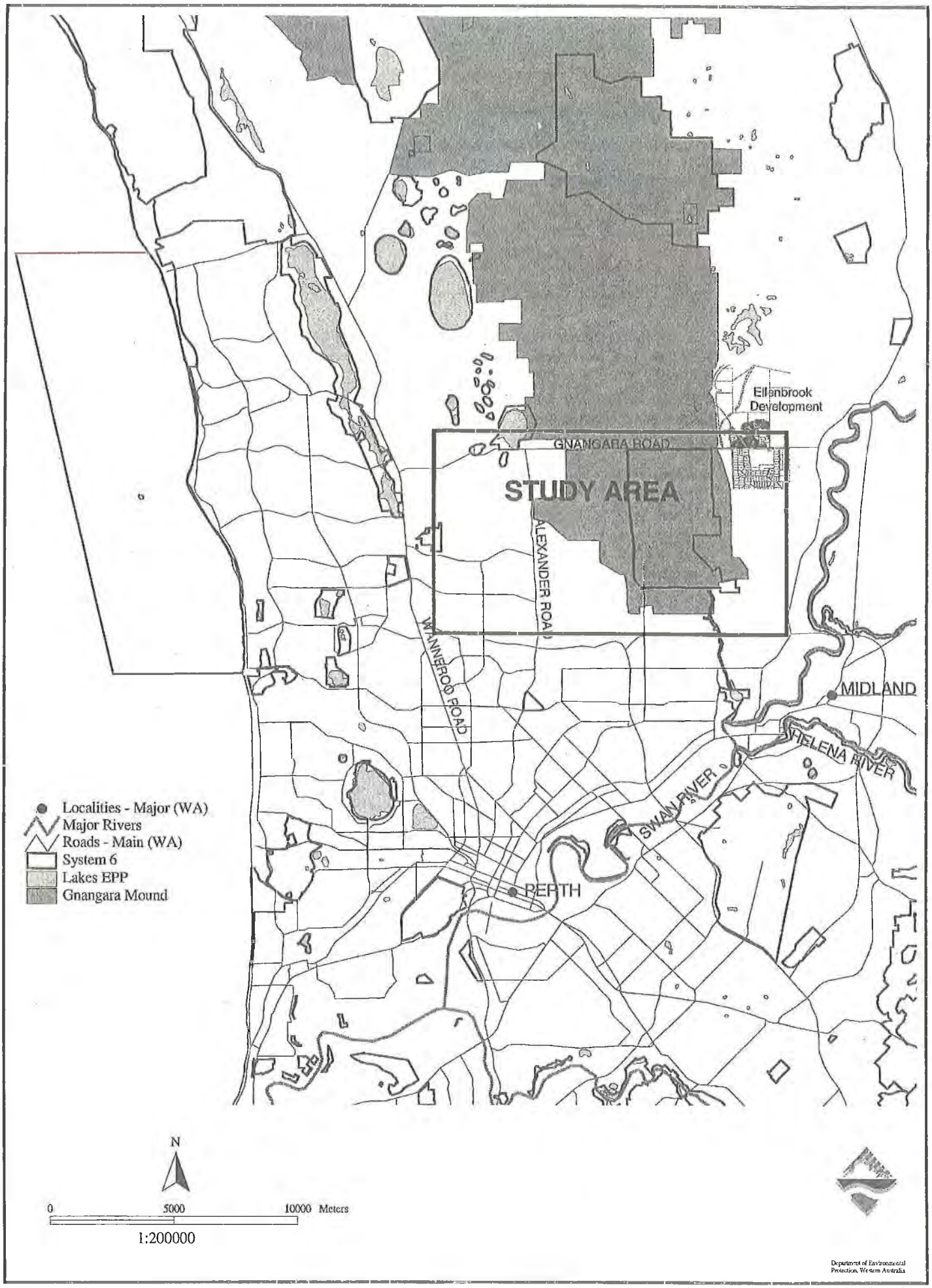

Figure 1. Location map.

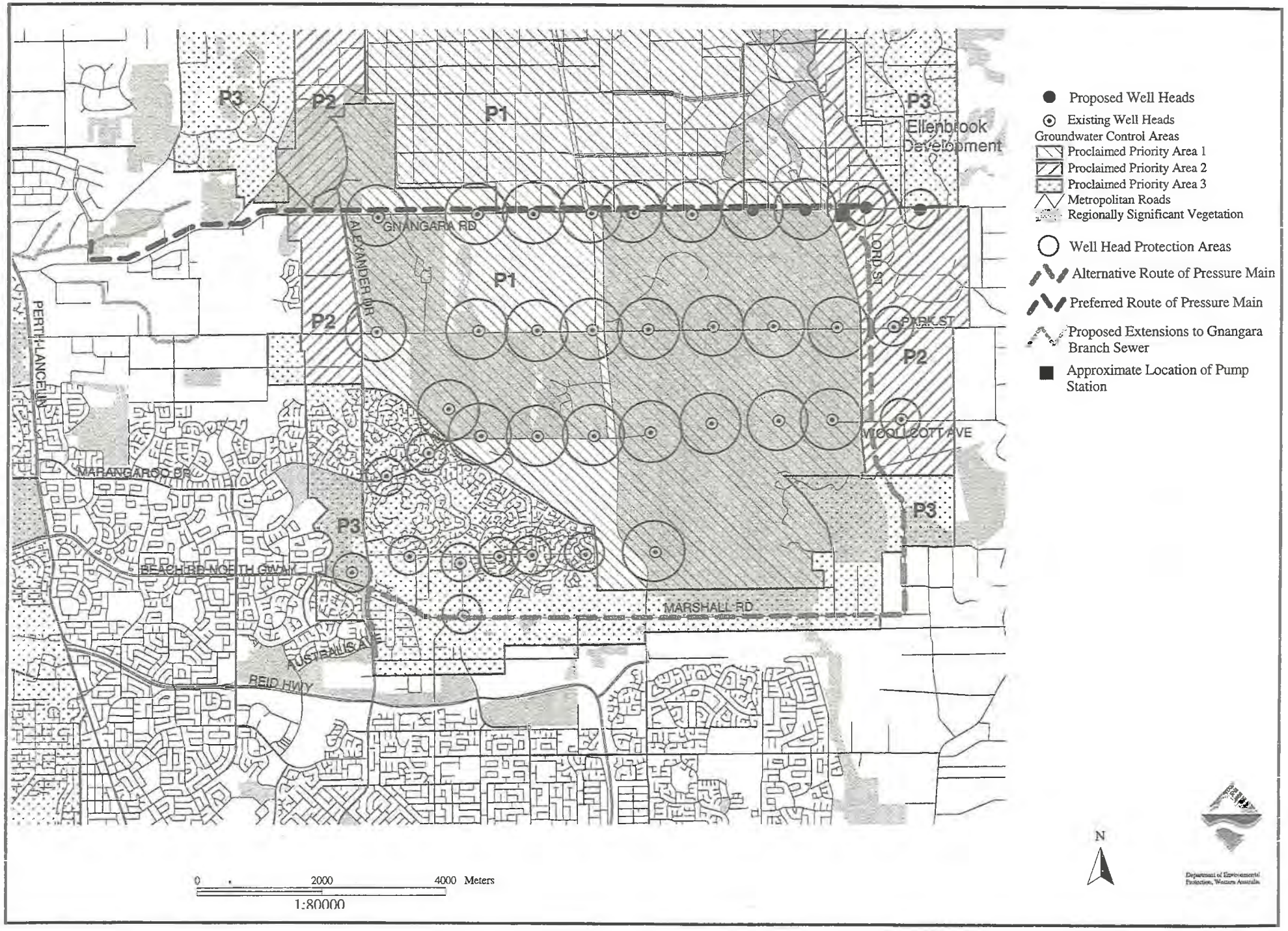

Figure 2. Water Corporation preferred and alternative routes.

The pump station is to be located at the corner of Lord Street and Gnangara Road, in the Shire of Swan. The pressure main was to run from the pump station west along Gnangara Road to Hartman Drive, then north up Hartman Drive to join the proposed Gnangara branch sewer.

The main characteristics of the original proposal are summarised in Table 1 below.

Table 1. Summary of key proposal characteristics for the original proposal

Feature	Location	Description	Potential Impacts
Pump Station	south west corner of Lord Street and Gnangara Road within Priority 2 Under Ground Water Pollution Control Area (UWPCA)	• below ground 'wet well' construction 8m deep • two pumps (one as backup) operated according to the sewage level in the wet well • initial delivery rate of 40L/s • ultimate delivery rate of 200L/s • 4.5 hours of below ground storage at maximum delivery rate • alternate on-site power supply	• contamination of groundwater in Priority 2 groundwater protection area • overflow of sewage into Whiteman Park, Henley Brook, Ellen Brook and Swan River • noise impacts on adjacent residents due to pump operations • odour impacts on adjacent residents due to pump operations
Pressure Sewer Main	approx 30m north of the existing carriageway of Gnangara Road within the road reserve between Ellenbrook and Alexander Drive (within P1 & P2 UWPCA), then the southern side of the Gnangara Road Reserve to Hartman Drive connecting to the proposed Gnangara Branch Sewer.	• Approx 12.4km of pipeline consisting of 12m sections of 500mm internal diameter mild steel internal cement lined sewer pipe • rubber ring joined • buried to a depth of between 1m and 3m • 50m each side of air valves to have polythene internal lining • approx 5 air values and 5 scour pits (3 of each within P1 and P2 areas) • minimum separation from production bores is 50m • passes within the well head protection zone of 6 existing and 3 proposed production bores	• contamination of groundwater in Priority 1 and 2 UWPCAs and well head protection zones • deterioration of visual amenity • impacts on areas of Aboriginal Heritage • impacts on wetlands due to dewatering during construction • impacts on wetlands due to sewage leaks • odour impacts on adjacent residents due to venting
Wastewater Characteristics		• domestic sewage only, however with an industrial area mooted for south of Bullsbrook there is a possibility that industrial waste will also be carried at some time in the future	• increased potential for impacts to due possibility of more intractable contaminants

Since release of the Public Environmental Review (PER) (GHD, 1997) for public comment, the Water Corporation has made a significant change to the route of the proposed pressure main by selecting the alternative alignment outlined in the PER. The revised route for the pressure main

that is the subject of this report now goes south from the pump station within road reserves on the east side of Lord Street for about 7km, west along Marshall Road for about 9km, and south along Alexander Drive for about 1km to an existing pressure main in Australis Way (see Figure 2). In summary, the significant changes to the original proposal are:

- selecting the alternative route around the Gnangara Water Mound for the pressure main;
- increasing on-site storage at the pump station from 4.5 hours to 8 hours at maximum delivery rate; and
- ensuring on-site storage of sewage and other potential contaminants associated with the pump station does not occur within a well head protection zone.

The main characteristics of this proposal are summarised in Table 2.

Note: the original PER documentation submitted by the Water Corporation for public review included information that is relevant to both the preferred and alternative routes.

Table 2. Summary of key proposal characteristics for the revised proposal

Feature	Location	Description	Potential Impacts
Pump Station	south west corner of Lord Street and Gnangara Road intersection within Priority 2 UWPCA	• below ground 'wet well' construction 8m deep • two pumps (one as backup) operated according to the sewage level in the wet well • initial delivery rate of 40L/s • ultimate delivery rate of 200L/s • 8 hours of below ground storage at maximum delivery rate • alternate on-site power supply • on-site sewage storage and other potential contaminants located external to the well head protection zone	• contamination of groundwater in a Priority 2 UWPCA and well head protection zone • overflow of sewage into Whiteman Park, Henley Brook, Ellen Brook and Swan River • noise impacts on adjacent residents due to pump operations • odour impacts on adjacent residents due to pump operations
Pressure Sewer Main	south from the pump station site on the east side of Lord Street for about 7km (1.9km in P2 UWPCA, 1.8km in P3 UWPCA, and a section within the well head protection zone of proposed bore M380), west along Marshall Road for about 9km (2km in P3 UWPCA), and south in Alexander Drive for about 1km (mostly within P3 UWPCA, and passing within the well head protection zone of one bore M34) to an existing pressure main in Australis Way	• Approx 17km of pipeline consisting of 12m sections of 500mm internal diameter mild steel internal cement lined sewer pipe • rubber ring joined • buried to a depth of between 1m and 3m • 50m to each side of air valves to have polythene internal lining • approx 1 air value and 1 scour valve within P2, and 3 air values, 3 scour valves, and 1 scour/section valve within P3 • passes within the well head protection zone of one existing production bore	• contamination of groundwater in Priority 2 and 3 UWPCAs and well head protection zones • deterioration of visual amenity • impacts on areas of Aboriginal Heritage • impacts on wetlands due to dewatering during construction • impacts on wetlands due to sewage leaks • odour impacts on adjacent residents due to venting

Feature	Location	Description	Potential Impacts
Wastewater Characteristics		• domestic sewage only, however with an industrial area mooted for south of Bullsbrook there is a possibility that industrial waste will also be carried at some time in the future	• increased potential for impacts to due possibility of more intractable contaminants

The potential impacts of the revised proposal and their proposed management are summarised in Table 2 (Appendix 4).

3. Environmental factors

3.1 Relevant environmental factors

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

It is the EPA's opinion that the following are the environmental factors relevant to the revised proposal, which require detailed evaluation in this report:

(a) Vegetation Communities - impacts during construction;

(b) Declared Rare and Priority Flora - impacts during construction;

(c) Wetlands - impacts due to dewatering;

(d) Groundwater Quality - contamination due to leakage of sewage;

(e) Dieback - introduction into uninfected areas;

(f) Aboriginal Culture and Heritage - impact on areas of cultural significance;

(g) Noise - impact on adjacent residents; and

(h) Odour - impact on adjacent residents.

The above relevant factors were identified from the EPA's consideration and review of all environmental factors (preliminary factors) generated from the PER document and the submissions received, in conjunction with the proposal characteristics (including significance of the potential impacts), the adequacy of the proponent's response and commitments, the effectiveness of current management and alternative approval processes which ensure that the factors will be appropriately managed. On this basis, the EPA considers that Dust and Visual Amenity factors, and other issues raised in the submissions do not require further evaluation by the EPA. These factors either have manageable impacts, are addressed by the proponent's commitments, or are covered by other environmental control processes. The identification of relevant environmental factors is summarised in Table 3, and a summary of their assessment is set out in Table 4.

The relevant environmental factors are discussed in Sections 3.2 to 3.9 of this report.

3.2 Vegetation Communities - impacts during construction

Description

The proposed pressure main and pump station will be located adjacent to areas of remnant vegetation which are considered regionally significant (see Figure 3).

Figure 3. Location of regionally significant vegetation relative to the proposed sewer main and pump station.

The proposal is to locate the pressure main wholly within the road reserves and therefore direct impacts on regionally significant vegetation such as clearing are considered to be unlikely. The main source of potential impacts on regionally significant vegetation will be indirect impacts such as the spread of dieback. Management of dieback is discussed in section 3.6 below.

Not withstanding the limited impacts on regionally significant vegetation the proponent has conducted a vegetation survey of the route to identify the better stands. The most significant stands were located along Alexander Drive and the proposed pressure main route has been modified to avoid this vegetation.

Assessment

The area considered for assessment of this factor is the Swan Coastal Plain.

The EPA's objective in regard to this environmental factor is to maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities.

No areas of regionally significant vegetation will be directly impacted by the proposal.

Indirect impacts, such as the spread of dieback, are possible and are discussed under the factor Dieback.

The proponent has made the following commitments to ensure impacts on regionally significant vegetation are avoided and any areas impacted are rehabilitated:

- Where there are likely to be impacts on vegetation listed under System 6, or draft Perth's Bushplan, further assessment of vegetation likely to be impacted during construction will be undertaken prior to the finalisation of a detailed route for the pressure main. These studies will identify direct and indirect impacts in terms of construction impacts, and seek to minimise the loss of vegetation to the requirements of Department of Environmental Protection (DEP), Water and Rivers Commission (WRC), and Conservation and Land Management (CALM);
- The detailed route of the pressure main will be selected to the requirements of the DEP on the advice of WRC and CALM;
- Prior to construction a Rehabilitation Management Plan will be prepared which includes both dry and wet land environments encountered by the pressure main and pump station, to the requirements of DEP on the advice of the Shire of Swan, WRC, and CALM;
- The approved Rehabilitation Plan will be implemented following construction.

Having particular regard to the:

a) proposed detailed studies to minimise impacts on significant vegetation;

b) intention for minor variations in the pressure main route to avoid significant vegetation;

c) proposed Rehabilitation Management Plan following construction; and

d) commitments made by the proponent to ensure impacts on regionally significant vegetation are avoided;

it is the EPA's opinion that the proposal can meet the EPA's objective.

3.3 Declared Rare and Priority Flora - impacts during construction

Description

Preliminary studies by the Water Corporation did not identify any Declared Rare or Priority Flora (DRF) that may be affected by the proposal. Notwithstanding this, however, the Water Corporation has acknowledged that this study was preliminary in nature and proposes to conduct a full DRF survey prior to the finalisation of the detailed route of the pressure main.

Assessment

The area considered for assessment of this factor is the Swan Coastal Plain.

The EPA's objective in regard to this environmental factor is to protect Declared Rare and Priority Flora, consistent with the provisions of the Wildlife Conservation Act 1950.

A preliminary survey of the revised pressure main route did not locate DRF that may be impacted by the proposal however the proponent has made the following commitment to ensure the objective for the factor Declared Rare and Priority Flora is achieved:

- Prior to finalisation of the route for the pressure main a comprehensive Declared Rare and Priority flora survey will be conducted and clearances obtained and/or modifications to the route made, to the requirements of the DEP on the advice of CALM.

Having particular regard to the:

(a) initial survey indicating that no DRF will be affected; and

(b) the commitment made by the proponent to conduct a comprehensive Declared Rare and Priority Flora survey and make modifications if necessary;

it is the EPA's opinion that the proposal can meet the EPA's objective.

3.4 Wetlands - impacts due to dewatering

Description

The revised route around the south of Whiteman Park crosses a number of wetlands classified as Conservation, Resource Enhancement, or Multiple Use by the Water and Rivers Commission (Hill *et al*, 1996).

Bennett Brook, which is listed as System 6 area M41, is the most significant wetland crossed by the southern route option. The quality of the wetland in the immediate vicinity of the crossing at Marshall Road is relatively poor, however, downstream impacts on the wetlands in Bennett Brook are possible.

The proposed sewer main also crosses a low-lying area of the Bennett Brook catchment adjacent to Youle-Deane Road. This section of the drainage contributing to Bennett Brook flows into, and adjacent to, the Caversham Airfield.

Dewatering during construction of the pressure main and pump station has the potential to significantly affect a number of these wetlands due to increased surface water quantity, changes in groundwater level, and changes in water quality.

Once the pump station and pressure main are constructed potential impacts on wetlands will result from leaks in the pressure main or an overflow from the pump station. The proponent has made a number of commitments that address this possibility.

Some submissions suggested that the sewer poses an unacceptable risk to wetlands with important conservation values that could be adversely affected by construction activities (including dewatering) and groundwater contamination through acute or long-term leakage.

There was also a call to assess the cumulative impact of development in the north east corridor on the wetlands. It was suggested that if the Ellenbrook development, Egerton Development, Sewer pressure main, Lexia borefield and associated infrastructure are considered as a whole they pose an unacceptable risk to the local environment and threaten the wetlands, watercourses, groundwater and remnant vegetation.

Assessment

The area considered for assessment of this factor is the Swan Coastal Plain.

The EPA's objective in regard to this environmental factor is to maintain the integrity, functions and environmental values of wetlands.

The only regionally significant wetland crossed by the pressure main is Bennett Brook which is listed under System 6. The Water Corporation propose to cross Bennett Brook with an above ground pipeline.

The proposal does not directly impact any other wetlands that have been recognised as regionally significant, however a number of wetlands that are classified by the Water and Rivers Commission as 'Conservation Category' wetlands (Hill *et al*, 1996) are crossed (see Figure 3).

Indirect impacts on wetlands and the associated vegetation in the vicinity of the proposal may also be apparent as a result of dewatering activities during construction, although dewatering would be of a short duration.

The proponent has made the following commitments to manage the issues associated with this factor:

- Prior to construction, a Dewatering Management Plan will be prepared to the requirements of DEP on the advice of WRC, to ensure receiving wetlands, groundwater-dependent vegetation, and streams are not degraded; and
- The approved Dewatering Management Plan will be implemented during construction, to the requirements of DEP on the advice of WRC.

Having particular regard to the:

a) proposed Dewatering Management Plan to minimise potential impacts of dewatering during construction on the adjacent environment;

b) intention to include consideration of wetland vegetation in the Rehabilitation Management Plan (see Section 3.2); and

c) commitments made by the proponent to minimise impacts on wetlands, wetland vegetation, and streams during construction;

it is the EPA's opinion that the proposal can meet the EPA's objective subject to the successful implementation of the Dewatering Management Plan and Rehabilitation Management Plan.

3.5 Groundwater Quality - contamination due to leakage of sewage

Description

There are two aspects to the potential impacts on groundwater quality: physical impact, and implications to policies for the protection of groundwater resources.

Physical Impacts

The pump station and about 1.8km of pressure main are located within the Priority 2 Underground Water Pollution Control Area (UWPCA) associated with the Gnangara Water Mound. A further 4.8km of pressure main is within the Priority 3 UWPCA.

The proposed pressure main also passes within the well head protection zone of one existing (M34) and one proposed (M380) production bore.

Operation of the pressure main has the potential to contaminate the groundwater through either slow, cumulative leaks or acute leaks such as a rupture.

Pump Station

The Water and Rivers Commission (WRC) has accepted that the pump station, with its revised storage capacity, emergency power supply, and other design considerations, has a reduced risk of groundwater contamination which is acceptable for a Priority 2 UWPCA. However, the WRC does not consider it acceptable for the pump station to be located within the well head protection zone of any water supply production bore.

The WRC issues Permits for activities in UWPCAs that have the potential to contaminate groundwater. This is required under the by-laws of the Metropolitan Water Supply, Sewerage And Drainage Act, 1909. The WRC will develop a Permit for the pump station site with the Water Corporation. This should be done during the design phase of the pump station to ensure that the WRC's requirements can be met.

In addition to licensing requirements by the Department of Minerals and Energy the WRC also has guidelines for the storage of fuels and other hazardous materials in UWPCAs which must be complied with. The storage of these materials can be included in the Permit approval from the WRC.

Pressure Main

Proposal activities that may require Permitting by the WRC during the construction phase are refuelling and the temporary storage of fuel and other hazardous materials. The WRC has guidelines on the temporary storage of fuels within UWPCAs.

The revised pipeline route passes through the well head protection zone of two bores (M380 [proposed] & M34). The WRC has recommended that two shallow monitoring bores be installed between the pipeline and each operating production bore. The location and monitoring program for these bores to be determined in consultation with the WRC.

In the event of a leak or spill in a UWPCA the WRC should be the primary contact as this is a requirement under the by-laws of the Metropolitan Water Supply, Sewerage and Drainage Act 1909.

Policy Impacts

The proposed pump station, and sections of the pressure main, are within the Priority 2 UWPCA. The objective for Priority 2 UWPCA is for no increased risk to groundwater contamination (Legislative Assembly, 1994). Considering the revised design specifications and proposed overflow storage capacity for the pump station the WRC has accepted the location of this pump station within the Priority 2 area, but not within the well head protection zone. The acceptance of the pump station within a Priority 2 protection area will set a precedent for similar pump stations within other Priority 2 areas.

The WRC has not indicated any specific concerns about the sections of pressure main within the Priority 2 UWPCA other than where they pass within well head protection zones. In these areas the WRC has recommended that groundwater quality monitoring bores be installed between the pressure main and production bore. Again, the location of sections of the pressure main within the Priority 2 UWPCA, and passing within the well head protection zone of a Production Bore, sets a precedent for the location of other pressure mains within Priority 2 UWPCA and well head protection zones.

Assessment

The area considered for assessment of this factor is the Gnangara Water Mound.

The EPA's objective in regard to this environmental factor is to maintain or improve the quality of groundwater to ensure that existing and potential uses, including ecosystem maintenance are protected, consistent with the draft WA Guidelines for Fresh and Marine Waters (EPA, 1993)

and the NHMRC / ARMCANZ Australian Drinking Water Guidelines - National Water Quality Management Strategy.

Physical Impacts

Pump Station

The WRC has stated that they are satisfied with the pump station design and accepts its proposed location provided it is located outside of any well head protection zone.

In support of their proposal the Water Corporation has provided a commitment that any storage of sewage or overflow facilities for the pump station will be located outside the well head protection zone. The WRC has accepted this commitment as adequate on the understanding that the only portion of the pump station that may be located within the well head protection zone are low risk features such as a car park, or facilities to supply electricity to the pumps. The location of other facilities within the well head protection zone may only be acceptable if there is no other option available, including relocating the bore or the pump station to achieve adequate separation.

The location of fuels, such as diesel for the emergency generator, or sewage storage within the well head protection zone are unacceptable to WRC.

On considering the detailed design and operation considerations and advice from the WRC the EPA has accepted that the location, and operation, of the pump station within the Priority 2 UWPCA is not inconsistent with the recommendations of the Select Committee Report (1994) and does not constitute an increase in the risk of polluting the groundwater.

Pressure Main

The EPA acknowledges the proponent's willingness to reconsider their preferred route for the pressure main following the public submission period and the adoption of the alternative route for the pressure main. The adoption of the alternative route around the Priority 1 UWPCA has significantly reduced concerns about leaks and spills of sewage associated with the operation of the pressure main contaminating protected groundwater resources.

The EPA also acknowledges the proponent's willingness to retain the original design and operational features of the pressure main when selecting the alternative route.

Notwithstanding this the alternative route for the pressure main still passes through Priority 2 and Priority 3 UWPCA, and within one well head protection zone for a Production Bore (M34).

As part of the assessment process the Water Corporation conducted a Risk Assessment of the pressure main which is applicable to both the original and revised routes (GHD, 1997). The conclusion of the Risk Assessment was that over an 8km length of pipeline the Primary Risk (frequency and size a leak in the pressure main) may be expressed as a small leak occurring once every 6 years, and an acute leak occurring once every 18 years. The Risk Assessment points out that these figures are based on other industry sources and should be used with caution. The Water Corporation has made a commitment to implement a comprehensive monitoring program to detect leaks as soon as possible. Under the proposed monitoring program the Water Corporation has made assurances that the worst possible scenario would be that a leak of 2% of the flow may go undetected for 3 months. The EPA considers this to be acceptable on the basis that the pressure main design incorporates risk minimisation features.

The Water Corporation has assumed the Secondary Risk (frequency of the leak impacting on the groundwater) for the pressure main to be one hundred percent; that is that if a leak occurs it will reach the groundwater.

The Risk Assessment concluded that the Tertiary Risk to the groundwater (risk of the groundwater quality being degraded as a result the leak and the risk to public health from the various contaminants) is so low as to constitute a negligible risk to public health, and the Quaternary Risk (risk of medium to long term degradation of groundwater, or nearby surface water, quality as a result of a leak) is negligible.

The WRC raised concerns regarding the pressure main passing within the well head protection zone for M34. These concerns were allayed by a Water Corporation commitment to locate shallow groundwater monitoring bores between the production bore (M34) and the pressure main so that, in the unlikely event of a leak, contamination will be detected before it can migrate to the production bore allowing time for the bore to be shut down and or the contamination cleaned-up.

Having considered the detailed design and operation, the Risk Assessment conducted by the Water Corporation, and advice from the WRC the EPA accepts that the location and operation of the pressure main within Priority 2 UWPCA is not inconsistent with the recommendations of the Select Committee Report (1994) and does not constitute an increase in the risk of polluting the groundwater resource.

Policy Impacts

Acceptance of the pump station and pressure main within a Priority 2 UWPCA, irrespective of the design and operational commitments, does set a precedent for acceptable landuses within Priority 2 UWPCAs. The recommendations by the Legislative Assembly in the Select Committee on Metropolitan Development and Groundwater Supplies Report (1994) does not specifically exclude pump stations and pressure sewer mains from Priority 2 UWPCAs, however neither are they are listed as acceptable. The Legislative Assembly (1994) specifically *excludes* sewers from Priority 1 areas, and specifically *includes* sewers as acceptable in Priority 3 areas. Acceptable activities for Priority 2 UWPCA in Legislative Assembly (1994) only list acceptable residential development as "...Special Rural Use with a minimum lot size of 2ha, clearing limitation, low intensity of use, and no commercial use involving the storage of fuel or chemicals". Unacceptable uses within Priority 2 areas include "...any activity with the potential to further degrade the groundwater quality...[such as] residential lot sizes less than 2ha".

The absence of a landuse in the discussion about acceptable and unacceptable landuses in Priority 2 UWPCA in Legislative Assembly (1994) does not necessarily imply that it is excluded from the Priority 2 area. Where this occurs the proposed landuse should be considered on its merits in the full knowledge of the objectives for Priority 2 UWPCA before a decision is made on acceptability of the landuse. Consistent with the recommendations of the Legislative Assembly (1994) the EPA has considered the pump station and pressure main on their merits in the full knowledge of the objectives for Priority 2 UWPCA and is of the opinion that these facilities of the design and location proposed by the Water Corporation combined with the ongoing management commitments does not constitute an activity with the potential to further degrade the groundwater quality.

The acceptance of this proposal would result in the construction and operation of the only sewage pump station and pressure main within a Priority 1 or 2 UWPCA. In making this judgement the EPA has considered the sophisticated design, construction and monitoring commitments given by the Water Corporation to avoid risk to the groundwater, and also the lack of available options in terms of the location of the pump station. To this extent this proposal sets a precedent that the EPA is prepared to accept, but it is clearly based on the demonstrated ability to protect the groundwater quality in the area.

Commitments

The Water Corporation has made the following commitments to ensure the EPA objective for groundwater quality is met both during construction of the proposal and during operation.

General

- The Water and Rivers Commission will be the primary contact for leaks within the UWPCA as this is a legal requirement under the by-laws of the Metropolitan Water Supply, Sewerage and Drainage Act 1909.

- Prior to operation of the pressure main or pump station an Emergency Response Plan will be prepared and implemented to minimise the extent and impact of any leak from the pressure main or pump station to the requirements DEP and WRC.

- Prior to construction a Hazardous Materials Storage Plan (Construction) will be prepared, to the requirements of the Department of Minerals and Energy (DME) and WRC, to ensure hazardous materials are appropriately managed to prevent spills or leaks entering sensitive receiving environments during construction of the pressure main and pump station.

- The approved Hazardous Materials Storage Plan (Construction) will be implemented during construction to the requirements of DME and WRC.

- Commence repairs of known leaks within 24 hours to minimise the effect of leaks on the environment through coordinated procedures as part of Emergency Response Plan to the requirements of DEP and WRC.

- Where a spillage or leak pollutes groundwater in a Priority area:
  - pumping will be undertaken to remediate the groundwater quality until pre-spill levels are achieved;
  - groundwater will be monitored for at least 30 days after spill; and
  - if soil is contaminated it will be remediated to pre-spill conditions;

  to the requirements of the DEP and WRC.

Pump Station

- The complete pump station site will not be located within any existing or proposed well head protection zones;

- The use of tankers as backup to minimise the risk of discharging sewage into the groundwater and the local river system from the pump station in the event of a break down will be included in the Emergency Response Plan.

- Prior to operation of the pump station a Hazardous Materials Storage Plan (pump station) will be prepared and implemented to ensure fuels and oils associated with the emergency power supply are appropriately managed to prevent spills or leaks entering sensitive receiving environments, to the requirements of DME and WRC.

- To minimise the risk of sewage overflow the pump station will be equipped with a dedicated diesel generator to guarantee continued operation during grid power failures, to the requirements of WRC.

- To minimise the risk of sewage overflow pumps in the pump station will be set up as 'duty/standby' to ensure continued operation where the duty pump fails, to the requirements of WRC.

- For the life of the pressure main there will be no less than eight hours of storage time (under worst case conditions) at the Lord Street pump station.

Pressure Main

- Where the pressure main passes within a well head protection zone a shallow monitoring bore will be installed adjacent to the production bore. The monitoring program for this bore will be to the requirements of WRC.

- Acoustic and pressure testing of the pressure main will be offset by three months and conducted on a 6 month cycle, such that the maximum time between either form of test for any section of the pressure main within Priority 2 or 3 UWPCA is three months.

- Annual reports will be provided to the requirements of WRC and DEP on the operation of five Leak Detection Systems which consist of:
  - pressure sensors on pumps for shut down on pressure loss;
  - differential flow metering;

- periodic pressure testing on sections of the pipe;
- periodic acoustic leak surveys, and
- periodic visual inspections;

to maximise the possibility of detecting any leak from the pressure main.

Having particular regard to the:

a) special design features of the pressure main and pump station to minimise the potential for groundwater pollution in the Priority 2 & 3 UWPCA, well head protection zones, and adjacent wetlands;

b) sophisticated monitoring program to detect leaks and the preparation of an Emergency Response Plan to be implemented in the event that a leak is detected;

c) location of the pump station outside of the well head protection zone;

d) agreed special management considerations within well head protection zones; and

e) commitments made by the proponent to incorporate special design and operational features in the proposal to minimise the risk of groundwater pollution;

it is the EPA's opinion that the proposal can meet the EPA's objective.

3.6 Dieback - introduction into uninfected areas

Description

Vegetation survey work conducted as part of the assessment process noted that a number of dieback susceptible vegetation species are present along the proposed alignment. This suggests that there are some dieback-free areas. The vegetation of most concern is that which has been recognised as regionally significant. There is a need for activities in these areas to be managed to avoid the spread of dieback into dieback-free areas.

Assessment

The area considered for assessment of this factor is the land and vegetation adjacent to the proposed route of the pressure main.

The EPA's objective in regard to this environmental factor is to protect areas free of vegetation diseases and to minimise the spread of diseases where they are identified.

Much of the route traversed by the proposed pressure main and pump station is poorly vegetated. The proposal does, however, pass within close proximity to areas of regionally significant vegetation. The spread of dieback into these areas is of primary concern to the EPA.

To ensure the EPA's objective for Dieback is met during the construction of the proposal the proponent has made the following commitments:

- Prior to construction, all dieback-free areas within System 6 or draft Perth's Bushplan areas that may be influenced by the pressure main and pump station will be clearly identified by a dieback survey, to the requirements of CALM.
- Prior to construction, a Dieback Management Plan will be prepared to minimise the spread of Dieback in dieback-free areas of regionally significant vegetation to the requirements of CALM.
- The approved Dieback Management Plan will be implemented during construction, to the requirements of CALM.

Having particular regard to the:

a) proposed preparation of a Dieback Management Plan to minimise the potential for the spread of dieback into dieback-free areas of significant vegetation; and

b) the commitments made by the proponent to minimise the spread of dieback;

it is the EPA's opinion that the proposal can meet the EPA's objective.

3.7 Aboriginal Culture and Heritage - impact on areas of cultural significance

Description

The pressure main route is primarily located adjacent to existing roads within road reserves but does cross Bennett Brook, which is a significant Aboriginal site. Although no formal survey has yet been undertaken for this proposal it is not expected that additional sites will be located.

Assessment

The area considered for assessment of this factor is Bennett Brook and other land in the vicinity of the proposed pressure main.

The EPA's objective in regard to this environmental factor is to ensure that the proposal complies with the requirements of the Aboriginal Heritage Act 1972 and to ensure that changes to the biological and physical environment resulting from the project do not adversely affect cultural associations with the area.

The proponent has made the following commitments to ensure the EPA's objective is met:

- Prior to construction of the pump station and pressure main an archaeological survey will be carried out along the route to ensure construction does not damage or destroy important archaeological sites to the requirements of Aboriginal Affairs Department (AAD).

- Where the pressure main is proposed to cross Bennett Brook the Water Corporation will consult with indigenous stakeholders and AAD to address the cultural significance of Bennett Brook. This will be to the satisfaction of AAD.

Having particular regard to the:

a) significance of Bennet Brook to the Aboriginal Community; and

b) commitments made by the proponent to identify any other sites and to take into account Aboriginal cultural and heritage issues;

it is the EPA's opinion that the proposal can meet the EPA's objective.

3.8 Noise - impact on adjacent residents

Description

There are a number of residences adjacent to the proposed pressure main and pump station that may be affected due to noise generated during construction activities. The proponent has made a commitment to manage noise during the construction phase of the proposal to the satisfaction of the Shire of Swan. This will also need to comply with the Environmental Protection (Noise) Regulations 1997.

The ongoing operation of the pump station also has the potential to impact on within the Ellenbrook development north of Gnangara Road adjacent to the pump station. The proponent has made a commitment to comply with the Environmental Protection (Noise) Regulations 1997 as a means of managing this issue.

Assessment

The area considered for assessment of this factor is the residences in the vicinity of the proposed pump station and route of the pipeline.

The EPA's objective in regard to this environmental factor is to protect the amenity of nearby residents from noise impacts resulting from activities associated with the proposal by ensuring that noise levels meet statutory requirements and acceptable standards.

The proponent has made the following commitments to ensure the EPA's objective is met:

- All construction work will occur between the hours of 6:00am and 6:00pm, Monday to Sunday, and plant and machinery will be fitted with appropriate noise control equipment, to the requirements of the Shire of Swan; and
- operations will comply with the Environmental Protection (Noise) Regulations 1997.

Having particular regard to the:

a) limitations on work hours to minimise noise impacts on adjacent residents; and

b) the commitments made by the proponent to minimise noise impacts;

it is the EPA's opinion that the proposal can meet the EPA's objective.

3.9 Odour - impact on adjacent residents

Description

The venting of gas from the pressure main and odours associated with the operation of the pump station have the potential to adversely impact on residents adjacent to the pump station and pressure main.

Assessment

The area considered for assessment of this factor is the residences in the vicinity of the proposed pump station and route of the pipeline.

The EPA's objective in regard to this environmental factor is to ensure odours emanating from the proposed development should not adversely affect the welfare and amenity of other land users.

The proponent has made the following commitments related to odour:

- Prior to construction of the pump station and pressure main the location and design of air vents will be determined to minimise odour impacts on adjacent residents to the requirements of DEP.
- Prior to operation of the pump station and pressure main Operational Procedures will be developed to minimise the risk of offensive odours impacting on adjacent residents to the requirements of the Shire of Swan.
- The Operational Procedures will be implemented to the requirements of the Shire of Swan.

Having particular regard to the:

a) proposed Operational Procedures to minimise the potential for odours to impact on adjacent residents; and

b) the commitments made by the proponent to minimise odour impacts;

it is the EPA's opinion that the proposal can meet the EPA's objective.

4. Conditions

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

In developing recommended conditions for each project, the EPA's preferred course of action is to have the proponent provide an array of commitments to ameliorate the impacts of the proposal on the environment. The commitments are considered by the EPA as part of its assessment of the proposal, and following discussion with the proponent the EPA may seek additional commitments.

The EPA recognises that not all of the commitments are written in a form which makes them readily enforceable, but they do provide a clear statement of the action to be taken as part of the proponent's responsibility for and commitment to continuous improvement in environmental performance. The commitments, modified if necessary to ensure enforcability, then form part of the conditions to which the proposal should be subject if it is to be implemented.

The EPA may, of course, also recommend conditions additional to that relating to the proponent's commitments.

Having considered the proponent's commitments and the information provided in this report, the EPA has developed a set of conditions which the EPA recommends be imposed if the proposal by the Water Corporation to construct a 500mm to 600mm diameter pressure sewer main and associated pump station to service the requirements of the Ellenbrook development, is approved for implementation. These conditions are presented in Appendix 3.

Matters addressed in the conditions include a requirement that the proponent fulfil the commitments in the Consolidated Commitments statement set out as an attachment to the recommended conditions in Appendix 3.

The key factor in this assessment is Groundwater Quality. The primary commitments made by the Water Corporation to ensure the EPA's objective for this factor can be achieved are:

- Prior to operation of the pressure main or pump station an Emergency Response Plan will be prepared and implemented to minimise the extent and impact of any leak from the pressure main or pump station to the requirements DEP and WRC.
- Commence repairs of known leaks within 24 hours to minimise the effect of leaks on the environment through coordinated procedures as part of Emergency Response Plan to the requirements of DEP and WRC.
- Where a spillage or leak pollutes groundwater in a Priority area:
  - pumping will be undertaken to remediate the groundwater quality until pre-spill levels are achieved;
  - groundwater will be monitored for at least 30 days after spill; and
  - if soil is contaminated it will be remediated to pre-spill conditions;

  to the requirements of the DEP and WRC.
- The overflow and storage associated with the pump station site will not be located within any existing or proposed well head protection zones;
- Where the pressure main passes within a well head protection zone a shallow monitoring bore will be installed adjacent to the production bore. The monitoring program for this bore will be to the requirements of WRC.
- Acoustic and pressure testing of the pressure main will be offset by three months and conducted on a 6 month cycle, such that the maximum time between either form of test for any section of the pressure main within Priority 2 or 3 UWPCA is three months.

- Annual reports will be provided to the requirements of WRC and DEP on the operation of five Leak Detection Systems which consist of:
  - pressure sensors on pumps for shut down on pressure loss;
  - differential flow metering;
  - periodic pressure testing on sections of the pipe;
  - periodic acoustic leak surveys, and
  - periodic visual inspections;

  to maximise the possibility of detecting any leak from the pressure main.

5. Conclusions

The EPA has considered the original and revised proposal by the Water Corporation to construct a 500mm to 600mm diameter pressure sewer main and associated pump station to service the sewage requirements of residential development within the vicinity of the Ellenbrook development. The decision by the Water Corporation to adopt the alternative route to avoid impacts on the Priority 1 Underground Water Pollution Control Area has fewer impacts than the original proposal. The EPA has concluded that it can be constructed and operated to meet the EPA's objectives provided the conditions recommended in Section 4, and set out in Appendix 3, are imposed.

6. Recommendations

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

The EPA submits the following recommendations to the Minister for the Environment:

1. That the Minister considers the report on the relevant environmental factors of Vegetation Communities, Declared Rare and Priority Flora, Wetlands, Groundwater Quality, Dieback, Aboriginal Culture and Heritage, Noise, and Odour;
2. That the Minister notes that the EPA has concluded that the proposal can be managed to meet the EPA's objectives, and thus not impose an unacceptable impact on the environment, provided there is satisfactory implementation by the proponent of the commitments set out in Section 4;
3. That the Minister imposes the conditions and procedures consistent with Section 4 and set out in formal detail in Appendix 3 of this report.

Appendix 1

List of submitters

Organisations:

- Bennett Brook Catchment Group
- Conservation Council of WA;
- Department of Conservation and Land Management;
- Department of Environmental Protection;
- Ellenbrook Conservation Group;
- Main Roads Western Australia;
- Swan Valley Nyungah Community;
- Water and Rivers Commission; and
- Whiteman Park.

Individual:

- Shire of Swan Councillor;

Appendix 2

References

DEP (1997), Environmental Protection (Noise) Regulations 1997.

EPA (1993), Western Australian Guidelines for Fresh and Marine Waters

GHD (1997) *Sewer Pressure Main Along Gnangara Road between Ellenbrook and Wangara.* Water Corporation, Perth, November 1997.

Hill, A.L., Semeniuk, C.A., Semeniuk, V. and Del Marco, A. (1996) *Wetlands of the Swan Coastal Plain - Wetland mapping, classification and evaluation;* Water and Rivers Commission, Perth.

Legislative Assembly (1994) *The Select Committee on Metropolitan Development and Groundwater Supplies Report*, Western Australian Legislative Assembly, State Law Publisher, Perth, December 1994.

NHMRC/ARMCANZ *Australian Drinking Water Guidelines 1996*

Appendix 3

List of recommended Ministerial Conditions and proponent's consolidated commitments

Statement No.

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED (PURSUANT TO THE PROVISIONS OF THE ENVIRONMENTAL PROTECTION ACT 1986)

ELLENBROOK PRESSURE MAIN (WASTEWATER), SHIRE OF SWAN

Proposal: This proposal consists of the construction and operation of two major components:

1. a sewage pump station on land at the south-western corner of the intersection of Lord Street and Gnangara Road to convey domestic sewage from the Ellenbrook development to the sewage management system for Perth, and
2. a 500mm to 600mm diameter pressure sewer main contained within the road reserve extending south from the pump station on the east side of Lord Street for about 7km, west along Marshall Road for about 9km, and south along Alexander Drive for about 1km to an existing pressure main in Australis Way,

as documented in Schedule 1 of this statement.

Proponent: Water Corporation

Proponent Address: 629 Newcastle Street, Leederville WA 6007

Assessment Number: 1115

Report of the Environmental Protection Authority: Bulletin 897

The proposal to which the above report of the Environmental Protection Authority relates may be implemented subject to the following conditions and procedures:

1. Implementation

1-1 Subject to these conditions and procedures, the proponent shall implement the proposal as documented in schedule 1 of this statement.

1-2 Where, in the course of implementing the proposal, the proponent seeks to change any aspect of the proposal as documented in schedule 1 of this statement in any way that the Minister for the Environment determines, on advice of the Environmental Protection Authority, is not substantial, those changes may be effected.

2. Proponent Commitments

2-1 The proponent shall implement the consolidated environmental management commitments documented in schedule 2 of this statement.

2-2 The proponent shall implement subsequent environmental management commitments which the proponent makes as part of the fulfilment of conditions and procedures in this statement.

Published on

3. Environmental Management System

3-1 In order to manage the environmental impacts of the project, and to fulfil the requirements of the conditions and procedures in this statement, prior to construction, the proponent shall demonstrate to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection that there is in place an environmental management system which includes the following elements:

1. environmental policy and commitment;
2. planning of environmental requirements;
3. implementation and operation of environmental requirements;
4. measurement and evaluation of environmental performance; and
5. review and improvement of environmental outcomes.

3-2 The proponent shall implement the environmental management system referred to in condition 3-1.

4. Decommissioning Management Plan

4-1 At least six months prior to decommissioning, the proponent shall prepare a Decommissioning Management Plan to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection.

This Plan shall address:

1 removal or, if appropriate, disposal on-site of plant and infrastructure;

2 rehabilitation of all disturbed areas to agreed final land use(s); and

3 identification of contaminated areas, including provision of evidence of notification to relevant statutory authorities.

4-2 The proponent shall implement the Decommissioning Management Plan required by condition 4-1.

4-3 The proponent shall make the Decommissioning Management Plan required by condition 4-1 publicly available, to the requirements of the Environmental Protection Authority.

5. Performance Review

5-1 Each six years following the commencement of construction, the proponent shall submit a Performance Review to evaluate the environmental performance relevant to:

1. environmental objectives reported on in Environmental Protection Authority Bulletin 897;

2. proponent's consolidated environmental management commitments documented in schedule 2 of this statement and those arising from the fulfilment of conditions and procedures in this statement;

3. Environmental Management System environmental management targets;

4. Environmental Management Programs and Plans; and

5. environmental performance indicators;

to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection.

Note: The Environmental Protection Authority may recommend changes and actions to the Minister for the Environment following consideration of the Performance Review.

6. Proponent

6-1 The proponent for the time being nominated by the Minister for the Environment under section 38(6) or (7) of the Environmental Protection Act is responsible for the implementation of the proposal until such time as the Minister for the Environment has exercised the Minister's power under section 38(7) of the Act to revoke the nomination of that proponent and nominate another person in respect of the proposal.

6-2 Any request for the exercise of that power of the Minister referred to in condition 6-1 shall be accompanied by a copy of this statement endorsed with an undertaking by the proposed replacement proponent to carry out the proposal in accordance with the conditions and procedures set out in the statement.

6-3 The proponent shall notify the Minister for the Environment of any change of proponent contact name and address within 30 days of such change.

7. Commencement

7-1 The proponent shall provide evidence to the Minister for the Environment within five years of the date of this statement that the proposal has been substantially commenced.

7-2 Where the proposal has not been substantially commenced within five years of the date of this statement, the approval to implement the proposal as granted in this statement shall lapse and be void. The Minister for the Environment will determine any question as to whether the proposal has been substantially commenced.

7-3 The proponent shall make application to the Minister for the Environment for any extension of approval for the substantial commencement of the proposal beyond five years from the date of this statement.

7-4 Where the proponent demonstrates to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority that the environmental parameters of the proposal have not changed significantly, then the Minister may grant an extension not exceeding five years for the substantial commencement of the proposal.

8. Compliance Auditing

8-1 The proponent shall submit periodic Performance and Compliance Reports, in accordance with an audit program prepared in consultation between the proponent and the Department of Environmental Protection.

8-2 Unless otherwise specified, the Department of Environmental Protection is responsible for assessing compliance with the conditions contained in this statement and for issuing formal clearance of conditions.

8-3 Where compliance with any condition is in dispute, the matter will be determined by the Minister for the Environment.

Note

1 The proponent is required to apply for a Works Approval and Licence for this project under the provisions of Part V of the Environmental Protection Act.

Schedule 1

The Proposal

This proposal consists of the construction and operation of two major components:

1. a sewage pump station on land at the south-western corner of the intersection of Lord Street and Gnangara Road to convey domestic sewage from the Ellenbrook development to the sewage management system for Perth, and
2. a 500mm diameter pressure sewer main contained within the road reserve extending south from the pump station on the east side of Lord Street for about 7km, west along Marshall Road for about 9km, and south along Alexander Drive for about 1km to an existing pressure main in Australis Way, as shown in Figures 1 and 2.

Key Proposal Characteristics

Feature	Location	Description
Pump Station	south west corner of Lord Street and Gnangara Road intersection within Priority 2 Underground Water Pollution Control Area (UWPCA) external to well head protection zones	• below ground 'wet well' construction 8m deep • two pumps (one as backup) operated according to the sewage level in the wet well • initial delivery rate of 40L/s • ultimate delivery rate of 200L/s • 8 hours of below ground storage at maximum delivery rate • alternate on-site power supply
Pressure Sewer Main	within the road reserve south from the pump station site on the east side of Lord Street for about 7km (1.9km in Priority 2 UWPCA, 1.8km in Priority 3 UWPCA, and a section within the well head protection zone of proposed bore M380), west along Marshall Road for about 9km (2km in Priority 3 UWPCA), and south in Alexander Drive for about 1km (mostly within Priority 3, and passing within the well head protection zone of one bore M34) to an existing pressure main in Australis Way	• approx. 17km of pipeline consisting of 12m sections of 500mm to 600mm internal diameter mild steel internal cement lined sewer pipe • rubber ring joined • buried to a depth of between 1m and 3m • 50m to each side of air valves to have polythene internal lining • approx 1 air value and 1 scour valve within P2, and 3 air values, 3 scour valves, and 1 scour/section valve within P3
Wastewater Characteristics		• domestic sewage only, however with an industrial area mooted for south of Bullsbrook there is a possibility that industrial waste will also be carried at some time in the future

Note: Priority 2 and Priority 3 refer to the level of protection afforded areas within the Gnangara Underground Water Pollution Control Area (UWPCA).

Figure 1 - Location Map

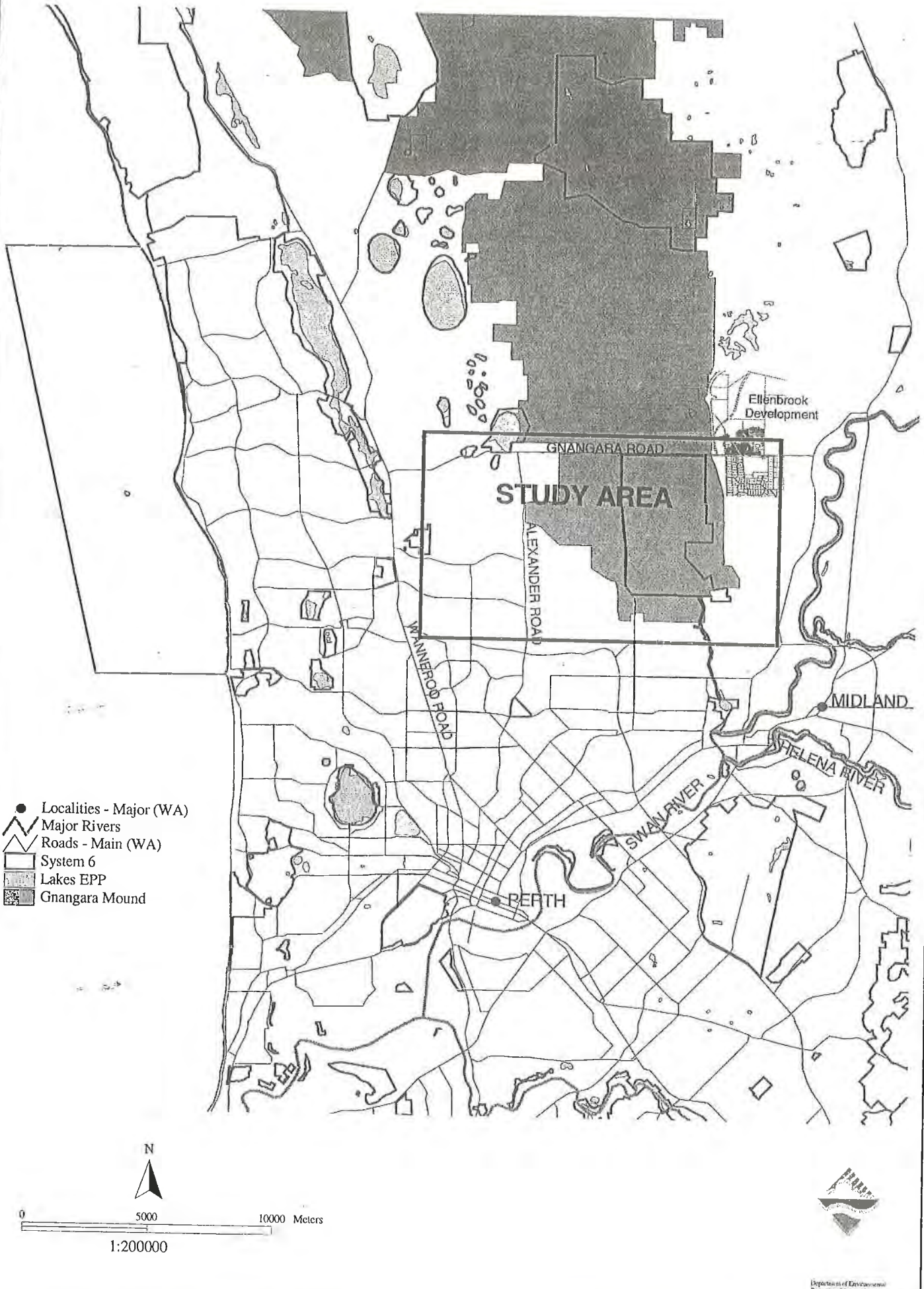

Figure 2 - Water Corporation proposed sewer main and pump station

Schedule 2

Proponent's Consolidated Environmental Management Commitments

19 March 1998

ELLENBROOK PRESSURE MAIN (WASTEWATER), SHIRE OF SWAN

Water Corporation

1. Vegetation Communities - impacts during construction

1.1. Where there are likely to be impacts on vegetation listed under System 6, or draft Perth's Bushplan, further assessment of vegetation likely to be impacted during construction will be undertaken prior to the finalisation of a detailed route for the pressure main. These studies will identify direct and indirect impacts in terms of construction impacts, and seek to minimise the loss of vegetation to the requirements of Department of Environmental Protection (DEP), Water and Rivers Commission (WRC), and Conservation and Land Management (CALM).

1.2. The detailed route of the pressure main will be to the requirements of the DEP on the advice of WRC and CALM.

1.3. Prior to construction a Rehabilitation Plan will be prepared which includes both dry and wet land environments encountered by the pressure main and pump station, to the requirements of DEP on the advice of the Shire of Swan, WRC, and CALM.

1.4. The approved Rehabilitation Plan will be implemented following construction.

2. Declared Rare and Priority Flora - impacts during construction

2.1. Prior to finalisation of the route for the pressure main a comprehensive Declared Rare and Priority flora survey will be conducted and clearances obtained and/or modifications to the route made, to the requirements of the DEP on the advice of CALM.

3. Wetlands - impacts due to dewatering

3.1. Prior to construction, a Dewatering Management Plan will be prepared the requirements of DEP on the advice of WRC, to ensure receiving wetlands, groundwater dependant vegetation, and streams are not degraded.

3.2. The approved Dewatering Management Plan will be implemented during construction, to the requirements of DEP on the advice of WRC.

4. Groundwater Quality - contamination due to leakage of sewage

4.1. The complete pump station site will not be located within any existing or proposed well head protection zones;

4.2. The use of tankers as backup to minimise the risk of discharging sewage into the groundwater and the local river system from the pump station in the event of a break down will be included in the Emergency Response plan.

4.3. Prior to operation of the pump station a Hazardous Materials Storage Plan (pump station) will be prepared and implemented to ensure fuels and oils associated with the emergency power supply are appropriately managed to prevent spills or leaks entering sensitive receiving environments, to the requirements of the Department of Minerals and Energy (DME) and WRC.

4.4. Where the pressure main passes within a well head protection zone a shallow monitoring bore will be installed adjacent to the production bore. The monitoring program for this bore will be to the requirements of WRC.

4.5. Acoustic and pressure testing of the pressure main will be offset by three months and conducted on a 6 month cycle where the maximum time between either of the form of test for any section of the pressure main within Priority 2 or 3 Underground Water Pollution Control Areas (UWPCA) is three months

4.6. The Water and Rivers Commission will be the primary contact for leaks within the UWPCA as this is a legal requirement under the by-laws of the Metropolitan Water Supply, Sewerage and Drainage Act 1909.

4.7. To minimise the risk of sewage overflow the pump station will be equipped with dedicated diesel generator to guarantee continued operation during grid power failures to the requirements of WRC.

4.8. To minimise the risk of sewage overflow the pumps in the pump station will be set up as 'duty/standby' to ensure continued operation where duty pump fails to the requirements of WRC.

4.9. For the life of the pressure main there will be no less than eight hours of storage time (under worst case conditions) at the Lord Street pump station.

4.10. Prior to operation of the pressure main or pump station an Emergency Response Plan will be prepared and implemented to minimise the extent and impact of any leak from the pressure main or pump station to the requirements DEP and WRC.

4.11. Annual reports will be provided to the requirements of WRC and DEP on the operation of five Leak Detection Systems which consist of:

- pressure sensors on pumps for shut down on pressure loss,
- differential flow metering,
- periodic pressure testing on sections of the pipe,
- periodic acoustic leak surveys, and
- periodic visual inspections

to maximise the possibility of detecting any leak from the pressure main.

4.12. Commence repairs of known leaks within 24 hours to minimise the effect of leaks on the environment through coordinated procedures as part of Emergency Response Plan to the requirements of DEP and WRC.

4.13. Where a spillage or leak pollutes groundwater in a Priority area:

- pumping will be undertaken to remediate the groundwater quality until pre-spill levels are achieved;
- groundwater will be monitored for at least 30 days after spill; and
- if soil is contaminated it will be remediated to pre-spill conditions;

to the requirements of the DEP and WRC.

4.14. Prior to construction a Hazardous Materials Storage Plan (Construction) will be prepared, to the requirements of DME and WRC, to ensure hazardous materials are appropriately managed to prevent spills or leaks entering sensitive receiving environments during construction of the pressure main and pump station.

4.15. The approved Hazardous Materials Storage Plan (Construction) will be implemented during construction to the requirements of DME and WRC.

5. Dust - impacts on adjacent residents

5.1. Prior to construction a Dust Management Plan will be prepared to retain visual amenity and prevent dust pollution during construction to the requirements of the Shire of Swan.

5.2. The approved Dust Management Plan will be implemented during construction to the requirements of the Shire of Swan.

6. Dieback - introduction into uninfected areas

6.1. Prior to construction, all dieback-free areas within System 6 or draft Perth's Bushplan areas that may be influenced by the pressure main and pump station will be clearly identified by a dieback survey, to the requirements of CALM.

6.2. Prior to construction, a Dieback Management Plan will be prepared to minimise the spread of Dieback in dieback free areas of regionally significant vegetation to the requirements of CALM.

6.3. The approved Dieback Management Plan will be implemented during construction, to the requirements of CALM.

7. Aboriginal Culture and Heritage - impact on areas of cultural significance

7.1. Prior to construction of the pump station and pressure main an archaeological survey will be carried out along the route to ensure construction does not damage or destroy important archaeological sites to the requirements of Aboriginal Affairs Department (AAD).

7.2. Where the pressure main is proposed to cross Bennett Brook the Water Corporation will consult with indigenous stakeholders and AAD to address the cultural significance of Bennett Brook. This will be to the requirements of AAD.

8. Noise - impact on adjacent residents

8.1. All construction work will occur between the hours of 6:00am and 6:00pm, Monday to Sunday, and plant and machinery will be fitted with appropriate noise control equipment to the requirements of the Shire of Swan.

9. Odour - impact on adjacent residents

9.1. Vents will be located as far as practical from residential areas.

9.2. Prior to operation of the pump station and pressure main Operational Procedures will be developed to minimise the risk of offensive odours impacting on adjacent residents to the requirements of the Shire of Swan.

9.3. The Operational Procedures will be implemented to the requirements of the Shire of Swan.

Appendix 4

Summary of Relevant Factors

Table 3. Identification of Relevant Environmental Factors

PRELIMINARY ENVIRONMENTAL FACTOR	SITE SPECIFIC FACTOR	PROPOSAL CHARACTERISTIC	GOVERNMENT AGENCY AND PUBLIC COMMENTS	IDENTIFICATION OF RELEVANT FACTORS
BIOPHYSICAL				
Vegetation communities	System 6 Areas (M13 & M41), and proposed Perth's Bushplan sites are adjacent to the proposed location of the pump station and pressure main.	Clearing of potentially regionally significant vegetation along the proposed route of the pressure main. The pressure main will be located within the road reserve and any clearing requirements are likely to be in the order of 10m wide.	**(DEP Comments)** The pressure main will go through remnant vegetation however there is no information on what the impacts may be. The clearing of any native vegetation should be clearly indicated together with the size of areas to be cleared so the loss of vegetation due to the proposal as a whole is known. There should be more detail about the wetlands and vegetation types that will be impacted during the construction phase of the pressure main. Where revegetation work is proposed this should be with species local to the area.	**Considered to be a Relevant Factor.**
Declared Rare and Priority Flora	Possible Declared Rare and Priority Flora species present on the proposed location of the pump station and pressure main.	Potential clearing of Rare and Priority Flora along the proposed pressure main route and at the pump station location.	**(DEP Comments)** No DRF were located by the preliminary Water Corporation survey however the consultant who conducted the survey recommends a full DRF survey be undertaken if the alternative route is chosen.	**Considered to be a Relevant Factor.**
Wetlands	Conservation, Resource Enhancement and Management Category wetlands in the vicinity if the proposed pressure main and pump station.	Potential impacts on wetlands in the Conservation, Resource Enhancement and Management Categories at various locations along the proposed pressure main route during construction or as a result of leaks during operation.	Comments were received on the Preferred Route. However most are not applicable to the alternative route which has been adopted by the Water Corporation. **(WRC Comments)** If not properly managed, activities such as dewatering and excavation could impact on wetlands and groundwater-dependent vegetation. Dewatering can be managed by WRC through the use of abstraction licences. The WRC will work with the Water Corporation to ensure that appropriate measures are taken to	**Considered to be a Relevant Factor.**

PRELIMINARY ENVIRONMENTAL FACTOR	SITE SPECIFIC FACTOR	PROPOSAL CHARACTERISTIC	GOVERNMENT AGENCY AND PUBLIC COMMENTS	IDENTIFICATION OF RELEVANT FACTORS
			minimise impact on the wetlands. To protect wetlands, the Water Corporation should provide a commitment to manage the pipeline construction to the satisfaction of the WRC ensuring impacts on wetlands and the surrounding flora and fauna are minimised.	
POLLUTION				
Groundwater Quality	Well head protection zones, Priority 2, and Priority 3 Underground Water Pollution Control Areas traversed by the proposed route of the pressure main and pump station location.	Potential contamination of groundwater within well head protection zones, Priority 2, and Priority 3 Underground Water Pollution Control Areas in the event of leakage from the pressure main.	**(WRC Comments)** <u>Pipeline Construction</u> During the construction phase, activities that may require Permitting under the by-laws of Metropolitan Water Supply, Sewerage And Drainage Act, 1909 are, refuelling and the temporary storage of fuel and other hazardous materials. WRC has written guidelines on the temporary storage of fuels within UWPCAs. There should be a commitment from the Water Corporation to manage the construction of the pipeline to the satisfaction of the WRC in order to ensure refuelling and fuel storage are to WRC standards. <u>Pump Station</u> • *Location* WRC accepts that the pump station, with eight hours storage capacity, has a reduced risk of groundwater contamination to a level acceptable for Priority 2 Protection. The proposed pump station, however, is not considered acceptable within the well head protection zone for any water supply production bore. The WRC is prepared to meet with the Water Corporation to develop a Permit for the pump station site. This should be done during the design phase of the pump station to ensure that WRC's requirements can be met. Consideration should be given to include an onsite overflow facility in the design.	**Considered to be a Relevant Factor.**

PRELIMINARY ENVIRONMENTAL FACTOR	SITE SPECIFIC FACTOR	PROPOSAL CHARACTERISTIC	GOVERNMENT AGENCY AND PUBLIC COMMENTS	IDENTIFICATION OF RELEVANT FACTORS
			• *Options During Pump Station Down-Time* WRC supports the backup use of tankers when a pipeline rupture occurs and repairs cannot be effected within the time available for the storage of sewage to minimise the risk of discharging sewage into the groundwater and the local river system. This statement should be made as a commitment. • *Storage of Fuel and Other Hazardous Materials* Fuel and other hazardous materials will be stored at the pump station for use with backup power generators, WRC guidelines on the storage of fuels and other hazardous materials in UWPCAs must be complied with, in addition to licensing by the Department of Minerals and Energy. Storage of these materials will be included in the permit approval from the Commission. <u>Leak Detection and Management</u> • *Monitoring Bores* The revised pipeline route passes through the well head protection zone of two bores (M380 [proposed] & M34). WRC recommends that two shallow monitoring bores be installed between the pipeline and each operating production bore. The location and monitoring program for these bores should be determined in consultation with the Water and Rivers Commission. • *Advice to WRC and its Involvement in the Event of a Leak* The Water and Rivers Commission and Health Department of WA have been omitted from the list of agencies involved in the event of a leak from the pressure main. The WRC should be primary contact for leaks within the UWPCA as this is a legal requirement under the by-laws of the Metropolitan Water Supply, Sewerage and Drainage Act 1909. • *Acoustic and Pressure Testing* Acoustic and pressure testing will be used in addition to other	

PRELIMINARY ENVIRONMENTAL FACTOR	SITE SPECIFIC FACTOR	PROPOSAL CHARACTERISTIC	GOVERNMENT AGENCY AND PUBLIC COMMENTS	IDENTIFICATION OF RELEVANT FACTORS
			leak detection methods for the pipeline every 6 months, not at the same time but 3 months apart. WRC compliments the Corporation on the suggested frequency and suggests that this be placed as an additional commitment.	
Dust	In the vicinity of the proposed pressure main route and pump station location.	Potential for dust generated during the construction phase of the pressure main and pump station to impact on adjacent residents.		Large scale earth moving operations likely to generate significant volumes of dust are not a feature of this proposal. Dust may be an issue for some isolated residences for a short time but this can be effectively managed by the Local Authority. **No further evaluation required by the EPA.**
Dieback	In the vicinity of the proposed pressure main route and pump station location.	Potential spread of dieback into dieback-free areas during construction and maintenance of the pressure main.	**(DEP Comments)** It is essential that strict dieback hygiene procedures are followed to ensure that no dieback will be spread between areas. CALM's dieback hygiene procedures are being used and it is important that the people working on the pressure main are aware of how these should be followed.	**Considered to be a Relevant Factor.**
SOCIAL SURROUNDINGS				
Visual Amenity	In the vicinity of the proposed pressure main route and pump station location.	Visual intrusion by the presence of a pipeline along the proposed route and pump station housing.	Comments were received on the Preferred Route. However none are applicable to the alternative route which has been adopted by the Water Corporation.	The pressure main is proposed to be underground. Some visual impacts will be evident during the construction but as the bulk of the pressure main is below ground this will only be temporary. The

PRELIMINARY ENVIRONMENTAL FACTOR	SITE SPECIFIC FACTOR	PROPOSAL CHARACTERISTIC	GOVERNMENT AGENCY AND PUBLIC COMMENTS	IDENTIFICATION OF RELEVANT FACTORS
				only section above ground is possibly at Bennett Brook. The extent and form of this section can be managed under the factor Aboriginal Culture and Heritage. **No further evaluation required by the EPA.**
Aboriginal Culture and Heritage	In the vicinity of the proposed pressure main route and pump station location.	Bennett Brook is a known site of aboriginal significance that will be affected by the construction and operation of the pressure main.	**(Swan Valley Nyungah Comments)** The Water Mound is an area of significance to the Nyungah people. There are serious cultural concerns that need to be discussed on site prior to any final decisions being made.	**Considered to be a Relevant Factor.**
Noise	In the vicinity of the proposed pressure main route and pump station location.	Potential impact of noise on adjacent residents during construction of the pressure main and pump station. Potential impact of noise on adjacent residents due to the operation of the pump station.	**(DEP Comments)** Pump station should be designed and operated to ensure it complies with the Environmental Protection (Noise) Regulations 1987.	**Considered to be a Relevant Factor.**
Odour	In the vicinity of the proposed pressure main route and pump station location.	Potential impact of odour on adjacent residents due to the operation of the pump station and pressure main.	**(DEP Comments)** Pump station operation and venting of air from the pipeline during operation could result in nuisance odours for adjacent residents.	**Considered to be a Relevant Factor.**

ATTACHMENT 2

Table 4. Summary of Assessment of Relevant Environmental Factors

RELEVANT ENVIRONMENTAL FACTOR	RELEVANT AREA	EPA OBJECTIVE	EPA ASSESSMENT	EPA ADVICE
BIOPHYSICAL				
Vegetation Communities - impacts during construction.	Swan Coastal Plain	Maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities.	Although some areas require more investigation the overall impact on significant vegetation as a result of this proposal is expected to be minimal. **Proponent's Commitments** • Where there are likely to be impacts on vegetation listed under System 6, or draft Perth's Bushplan, further assessment of vegetation likely to be impacted during construction will be undertaken prior to the finalisation of a detailed route for the pressure main. These studies will identify direct and indirect impacts in terms of construction impacts, and seek to minimise the loss of vegetation to the requirements of Department of Environmental Protection (DEP), Water and Rivers Commission (WRC), and Conservation and Land Management (CALM). • The detailed route of the pressure main will be to the requirements of the DEP on the advice of WRC and CALM. • Prior to construction a Rehabilitation Plan will be prepared which includes both dry and wet land environments encountered by the pressure main and pump station, to the requirements of DEP on the advice of the Shire of Swan, WRC, and CALM. • The approved Rehabilitation Plan will be implemented following construction.	Having regard to : • proposed further detailed studies to minimise impacts on significant vegetation, • the ability to implement minor variations in the pressure main route to avoid significant vegetation, and • commitments made by the proponent it is the EPA's opinion that the proposal can be managed to meet the EPA's objective.
Declared Rare and Priority Flora - impacts during construction.	Swan Coastal Plain	Protect Declared Rare and Priority Flora, consistent with the provisions of the Wildlife Conservation Act 1950.	**Proponent's Commitments** • Prior to finalisation of the route for the pressure main a comprehensive Declared Rare and Priority flora survey will be conducted and clearances obtained and/or modifications to the route made, to the requirements of the DEP on the advice of CALM.	Having regard to : • the commitment made by the proponent to complete vegetation surveys along the alignment

RELEVANT ENVIRONMENTAL FACTOR	RELEVANT AREA	EPA OBJECTIVE	EPA ASSESSMENT	EPA ADVICE
				it is the EPA's opinion that the proposal can be managed to meet the EPA's objective.
Wetlands - impacts due to dewatering	Swan Coastal Plain	Maintain the integrity, functions and environmental values of wetlands.	A number of wetlands classified as Conservation, Resource Enhancement, or Multiple Use by the Water and Rivers Commission will be crossed by the pressure main. **Proponent's commitments** • Prior to construction, a Dewatering Management Plan will be prepared the requirements of DEP on the advice of WRC, to ensure receiving wetlands, groundwater-dependant vegetation, and streams are not degraded. • The approved Dewatering Management Plan will be implemented during construction, to the requirements of DEP on the advice of WRC.	Having regard to : • the proposed management of dewatering activities during construction to prevent impacts on the adjacent environment; • the intention to include consideration of wetland vegetation in the Rehabilitation Management Plan; and • the commitments made by the proponent; it is the EPA's opinion that the proposal can be managed to meet the EPA's objective.
POLLUTION MANAGEMENT				
Groundwater Quality - contamination due to leakage of sewage	Gnangara Water Mound	Maintain or improve the quality of groundwater to ensure that existing and potential uses, including ecosystem maintenance are protected, consistent with the draft WA Guidelines for Fresh and Marine Waters (EPA, 1993) [and	Although special consideration and management of structures within well head protection zones is required the proposed design and operation of the pressure main and pump station is not likely to pose an unacceptable risk to the groundwater within the Priority 2 and Priority 3 UWPCA areas providing the following proponent's commitments are satisfactorily implemented. **Proponent Commitments** There are a number of detailed commitments made by the proponent to	Having regard to : • the measures to prevent groundwater pollution in the Priority 2 & 3 UWPCA; • the measures to prevent sewage

RELEVANT ENVIRONMENTAL FACTOR	RELEVANT AREA	EPA OBJECTIVE	EPA ASSESSMENT	EPA ADVICE
		the NHMRC / ARMCANZ Australian Drinking Water Guidelines - National Water Quality Management Strategy].	manage this factor. In summary the main commitments are: • Five Leak Detection Systems, • Repairs to leaks commence within 24 hours of detection, • Any spill or leak in a Priority area remediated to pre-spill conditions, and • 8 hours on-site storage and on-site emergency generator at the pump station	overflow into sensitive wetlands and vegetation; • the incorporation of special management considerations within well head protection zones; and • the commitments made by the proponent; it is the EPA's opinion that the proposal can be managed to meet the EPA's objective.
Dieback - introduction into uninfected areas.	Land and vegetation adjacent to the proposed route of the pressure main.	To protect areas free of vegetation diseases and to minimise the spread of diseases where they are identified.	Work in the PER suggests at least some areas on the proposed pressure main route are free of dieback. **Proponent's Commitments** • Prior to construction, all dieback-free areas within System 6 or draft Perth's Bushplan areas that may be influenced by the pressure main and pump station will be clearly identified by a dieback survey, to the requirements of CALM. • Prior to construction, a Dieback Management Plan will be prepared to minimise the spread of Dieback in dieback-free areas of regionally significant vegetation to the requirements of CALM. • The approved Dieback Management Plan will be implemented during construction, to the requirements of CALM.	Having regard to : • the commitments made by the proponent; it is the EPA's opinion that the proposal can be managed to meet the EPA's objective.
SOCIAL SURROUNDINGS				
Aboriginal Culture and Heritage - impact on areas of cultural significance.	Bennett Brook and in the vicinity of the proposed pressure main.	Ensure that the proposal complies with the requirements of the	**Proponent's Commitments** • Prior to construction of the pump station and pressure main an archaeological survey will be carried out along the route to ensure	Having regard to : • the significance of Bennet Brook to the

RELEVANT ENVIRONMENTAL FACTOR	RELEVANT AREA	EPA OBJECTIVE	EPA ASSESSMENT	EPA ADVICE
		Aboriginal Heritage Act 1972; and Ensure that changes to the biological and physical environment resulting from the project do not adversely affect cultural associations with the area.	construction does not damage or destroy important archaeological sites to the requirements of Aboriginal Affairs Department (AAD). • The pressure main will cross Bennett Brook in a manner that is satisfactory to indigenous stakeholders, ensuring the cultural significance of this site is not adversely affected. This will be to the requirements of AAD.	Aboriginal Community; and • the commitments made by the proponent; it is the EPA's opinion that the proposal can be managed to meet the EPA's objective.
Noise - impact on adjacent residents.	Residences in the vicinity of the proposed pump station and route of the pipeline.	Protect the amenity of nearby residents from noise impacts resulting from activities associated with the proposal by ensuring that noise levels meet statutory requirements and acceptable standards.	**Proponent's Commitments** • All construction work will occur between the hours of 6:00am and 6:00pm, Monday to Sunday, and plant and machinery will be fitted with appropriate noise control equipment to the requirements of the Shire of Swan.	Having regard to : • the commitments made by the proponent; it is the EPA's opinion that the proposal can be managed to meet the EPA's objective.
Odour - impact on adjacent residents.	Residences in the vicinity of the proposed pump station and route of the pipeline.		Venting of gas from the pressure main and odours associated with the operation of the pump station have the potential to adversely impact on residents adjacent to the pump station and pressure main. **Proponent's Commitment** • Prior to operation of the pump station and pressure main Operational Procedures will be developed to minimise the risk of offensive odours impacting on adjacent residents to the requirements of the Shire of Swan. • The Operational Procedures will be implemented to the requirements of the Shire of Swan.	Having regard to : • the commitments made by the proponent; it is the EPA's opinion that the proposal can be managed to meet the EPA's objective.